

EXHAUST FANS

TAG	EF-1	EF-2	EF-3	EF-4	EF-5	EF-6	EF-MG
SERVICE	TRIAGE EXHAUST	ISOLATION EXHAUST	DECONT. EXHAUST	GENERAL EXHAUST	SOILED EXHAUST	STAFF TLT EXHAUST	MEDGAS MANIFOLDS
TYPE	BELTED VENTSET	BELTED VENTSET	BELTED VENTSET	UPBLAST	INLINE	CABINET	INLINE
SIZE/MODEL	USF-10-3-B6	USF	USF-04-3-B6	CUE-100HP-VG	SQ-98-VG	SP-B150	SQ-120
CFM	300	575	215	505	380	150	300
SP (IN W.C.)	0.75	0.75	0.75	0.5	1.0	0.5	0.5
FAN RPM	1,317	1,177	1,652	1,894	1,800	1,050	1,140
MOTOR RPM	1,725	1,725	1,725	2,500	2,200	1,725	1,725
DRIVE TYPE	BELT	BELT	BELT	DIRECT	DIRECT	DIRECT	DIRECT
APPROX. SIZE (WxLxH)	---	---	---	24.88"ø	15"x21"x15"	15"x14"x7"	19x24x19
MOTOR HP	1/4	1/4	1/4	1/2	1	125 WATTS	1/4
ELECTRICAL	115/1/60	115/1/60	115/1/60	115/1/60	208/1/60	115/1/60	115/1/60
POWER TYPE	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY	EMERGENCY
INLET SCREEN	YES	YES	YES	NO	YES	YES	YES
OUTLET SCREEN	NO	NO	NO	YES	NO	NO	NO
INLET DAMPER	NONE	NONE	NONE	BACKDRAFT	NONE	NONE	NONE
OUTLET DAMPER	BACKDRAFT	BACKDRAFT	BACKDRAFT	NONE	BACKDRAFT	BACKDRAFT	BACKDRAFT
DISCONNECT/STARTER	DISCONNECT	DISCONNECT	DISCONNECT	DISCONNECT	DISCONNECT	DISCONNECT	DISCONNECT
MAX SONES	8.1	10.5	11.4	10.5	13.5	3.5	5.8
UNIT WEIGHT (lbs)	126	143	130	52	50	10	95
REMARKS	2,3,5,6,7,8,9	2,3,5,6,7,8	2,3,5,6,7,8	1,6,7,8	6, 9	6	4,6

REMARKS

- ROOF CURB. CURB TO BE SELECTED FOR HIGH WINDS CAPABLE OF WITHSTANDING WIND LOADS OF 121 MPH.
- PROVIDE SUPPORT RAILS WITH VIBRATION ISOLATION. RAILS AND VIBRATION ISOLATION BE SELECTED FOR HIGH WINDS CAPABLE OF WITHSTANDING WIND LOADS OF 121 MPH.
- PROVIDE EXHAUST STACK TO DISCHARGE MINIMUM OF 10'-0" ABOVE FINISHED ROOF.
- SPARK RESISTANT CONSTRUCTION PER AMCA STANDARD 99-0401 TYPE B
- OSHA BELT GUARD / WEATHER COVER WITH ACCESS DOOR
- PRESSURE SWITCH TO BE MONITORED BY B.A.S.
- FAN TO BE HIGH WIND RATED TO WITHSTAND WIND LOADS OF 121 MPH.
- DRAIN CONNECTION - 1" PIPE THREAD WITH PLUG
- VIBRATION ISOLATORS

SEISMIC DESIGN NOTE:

MECHANICAL EQUIPMENT SHALL BE CERTIFIED BY THE MANUFACTURER AS OPERABLE AFTER AN APPROVED SHAKE TABLE TEST UNLESS IT CAN BE SHOWN THAT THE EQUIPMENT IS SIMILAR SEISMICALLY TO QUALIFIED EQUIPMENT. EVIDENCE DEMONSTRATING COMPLIANCE WITH THIS REQUIREMENT SHALL BE SUBMITTED FOR APPROVAL TO THE AUTHORITY HAVING JURISDICTION, PER THE ASCE STANDARD 7-16. FANS SHALL BE INSTALLED TO MEET THE SEISMIC DESIGN CRITERIA OF IMPORTANCE FACTOR = 1.5, RISK CATEGORY IV, SITE CLASS -, SEISMIC DESIGN CATEGORY C. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION. AS A DELEGATED ENGINEERING DESIGN, SUBMIT SUPPORT DETAILS, STRUCTURAL ANCHORAGE FOR ROOFTOP EQUIPMENT, AND CALCULATIONS STAMPED BY A QUALIFIED VIRGINIA ENGINEER.

SUPPLY DIFFUSER SCHEDULE

SYMBOL	ADAPTOR/NECK SIZE	FACE SIZE	MAX CFM	MAX TP	MAX NC	THROW	DUCT RUNOUT SIZE *
SA	6" Ø	12"x12" / 24"x24"	100	0.07	20	4-WAY	8"x4"6" Ø
SB	8" Ø	24"x24"	200	0.07	20	4-WAY	10"x6"8" Ø
SC	10" Ø	24"x24"	400	0.08	20	4-WAY	12"x8"10" Ø
SD	12" Ø	24"x24"	500	0.10	20	4-WAY	14"x9"12" Ø
SE	14" Ø	24"x24"	700	0.173	23	4-WAY	16"x10"14" Ø
SF	8" Ø	24"x48"	100	0.06	15	LAMINAR	8" Ø
SG	10" Ø	24"x48"	200	0.06	15	LAMINAR	10" Ø
SH	12" Ø	24"x48"	250	0.035	15	LAMINAR	12" Ø

PERFORMANCE BASIS:

- 24"x24" AND 12"x12" CEILING DIFFUSERS BASED UPON TITUS TDC ALL STEEL DIFFUSERS WITH ROUND INLET. PROVIDE LAY-IN CEILING FRAME IN LAY-IN CEILING AREAS AND SURFACE MOUNTING FRAME IN HARD CEILING AREAS. DIFFUSERS IN LOBBIES AND CORRIDORS TO BE TITUS OMI.
- PERFORATED PANELS (SF, SG, SH) BASED ON TITUS TLF-AA/KRUEGER SERIES 5000 O.R.D. ALUMINUM LAMINAR FLOW DIFFUSER WITH REMOTE OPERATED DAMPER.
- CONTRACTOR TO PROVIDE DUCT SPIN-IN FITTING WITH EXTRACTOR AND MANUAL VOLUME DAMPER EQUAL TO GENFLEX MODEL SM-2DEL (OR APPROVED EQUAL) AT ALL BRANCH TAKEOFFS TO AIR DISTRIBUTION DEVICES. PROVIDE MIN. 18"x18" ACCESS DOOR IN HARD CEILING AREAS. BALANCING DAMPERS @ FACE OF DIFFUSERS ARE NOT ACCEPTABLE.
- PROVIDE EARTHQUAKE TABS FOR ALL AIR DEVICES.

CEILING GRILLES & REGISTERS

SYMBOL	NECK	FACE	MAX CFM	MAX SP	MAX NC	DUCT RUNOUT SIZE *
RA/EA	6" SQ	8"x8"	85	.04	28	8"x4"6" Ø
RB/EB	8" SQ	10"x10"	200	.05	28	10"x6"8" Ø
RC/EC	10" SQ	12"x12"	300	.05	27	12"x8"10" Ø
RD/ED	12" SQ	14"x14"	500	.06	28	16"x8"12" Ø
RE/EE	14" SQ	18"x18"	800	.07	28	18"x8"14" Ø
RF/EF	18" SQ	20"x20"	1250	.07	27	24"x10"18" Ø
RG/EG	22" SQ	24"x24"	1700	.06	23	24"x12"18" Ø

PERFORMANCE BASIS:

- RETURN/EXHAUST GRILLE SCHEDULE BASED ON TITUS MODEL 50-F ALUMINUM EGG-CRATE GRILLE WITH 1/2"x1/2" CORE. SQUARE TO ROUND ADAPTER AND SURFACE MOUNTING FRAME. 24"x24" FACE GRILLES IN LAY-IN CEILING AREAS TO HAVE LAY-IN MOUNTING FRAME.
- CONTRACTOR TO PROVIDE DUCT SPIN-IN FITTING WITH MANUAL VOLUME DAMPER EQUAL TO FLEXMASTER MODEL "FLD" AT ALL BRANCH TAKEOFFS TO AIR DISTRIBUTION DEVICES. PROVIDE MIN. 18"x18" ACCESS DOOR IN HARD CEILING AREAS. BALANCING DAMPERS @ FACE OF REGISTERS ARE NOT ACCEPTABLE.
- RA/EA SHALL BE RETURN/ EXHAUST GRILLE SCHEDULE BASED ON TITUS MODEL 50-F ALUMINUM EGG-CRATE GRILLE WITH 1/2"x1/2" CORE. SQUARE TO ROUND ADAPTER AND SURFACE MOUNTING FRAME. 12"x12" FACE GRILLES IN LAY-IN CEILING AREAS TO HAVE LAY-IN MOUNTING FRAME.
- PROVIDE EARTHQUAKE TABS FOR ALL AIR DEVICES

LEGEND

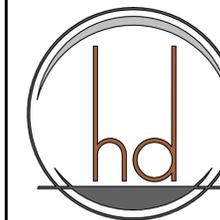
	MEDIUM PRESSURE TEE		DUCT TERMINATION
	RECTANGULAR DUCT TURNING DOWN		45° FULL RADIUS TURN
	ROUND DUCT TURNING DOWN		FULL RADIUS TURN
	DUCT TURNING DOWN TO SIDEWALL REGISTER		LCD DISPLAY HUMIDITY SENSOR
	DOUBLE LINE TO DUCTWORK		LCD DISPLAY THERMOSTAT
	BRANCH TAP OFF MAIN W/45° FITTING OR SPIN-IN FITTING W/DAMPER (LOW PRESSURE)		MANUAL VOLUME DAMPER
	TRANSITION IN DUCT (NOT DIRECTION OF AIRFLOW)		VARIABLE VOLUME BOX
	FIRE DAMPER		INDICATES A SIZE "A" EXHAUST REGISTER SET FOR 100 CFM
	FIRE/SMOKE DAMPER		INDICATES A SIZE "B" RETURN REGISTER SET FOR 200 CFM
	SMOKE DETECTOR		INDICATES A SIZE "B" SUPPLY DIFFUSER SET FOR 200 CFM
	DUCT SMOKE DETECTOR		SUPPLY DIFFUSER (4-WAY)
	ACCESS DOOR		EXHAUST GRILLE
	ABOVE FINISHED FLOOR		RETURN GRILLE
	BELOW FINISHED FLOOR		DOOR GRILLE
	VARIABLE FREQUENCY DRIVE		TRANSFER AIR OPENING
	TRANSFER AIR DUCT		BUILDING AUTOMATION CONTROL SYSTEM
			TEMPERATURE SENSOR (NO MANUAL ADJUSTMENT) MOTORIZED DAMPER

AIR BALANCE SCHEDULE

TAG	SERVICE	OA SUPPLY CFM	EXHAUST CFM
RTU-1	GENERAL OA	1,850	0
RTU-2	GENERAL OA	350	0
RTU-3	GENERAL OA	930	0
EF-1	TRIAGE	---	300
EF-2	ISO EA	---	575
EF-3	DECON	---	215
EF-4	GENERAL EA	---	505
EF-5	SOILED EA	---	380
EF-6	STAFF TLT EA	---	150
TOTAL		3,130	2,125
NET POSITIVE		1,005	

MECHANICAL SHEET INDEX

SHEET #	SHEET NAME
M001	HVAC - LEGEND AND SCHEDULES
M002	HVAC - SCHEDULES
M003	HVAC - SCHEDULES
M004	HVAC - SCHEDULES
M101	HVAC - FLOOR PLAN
M101Z	HVAC ZONING - FLOOR PLAN
M102	HVAC - ROOF PLAN
M201	PIPING - FLOOR PLAN
M401	HVAC - DETAILS
M402	HVAC - DETAILS
M403	HVAC - DETAILS
M404	HVAC - DETAILS
M501	HVAC - CONTROLS
M502	HVAC - CONTROLS
M503	HVAC - CONTROLS
M504	HVAC - CONTROLS



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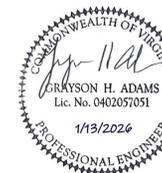
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STATUS CONSTRUCTION DOCUMENTS



01/12/2026

DATE OF ISSUANCE

TITLE HVAC - LEGEND AND SCHEDULES

SHEET M001

VARIABLE VOLUME TERMINAL BOX SCHEDULE

IDENTIFICATION	1-1	1-2	1-3	1-4	1-5	1-6	1-7	1-8	1-9	1-10	1-11	1-12	1-13
MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
MODEL NUMBER	VCEF-6	VCEF-10	VCEF-5	VCEF-6	VCEF-5	VCEF-4	VCEF-4	VCEF-8	VCEF-14	VCEF-8	VCEF-10	VCEF-6	VCEF-8
PRIMARY INLET SIZE / RUNOUT SIZE (IN)	6	10	5	6	5	4	4	8	14	8	10	6	8
DESIGN COOLING AIRFLOW (CFM)	270	600	170	450	220	100	150	775	1,375	510	715	405	480
MIN COOLING AIRFLOW (CFM)	270	600	170	450	220	100	150	775	1,375	510	715	405	480
APD @ COOLING AIRFLOW (IN WC)	0.07	0.01	0.01	0.18	0.01	0.01	0.01	0.08	0.01	0.04	0.02	0.14	0.04
HEATING AIRFLOW (CFM)	270	600	170	450	220	100	150	775	1,375	510	715	405	480
ELECTRIC HEATER VOLTAGE	480/3	480/3	277/1	480/3	277/1	277/1	277/1	480/3	480/3	480/3	480/3	277/1	480/3
ELECTRIC KW / STAGES	3.5 / SCR	8.0 / SCR	2.0 / SCR	3.5 / SCR	2.0 / SCR	1.0 / SCR	1.0 / SCR	7.0 / SCR	18 / SCR	5.5 / SCR	9.0 / SCR	3.0 / SCR	6.5 / SCR
HEATER AMPS	4.21	9.62	7.22	4.21	7.22	3.61	3.61	8.42	21.65	6.62	10.83	10.83	7.82
MCA / MOCP	5.26 / 20	12.03 / 15	9.03 / 15	5.26 / 15	9.03 / 15	4.51 / 15	4.51 / 15	10.52 / 15	27.06 / 30	8.27 / 15	13.53 / 15	13.54 / 15	9.77 / 15
HEATING EAT / LAT (°F)	50 / 91	50 / 92	50 / 87	50 / 74	50 / 78	50 / 81	50 / 71	50 / 78	50 / 91	50 / 84	50 / 90	50 / 73	50 / 93
DICHARGE (NC)	19	<15	16	24	20	15	21	24	17	19	<15	23	19
RADIATED (NC)	<15	<15	<15	17	<15	<15	<15	21	19	16	15	15	16
ACCESSORIES:	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW

- ACCESSORIES:
 A. FACTORY MOUNT & WIRE PRESSURE INDEPENDENT DDC CONTROLS INCLUDING CONTROLLER AND ACTUATOR PROVIDED BY BAS CONTRACTOR
 B. 1-INCH MATTE FACED INSULATION
 C. CONTROL TRANSFORMER FOR BAS CONTROLS
 D. AIRFLOW SWITCH
 E. SECONDARY TEMPERATURE LIMIT WITH MANUAL RESET
 F. MODULATING ELECTRIC HEAT
 G. INTERLOCKING DOOR MOUNTED DISCONNECT

- REMARKS:
 1. TERMINAL UNITS SHALL BE JOHNSON CONTROLS TSS-EH
 2. AIR DAMPER ACTUATORS SHALL BE 0-10 VDC OR 0-20 mA MODULATING CONTROL. ZONE TYPE, TRI-STATE, PULSE TYPE, OR SIMILAR CONTROL IS NOT ACCEPTABLE.
 3. FACTORY MOUNT PRESSURE INDEPENDENT DDC CONTROLS INCLUDING CONTROLLER AND ACTUATOR PROVIDED BY BAS CONTRACTOR.
 4. MAX NC FOR BOTH DISCHARGE AND RADIATED SOUND POWER LEVELS SHALL NOT EXCEED NC-35 WHEN CALCULATED IN ACCORDANCE WITH ARI-885 USING MINERAL FIBER CEILING AND 0.75" SP AT BOX INLET.
 5. DUCT RUN OUT SIZE DOES NOT MEAN INLET BOX SIZE. A TRANSITION MAY BE REQUIRED.

VARIABLE VOLUME TERMINAL BOX SCHEDULE

IDENTIFICATION	2-1	2-2	2-3	2-4	3-1	3-2	3-3	3-4	3-5	3-6
MANUFACTURER	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE	TRANE
MODEL NUMBER	VCEF-10	VCEF-10	VCEF-8	VCEF-6	VCEF-8	VCEF-12	VCEF-8	VCEF-6	VCEF-8	VCEF-8
PRIMARY INLET SIZE / RUNOUT SIZE (IN)	10	10	8	6	8	12	8	6	8	8
DESIGN COOLING AIRFLOW (CFM)	770	860	575	365	615	1,440	730	255	735	900
MIN COOLING AIRFLOW (CFM)	630	645	430	275	375	865	440	255	735	900
APD @ COOLING AIRFLOW (IN WC)	0.02	0.02	0.05	0.12	0.05	0.04	0.07	0.06	0.07	0.10
HEATING AIRFLOW (CFM)	630	645	430	275	375	865	440	255	735	900
ELECTRIC HEATER VOLTAGE	480/3	480/3	480/3	480/3	480/3	480/3	480/3	480/3	480/3	480/3
ELECTRIC KW / STAGES	9.0 / SCR	8.0 / SCR	5.5 / SCR	3.5 / SCR	4.0 / SCR	10.0 / SCR	6.0 / SCR	3.5 / SCR	6.5 / SCR	6.5 / SCR
HEATER AMPS	10.83	9.62	6.62	4.21	4.81	12.03	7.72	4.21	7.82	7.82
MCA / MOCP	13.53 / 15	12.03 / 15	8.27 / 15	5.26 / 15	6.01 / 15	15.04 / 20	9.02 / 15	5.26 / 15	9.77 / 15	9.77 / 15
HEATING EAT / LAT (°F)	55 / 100	55 / 94	55 / 95	55 / 95	50 / 84	50 / 86	50 / 93	50 / 93	50 / 78	50 / 73
DICHARGE (NC)	15	17	21	20	22	18	22	17	24	28
RADIATED (NC)	15	18	18	<15	19	21	21	<15	21	23
ACCESSORIES:	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW	SEE BELOW

- ACCESSORIES:
 A. FACTORY MOUNT & WIRE PRESSURE INDEPENDENT DDC CONTROLS INCLUDING CONTROLLER AND ACTUATOR PROVIDED BY BAS CONTRACTOR
 B. 1-INCH MATTE FACED INSULATION
 C. CONTROL TRANSFORMER FOR BAS CONTROLS
 D. AIRFLOW SWITCH
 E. SECONDARY TEMPERATURE LIMIT WITH MANUAL RESET
 F. MODULATING ELECTRIC HEAT
 G. INTERLOCKING DOOR MOUNTED DISCONNECT

- REMARKS:
 1. TERMINAL UNITS SHALL BE JOHNSON CONTROLS TSS-EH
 2. AIR DAMPER ACTUATORS SHALL BE 0-10 VDC OR 0-20 mA MODULATING CONTROL. ZONE TYPE, TRI-STATE, PULSE TYPE, OR SIMILAR CONTROL IS NOT ACCEPTABLE.
 3. FACTORY MOUNT PRESSURE INDEPENDENT DDC CONTROLS INCLUDING CONTROLLER AND ACTUATOR PROVIDED BY BAS CONTRACTOR.
 4. MAX NC FOR BOTH DISCHARGE AND RADIATED SOUND POWER LEVELS SHALL NOT EXCEED NC-35 WHEN CALCULATED IN ACCORDANCE WITH ARI-885 USING MINERAL FIBER CEILING AND 0.75" SP AT BOX INLET.
 5. DUCT RUN OUT SIZE DOES NOT MEAN INLET BOX SIZE. A TRANSITION MAY BE REQUIRED.

ELECTRIC UNIT HEATER SCHEDULE

IDENTIFICATION	EUH-1	EUH-2	EUH-3	EUH-4
MANUFACTURER	BERKO	BERKO	BERKO	BERKO
MODEL	FFCH547	FFCH547	HUHA327	HUHA327
AREA SERVED	ENTRY VEST.	AMBULANCE VEST.	FIRE RISER	MECH
TYPE	CEILING	CEILING	SUSPENDED	SUSPENDED
CFM	300	300	350	350
KW	3	3	3	3
VOLTAGE/PHASE	277/1	277/1	277/1	277/1
AMPS	10.8	10.8	11	11
DIMENSIONS (HxWxD)	23.75"x23.75"x7"	23.75"x23.75"x7"	16"x14"x8.5"	16"x14"x8.5"
WEIGHT (LBS)	27	27	27	27
ACCESSORIES REQ'D	A, B, C, D	A, B, C, D	A, C	A, C

- ACCESSORIES:
 A. DISCONNECT
 B. SEMI-RECESSED MOUNTING SLEEVE
 C. BUILT-IN TAMPERPROOF THERMOSTAT, SET TO 65°F
 D. T-BAR FRAME KIT

- REMARKS:
 UNIT SHALL BE UL LISTED.
 UNITS NOT INSTALLED IN THE WALL SHALL BE SEISMICALLY RESTRAINED.

