LEGEND

SUPPLY DUCT UP

SUPPLY DUCT DOWN

RETURN DUCT UP

RETURN DUCT DOWN

INCLINED RISE, AIRFLOW LEFT TO RIGHT

INCLINED DROP, AIRFLOW LEFT TO RIGHT

ROUND DUCT INCLINED RISE, AIRFLOW LEFT TO RIGHT

ROUND DUCT INCLINED DROP, AIRFLOW LEFT TO RIGHT

LINED DUCT

RECTANGULAR ELBOW WITH TURNING VANES

ROUND TAKEOFF WITH BALANCING DAMPER

RECTANGULAR DUCT WITH BALANCING DAMPER

FLEXIBLE DUCT

SUPPLY-AIR DIFFUSER

RETURN-AIR GRILLE

EXHAUST-AIR GRILLE

HVAC SYMBOLS

MECHANICAL EQUIPMENT TAG

EQUIPMENT DESIGNATION (SEE ABBREVIATIONS)

NUMBER DESIGNATION

AIR DISTRIBUTION DEVICE TAG

DEVICE TYPE (SEE ABBREVIATIONS)

AIR QUANTITY (CFM)

NEW WORK PLAN NOTE

T THERMOSTAT

FORCED AIRFLOW

INDUCED AIRFLOW

FD VERTICAL FIRE DAMPER

FD HORIZONTAL FIRE DAMPER

ABBREVIATIONS

ABV	ABOVE
ACR	AIR CONDITIONING AND REFRIGERATION
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
BD	BACKDRAFT DAMPER
BOD	BOTTOM OF DUCT
BOT	BOTTOM
BTUH	BRITISH THERMAL UNIT PER HOUR
CAV	CONSTANT AIR VOLUME
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
CLR	CLEAR
CU	CONDENSING UNIT
DB	DRY BULB TEMPERATURE (DEG. F)
DEG	DEGREES
DEG. F	DEGREES FARENHEIT
DN	DOWN
DX	DIRECT EXPANSION
EAT	ENTERING AIR TEMPERATURE (DEG. F)
ENT	ENTERING
EXT	EXTERNAL
FC	FORWARD CURVED
FD	FIRE DAMPER
FF	FINISHED FLOOR
FPM	FEET PER MINUTE
GPM	GALLONS PER MINUTE
HP	HEAT PUMP
HP	HORSEPOWER
HZ	HERTZ
IN. W.G.	INCHES OF WATER GAUGE
LAT	LEAVING AIR TEMPERATURE (DEG. F)
LB	POUND
LP	LIQUIFIED PETROLEUM GAS
LVG	LEAVING
MAL	MALLEABLE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MFR	MANUFACTURER
MIN	MINIMUM
MOD	MOTOR OPERATED DAMPER
MVD	MANUAL VOLUME DAMPER
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NOM	NOMINAL
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
OED	OPEN-END DUCT
OPG	OPENING
PD	PRESSURE DROP
Ph	PHASE
PSIG	POUNDS PER SQUARE INCH GAUGE
R	RADIUS
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
RTU	ROOFTOP UNIT
SA	SUPPLY AIR
SCH	SCHEDULE
SEN	SENSIBLE
SP	STATIC PRESSURE (INCHES OF WATER)
SS	STAINLESS STEEL
TYP	TYPICAL
V	VOLTS
VEL	VELOCITY
W	WIDTH
WB	WET BULB TEMPERATURE (DEG. F)
WL	WALL LOUVER
WMS	WIRE MESH SCREEN
WPD	WATER PRESSURE DROP
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE

GENERAL NOTES

1. WHERE DUCTWORK, PIPING, OR ANY OTHER MECHANICAL EQUIPMENT IS INSTALLED ABOVE THE CEILING STRUCTURE, SUFFICIENT CLEARANCE SHALL BE PROVIDED BELOW ALL LOW POINTS OF THIS EQUIPMENT FOR THE INSTALLATION OF THE FINISHED CEILING AND ITS STRUCTURE AND ALL CEILING-MOUNTED EQUIPMENT INCLUDING CEILING-MOUNTED MECHANICAL EQUIPMENT, LIGHT FIXTURES, PLUMBING LINES, SPRINKLER HEADS, ETC. CLEARANCES REQUIRED FOR THE INSTALLATION OF THIS CEILING-MOUNTED EQUIPMENT SHALL BE VERIFIED AND COORDINATED WITH THE GENERAL CONTRACTOR AND ALL INVOLVED SUBCONTRACTORS BEFORE INSTALLING THE MECHANICAL EQUIPMENT. PROVIDE HANGERS, SUPPORTS, AND BRACING AS REQUIRED FOR SEISMIC CLASSIFICATION AS INDICATED IN SPECIFICATIONS.
2. WHERE SPACE IS LIMITED, SUCH AS IN THE FURRED CEILING SPACES AND CHASES, ROUTES AND CLEARANCES AND INSTALLATION PROCEDURES FOR DUCTWORK, PIPING, VALVES, AND OTHER MECHANICAL EQUIPMENT SHALL BE VERIFIED AND COORDINATED WITH OTHER WORK BEFORE EQUIPMENT IS INSTALLED.
3. ALL STRUCTURAL STEEL AND OTHER MATERIALS REQUIRED FOR OVERHEAD-SUSPENDED MECHANICAL EQUIPMENT SHALL BE PROVIDED BY MECHANICAL CONTRACTOR UNLESS DETAILED ON STRUCTURAL DRAWINGS. ALL NECESSARY REINFORCING IN BUILDING STRUCTURE SHALL BE PROVIDED BY GENERAL CONTRACTOR. SEE SPECIFICATIONS FOR SEISMIC REQUIREMENTS.
4. GRILLE AND OTHER EQUIPMENT MOUNTING HEIGHTS WHERE SHOWN ON DRAWINGS ARE MEASURED FROM FINISHED FLOOR TO BOTTOM EDGE OF OPENING UNLESS OTHERWISE INDICATED.
5. MOUNT WALL SENSORS WITH SETPOINT ADJUSTMENT 5'-0" ABOVE FINISHED FLOOR.
6. IF ANY EQUIPMENT OTHER THAN THAT SHOWN OR SPECIFIED IS FURNISHED, THE CONTRACTOR SHALL VERIFY THAT THE EQUIPMENT CAN BE INSTALLED IN THE SPACE AVAILABLE, INCLUDING PASSAGE THROUGH DOORS AND ACCESS DOORS AND ACCESS TO THOSE PARTS OF THE EQUIPMENT REQUIRING SERVICE.
7. ALL DUCTS 30" WIDE OR WIDER SHOWN RUNNING SIDE-BY-SIDE ON THE PLANS SHALL BE INSTALLED WITH A MINIMUM CLEARANCE OF 6" BETWEEN THEM TO PROVIDE SPACE FOR CEILING SUSPENSION DEVICES.
8. OPEN ENDS OF ALL RETURN AND EXHAUST DUCTS IN THE FURRED SPACE ABOVE THE CEILING SHALL BE COVERED WITH 1/2" WMS SECURELY ATTACHED TO THE DUCTS.
9. ALL DUCTWORK AND PIPING SHALL BE LOCATED ABOVE NEW CEILING UNLESS NOTED OTHERWISE.
10. MAXIMUM LENGTH OF FLEXIBLE DUCTS SHALL BE 5 FEET.
11. RUN CONDENSATE LINE FROM DRAINS ON AIR HANDLING UNITS TO NEARBY FLOOR DRAINS UNLESS OTHERWISE SHOWN. DRAINS SHALL BE SAME SIZE AS TAPPING ON UNIT EXCEPT NOT SMALLER THAN 1"Ø.
12. WHERE EXTERNAL INSULATION IS SHOWN ON DUCTS CONTAINING INTERNAL INSULATION, THE THICKNESS OF THE EXTERNAL INSULATION MAY BE REDUCED BY THE THICKNESS OF THE INTERNAL INSULATION.
13. ALL INTERNAL INSULATION IN DUCTWORK SHALL BE PROTECTED AT UPSTREAM AND DOWNSTREAM EDGES BY MITERED OFFSETS IN DUCT. OFFSETS SHALL BE SAME AS THICKNESS OF INSULATION.
14. SEE SPECIFICATIONS FOR DESCRIPTION OF DUCTWORK INSULATION.
15. ALL AIR INTAKE AND DISCHARGE LOUVERS TO EXTERIOR WALLS OF THE BUILDING SHALL BE FURNISHED BY MECHANICAL CONTRACTOR. SEE LOUVER SPECIFICATIONS FOR REQUIREMENTS.
16. ALL DUCTWORK SHOWN LINED SHALL HAVE 1/2" INTERNAL INSULATION. SEE SPECIFICATIONS.
17. OFFSET DUCTS AND PIPING WHERE NECESSARY TO CLEAR OTHER WORK SUCH AS BEAMS, PIPES, ELECTRICAL EQUIPMENT, ETC., COORDINATE DUCTWORK INSTALLATION WITH OTHER TRADES TO AVOID SPACE CONFLICTS.
18. ALL CEILING-MOUNTED DIFFUSERS AND GRILLES IN FURRED CEILING SHALL BE SYMMETRICALLY LOCATED WITH RESPECT TO LIGHTING FIXTURES. DO NOT SCALE DRAWINGS FOR LOCATIONS. COORDINATE EXACT LOCATIONS WITH ELECTRICAL CONTRACTOR AND REFER TO REFLECTED CEILING PLAN.
19. DUCT SIZES SHOWN ON PLANS INDICATE CLEAR INSIDE DIMENSIONS OF DUCTS, NOT INCLUDING ALLOWANCE FOR INTERNAL INSULATION.
20. PROVIDE AND INSTALL ACCESS DOORS IN DRYWALL TO MATCH EXISTING FOR ACCESS TO ALL BALANCING DAMPERS AND NEW EQUIPMENT.
21. AIR-BALANCE REPORT SHALL ACCOMPANY A SET OF AS-BUILT PLANS INDICATING EXACT TO-SCALE LOCATIONS AND FINAL BALANCE AIR RATES. MAINTAIN A MINIMUM OF ONE INTACT SET OF PROJECT PLANS AND SPECIFICATIONS AT JOB SITE MARKED TO SHOW ALL DEVIATIONS PERMITTED DURING CONSTRUCTION AS THE WORK IS INSTALLED. ALL MARKS SHALL BE RED IN COLOR, COMPLETE, CLEAR AND LEGIBLE.
22. PROVIDE FIRE-STOPPING AND FIRE DAMPERS AT ALL PENETRATIONS THROUGH RATED ASSEMBLIES AS REQUIRED BY NFPA 90A.

