MECHANICAL ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS MAY BE USED.

ABBREVIATION	DESCRIPTION
(D)	EXISTING TO BE DEMOLISHED
(E)	EXISTING TO REMAIN
(F)	FUTURE
AFF	ABOVE FINISHED FLOOR
AMB	AMBIENT
APD	AIR PRESSURE DROP
AVG	AVERAGE OR AVERAGING
BAS	BUILDING AUTOMATION SYSTEM
BFP	BACKFLOW PREVENTOR
BHP	BRAKE HORSEPOWER
BLDG	BUILDING
BOB	BOTTOM OF BEAM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOS	BOTTOM OF STRUCTURE
BTUH	BRITISH THERMAL UNITS PER HOUR
CFM	CUBIC FEET PER MINUTE
CL	CENTER LINE
CO	CLEAN OUT
COMPR	COMPRESSOR
COP	COEFFICIENT OF PERFORMANCE
CV	CONSTANT VOLUME
DB	DRY BULB
DIA	DIAMETER
DN	DOWN
EAT	ENTERING AIR TEMPERATURE
ECM	ELECTRONICALLY COMMUTATED MOTORS
EER	ENERGY EFFICIENCY RATIO
EFF	EFFICIENCY
EG	ETHYLENE GLYCOL
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
FLA	FULL LOAD AMPS
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
FT	FEET
GAL	GALLONS
GPM	GALLONS PER MINUTE
HD	HEAD
HP	HORSEPOWER
ID	INNER DIAMETER
IPLV	INTEGRATED PART LOAD VALUE
KW	KILOWATTS
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MBH	THOUSAND BTUH
MCA	MINIMUM CIRCUIT AMPACITY
MFR	MANUFACTURER
MOCP	MAXIMUM OVERCURRENT PROTECTION
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
NOX	NITROUS OXIDE
NPLV	NON-STANDARD PART LOAD VALUE
NPSH	NET POSITIVE SUCTION HEAD
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
PD	PRESSURE DROP
PG	PROPYLENE GLYCOL
PPH	POUNDS PER HOUR
PPM	PARTS PER MILLION
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
REFRIG	REFRIGERANT
RH	RELATIVE HUMIDITY
RPM	REVOLUTIONS PER MINUTE
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SP	STATIC PRESSURE
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VAV	VARIABLE AIR VOLUME
VFD	VARIABLE FREQUENCY DRIVE
VOC	VOLATILE ORGANIC COMPOUNDS
VRF	VARIABLE REFRIGERANT FLOW
VRV	VARIABLE REFRIGERANT VOLUME
W	WATTS
WB	WET BULB
WG	WATER GAUGE
WPD	WATER PRESSURE DROP

MECHANICAL SYSTEM TYPES AND ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS MAY BE USED.

ABBREVIATION	DESCRIPTION
D	DRAIN
EA	EXHAUST AIR
HR	HEAT PUMP RETURN
HS	HEAT PUMP SUPPLY
OA	OUTDOOR AIR
PC	PUMPED CONDENSATE
R	REFRIGERANT
RA	RETURN AIR
REL	RELIEF AIR
SA	SUPPLY AIR
V	VENT

MECHANICAL EQUIPMENT ABBREVIATIONS

NOTE: NOT ALL ABBREVIATIONS MAY BE USED.

ABBREVIATION	DESCRIPTION
AC	AIR CURTAIN
BS	BRANCH SELECTOR
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
DC	DUST COLLECTOR
DOAS	DEDICATED OUTDOOR AIR SYSTEM
EF	EXHAUST FAN
FCU	FAN COIL UNIT
HP	HEAT PUMP
L	LOUVER
MAU	MAKE-UP AIR UNIT
ODU	OUTDOOR UNIT (VRF)
UH	UNIT HEATER

MECHANICAL SYMBOLS LIST

NOTE: NOT ALL SYMBOLS MAY BE USED.

SYMBOL	DESCRIPTION
(1)	KEYNOTE (SEE LEGEND ON SHEET)
	AIRFLOW ARROW
	FLOW ARROW
	CONNECT TO EXISTING
	END OF DEMOLITION
	PIPE CAPPED
	PIPE DROP
	PIPE RISE
	PIPE TEE DOWN
	PIPE REDUCER
	PIPE UNION
	PIPE GUIDES OR SLEEVES
	PIPE ANCHOR
	FLEXIBLE PIPE CONNECTION
	GENERAL SERVICE VALVE (SEE SPECIFICATIONS FOR VALVE TYPE PER APPLICATION)
	CHECK VALVE (ARROW INDICATES DIRECTION OF FLOW)
	MANUAL BALANCING VALVE
	AUTOMATIC BALANCING VALVE
	TWO-WAY CONTROL VALVE
	THREE-WAY CONTROL VALVE
PICBV	TWO-WAY PRESSURE INDEPENDENT CONTROL AND BALANCE VALVE
	PRESSURE REDUCING VALVE
	STEAM PRESSURE REGULATING VALVE
	RELIEF VALVE
	DRAIN VALVE WITH THREADED HOSE CONNECTION
	REDUCED PRESSURE BACKFLOW PREVENTER
	PRESSURE GAUGE WITH STOPCOCK
	STRAINER WITH BLOW DOWN VALVE
AV	AUTOMATIC AIR VENT
MAV	MANUAL AIR VENT
	TEMPERATURE/PRESSURE TEST PLUG (PETE'S PLUG)
	SIGHT FLOW INDICATOR
	STEAM TRAP
CO CO	CLEAN OUT
	FLOW METER
	THERMOMETER
	PITCH DOWN IN DIRECTION OF ARROW
H	HUMIDISTAT WITH ADJUSTABLE CONTROL
T	THERMOSTAT WITH ADJUSTABLE CONTROL
H	HUMIDITY SENSOR
T	TEMPERATURE SENSOR
HZ	HYDROGEN SENSOR
CO2	CARBON DIOXIDE SENSOR
CO	CARBON MONOXIDE SENSOR
NO2	NITROGEN DIOXIDE SENSOR
OS	OCCUPANCY SENSOR

WALL RATING LEGEND

	FIRE RESISTIVE RATED WALLS, 1 HOUR
	FIRE RESISTIVE RATED WALLS, 2 HOUR
	FIRE RATED, SMOKE BARRIER WALLS, 1 HOUR
	FIRE RATED, SMOKE BARRIER WALLS, 2 HOUR

MECHANICAL SYMBOLS LIST CONT.

NOTE: NOT ALL SYMBOLS MAY BE USED.

SYMBOL	DESCRIPTION
	SUPPLY DIFFUSER WITH FLEXIBLE DUCT TAG - NECK SIZE / AIRFLOW (CFM) — TAG EXAMPLE: S1-6ø / 100
	SUPPLY DIFFUSER TAG - NECK SIZE / AIRFLOW (CFM) — TAG EXAMPLE: S1-6ø / 100
	RETURN/EXHAUST GRILLE TAG / AIRFLOW (CFM) — TAG EXAMPLE: R1 / 500, E1 / 500
	SIDEWALL SUPPLY DIFFUSER TAG - NECK SIZE / AIRFLOW (CFM) — TAG EXAMPLE: S2-12x8 / 100
	SIDEWALL RETURN/EXHAUST GRILLE TAG / AIRFLOW (CFM) — TAG EXAMPLE: R2 / 100, E2 / 100
BDD	DAMPERS/DUCT ACCESSORIES BDD: BACKDRAFT DAMPER FSD: FIRE/SMOKE DAMPER FD: FIRE DAMPER MD: MOTORIZED DAMPER SD: SMOKE DAMPER VD: VOLUME DAMPER SB: SECURITY BARS
	SUPPLY AND OUTDOOR AIR RECTANGULAR DUCT ELBOW UP
	OVAL DUCT ELBOW UP
	ROUND DUCT ELBOW UP
	RETURN, RELIEF, AND EXHAUST AIR RECTANGULAR DUCT ELBOW UP
	OVAL DUCT ELBOW UP
	ROUND DUCT ELBOW UP
	SUPPLY AND OUTDOOR AIR RECTANGULAR DUCT ELBOW DOWN
	OVAL DUCT ELBOW DOWN
	ROUND DUCT ELBOW DOWN
	RETURN, RELIEF, AND EXHAUST AIR RECTANGULAR DUCT ELBOW DOWN
	OVAL DUCT ELBOW DOWN
	ROUND DUCT ELBOW DOWN
	NEW WORK DUCTWORK
	EXISTING DUCTWORK
	DEMOLITION DUCTWORK
	NEW WORK PIPING
	EXISTING PIPING
	DEMOLISHED PIPING
	NEW WORK MECHANICAL EQUIPMENT (WITH CLEARANCE SHOWN)
	EXISTING MECHANICAL EQUIPMENT
	DEMOLISHED MECHANICAL EQUIPMENT
	GENERIC FAN
	GENERIC PUMP
	ACCESS DOOR
	TERMINAL BOXES VAV TERMINAL BOX (WITH REHEAT) VAV TERMINAL BOX (NO REHEAT)
	TERMINAL BOX NOTES 1. IF MIN COOLING CFM IS NOT SHOWN ON PLANS, THEN MIN COOLING CFM IS EQUAL TO 65% OF MAX COOLING CFM. 2. HEATING CFM IS EQUAL TO MIN COOLING CFM.
	DUCTWORK PLANS TAG MAX COOLING CFM / MIN COOLING CFM
	PIPING PLANS TAG

TAG EXAMPLES:	DUCTWORK PLANS		PIPING PLANS
	TB1 500/200	TB1 500	TB1

MECHANICAL CONTROLS SYMBOLS LIST

NOTE: NOT ALL SYMBOLS MAY BE USED.

SYMBOL	DESCRIPTION
AF	AIR FLOW MEASURING DEVICE
AS	AIR SWITCH
CT	CONDUCTIVITY TRANSMITTER
CS	CURRENT SENSOR
DP	DIFFERENTIAL PRESSURE TRANSMITTER
EPT	ELECTRONIC PNEUMATIC TRANSDUCER
ES	END SWITCH
FM	FLOW METER
HOA	HAND-OFF-AUTO SWITCH
LT	LEVEL TRANSMITTER
M	METER
PHT	PH TRANSMITTER
PS	PRESSURE SWITCH
PT	PRESSURE TRANSMITTER
SD	SMOKE DETECTOR
	STARTER
TS	TEMPERATURE SWITCH
VFD	VARIABLE FREQUENCY DRIVE
VT	VIBRATION TRANSMITTER
FS	WATER FLOW SWITCH
VOC	VOC SENSOR

MECHANICAL SHEET INDEX

MECHANICAL GENERAL NOTES

1. VISIT THE SITE OF THE WORK TO GAIN AN ACCEPTABLE KNOWLEDGE OF CONDITIONS AFFECTING THE EXECUTION OF THE WORK. AFTER VISITING THE SITE, REQUEST SUCH INFORMATION AND/OR CLARIFICATIONS AS NECESSARY TO FULLY UNDERSTAND THE WORK REQUIRED AND TO PROPERLY ESTIMATE COSTS.
2. REVIEW ALL DRAWINGS TO VERIFY EXTENT AND SCHEDULING OF ALL DEMOLITION ACTIVITIES PRIOR TO COMMENCING DEMOLITION WORK. FIELD VERIFY ALL SIZES AND LOCATIONS OF EXISTING DUCTWORK AND PIPING TO REMAIN, NOTIFY ARCHITECT/ENGINEER OF DEVIATIONS WHICH AFFECT RENOVATION WORK PRIOR TO PROCEEDING WITH THE WORK.
3. ITEMS NOTED TO BE DEMOLISHED INCLUDES BUT IS NOT LIMITED TO ALL ASSOCIATED COMPONENTS, CONTROL WIRING, PIPING, DUCTWORK, ELECTRICAL CONNECTIONS, SUPPORTS, INSULATION, ETC. COORDINATE WITH OTHER TRADES AS REQUIRED.
4. ALL WORK IS TO BE PHASED AS INDICATED ON THE ARCHITECTURAL DRAWINGS. COORDINATE PHASING OF ALL DEMOLITION, RENOVATION, AND NEW WORK WITH OTHER TRADES. CLOSELY COORDINATE PHASING OF WORK WITHIN CORRIDORS WITH THE OWNER. CORRIDORS CANNOT BE COMPLETELY CLOSED OFF TO PEDESTRIAN TRAFFIC. TO ACCOMMODATE PHASING, CORRIDOR ACCESS WORK MAY NEED TO BE PERFORMED DURING OFF PEAK PERIODS. PRIOR TO MOVING ON TO THE NEXT PHASE, ALL WORK IN PREVIOUSLY PHASED AREAS MUST BE COMPLETE AND OPERATIONAL.
5. ENSURE THAT THE WORK WILL NOT INTERFERE OR INTERRUPT SERVICES TO AREAS OUTSIDE OF THE DESIGNATED CONTRACT AREAS. SCHEDULE ALL WORK AS TO CAUSE MINIMAL SERVICE INTERRUPTIONS FOR THE OWNER. UNAVOIDABLE INTERRUPTIONS ARE TO BE SCHEDULED WITH THE OWNER NO LESS THAN TWO WEEKS PRIOR TO THEIR EXPECTED COMMENCEMENT. WORK SHALL BE PERFORMED AT SUCH TIMES AS DIRECTED BY THE OWNER AND, IF POSSIBLE, ARE TO OCCUR DURING OFF PEAK PERIODS.
6. THE CONTRACTOR IS TO VERIFY THE EXACT SERVICE OF ANY EXISTING PIPING OR DUCTWORK PRIOR TO INSTALLING ANY NEW CONNECTIONS. ANY DISCREPANCIES BETWEEN THE CONSTRUCTION DOCUMENTS OR THE DESIGN INTENT AND ACTUAL CONDITIONS ARE TO BE BROUGHT TO THE ATTENTION OF THE ENGINEER IMMEDIATELY, PRIOR TO FABRICATION OR INSTALLATION.
7. CONTRACTOR SHALL REMOVE AND REPLACE EXISTING LAY-IN CEILING GRID AND TILES AS NECESSARY TO COMPLETE ABOVE CEILING WORK. RETURN CEILING TO ORIGINAL CONDITION FOLLOWING COMPLETION OF CONSTRUCTION.
8. EACH TRADE SHALL PAY THE GENERAL CONTRACTOR TO PATCH FLOOR SLAB AND WALL PENETRATIONS TO MATCH EXISTING WHERE THEIR PIPING, DUCT OR EQUIPMENT IS BEING REMOVED OR INSTALLED.
9. ALL ROOFING MODIFICATIONS SHALL BE DONE BY OWNER'S ROOFING VENDOR TO MAINTAIN ANY AND ALL WARRANTIES. COST TO BE INCLUDED IN THIS CONTRACT UNLESS SPECIFICALLY INCLUDED IN GENERAL TRADES CONTRACTOR'S SCOPE OF WORK.
10. INSULATE DUCTWORK AND PIPING WHERE EXISTING INSULATION HAS BEEN DAMAGED AND/OR REMOVED IN THE PERFORMANCE OF WORK FOR THIS PROJECT.
11. FOR RENOVATION WORK, IT IS PROHIBITED TO SUSPEND NEW WORK FROM THE EXISTING FLOOR SLAB OR ROOF DECK.
12. INSTALL ALL WORK TO COMPLY WITH ALL LAWS, REGULATIONS, CODES, AND STANDARDS (FEDERAL, STATE, AND LOCAL), AS ADOPTED BY THE AGENCIES HAVING JURISDICTION, INCLUDING REASONABLY ANTICIPATED REVISIONS BASED ON EMERGING TRENDS IN BUILDING REGULATIONS. WHERE ANY OF THESE DIFFER, THE MOST STRINGENT SHALL APPLY.
13. CONTRACT DOCUMENTS FOR MECHANICAL WORK ARE SCHEMATIC IN NATURE AND ARE INTENDED TO CONVEY SCOPE AND GENERAL ARRANGEMENT ONLY.
14. PROVIDE ALL MATERIALS AND EQUIPMENT AND PERFORM ALL LABOR REQUIRED TO INSTALL COMPLETE AND OPERABLE SYSTEMS AS INDICATED ON THE DRAWINGS AND SPECIFICATIONS. INCLUDE ALL NECESSARY AND APPLICABLE APPURTENANCES, WHETHER INDICATED OR NOT.
15. ANY DEVIATIONS FROM THE BASIS OF DESIGN THAT REQUIRE ADDITIONAL PROVISIONS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
16. COORDINATE THE EXACT REQUIREMENTS AND LOCATION OF WORK WITH THE WORK OF OTHER TRADES PRIOR TO FABRICATION AND INSTALLATION. PROVIDE ADDITIONAL OFFSETS AND SECTIONS IN DUCTWORK AND/OR PIPING REQUIRED TO MEET THE APPLICABLE JOB CONDITION REQUIREMENTS. VERIFY JOB SITE ELEVATIONS, DIMENSIONS, AND CONDITIONS, PRIOR TO FABRICATION OR INSTALLATION OF THE WORK. COORDINATE EXACT ROUTING OF DUCTWORK AND PIPING WITH OTHER TRADES SO THAT NO CONFLICTS OCCUR WITH DUCTWORK, PIPING, LIGHTS, STRUCTURE, ETC. PROVIDE ALL PERTINENT DATA CONCERNING THE LOCATION, DIMENSIONS, ETC., OF THE MECHANICAL EQUIPMENT THAT REQUIRES BASES, CURBS AND SUPPORTS TO THE APPROPRIATE TRADES.
17. WHERE CEILINGS ARE INDICATED, ALL DUCTS AND PIPES SHALL BE RAN ABOVE CEILING. IN EXPOSED CONDITIONS, INSTALL DUCTWORK AND PIPING TIGHT TO THE BOTTOM OF STRUCTURE.
18. ALL RATED WALL AND FLOOR PENETRATIONS ARE TO BE SEALED WATER TIGHT AND PACKED WITH FIRE STOP MATERIAL.
19. ALL ITEMS THAT REQUIRE MAINTENANCE OR ADJUSTMENT MUST BE INSTALLED IN ACCESSIBLE LOCATIONS. PROVIDE AN APPROPRIATELY SIZED ACCESS DOOR AS REQUIRED.
20. ALL SEALS, BEARINGS, PACKINGS, AND ACCESSORIES FOR ALL EQUIPMENT AND PIPING SPECIALTIES SHALL BE SUITABLE FOR THE CONTINUOUS OPERATIONAL TEMPERATURES, PRESSURES AND CHARACTERISTICS, OF THE SYSTEM THEY SERVE.
21. PERFORM A COMPLETE AIR AND WATER SYSTEM FLOW BALANCE FOR ALL EQUIPMENT THAT IS SHOWN, SCHEDULED OR OTHERWISE IDENTIFIED, AT THE END OF CONSTRUCTION.
22. INSTALL EQUIPMENT, MATERIALS, ETC. IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND DIRECTION. PROVIDE STRAIGHT INLET AND OUTLET DUCTS/PIPES BASED ON MANUFACTURER'S RECOMMENDATIONS. IF IN CONFLICT WITH THE DESIGN INDICATED HEREIN, ADVISE THE ENGINEERS PRIOR TO INSTALLATION FOR CLARIFICATION.
23. COORDINATE THE EXACT LOCATIONS OF DIFFUSERS, GRILLES AND REGISTERS WITH ARCHITECTURAL REFLECTED CEILING PLANS. AREA SMOKE DETECTORS, SPRINKLERS, LIGHTS AND ELECTRICAL DEVICES. AIR DEVICES SHALL NOT BE WITHIN 3 FEET OF AN AREA SMOKE DETECTOR.
24. UNLESS NOTED OTHERWISE, PROVIDE BRANCH DUCT TO DIFFUSERS SAME SIZE AS DIFFUSER NECK. FLEXIBLE DUCT CONNECTION TO THE DIFFUSER SHALL BE NO MORE THAN FIVE FEET IN LENGTH. ALL BRANCH DUCT TAKEOFFS TO AIR DEVICES SHALL HAVE A MANUAL BALANCING DAMPER INSTALLED IN AN ACCESSIBLE LOCATION.
25. AIR DEVICES PROVIDED WITH INTEGRAL BALANCE DAMPERS SHALL NOT HAVE AN ADDITIONAL BALANCING DAMPER AT AIR DEVICE BRANCH TAKEOFF.
26. PROVIDE ROOM TEMPERATURE THERMOSTATS / TEMPERATURE SENSORS FOR ALL EQUIPMENT THAT MAINTAINS SPACE TEMPERATURE. PREFERRED LOCATIONS ARE SHOWN ON THE PLANS. THERMOSTATS / TEMPERATURE SENSORS SHALL BE MOUNTED AT 48" ABOVE FINISHED FLOOR, UNLESS NOTED OTHERWISE. COORDINATE THE EXACT LOCATIONS OF THERMOSTATS / TEMPERATURE SENSORS WITH MARKERBOARDS, SWITCHES, AND ANY OTHER WALL MOUNTED FIXTURES PRIOR TO ROUGH IN.
27. UNLESS NOTED OTHERWISE, MINIMUM PIPE SIZE TO TERMINAL EQUIPMENT SHALL BE 3/4 INCH AND MINIMUM FLOW SHALL BE 0.5 GPM.
28. PROVIDE SHUT-OFF VALVES WITHIN ALL SUPPLY PIPING BRANCH TAKEOFFS FROM MAINS. PROVIDE A MANUAL BALANCE VALVE AND A SEPARATE SHUT-OFF VALVE WITHIN ALL RETURN PIPING BRANCH TAKE-OFFS FROM MAINS. LOCATE VALVES IN ACCESSIBLE LOCATIONS.
29. INSTALL ALL PIPING IN LOCATIONS AND ELEVATIONS SUCH THAT COILS, TUBES, AND FILTERS CAN BE REMOVED AND REPLACED WITHOUT MAJOR PIPING REMOVAL. LOCATE VALVES IN APPROPRIATE PLACES TO ACCOMMODATE MAINTENANCE. FOR GRAVITY FLOW PIPING, ADEQUATE SLOPE SHALL BE PROVIDED.
30. INSTALL TWO-WAY CONTROL VALVES ON ALL EQUIPMENT UNLESS NOTED OTHERWISE.
31. AT TIME OF ROUGH INSTALLATION, DURING STORAGE ON THE CONSTRUCTION SITE, AND UNTIL FINAL STARTUP OF THE HEATING AND COOLING EQUIPMENT, ALL DUCT AND OTHER RELATED AIR DISTRIBUTION COMPONENT OPENINGS SHALL BE COVERED WITH TAPE, PLASTIC, SHEET METAL OR OTHER METHODS ACCEPTABLE FOR PROTECTION TO THE ENFORCING AGENCY TO REDUCE THE AMOUNT OF DUST OR DEBRIS WHICH MAY COLLECT IN THE SYSTEM(S).
32. IN MECHANICALLY VENTILATED BUILDINGS, PROVIDE REGULARLY OCCUPIED AREAS OF THE BUILDING WITH AIR FILTRATION MEDIA FOR OUTSIDE AND RETURN AIR THAT PROVIDES AT LEAST A MINIMUM EFFICIENCY REPORTING VALUE (MERV) OF 8 PRIOR TO OCCUPANCY. FILTERS SHALL BE CHANGED PRIOR TO AIR BALANCE AND COMMISSIONING, AND AGAIN AT THE COMPLETION OF CONSTRUCTION JUST PRIOR TO OCCUPANCY OF THE BUILDING WITH FINAL FILTERS PER SPECIFICATIONS. MAINTENANCE RECOMMENDATIONS FOR FILTERS OF THE SAME VALUE SHALL BE INCLUDED IN THE OPERATION AND MAINTENANCE MANUAL.
33. INSTALLATION OF HVAC, REFRIGERATION, AND FIRE SUPPRESSION EQUIPMENT SHALL NOT CONTAIN ANY CFCS OR HALONS.
34. ALL SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SYSTEMS, DEVICES SHALL BE FROM THE BUILDING STRUCTURE. SUPPORT FROM STRUCTURAL BRIDGING IS UNACCEPTABLE.
35. DO NOT INSTALL PIPING, CONDUIT, DUCTWORK, ETC., IN A LOCATION OR IN A MANNER THAT WILL ALLOW FREEZING AND/OR THE COLLECTION OF CONDENSATION.