DX ROOFTOP UNIT SCHEDULE

TAG	RTU-1	RTU-2	RTU-3
SERVICE	WAITING / EXAMS	OFFICES / LOUNGES	IMAGING
MANUFACTURER	AAON	AAON	AAON
MODEL	RNA-020-C-A-3-GABBC-0000	RNA-011-C-A-3-GAABC-0000	RNA-013-C-A-3-GABBC-0000
DIMENSIONS (LxWxH)	18'-9"x8'-5"x5'-0"	18'-9"x8'-5"x5'-0"	16'-5"x4'-11"x5'-0"
UNIT WEIGHT (LBS)	3,645 (± 5%)	3,198 (± 5%)	3,278 (± 5%)
TOTAL AIRFLOW CFM	6,215	2,570	4,610
O.A. MINIMUM CFM	1,850	350	930
O.A. MAXIMUM CFM	6,215	2,570	4,610
SUPPLY FAN	270D60	270D60	270D60
MOTOR QTY / HP / BHP	1 / 15 / 9.93	1 / 5 / 4.2	1 / 10 / 7.3
ISP (IN W.C.)	3.12	2.35	2.9
ESP (IN W.C.)	3.00 NOTE 10	2.25	2.5
TSP (IN W.C.)	6.12	4.60 NOTE 10	5.4 NOTE 10
FAN RPM	1,778	1,708	1,670
VOLTAGE/PHASE	460/3/60	460/3/60	460/3/60
EMERGENCY POWER	YES	YES	YES

EXHAUST FAN	RM220A	RM220AB70	RM220A
AIRFLOW CFM	4,365	2,220	3,680
ESP (IN W.C.)	1.00	1.00	1.00
MOTOR HP / BHP	3 / 2.13	1 / 0.62	1 / 2 / 1.62
FAN RPM	1,173	1,006	1,070
VOLTAGE/PHASE	460/3/60	460/3/60	460/3/60
EMERGENCY POWER	YES	YES	YES

COOLING CAPACITY			
TOTAL CAPACITY (MBH)	242.1	105.2	157.7
SENSIBLE CAPACITY (MBH)	174.2	71.1	117.6
EAT (DB/WB °F)	77.8 / 64.6	73.4 / 62.1	75.2 / 63.0
LAT (DB/WB °F) COIL	50.8 / 50.6	46.9 / 46.5	50.8 / 50.6
LAT (DB/WB °F) UNIT	54.8 / 52.3	51.2 / 48.4	54.8 / 52.3
REFRIGERANT TYPE	R454B	R454B	R454B
AMBIENT TEMP (DB/WB °F)	96.0 / 73.4	96.0 / 73.4	96.0 / 73.4

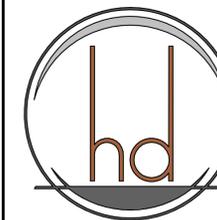
HEAT	N/A	N/A	N/A
AIRFLOW CFM			
TOTAL HEAT CAPACITY (MBH)			
MAT (DB/WB °F)	49.4 / 41.3	56.6 / 46.0	51.7 / 42.8
HEAT TEMP RISE (°F)			
EWT / LWT (°F)			
HEAT COIL PD (FT H2O)			
HEAT COIL FLOW (GPM)			

FILTERS	NOTE 6	NOTE 6	NOTE 6
VFDS	NOTE 9	NOTE 9	NOTE 9
EER / IEER	11.96 / 15.19	12.94 / 15.78	11.96 / 16.27
MCA CIRCUIT 1 / CIRCUIT 2	38 / 31	20 / 12	25 / 21
MOCP CIRCUIT 1 / CIRCUIT 2	50 / 50	25 / 15	35 / 30
NO. OF COMPRESSORS	2	2	2

- ACCESSORIES:
 A. SCROLL COMPRESSORS - CAPACITY STEPS FROM 25 - 100% CAPACITY.
 B. 100% INTEGRATED DUAL ENTHALPY ECONOMIZER WITH LOW LEAK SEALS.
 C. VAV MICROPROCESSOR CONTROL WITH BACNET INTERFACE.
 D. SLOPED STAINLESS STEEL DRAIN PAN.
 E. UNIT DISCONNECTS PROVIDED BY DIVISION 26.
 F. LOUVERED HAIL GUARDS.
 G. FULLY MODULATING ACTUATORS WITH AFMS FOR THE OUTSIDE AIR
 H. NEMA MG1 PART 31 COMPLIANT MOTOR.
 I. LOW AMBIENT OPERATION TO 0 DEG. F.
 J. PROVIDE DOUBLE WALL CONSTRUCTION.
 K. PROVIDE R-13 INSULATION (MINIMUM)
 L. PROVIDE ROOF CURB WITH SPRING ISOLATION RAIL. REFER TO ROOF CONSTRUCTION FOR SLOPE. ROOF CURB AND SPRING ISOLATION RAIL SHALL BE CAPABLE OF WITHSTANDING WIND LOADS OF 152 MPH. ROOFTOP UNIT TO BE PERMANENTLY ATTACHED TO CURB AND CURB TO STRUCTURE. AS A DELEGATED ENGINEERING DESIGN, SUBMIT ANCHORAGE DETAILS AND CALCULATIONS STAMPED BY A VIRGINIA ENGINEER. REFER TO STRUCTURAL DRAWINGS FOR ADDITIONAL INFORMATION.
 M. PROVIDE FLOAT SWITCH IN COOLING COIL DRAIN PAN.
 N. PROVIDE ALL NECESSARY SENSORS AND PROGRAMMING FOR ECONOMIZER FAULT DETECTION AND DIAGNOSTICS (FDD) IN ACCORDANCE WITH 2018 IECC.

- REMARKS:
 1. PROVIDE CLOGGED FILTER SWITCHES / GAUGES ON ALL FILTER BANKS.
 2. FINAL FILTERS TO BE LOCATED IN UNIT.
 3. UNIT TO BE ETL LISTED.
 4. LOCK DOWN SUPPLY FAN AND EXHAUST FAN VIBRATION ISOLATION SPRINGS INTERNAL TO UNIT.
 5. * INDICATES PREMIUM EFFICIENCY MOTOR.
 6. SEE FILTER SCHEDULE.
 7. UNIT WEIGHT DOES NOT INCLUDE CURB.
 8. PROVIDE 2 SEPARATE POWER CONNECTIONS TO UNIT. (COORDINATE WITH DIVISION 26)
 9. VARIABLE FREQUENCY DRIVES FOR SUPPLY AND EXHAUST FANS TO BE PROVIDED WITH INTEGRAL BYPASS.
 10. 2.0" STATIC PRESSURE ADDED TO EXTERNAL STATIC PRESSURE (ESP) FOR DIRTY FILTER ALLOWANCE.
 11. FLOAT SWITCH TO ALARM BAS FOR 1 HOUR BEFORE SHUTTING DOWN THE UNIT.
 12. UNIT TO HAVE GREATER THAN 15 KA SCRR. COORDINATE WITH DIVISION 26.
 13. UNIT DIMENSIONS DO NOT INCLUDE FAN SECTION OR OUTSIDE AIR HOOD

- SEISMIC DESIGN NOTE:
 MECHANICAL EQUIPMENT SHALL BE CERTIFIED BY THE MANUFACTURER AS OPERABLE AFTER AN APPROVED SHAKE TABLE TEST UNLESS IT CAN BE SHOWN THAT THE EQUIPMENT IS SIMILAR SEISMICALLY TO QUALIFIED EQUIPMENT. EVIDENCE DEMONSTRATING COMPLIANCE WITH THIS REQUIREMENT SHALL BE SUBMITTED FOR APPROVAL TO THE AUTHORITY HAVING JURISDICTION. PER THE ASCE STANDARD 7-16, RTU SHALL BE INSTALLED TO MEET THE SEISMIC DESIGN CRITERIA OF IMPORTANCE FACTOR = 1.5, RISK CATEGORY IV, SITE CLASS E, SEISMIC DESIGN CATEGORY D. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION. AS A DELEGATED ENGINEERING DESIGN, SUBMIT SUPPORT DETAILS AND CALCULATIONS STAMPED BY A QUALIFIED VIRGINIA ENGINEER.



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STATUS
CONSTRUCTION DOCUMENTS



01/12/2026

SHEET TITLE DATES OF ISSUANCE

HVAC - SCHEDULES

M002

HUMIDIFIER SCHEDULE

IDENTIFICATION	H-1
AREA SERVED	WHOLE BUILDING
MANUFACTURER	DRISTEEM
MODEL NUMBER	RX-30-1
AIRFLOW	3,570
OUTSIDE AIR CONDITIONS D.B. (°F) / RH %	22.2 / 27
ENTERING AIR CONDITIONS D.B. (°F) / RH %	54.2 / 54
DESIRED ROOM TEMP D.B. (°F) / RH %	70 / 40
HUMIDIFIER CAPACITY #STM/HR	30.0
HUMIDIFIER HxLxW (IN.)	62.0 x 32.8 x 53.6
HUMIDIFIER OPER. WEIGHT (LBS)	405
WATER TYPE	POTABLE
DISPERSION MODEL	ULTRA-SORB LV
HEADER LOCATION	OUTSIDE DUCT
TRAP LOCATION	OUTSIDE DUCT
DISPERION WxHxL (IN.)	25 x 21 x 5
DISPERSION OPERATING WEIGHT (LBS)	39
NON-WETTING DISTANCE (IN.)	7
TUBE DIAMETER (IN.)	1.5
TUBE SPACING ON-CENTER (IN.)	12
TUBE QUANTITY	2
DUCT SIZE (IN.)	22 x 12
ELECTRIC KW	10
VOLTAGE/PHASE	480/3
STAGES	1
F.L.A.	14.4
OUTDOOR ENCLOSURE HEATER PKG	YES
VOLTAGE/PHASE	120/1
F.L.A.	7.0
ACCESSORIES REQUIRED	A,B,C,D,E,F,G,H,I

- ACCESSORIES:
 A. HIGH-LIMIT HUMIDISTAT: ELECTRIC, MODULATING
 B. AIRFLOW PROVING SWITCH: ELECTRIC PRESSURE
 C. HUMIDITY TRANSMITTER: DUCT
 D. DRAIN COOLER
 E. BACNET INTERFACE
 F. 304 STAINLESS STEEL OUTDOOR ENCLOSURE WITH BOTTOM CONNECTIONS
 G. OUTDOOR ENCLOSURE WITH 18" ROOF CURB
 H. OPTIONAL HEATERS
 I. HIGH TEMP CONDENSATE PUMP

SEISMIC DESIGN NOTE:
 UNITS SHALL BE INSTALLED TO MEET THE SEISMIC DESIGN CRITERIA OF IMPORTANCE FACTOR = 1.5, RISK CATEGORY IV, SITE CLASS D, SEISMIC DESIGN CATEGORY C. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION. AS A DELEGATED ENGINEERING DESIGN, SUBMIT SUPPORT DETAILS AND CALCULATIONS STAMPED BY A VIRGINIA ENGINEER.

VRF BRANCH SELECTOR

UNIT DESIGNATION	BC-1
CONDENSOR	CU-1
MODEL	CMB-M104NU-MA-SV
ELECTRICAL	208/1/60
MCA	0.38
DIMENSIONS	10"x24"x16"
MIN. NUMBER OF PORTS	4
APPROX WEIGHT (LBS)	64

- REMARKS:
 1. UNIT SHALL ALLOW ALL UNITS TO HAVE SIMULTANEOUS HEATING AND COOLING FROM THE SAME CONDENSING UNIT.
 2. SERVED FROM EMERGENCY POWER EQUIPMENT BRANCH.

SEISMIC DESIGN NOTE:
 UNIT SHALL BE INSTALLED TO MEET THE SEISMIC DESIGN CRITERIA OF IMPORTANCE FACTOR = 1.5, RISK CATEGORY IV, SITE CLASS E, SEISMIC DESIGN CATEGORY D. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION. AS A DELEGATED ENGINEERING DESIGN, SUBMIT SUPPORT DETAILS AND CALCULATIONS STAMPED BY A QUALIFIED VIRGINIA ENGINEER.

MULTI-ZONE INDOOR UNITS

TAG	AC-1	AC-2	AC-3	AC-4
BASIS OF DESIGN	MITSUBISHI	MITSUBISHI	MITSUBISHI	MITSUBISHI
MODEL	TPEFYP018MA1M0A	TPKFYP012LM1M0A	TPKFYP006LM1M0A	TPEFYP036MA1M0A
NOM. COOLING CAPACITY (MBH)	18	12	6	36
NOM. HEATING CAPACITY (MBH)	20	13.5	6.7	40
REFRIGERANT	R-410A	R-410A	R-410A	R-410A
FILTER	WASHABLE	WASHABLE	WASHABLE	WASHABLE
APPROX WEIGHT	58	24.5	24.5	84
APPROX DIMENSION (LxWxH,IN.)	36x29x10	31x10x12	31x10x12	55x28x10
MCA/MOCP	2.5/15	0.24/15	0.24/15	3.1/15
VOLTAGE / PHASE	208-1	208-1	208-1	208-1
POWER COOLING (KW/H)	0.14	0.04	0.02	0.222
CFM	833	297	191	1,271
EXTERNAL STATIC	0.6"	0.0"	0.0"	0.6"
MAX SOUND PRESS. (DBA)	39-33-37	24-31-37-41	22-26-29-31	35-39-43
TYPE	HORIZ. CONCEALED	WALL MOUNTED	WALL MOUNTED	HORIZ. CONCEALED
NOMINAL TONS	1.5	1	0.5	3
REMARKS	1 THRU 8	1 THRU 8	1 THRU 8	1 THRU 8

- REMARKS:
 1. PROVIDE EACH UNIT WITH AN INTEGRAL CONDENSATE PUMP WITH MIN. 30" LIFT. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED INSTALLATION AND WIRING AND POWERING OF PUMPS NOT FACTORY INSTALLED AND WIRED. UNITS WITHOUT INTEGRAL PUMPS SHALL BE PROVIDED WITH EXTERNAL PUMP. ALL PUMPS TO BE PROVIDED WITH A FLOAT SWITCH INTERLOCKED WITH AC UNIT.
 2. PROVIDE EACH INDOOR UNIT WITH AN AUTO CHANGE OVER WALL MOUNTED THERMOSTAT WITH SET POINT ADJUSTMENT.
 3. PROVIDE REFRIGERANT PIPING SYSTEM PER MANUFACTURER'S DETAILED DIAGRAM.
 4. PROVIDE CONDENSATE DRAIN PAN LEVEL SENSOR.
 5. SEE SPECS. FOR OWNER TRAINING REQUIREMENTS.
 6. PROVIDE POLYPROPYLENE HONEYCOMB FILTERS.
 7. SUSPEND ALL HUNG UNITS FROM STRUCTURE WITH VIBRATION ISOLATION PER SEISMIC DESIGN NOTE BELOW.
 8. SERVED FROM EMERGENCY POWER EQUIPMENT BRANCH.

SEISMIC DESIGN NOTE:
 UNITS SHALL BE INSTALLED TO MEET THE SEISMIC DESIGN CRITERIA OF IMPORTANCE FACTOR = 1.5, RISK CATEGORY IV, SITE CLASS D, SEISMIC DESIGN CATEGORY C. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION. AS A DELEGATED ENGINEERING DESIGN, SUBMIT SUPPORT DETAILS AND CALCULATIONS STAMPED BY A QUALIFIED VIRGINIA ENGINEER.

MECHANICAL/ELECTRICAL SYSTEM COORDINATION SCHEDULE

SYSTEM	FURNISHED UNDER	INSTALLED UNDER	POWER WIRING UNDER	CONTROL OR SUPERVISION WIRING UNDER
EMEGENCY GENERATOR	DIV 26	DIV 26	DIV 26	DIV 26
MUFFLER - OUTDOOR	DIV 26	DIV 26	---	---
REMOTE ANUNCIATOR	DIV 26	DIV 26	DIV 26	DIV 26
MAIN FUEL OIL SYSTEM	DIV 23	DIV 23	DIV 26	DIV 23
LIFE SAFETY SYSTEM	---	---	---	---
SMOKE DAMPER / ACTUATOR	DIV 23	DIV 23	DIV 26	DIV 28
FIRE/SMOKE DAMPER / ACTUATOR	DIV 23	DIV 23	DIV 26	DIV 28
DUCT SMOKE DETECTOR	DIV 26	DIV 23	---	DIV 28
FIRE SPRINKLER SYSTEM	DIV 21	DIV 21	DIV 26	DIV 28
WATER FLOW SWITCHES	DIV 21	DIV 21	---	DIV 28
TAMPER SWITCHES	DIV 21	DIV 21	---	DIV 28
MEDICAL GAS ALARM	DIV 22	DIV 22	DIV 26	DIV 22
CHEMICAL FEED SYSTEM	DIV 22 / 23	DIV 22 / 23	DIV 26	DIV 22 / 23
STEAM OR HEATING WATER BOILERS	DIV 23	DIV 23	DIV 26	DIV 23
DOMESTIC WATER BOILERS	DIV 22	DIV 22	DIV 26	DIV 23
MOTOR STARTERS (INTEGRAL TO EQUIP.)	DIV 22 / 23	---	DIV 26	DIV 23
MOTOR STARTERS (NON-INTEGRAL TO EQUIP.)	DIV 26	DIV 26	DIV 26	DIV 23
COMBINATION MOTOR STARTER/DISCONNECT (INTEGRAL TO EQUIP.)	DIV 22 / 23	---	DIV 26	DIV 23
COMBINATION MOTOR STARTER/DISCONNECT (NON-INTEGRAL TO EQUIP.)	DIV 26	DIV 26	DIV 26	DIV 23
VARIABLE FREQUENCY DRIVES (VFD'S)	DIV 22 / 23	DIV 23	DIV 26	DIV 23
DISCONNECT SWITCHES (NON-INTEGRAL TO EQUIP.)	DIV 26	DIV 26	DIV 26	---
HEAT TRACE	DIV 22 / 23	DIV 22 / 23	DIV 26	DIV 23

THIS TABLE IS PROVIDED AS A GUIDE TO THE DOCUMENT PREPARATION AND IN NO WAY INDICATES CONTRACTOR MEANS AND METHODS.

ALL LISTED ITEMS ARE TO BE FURNISHED AND INSTALLED BY THE GENERAL CONTRACTOR, UNDER THE DIVISIONS INDICATED ABOVE, UNLESS OTHERWISE NOTED.

MULTI-ZONE OUTDOOR UNIT

TAG	CU-1
BASIS OF DESIGN	TRANE/MITSUBISHI
MODEL	TURY-0724AMMOAN
NOMINAL TONS	6
NOM. COOLING CAPACITY (MBH)	72.0
NOM. HEATING CAPACITY (MBH)	80.0
FACTORY CHARGE (LBS)	12
APPROX WEIGHT (LBS)	633
APPROX DIMENSIONS (WxLxH,IN.)	26.25x29.44x70.81
VOLTAGE / PHASE	460/3/60
MCA / MOP (CONNECTION #1)	22 / 35
IEER - EER	24.2 / 14.75
COP	4.35
REMARKS	1 THRU 12

- REMARKS:
 1. ADDITIONAL REFRIGERANT CHARGE SHALL BE REQUIRED IN FIELD. REFRIGERANT TO BE R32.
 2. PROVIDE MINIMUM 1 INVERTER COMPRESSOR PER CHASSIS.
 3. EACH REFRIGERANT PIPE REQUIRES INDIVIDUAL FIELD INSULATION PER MFRS RECOMMENDATIONS.
 4. INSTALLER SHALL VACUUM LEAK TEST THE REFRIGERANT PIPING DOWN TO 500 MICRONS PER MANUFACTURERS INSTRUCTIONS BEFORE STARTUP.
 5. PROVIDE REFRIGERATION RATED BALL SHUTOFF VALVES AT EACH CONDENSING UNIT CONNECTION.
 6. PROVIDE BACNET GATEWAY FOR CONNECTION OF CU AND AC UNIT CONTROLS INTO BUILDING DDC SYSTEM. COORDINATE ALL CONTROL REQUIREMENTS WITH CONTROL CONTRACTOR PRIOR TO BID. MAIN SYSTEM CONTROLLER SHALL BE POWERED BY 120V POWER.
 7. ALL UNITS SHALL HAVE 2-YR FUNCTIONAL PARTS WARRANTY.
 8. UNIT TO BE RATED FOR 95°F AMBIENT.
 9. PROVIDE LOW AMBIENT KIT FOR COOLING DOWN TO 0°F.
 10. PROVIDE HAIL GUARDS.
 11. SERVED FROM EMERGENCY POWER EQUIPMENT BRANCH.

SEISMIC DESIGN NOTE:
 OUTDOOR UNIT SHALL BE CAPABLE OF WITHSTANDING WIND LOADS OF 121 MPH. UNIT TO BE PERMANENTLY ATTACHED TO CURB AND CURB TO STRUCTURE. AS A DELEGATED ENGINEERING DESIGN, SUBMIT ANCHORAGE DETAILS AND CALCULATIONS STAMPED BY A QUALIFIED VIRGINIA ENGINEER. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION.

DUCTLESS SPLIT SYSTEM SCHEDULE

	MANUFACTURER	MITSUBISHI	MITSUBISHI
INDOOR UNIT	IDENTIFICATION	AC 2-1	AC 3-1
	MODEL NUMBER	PKA-AK36NL	PKA-AL18NL
	COOLING E.A.T. DB/WB	75/64	75/64
	CFM/ESP	705	375
	COOLING CAPACITY MBH	33.4	18.0
	HEATING CAPACITY MBH	NA	23.6
OUTDOOR UNIT	VOLTAGE/PHASE	208/1	208/1
	MCA	1	1
	IDENTIFICATION	CU-2	CU-3
	MODEL NUMBER	PUY-AK36NL	PUZ-AK18NL
	AMBIENT	95	95
	VOLTAGE/PHASE	208/1	208/1
MCA/MOCP	34/56	16/26	
REFRIGERANT	R454B	R454B	
ACCESSORIES REQUIRED	A,B,C,D,E,F,G,H	A,B,C,D,E,F,G,H	

- ACCESSORIES:
 A: LOW AMBIENT OPERATION
 B: CONDENSATE PUMP
 C: WIRED CONTROLLER
 D: AUTO RESTART AFTER POWER OUTAGE
 E: WIND BAFFLE
 F: DRAIN PAN LEVEL SENSOR KIT
 G: FLOAT SWITCH IN DRAIN PAN
 H: BACNET INTERFACE

- REMARKS:
 1. AC 2-1 SETPOINT TO BE 74°F.
 2. PUMP TO BE PROVIDED WITH A FLOAT SWITCH INTERLOCKED WITH AC UNIT, UNIT TO SHUT DOWN UPON PUMP SHUT-OFF.

SEISMIC DESIGN NOTE:
 OUTDOOR UNIT SHALL BE CAPABLE OF WITHSTANDING WIND LOADS OF 162 MPH. UNIT TO BE PERMANENTLY ATTACHED TO CURB AND CURB TO STRUCTURE. AS A DELEGATED ENGINEERING DESIGN, SUBMIT ANCHORAGE DETAILS AND CALCULATIONS STAMPED BY A QUALIFIED VIRGINIA ENGINEER. REFER TO STRUCTURAL DRAWING S001 FOR ADDITIONAL INFORMATION.