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

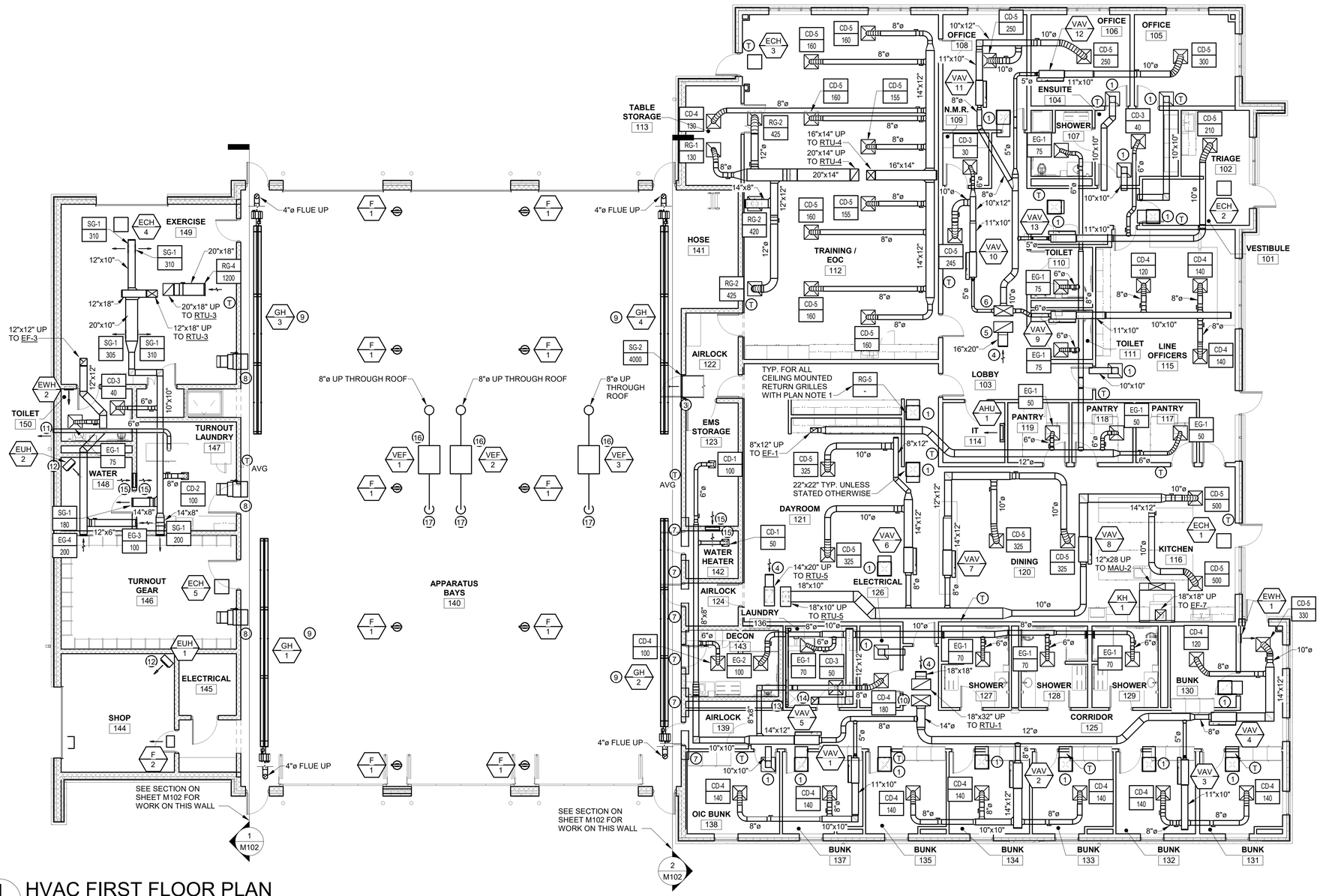
Project Status	**Issue Date**
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

HVAC LEGEND, GENERAL NOTES AND ABBREVIATIONS

M001



1 HVAC FIRST FLOOR PLAN

M101 1/8" = 1'-0"

PLAN NOTES

1. INSTALL LINED ELBOW (SEE DETAIL) (TYP).
2. MOUNT EUH ON WALL BRACKET AT 12' AFF.
3. 24"x24" TO MAU-1. SEE ROOF PLAN ON SHEET M103.
4. COVER OPENING WITH WMS. SEE DETAIL.
5. 18"x32" UP TO RTU-2.
6. 18"x32" UP TO RTU-2. TRANSITION IN VERTICAL TO DISCHARGE OPENING SIZE.
7. LOUVER ABOVE ROOF. SEE SECTION 2 ON SHEET M102.
8. WALL-MOUNTED EF ABOVE ROOF. SEE SECTION 1 ON SHEET M102.
9. MOUNT GAS-TUBE HEATER ON 45-DEGREE DOWNDRAFT ANGLE AWAY FROM WALL.
10. 18"x32" UP TO RTU-1.
11. PROVIDE 6"ø WALL CAP AND BACKDRAFT DAMPER FOR EXHAUST FROM DRYING CABINET IN TURNOUT LAUNDRY 147. WALL CAP SHALL BE EQUAL TO SEIHO MODEL SFX. COORDINATE FINAL LOCATION OF WALL CAP WITH ARCHITECT.
12. MOUNT EUH 7' AFF.
13. ROUTE 4"ø DRYER EXHAUST DUCT UP THROUGH ROOF AND TERMINATE WITH DRYERJACK ROOF VENT. SEE HVAC ROOF PLAN ON SHEET M103 FOR ROOF VENT MODEL AND INSTALLATION INSTRUCTIONS.
14. 12"x12" UP TO EF-2.
15. MOUNT TG-1 9' AFF. SEE AIR DISTRIBUTION SCHEDULE ON SHEET M201.
16. MOUNT PLYMOVEMENT EXHAUST FAN TO ROOF STRUCTURE. ROUTE EXHAUST DUCT THROUGH ROOF AND TERMINATE USING NO-LOSS STACK. NO-LOSS STACKHEAD SHALL BE CONSTRUCTED OF STAINLESS STEEL AND BE A US DUCT PRODUCT OR SIMILAR.
17. CONNECT PLYMOVEMENT HOSE TO APPARATUS. COORDINATE FINAL LOCATION WITH APPARATUS ARRANGEMENT.