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STATE OF OHIO
RENAE FOCHESATO
E-60911 EXPIRES
REGISTERED
PROFESSIONAL ENGINEER
01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

GENERAL INFORMATION - HVAC

SHEET NUMBER

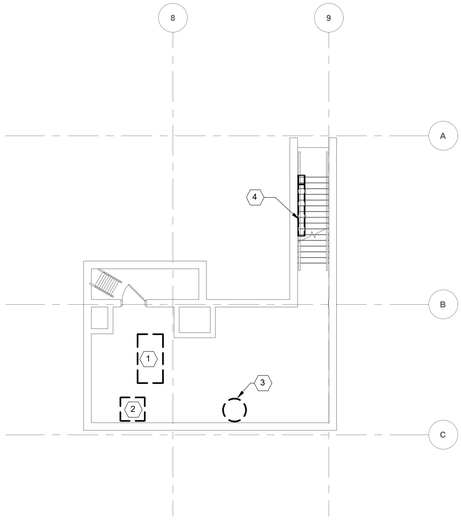
M001

GENERAL NOTES

1. ALL HVAC DEMOLITION ITEMS MAY NOT BE CAPTURED BY THE DEMOLITION PLAN.

KEYNOTES

1 DEMOLISH STEAM BOILER AND ALL ASSOCIATED CONTROLS, ACCESSORIES, PIPING, AND FLUES.
2 DEMOLISH CONDENSATE PUMPS AND ALL ASSOCIATED CONTROLS, ACCESSORIES, PIPING, AND SUPPORTS.
3 DEMOLISH EXISTING FLASH TANK AND ALL ASSOCIATED PIPING AND ACCESSORIES.
4 DEMOLISH EXISTING DUCTWORK INSTALLED IN THE STAIRWELL.



1 MD100 **BASEMENT HVAC DEMOLITION PLAN**
Scale: 1/8" = 1'-0"

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I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

BASEMENT DUCTWORK DEMOLITION PLAN

SHEET NUMBER

MD100

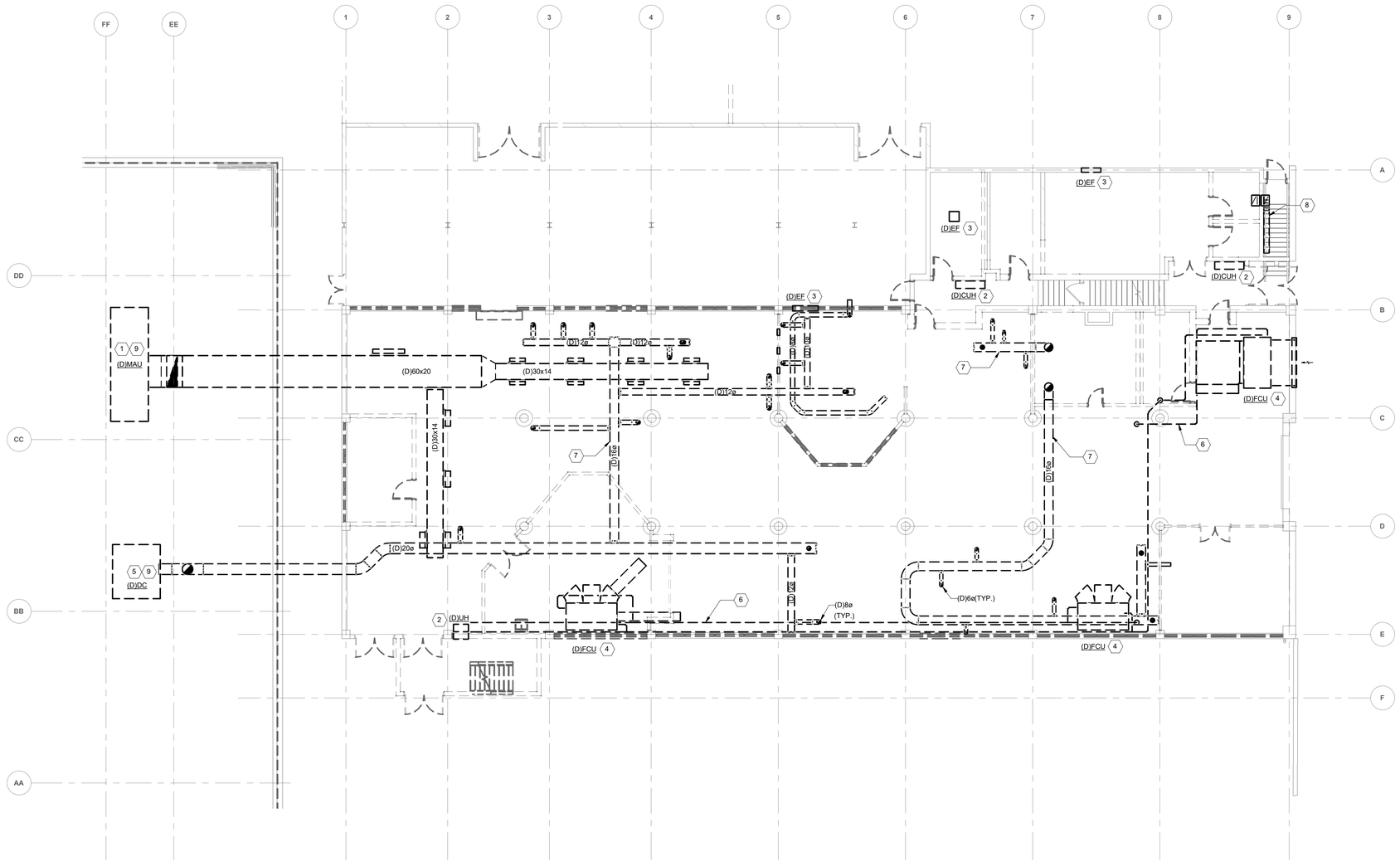
Project Management Initials: Designer: AG Checked: XW Approved: XW ARCH E1 30"x42"

GENERAL NOTES

1. ALL HVAC DEMOLITION ITEMS MAY NOT BE CAPTURED BY THE DEMOLITION PLAN.

KEYNOTES

1 DEMOLISH MAU AND ALL ASSOCIATED DUCTWORK, GRILLES, AND ACCESSORIES.
2 DEMOLISH UNIT HEATER AND ALL ASSOCIATED PIPING AND ACCESSORIES.
3 DEMOLISH EXHAUST FAN AND ALL ASSOCIATED ACCESSORIES AND DUCTWORK.
4 DEMOLISH EXISTING FAN COIL UNIT AND ALL ASSOCIATED PIPING, DUCTWORK, AND ACCESSORIES.
5 DEMOLISH EXISTING DUST COLLECTOR, DUCTWORK, AND ALL ASSOCIATED ACCESSORIES.
6 DEMOLISH ALL EXISTING STEAM PIPING AND ACCESSORIES IN BUILDING INCLUDING ABANDONED PIPING (TYP.)
7 DEMOLISH ALL EXISTING DUCTWORK, GRILLES, AND ACCESSORIES IN BUILDING INCLUDING ABANDONED DUCTWORK (TYP.)
8 DEMOLISH EXISTING DUCTWORK INSTALLED IN THE STAIRWELL.
9 COORDINATE PATCHING OF CANYON ROOF WITH GC.



1 MD101 **FIRST FLOOR HVAC DEMOLITION PLAN**
Scale: 1/8" = 1'-0"

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01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

FIRST FLOOR DUCTWORK DEMOLITION PLAN

SHEET NUMBER

MD101

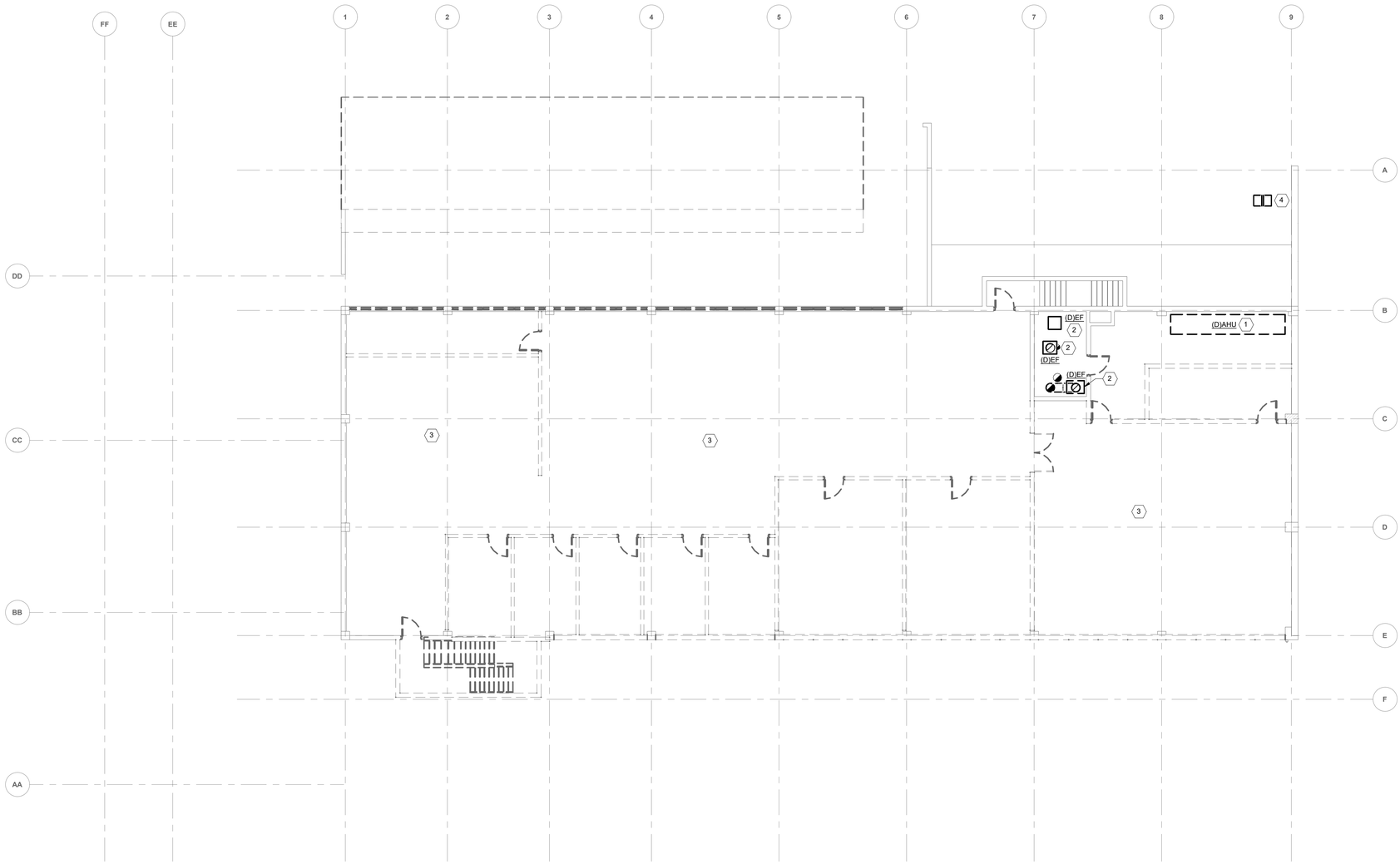
Last Printed: 1/17/2025 8:43:12 AM
Filename: Autodesk Docs://SF-AMER (USA) 60708192 CCAD Center for Creative Collaboration/60708192_ACM_R22_CCAD_SH.rvt

GENERAL NOTES

1. ALL HVAC DEMOLITION ITEMS MAY NOT BE CAPTURED BY THE DEMOLITION PLAN.

KEYNOTES

1 DEMOLISH EXISTING AIR HANDLING UNIT AND ASSOCIATED DX CONDENSING UNIT. DEMOLISH ALL ASSOCIATED DUCTWORK, PIPING, CONTROLS, AND ACCESSORIES.
2 DEMOLISH EXHAUST FAN AND ALL ASSOCIATED ACCESSORIES AND DUCTWORK.
3 DEMOLISH ALL EXISTING DUCTWORK, DIFFUSERS, AND OTHER MECHANICAL EQUIPMENT ABOVE CEILING ON SECOND FLOOR (TYP.)
4 DEMOLISH EXISTING GOOSENECK DUCTWORK. COORDINATE ROOF PATCHING WITH GC.