FILTER SCHEDULE

SYSTEM:	RTU-1	RTU-2	RTU-3
UNIT DESIGNATION	PF-1	PF-1	PF-1
TYPE	1	2	2
FILTER POSITION	PRE-FILTER	PRE-FILTER	PRE-FILTER
CFM	6,215	2,570	4,610
INITIAL RESISTANCE - H2O	0.13"	0.38"	0.38"
FINAL RESISTANCE - H2O	1.0"	1.0"	1.0"
MAX FACE VELOCITY	275	388	388
EFF. - DUCT SPOT (ATMOS. DUST)	60%	95%	95%
UNIT DESIGNATION	FF-1	FF-2	FF-3
TYPE	2	2	2
FILTER POSITION	FINAL-FILTER	FINAL-FILTER	FINAL-FILTER
CFM	6,215	2,570	4,610
INITIAL RESISTANCE - H2O	0.38"	0.38"	0.38"
FINAL RESISTANCE - H2O	1.0"	1.0"	1.0"
MAX FACE VELOCITY	388	388	388
EFF. - DUCT SPOT (ATMOS. DUST)	95%	95%	95%
DIMENSIONS	MATCH UNIT CASING SIZE	MATCH UNIT CASING SIZE	MATCH UNIT CASING SIZE
REMARKS:	TYPE 1: 30% EFFICIENT, 2" THICK CARTRIDGE (MERV-8) TYPE 2: 95% EFFICIENT, 12" THICK CARTRIDGE (MERV-14)		



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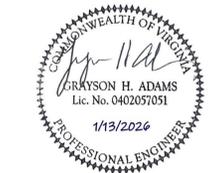
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CONSTRUCTION DOCUMENTS



01/12/2026



DATE OF ISSUANCE

TITLE HVAC - SCHEDULES

SHEET M003



COMcheck Software Version COMcheckWeb
Mechanical Compliance Certificate

Project Information

Energy Code: 2021 IECC
Project Title: Carilion FSR
Location: Roanoke, Virginia
Climate Zone: 4a
Project Type: New Construction

Construction Site: 35 Medical Ct., Hardy, Virginia 24101
Owner/Agent: Carilion Roanoke Memorial Hospital, 1906 Bellevue Ave, Roanoke, Virginia 24101
Designer/Contractor: PMC Consulting Engineers, 60 Music Square East, Nashville, Tennessee 37203

Additional Efficiency Package(s)

Credits: 10.0 Required 0.0 Proposed

Mechanical Systems List

Quantity System Type & Description

- RTU-1 (Multiple-Zone):
Cooling: 1 each - Single Package DX Unit, Capacity = 242 kBtu/h, Air-Cooled Condenser, Air Economizer
Proposed Efficiency = 11.20 EER, Required Efficiency = 10.00 EER
Proposed Part Load Efficiency = 22.00 IEER, Required Part Load Efficiency = 13.20 IEER
Fan System: FAN SYSTEM 1 -- Compliance (Brake HP and fan efficiency method) : Passes
Fans:
FAN 1 Supply, Multi-Zone VAV, 6215 CFM, 15.0 motor nameplate hp, 9.9 design brake hp (9.9 max. BHP), 0.00 fan energy index , fan exception: Part of code listed equipment
Pressure Drop Credits:
Particulate filtration credit: MERV 13 through 15, 1.3540 credit
Fully ducted return and/or exhaust air systems, 0.7522 credit
- RTU-2 (Multiple-Zone):
Cooling: 1 each - Single Package DX Unit, Capacity = 105 kBtu/h, Air-Cooled Condenser, Air Economizer
Proposed Efficiency = 11.20 EER, Required Efficiency = 11.20 EER
Proposed Part Load Efficiency = 22.00 IEER, Required Part Load Efficiency = 14.80 IEER
Fan System: RTU-2 -- Compliance (Brake HP and fan efficiency method) : Passes
Fans:
RTU-2 Supply, Multi-Zone VAV, 2570 CFM, 5.0 motor nameplate hp, 4.2 design brake hp (5.4 max. BHP), 0.00 fan energy index , fan exception: Part of code listed equipment
Pressure Drop Credits:
Particulate filtration credit: MERV 13 through 15, 0.5599 credit
Fully ducted return and/or exhaust air systems, 0.3111 credit
Return and/or exhaust airflow control devices, 0.3111 credit
- RTU-3 (Multiple-Zone):
Cooling: 1 each - Single Package DX Unit, Capacity = 157 kBtu/h, Air-Cooled Condenser, Air Economizer
Proposed Efficiency = 11.20 EER, Required Efficiency = 11.00 EER
Proposed Part Load Efficiency = 22.00 IEER, Required Part Load Efficiency = 14.80 IEER
Fan System: RTU-3 -- Compliance (Brake HP and fan efficiency method) : Passes
Fans:
RTU-3 Supply, Multi-Zone VAV, 4610 CFM, 10.0 motor nameplate hp, 7.3 design brake hp (8.0 max. BHP), 0.01 fan energy index , fan exception: Part of code listed equipment
Pressure Drop Credits:
Particulate filtration credit: MERV 13 through 15, 1.0044 credit
Fully ducted return and/or exhaust air systems, 0.5580 credit
- HVAC System (Single Zone):

Project Title: Carilion FSR Report date: 01/12/26

Quantity System Type & Description

- RTU-1 (Multiple-Zone):
Cooling: 1 each - Computer Room AC Horizontal Flow Unit, Capacity = 36 kBtu/h, Air-Cooled Condenser, Unknown Economizer
No minimum efficiency requirement applies
Fan System: FAN SYSTEM 2 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes
Fans:
FAN 2 Supply, Constant Volume, 810 CFM, 0.1 motor nameplate hp, 0.00 fan energy index , fan exception: Single fan < 1 HP or < 0.89 kW
- HVAC System (Unknown):
VRF Condensing Unit, Air Cooled Heat Pump
Heating Mode: Capacity = 80 kBtu/h,
Proposed Efficiency = 4.14 COP, Required Efficiency = 3.30 COP
Cooling Mode: Capacity = 72 kBtu/h,
Proposed Efficiency = 11.50 EER, Required Efficiency = 11.00 EER
Proposed Part Load Efficiency = 23.80 IEER, Required Part Load Efficiency = 14.60 IEER
Fan System: None
- HVAC System (Single Zone):
Cooling: 1 each - VRF Zone Fan Unit, Capacity = 18 kBtu/h, Unknown Economizer
No minimum efficiency requirement applies
Fan System: FAN SYSTEM 3 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes
Fans:
FAN 3 Supply, Single-Zone VAV, 742 CFM, 0.5 motor nameplate hp, 0.00 fan energy index , fan exception: Part of code listed equipment
- HVAC System (Single Zone):
Cooling: 1 each - VRF Zone Fan Unit, Capacity = 12 kBtu/h, Unknown Economizer
No minimum efficiency requirement applies
Fan System: FAN SYSTEM 4 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes
Fans:
FAN 4 Supply, Single-Zone VAV, 742 CFM, 0.5 motor nameplate hp, 0.00 fan energy index , fan exception: Part of code listed equipment
- HVAC System (Single Zone):
Cooling: 1 each - VRF Zone Fan Unit, Capacity = 36 kBtu/h, Unknown Economizer
No minimum efficiency requirement applies
Fan System: FAN SYSTEM 5 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes
Fans:
FAN 5 Supply, Single-Zone VAV, 1077 CFM, 0.8 motor nameplate hp, 0.00 fan energy index , fan exception: Part of code listed equipment
- HVAC System (Single Zone):
Cooling: 1 each - VRF Zone Fan Unit, Capacity = 6 kBtu/h, Unknown Economizer
No minimum efficiency requirement applies
Fan System: FAN SYSTEM 6 -- Compliance (Motor nameplate HP and fan efficiency method) : Passes
Fans:
FAN 6 Supply, Constant Volume, 173 CFM, 0.1 motor nameplate hp, 0.00 fan energy index , fan exception: Part of code listed equipment
- Water Heater:
Electric Instantaneous Water Heater, Capacity: 1 gallons w/ Circulation Pump
No minimum efficiency requirement applies

Project Title: Carilion FSR Report date: 01/12/26

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2021 IECC requirements in COMcheck Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Kimberly Brown - Senior Mechanical Designer 01/12/2026
Name - Title Signature Date

Carilion FSR MINIMUM VENTILATION SUMMARY TABLE (Minimum Design Parameters per ASHRAE Standard 170-2017 Table 7-1 & IMC 2018 Table 403.3.1.1) - RTU-1 Design Outside Air set to minimum 27.5% of Design Total Supply Air

Zone	Room Name	Area	Ceiling Height	Volume cu ft	Min Total ACH	Min Supply Airflow	Design Supply Airflow	Airflow From Adjacent Space	Design Total ACH	Min OA ACH	Min OA Airflow	Design OA Airflow	Design OA ACH	Return Airflow	Exhaust Airflow	Pressure Relation
1-1	100 Vestibule	115.0	9.0	1,035	NA	NA	270		15.7	NA	0	80	5			NR
1-2	101 Waiting	379.0	9.0	3,411	12	682	550	50	10.6	2	114	164	3	600		Negative
	102 Public Tit	46.0	9.0	414	10	69	50	30	11.6	NA	NA	15	2		80	Negative
1-3	107 Decon	103.0	9.0	927	12	185	165	50	13.9	2	31	49	3		215	Negative
1-4	108 Exam 10 (All)	239.0	9.0	2,151	12	430	375	75	12.6	2	72	112	3		450	Negative
	109 Pat Tr (All)	71.0	9.0	639	10	107	75	50	11.7	NA	NA	22	2		125	Negative
1-5	110 Exam 9 (BH)	147.0	9.0	1,323	6	132	170		7.7	2	44	51	2	170		NR
	111 Pat. Tit. 2 (BH)	62.0	9.0	558	10	93	50	60	11.8	NA	NA	15	2		110	Negative
1-6	112 P.O.C.	79.0	9.0	711	6	71	100	50	12.7	2	24	30	3		150	Negative
1-7	114 Meds	85.0	9.0	765	4	51	150		11.8	2	26	45	3	75		Positive
1-8	106 Corridor	732.0	9.0	6,588	NA	NA	300	985	11.7	NA	34	89	1	1285		NR
	113 Nurse Station	138.0	9.0	1,242	NA	NA	200		9.7	NA	24	59	3			NR
	115 Dictation	96.0	9.0	864	NA	NA	200		13.9	NA	16	59	4			NR
	116 Corridor	157.0	9.0	1,413	NA	NA	75		3.2	NA		22	1			NR
1-9	125 Exam 5	201.0	9.0	1,809	6	181	235		7.8	2	60	70	2	235		NR
	124 Exam 4	185.0	9.0	1,665	6	167	270		9.7	2	56	80	3	270		NR
	123 Exam 3	185.0	9.0	1,665	6	167	270		9.7	2	56	80	3	270		NR
	122 Exam 2	167.0	9.0	1,503	6	150	270		10.8	2	50	80	3	270		NR
	121 Exam 1	170.0	9.0	1,530	6	153	220		8.6	2	51	65	3	220		NR
	130 Pat. Tit 3 (IOS)	74.0	9.0	666	10	111	110	50	14.4	NA	0	33	3		160	Negative
1-10	106 Corridor Exterior	490.0	9.0	4,410	NA	NA	250		3.4	NA	29	74	1			NR
	106A Nourish	53.0	9.0	477	2	16	260		32.7	NR	19	77	10			NR
1-11	119 Exam 6	189.0	9.0	1,701	6	170	365		12.9	2	57	109	4	365		NR
	118 Exam 7 (IOS)	347.0	9.0	3,123	6	312	350		6.7	2	104	104	2	350		NR
1-12	101B Reception	101.0	9.0	909	NA	NA	175		11.6	NA	16	52	3	175		NR
	104 Triage	97.0	9.0	873	12	175	150	70	15.1	2	29	45	3		220	Negative
	103 Security	93.0	9.0	837	NA	NA	80		5.7	NA	11	24	2	80		NR
1-13	Low Acuity Work	167.0	9.0	1,503	NA	NA	110		4.4	NA	16	33	1			NR
	Low Acuity 1	52.0	9.0	468	6	47	100		12.8	2	16	30	4			NR
	Low Acuity 2	52.0	9.0	468	6	47	120		15.4	2	16	36	5			NR
	Low Acuity 3	54.0	9.0	486	6	49	60		7.4	2	16	18	2			NR
	Low Acuity 4	54.0	9.0	486	6	49	90		11.1	2	16	27	3			NR
Totals		5,180		46,620			6,215				1,901	1,849		4,365	1,510	

Notes: NR = No Requirement; NA = Not Applicable

Carilion FSR MINIMUM VENTILATION SUMMARY TABLE (Minimum Design Parameters per ASHRAE Standard 170-2017 Table 7-1 & IMC 2018 Table 403.3.1.1) - RTU-2 Design Outside Air set to minimum 13.6% of Design Total Supply Air

Zone	Room Name	Area	Ceiling Height	Volume cu ft	Min Total ACH	Min Supply Airflow	Design Supply Airflow	Airflow From Adjacent Space	Design Total ACH	Min OA ACH	Min OA Airflow	Design OA Airflow	Design OA ACH	Return Airflow	Exhaust Airflow	Pressure Relation
2-1	126 Corridor	880.0	22.0	19,360	NA	NA	600	40	2.0	NA	70	82	0	640		NR
	128 Pat Tit. 4	59.0	9.0	531	10	89	50	50	11.3	NA	0	7	1		100	Negative
	129 Equip Alcove	108.0	9.0	972	2	32	120		7.4	NR	7	16	1			NR
2-2	131 Office	116.0	9.0	1,044	NA	NA	235		13.5	NA	17	32	2	235		NR
	130 Staff Tit. 1	77.0	9.0	693	10	116	75	75	13.0	NR	0	10	1	150		Negative
	132 Staff Lounge	186.0	9.0	1,674	NA	NA	550		19.7	NA	52	75	3	550		NR
2-3	133 Ambulance Entry	74.0	9.0	666	NA	NA	85		7.7	NA	0	12	1			NR
	134 EMS Lounge	122.0	9.0	1,098	NA	NA	490		26.8	NA	17	67	4	180		NR
2-4	137 Pharmacist Office	127.0	9.0	1,143	NA	NA	205		10.8	NA	13	28	1	130		Positive
	135 Mat. Mgmt	118.0	9.0	1,062	NA	NA	160		9.0	NA	12	22	1	85		NR
Totals		1,867		28,243			2,570				188	350		1,820	250	

Notes: NR = No Requirement; NA = Not Applicable

Carilion FSR MINIMUM VENTILATION SUMMARY TABLE (Minimum Design Parameters per ASHRAE Standard 170-2017 Table 7-1 & IMC 2018 Table 403.3.1.1) - RTU-3 Design Outside Air set to minimum 20.1% of Design Total Supply Air

Zone	Room Name	Area	Ceiling Height	Volume cu ft	Min Total ACH	Min Supply Airflow	Design Supply Airflow	Airflow From Adjacent Space	Design Total ACH	Min OA ACH	Min OA Airflow	Design OA Airflow	Design OA ACH	Return Airflow	Exhaust Airflow	Pressure Relation
3-1	127 Equip Storage	126.0	9.0	1,134	NA	NA	75		4.0	NA	0	15	1	75		NR
	150 CT Control	140.0	9.0	1,260	NA	NA	540		25.7	NA	14	109	5	510		NR
3-2	149 CT	419.0	9.0	3,771	6	377	1,440		22.9	2	126	291	5	1390		NR
3-3	146 Radiology	353.0	9.0	3,177	6	318	580		11.0	2	106	117	2	540		NR
	148 Reading	60.0	9.0	540	NA	NA	150		16.7	NA	14	30	3	110		NR
3-4	147 Control	149.0	9.0	1,341	NA	NA	190		8.5	NA	14	38	2	180		NR
3-5	144 Corridor	248.0	9.0	2,232	NA	NA	200		5.4	NA	9	40	1			NR
	145 TDR	129.0	12.5	1,613	NA	NA	75		2.8	NR	0	15	1			NR
	142 E.V.S.	57.0	12.5	713	10	119	50	80	10.9	NR	0	10	1		130	Negative
	143 Clean Supply	133.0	9.0	1,197	4	80	200		10.0	2	40	40	2	125		Positive
	141 Soiled	139.0	9.0	1,251	10	209	210	100	14.9	2	42	42	2	310		Negative
3-6	117 Exam 8 (Trauma)	367.0	9.5	3,487	15	872	900		15.5	3	174	182	3	750		Positive
Totals		2,320		21,715			4,610				539	930		3,680	440	

Notes: NR = No Requirement; NA = Not Applicable



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KEY NOTES

- TRANSITION CONNECTION SIZE SUPPLY DUCT FROM RTU IN ROOF CURB TO SIZE SHOWN. COORDINATE WITH STRUCTURAL BEAMS AND SMOKE PARTITION WALL.
- TRANSITION CONNECTION SIZE RETURN DUCT FROM RTU IN ROOF CURB TO SIZE SHOWN. COORDINATE WITH STRUCTURAL BEAMS AND SMOKE PARTITION WALL.
- 10"x10" EXHAUST DUCT UP TO EXHAUST FAN EF-1 MOUNTED ON ROOF.
- 14"x10" EXHAUST DUCT UP TO EXHAUST FAN EF-2 MOUNTED ON ROOF.
- 10"Ø EXHAUST DUCT UP TO EXHAUST FAN EF-3 MOUNTED ON ROOF.
- 12"x12" EXHAUST DUCT UP TO EXHAUST FAN EF-4 MOUNTED ON ROOF.
- EXHAUST FAN SUPPORTED FROM STRUCTURE, BELOW FIRE RATED CEILING CAP. ROUTE DISCHARGE AIR TO 48"Wx12"H LOUVER MOUNTED ABOVE DOOR. REFER TO ARCHITECTURAL ELEVATIONS FOR LOCATION.
- CEILING MOUNTED EXHAUST FAN. ROUTE DISCHARGE TO 6" WALL CAP WITH BIRDSCREEN AND BACKDRAFT DAMPER.
- 14"x12" RETURN DUCT DOWN TO 24"Hx12"W LOW WALL RETURN GRILLE MOUNTED 8" AFF. BALANCE TO 750 CFM. RETURN GRILLE TO BE STEEL SIDEWALL GRILLE MODEL TITUS 350RS, OR EQUAL, 3/4" BLADE SPACING, SINGLE DEFLECTION, 35° DEFLECTION, BLADES PARALLEL TO SHORT DIMENSION.
- 6"x6" ALUMINUM SIDEWALL EXHAUST GRILLE MODEL TITUS 350FL, OR EQUAL, 3/4" BLADE SPACING, SINGLE DEFLECTION, 35° DEFLECTION, BLADES PARALLEL TO LONG DIMENSION.
- 6"x6" ALUMINUM SIDEWALL EXHAUST GRILLE MODEL TITUS 300FS, OR EQUAL, 3/4" BLADE SPACING, DOUBLE DEFLECTION, 35° DEFLECTION, BLADES PARALLEL TO SHORT DIMENSION.
- 4'-0" L x 2" W LINEAR BAR DIFFUSER EQUAL TO TITUS CT-540. PROVIDE 8"Ø RUN OUT BALANCED TO CFM SHOWN. (TYP OF 2)
- PROVIDE 12"x12" STEEL SECURITY GRILLE COVERS EQUAL TO TITUS SG-SD WITH OPTIONAL MOUNTING FRAME IN THIS SPACE FOR SUPPLY AND RETURN/EXHAUST GRILLES.
- SUPPLY DUCT STATIC PRESSURE SENSOR.
- 12"x12" EXHAUST DUCT TO TERMINATE 6" AFF. PROVIDE HARDWARE CLOTH OVER DUCT OPENING.
- 12"Wx16"H INTAKE LOUVER INSTALLED IN WALL MOUNTED 6" ABOVE FINISHED FLOOR. PROVIDE SHEETMETAL SLEEVE ON BACKSIDE OF LOUVER. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION.
- 12"Wx16"H INTAKE LOUVER INSTALLED IN WALL. TOP OF LOUVER TO BE WITHIN 6" OF FIRE RATED CEILING CAP. PROVIDE SHEETMETAL SLEEVE ON BACKSIDE OF LOUVER. REFER TO ARCHITECTURAL ELEVATIONS FOR EXACT LOCATION.
- UNIT HEATER SUSPENDED FROM STRUCTURE.
- PROVIDE REMOTE CABLE OPERATED DAMPER. MOUNT WALL PLATE ABOVE CEILING IN CORRIDOR 106.
- RECESSED CEILING UNIT HEATER.
- PROVIDE HARD DUCT CONNECTION AT EXHAUST GRILLE.
- DUCT MOUNTED HUMIDIFIER DISPERSION MANIFOLD. BOTTOM OF MANIFOLD TO BE MOUNTED A MINIMUM OF 12" ABOVE THE CEILING GRID. SEE SHEETS M201 AND M405 FOR ADDITIONAL INFORMATION.
- DAMPER ACCESS TO BE ON P.O.C. 112 SIDE OF WALL.
- FAN FILTER UNIT, ENVIRCO MODEL MAC10 WITH FILTER LOAD INDICATOR LGT - RED (ILFS), OR EQUAL, AT 600 CFM. PROVIDE MGF'S BACNET GATEWAY TO INTEGRATE WITH BAS.

GENERAL NOTES

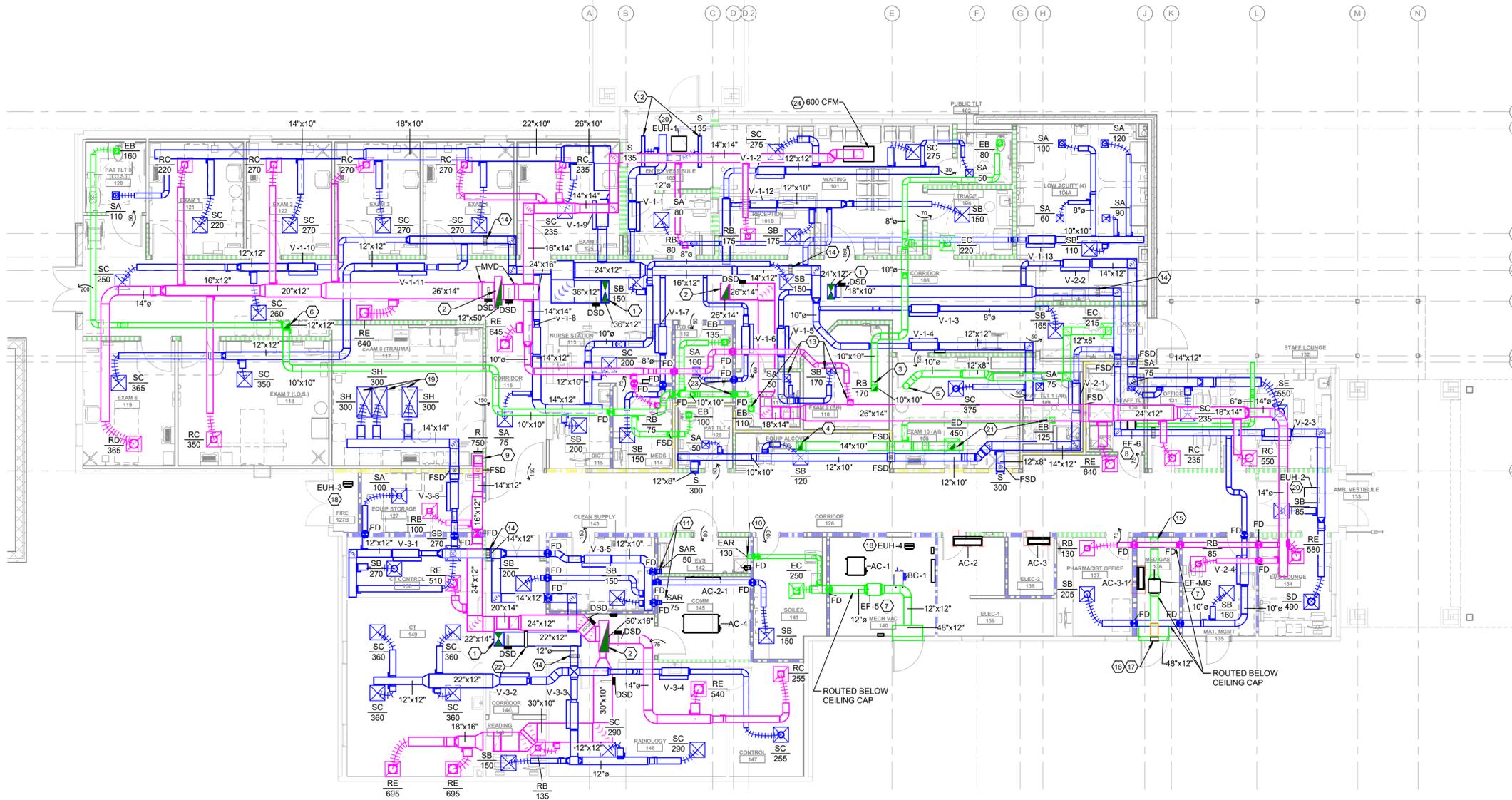
- CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
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- PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEM AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
- INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
- PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
- THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
- ONLY PIPING AND DUCT WORK SERVING THE ELECTRICAL OR COMMUNICATION SPACES SHALL ROUTE THROUGH THESE SPACES PER NFPA 70. ALL OTHER PIPING AND DUCTWORK IS PROHIBITED.
- OBSERVE ALL MANUFACTURER'S RECOMMENDED CLEARANCES. COMPLY WITH NFPA 70 (NEC) ARTICLE 110.26 FOR ELECTRICAL DISCONNECT SWITCHES.
- INSTALL DUCT ACCESS PANEL ON ONE SIDE OF EVERY LIFE SAFETY DAMPER.