1/8" = 1'-0"
0' 4' 8' 16' 32'

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

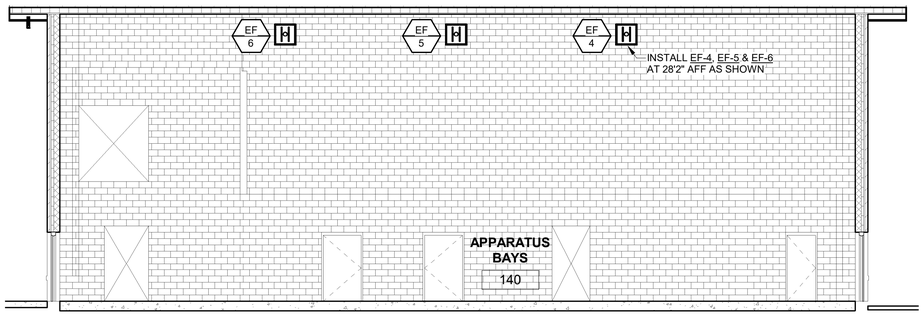
Project Status	Issue Date
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

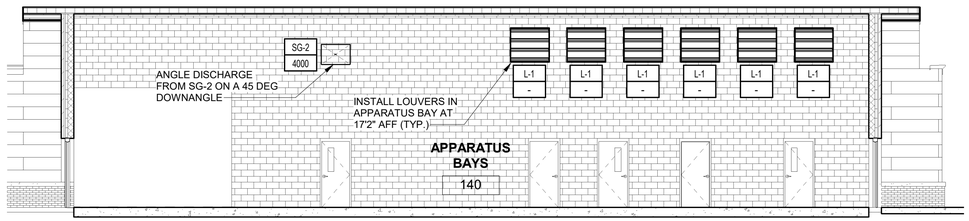
HVAC FIRST FLOOR PLAN

M101



1 M102 HVAC WEST APPARATUS BAY SECTION

1/8" = 1'-0"



2 M102 HVAC EAST APPARATUS BAY SECTION

1/8" = 1'-0"

1/8" = 1'-0"

0' 4' 8' 16' 32'

MASTER
ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

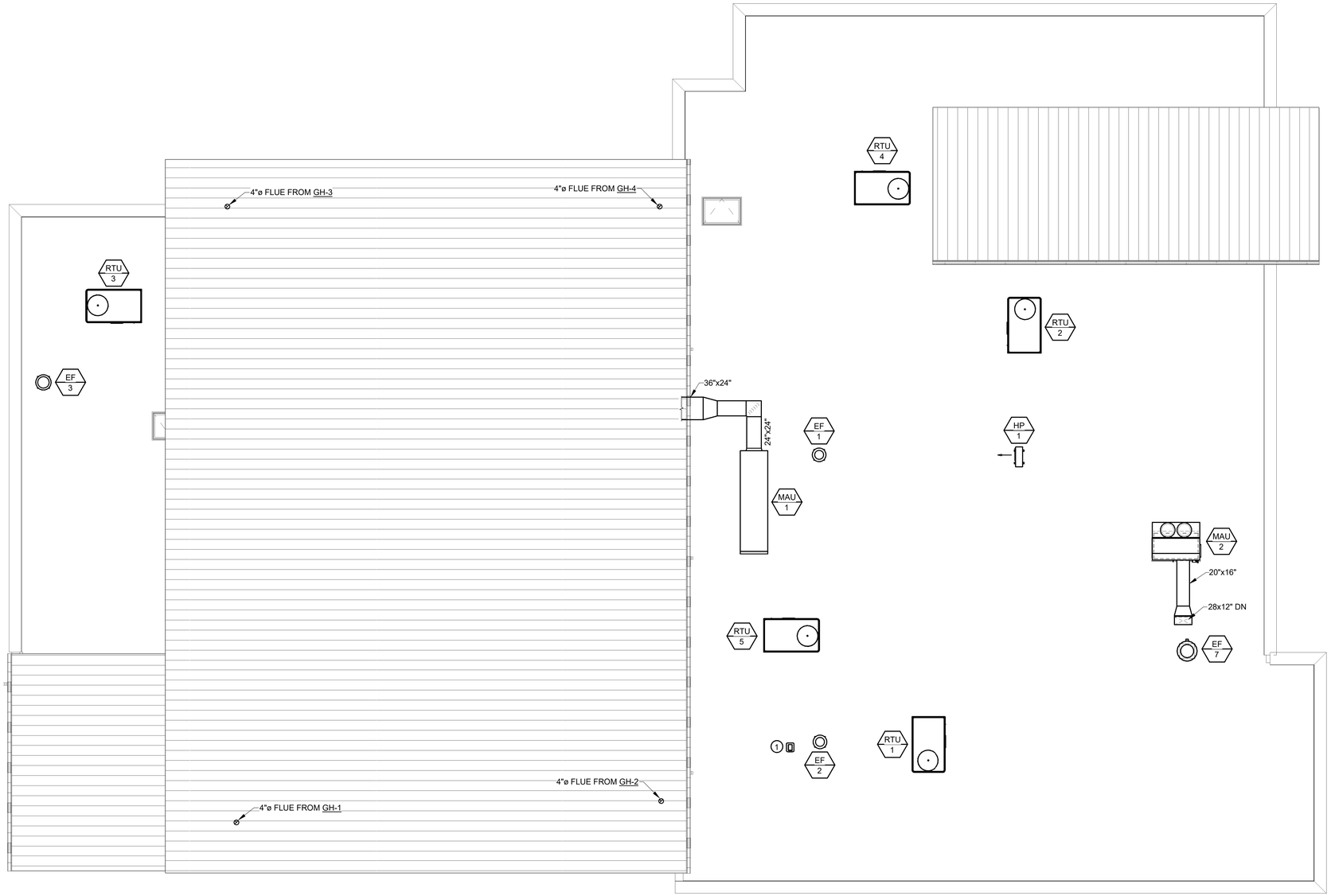
Project Status	Issue Date
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

HVAC APPARATUS BAY SECTION VIEWS

M102



1 HVAC ROOF PLAN
M103 1/8" = 1'-0"

PLAN NOTES

1. PROVIDE DRYER VENT EQUAL TO DRYERJACK MODEL DJK477 AND INSTALL IN ACCORDANCE TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. IN ADDITION, PROVIDE BACKDRAFT DAMPER.

1/8" = 1'-0"
0' 4' 8' 16' 32'

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

Project Status	**Issue Date**
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

HVAC ROOF PLAN

M103

ROOFTOP UNIT SCHEDULE

MARK	MODEL	SUPPLY CFM	OA CFM	FAN DRIVE	FAN HP	FAN EXT S.P. IN. W.G.	NOM COOLING TONS	NET COOLING SEN MBH	COOLING EAT db/wb	COOLING LAT db/wb	HEATER KW	HEATING EAT/LAT	V/Ph/Hz	REMARKS
RTU-1	THK072	2035	580	DIRECT	3.0	1.5	6	51.3	79.4/66.8	55.9/54.5	9	49.7/63.4	460/3/60	1,2,3,5
RTU-2	THK060	1725	425	DIRECT	3.0	1.5	5	56.9	79/65.8	55.2/53.8	6	45/55.7	460/3/60	1,2,3,5
RTU-3	THK060	1750	550	DIRECT	3.0	0.75	5	41.7	79.8/67.2	56.1/55.1	27	48.3/96	460/3/60	1,2,4,5,6
RTU-4	THK048	1400	500	DIRECT	3.0	0.75	4	34.1	78.7/65.5	54.7/53.5	18	45/84.6	460/3/60	1,2,4,5,6
RTU-5	THK072	2300	450	DIRECT	3.0	1.5	6	57.0	78.1/65.3	55.7/54.3	9	43/55.1	460/3/60	1,2,3,5

REMARKS:

1. MODEL NUMBER BASED ON TRANE.
2. PROVIDE UNIT WITH DISCONNECT, COMPARATIVE ENTHALPY ECONOMIZER, POWER EXHAUST FAN, AND SINGLE POINT POWER CONNECTION.
3. UNIT TO BE CONTROLLED USING VAV CONTROL SEQUENCE. SEE CONTROLS DRAWINGS. ELECTRIC HEATER SHALL BE CAPABLE OF SUPPLY AIR TEMPERING OPERATION.
4. UNIT TO BE CONTROLLED USING SINGLE-ZONE VAV CONTROL SEQUENCE. SEE CONTROLS DRAWINGS.
5. PROVIDE WITH MINIMUM 14FT HIGH INSULATED ROOF CURB. COORDINATE FINAL CURB HEIGHT WITH ROOF INSULATION TO ALLOW 10" BETWEEN TOP OF INSULATION AND TOP OF CURB.
6. PROVIDE WITH MODULATING HOT GAS REHEAT.

VAV BOX SCHEDULE

MARK	MODEL NUMBER	SIZE	MAX AIRFLOW (CFM)	MIN COOLING AIRFLOW (CFM)	HEATING AIRFLOW (CFM)	A.P.D. (IN W.G.)	HEATING EAT/LAT	HEATER kW	HEATER V/Ph/Hz	REMARKS
VAV-1	VCEF05	5" Ø	280	85	140	0.02	55.0/88.7	1.5	277/1/60	1,2
VAV-2	VCEF08	8" Ø	420	125	210	0.03	55.0/92.47	2.5	277/1/60	1,2
VAV-3	VCEF05	5" Ø	280	85	140	0.02	55.0/88.7	1.5	277/1/60	1,2
VAV-4	VCEF08	8" Ø	450	135	225	0.03	55.0/89.97	2.5	277/1/60	1,2
VAV-5	VCEF08	8" Ø	605	180	305	0.05	55.0/91.12	3.5	277/1/60	1,2
VAV-6	VCEF08	8" Ø	650	195	325	0.06	55.0/93.7	4.0	277/1/60	1,2
VAV-7	VCEF08	8" Ø	650	195	325	0.06	55.0/93.7	4.0	277/1/60	1,2
VAV-8	VCEF10	10" Ø	1000	300	500	0.03	55.0/95.9	6.5	277/1/60	1,2
VAV-9	VCEF06	6" Ø	400	120	200	0.14	55.0/94.3	2.5	277/1/60	1,2
VAV-10	VCEF05	5" Ø	275	85	140	0.02	55.0/88.7	1.5	277/1/60	1,2
VAV-11	VCEF08	8" Ø	500	150	250	0.04	55.0/92.7	3.0	277/1/60	1,2
VAV-12	VCEF05	5" Ø	300	90	150	0.02	55.0/86.4	1.5	277/1/60	1,2
VAV-13	VCEF05	5" Ø	250	75	125	0.02	55.0/92.4	1.5	277/1/60	1,2

REMARKS:

1. MODEL NUMBER BASED ON TRANE.
2. PROVIDE 1-INCH FOIL-FACED INSULATION, DISCONNECT, POWER FUSES, AND SCR HEAT CONTROLLER.