1 SECOND FLOOR HVAC DEMOLITION PLAN
MD102 Scale: 1/8" = 1'-0"

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I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

SECOND FLOOR DUCTWORK DEMOLITION PLAN

SHEET NUMBER

MD102

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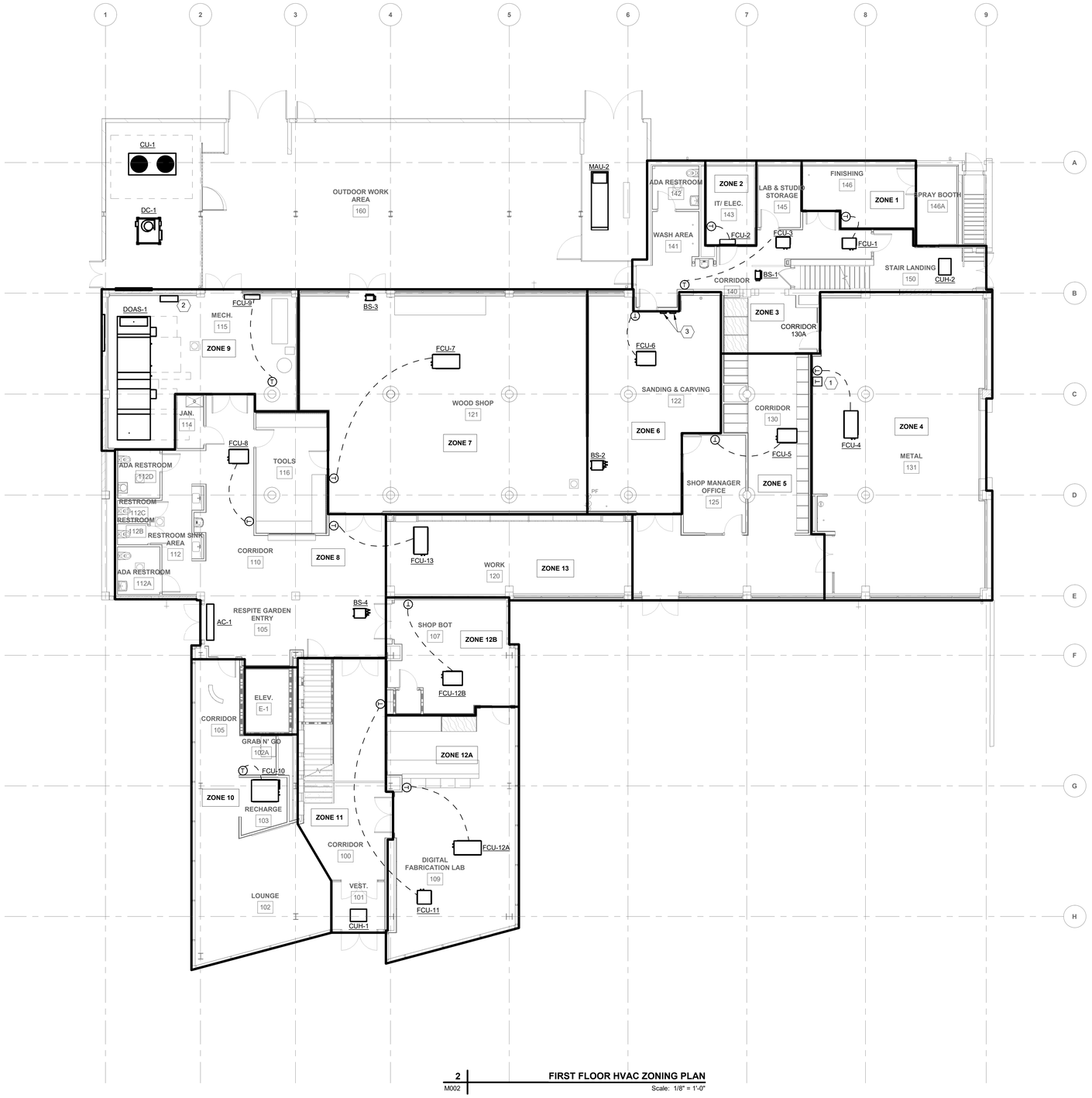
CITY OF COLUMBUS - BUILDING & ZONING SERVICES * PLAN APPROVAL ENDORSED BY THE CHIEF BUILDING OFFICIAL * APP # ADDC2445310 * DATE: 3/26/2025

KEYNOTES

1 TEMPERATURE SENSOR FOR MAU-1. CONFIGURE CONTROLS TO LOCK FCU-4 OUT OF COOLING WHEN MAU IS IN HEATING MODE.
2 DOAS CONTROL PANEL LOCATION.
3 DUST COLLECTOR MAIN CONTROL PANEL AND SPARK DETECTION PANEL.



2 FIRST FLOOR HVAC ZONING PLAN
M002 Scale: 1/8" = 1'-0"

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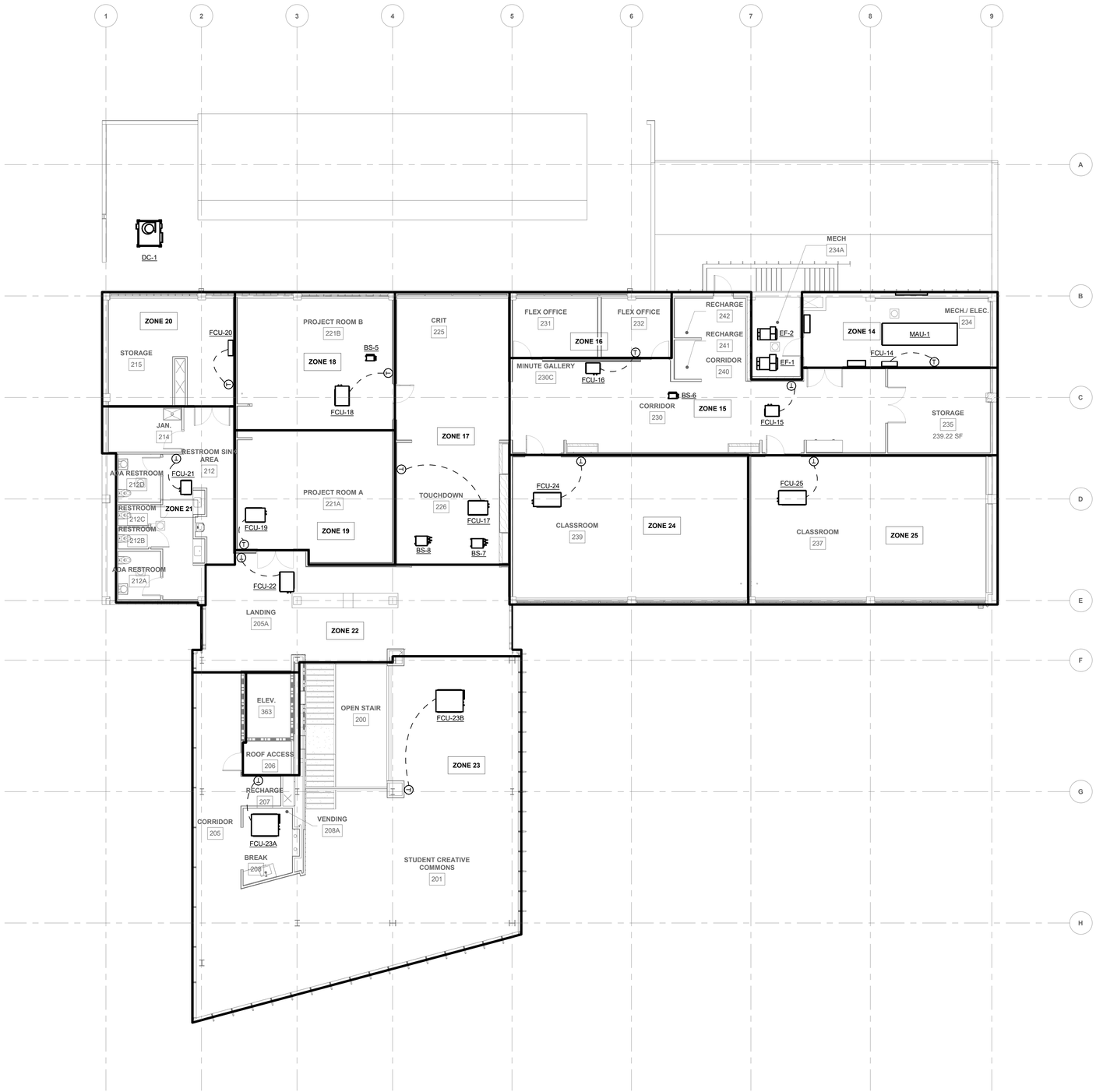
I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER
60708192

SHEET TITLE
HVAC ZONING PLANS

SHEET NUMBER
M002



1 M003 **SECOND FLOOR HVAC ZONING**

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

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I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

HVAC ZONING PLANS

SHEET NUMBER

M003

Project Management Initials: Designer: AG Checked: XW Approved: XW ARCH E1 30"x42"

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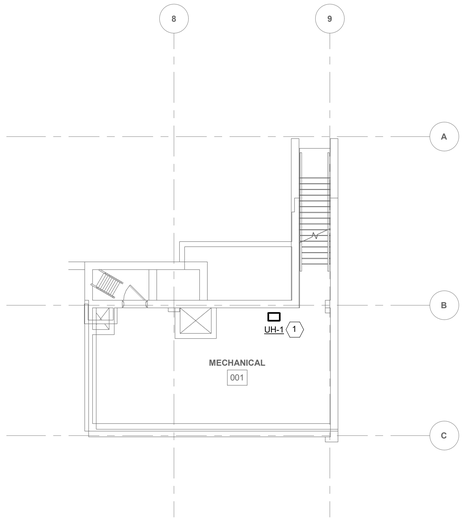
KEYNOTES

1 PROVIDE WALL MOUNTING BRACKET FOR UNIT HEATER. COORDINATE INSTALLATION WITH PLUMBING AND FIRE PROTECTION EQUIPMENT IN BASEMENT.



1 M100 **BASEMENT HVAC DUCTWORK PLAN**
Scale: 1/8" = 1'-0"

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I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

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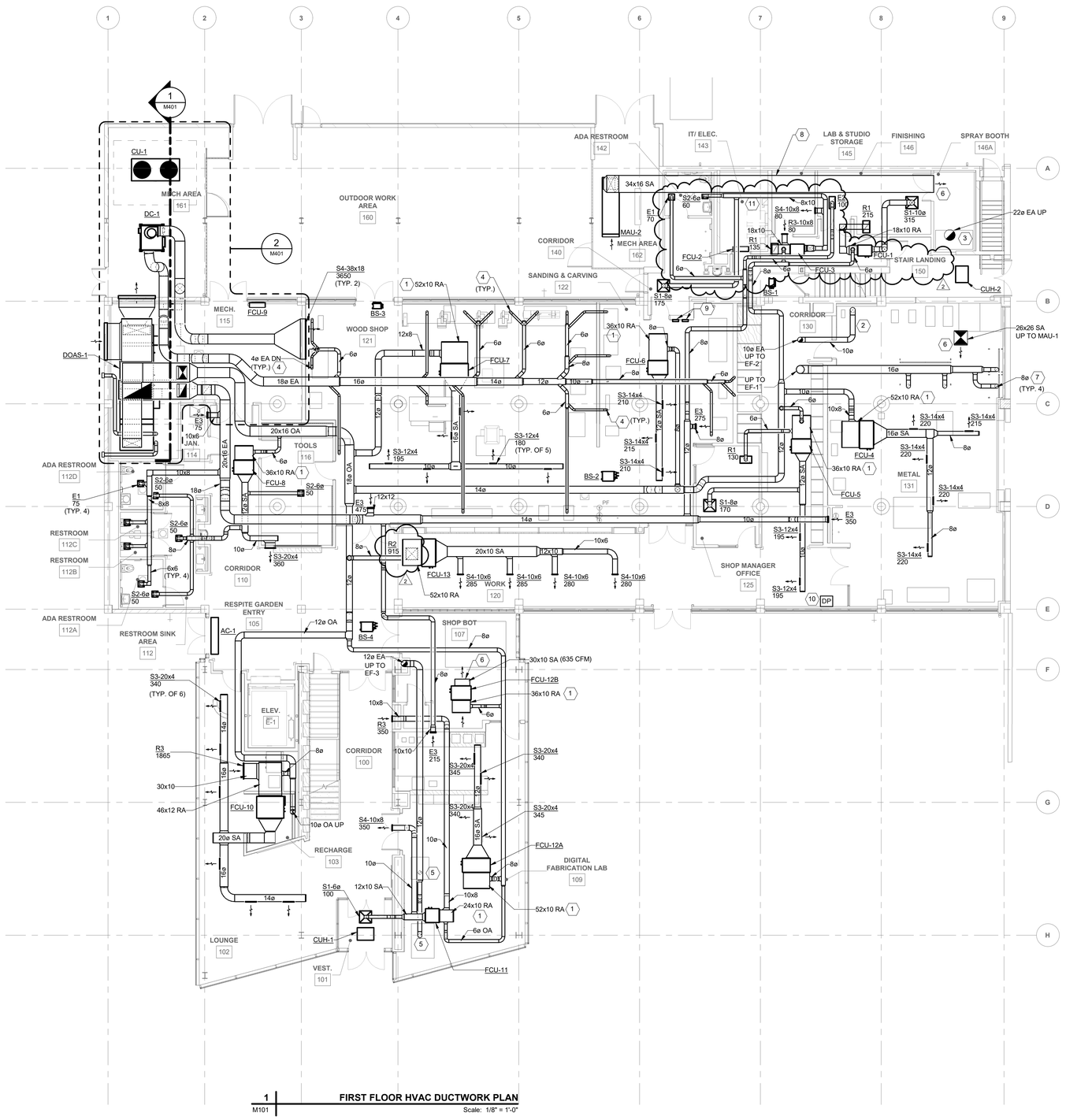
SHEET TITLE

BASEMENT DUCTWORK PLAN

SHEET NUMBER

M100

CITY OF COLUMBUS - BUILDING & ZONING SERVICES * PLAN APPROVAL ENDORSED BY THE CHIEF BUILDING OFFICIAL * APP # ADDC2445310 * DATE: 3/26/2025



1 M101 **FIRST FLOOR HVAC DUCTWORK PLAN**
Scale: 1/8" = 1'-0"

KEYNOTES

1 PROVIDE MESH COVERED OPENING ON TOP OF FAN COIL RETURN PLENUM IN EXPOSED AREAS.
2 CONNECT EXHAUST DUCTWORK TO PLASMA TABLE. REFER TO ARCHITECTURAL SHEETS FOR EXACT LOCATION.
3 EXHAUST DUCTWORK WILL CONNECT TO EXHAUST FAN ON PAINT BOOTH. REFER TO ARCHITECTURAL DRAWINGS FOR PAINT BOOTH. ROUTE EXHAUST DUCT BETWEEN TRUSSES.
4 ALL DROPS FROM DUST COLLECTOR SYSTEM SHALL BE 4" ROUND AND TERMINATE 5'-0" A.F.F
5 EXTEND 8" DUCT DOWN AND CONNECT TO LASER CUTTER.
6 PROVIDE MESH COVERING OVER SUPPLY DUCT OPENING.
7 CONNECT EXHAUST DUCTWORK TO FOUR (4) WELDING FUME EXTRACTION ARMS. COORDINATE EXACT DROP LOCATION WITH WELDING STATIONS.
8 INSTALL DUCTWORK FROM MAU-2 IN SOFFIT. REFER TO ARCHITECTURAL DRAWINGS FOR SOFFIT.
9 DUST COLLECTOR MAIN CONTROL PANEL AND SPARK DETECTION PANEL.
10 BUILDING PRESSURE SENSOR LOCATION.
11 DO NOT ROUTE DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS. REFER TO ELECTRICAL DRAWINGS FOR EXACT PANEL LOCATIONS.