PARTITION FIRE RATING LEGEND

PLAN NOTATION	PER NFPA 70 (Table 6.3.3)	DEFINITION
	1-HR FIRE BARRIER (UL 465)	1-HR FIRE BARRIER (UL 465)
	1-HR FIRE/SMOKE BARRIER (UL 465)	1-HR FIRE/SMOKE BARRIER (UL 465)
	2-HR FIRE BARRIER (UL 465)	2-HR FIRE BARRIER (UL 465)
		NON-RATED INTERIOR PARTITION

HVAC DUCT LEGEND

	SUPPLY DUCT
	RETURN DUCT
	EXHAUST DUCT
	OUTDOOR AIR DUCT



1 HVAC - FIRST FLOOR PLAN
1/8" = 1'-0"
0 4 8 16'



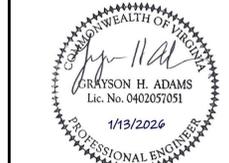
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SHEET TITLE **HVAC - FLOOR PLAN**

M101

PARTITION FIRE RATING LEGEND

PLAN NOTATION	PER NFPA 170 (table 6.3.3)	DEFINITION
	1-HR FIRE BARRIER (UL 465)	1-HR FIRE BARRIER (UL 465)
	1-HR FIRE/SMOKE BARRIER (UL 465)	1-HR FIRE/SMOKE BARRIER (UL 465)
	2-HR FIRE BARRIER (UL 465)	2-HR FIRE BARRIER (UL 465)
	NON-RATED INTERIOR PARTITION	NON-RATED INTERIOR PARTITION



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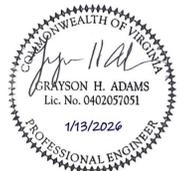
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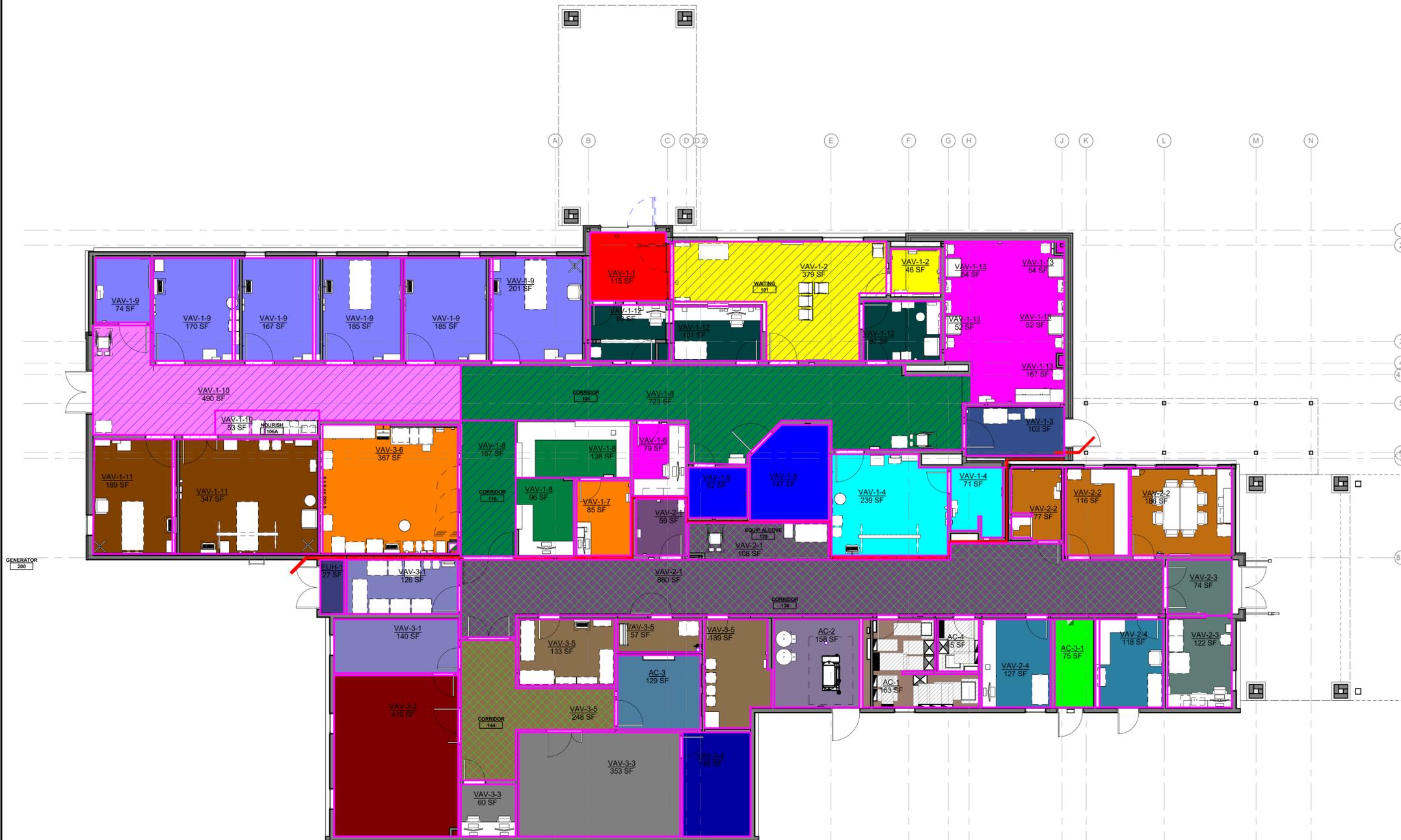


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TITLE
HVAC ZONING - FLOOR PLAN

SHEET
M101Z



- AC-1
- AC-2
- AC-3
- AC-3-1
- AC-4
- Area
- EF-1
- EUH-1
- VAV-1-1
- VAV-1-2
- VAV-1-3
- VAV-1-4
- VAV-1-5
- VAV-1-6
- VAV-1-7
- VAV-1-8
- VAV-1-9
- VAV-1-10
- VAV-1-11
- VAV-1-12
- VAV-1-13
- VAV-1-14
- VAV-2-1
- VAV-2-2
- VAV-2-3
- VAV-2-4
- VAV-3-1
- VAV-3-2
- VAV-3-3
- VAV-3-4
- VAV-3-5
- VAV-3-6

1 HVAC ZONING - FLOOR PLAN
1/8" = 1'-0"



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- KEY NOTES**
- RTU MOUNTED ON SPRING ISOLATION CURB.
 - COORDINATE EXACT CURB HEIGHT TO MAINTAIN OA INTAKE HEIGHT REQUIREMENT. OUTDOOR AIR INTAKE MOUNTED MINIMUM OF 36" ABOVE FINISHED ROOF.
 - MAGNETIC DIFFERENTIAL PRESSURE GAUGES REQUIRED PER ASHRAE 170-2018 6.4 FOR FILTER SECTIONS OF AIR HANDLING UNITS WITH 14 FILTER SECTION. PROVIDE LABEL TO INDICATE THE PRESSURE DROP THE FILTER NEEDS TO BE CHANGED PER THE UNIT MANUFACTURER'S RECOMMENDATIONS.
 - ALL FRESH AIR INTAKES OF RTU'S TO BE PROTECTED BY SCREEN OF CORROSION RESISTANT MATERIAL NO LARGER THAN 0.5" MESH. REFER TO THE GUIDELINES FOR DESIGN AND CONSTRUCTION OF HOSPITAL FACILITIES (FGI, 2018), PART 3 SECTION 6.3.1.
 - TRANSITION SUPPLY AND RETURN DUCTS IN ROOF CURB TO SIZES SHOWN ON SHEET M101. COORDINATE WITH STRUCTURAL SUPPORT BEAMS, OFFSET DUCTS AS REQUIRED.
 - RTU SHALL HAVE 1-1/2" TRAPPED CONDENSATE LINE FROM EACH PRIMARY DRAIN CONNECTION ON UNIT. ROUTED TO NEAREST PRIMARY ROOF DRAIN. REFER TO MFG'S PUBLISHED INFORMATION FOR QUANTITY AND LOCATIONS OF CONNECTIONS. PROVIDE MIRO INDUSTRIES PILLOW BLOCK SUPPORTS EVERY 5 FEET.
 - SPLIT SYSTEM CONDENSING UNIT MOUNTED ON EQUIPMENT SUPPORT CURB RAILS.
 - REFRIGERANT PIPING THRU PARAPET WALL. SEAL WALL WEATHER TIGHT.
 - BELTED VENT SET EXHAUST MOUNTED ON EQUIPMENT SUPPORT CURB RAILS. PROVIDE MINIMUM 2.5x DUCT DIAMETERS OF STRAIGHT DUCT TO THE INLET OF THE FAN. PROVIDE FLEXIBLE CONNECTION AT FAN INLET. COORDINATE EXACT LOCATION WITH THE EXISTING STRUCTURE AND MANUFACTURER'S RECOMMENDATIONS.
 - 12"x12" EXHAUST DUCT UP THROUGH ROOF IN DUCT PENETRATION CURB. TRANSITION TO FAN CONNECTION SIZE ON ROOF, PROVIDE RADIUS ELBOW.
 - 6" EXHAUST DUCT STACK UP TO DISCHARGE AT MINIMUM 10'-0" ABOVE FINISHED ROOF. SECURE DUCT TO ROOF WITH GUY WIRES.
 - 14"x10" EXHAUST DUCT UP THROUGH ROOF IN DUCT PENETRATION CURB. TRANSITION TO FAN CONNECTION SIZE ON ROOF, PROVIDE RADIUS ELBOW.
 - 8" EXHAUST DUCT STACK UP TO DISCHARGE AT MINIMUM 10'-0" ABOVE FINISHED ROOF. OFFSET DUCT TO MAINTAIN 25'-0" FROM RTU FRESH AIR INTAKE. SECURE DUCT TO ROOF WITH GUY WIRES.
 - 10" EXHAUST DUCT UP THROUGH ROOF IN DUCT PENETRATION CURB. TRANSITION TO FAN CONNECTION SIZE ON ROOF, PROVIDE RADIUS ELBOW.
 - 6" EXHAUST DUCT STACK UP TO DISCHARGE AT MINIMUM 10'-0" ABOVE FINISHED ROOF. SECURE DUCT TO ROOF WITH GUY WIRES.
 - CENTRIFUGAL UPBLAST EXHAUST FAN EF-4 MOUNTED ON ROOF CURB.
 - STEAM GENERATOR H-1 IN OUTSIDE ENCLOSURE WITH ROOF CURB. ROUTE 2" STEAM DOWN THRU ROOF TO DISPERSION MANIFOLD. ROUTE INSULATED COPPER CONDENSATE DOWN THRU ROOF. SEE M101 FOR CONTINUATION.
 - COORDINATE EXACT LOCATION WITH ROOF SCREEN WALL SUPPORT BRACING. MAINTAIN ALL MANUFACTURER'S CLEARANCE REQUIREMENTS.

- GENERAL NOTES**
- CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
 - COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, AND OTHER DISCIPLINES PRIOR TO CONSTRUCTION.
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 - INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
 - PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
 - THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.

PARTITION FIRE RATING LEGEND

PLAN NOTATION	PER NFPA 170 (Table 6.3.3)	DEFINITION
	1-HR FIRE BARRIER (UL 465)	1-HR FIRE BARRIER (UL 465)
	1-HR FIRE/SMOKE BARRIER (UL 465)	1-HR FIRE/SMOKE BARRIER (UL 465)
	2-HR FIRE BARRIER (UL 465)	2-HR FIRE BARRIER (UL 465)
		NON-RATED INTERIOR PARTITION

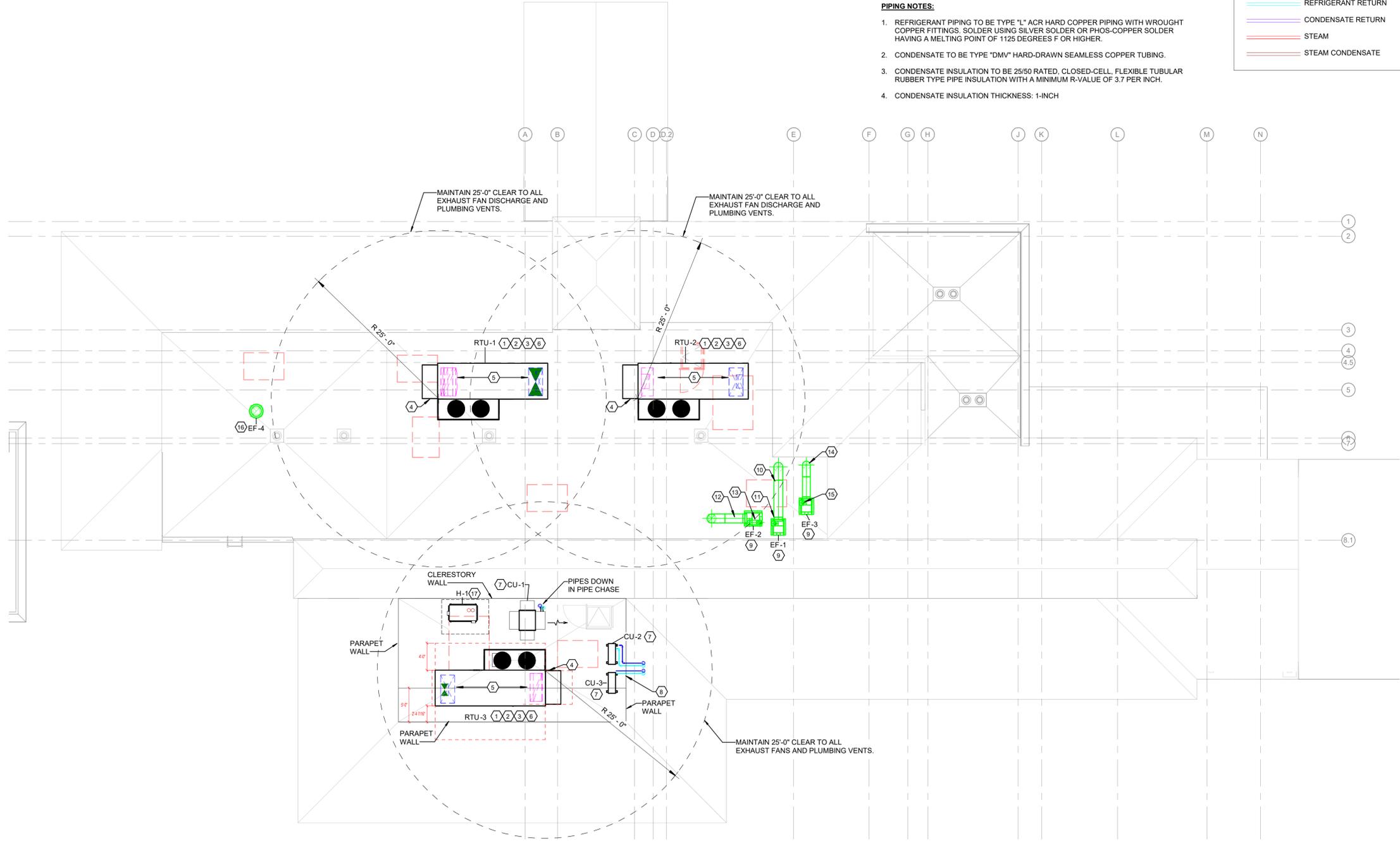
HVAC DUCT LEGEND

	SUPPLY DUCT
	RETURN DUCT
	EXHAUST DUCT
	OUTDOOR AIR DUCT

HVAC PIPING LEGEND

	REFRIGERANT SUPPLY
	REFRIGERANT RETURN
	CONDENSATE RETURN
	STEAM
	STEAM CONDENSATE

- PIPING NOTES:**
- REFRIGERANT PIPING TO BE TYPE "L" ACR HARD COPPER PIPING WITH WROUGHT COPPER FITTINGS. SOLDER USING SILVER SOLDER OR PHOS-COPPER SOLDER HAVING A MELTING POINT OF 1125 DEGREES F OR HIGHER.
 - CONDENSATE TO BE TYPE "DMV" HARD-DRAWN SEAMLESS COPPER TUBING.
 - CONDENSATE INSULATION TO BE 25/50 RATED, CLOSED-CELL, FLEXIBLE TUBULAR RUBBER TYPE PIPE INSULATION WITH A MINIMUM R-VALUE OF 3.7 PER INCH.
 - CONDENSATE INSULATION THICKNESS: 1-INCH



1 HVAC - ROOF PLAN
1/8" = 1'-0"
0 4 8 16'

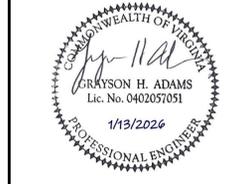


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- ### KEY NOTES
- ROOM PRESSURE MONITOR EQUAL TO TSI MODEL RPM. MONITOR TO MEASURE ROOM DIFFERENTIAL PRESSURE AND ALARM AT THE MONITOR STATION AND BUILDING EMS. PROVIDE DOOR SWITCH, MODEL 800148, WIRED INTO THE RPM PER MANUFACTURER'S INSTALLATION INSTRUCTIONS.
 - REMOTE ROOM PRESSURE MONITOR AT NURSES STATION. ROOM BEING MONITORED BY REMOTE TO BE LABELED WITH THE NAME AND NUMBER DISPLAYED ON MONITOR FACE AND TO ALARM WHEN RESPECTIVE ROOM IS FOUND IN ALARM CONDITION.
 - PROVIDE WALL PLATE JCI MODEL TE-63XF TEMPERATURE SENSOR, OR EQUAL.
 - DDC TEMP SENSOR MOUNTED IN RETURN DUCT TO PROVIDE REMOTE TEMPERATURE INPUT FOR VAV 1-5.
 - PROVIDE LABEL ABOVE THERMOSTAT "EXAM 9 TEMPERATURE ADJUSTMENT".
 - 1/4" CONDENSATE DOWN TO HOUSEKEEPING SERVICE BASIN, PROVIDE AIR GAP.
 - 1/4" CONDENSATE DOWN TO FLOOR DRAIN, PROVIDE AIR GAP.
 - VRF AC UNIT SUSPENDED FROM STRUCTURE. PIPE CONDENSATE TO 1-1/4" CONDENSATE MAIN.
 - VRF AC UNIT MOUNTED APPROXIMATELY 9'-0" A.F.F. ON WALL. PROVIDE OPTIONAL CONDENSATE PUMP AS REQUIRED. ROUTED CONDENSATE TO CONDENSATE MAIN.
 - AC UNIT MOUNTED APPROXIMATELY 9'-0" A.F.F. ON WALL. PROVIDE OPTIONAL CONDENSATE PUMP AS REQUIRED. ROUTED CONDENSATE TO CONDENSATE MAIN.
 - SPLIT SYSTEM REFRIGERANT SUPPLY AND RETURN UP TO CONDENSER CU-1 ON ROOF.
 - VRF SYSTEM REFRIGERANT BRANCH CONTROLLER SUSPENDED FROM STRUCTURE.
 - DO NOT ROUTE REFRIGERANT OR CONDENSATE PIPE OVER ANY EQUIPMENT.
 - SPLIT SYSTEM REFRIGERANT SUPPLY AND RETURN UP TO ASSOCIATED CONDENSING UNIT ON ROOF.
 - BUILDING STATIC PRESSURE SENSOR ON WALL.
 - LOCATE NEW T'STAT AT EXISTING BACKBOX. FIELD VERIFY EXACT LOCATION.
 - DUCT MOUNTED HUMIDIFIER DISPERSION MANIFOLD. COORDINATE MOUNTING HEIGHT TO MAINTAIN STEAM PIPE AND CONDENSATE/TRAP SLOPE. BOTTOM OF MANIFOLD TO BE MOUNTED A MINIMUM OF 12" ABOVE THE CEILING.
 - 2" INSULATED STEAM LINE TO DISPERSION MANIFOLD.
 - HIGH TEMPERATURE CONDENSATE PUMP AT MINIMUM 12 GPM AT 10 FEET HEAD, 115/1. INSTALL CHECK VALVE AT PUMP DISCHARGE. PUMP TO INCLUDE DRY CONTACT TO COMMUNICATE WITH HUMIDIFIER H-1. MOUNT CONDENSATE PUMP ON WALL OR SUSPENDED FROM STRUCTURE.
 - ROUTE 3/4" INSULATED COPPER CONDENSATE FROM DISPERSION MANIFOLD TO 1-1/4" CONDENSATE MAIN.
 - ROUTE 1-1/4" INSULATED COPPER TANK DRAIN FROM ROOF MOUNTED STEAM GENERATOR TO CONDENSATE MAIN.
 - DRAIN COOLER MOUNTED ON WALL. ROUTE 2" INSULATED COPPER CONDENSATE FROM DRAIN COOLER TO SERVICE BASIN IN EVS ROOM. COORDINATE TERMINATION WITH PLUMBING PLANS.
 - MOUNT HUMIDISTAT IN RETURN DUCT VERTICAL RISER.
 - STEAM AND TANK DRAIN UP THRU BOTTOM CONNECTION AT STEAM GENERATOR OUTDOOR ENCLOSURE.

- ### GENERAL NOTES
- CONTRACT DOCUMENT DRAWINGS FOR MECHANICAL WORK ARE DIAGRAMMATIC AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
 - COORDINATE CONSTRUCTION OF ALL MECHANICAL WORK WITH ARCHITECTURAL, STRUCTURAL, CIVIL, AND OTHER DISCIPLINES PRIOR TO CONSTRUCTION.
 - PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE MECHANICAL SYSTEM AS INDICATED ON THE DRAWINGS, AS SPECIFIED AND AS REQUIRED BY CODE.
 - INSTALL ALL MECHANICAL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, CONTRACT DOCUMENTS, AND APPLICABLE CODES AND REGULATIONS.
 - PROVIDE VIBRATION ISOLATION FOR ALL MECHANICAL EQUIPMENT TO PREVENT TRANSMISSION OF VIBRATION TO BUILDING STRUCTURE.
 - THE LOCATIONS OF ALL ITEMS SHOWN ON THE DRAWINGS OR CALLED FOR IN THE SPECIFICATIONS THAT ARE NOT DEFINITELY FIXED BY DIMENSIONS ARE APPROXIMATE ONLY. THE EXACT LOCATIONS NECESSARY TO SECURE THE BEST CONDITIONS AND RESULTS MUST BE DETERMINED BY THE PROJECT SITE CONDITIONS AND SHALL HAVE THE APPROVAL OF THE ENGINEER BEFORE BEING INSTALLED. DO NOT SCALE DRAWINGS.
 - ALL PIPE SIZES SHOWN AS OUTSIDE DIAMETER (O.D.).
 - OBSERVE ALL MANUFACTURER'S RECOMMENDED CLEARANCES. COMPLY WITH NFPA 70 (NEC) ARTICLE 110.26 FOR ELECTRICAL DISCONNECT SWITCHES.