AIR DISTRIBUTION SCHEDULE

MARK	MODEL	NECK SIZE	MOUNTING	MATERIAL	COLOR	MAX NC	REMARKS
CD-1	SCD	6"ø	DUCT	ALUMINUM	WHITE	25	1
CD-2	SCD	8"ø	DUCT	ALUMINUM	WHITE	25	1
CD-3	SCD	6"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
CD-4	SCD	8"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
CD-5	SCD	10"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
EG-1	PDDR	6"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
EG-2	PDDR	8"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
EG-3	630	12"x6"	WALL/DUCT	ALUMINUM	WHITE	25	1,3
EG-4	630	12"x12"	WALL	ALUMINUM	WHITE	25	1,3
RG-1	PDDR	8"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
RG-2	PDDR	12"ø	LAY-IN	ALUMINUM	WHITE	25	1,2
RG-3	PDDR	10"x10"	LAY-IN	ALUMINUM	WHITE	25	1,2
RG-4	530	20"x18"	DUCT	ALUMINUM	WHITE	25	1,3
RG-5	PDDR	22"x22"	LAY-IN	ALUMINUM	WHITE	25	1,2
SG-1	510	14"x8"	DUCT	ALUMINUM	WHITE	25	1,3
SG-2	150	36"x24"	WALL	ALUMINUM	WHITE	25	1,4,5
TG-1	ATG1	24"x10"	WALL	ALUMINUM	WHITE	25	1

REMARKS:
1. MODEL NUMBER BASED ON PRICE INDUSTRIES.
2. WITH 24"x24" GRILLE OR DIFFUSER.
3. PROVIDE WITH OPPOSED BLADE DAMPER.
4. PROVIDE WITH HEAVT DUTY COATED STELL OPPOSED BLADE DAMPER.
5. ADJUST GRILLE TO 45-DEGREE DOWNTURN ANGLE.

MAKE-UP AIR UNIT SCHEDULE

MARK	MODEL	SUPPLY CFM	OA CFM	FAN DRIVE	FAN HP	FAN EXT S.P. IN. W.G.	HEATING INPUT MBH	HEATING OUTPUT MBH	HEATING EAT/LAT	NOM COOLING TONS	COOLING SEN MBH	COOLING EAT db/wb	COOLING LAT db/wb	LP GAS PRESSURE (IN. W.G.)	V/Ph/Hz	REMARKS
MAU-1	GRAA250	4000	4000	BELT	3 HP	0.5	250	200	10.0/56.0	-	-	-	-	11 - 14	460/3/60	1,2,3
MAU-2	CAS-HVAC1-I.75-18-3T-MPU	720	720	DIRECT	1 HP	0.5	61.2	49.6	-	3.2	14.6	80.1/75.1	60.6/59.7	11 - 14	460/3/60	4

REMARKS:

1. MODEL NUMBER BASED ON TRANE.
2. PROVIDE WITH DISCONNECT, 409 STAINLESS STEEL HEAT EXCHANGE, 2 POSITION OA DAMPER, 2 STAGE LP GAS VALVE, AND FAU CONTACTOR.
3. PROVIDE WITH MINIMUM 14 FT HIGH INSULATED ROOF CURB. COORDINATE FINAL CURB HEIGHT WITH ROOF INSULATION TO ALLOW 10" BETWEEN TOP OF INSULATION AND TOP OF CURB.
4. MODEL NUMBER BASED ON CAPTIVEAIR.

LOUVER SCHEDULE

MARK	MODEL	DUTY	AIRFLOW	SIZE	PRESSURE DROP IN W.C.	REMARKS
L-1	EACA-601	AS APPLIES, SEE SEQUENCE	4000	84"x36"	0.022	1,2

REMARKS:

1. MODEL NUMBER BASED ON GREENHECK.
2. PROVIDE WITH 24V MOTORIZED DAMPER, INSECT SCREEN, AND DRAINABLE BLADES.
3. MANUFACTURER'S STANDARD FINISH. COLOR TO BE SELECTED BY ARCHITECT.

KITCHEN HOOD SCHEDULE

MARK	MODEL	LENGTH	MAX COOKING TEMP	TYPE	APPLIANCE DUTY	DESIGN CFM/FT	TOTAL EXH CFM	EXHAUST PLENUM RISER(S) WIDTH	LENGTH	HEIGHT	DIA	CFM	VELOCITY (FPM)	S.P. IN. W.G.	TOTAL SUPPLY CFM	HOOD CONSTRUCTION	HOOD CONFIGURATION END TO END	HOOD CONFIGURATION ROW	REMARKS
KH-1	5424 ND-2-PSP-F	4'-0"	600 DEG	I	HEAVY	225	900	-	-	4"	10"	900	1650	-0.551	780	430 SS WHERE EXPOSED	ALONE	ALONE	1,2,3,4

REMARKS:

1. MODEL NUMBER BASED ON CAPTIVEAIRE.
2. WITH TWO (2), 20" X 20", 85% EFFICIENT CAPATRATE SOLO FILTERS.
3. WITH ONE (1) LIGHT TO BE RECESSED ROUND AND WITH NO WIRE GUARD.
4. WITH RIGHT SIDE, 12" X 54" X 24" UTILITY CABINET, INCLUDING A SIZE 4.0 TYPE TANK FS FIRE SYSTEM.

FAN SCHEDULE

MARK	MODEL NUMBER	CFM	SP in Wg	WATTS/HP	SONES	DRIVE	RPM	V/Ph/Hz	REMARKS
EF-1	G-090-VG	375	0.5	1/10 HP	7.9	DIRECT	1590	277/1/60	1,2,5
EF-2	G-090-VG	380	0.5	1/6 HP	8.6	DIRECT	1683	277/1/60	1,2,5
EF-3	G-099-VG	375	0.5	1/4 HP	8.2	DIRECT	1323	277/1/60	1,2,5
EF-4	AER-30-VGD	4000	0.15	3/4 HP	13.2	DIRECT	766	460/3/60	1,3
EF-5	AER-30-VGD	4000	0.15	3/4 HP	13.2	DIRECT	766	460/3/60	1,3
EF-6	AER-30-VGD	4000	0.15	3/4 HP	13.2	DIRECT	766	460/3/60	1,3
EF-7	DU85HFA	900	0.750	3/4 HP	6.4	DIRECT	1016	230/1/60	7

REMARKS:

1. MODEL NUMBERS BASED ON GREENHECK.
2. PROVIDE WITH INSULATED ROOF CURB, BACKDRAFT DAMPER, PREWIRED DISCONNECT SWITCH, AND UNIT MOUNTED SPEED CONTROLLER.
3. PROVIDE WITH WALL SLEEVE, 0-10 VDC CONTROL INPUT, DISCONNECT SWITCH, ALUMINUM 45 DEGREE WEATHERHOOD WITH BIRDSCREEN, AND 24V ISOLATION DAMPER.
4. PROVIDE WITH WALL BRACKET.
5. PROVIDE WITH MINIMUM 14FT HIGH INSULATED ROOF CURB. COORDINATE FINAL CURB HEIGHT WITH ROOF INSULATION TO ALLOW 10" BETWEEN TOP OF INSULATION AND TOP OF CURB.
6. F-1 QUANTITY IS TEN FANS. COORDINATE FINAL LOCATION WITH OVERHEAD DEVICES AND OWNER.
7. MODEL NUMBER BASED ON CAPTIVEAIR.

ELECTRIC UNIT HEATER SCHEDULE

MARK	MODEL	CFM	WATTS	V/Ph/Hz	REMARKS
EUH-1	GIG5103N	400	3300	277/1/60	1,2
EUH-2	GIG5103N	400	3300	277/1/60	1,2

REMARKS:

1. MODEL NUMBER BASED ON MARKEL.
2. PROVIDE DISCONNECT, LINE VOLTAGE THERMOSTAT, AND WALL BRACKET.

ELECTRIC WALL HEATER SCHEDULE

MARK	MODEL	CFM	WATTS	V/Ph/Hz	REMARKS
EWH-1	G3422T	245	2000 W	277/1/60	1,2
EWH-2	G3422T	245	2000 W	277/1/60	1,2

REMARKS:

1. MODEL NUMBER BASED ON MARKEL.
2. PROVIDE INTEGRAL THERMOSTAT, DISCONNECT, AND SURFACE MOUNTED WALL BOX.

AIR HANDLING UNIT SCHEDULE

MARK	AREA SERVED	MODEL NUMBER	FAN CFM	FAN W/HP	NOM COOLING TONS	COOLING SEN MBH	COOLING EAT db/wb	V/Ph/Hz	REMARKS
AHU-1	IT 114	MSY-GX09NL	256	30 W	0.75	6.9	80/67	208-230/1/60	1,2,3

REMARKS:

1. MODEL NUMBER BASED ON MITSUBISHI.
2. PROVIDE WITH CONDENSATE PUMP AND ROUTE CONDENSATE TO SPLASHBLOCK IN APPROVED LOCATION BY ARCHITECT.
3. UNIT WAS SELECTED BASED ON PRELIMINARY KNOWLEDGE OF EQUIPMENT IN IT 114. ONCE EQUIPMENT SERVING IT 114 IS FINALIZED AND PROVIDED, UNIT SHALL BE RESELECTED BY MASTER ENGINEERS & DESIGNERS.