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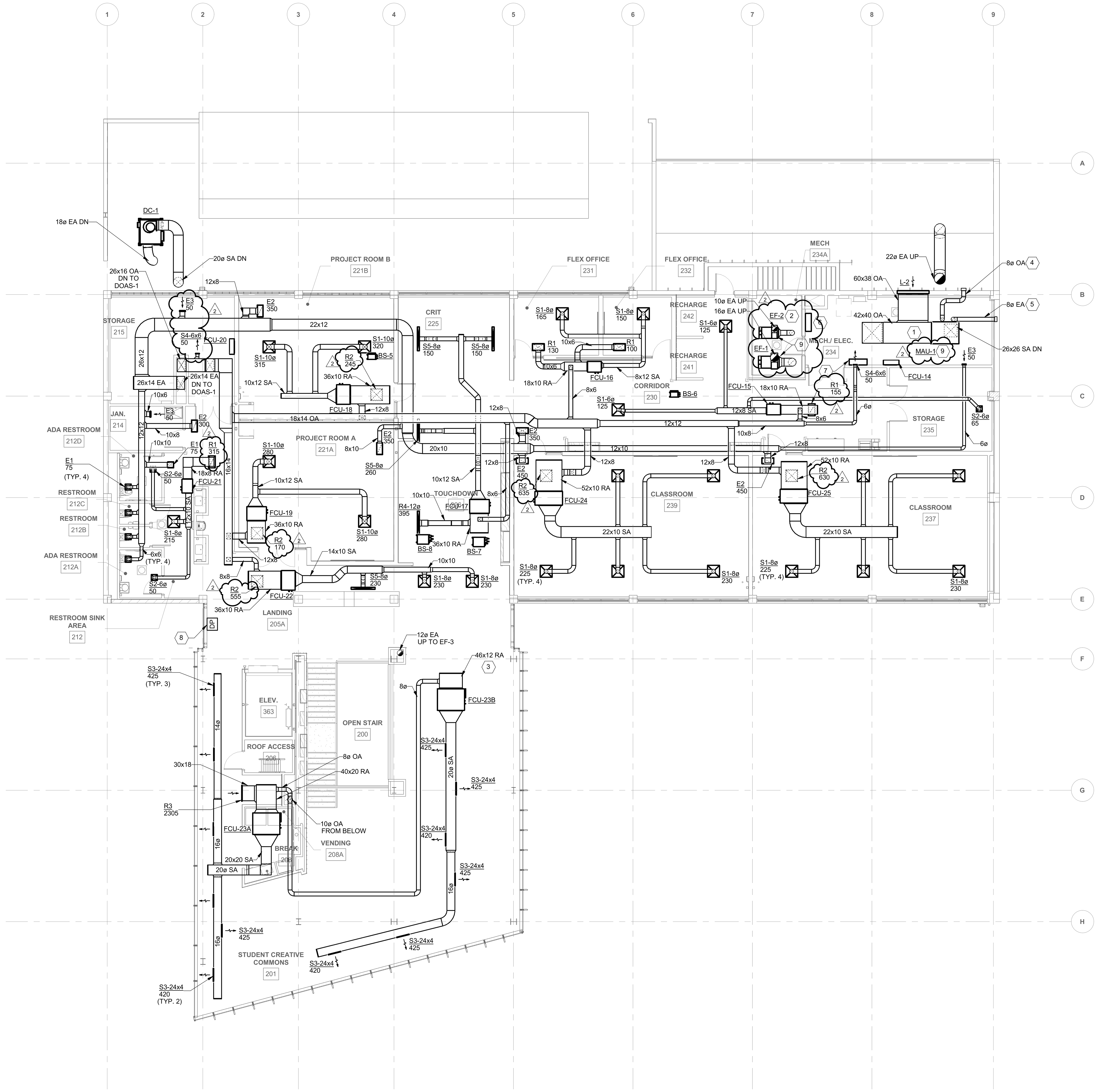
I/R	DATE	DESCRIPTION
2	01.20.2025	Correction Letter #1
1	11.01.2024	Issue for Permit

PROJECT NUMBER
60708192

SHEET TITLE
FIRST FLOOR DUCTWORK PLAN

SHEET NUMBER
M101



1 | SECOND FLOOR HVAC DUCTWORK PLAN
M102 | Scale: 1/8" = 1'-0"

KEYNOTES

1. EXTEND A FULL SIZE PLENUM BOX FROM LOUVER AND CONNECT NEW OUTSIDE AIR INTAKE TO IT. SLOPE THE PLENUM BOX AND PROVIDE A DRAIN. MAINTAIN 10' BETWEEN INTAKE AND EXHAUST LOCATIONS.
2. COORDINATE REUSE OF EXISTING FLOOR AND ROOF PENETRATIONS FOR EXHAUST DUCTWORK. EXTEND THE EXHAUST FAN DISCHARGE THROUGH THE ROOF TO A 3' DUCT STACK. ROUTE THE DRAIN FROM FAN CABINET TO FLOOR DRAIN IN THE ROOM.
3. PROVIDE MESH COVERED OPENING ON TOP OF FAN COIL RETURN PLENUM IN EXPOSED AREAS.
4. PROVIDE 8" COMBUSTION AIR INTAKE TO GAS HEATER. PROVIDE VENT CAP OVER EXTERIOR WALL OPENING. MAINTAIN 10' BETWEEN INTAKE AND ANY EXHAUST LOCATIONS.
5. PROVIDE 8" EXHAUST FLUE FROM GAS HEATER TO EXTERIOR WALL AND TERMINATE WITH VENT CAP. MAINTAIN 10' BETWEEN EXHAUST LOCATION AND ANY AIR INTAKE LOCATIONS.
6. DDC CONTROL PANEL LOCATION.
7. VRF CONTROL PANEL LOCATION.
8. BUILDING PRESSURE SENSOR LOCATION.
9. EF-1 AND EF-2 SHALL BE INTERLOCKED WITH MAU-1. REFER TO SEQUENCE OF OPERATIONS.

2

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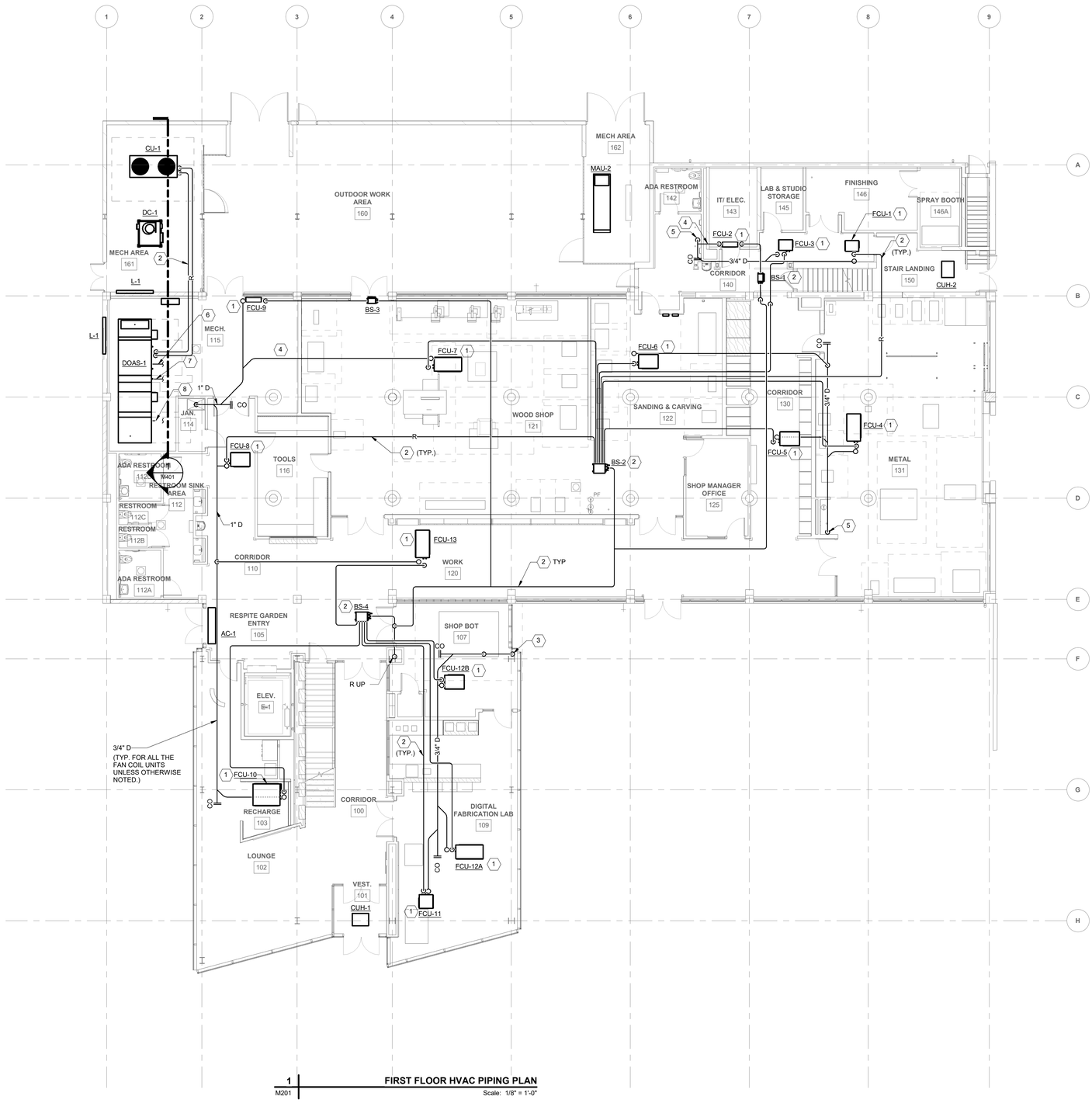
SHEET TITLE

SECOND FLOOR DUCTWORK PLAN

SHEET NUMBER

M102



1 FIRST FLOOR HVAC PIPING PLAN
M201 Scale: 1/8" = 1'-0"

KEYNOTES

1 ROUTE CONDENSATE DRAIN TO JANITOR SINK, UTILITY SINK, OR SPLASH BLOCK AS SHOWN. MAKE AN INDIRECT CONNECTION.

2 REFRIGERANT PIPING SHOWN SCHEMATICALLY AS SINGLE LINE FOR READABILITY. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL REFRIGERANT PIPING LINE SETS. SIZING AND ALL ACCESSORIES WITH EQUIPMENT MANUFACTURER. PIPE SIZING SHALL BE BASED ON ACTUAL FIELD DEVELOPED PIPE LENGTHS. ALL REFRIGERANT PIPING SHALL BE FULLY INSULATED. ALL REFRIGERANT PIPING OUTDOORS SHALL BE JACKETED WITH ALUMINUM. A REFRIGERANT PIPING INSTALLATION DIAGRAM SHALL BE INCLUDED AS PART OF THE SHOP DRAWING PROCESS AND DOCUMENT SET INDICATING ALL REQUIRED LINE SIZES, TRAPS, ACCESSORIES, PITCHING, RISERS AND INSTALLATION REQUIREMENTS IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

3 ROUTE CONDENSATE DRAIN TO SPLASH BLOCK OUTSIDE.

4 DO NOT ROUTE CONDENSATE OVER ELECTRICAL PANELS. REFER TO ELECTRICAL DRAWINGS AND COORDINATE IN FIELD.

5 ROUTE CONDENSATE LINE DOWN TO CORNER OF UTILITY SINK. MAKE INDIRECT CONNECTION.

6 PROVIDE DRAIN FROM HEAT EXCHANGER CORE AND INDIRECT TO FLOOR DRAIN.

7 PROVIDE CONDENSATE DRAIN FROM COOLING COIL AND INDIRECT TO FLOOR DRAIN.

8 PROVIDE CONDENSATE DRAIN AND CONDENSATE NEUTRALIZER KIT FROM GAS HEATER AND INDIRECT TO FLOOR DRAIN.

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SHEET TITLE

FIRST FLOOR HVAC PIPING PLAN

SHEET NUMBER

M201

Last Plotted: 1/17/2025 8:42:47 AM
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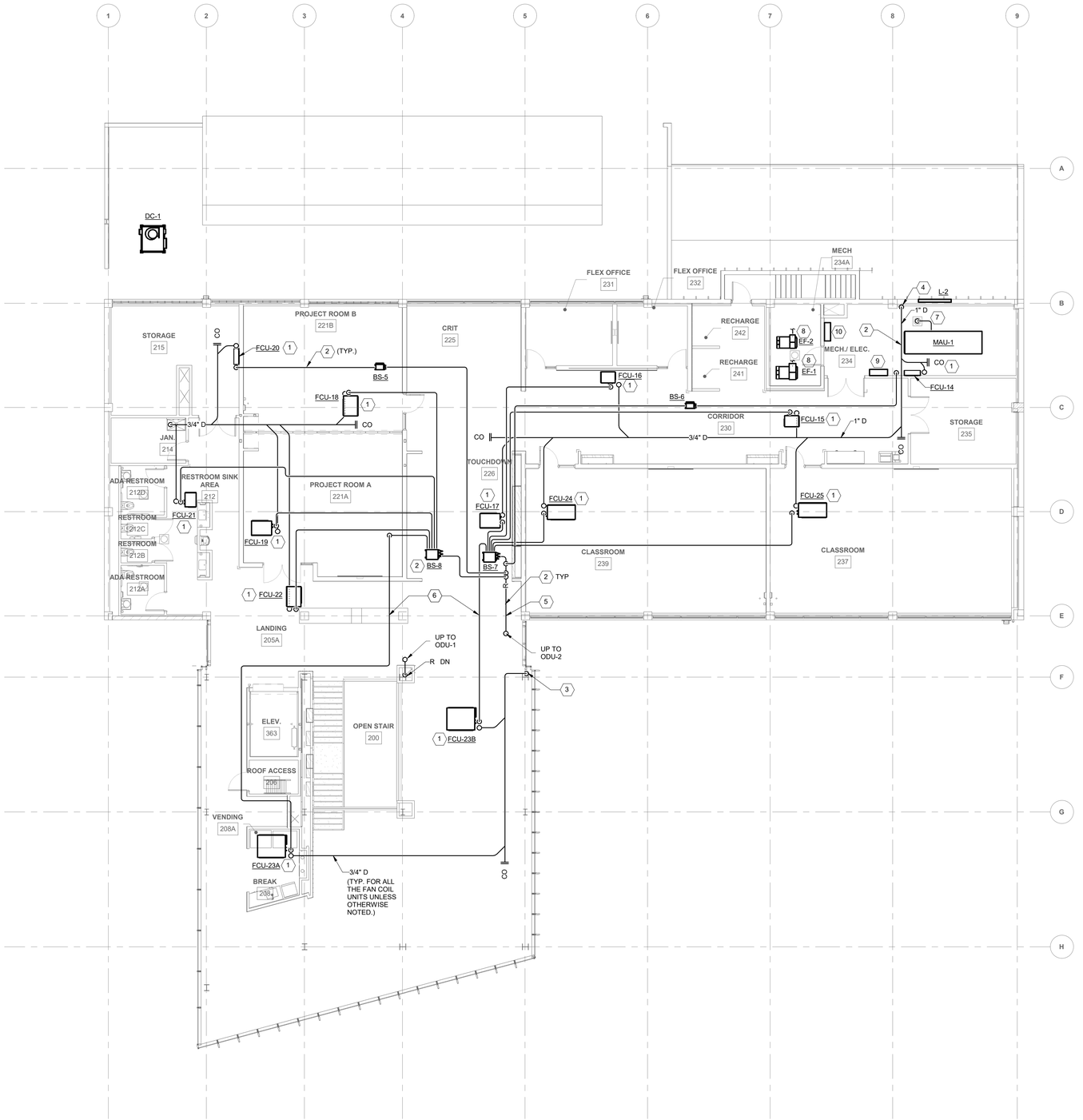

KEYNOTES

1. ROUTE CONDENSATE DRAIN TO JANITOR SINK, UTILITY SINK, OR SPLASH BLOCK AS SHOWN. MAKE AN INDIRECT CONNECTION.
2. REFRIGERANT PIPING SHOWN SCHEMATICALLY AS SINGLE LINE FOR READABILITY. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL REFRIGERANT PIPING LINE SETS, SIZING AND ALL ACCESSORIES WITH EQUIPMENT MANUFACTURER. PIPE SIZING SHALL BE BASED ON ACTUAL FIELD DEVELOPED PIPE LENGTHS. ALL REFRIGERANT PIPING SHALL BE FULLY INSULATED. ALL REFRIGERANT PIPING OUTDOORS SHALL BE JACKETED WITH ALUMINUM. A REFRIGERANT PIPING INSTALLATION DIAGRAM SHALL BE INCLUDED AS PART OF THE SHOP DRAWING PROCESS AND DOCUMENT SET INDICATING ALL REQUIRED LINE SIZES, TRAPS, ACCESSORIES, PITCHING, RISERS AND INSTALLATION REQUIREMENTS IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
3. ROUTE CONDENSATE DRAIN DOWN TO FIRST FLOOR AND CONNECT TO DRAIN LINE GOING TO SPLASH BLOCK.
4. ROUTE DRAIN PIPING DOWN FLUSH TO WALL AND EXTEND TO FLOOR DRAIN IN MECHANICAL ROOM. MAKE INDIRECT CONNECTION.
5. ROUTE (3) REFRIGERANT LINES THROUGH CENTERLINE OF STEEL BEAM. COORDINATE EXACT PENETRATION LOCATION WITH FIELD CONDITIONS SUCH THAT ROOF MEMBRANE IS NOT PENETRATED.
6. ROUTE (2) REFRIGERANT LINES TO FCU THROUGH CENTERLINE OF CONCRETE BEAM.
7. PROVIDE CONDENSATE DRAIN AND CONDENSATE NEUTRALIZER KIT FROM GAS HEATER AND INDIRECT TO FLOOR DRAIN.
8. PROVIDE DRAIN FROM FAN BODY AND INDIRECT TO FLOOR DRAIN.
9. VRF CONTROL PANEL LOCATION.
10. DDC CONTROL PANEL LOCATION.