PARTITION FIRE RATING LEGEND

PLAN NOTATION	PER NFPA 720 (Table 6.3.3)	DEFINITION
	1-HR FIRE BARRIER (UL 465)	1-HR FIRE BARRIER (UL 465)
	1-HR FIRE/SMOKE BARRIER (UL 465)	1-HR FIRE/SMOKE BARRIER (UL 465)
	2-HR FIRE BARRIER (UL 465)	2-HR FIRE BARRIER (UL 465)
		NON-RATED INTERIOR PARTITION

HVAC PIPING LEGEND

	REFRIGERANT SUPPLY
	REFRIGERANT RETURN
	CONDENSATE RETURN
	STEAM
	STEAM CONDENSATE



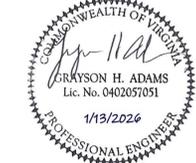
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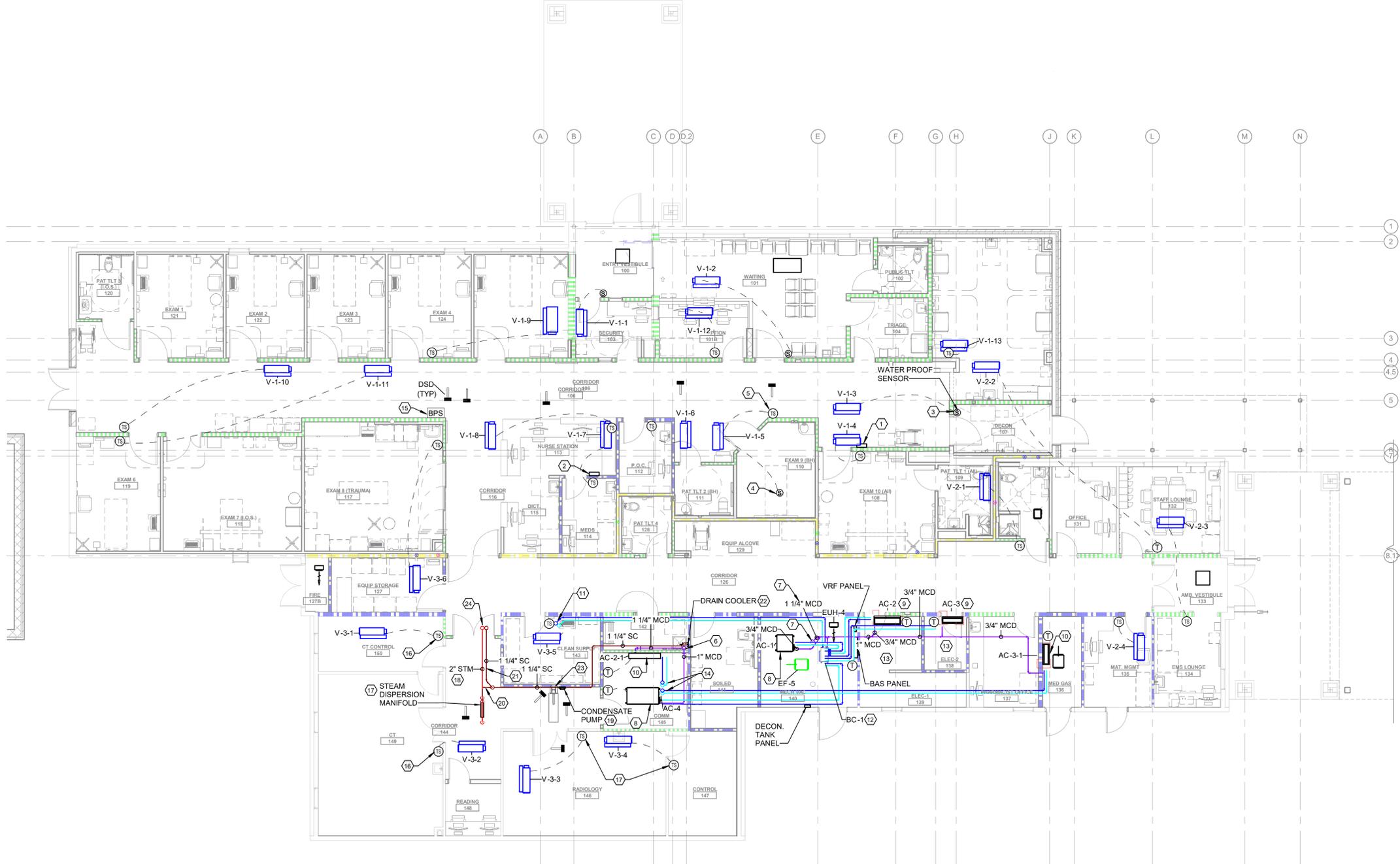
CONSTRUCTION DOCUMENTS



01/12/2026

PIPING - FLOOR PLAN

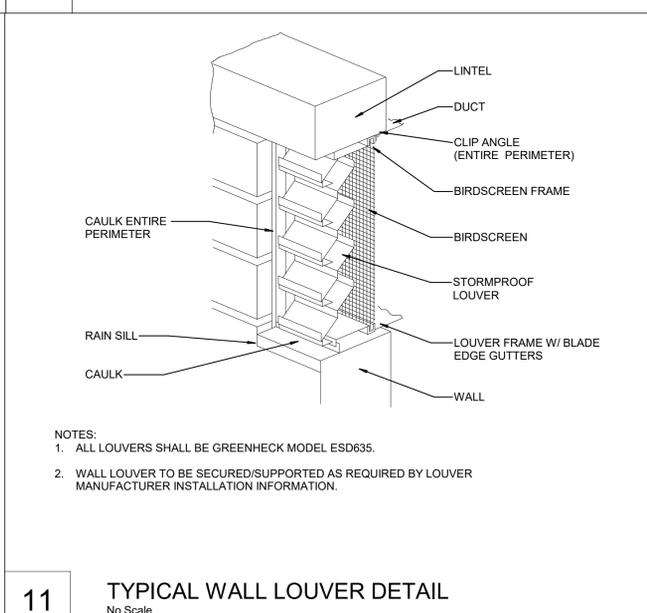
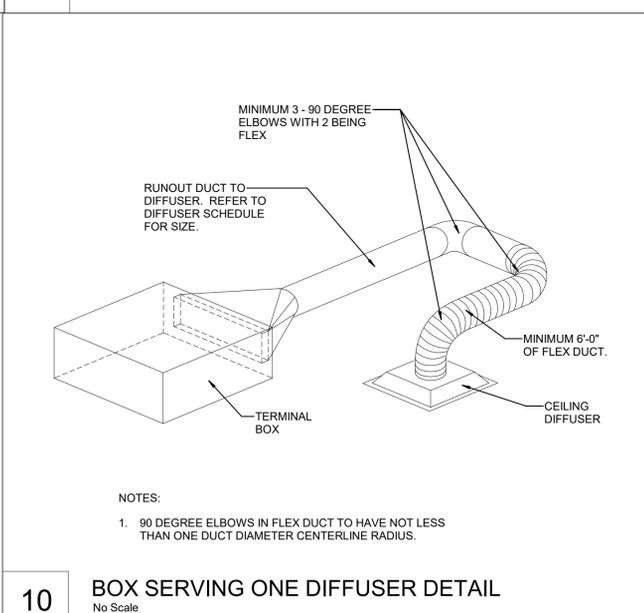
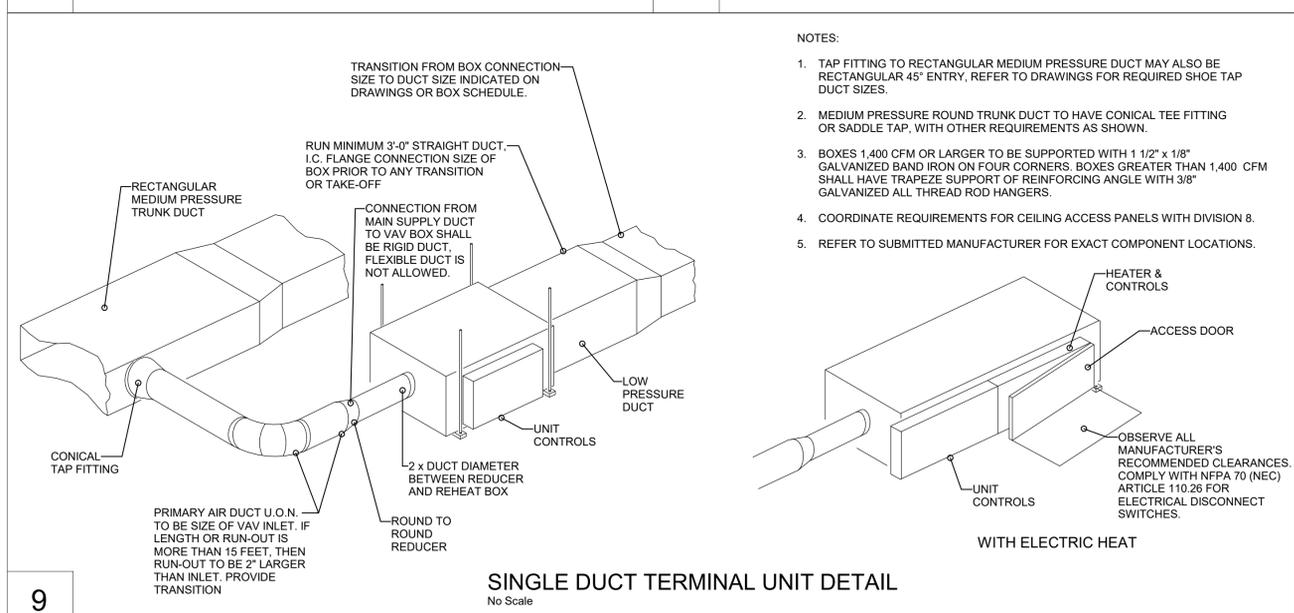
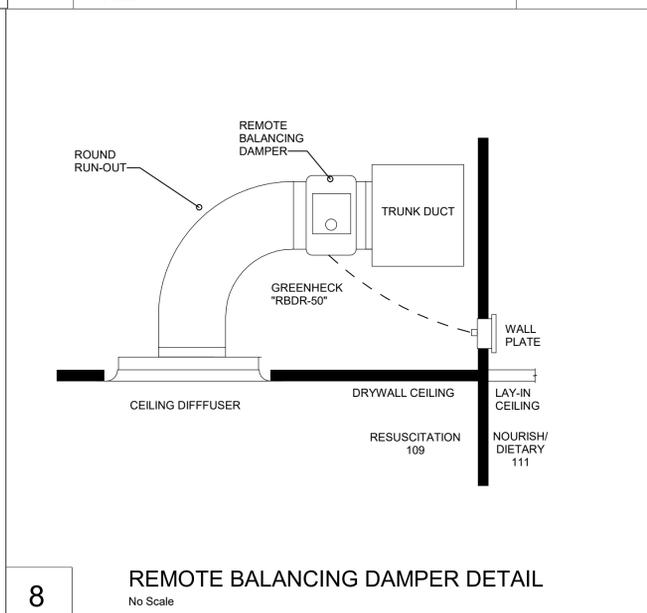
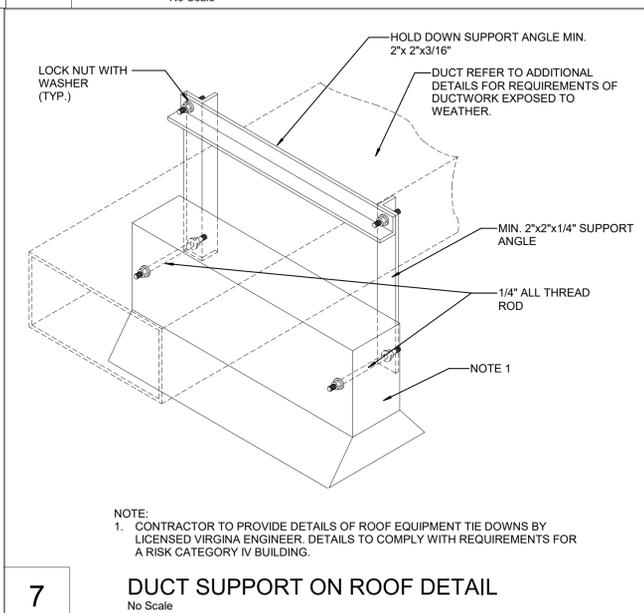
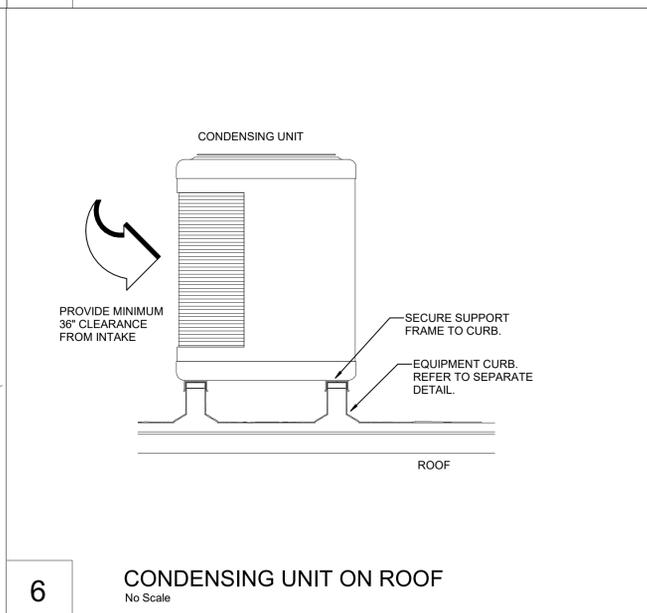
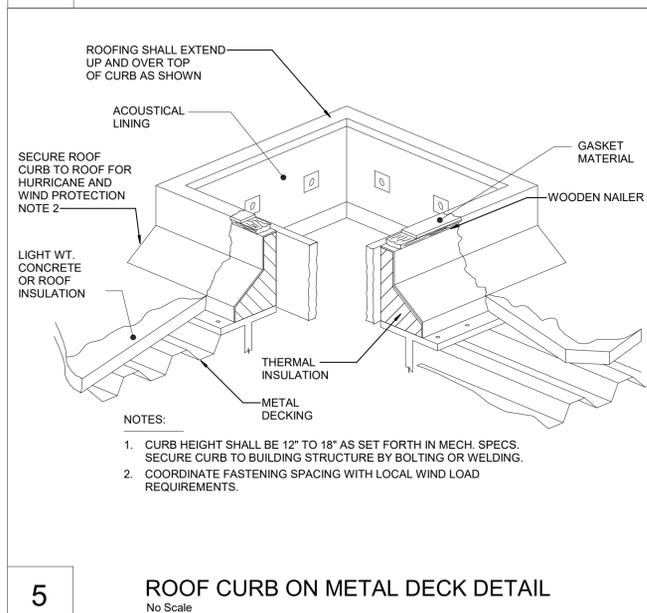
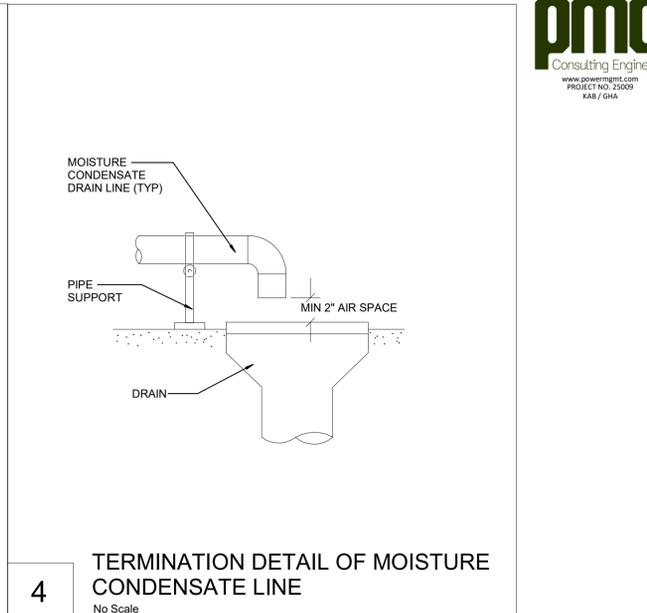
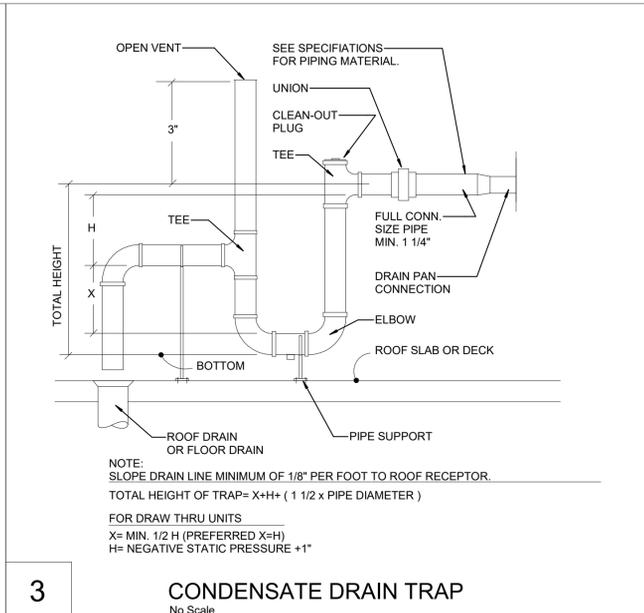
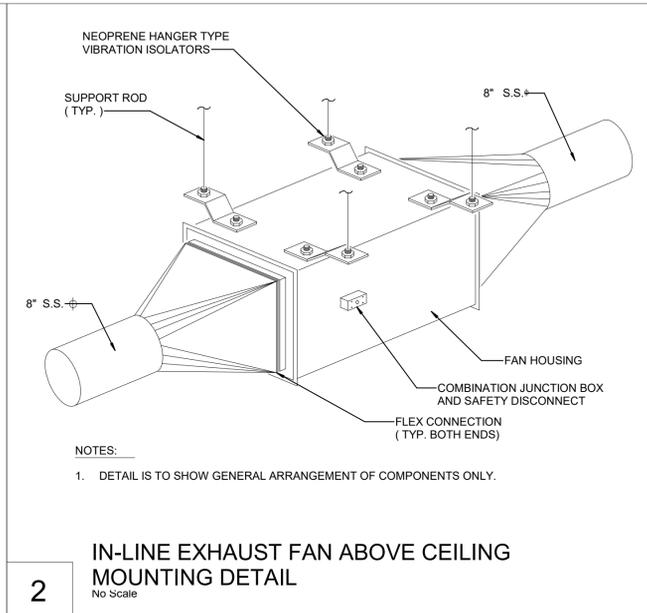
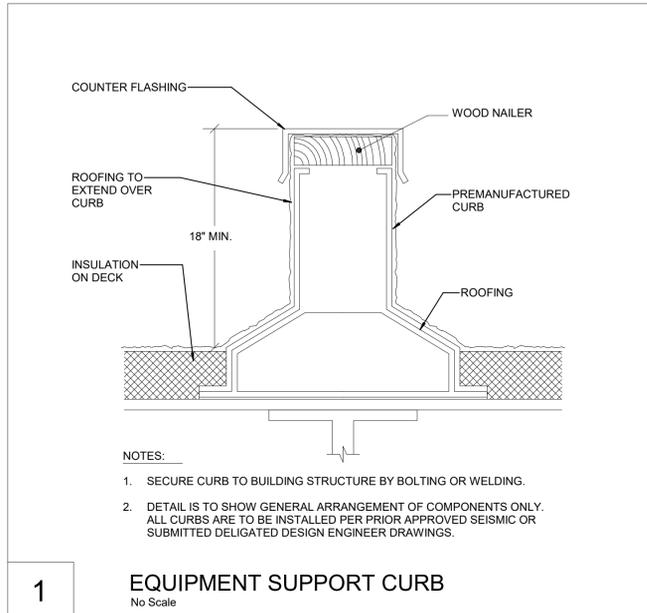
SHEET M201



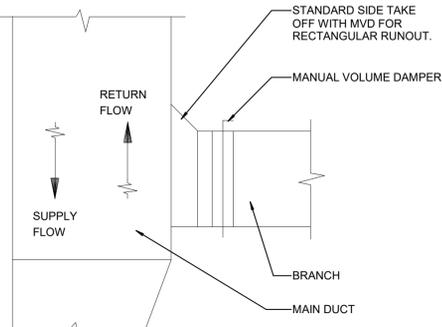
1 PIPING - FIRST FLOOR PLAN
1/8" = 1'-0"



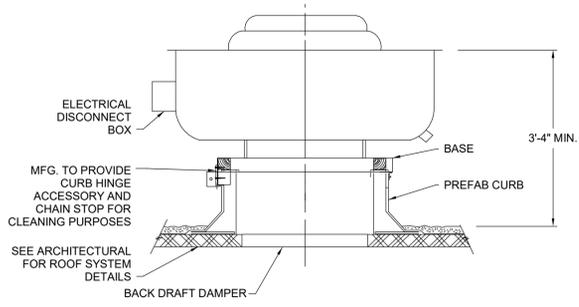
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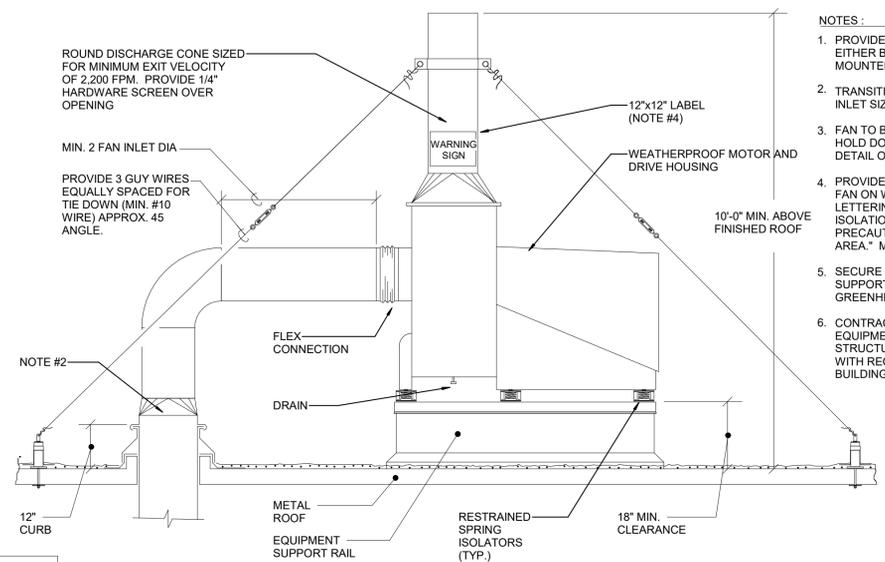
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1 LOW PRESSURE RECTANGULAR BRANCH RUNOUT
No Scale

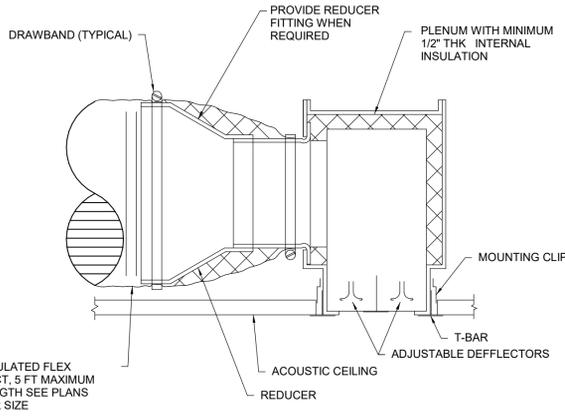


2 UPBLAST EXHAUST FAN DETAIL
No Scale

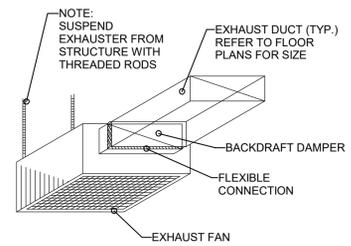


3 ISOLATION ROOM/DECON/TRIAGE EXHAUST FAN DETAIL
No Scale

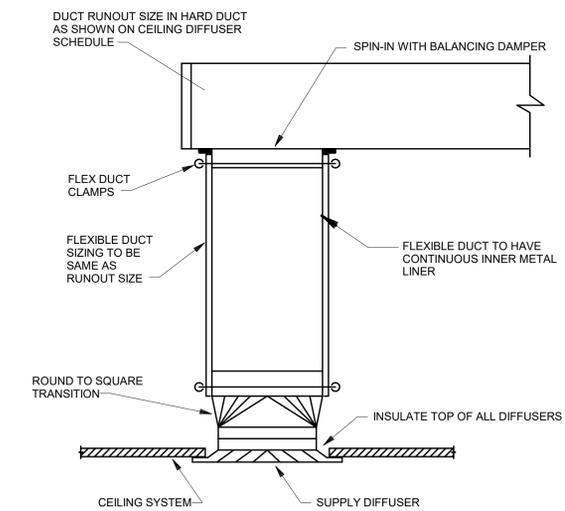
- NOTES:
1. PROVIDE MEANS TO LUBRICATE BEARINGS EITHER BY ACCESS PANEL OR EXTERIOR MOUNTED GREASE FITTING.
 2. TRANSITION FROM SQUARE TO ROUND FAN INLET SIZE.
 3. FAN TO BE SECURED WITH GUY WIRES AND HOLD DOWN STRAPS SIMILAR TO ROOFTOP UNIT DETAIL ON THIS SHEET.
 4. PROVIDE TWO SIGNS, ONE ON EACH SIDE OF FAN ON WHITE BACKGROUND WITH RED LETTERING TO READ "WARNING: PATIENT ISOLATION ROOM EXHAUST FAN. TAKE PROPER PRECAUTIONS PRIOR TO WORKING IN THIS AREA." MOUNT 5'-0" ABOVE FINISHED ROOF.
 5. SECURE FAN TO ISOLATORS AND ISOLATORS TO SUPPORT CURB FRAME PER NOA DETAIL FOR GREENHECK MODEL SWB.
 6. CONTRACTOR TO PROVIDE DETAILS OF ROOF EQUIPMENT TIE DOWNS BY LICENSED STRUCTURAL ENGINEER. DETAILS TO COMPLY WITH REQUIREMENTS FOR A RISK CATEGORY IV BUILDING.