VEHICLE EXHAUST FAN SCHEDULE

MARK	MODEL NUMBER	CFM	SP in Wg	WATTS/HP	SONES	DRIVE	RPM	V/Ph/Hz	REMARKS
VEF-1									1
VEF-2									1
VEF-3									1

REMARKS:

1. VEHICLE EXHAUST EQUIPMENT SHALL BE SELECTED ONCE SUFFICIENT DATA HAS BEEN PROVIDED. PLANS SHOW ROUGH LOCATION OF FANS AND THEIR EXHAUST DUCT TERMINATIONS. IF NO SUFFICIENT DATA CAN BE PROVIDED, DESIGN OF VEHICLE EXHAUST SHALL BE DONE THROUGH DELEGATED DESIGN.

ELECTRIC CEILING HEATER SCHEDULE

MARK	MODEL	CFM	WATTS	V/Ph/Hz	REMARKS
ECH-1	CP702	-	250	277/1/60	1,2
ECH-2	CP702	-	250	277/1/60	1,2
ECH-3	CP702	-	250	277/1/60	1,2
ECH-4	CP702	-	250	277/1/60	1,2
ECH-5	CP702	-	250	277/1/60	1,2

REMARKS:

1. MODEL NUMBER BASED ON MARKEL.
2. CEILING HEATER TO MOUNT IN NOMINAL 2X2 CEILING GRID.

INFRARED HEATER SCHEDULE

MARK	MODEL	BTUH	V/Ph/Hz	REMARKS
GH-1	LTS-60	60000	115/1/60	1,2
GH-2	LTS-60	60000	115/1/60	1,2
GH-3	LTS-60	60000	115/1/60	1,2
GH-4	LTS-60	60000	115/1/60	1,2

REMARKS:

1. MODEL NUMBER BASED ON SPACE RAY.
2. PROVIDE WITH DIRECT VENT KIT, HANGING CHAINS, 2 STAGE CONTROL VALVE, AND FLUE TERMINATION.

HEAT PUMP SCHEDULE

MARK	MODEL NUMBER	NOM COOLING TONS	SYSTEM SERVED	V/Ph/Hz	REMARKS
HP-1	MUY-GX09NL	0.75	AHU-1	208-230/1/60	1,2,3,4

REMARKS:

1. MODEL NUMBER BASED ON MITSUBISHI.
2. PROVIDE LOW AMBIENT COOLING KIT FOR OPERATION DOWN TO 0 DEG. F.
3. PROVIDE HAIL GUARD.
4. PROVIDE WITH ZERO PENETRATION EQUIPMENT SUPPORT.

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

Project Status	Issue Date
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

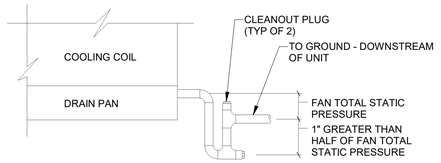
REV. #	DESCRIPTION	DATE

HVAC SCHEDULES

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

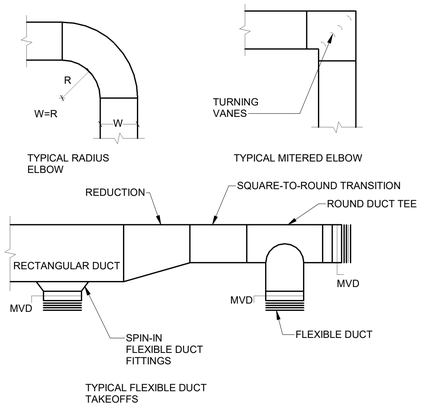
M201

CONDENSATE DRIP SIZING	
PIPE SIZE	CONNECTED LOAD (TONS)
1"	UP TO 5
1-1/4"	UP TO 30
1-1/2"	UP TO 50
2"	UP TO 175
3"	UP TO 300
4"	UP TO 400



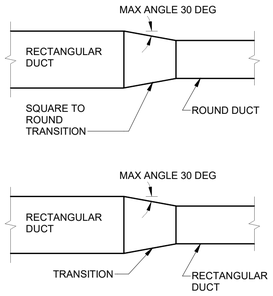
CONDENSATE TRAP DETAIL

NOT TO SCALE



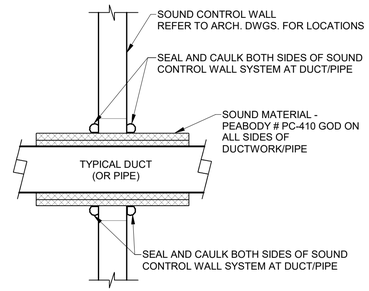
DUCT CONNECTION DETAILS

NOT TO SCALE



DUCT TRANSITION DETAILS

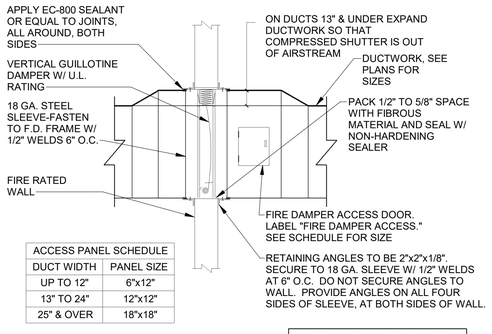
NOT TO SCALE



NOTE: THIS DETAIL IS REQUIRED FOR ALL NON-RATED WALL PENETRATIONS

DUCT/PIPE PENETRATION THRU WALL DETAIL

NOT TO SCALE

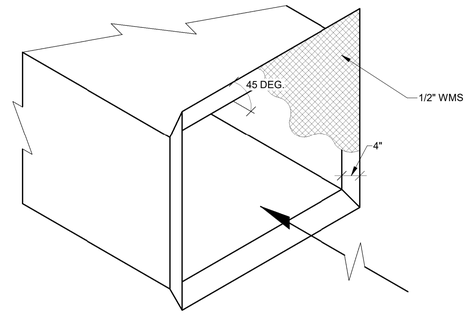


ACCESS PANEL SCHEDULE	
DUCT WIDTH	PANEL SIZE
UP TO 12"	6"x12"
13" TO 24"	12"x12"
25" & OVER	18"x18"

NOTE: INSTALL FIRE DAMPER IN ACCORDANCE WITH NFPA PAMPHLET NO. 90A.

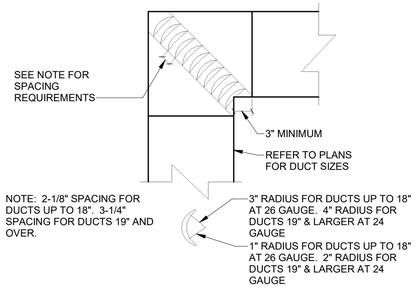
VERTICAL FIRE DAMPER DETAIL

NOT TO SCALE



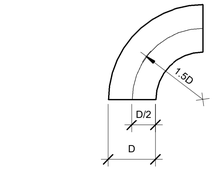
OPEN-END RETURN DUCT DETAIL

NOT TO SCALE



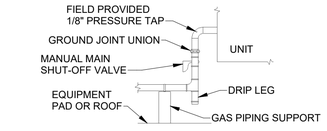
SQUARE ELBOW TURNING VANES DETAIL

NOT TO SCALE



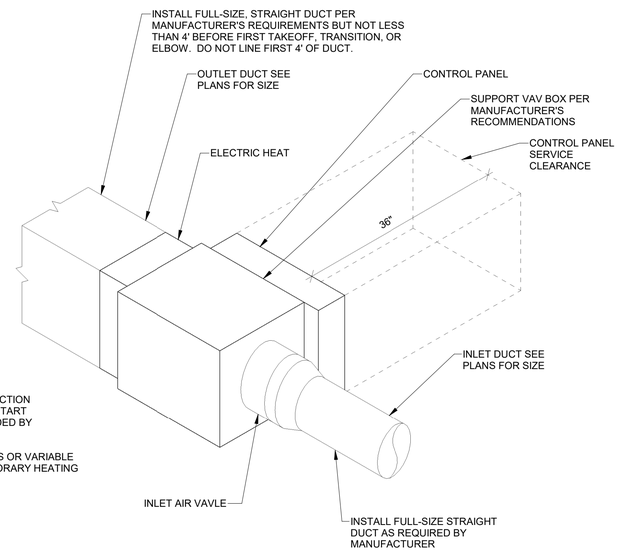
RADIUS ELBOW DETAIL

NOT TO SCALE



GAS CONNECTION DETAIL

NOT TO SCALE

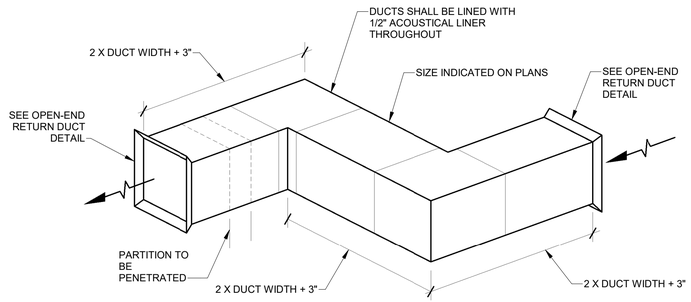


GENERAL NOTES

1. REFER TO INSTALLATION INSTRUCTION INFORMATION FOR CHECK AND START REQUIREMENTS AS RECOMMENDED BY MANUFACTURER.
2. DO NOT USE AIR HANDLING UNITS OR VARIABLE AIR VOLUME SYSTEM FOR TEMPORARY HEATING DURING CONSTRUCTION.