1 SECOND FLOOR HVAC PIPING PLAN
M202
Scale: 1/8" = 1'-0"

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1	11.01.2024	Issue for Permit

PROJECT NUMBER
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SHEET TITLE
SECOND FLOOR HVAC PIPING PLAN

SHEET NUMBER
M202

Project Management Initials: Designer: AG Checked: XW Approved: XW ARCH E1 30"x42"

Last Plotted: 1/17/2025 8:42:51 AM
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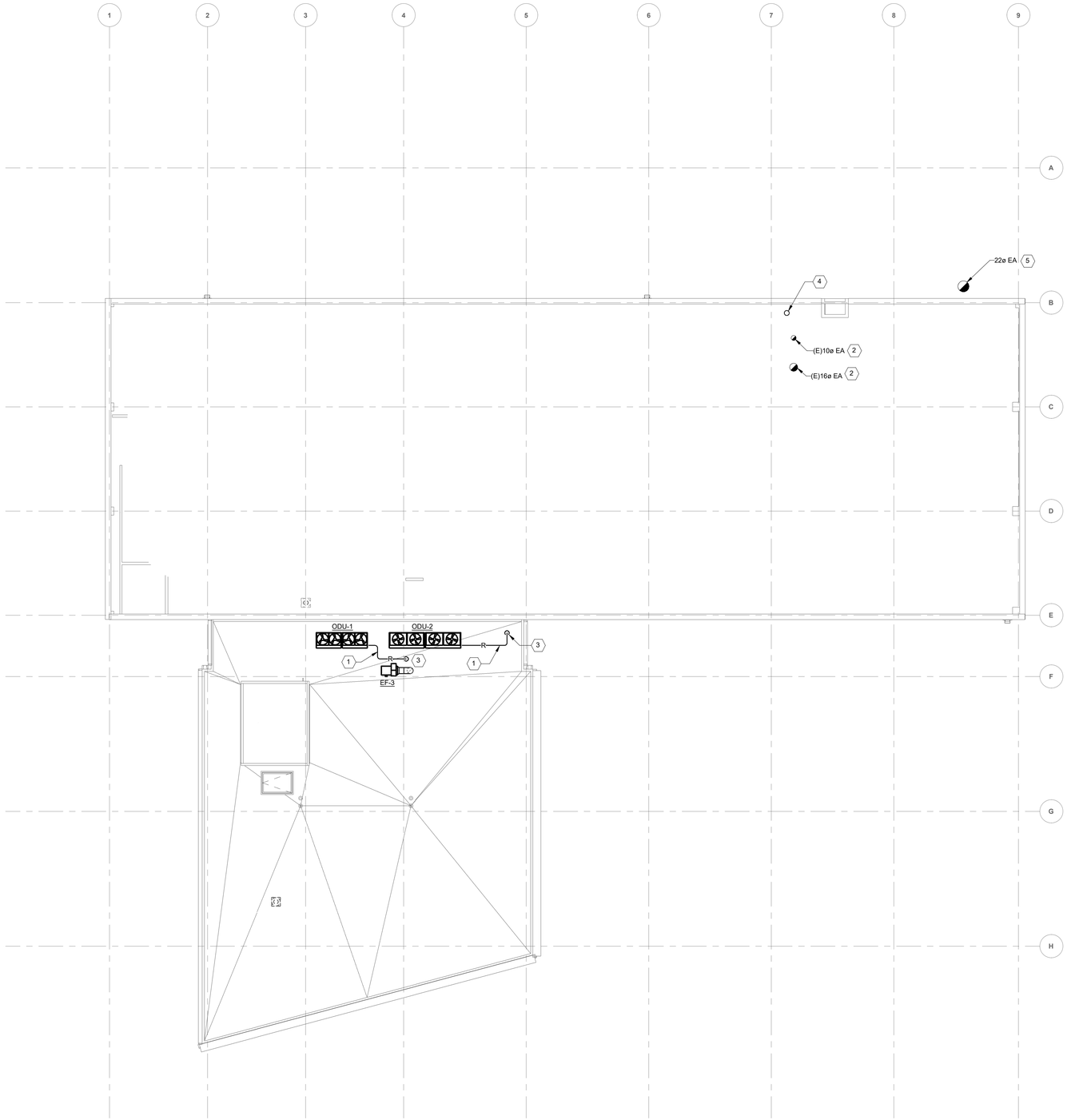

KEYNOTES

1 REFRIGERANT PIPING SHOWN SCHEMATICALLY AS SINGLE LINE FOR READABILITY. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL REFRIGERANT PIPING LINE SETS, SIZING AND ALL ACCESSORIES WITH EQUIPMENT MANUFACTURER. PIPE SIZING SHALL BE BASED ON ACTUAL FIELD DEVELOPED PIPE LENGTHS. ALL REFRIGERANT PIPING SHALL BE FULLY INSULATED. ALL REFRIGERANT PIPING OUTDOORS SHALL BE JACKETED WITH ALUMINUM. A REFRIGERANT PIPING INSTALLATION DIAGRAM SHALL BE INCLUDED AS PART OF THE SHOP DRAWING PROCESS AND DOCUMENT SET INDICATING ALL REQUIRED LINE SIZES, TRAPS, ACCESSORIES, PITCHING, RISERS AND INSTALLATION REQUIREMENTS IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

2 EXISTING EXHAUST STACK TO BE REUSED. RECONNECT DUCTWORK INSIDE BUILDING. DO NOT PENETRATE ROOF MEMBRANE.

3 PROVIDE DOG HOUSE TYPE PIPE CURB FOR ROOF PENETRATION. REFER TO DETAILS.

4 CAP AND SEAL EXHAUST DUCT WEATHERTIGHT. DO NOT PENETRATE ROOF MEMBRANE.

5 EXTEND EXHAUST DUCT FROM PAINT BOOTH 6'-0" ABOVE ROOF. PROVIDE RAIN CAP AT DUCT TERMINATION.

1 ROOF HVAC PLAN
M301 Scale: 1/8" = 1'-0"

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I/R	DATE	DESCRIPTION
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60708192

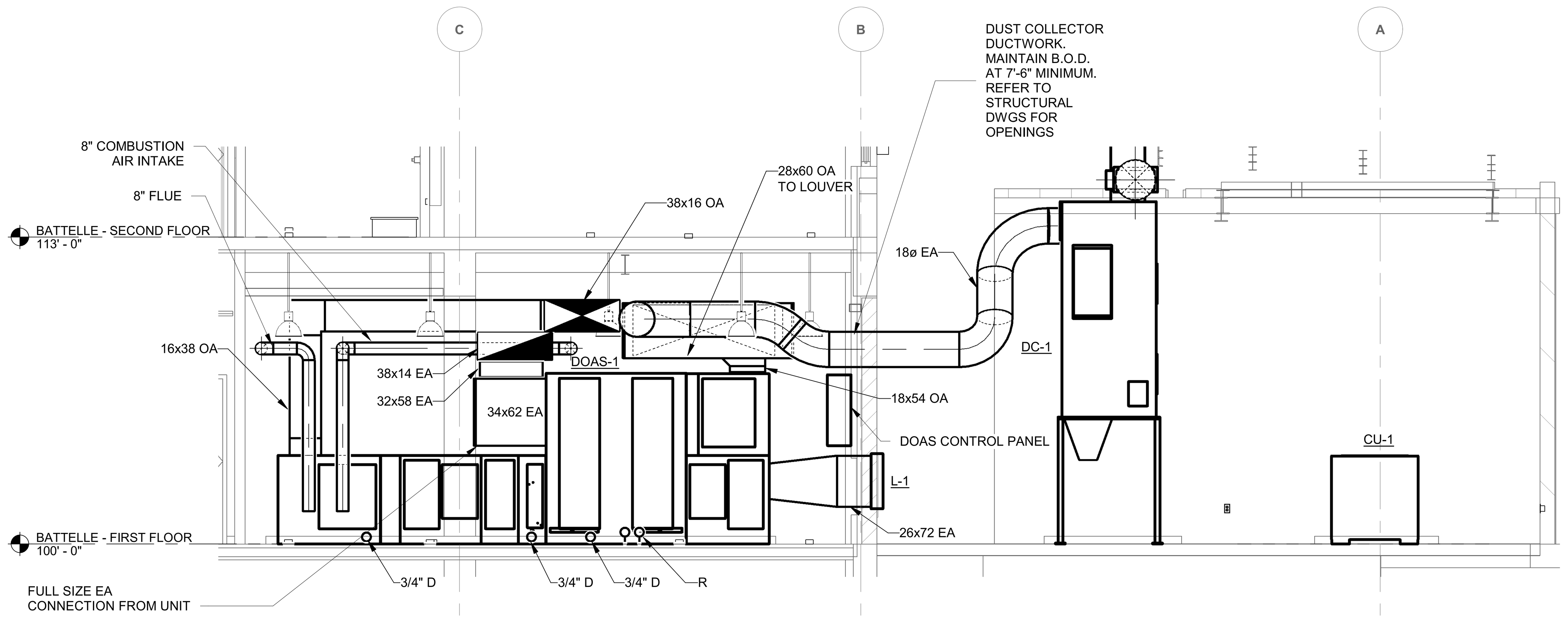
SHEET TITLE
HVAC ROOF PLANS

SHEET NUMBER
M301

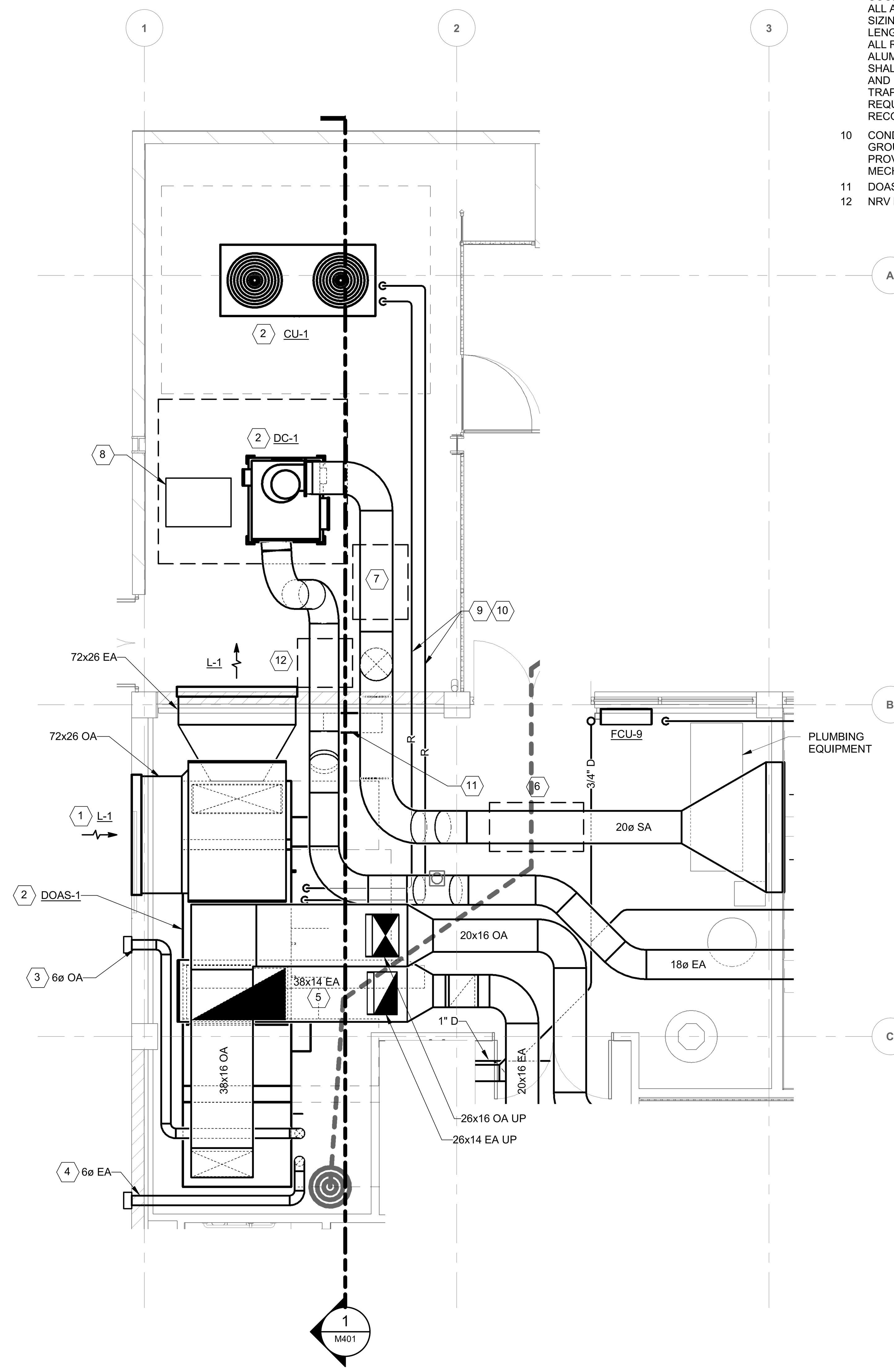
CITY OF COLUMBUS - BUILDING & ZONING SERVICES * PLAN APPROVAL ENDORSED BY THE CHIEF BUILDING OFFICIAL * APP # ADDC2445310 * DATE: 3/26/2025

KEYNOTES

1. EXTEND A FULL SIZE PLENUM BOX FROM LOUVER AND CONNECT NEW OUTSIDE AIR INTAKE TO IT. SLOPE THE PLENUM BOX AND PROVIDE A DRAIN. MAINTAIN 10' BETWEEN INTAKE AND EXHAUST LOCATIONS.
2. PLACE UNIT ON 4" CONCRETE PAD.
3. PROVIDE 8" COMBUSTION AIR INTAKE TO GAS HEATER. PROVIDE VENT CAP OVER EXTERIOR WALL OPENING. MAINTAIN 10' BETWEEN INTAKE AND ANY EXHAUST LOCATIONS.
4. PROVIDE 8" EXHAUST FLUE FROM GAS HEATER TO EXTERIOR WALL AND TERMINATE WITH VENT CAP. MAINTAIN 10' BETWEEN EXHAUST LOCATION AND ANY AIR INTAKE LOCATIONS.
5. DO NOT ROUTE DUCTWORK OR PIPING ABOVE ELECTRICAL PANELS. REFER TO ELECTRICAL DRAWINGS FOR EXACT PANEL LOCATIONS.
6. NOISE ATTENUATOR LOCATION.
7. HIGH SPEED ABORT GATE LOCATION.
8. EXPLOSION VENT DEFLECTOR LOCATION.
9. REFRIGERANT PIPING SHOWN SCHEMATICALLY AS SINGLE LINE FOR READABILITY. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL REFRIGERANT PIPING LINE SETS, SIZING AND ALL ACCESSORIES WITH EQUIPMENT MANUFACTURER. PIPE SIZING SHALL BE BASED ON ACTUAL FIELD DEVELOPED PIPE LENGTHS. ALL REFRIGERANT PIPING SHALL BE FULLY INSULATED. ALL REFRIGERANT PIPING OUTDOORS SHALL BE JACKETED WITH ALUMINUM. A REFRIGERANT PIPING INSTALLATION DIAGRAM SHALL BE INCLUDED AS PART OF THE SHOP DRAWING PROCESS AND DOCUMENT SET INDICATING ALL REQUIRED LINE SIZES, TRAPS, ACCESSORIES, PITCHING, RISERS AND INSTALLATION REQUIREMENTS IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.
10. CONDENSING UNIT HAS TWO INDEPENDENT CIRCUITS. PROVIDE GROUND AND FLOOR SUPPORTS FOR REFRIGERANT PIPING. PROVIDE A HOSE RAMP FOR FLOOR MOUNTED PIPING IN MECHANICAL ROOM.
11. DOAS CONTROL PANEL LOCATION.
12. NRV DAMPER LOCATION.



1 **DOAS SECTION VIEW**
M401 Scale: 1/4" = 1'-0"



2 **FIRST FLOOR MECHANICAL ROOM**
M401 Scale: 1/4" = 1'-0"

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STATE OF OHIO
RENAE FOCHESATO
E-90911
REGISTERED
PROFESSIONAL ENGINEER
01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
2	01.20.2025	Correction Letter #1
1	11.01.2024	Issue for Permit