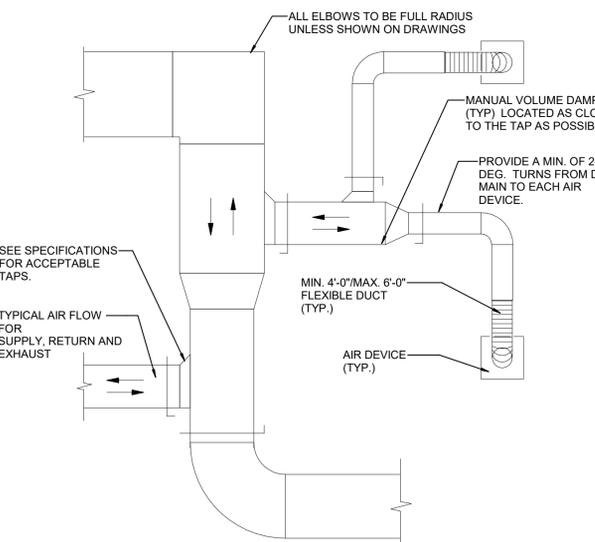
4 LINEAR SLOT DIFFUSER DETAIL
No Scale



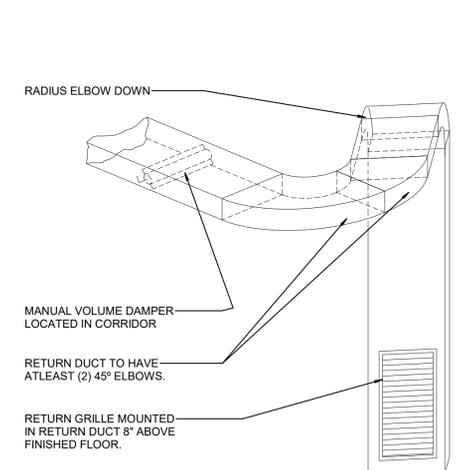
5 CEILING MOUNTED EXHAUST FAN
No Scale



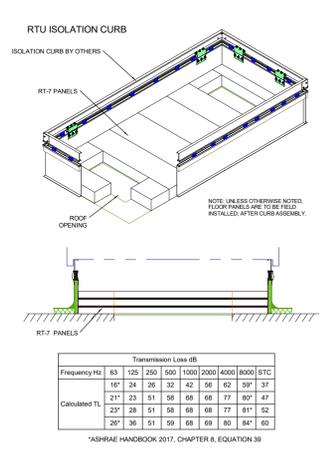
7 SUPPLY AIR DIFFUSER DETAIL
No Scale



8 TYPICAL LOW PRESSURE SUPPLY, RETURN AND EXHAUST DUCT DETAIL
No Scale



9 TYPICAL LOW WALL RETURN/EXHAUST GRILLE
No Scale



10 RTU CURB INSULATION
No Scale

Specifications for Type RT-7curb floor acoustical package

1.0 General
Acoustical Panel shall be factory laminated construction and shall be provided as indicated on drawings by a recognized manufacturer with published standards of construction and technical performance. Performance of the fabricated and installed system shall conform to all specifications listed herein.

2.0 Materials
Panel layers shall be comprised of 2" 3PCF AcoustiBoard fiberglass and 5/8" AcousticSheet as manufactured by Kinetics Noise Control (KNC). STC 47 through STC 60 options shall include added layers of KNM-200B as manufactured by KNC.

2.1 Acoustical Panels
A. All panels and their components shall be pre-fabricated, sectional, and modular; designed for easy and accurate field assembly.
B. Panel Construction
All panels shall be 7-1/4" inches thick (min), comprised of alternating layers of 2" fiberglass absorption panels and 5/8" acoustically dampened sheetrock, STC-47 through STC 60 options integrate added layers of KNM-200B barriers (see product submittals for additional information)

C. Acoustical Performance
Panels shall be rated for STC [37, 47, 52, 60]. The manufacturer shall provide testing data indicating sound absorption and transmission loss characteristics of the panel assembly. Testing data shall demonstrate minimal performance as follows: see chart

D. Manufacturer
All materials shall be provided by Kinetics Noise Control, Inc.

End of Section

Frequency Hz	63	125	250	500	1000	2000	4000	8000	STC
RT-7 PANELS	16	24	26	32	42	56	62	59	37
RT-7 PANELS	21	23	51	58	68	68	77	89	47
RT-7 PANELS	23	28	51	58	68	68	77	81	52
RT-7 PANELS	26	36	51	59	68	68	80	84	60

*ASHRAE HANDBOOK 2017, CHAPTER 8, EQUATION 39

Note:
The STC 47 system will be 8" when installed within the curb, and have an added weight of 10.3 psf.

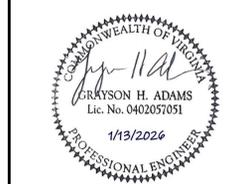


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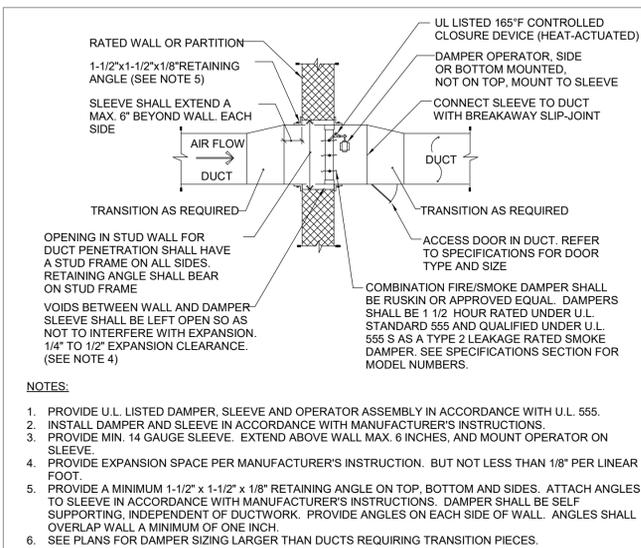
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HVAC - DETAILS

M402

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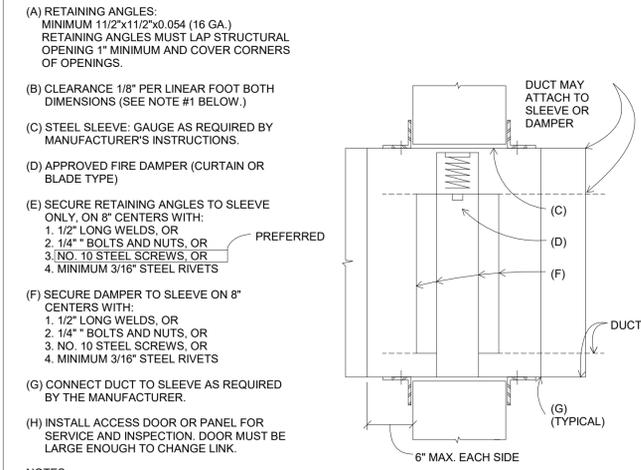


1 COMBINATION FIRE/SMOKE DAMPERS
No Scale

REQUIRED, THE FIRE RESISTIVE MATERIALS SHALL BE EQUAL TO THE REQUIREMENTS FOR FIRE RESISTIVE MATERIALS USED IN THE CONSTRUCTED WALL SO THAT A CONTINUOUS RATING EXISTS AT THE WALL PENETRATION.

MANUFACTURERS' INSTALLATION DETAILS
THE FIRE DAMPER MANUFACTURERS' INSTALLATION DETAILS AND INSTRUCTIONS AS TESTED AND APPROVED BY U.L. MUST BE USED IN LIEU OF THE ABOVE DETAILS WHERE APPLICABLE.

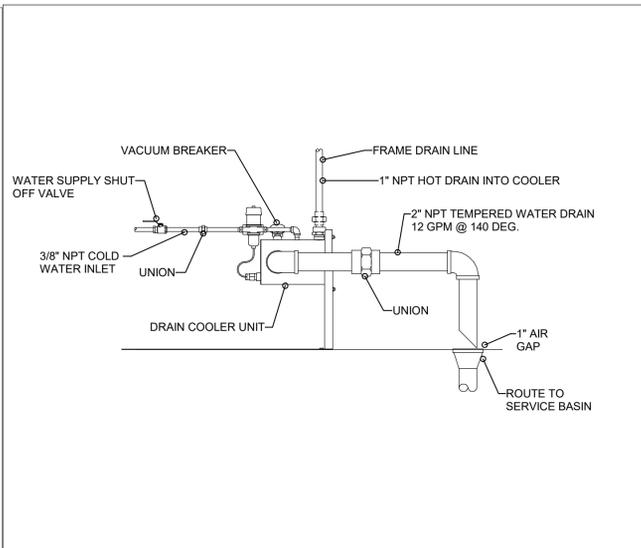
NOTE:
NO CAULKING IS REQUIRED ON FIRE DAMPERS OR FIRE DAMPER RETAINING ANGLES.



NOTES:

- FIRE DAMPER SLEEVE CLEARANCE WITHIN WALL OPENING.
- CLEARANCE REQUIREMENTS FOR DAMPER SLEEVES WITHIN A WALL OPENING IS BASED ON 1/8" INCH PER FOOT OF WIDTH (OR HEIGHT) UNLESS OTHERWISE STATED IN THE LISTING OF THE ASSEMBLY. THE SLEEVE MAY REST ON THE BOTTOM OF THE OPENING, AND NEED NOT BE CENTERED. (FRACTIONAL DIMENSIONS SHALL BE TAKEN AS THE NEXT LARGEST WHOLE FOOT.)
- EXAMPLE: A 30 INCH X 24 INCH FIRE DAMPER SLEEVE IS INSTALLED IN A WALL OPENING. THE OPENING SHALL BE 30 3/8 INCHES WIDE (1/8 INCH X3 FEET) BY 24 1/4 INCHES HIGH (1/8 INCH X2 FEET.)
- THE SLEEVE IS RETAINED IN THE WALL OPENING BY THE USE OF STEEL RETAINING ANGLES (A). THESE MUST OVER-LAP THE EDGE OF THE FRAMING BY A MINIMUM OF ONE (1) INCH OVER AND BEYOND ALL MATERIAL IN THE OPENING. THIS MEANS THAT THE MINIMUM WIDTH OF THE RETAINING ANGLE WOULD BE 1 3/8 INCHES (GOOD PRACTICE CALLS FOR AN ADDITIONAL SAFETY FACTOR BY MAKING THE ANGLE IN THIS CASE 1 1/2 INCHES WIDE.) THE DIMENSIONS REQUIRED FOR THE OPENING SHALL BE THOSE REMAINING AFTER THE OPENING HAS BEEN FRAMED AND FIRE RESISTIVE MATERIALS PROVIDED WHERE.

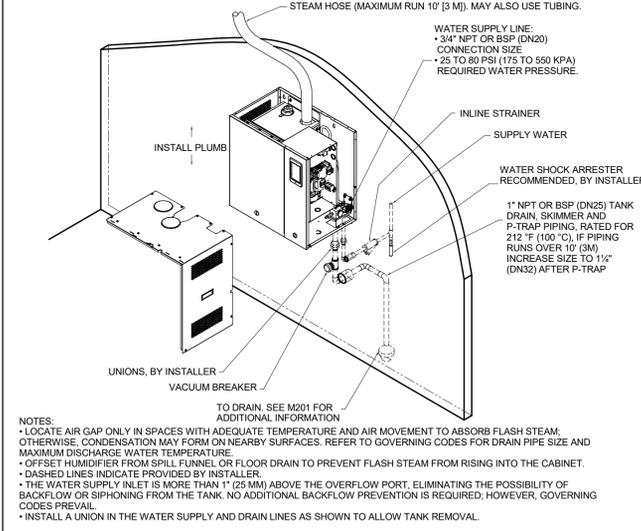
5 FIRE DAMPERS
No Scale



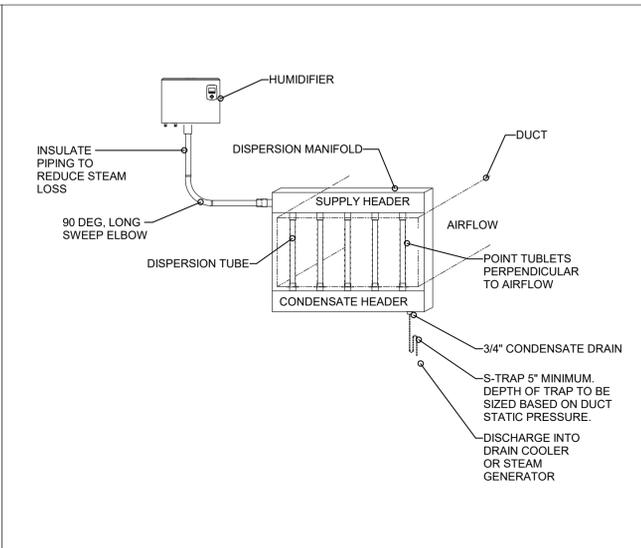
2 DRAIN COOLER DETAIL
SCALE: NONE

NOTES:

- LOCATE AIR GAP ONLY IN SPACES WITH ADEQUATE TEMPERATURE AND AIR MOVEMENT TO ABSORB FLASH STEAM. OTHERWISE, CONDENSATION MAY FORM ON NEARBY SURFACES. REFER TO GOVERNING CODES FOR DRAIN PIPE SIZE AND MAXIMUM DISCHARGE WATER TEMPERATURE.
- OFFSET HUMIDIFIER FROM SPILL FUNNEL OR FLOOR DRAIN TO PREVENT FLASH STEAM FROM RISING INTO THE CABINET.
- DASHED LINES INDICATE PROVIDED BY INSTALLER.
- THE WATER SUPPLY INLET IS MORE THAN 1" (25 MM) ABOVE THE OVERFLOW PORT. ELIMINATING THE POSSIBILITY OF BACKFLOW OR SIPHONING FROM THE TANK. NO ADDITIONAL BACKFLOW PREVENTION IS REQUIRED; HOWEVER, GOVERNING CODES PREVAIL.
- INSTALL A UNION IN THE WATER SUPPLY AND DRAIN LINES AS SHOWN TO ALLOW TANK REMOVAL.



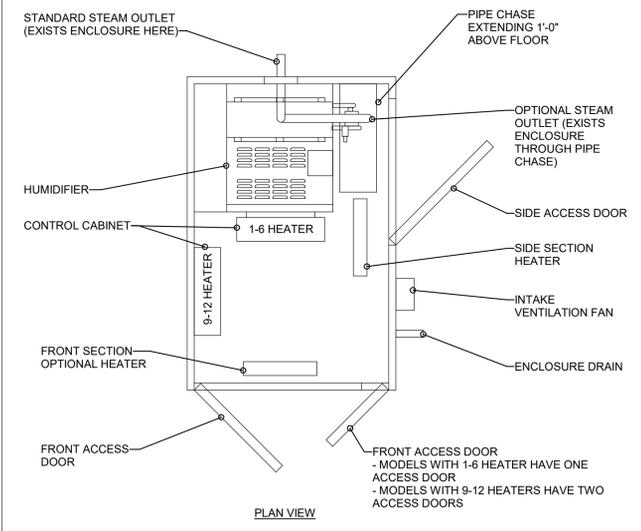
5 HUMIDIFIER FIELD PIPING DETAIL
SCALE: NONE



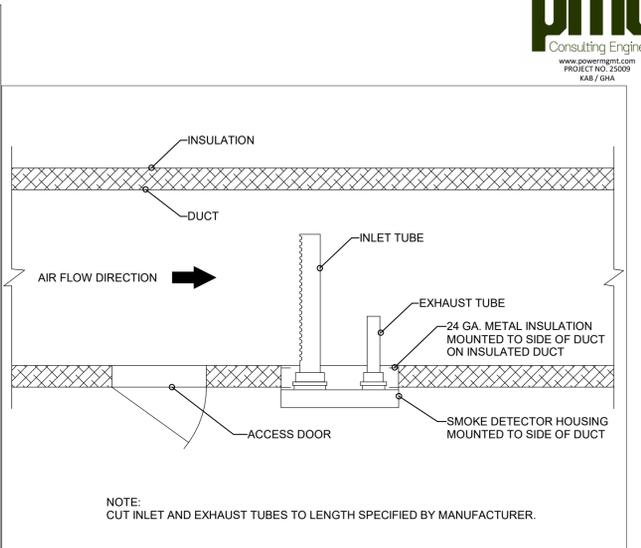
3 HUMIDIFIER DISPERSION TUBE DETAIL
SCALE: NONE

NOTES:

- LOCATE AIR GAP ONLY IN SPACES WITH ADEQUATE TEMPERATURE AND AIR MOVEMENT TO ABSORB FLASH STEAM. OTHERWISE, CONDENSATION MAY FORM ON NEARBY SURFACES. REFER TO GOVERNING CODES FOR DRAIN PIPE SIZE AND MAXIMUM DISCHARGE WATER TEMPERATURE.
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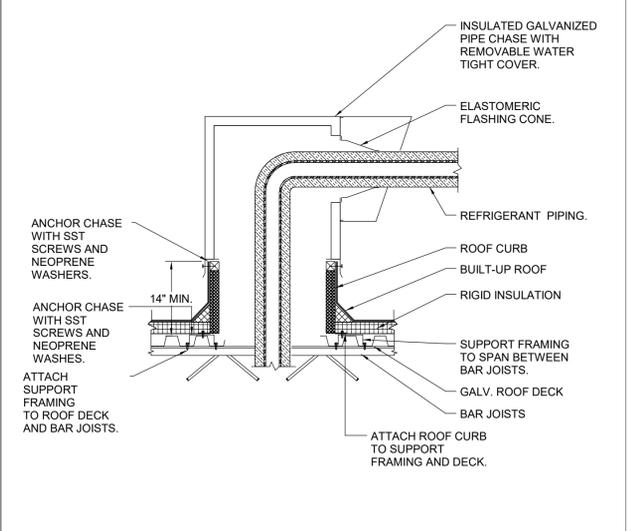


6 HUMIDIFIER IN OUTDOOR ENCLOSURE DETAIL
SCALE: NONE



4 DUCT MOUNTED SMOKE DETECTOR DETAIL
No Scale

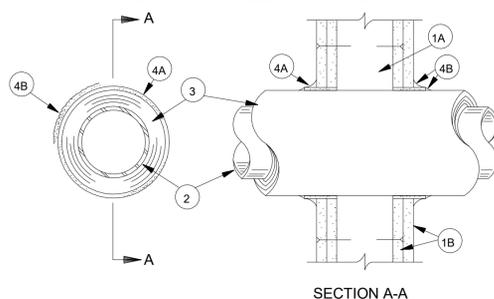
NOTE:
CUT INLET AND EXHAUST TUBES TO LENGTH SPECIFIED BY MANUFACTURER.



7 PIPE CHASE DETAIL
No Scale

SYSTEM NO. W-L-5001
MAY 19, 2005

F RATINGS - 1 AND 2 HR (SEE ITEM 1)
T RATINGS - 3/4, 1 AND 1 1/2 HR (SEE ITEM 3)
L RATING AT AMBIENT - 2 CFM/SQ FT
L RATING AT 400 F - LESS THAN 1 CFM/SQ FT



- WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM BOARD/STUD WALL ASSEMBLY CONSTRUCTED OF THE MATERIALS AND IN THE MANNER DESCRIBED IN THE INDIVIDUAL U300, U400 OR V400 SERIES WALL OR PARTITION DESIGN IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:
 - STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC WITH NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER END PLATES AND CROSS BRACES. STEEL STUDS TO BE MIN 3-5/8 IN. (92 MM) WIDE BY 1-3/8 IN. (35 MM) DEEP CHANNELS SPACED MAX 24 IN. (610 MM) OC.
 - GYPSUM BOARD* - NOM 5/8 IN. (16 MM) THICK, 4 FT (122 CM) WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIAM OF OPENING IS 14-1/2 (368MM) IN FOR WOOD STUD WALLS AND 18 IN. (457 MM) FOR STEEL STUD WALLS. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS 1 HR WHEN INSTALLED IN A 1 HR FIRE RATED WALL AND 2 HR WHEN INSTALLED IN A 2 HR FIRE RATED WALL.
- THROUGH PENETRANTS - ONE METALLIC PIPE OR TUBING TO BE CENTERED WITHIN THE FIRESTOP SYSTEM. PIPE OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES OR TUBING MAY BE USED:
 - STEEL PIPE - NOM 12 IN. (305 MM) DIAM (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
 - COPPER TUBING - NOM 6 IN. (152 MM) DIAM (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
 - COPPER PIPE - NOM 6 IN. (152 MM) DIAM (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

- PIPE COVERING* - NOM 1 OR 2 IN. (25 OR 51 MM) THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF OR 56 KG/M3) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY-APPLIED SELF-SEALING LAP TAPE. TRANSVERSE JOINTS SEALED WITH METAL FASTENERS OR WITH BUTT STRIP TAPE SUPPLIED WITH THE PRODUCT. WHEN NOM 1 IN. (25 MM) THICK PIPE COVERING IS USED, THE ANNULAR SPACE BETWEEN THE PIPE COVERING AND THE CIRCULAR CUTOUT IN THE GYPSUM WALLBOARD LAYERS ON EACH SIDE OF THE WALL SHALL BE MIN 1/4 IN. (6 MM) TO MAX 3/8 IN. (10 MM) WHEN NOM 2 IN. (51 MM) THICK PIPE COVERING IS USED, THE ANNULAR SPACE BETWEEN THE PIPE COVERING AND THE CIRCULAR CUTOUT IN THE GYPSUM WALLBOARD LAYERS ON EACH SIDE OF THE WALL SHALL BE MIN 1/2 IN. (13 MM) TO MAX 3/4 IN. (19 MM) SEE PIPE AND EQUIPMENT COVERING MATERIALS (BRGU) CATEGORY IN BUILDING MATERIALS DIRECTORY FOR NAMES OF MANUFACTURERS. ANY PIPE COVERING MATERIAL MEETING THE ABOVE SPECIFICATIONS AND BEARING THE UL CLASSIFICATION MARKING WITH A FLAME SPREAD INDEX OF 25 OR LESS AND A SMOKE DEVELOPED INDEX OF 50 OR LESS MAY BE USED. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS 3/4 HR WHEN NOM 1 IN. (25 MM) THICK PIPE COVERING IS USED. THE HOURLY T RATING OF THE FIRESTOP SYSTEM IS 1 HR AND 1-1/2 HR WHEN NOM 2 IN. (52 MM) THICK PIPE COVERING IS USED WITH 1 HR AND 2 HR FIRE RATED WALLS, RESPECTIVELY.