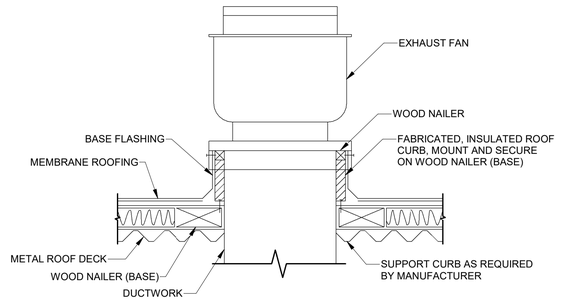
VAV BOX DETAIL

NOT TO SCALE



RETURN-AIR PLENUM TRANSFER DUCT

NOT TO SCALE



FLAT ROOF CURB DETAIL

NOT TO SCALE

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

Project Status	Issue Date
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

HVAC DETAILS

M301

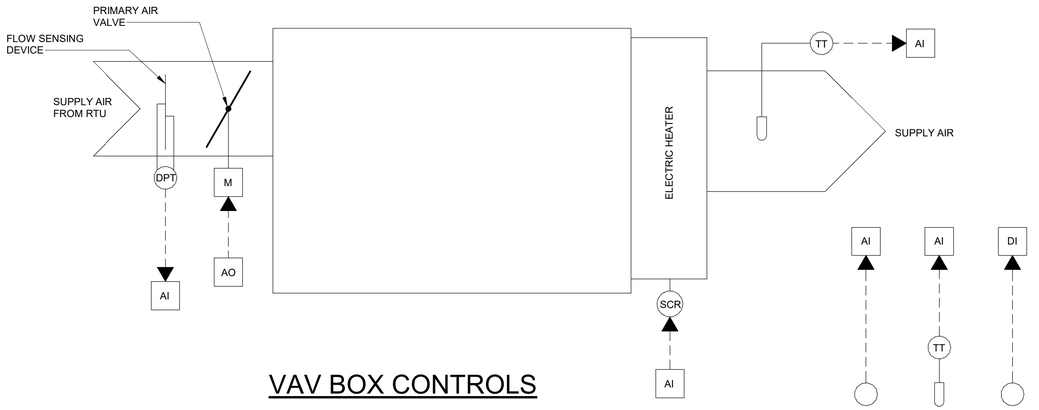
CONTROLS LEGEND

SYMBOLS

AI	ANALOG INPUT (0-10, 1-5V, 4-20 mA OR THE LIKE)	CSS	CURRENT SENSING SWITCH
AO	ANALOG OUTPUT (0-10, 1-5V, 4-20 mA OR THE LIKE)	EH	ELECTRIC HEAT
DI	DIGITAL INPUT (2-STATE, ON/OFF)	M	MOTORIZED ACTUATOR
DO	DIGITAL OUTPUT (2-STATE, ON/OFF)	M	MOTOR
JS	MOTOR STARTER	TT	TEMPERATURE TRANSMITTER
RH	RELATIVE HUMIDITY	SD	SMOKE DETECTOR
VFD	VARIABLE FREQUENCY DRIVE	DPT	DIFFERENTIAL PRESSURE TRANSMITTER
SP	STATIC PRESSURE SENSOR	SCR	SILICON CONTROLLED RECTIFIER

ABBREVIATIONS

(ADJ)	ADJUSTABLE
ASC	APPLICATION SPECIFIC CONTROLLER
DEG. F	DEGREES FAHRENHEIT
DX	DIRECT EXPANSION
FA	FIRE ALARM
NSB	NIGHT SET BACK
RH	RELATIVE HUMIDITY
S/S	START/STOP
TEMP	TEMPERATURE



VAV BOX CONTROLS

SEQUENCE OF OPERATION

OCCUPIED MODE:

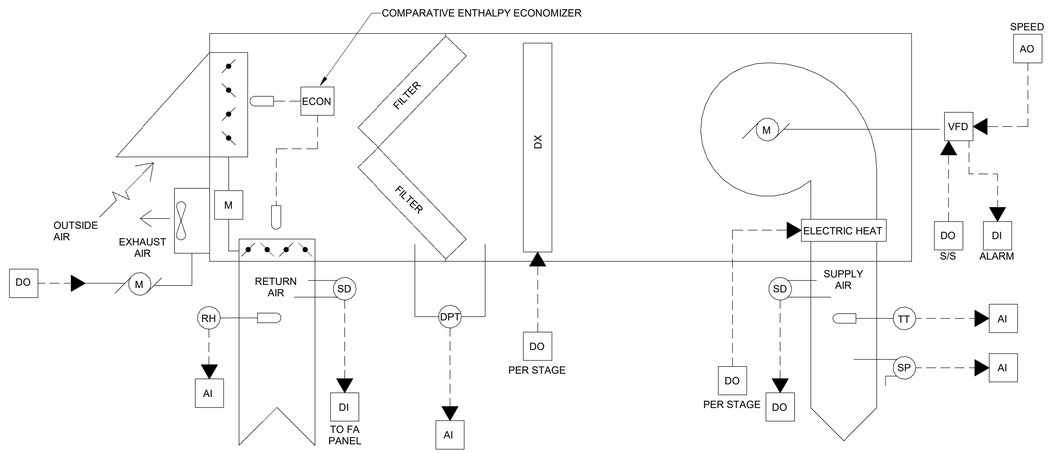
THE ASC SHALL MODULATE THE PRIMARY AIR VALVE TO MAINTAIN COOLING SETPOINT. AS TEMPERATURE IN THE SPACE AS SENSED BY THE SPACE TEMPERATURE ELEMENT CONTINUES TO DROP, THE ASC SHALL MODULATE THE PRIMARY AIR VALVE TO THE HEATING SETPOINT AND ENABLE THE ELECTRIC HEATING COIL. THE ELECTRIC HEATING COIL SCR SHALL MODULATE THE OUTPUT OF THE HEATING COIL TO MAINTAIN THE SPACE TEMPERATURE AT THE HEATING SETPOINT.

SETPOINTS:
COOLING = 75°F (ADJ)
HEATING = 70°F (ADJ)

UNOCCUPIED MODE:

SPACE OCCUPANTS MAY OVERRIDE UNOCCUPIED MODE BY DEPRESSING THE OVERRIDE PUSHBUTTON ON EACH SPACE TEMPERATURE SENSOR. WHEN DEPRESSED, THE VAV BOX SHALL CHANGE TO OCCUPIED MODE. IF COOLING IS REQUIRED, THE DDC SYSTEM SHALL START THE ASSOCIATED RTU IN UNOCCUPIED MODE. WHEN ENABLED IN UNOCCUPIED COOLING MODE, ALL ASSOCIATED VAV BOXES SHALL OPEN TO 100% UNTIL ALL ZONES FALL BELOW THE UNOCCUPIED COOLING SETPOINT MINUS 3 DEG. F. (ADJ). WHEN ENABLED IN UNOCCUPIED HEATING MODE, ALL ASSOCIATED VAV BOXES SHALL OPEN TO 100% UNTIL ALL ZONES RISE ABOVE THE UNOCCUPIED HEATING SETPOINT PLUS 3 DEG. F. (ADJ). CHANGE TO UNOCCUPIED MODE SHALL OCCUR AFTER ADJUSTABLE TIME PERIOD. INITIAL SETPOINT = 1 HOURS (ADJ).

SETPOINTS:
COOLING = 82°F (ADJ)
HEATING = 64°F (ADJ)



RTU-1, 2 AND 5 CONTROLS

SEQUENCE OF OPERATION

ALL MODES:

ALL CONTROL FUNCTIONS INDICATED IN THIS SEQUENCE OF OPERATION SHALL BE ACCOMPLISHED BY AN APPLICATION SPECIFIC CONTROLLER WHICH IS CONNECTED TO THE DDC CONTROL SYSTEM. COMMUNICATION POINTS ARE LISTED AT THE END OF THIS SEQUENCE OF OPERATION.