PROJECT NUMBER

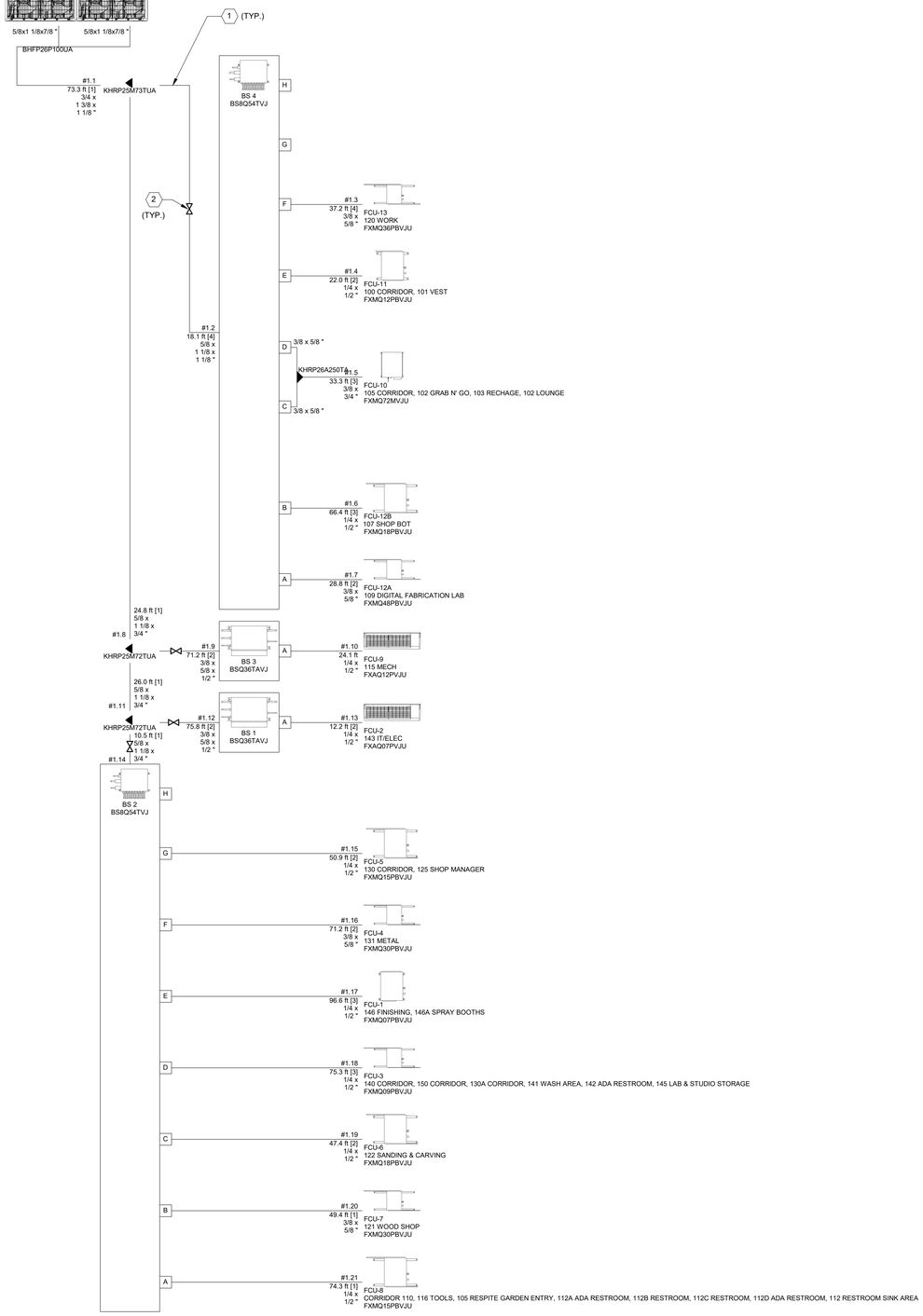
60708192

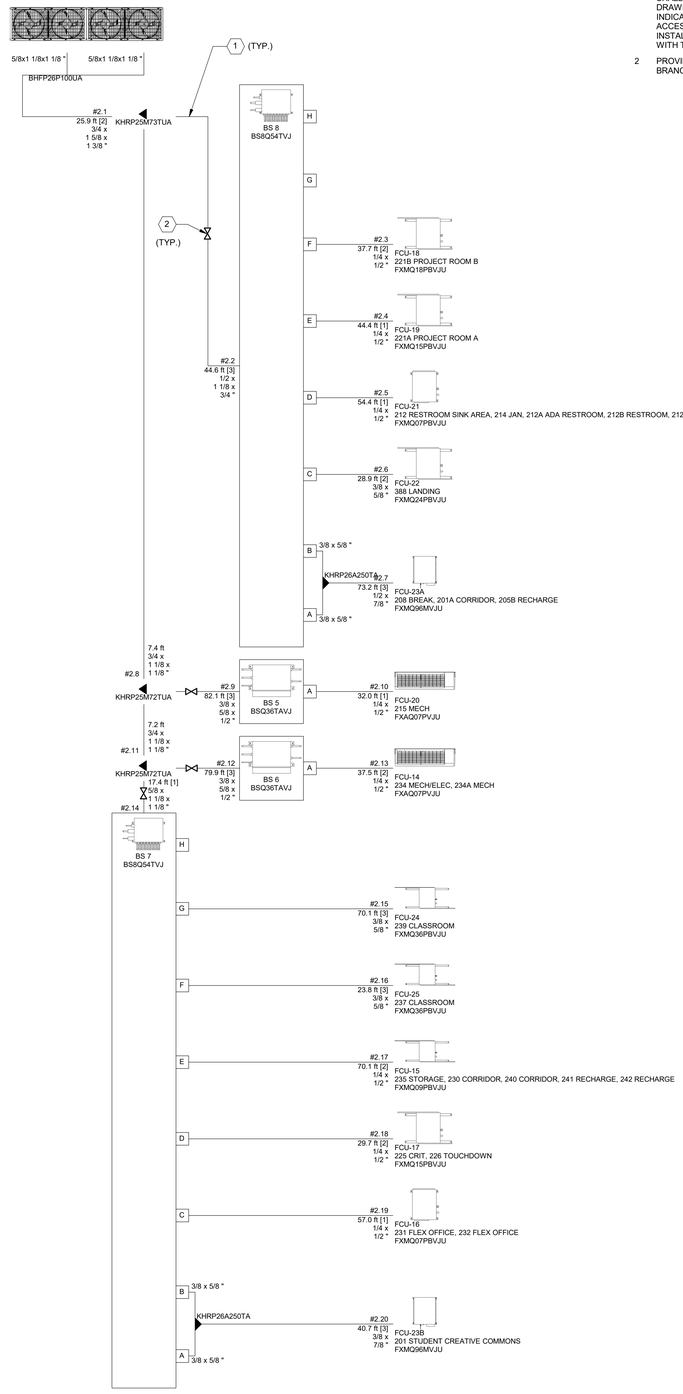
SHEET TITLE

HVAC ENLARGED PLANS

SHEET NUMBER

M401





KEYNOTES

1 REFRIGERANT PIPING SHOWN SCHEMATICALLY AS SINGLE LINE FOR READABILITY. HVAC CONTRACTOR IS RESPONSIBLE FOR COORDINATING ALL REFRIGERANT PIPING LINE SETS, SIZING AND ALL ACCESSORIES WITH EQUIPMENT MANUFACTURER. PIPE SIZING SHALL BE BASED ON ACTUAL FIELD DEVELOPED PIPE LENGTHS. ALL REFRIGERANT PIPING SHALL BE FULLY INSULATED. ALL REFRIGERANT PIPING OUTDOORS SHALL BE JACKETED WITH ALUMINUM. A REFRIGERANT PIPING INSTALLATION DIAGRAM SHALL BE INCLUDED AS PART OF THE SHOP DRAWING PROCESS AND DOCUMENT SET INDICATING ALL REQUIRED LINE SIZES, TRAPS, ACCESSORIES, PITCHING, RISERS AND INSTALLATION REQUIREMENTS IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS.

2 PROVIDE REFRIGERANT ISOLATION VALVE PER BRANCH SELECTOR BOX.

1 VRF PIPING DIAGRAM
M501 NTS

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01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

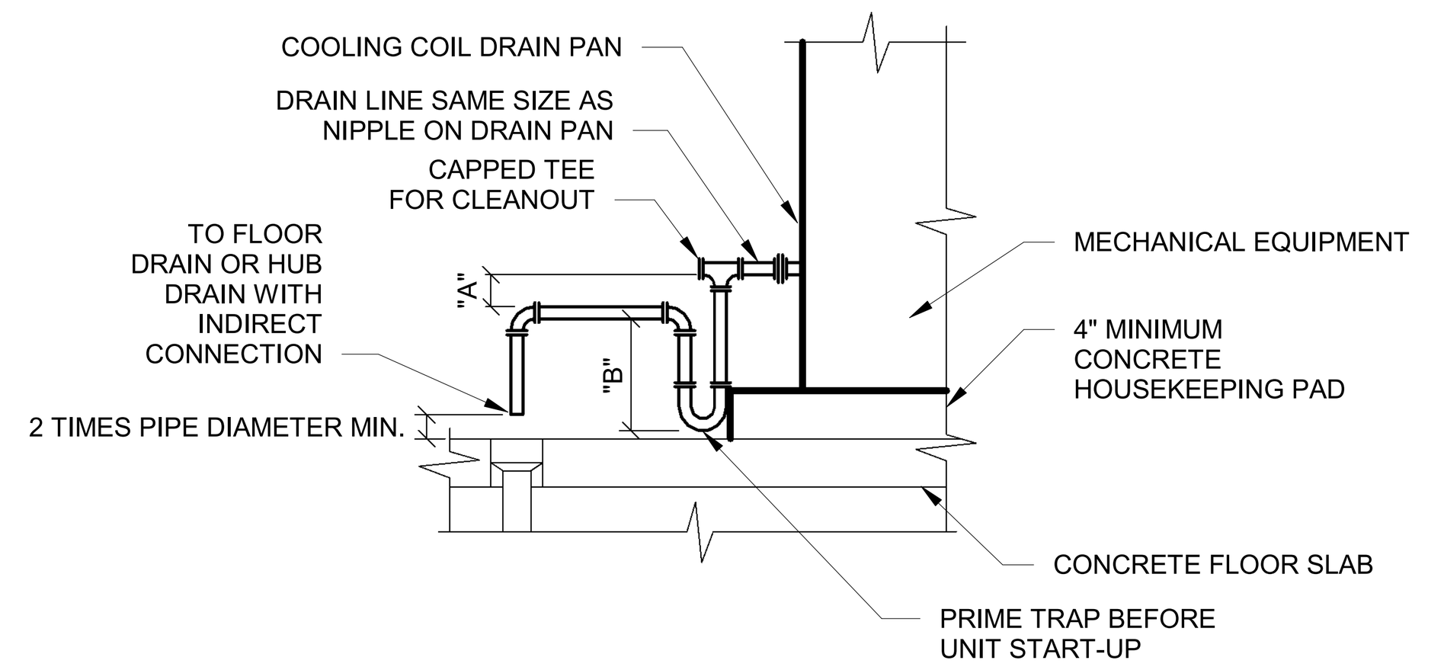
PROJECT NUMBER
60708192

SHEET TITLE
HVAC DIAGRAMS

SHEET NUMBER
M501

Last Plotted: \\172\2025 8:43:01 AM
Filename: Autodesk Docs://BP-AMER (USA) 60708192 CCAD Center for Creative Collaboration/60708192_ACM_R22_CCAD_M.rvt

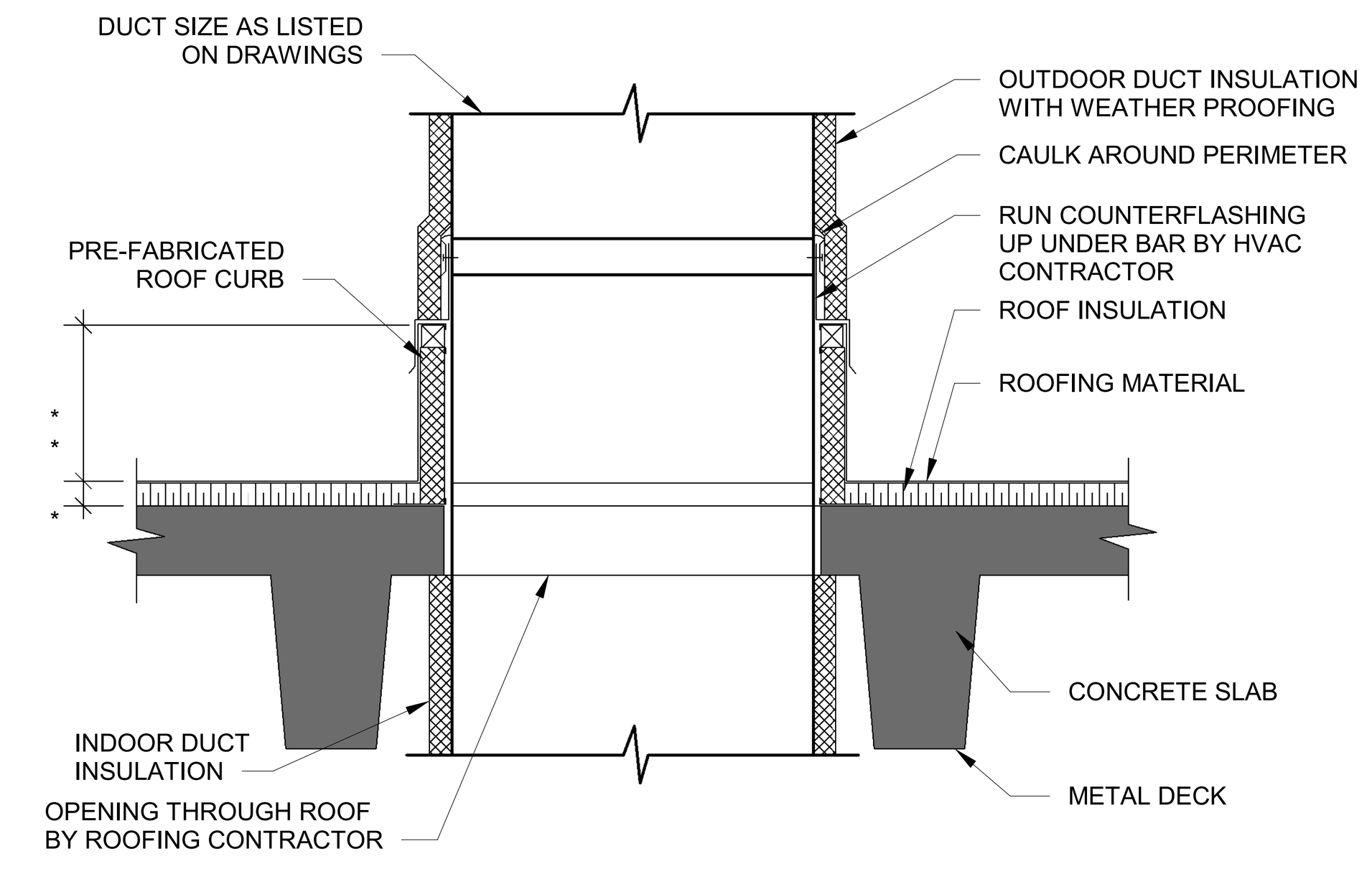
CITY OF COLUMBUS - BUILDING & ZONING SERVICES * PLAN APPROVAL ENDORSED BY THE CHIEF BUILDING OFFICIAL * APP # ADDC2445310 * DATE: 3/26/2025



	A(IN)	B(IN)
DRAWTHRU COIL	FAN INLET STATIC	"A"/2+1
BLOWTHRU COIL	2" MIN.	FAN DISCHARGE STATIC PLUS 1"

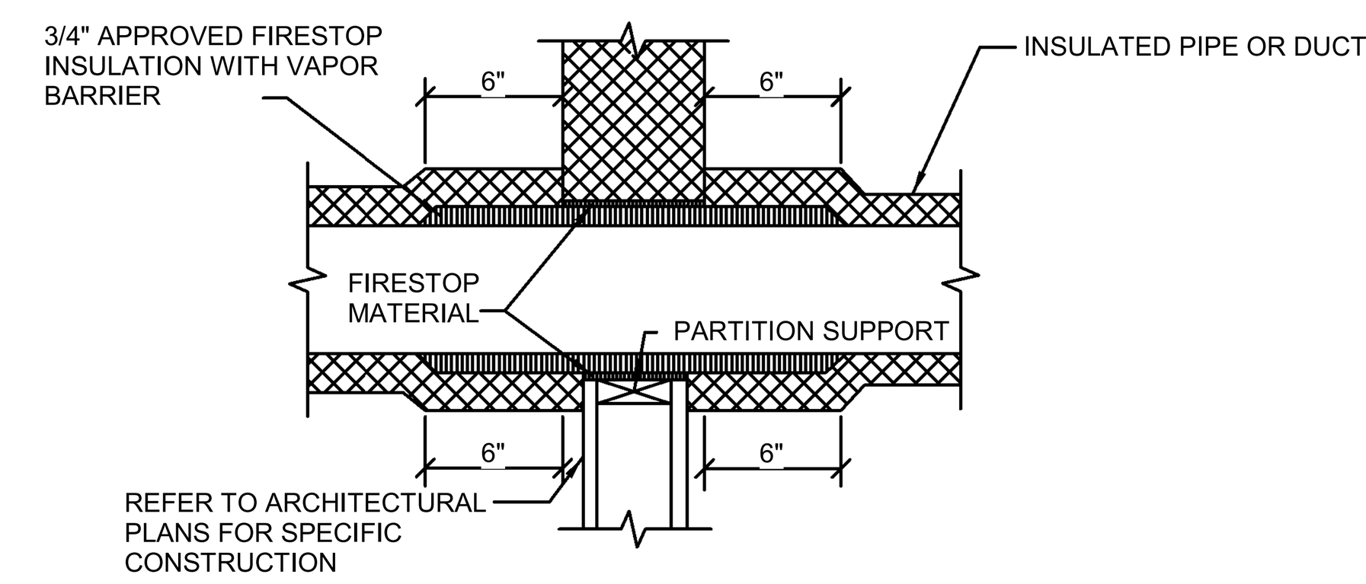
NOTE: CONTRACTOR TO ADJUST THICKNESS OF HOUSEKEEPING PAD AS NECESSARY TO ACCOMMODATE CONDENSATE DRAINS.

1 M601 — **CONDENSATE DRAIN PIPING DETAIL** — NTS



* VARIES SEE ARCHITECTURAL ROOF PLAN
* * 18" MIN. (REFER TO ROOF PLAN)
NOTE: ALL ROOF OPENINGS BY GENERAL TRADES CONTRACTOR.