FIRESTOP SYSTEM - INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY.
THE DETAILS OF THE FIRESTOP SYSTEM SHALL BE AS FOLLOWS:

- FIRESTOP SYSTEM - INSTALLED SYMMETRICALLY ON BOTH SIDES OF WALL ASSEMBLY.
THE DETAILS OF THE FIRESTOP SYSTEM SHALL BE AS FOLLOWS:

- FILL, VOID OR CAVITY MATERIALS* - WRAP STRIP - NOM 1/4 IN. (6 MM) THICK INTUMESCENT ELASTOMERIC MATERIAL FACED ON ONE SIDE WITH ALUMINUM FOIL, SUPPLIED IN 2 IN. (51 MM) WIDE STRIPS. NOM 2 IN. (51 MM) WIDE STRIP TIGHTLY WRAPPED AROUND PIPE COVERING (FOIL SIDE OUT) WITH SEAM BUTTED. WRAP STRIP LAYER SECURELY BOUND WITH STEEL WIRE OR ALUMINUM FOIL TAPE AND SLID INTO ANNULAR SPACE APPROX 1-1/4 IN. (32 MM) SUCH THAT APPROX 3/4 IN. (19 MM) OF THE WRAP STRIP WIDTH PROTRUDES FROM THE WALL SURFACE. ONE LAYER OF WRAP STRIP IS REQUIRED WHEN NOM 1 IN. (25 MM) THICK PIPE COVERING IS USED. TWO LAYERS OF WRAP STRIP ARE REQUIRED WHEN NOM 2 IN. (51 MM) THICK PIPE COVERING IS USED. 3M COMPANY - FS-195+
- FILL, VOID OR CAVITY MATERIALS* - CAULK OR SEALANT 15/32 MIN 1/4 IN. (6 MM) DIAM CONTINUOUS BEAD APPLIED TO THE WRAP STRIP/WALL INTERFACE AND TO THE EXPOSED EDGE OF THE WRAP STRIP LAYER APPROX 3/4 IN. (19 MM) FROM THE WALL SURFACE.

3M COMPANY - CP 25WB+, IC 15WB+, FIREADM 150+ CAULK OR FB-3000 WT SEALANT

*BEARING THE UL CLASSIFICATION MARK LAST UPDATED ON 2005-05-19

UL LISTED AND CLASSIFIED PRODUCTS UL RECOGNIZED COMPONENTS PRODUCTS CERTIFIED FOR CANADA

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THROUGH-PENETRATION FIRESTOP SYSTEMS W-L-5001

No Scale

NOTES FOR SEISMIC ANCHORAGE AND BRACING

A. General

1. Ducts, pipes, and conduits shall be braced in accordance with the 2021 International Building Code (IBC), Occupancy Category III, or IV. Refer to structural drawings for site class, short and long period acceleration parameters and seismic design category. Component importance factor shall be 1.5 for all systems. Bracing calculations and system design to be completed by a registered engineer within the state, refer to specification sections 230547 for additional requirements.

2. Unless otherwise permitted by the Code or applicable bracing standards, in-line equipment shall be braced independently of the ducts or pipes and in conformance with applicable building codes.

3. Pipe, duct, and conduit hangers shall be positively attached to the supporting structure above. The use of C-clamps or other friction-type anchors to hang pipe, duct, and conduit is prohibited. Friction-type anchors such as C-clamps with properly attached retaining straps may be used if approved by the Structural Engineer-of-Record.

4. Refer to the Structural Drawings for acceptable expansion anchor types and test loads where required.

5. Appropriate expansion/contraction capability shall be provided in ducts, conduits, pipes, etc. which cross building expansion direction on each side of the joint centerline. As a minimum, the total relative movement in any horizontal directions shall be equal to the size of the building expansion joint. For example, at a 3-inch building expansion joint, a pipe, duct, or conduit shall be permitted to move a minimum of three inches (1 1/2 inches in each of 2 opposite horizontal directions) on each side of the joint centerline.

6. Light fixtures may be required to be braced independently from ceilings, refer to the architectural documents for required seismic bracing and support of light fixtures.

B. Requirements for Bracing of Ducts

1. Brace rectangular ducts with cross-sectional areas of 6 square feet and larger. Brace flat oval ducts in the same manner as rectangular ducts. Brace round ducts with diameters of 28 inches and larger. Brace flat oval ducts the same as rectangular ducts of the same nominal size. Exception: No bracing is required if the duct is suspended by hangers 12 inches or less in length, as measured from the top of the duct to the bottom of the support where the hanger is attached. Hangers shall be positively attached to the supporting structure above and must be positively attached to the duct within 2 inches of the top of the duct with a minimum of two #10 sheet metal screws.

2. Transverse bracing shall occur at the interval specified in ASCE 7-16 or at both ends if the duct run is less than the specified interval. Transverse bracing shall be installed at each duct turn and at each end of a duct run, with a minimum of one brace at each end.

3. Longitudinal bracing shall occur at the interval specified in ASCE 7-16 with at least one brace per duct run.

4. A group of ducts may be combined in a larger frame so the combined weights and dimensions of the ducts are less than or equal to the maximum weight and dimensions of the duct for which bracing details are selected. (Example: to brace a 30" x 30" duct beside a 54" x 28" duct, select bracing for an 84" x 42" duct. The horizontal dimension of the 84" x 42" duct is equal to the combined ducts and its weight is greater than their combined weights.)

5. Un-braced ducts shall be installed with a 6-inch minimum clearance to vertical ceiling hanger wires.

C. Requirements for Bracing of Pipes

1. Provide bracing details, schedules, and notes for all types of pipe, conduit and joints.

2. Seismic support shall not be required for other piping systems where one of the following conditions are met:

a) Piping is supported by rod hangers; hangers in the pipe run are 12 in or less in length from the top of the pipe to the supporting structure; hangers are detailed to avoid bending of the hangers and their attachments; and provisions are made for piping to accommodate expected deflections.

b) High-deformability piping is used; provisions are made to avoid impact with larger piping or mechanical components or to protect the piping in the event of such impact; and the following size requirements are satisfied:

1. For Seismic Design Categories D, E, or F, the nominal pipe size shall be 1 in. or less.

2. For Seismic Design Category C, the nominal pipe size shall be 2 in or less.

3. Transverse bracing shall be at 40 feet maximum, except where a lesser spacing is indicated in the tables for bracing of pipes.

4. Longitudinal bracing shall be at 80 feet maximum, except where a lesser spacing is indicated in the tables. In pipes where thermal expansion is a consideration, an anchor point may be used as the specified longitudinal brace provided it has a capacity equal to or greater than a longitudinal brace. The longitudinal braces and connections must be capable of resisting the additional force induced by expansion and contraction.

5. Brace fuel-oil and natural gas piping, as required for flammable piping.

6. Provide flexibility in joints where pipes pass through building seismic joints or expansion joints or where rigidly supported pipes connect to equipment with vibration isolators.

7. Branch lines may not be used to brace main lines.

8. A rigid piping system shall not be braced to dissimilar parts of the building or to two dissimilar building systems that may respond differently during an earthquake.

9. Cast-iron pipe of all types, glass pipe, and any other pipe joined with a shield and clamp assembly, where the top of the pipe is 12 inches or more from the supporting structure, shall be braced on each side of a change in a direction of 90 degrees or more. Riser joints shall be braced or stabilized between floors.

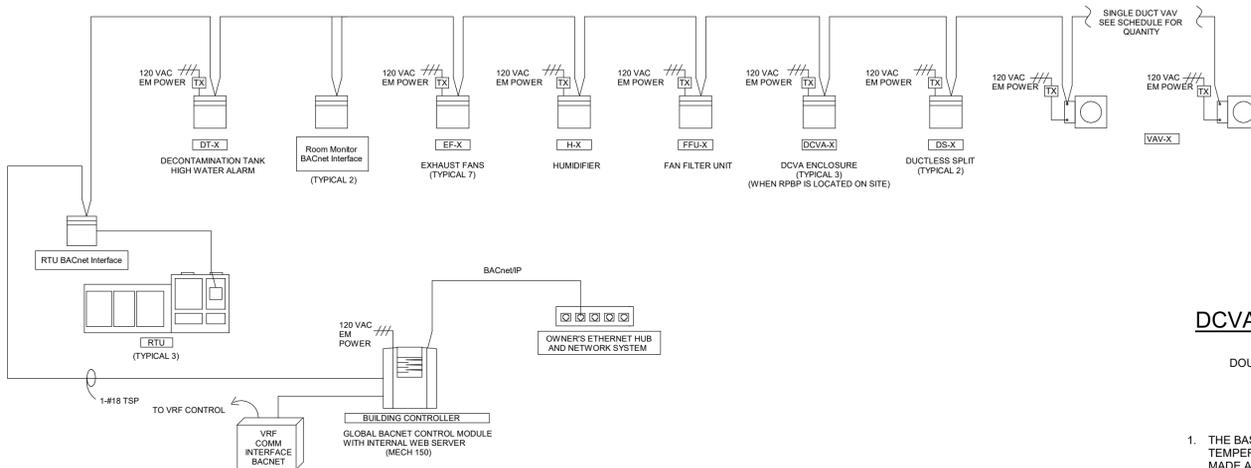
10. Vertical risers shall be laterally supported with a riser clamp at each floor. For buildings greater than six stories high, risers shall be engineered individually.

D. Equipment

1. Floor- or pad-mounted equipment without vibration isolators shall be bolted to the floor (slab) with 3/8-inch diameter expansion bolts (see Structural Drawings for acceptable bolt type and required embedment) unless noted or shown otherwise on the MPE Drawings. Provide expansion anchors at the four corners and at 4'-0" center-to-center maximum along each side unless noted otherwise.

2. Vibration isolators, snubbers, isolation rails, etc. and the anchorage of these assemblies for floor- or roof-mounted or suspended equipment shall be designed for the appropriate seismic forces (Fp) as found in the Chapter 13 if ASCE 7-16 and as required by the IBC. The design seismic forces shall be determined considering the amplification effects of non-rigid or flexible supports. Refer to the specifications for additional information and submittal requirements.

3. Contractor shall submit a letter from each equipment manufacturer stating that active mechanical and electrical equipment that must remain operable following the design level earthquake for the project site shall be certified as operable based on shake table testing as specified in Section 13.2.5 of ASCE 7-16, or experience and historical data as outlined in Section 13.2.6 of ASCE 7-16 while meeting the scheduled and detailed requirements of the project.

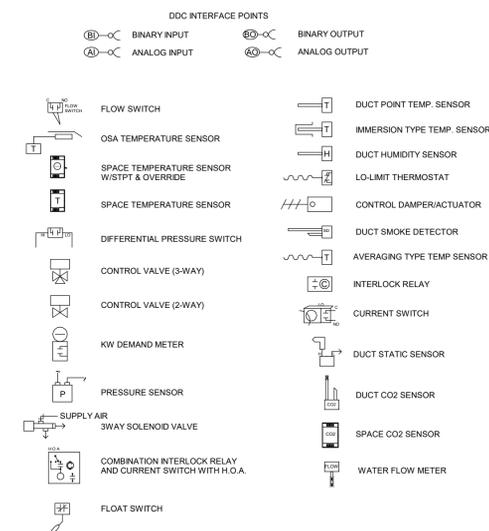


AUTOMATION SYSTEM LAYOUT AND COMMUNICATION RISER EXPANSION

ALL NEW PRIMARY HVAC EQUIPMENT SHALL BE CONNECTED TO THE NEW BACNET COMPLIANT FACILITY AUTOMATION SYSTEM. ALL NEW DDC CONTROLLERS SHALL COMMUNICATE VIA THE BACNET STANDARD PROTOCOL. THE OWNER SHALL PROVIDE AN ETHERNET LAN CONNECTION AND STATIC IP ADDRESS FOR CONNECTION OF THE WEB SERVER TO THE FACILITY ETHERNET NETWORK.

GRAPHICAL DISPLAYS SHALL BE PROVIDED FOR ALL CONNECTED HVAC EQUIPMENT. FLOOR PLAN DISPLAYS SHALL BE INCORPORATED INTO THE SYSTEM TO ALLOW OPERATOR NAVIGATION OF THE SYSTEM. AUTOMATION SYSTEM SHALL INCLUDE A WEB SERVER. THE WEB SERVER INTERFACE SHALL ENABLE OWNER TO MONITOR OPERATION AND MAKE SYSTEM CHANGES VIA A STANDARD INTERNET BROWSER. THE SYSTEM SHALL SEND POINT SPECIFIC ALARMS TO OWNER DEFINED EMAIL ADDRESSES.

HVAC CONTROL SYMBOL LEGEND



DCVA ENCLOSURE MONITORING

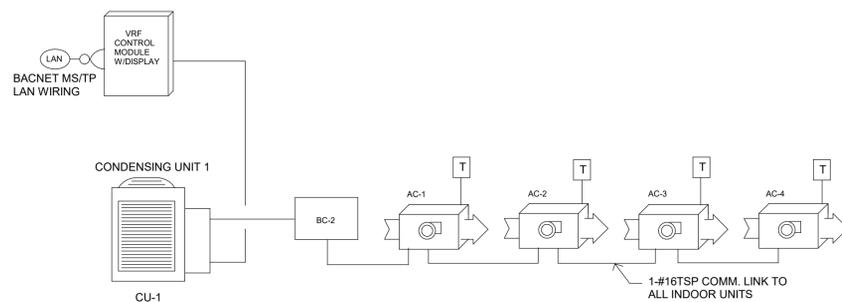
DOUBLE CHECK VALVE ASSEMBLY (DCVA) MONITORING
(WHEN RPBP IS LOCATED ON SITE)
SEQUENCE OF OPERATION

1. THE BAS SHALL MONITOR THE DCVA ENCLOSURE DRY-BULB TEMPERATURE ON A CONTINUAL BASIS. THESE VALUES SHALL BE MADE AVAILABLE TO THE SYSTEM AT ALL TIMES.
2. BAS SHALL ALARM IF TEMPERATURE DROPS BELOW 40°F.

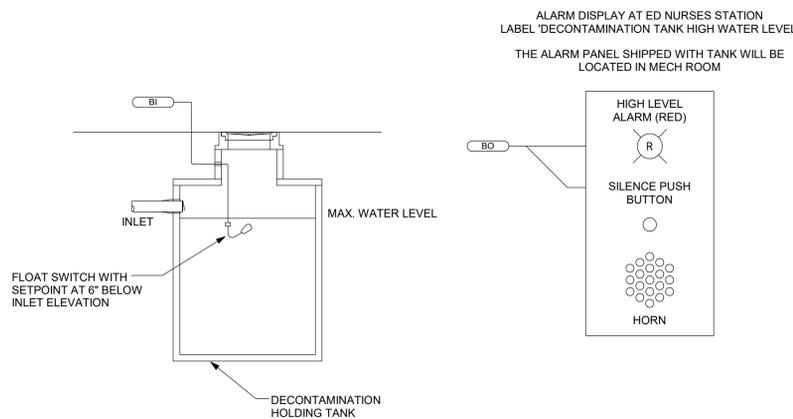
OUTSIDE AIR MONITORING

OUTSIDE AIR MONITORING
SEQUENCE OF OPERATION

1. THE BAS SHALL MONITOR THE OUTSIDE AIR DRY-BULB TEMPERATURE ON A CONTINUAL BASIS. THESE VALUES SHALL BE MADE AVAILABLE TO THE SYSTEM AT ALL TIMES.



VRF SYSTEM LAYOUT AND COMMUNICATION RISER DIAGRAM



DECONTAMINATION TANK HIGH WATER ALARM CONTROL

DECONTAMINATION TANK HIGH WATER ALARM CONTROL
SEQUENCE OF OPERATION

1. TANK LEVEL STATUS: THE BAS SHALL MONITOR THE TANK LEVEL STATUS AND ALARM BAS AND INITIATE VISUAL ALARM AT ED NURSES STATION.
2. THE HIGH LEVEL ALARM LIGHT SHALL REMAIN ENABLED WHENEVER ALARM CONDITION EXISTS.

DECONTAMINATION TANK HIGH WATER LEVEL										
POINT NAME	HARDWARE POINTS					SOFTWARE POINTS				
	AI	AO	BI	BO	AV	BV	SCHED	TREND	ALARM	SHOW ON GRAPHIC
HIGH WATER LEVEL			X			X		X		X
NURSES STATION VISUAL ALARM				X		X				
HIGH WATER LEVEL ALARM									X	

TYPICAL ROOM PRESSURIZATION MONITORING

ROOM PRESSURIZATION
SEQUENCE OF OPERATION

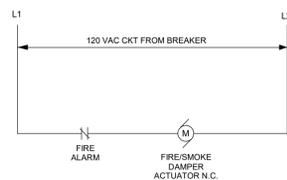
1. ROOM PRESSURE DIFFERENTIAL IS MEASURED CONTINUOUSLY.
2. DOOR SWITCH MONITORS DOOR OPEN/CLOSE POSITION WITH FIELD ADJUSTABLE DOOR DELAY TIMER TO AVOID MOMENTARY, NUISANCE ALARMS.

ROOM MONITORING

ROOM MONITORING
SEQUENCE OF OPERATION

1. THE BAS SHALL MONITOR AND TREND ROOM DIFFERENTIAL PRESSURE, TEMPERATURE, AND HUMIDITY, FOR ROOMS LISTED IN THE MISCELLANEOUS POINTS LIST.
2. ROOM DIFFERENTIAL PRESSURE SHALL BE MONITORED THROUGH THE ROOM PRESSURE CONTROLLER BACNET COMMUNICATIONS INTERFACE.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC	
	AI	AO	BI	BO	AV	BV	SCHED	TREND		ALARM
OUTSIDE AIR TEMP	X							X		X
DUCTLESS SPLIT SYSTEM DS-1 STATUS				X				X		X
118 ISOLATION DIFFERENTIAL PRESSURE					X			X		X

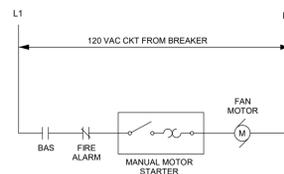
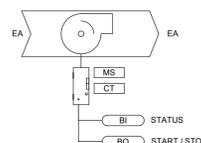


FIRE/SMOKE DAMPER CONTROL

DUCT SMOKE DETECTORS & CONTROL WIRING PROVIDED BY DIVISION 28.
POWER WIRING PROVIDED BY DIVISION 26.
DUCT SMOKE DETECTORS INSTALLED BY DIVISION 23.

SEQUENCE OF OPERATION

1. FIRE/SMOKE DAMPER SHALL BE CLOSED BY ASSOCIATED DUCT SMOKE DETECTOR ON DETECTION OF SMOKE. DETECTOR TO BE OUTSIDE OF DUCT WITH SAMPLING TUBES PROTRUDING INTO DUCT, WITHIN 5 FEET OF DAMPER.
2. THE FIRE ALARM SYSTEM SHALL CLOSE ALL FIRE/SMOKE DAMPERS ON A GENERAL FIRE ALARM.
3. WHEN AN ALARM CONDITION FROM A DUCT SMOKE DETECTOR CLOSSES ITS ASSOCIATED FIRE/SMOKE DAMPER, THE RTU SHALL CONTINUE TO RUN UNLESS STOPPED BY SAFETY SHUTDOWNS.
4. DAMPER SHALL BE CLOSED UPON FAN SHUTDOWN.

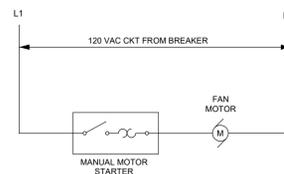
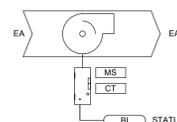


EXHAUST FAN EF-1, EF-2 & EF-3 CONTROL

EXHAUST FAN
SEQUENCE OF OPERATION
EF-1, EF-2, & EF-3

1. THE EXHAUST FAN SHALL BE INTERLOCKED TO RUN WHEN RTU-1 IS ON.
2. THE BAS SHALL MONITOR THE EXHAUST FAN STATUS.
3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - A. FAN FAILURE: COMMANDED ON, BUT STATUS IS OFF.
 - B. FAN IN HAND: COMMANDED OFF, BUT STATUS IS ON.
4. SAFETY SHUTDOWN: FIRE ALARM SYSTEM SHALL SHUTDOWN FAN ON GENERAL FIRE ALARM.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC	
	AI	AD	BI	BO	AV	BV	SCHED	TREND		ALARM
FAN STATUS			X							X
FAN START/STOP				X						X
FAN FAILURE									X	
FAN IN HAND									X	

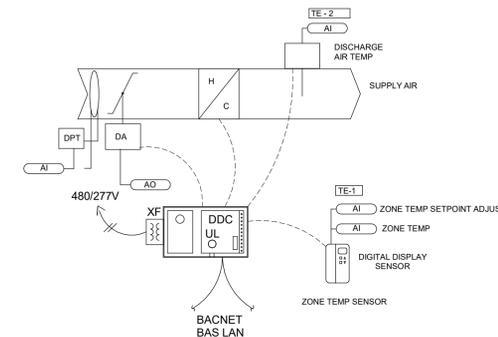


EXHAUST FAN EF-4, EF-5 & EF-6 & EF-MG CONTROL

EXHAUST FAN
SEQUENCE OF OPERATION
EF-4, EF-5, EF-6 & EF-MG

1. THE EXHAUST FAN SHALL BE RUN CONTINUOUSLY.
2. THE BAS SHALL MONITOR THE EXHAUST FAN STATUS.
3. ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - A. FAN FAILURE: COMMANDED ON, BUT STATUS IS OFF.
 - B. FAN IN HAND: COMMANDED OFF, BUT STATUS IS ON.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC	
	AI	AD	BI	BO	AV	BV	SCHED	TREND		ALARM
FAN STATUS			X							X
FAN FAILURE									X	
FAN IN HAND									X	



TYPICAL SINGLE DUCT VAV BOX CONTROL

TYPICAL SINGLE DUCT VAV BOX
SEQUENCE OF OPERATION

BUILDING AUTOMATION SYSTEM INTERFACE

1. THE BUILDING AUTOMATION SYSTEM SHALL COMMUNICATE WITH THE VAV BOX UNIT CONTROLLER AND SHALL SEND OCCUPIED COMMANDS, AIRFLOW SETPOINTS, AND ZONE TEMPERATURE SETPOINTS. THE BAS SHALL MONITOR THE AIRFLOW, DISCHARGE AIR TEMPERATURE, AND TEMPERATURE, AND ZONE HEATING AND COOLING DEMANDS.
2. SETPOINTS, CONTROL BANDS, SETPOINT INCREMENT VALUES, AND ADJUSTMENT FREQUENCIES SHALL BE FIELD ADJUSTED AND TUNED THROUGH THE BAS TO MEET ACTUAL FIELD CONDITIONS AND TO MAINTAIN MAXIMUM SYSTEM OPTIMIZATION AND STABLE SYSTEM CONTROL.

RUN CONDITIONS - CONTINUOUS

1. THE UNIT SHALL RUN CONTINUOUSLY WHEN THE ASSOCIATED RTU IS ON TO MAINTAIN THE FOLLOWING ZONE TEMPERATURE SETPOINTS:
 - A. 72°F (ADJ.) COOLING SETPOINT.
 - B. 70°F (ADJ.) HEATING SETPOINT.
2. ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - C. HIGH ZONE TEMP: IF THE ZONE TEMPERATURE IS GREATER THAN THE COOLING SETPOINT BY A USER DEFINABLE AMOUNT.
 - D. LOW ZONE TEMP: IF THE ZONE TEMPERATURE IS LESS THAN THE HEATING SETPOINT BY A USER DEFINABLE AMOUNT.