OCCUPIED MODE:

RTUS SHALL BE OCCUPIED BASED ON A USER-DEFINED SCHEDULE, EXCEPT RTU-1 WHICH SHALL OPERATE CONTINUOUSLY. PROVIDE OPTIMUM START AND OPTIMUM STOP CONTROLS. THE ASC SHALL COMMAND THE RTU TO START IN THE OCCUPIED MODE. THE RTU CONTROLLER SHALL COMMAND THE SUPPLY FAN TO RUN. THE ASC SHALL COMMAND THE ZONE-RELATED EXHAUST FANS TO RUN BASED ON THE SAME USER PROGRAMMABLE OCCUPANCY SCHEDULE. WHEN OCCUPIED, THE UNIT SUPPLY FAN SHALL RUN CONTINUOUSLY. THE SUPPLY FAN SPEED SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR STATIC PRESSURE AT THE STATIC PRESSURE SETPOINT OF 0.75" (ADJ).

THE ASC SHALL ENABLE STAGES OF COOLING AND ENABLE STAGES OF ELECTRIC HEATING TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT 55 DEG. F. (ADJ). THE ASC SHALL MONITOR THE SPACE TEMPERATURE AND POSITION OF EACH AIR VALVE CONNECTED TO THE RTU. WHEN IN COOLING MODE, THE ASC SHALL RESET THE RTU LEAVING AIR TEMPERATURE TO MAINTAIN THE MOST-OPEN AIR VALVE ASSOCIATED WITH THE RTU TO BETWEEN 90-100% OPEN, TO A MAXIMUM OF 60 DEGREES F LEAVING AIR TEMPERATURE (ADJ).

UNOCCUPIED MODE:

THE ASC SHALL DISABLE THE RTU BASED ON A USER PROGRAMMABLE OCCUPANCY SCHEDULE. WHEN IN UNOCCUPIED MODE, THE UNIT MOUNTED CONTROLLER SHALL DISABLE THE SUPPLY FAN AND ALL ASSOCIATED EXHAUST FANS IN THE SPACE, AND SHALL CLOSE THE OUTSIDE AIR DAMPER.

WHEN ENABLED, BASED ON THE ASSOCIATED ZONE TEMPERATURE SENSORS, THE ASC SHALL COMMAND THE RTU TO START IN THE UNOCCUPIED MODE. THE RTU CONTROLLER SHALL COMMAND THE SUPPLY FAN TO RUN. THE ZONE-RELATED EXHAUST SHALL REMAIN DISABLED IN THE UNOCCUPIED MODE. WHEN ENABLED, THE UNIT SUPPLY FAN SHALL RUN CONTINUOUSLY. THE SUPPLY FAN SPEED SHALL MODULATE TO MAINTAIN THE DISCHARGE AIR STATIC PRESSURE AT THE STATIC PRESSURE SETPOINT OF 0.75" (ADJ).

THE ASC SHALL ENABLE STAGES OF COOLING AND ENABLE THE ELECTRIC HEAT TO MAINTAIN THE DISCHARGE AIR TEMPERATURE AT 55 DEG. F. (ADJ) IN COOLING MODE, AND 90 DEG. F. (ADJ) IN HEATING MODE. THE UNIT OUTSIDE AIR DAMPER SHALL REMAIN CLOSED IN THE UNOCCUPIED MODE.

ALL MODES:

THE ASC SHALL ANNUNCIATE THE FILTER CHANGE STATUS BASED ON THE FILTER PRESSURE DROP COMPARED TO A PRE-PROGRAMMED SETPOINT (ADJ).

POINTS COMMUNICATED TO/FROM THE DDC SYSTEM:

ENABLE/DISABLE	DO
DISCHARGE TEMPERATURE	AI
COMPRESSOR ENABLE (PER STAGE)	DO
ALARM	DI
DIRTY FILTERS	AI
ELECTRIC HEAT	DO
EXHAUST FAN	DO
RETURN AIR HUMIDITY	AI
SUPPLY FAN VFD SPEED	AO
SUPPLY FAN VFD ALARM	DI
SUPPLY FAN START/STOP	DO

ECONOMIZER:

A UNIT-MOUNTED CONTROLLER SHALL CONTINOUSLY MONITOR THE RETURN AIR AND OUTSIDE AIR ENTHALPY CONDITIONS. WHEN CONDITIONS ARE APPROPRIATE (AS DETERMINED BY THE CONTROLLER) THE CONTROLLER SHALL OPEN THE OUTSIDE AIR DAMPER AND CLOSE THE RETURN AIR DAMPER TO MAINTAIN THE DISCHARGE AIR SETPOINT. WHEN THE OUTSIDE AIR DAMPER IS OPEN GREATER THAN 30% (ADJ), THE EXHAUST FAN SHALL START AND OPERATE CONTINUOUSLY.

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

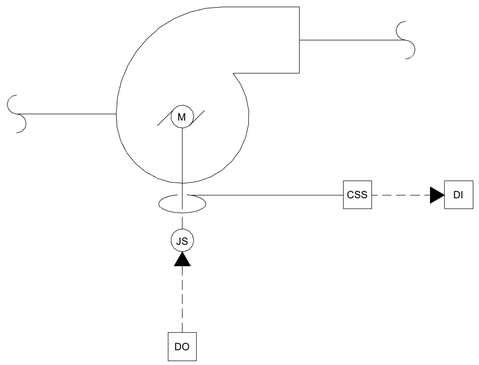
Project Status	**Issue Date**
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

HVAC CONTROLS PART 1

M401



EF CONTROLS

SEQUENCE OF OPERATION

THE BUILDING EXHAUST FANS SHALL BE CONTROLLED BY THE DDC SYSTEM. BASED ON THE OWNER-SPECIFIED OCCUPANCY SCHEDULE, ALL EXHAUST FANS SHALL BE ENABLED IN THE OCCUPIED MODE.

WHEN UNOCCUPIED, THE DDC SYSTEM SHALL DISABLE THE BUILDING EXHAUST FANS. WHEN OCCUPIED, THE DDC SYSTEM SHALL ENABLE AND MONITOR THE OPERATION OF THE FANS THROUGH CURRENT SENSING SWITCHES. IF A FAN IS ENABLED AND THE CURRENT SENSING SWITCH IS NOT ACTIVATED, THE DDC SYSTEM SHALL ANNUNCIATE AN ALARM AT THE OPERATOR'S WORKSTATION.

APPARATUS BAY CONTROL:

THE CONTROLS FOR THE APPARATUS BAY SHALL BE ENABLED CONTINUOUSLY.

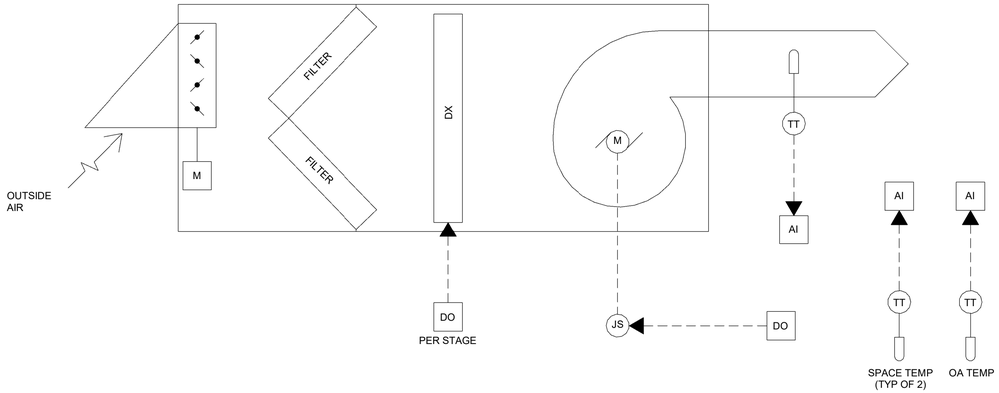
MAU-1 SHALL BE ENABLED CONTINUOUSLY. WHEN ENABLED, THE MAU-1 SUPPLY FAN SHALL START AND OPERATE CONTINOUSLY. MAU-1 SHALL ENABLE GAS HEATING OPERATION BASED ON THE SPACE TEMPERATURE OF THE APPARATUS BAY, AS MEASURED THROUGH TWO AVERAGING TEMPERATURE SENSORS. WHEN THE AVERAGE SPACE TEMPERATURE FALLS BELOW THE ACTIVE HEATING SETPOINT OF 55 DEGREES F (ADJ), MAU-1 SHALL START AND ENABLE THE STAGES OF THE LP HEATING SECTION TO MAINTAIN THE SPACE AT SETPOINT. WHEN THE LP HEATING SECTION OF MAU-1 IS ENABLED, THE DESTRATIFICATION FANS (F-1) SHALL BE ENABLED. ON A FURTHER FALL IN THE AVERAGE SPACE TEMPERATURE BELOW THE ACTIVE HEATING SETPOINT, THE FOUR RADIANT TUBE HEATERS SHALL BE ENABLED, IN SEQUENCE, AT LOW FIRE. ON A FURTHER FALL IN SPACE TEMPERATURE BELOW SETPOINT, THE FOUR RADIANT TUBE HEATERS SHALL BE SWITCHED TO HIGH FIRE, IN SEQUENCE. THE REVERSE ACTIONS SHALL OCCUR ON A RISE IN THE AVERAGE SPACE TEMPERATURE ABOVE THE ACTIVE HEATING SETPOINT. THE INTAKE LOUVERS SHALL REMAIN CLOSED DURING HEATING MODE AND THE SIDEWALL EXHAUST FANS SHALL REMAIN DISABLED DURING HEATING MODE.