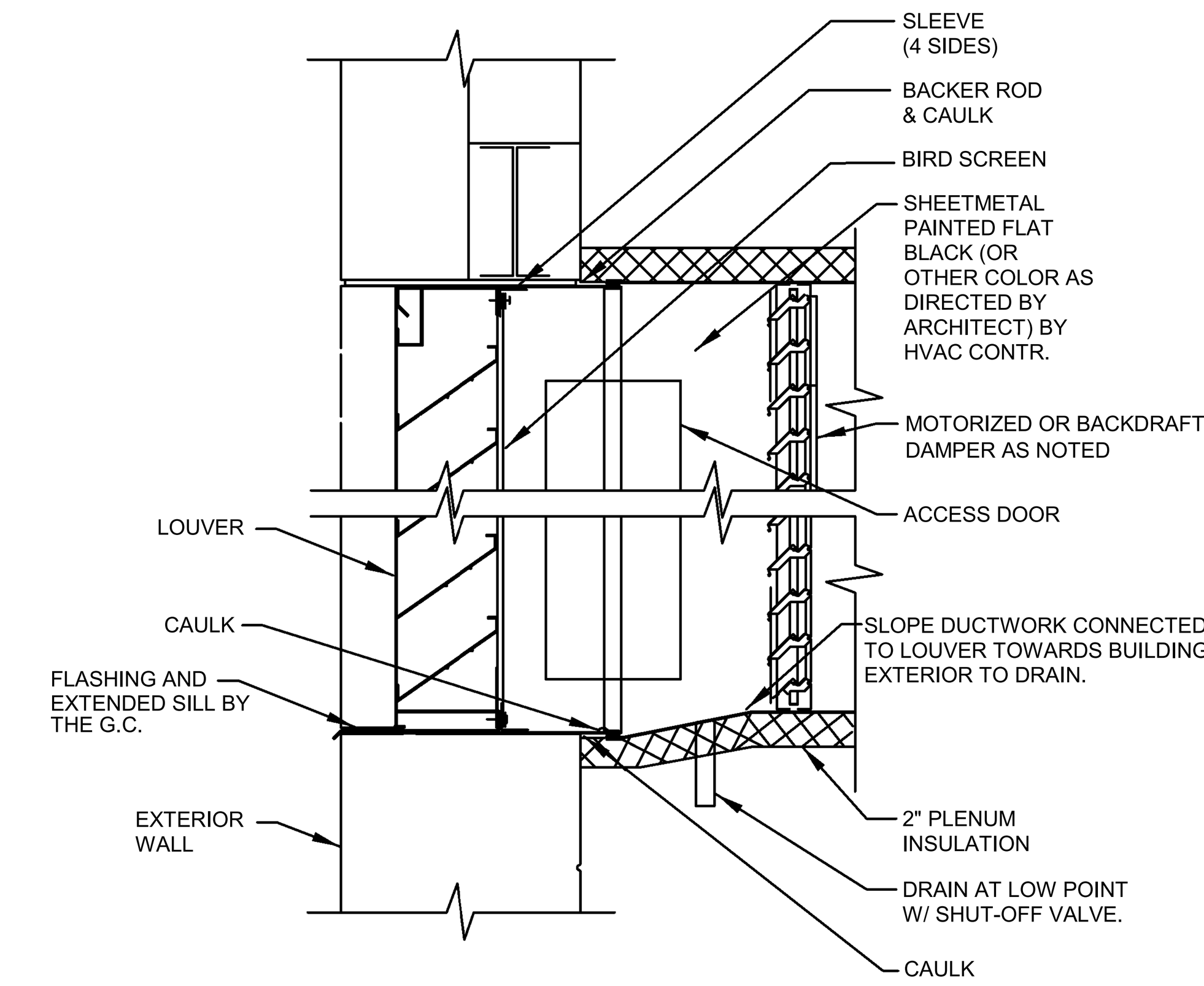
2 M601 — **DUCT THROUGH ROOF DETAIL** — NTS



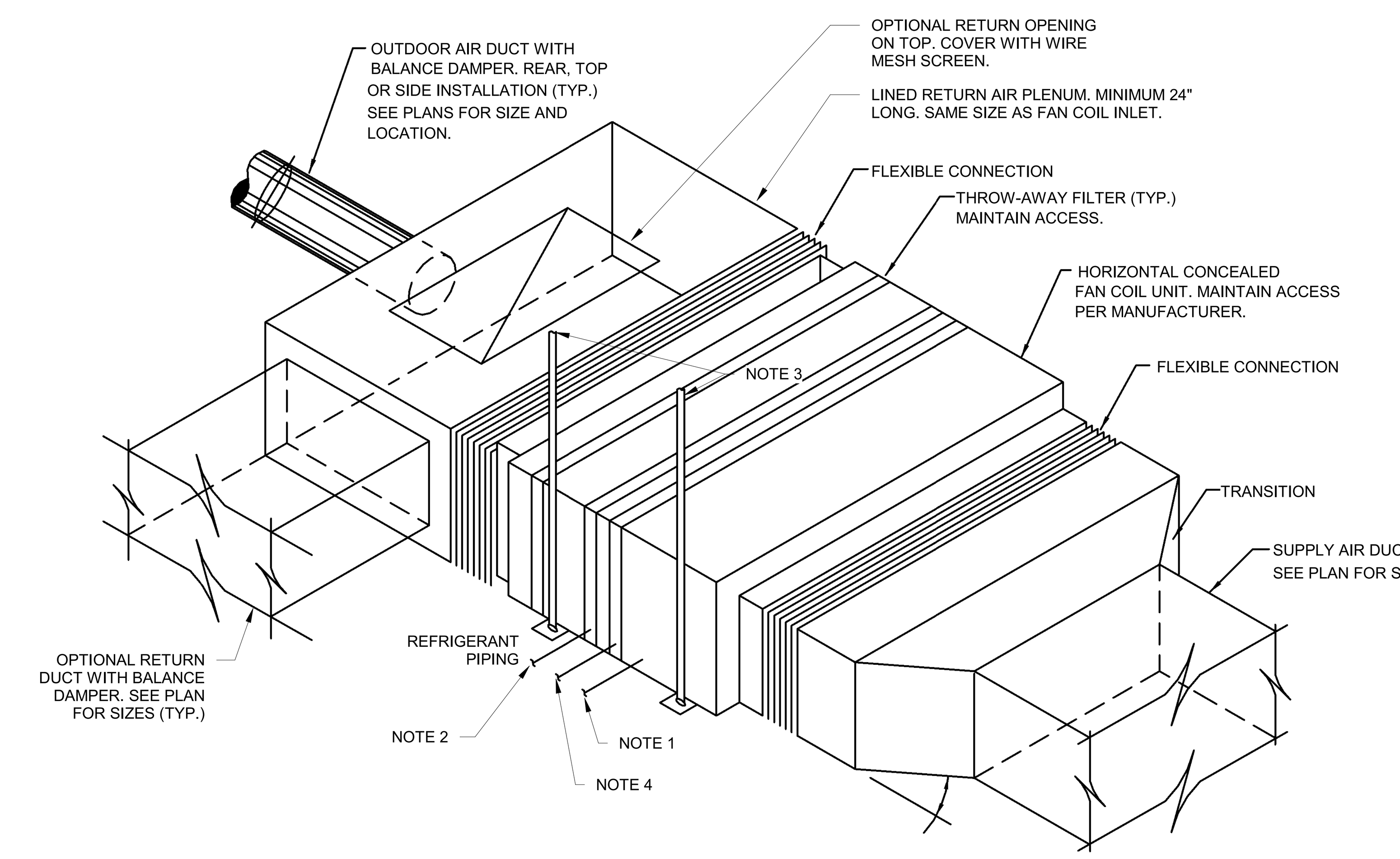
PARTITION OR CHASE PENETRATION

NOTE:
1. APPLICABLE TO PENETRATIONS OF ALL FIRE RATED MEMBRANES, IN ACCORDANCE WITH NFPA 101, REFER TO SPECIFICATIONS FOR FIRE STOPPING SYSTEMS.

3 M601 — **PIPE/DUCT WALL PENETRATION DETAIL** — NTS



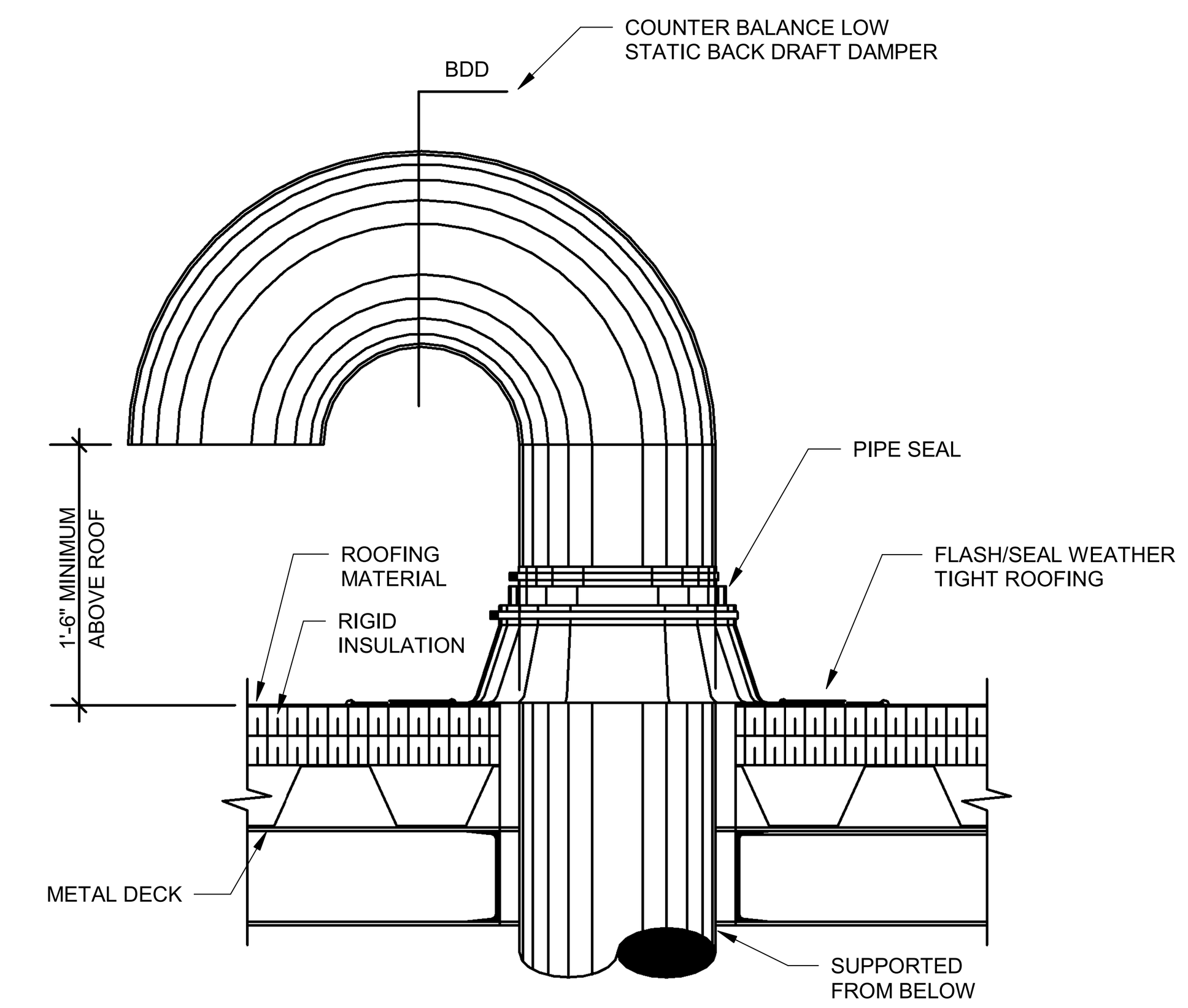
4 M601 — **WALL LOUVER DETAIL** — NTS



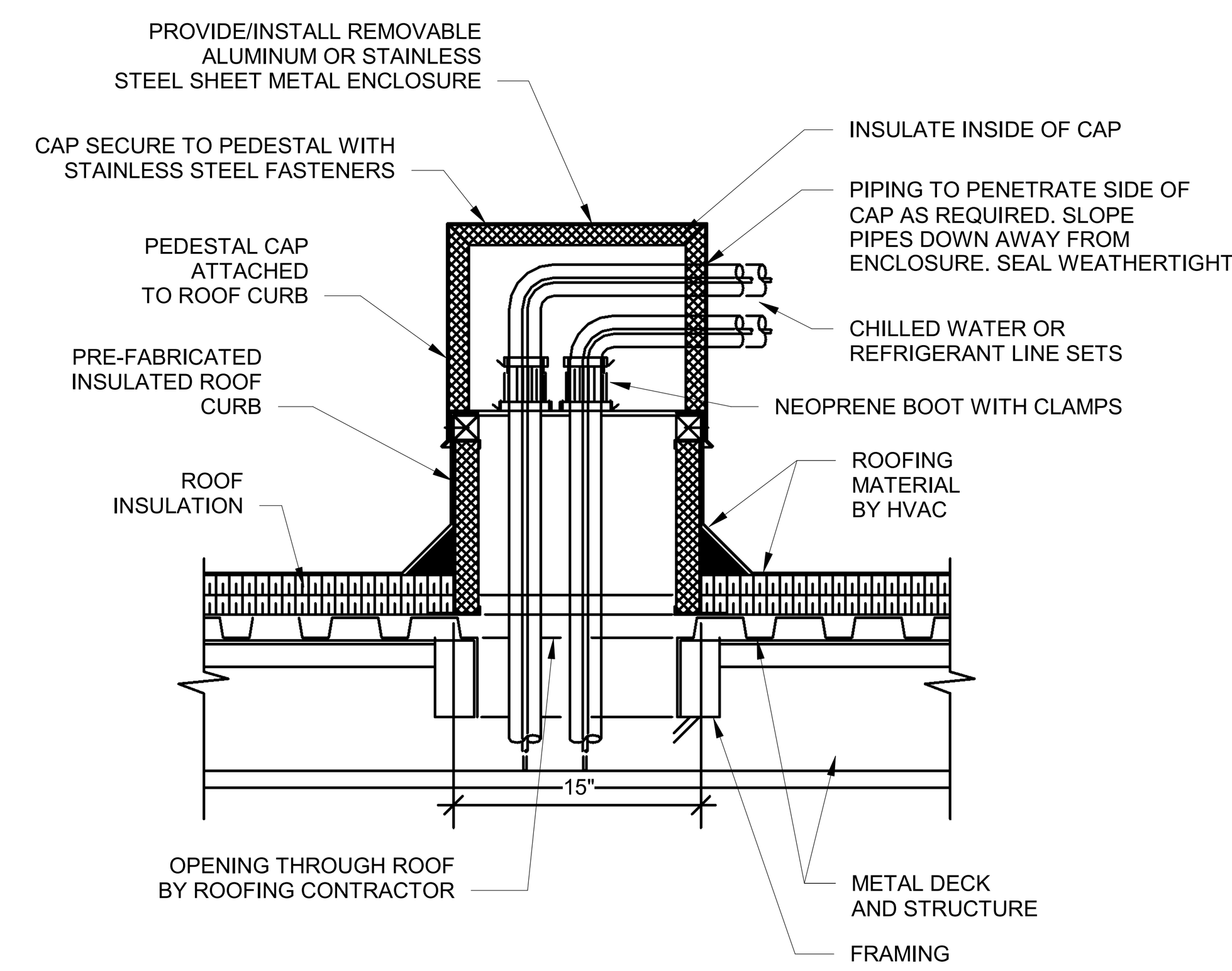
NOTES:

1. COPPER CONDENSATE PIPING - RUN ABOVE CEILING DOWN TO FLOOR DRAIN.
2. REFRIGERANT PIPING, INSULATE LINES, RUN ABOVE CEILING TO EACH RESPECTIVE INDOOR UNIT. REFER TO FLOOR PLANS FOR GENERAL ROUTING.
3. GALVANIZED ALL-THREAD ROD W/VIBRATION ISOLATOR (TYP.)
4. INSTALL AUX. CONDENSATE OVERFLOW SWITCH INTERLOCKED TO SHUT DOWN UNIT.

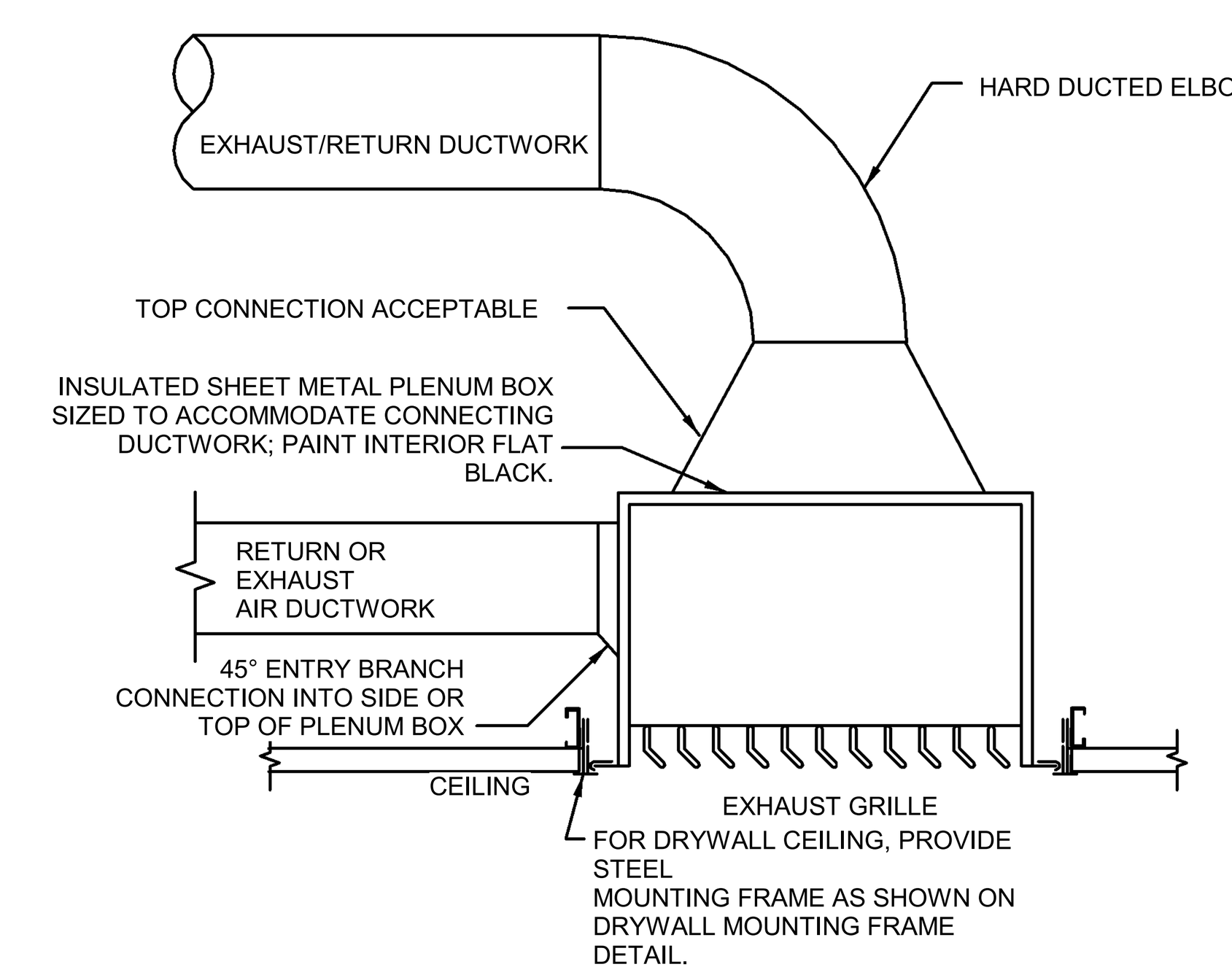
5 M601 — **HORIZONTAL FAN COIL DETAIL** — NTS