ZONE SETPOINT ADJUST

1. THE OCCUPANT SHALL BE ABLE TO ADJUST THE ZONE TEMPERATURE HEATING AND COOLING SETPOINTS AT THE ZONE SENSOR.

ZONE TEMPERATURE CONTROL - VARIABLE VOLUME AIRFLOW

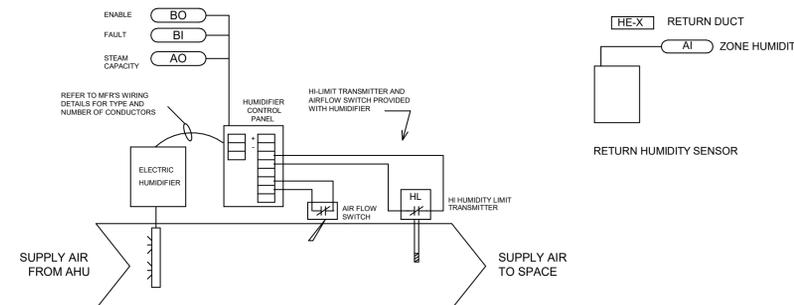
1. THE PRIMARY DAMPER SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE SETPOINT.
2. THE CONTROLLER SHALL MEASURE THE ZONE TEMPERATURE AND MODULATE THE ELECTRIC REHEAT TO MAINTAIN SETPOINT.
3. ON A DROP IN ZONE TEMPERATURE BELOW THE ZONE HEATING SETPOINT, THE ELECTRIC REHEAT WILL MODULATE TO MAINTAIN THE SPACE TEMPERATURE SETPOINT.

DISCHARGE AIR TEMPERATURE

1. THE CONTROLLER SHALL MONITOR THE DISCHARGE AIR TEMPERATURE.
2. ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - A. HIGH DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS GREATER THAN 120°F.
 - B. LOW DISCHARGE AIR TEMP: IF THE DISCHARGE AIR TEMPERATURE IS LESS THAN 40°F.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC	
	AI	AD	BI	BO	AV	BV	SCHED	TREND		ALARM
ZONE TEMP	X				X			X		X
ZONE TEMP ADJUST - NOTE 1	X									X
AIRFLOW	X						X			X
SUPPLY AIR TEMP	X						X			X
ZONE DAMPER			X							X
ELECTRIC REHEAT PERCENT			X				X			X
AIRFLOW SETPOINT					X					X
DISCHARGE AIR TEMPERATURE SETPOINT					X		X			X
HEATING SETPOINT					X					X
COOLING SETPOINT					X					X
HIGH ZONE TEMP									X	
LOW ZONE TEMP									X	
HIGH DISCHARGE AIR TEMP									X	
LOW DISCHARGE AIR TEMP									X	

1. ZONE TEMP SENSORS FOR VAV 1-21 (100 ENTRY VESTIBULE), VAV 1-23 (101 WAITING), AND VAV 1-16 (108 RECEIVING) ARE TEMP SENSOR ONLY - NO SETPOINT ADJUSTMENT.



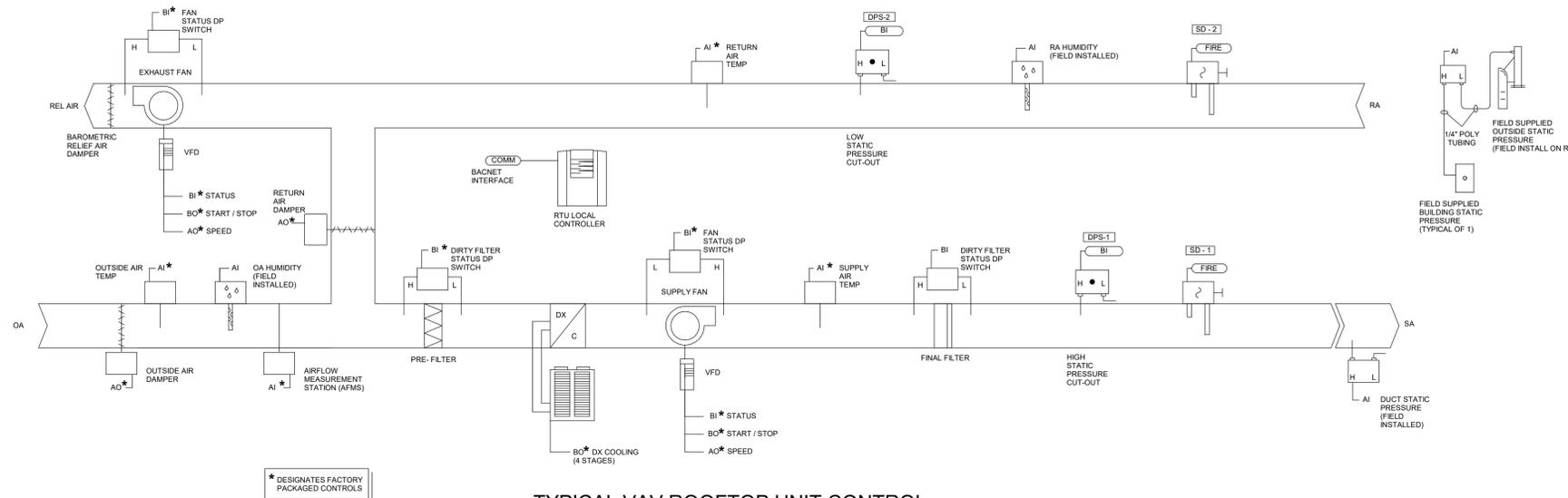
ELECTRIC HUMIDIFIER CONTROL

ELECTRIC HUMIDIFIER SEQUENCE OF OPERATION

1. THE BAS SHALL ENABLE THE SELF-CONTAINED HUMIDIFIER TO RUN IN AUTO MODE WHENEVER THE SUPPLY FAN STATUS IS ON.
2. WHEN ENABLED AND AIRFLOW HAS BEEN PROVEN, THE HUMIDIFIER CONTROLLER SHALL MEASURE THE SPACE HUMIDITY AND MODULATE THE STEAM CAPACITY TO MAINTAIN A ZONE HUMIDITY SETPOINT OF 32 PERCENT RH WHILE LIMITING THE SUPPLY AIR HUMIDITY TO A MAXIMUM RH OF 85 PERCENT.
3. THE ZONE HUMIDITY LEVEL SHALL BE MEASURED BY A FACTORY SUPPLIED HUMIDITY TRANSMITTER MOUNTED IN THE RETURN DUCT, AS SHOWN.
4. THE SUPPLY AIR HUMIDITY LEVEL SHALL BE MEASURED BY A FACTORY SUPPLIED HIGH LIMIT HUMIDITY TRANSMITTER MOUNTED IN THE SUPPLY DUCT. THE HUMIDIFIER CONTROLLER STARTS LOWERING THE HUMIDIFIER OUTPUT WHEN THE SUPPLY AIR RELATIVE HUMIDITY IS WITHIN A USER-DEFINED PERCENTAGE OF THE DUCT HIGH LIMIT SETPOINT.
5. AIRFLOW SHALL BE PROVEN BY A FACTORY SUPPLIED AIRFLOW PROVING SWITCH MOUNTED IN THE SUPPLY DUCT.
6. ALARMS SHALL BE PROVIDE AS FOLLOWS:
 - A. HIGH ZONE HUMIDITY: IF THE ZONE HUMIDITY IS GREATER THAN 60 PERCENT RH.
 - B. LOW ZONE HUMIDITY: IF THE ZONE HUMIDITY IS LESS THAN 10 PERCENT BELOW THE HUMIDIFICATION SETPOINT.
7. THE HIGH WATER FLOAT IN THE CONDENSATE PUMP SHALL TURN OFF HUMIDIFIER AND ALARM THE BAS.

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS					SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	SCHED	TREND	ALARM	
ZONE HUMIDITY	X							X		X
HUMIDIFIER STEAM CAPACITY		X								X
HUMIDIFIER FAULT			X							X
HUMIDIFIER ENABLE				X						X
HIGH ZONE HUMIDITY									X	X
LOW ZONE HUMIDITY									X	X

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TYPICAL VAV ROOFTOP UNIT CONTROL

VARIABLE AIR VOLUME AIR HANDLING UNIT
SEQUENCE OF OPERATION
RTU-1

BUILDING AUTOMATION SYSTEM (BAS) INTERFACE

- THE VARIABLE AIR VOLUME ROOFTOP UNIT (RTU) SHALL BE CONTROLLED BY A FACTORY MOUNTED MICRO-PROCESSOR BASED DDC CONTROLLER. THE ROOFTOP UNIT LOCAL CONTROLLER (RLC) SHALL COMMUNICATE WITH THE BAS VIA A BACNET MS/TP PROTOCOL INTERFACE.
- CURRENT ROOFTOP UNIT STATUS AND OPERATING CONDITIONS SHALL BE MONITORED THROUGH THE COMMUNICATIONS INTERFACE. THE BAS SHALL MONITOR AND TREND THE POINTS SHOWN ON THE VAV ROOFTOP UNIT BACNET INTERFACE POINTS LIST.
- SUPPLY AIR TEMPERATURE SETPOINTS, DUCT & BUILDING STATIC PRESSURE SETPOINTS, AND ECONOMIZER ENABLE SETPOINT SHALL BE ADJUSTABLE BY THE BAS THROUGH THE COMMUNICATIONS INTERFACE. BAS CONTROL AND MONITORING CAPABILITIES SHALL INCLUDE SCHEDULING AND DIAGNOSTICS.
- SETPOINTS, CONTROL BANDS, SETPOINT INCREMENT VALUES, AND ADJUSTMENT FREQUENCIES SHALL BE FIELD ADJUSTED AND TUNED THROUGH THE BAS TO MEET ACTUAL FIELD CONDITIONS AND TO MAINTAIN MAXIMUM SYSTEM OPTIMIZATION AND STABLE SYSTEM CONTROL.

UNIT RUN CONDITIONS

- THE UNIT SHALL BE ENABLED BY THE BAS TO RUN CONTINUOUSLY.

SUPPLY AIR FAN CONTROL

- THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN, UNLESS SHUTDOWN ON SAFETIES.
- ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - SUPPLY FAN FAILURE: COMMANDED ON, BUT STATUS IS OFF.
 - SUPPLY FAN IN HAND: COMMANDED OFF, BUT THE STATUS IS ON.

SUPPLY AIR DUCT STATIC PRESSURE CONTROL

- THE RTU LOCAL CONTROLLER SHALL MODULATE THE SUPPLY FAN VFD SPEED TO MAINTAIN THE SUPPLY DUCT STATIC PRESSURE SETPOINT.
- THE SUPPLY FAN SHALL START AT MINIMUM FAN SPEED.
- THE SUPPLY AIR DUCT STATIC PRESSURE SETPOINT SHALL BE THE LOWEST DUCT STATIC PRESSURE DETERMINED BY TAB THAT MAINTAINS THE MOST CRITICAL ZONE DAMPER AT GREATER THAN 90 PERCENT OPEN WITH ALL TERMINAL BOXES AT THEIR SCHEDULED MAXIMUM AIRFLOW.
- THE BAS SHALL MONITOR THE SUPPLY DUCT STATIC PRESSURE.
- ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - HIGH SUPPLY AIR STATIC PRESSURE: IF THE SUPPLY AIR STATIC PRESSURE IS 25 PERCENT GREATER THAN SETPOINT.
 - LOW SUPPLY AIR STATIC PRESSURE: IF THE SUPPLY AIR STATIC PRESSURE IS 25 PERCENT LESS THAN SETPOINT.

BUILDING PRESSURE AND EXHAUST FAN CONTROL - THE FOLLOWING CONTROLS WILL ONLY BE ENABLED WITH THE RTU IS IN ECONOMIZER MODE

- THE EXHAUST FAN SHALL BE ENABLED BASED ON BUILDING DIFFERENTIAL PRESSURE WHEN THE RTU IS IN ECONOMIZER MODE.
- WHEN THE SUPPLY FAN IS OPERATING AND THE BUILDING STATIC PRESSURE RISES ABOVE THE BUILDING STATIC PRESSURE SETPOINT PLUS THE DEADBAND, THE EXHAUST FAN WILL BE ENABLED AND THE RTU LOCAL CONTROLLER WILL MODULATE THE EXHAUST FAN VFD TO MAINTAIN BUILDING STATIC PRESSURE SETPOINT.
- BUILDING STATIC PRESSURE SETPOINT WILL BE SET DURING TAB AS THE MEASURED DIFFERENTIAL PRESSURE BETWEEN INSIDE AND OUTSIDE PRESSURES WHEN THE RTU IS ON AND ALL THE VAV BOXES AND EXHAUST FANS ARE AT MAXIMUM AIRFLOW AND BALANCED TO MAINTAIN ROOM PRESSURE RELATIONSHIPS.
- THE EXHAUST FAN VFD WILL START AT MINIMUM SPEED.
- ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - EXHAUST FAN FAILURE: COMMANDED ON, BUT STATUS IS OFF.
 - EXHAUST FAN IN HAND: COMMANDED OFF, BUT STATUS IS ON.
 - HIGH BUILDING STATIC PRESSURE: IF THE BUILDING STATIC PRESSURE IS 25 PERCENT GREATER THAN SETPOINT.

SUPPLY AIR TEMPERATURE SETPOINT RESET

- WHEN ENABLED, THE BAS UTILIZE A SUPPLY AIR TEMPERATURE SETPOINT RESET STRATEGY TO AND RESET THE SUPPLY AIR TEMPERATURE (SAT) SETPOINT BASED ON SATISFYING ALL ZONE COOLING REQUIREMENTS AND MINIMIZING REHEAT ENERGY.
- THE SAT SETPOINT SHALL BE RESET USING TRIM AND RESPOND LOGIC WITHIN THE RANGE OF 50 DEG F (SATMIN) AND 60 DEG F (SATMAX). THE INITIAL SAT SETPOINT SHALL BE 50 DEG F.
- THE BAS SHALL INCREMENTALLY INCREASE THE SAT SETPOINT AT A RATE OF 0.2 DEG F PER MINUTE TO A HIGH LIMIT OF SAT MAX. UNTIL AT LEAST ONE ZONE HEATING DEMAND IS LESS THAN 5 PERCENT. THIS APPROACH MINIMIZES THE REHEAT ENERGY BY KEEPING AT LEAST ONE ZONE ON THE VERGE OF RUNNING OUT OF COOLING CAPACITY.
- IF MORE THAN THREE ZONES ARE AT LESS THAN 5 PERCENT HEATING DEMAND, THE BAS SHALL INCREMENTALLY DECREASE THE SAT SETPOINT TO A LOW LIMIT OF SAT MIN. UNTIL ONLY ONE ZONE HEATING DEMAND IS LESS THAN 5 PERCENT.
- THE BAS SHALL OVERRIDE THE SAT SETPOINT RESET CONTROL TO MAINTAIN A MAXIMUM 59 PERCENT RH AS MEASURED BY THE HUMIDIFIER RETURN AIR HUMIDITY SENSOR.

IF THE RETURN RH IS GREATER THAN THE MAXIMUM SETPOINT AND THE CURRENT SAT SETPOINT IS GREATER THAN SAT MIN, THE BAS SHALL INCREMENTALLY DECREASE THE SAT SETPOINT TO A LOW LIMIT OF SAT MIN. UNTIL THE RETURN RH IS LESS THAN THE MAXIMUM RETURN RH SETPOINT.

6. ALARMS SHALL BE PROVIDED AS FOLLOWS:

- HIGH SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS GREATER THAN 75 DEG F.
- LOW SUPPLY AIR TEMP: IF THE SUPPLY AIR TEMPERATURE IS LESS THAN 45 DEG F.

MINIMUM OUTSIDE AIR CONTROL

- THE RTU LOCAL CONTROLLER SHALL OPEN THE OUTSIDE AIR DAMPER TO ITS MINIMUM OA POSITION WHEN THE SUPPLY FAN STATUS IS ON.
- WHEN THE ECONOMIZER IS DISABLED, THE OA CFM MINIMUM SETPOINT SHALL BE THE OA MINIMUM CFM SCHEDULED.
- MINIMUM OUTSIDE AIR DAMPER POSITION WILL BE SET DURING TAB TO PROVIDE SCHEDULED MINIMUM OUTSIDE AIRFLOW WHEN VAV BOXES ARE AT MAXIMUM AIRFLOW.
- THE OA AFMS SHALL MODULATE THE OA DAMPER TO MAINTAIN CONSTANT OA AIRFLOW DURING VARIABLE AIRFLOW OPERATION.

ECONOMIZER CHANGEOVER (DUAL ENTHALPY)

- DUAL ENTHALPY ECONOMIZER SHALL BE THE DEFAULT ECONOMIZER TYPE.
- THE ECONOMIZER SHALL BE ENABLED WHEN THE OA TEMPERATURE IS 2 DEG F LESS THAN THE OA DRY BULB SETPOINT (75 DEG F) AND THE OA ENTHALPY IS 1 BTULB LESS THAN THE RA ENTHALPY.
- THE ECONOMIZER SHALL BE DISABLED AND RETURN TO MINIMUM POSITION WHEN THE OA TEMPERATURE IS EQUAL TO OR GREATER THAN THE OA DRY BULB SETPOINT OR THE ENTHALPY IS GREATER THAN THE RETURN AIR ENTHALPY.

ECONOMIZER CHANGEOVER (FIXED DRY BULB)

- FIXED DRY BULB ECONOMIZER SHALL BE SELECTABLE AT THE BAS.
- THE ECONOMIZER SHALL BE ENABLED WHEN THE OA TEMPERATURE IS 2 DEG F LESS THAN THE OA DRY BULB SETPOINT (65 DEG F).
- THE ECONOMIZER SHALL BE DISABLED AND RETURN TO MINIMUM POSITION WHEN THE OA TEMPERATURE IS EQUAL TO OR GREATER THAN THE OA DRY BULB SETPOINT.

INTEGRATED ECONOMIZER OPERATION

- WHEN THE ECONOMIZER IS ENABLED, THE RTU LOCAL CONTROLLER SHALL MODULATE THE RA DAMPER, OA DAMPER, AND STAGE COOLING IN SEQUENCE TO MAINTAIN THE SUPPLY AIR TEMPERATURE AT THE COOLING SAT SETPOINT.

ECONOMIZER FAULT DETECTION AND DIAGNOSTICS (FDD)

- THE FDD WILL PROVIDE A SYSTEM STATUS SHOWING:
 - FREE COOLING IS AVAILABLE
 - ECONOMIZER ENABLED
 - COMPRESSOR ENABLED
 - MIXED AIR LOW LIMIT CYCLE ACTIVE
- THE FDD WILL DETECT THE FAULT AND NOTIFY THE OPERATOR USING LOCAL ANNUNCIATION AND PROVIDE A FAULT SIGNAL VIA A BUILDING COMMUNICATION SYSTEM (BACNET):
 - AIR TEMPERATURE SENSOR FAULT/FAILURE
 - NOT ECONOMIZING WHEN REQUIRED
 - ECONOMIZING WHEN NOT REQUIRED
 - DAMPER NOT MODULATING
 - EXCESS OUTDOOR AIR

DX COOLING CONTROL

- DX COOLING SHALL STAGE LAST IN SEQUENCE TO MAINTAIN SAT SETPOINT AND SHALL BE ENABLED WHENEVER:
 - THE SAT EXCEEDS THE SAT SETPOINT.
 - AND THE ECONOMIZER IS EITHER DISABLED OR FULLY OPEN.
 - AND THE SUPPLY FAN STATUS IS ON.
- THE RTU LOCAL CONTROLLER SHALL STAGE THE COOLING CAPACITY TO MAINTAIN THE SAT AT SETPOINT.
- THE BAS SHALL MONITOR THE DIFFERENTIAL PRESSURE ACROSS THE PREFILTER AND FINAL FILTER.
- ALARMS SHALL BE PROVIDED AS FOLLOWS:
 - PRE-FILTER CHANGE REQUIRED: PRE-FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT.
 - FINAL FILTER CHANGE REQUIRED: FINAL FILTER DIFFERENTIAL PRESSURE EXCEEDS A USER DEFINABLE LIMIT.

SAFETY SHUTDOWNS

- HIGH AND LOW STATIC SHUT DOWN: THE UNIT SHALL SHUT DOWN AND GENERATE AN ALARM UPON RECEIVING EITHER A HIGH OR LOW STATIC PRESSURE SHUTDOWN SIGNAL.
- SUPPLY AND RETURN AIR SMOKE DETECTION: RETURN AIR OR SUPPLY AIR SMOKE DETECTORS SHALL SHUT DOWN THE UNIT ON DETECTION OF SMOKE.
- GENERAL FIRE ALARM: THE FIRE ALARM SYSTEM SHALL SHUT DOWN THE UNIT ON GENERAL FIRE ALARM.

VAV ROOFTOP UNIT BACnet INTERFACE (RTU-1)

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	SCHED	TREND	
DUCT STATIC PRESSURE					X			X	X
BUILDING STATIC PRESSURE					X			X	X
RETURN AIR TEMP					X			X	X
SUPPLY AIR TEMP					X			X	X
OUTSIDE AIR TEMP					X			X	X
RETURN AIR HUMIDITY (RH)					X			X	X
OUTSIDE AIR ENTHALPY					X			X	X
RETURN AIR ENTHALPY					X			X	X
OUTSIDE AIR DAMPER POSITION					X			X	X
RETURN AIR DAMPER POSITION					X			X	X
SUPPLY FAN VFD SPEED					X			X	X
EXHAUST FAN VFD SPEED					X			X	X
MINIMUM OA DAMPER POSITION SETPOINT					X			X	X
UNIT CONTROL STATUS					X			X	X
DUCT STATIC PRESSURE SETPOINT					X			X	X
BUILDING STATIC PRESSURE SETPOINT					X			X	X
SAT COOLING SETPOINT					X			X	X
ECONOMIZER METHOD					X			X	X
ECONOMIZER STATUS					X			X	X
COOLING STAGES (TYPICAL OF 4)						X		X	X
PRE-FILTER STATUS						X		X	X
FINAL FILTER STATUS						X		X	X
SUPPLY FAN START/STOP					X			X	X
EXHAUST FAN START/STOP					X			X	X
SUPPLY FAN STATUS					X			X	X
EXHAUST FAN STATUS					X			X	X
COOLING ENABLED						X		X	X
FREE COOLING AVAILABLE						X		X	X

VAV ROOFTOP UNIT (RTU-1)

POINT NAME	HARDWARE POINTS				SOFTWARE POINTS				SHOW ON GRAPHIC
	AI	AO	BI	BO	AV	BV	SCHED	TREND	
SUPPLY AIR TEMP SETPOINT					X			X	X
HIGH SUPPLY STATIC AIR PRESSURE								X	X
LOW SUPPLY STATIC AIR PRESSURE								X	X
HIGH BUILDING STATIC PRESSURE								X	X
SUPPLY FAN FAILURE								X	X
SUPPLY FAN IN HAND								X	X
EXHAUST FAN FAILURE								X	X
EXHAUST FAN IN HAND								X	X
HIGH SUPPLY AIR TEMP								X	X
LOW SUPPLY AIR TEMP								X	X
HIGH RETURN AIR HUMIDITY								X	X
PRE-FILTER CHANGE REQUIRED								X	X
FINAL FILTER CHANGE REQUIRED								X	X