ON A RISE IN THE AVERAGE SPACE TEMPERATURE ABOVE THE ACTIVE COOLING SETPOINT OF 80 DEGREES F (ADJ), THE SIDEWALL EXHAUST FANS SHALL BE ENABLED, IN SEQUENCE. UPON THE ACTIVATION OF A SIDEWALL EXHAUST FAN, ALL LOUVERS IN THE OPPOSITE SIDEWALL SHALL BE OPENED. DURING COOLING MODE, THE MAU-1 LP HEATER, ALL DESTRATIFICATION FANS, AND ALL RADIANT TUBE HEATERS SHALL BE DISABLED.

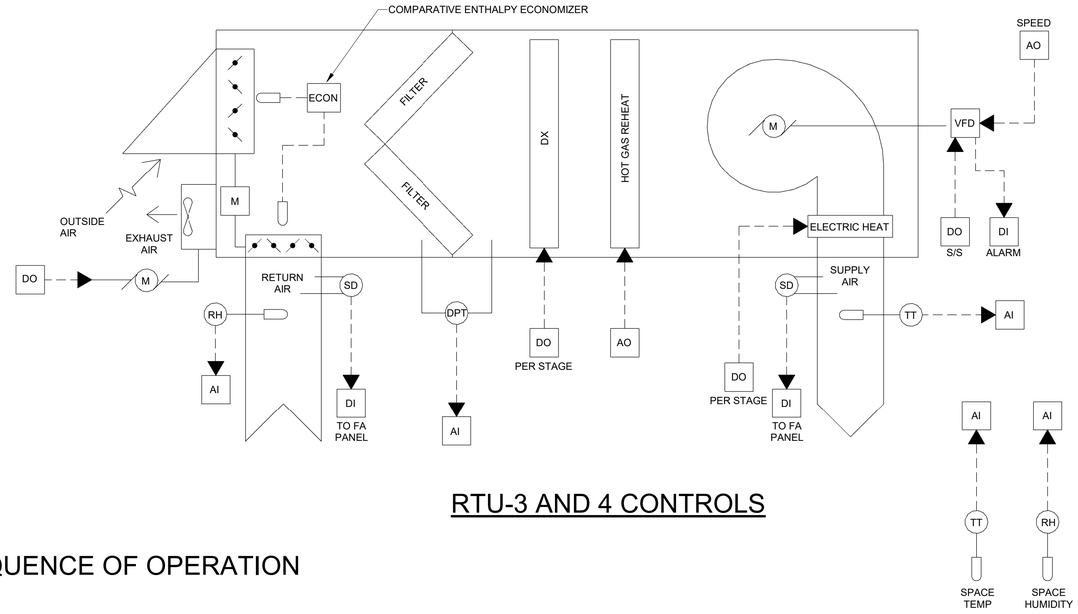
EF-3 CONTROL:

THE CONTROLS FOR EF-3 SHALL BE ENABLED CONTINUOUSLY.

EF-3 SHALL START AND OPERATE WHENEVER RTU-3 IS OPERATING.



MAU-1 CONTROLS



RTU-3 AND 4 CONTROLS

SEQUENCE OF OPERATION

ALL MODES:

ALL CONTROL FUNCTIONS INDICATED IN THIS SEQUENCE OF OPERATION SHALL BE ACCOMPLISHED BY AN APPLICATION SPECIFIC CONTROLLER WHICH IS CONNECTED TO THE DDC CONTROL SYSTEM. COMMUNICATION POINTS ARE LISTED AT THE END OF THIS SEQUENCE OF OPERATION.

OCCUPIED MODE:

RTUS SHALL BE OCCUPIED BASED ON A USER-DEFINED SCHEDULE. PROVIDE OPTIMUM START AND OPTIMUM STOP CONTROLS. THE ASC SHALL COMMAND THE RTU TO START IN THE OCCUPIED MODE. THE RTU CONTROLLER SHALL COMMAND THE SUPPLY FAN TO RUN. THE ASC SHALL COMMAND THE ZONE-RELATED EXHAUST FANS TO RUN BASED ON THE SAME USER PROGRAMMABLE OCCUPANCY SCHEDULE. WHEN OCCUPIED, THE UNIT SUPPLY FAN SHALL RUN CONTINUOUSLY. THE SUPPLY FAN SPEED SHALL MODULATE TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT.

THE ASC SHALL ENABLE STAGES OF COOLING AND ENABLE THE ELECTRIC HEAT AS REQUIRED TO MAINTAIN THE SPACE AT THE OCCUIED HEATING AND COOLING SETPOINTS OF 70 DEG. F. (ADJ) HEATING AND 75 DEG. F. (ADJ) COOLING IN THE ASSOCIATED VAV BOXES.

WHEN NOT IN HEATING MODE, IF THE ASC SENSES THAT THE SPACE HUMIDITY IS ABOVE THE ACTIVE HUMIDITY SETPOINT OF 60% (ADJ), THE ASC SHALL ENABLE THE UNIT COMPRESSOR AND SHALL MODULATE THE HOT GAS REHEAT VALVE TO MAINTAIN THE SPACE TEMPERATURE AT SETPOINT. THIS DEHUMIDIFICATION MODE SHALL BE TERMINATED WHEN THE SPACE HUMIDITY FALLS BELOW 55% (ADJ).

UNOCCUPIED MODE:

THE ASC SHALL DISABLE THE RTU BASED ON A USER PROGRAMMABLE OCCUPANCY SCHEDULE. WHEN IN UNOCCUPIED MODE, THE UNIT MOUNTED CONTROLLER SHALL DISABLE THE SUPPLY FAN AND ALL ASSOCIATED EXHAUST FANS IN THE SPACE, AND SHALL CLOSE THE OUTSIDE AIR DAMPER.

WHEN ENABLED, BASED ON THE ASSOCIATED ZONE TEMPERATURE SENSORS, THE ASC SHALL COMMAND THE RTU TO START IN THE UNOCCUPIED MODE. THE RTU CONTROLLER SHALL COMMAND THE SUPPLY FAN TO RUN. ZONE-RELATED EXHAUST FANS SHALL REMAIN DISABLED IN THE UNOCCUPIED MODE. THE SUPPLY FAN SPEED SHALL MODULATE TO FULL DESIGN AIRFLOW.

THE ASC SHALL ENABLE STAGES OF COOLING AND ENABLE THE ELECTRIC HEAT TO MAINTAIN THE SPACE TEMPERATURE AT 65 DEG. F. (ADJ) IN HEATING MODE, AND 80 DEG. F. (ADJ) IN COOLING MODE. THE UNIT OUTSIDE AIR DAMPER SHALL REMAIN CLOSED IN THE UNOCCUPIED MODE.

ALL MODES:

THE ASC SHALL ANNUNCIATE THE FILTER CHANGE STATUS BASED ON THE FILTER PRESSURE DROP COMPARED TO A PRE-PROGRAMMED SETPOINT (ADJ).

POINTS COMMUNICATED TO/FROM THE DDC SYSTEM:

ENABLE/DISABLE	DO
DISCHARGE TEMPERATURE	AI
COMPRESSOR ENABLE (PER STAGE)	DO
ALARM	DI
DIRTY FILTERS	AI
ELECTRIC HEAT (PER STAGE)	DO
EXHAUST FAN	DO
RETURN AIR HUMIDITY	AI
SUPPLY FAN VFD SPEED	AO
SUPPLY FAN VFD ALARM	DI
SUPPLY FAN START/STOP	DO

ECONOMIZER:

A UNIT-MOUNTED CONTROLLER SHALL CONTINOUSLY MONITOR THE RETURN AIR AND OUTSIDE AIR ENTHALPY CONDITIONS. WHEN CONDITIONS ARE APPROPRIATE (AS DETERMINED BY THE CONTROLLER) THE CONTROLLER SHALL OPEN THE OUTSIDE AIR DAMPER AND CLOSE THE RETURN AIR DAMPER TO MAINTAIN THE DISCHARGE AIR SETPOINT. WHEN THE OUTSIDE AIR DAMPER IS OPEN GREATER THAN 30% (ADJ), THE EXHAUST FAN SHALL START AND OPERATE CONTINUOUSLY.

MASTER ENGINEERS & DESIGNERS
904 Lakeside Drive, Lynchburg, VA 24501
434-846-1350 Fax: 434-846-1351
558-1919

SEH

COMMONWEALTH OF VIRGINIA
CHRISTOPHER L. SNYDER
Lic. No. 046584
8-28-2025
PROFESSIONAL ENGINEER

Project Owner

LYNCHBURG FIRE STATION 9 AT LIBERTY UNIVERSITY

LIBERTY MOUNTAIN DRIVE

SEH Project	LIBUN 178342
Checked By	CLS
Drawn By	ETO/JZP

Project Status	**Issue Date**
CONSTRUCTION DOCUMENTS	8/28/2025

REVISION SCHEDULE

REV. #	DESCRIPTION	DATE

HVAC CONTROLS PART 2

M402