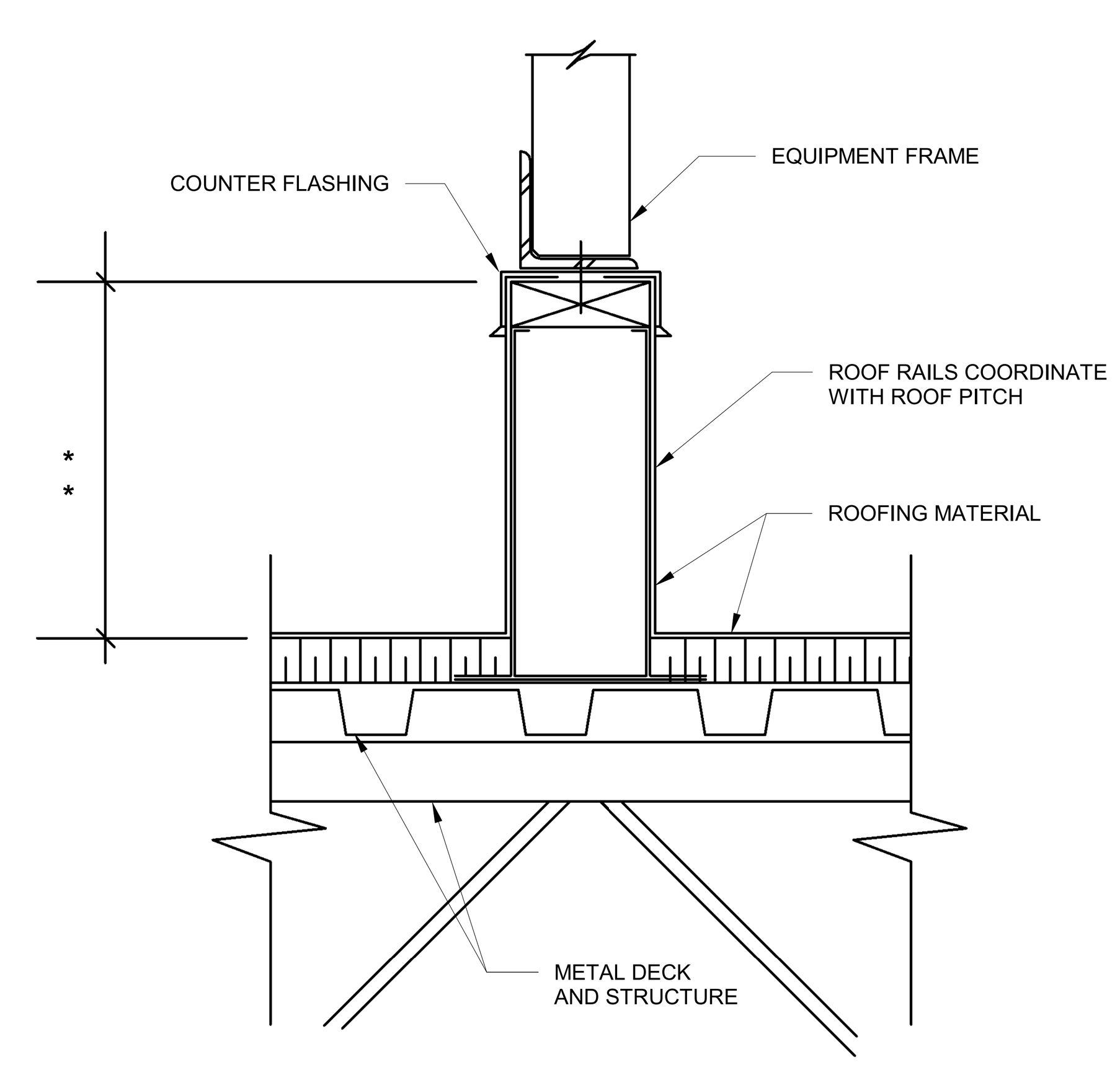
6 M601 — **GOOSENECK THROUGH ROOF DETAIL** — NTS



7 M601 — **PIPE ROOF PENETRATION DETAIL** — NTS

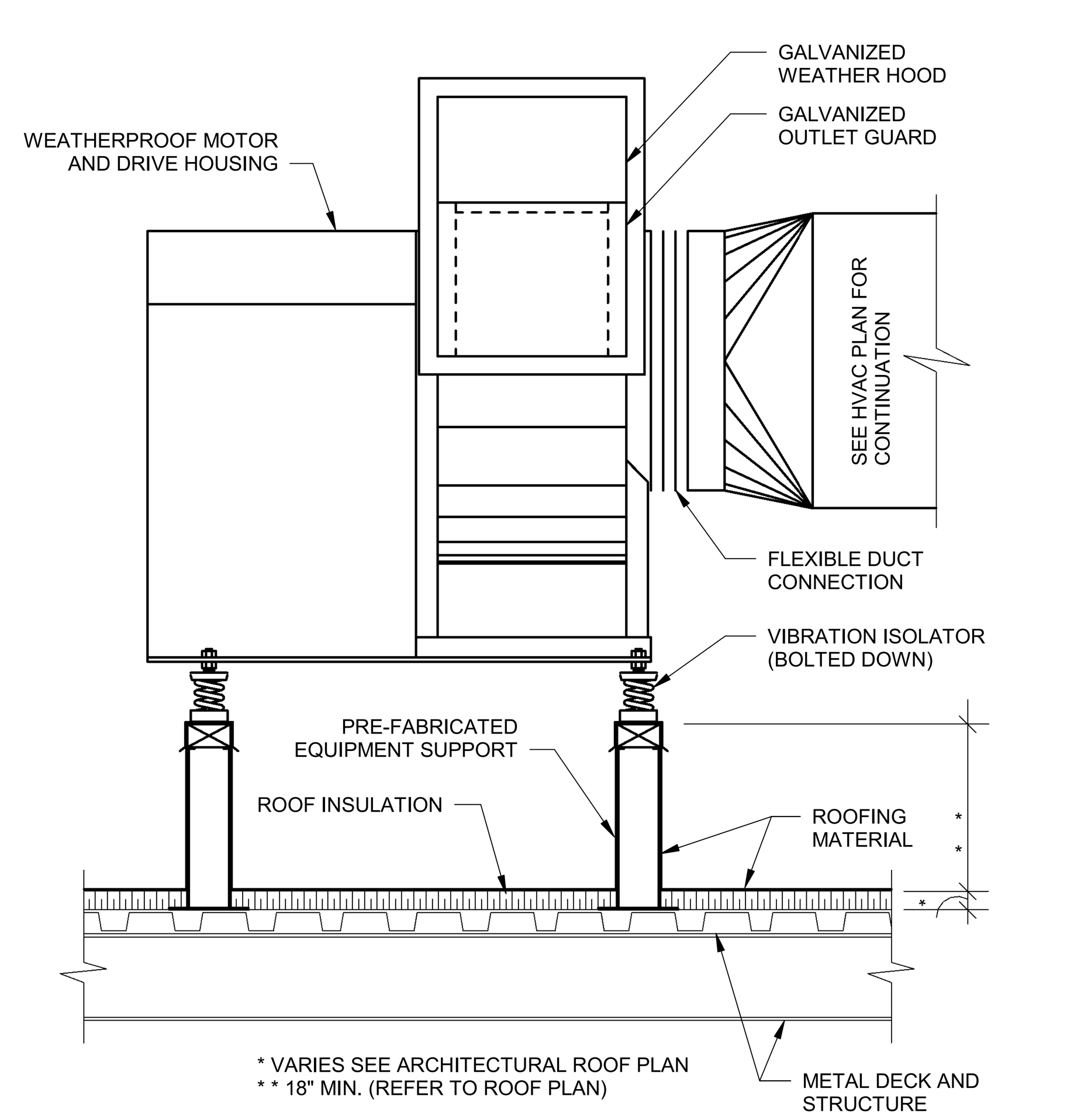


8 M601 — **HARD DUCTED EXHAUST OR RETURN GRILLE DETAIL** — NTS



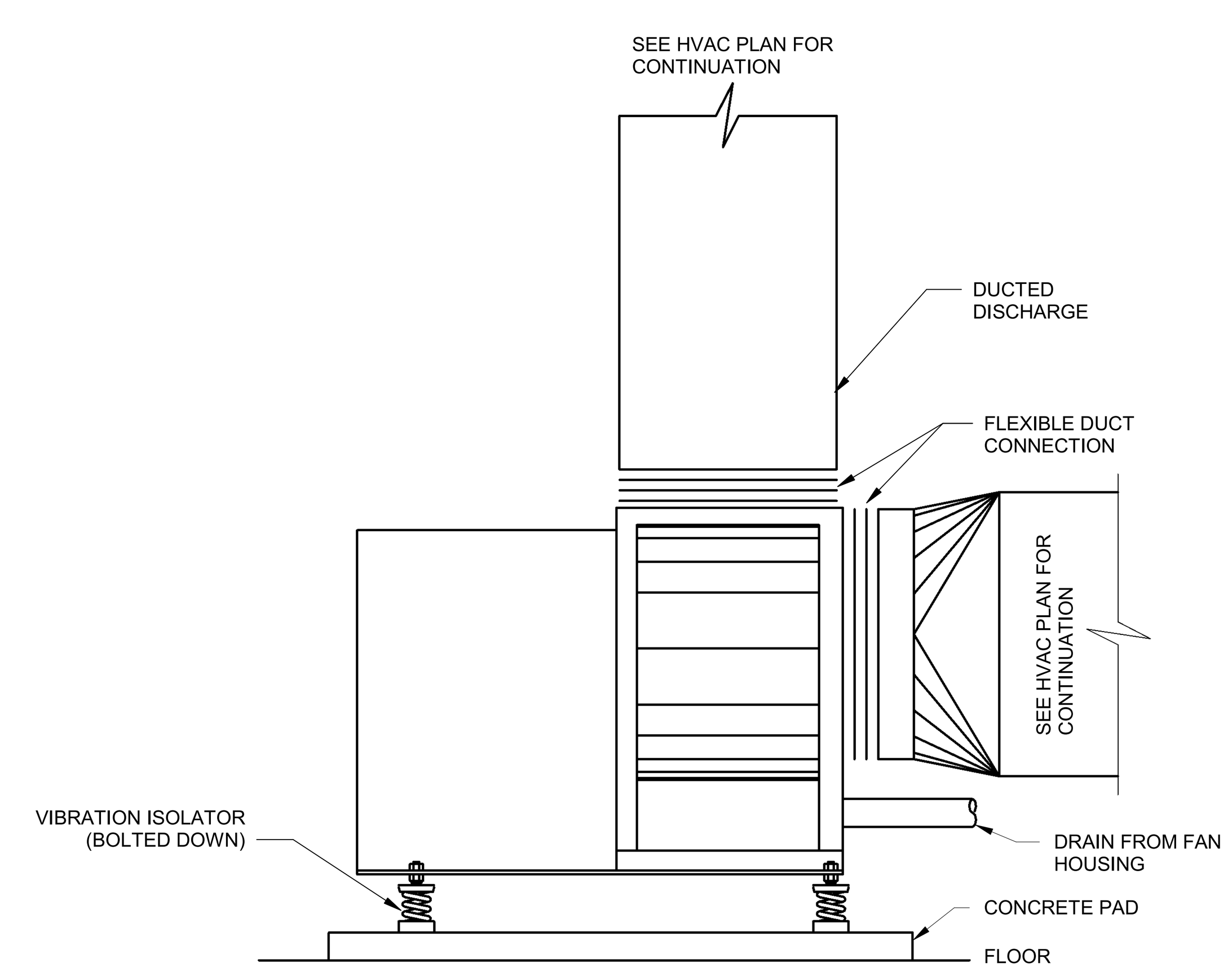
* * 18" MIN. (REFER TO ROOF PLAN)

9 M601 — **EQUIPMENT RAILS DETAIL** — NTS

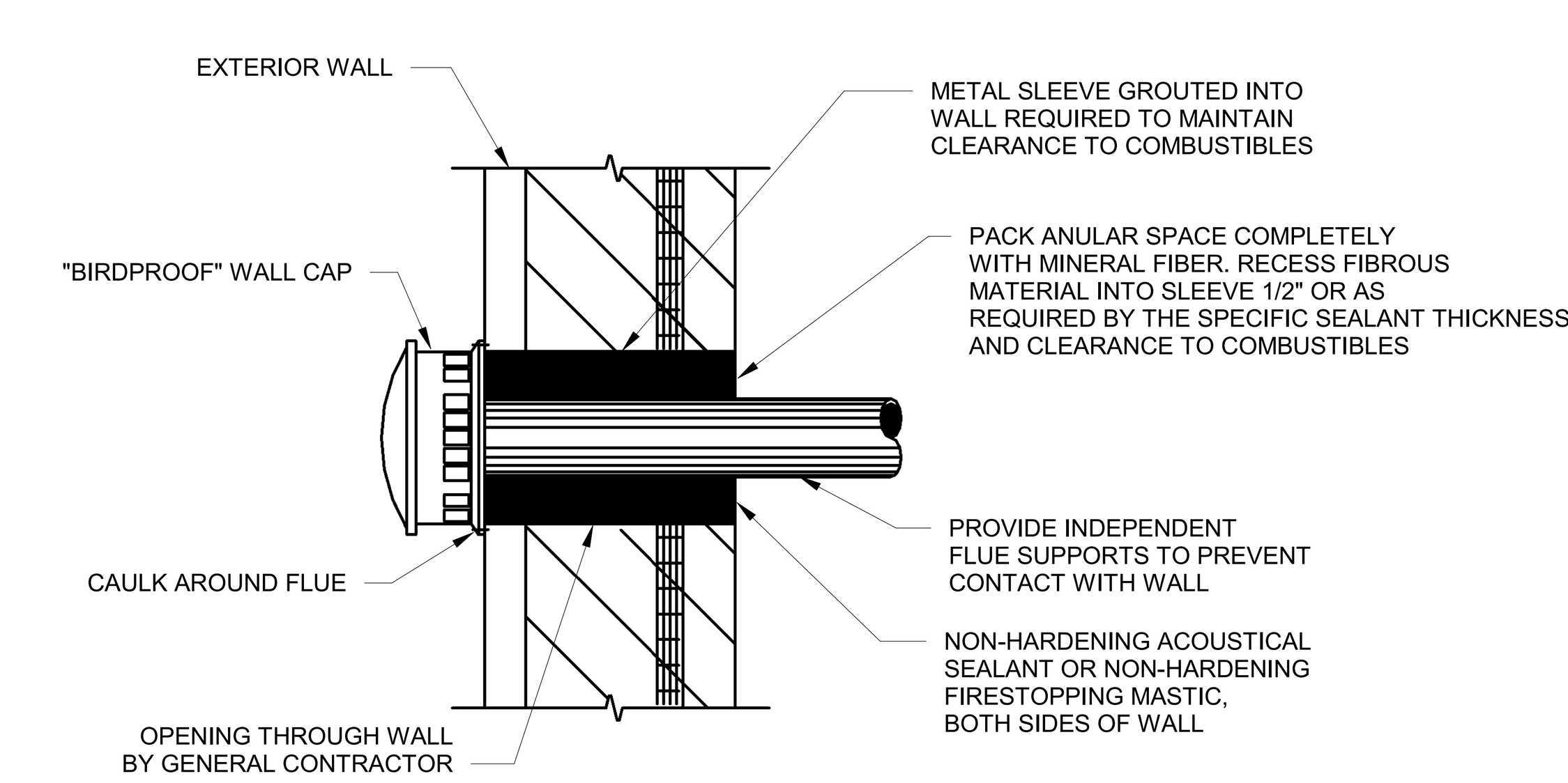


* VARIES SEE ARCHITECTURAL ROOF PLAN
* * 18" MIN. (REFER TO ROOF PLAN)

10 M601 — **UTILITY SET EXHAUST FAN ON ROOF DETAIL** — NTS



11 M601 — **UTILITY SET EXHAUST FAN ON CONCRETE PAD** — NTS



12 M601 — **EXHAUST FLUE SIDE WALL DETAIL** — NTS

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STATE OF OHIO — RENAE FOCHESATO — E-90911 — REGISTERED PROFESSIONAL ENGINEER
01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER
60708192

SHEET TITLE
HVAC DETAILS

SHEET NUMBER
M601

PROJECT SCHEDULE NOTES

1. PROVIDE 6" BASE RAIL.
2. PROVIDE STAINLESS STEEL HEAT EXCHANGER.
3. PROVIDE MANUFACTURERS REFRIGERANT LEAK DETECTION KIT AND MONITOR.
4. MANUFACTURER PROVIDED DISCONNECT.
5. PROVIDE INTEGRAL CONDENSATE PUMP.
6. PROVIDE WITH RETURN SIDE FILTER BOX WITH MERV-13 FILTER.
7. PROVIDE FIELD MOUNTED CONDENSATE PUMP.
8. MANUFACTURER PROVIDED THREADED DRAIN CONNECTION IN FAN BODY.
9. MANUFACTURER PROVIDED EXPLOSION VENT, SPARK DETECTION AND EXTINGUISHING SYSTEM WITH WATER BOOSTER PUMP, COMPRESSED AIR DRYER, AND NOISE ATTENUATOR.

PROJECT SCHEDULE NOTES

10. PROVIDE WITH INTEGRAL THERMOSTAT AND SUMMER FAN SWITCH.
11. PROVIDE MAGNETIC DOOR SWITCH FOR OPERATION.
12. PROVIDE INTAKE PLENUM WITH 12" DUCT CONNECTION ABOVE CEILING.
13. PROVIDE INTAKE PLENUM ABOVE DIFFUSER IN CEILING.
14. PROVIDE UNIT MOUNTED VFD
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PROJECT SCHEDULE NOTES

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PROJECT SCHEDULE NOTES

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DEDICATED OUTDOOR AIR UNIT SCHEDULE (DX COOLING, GAS HEATING) (PART 1 OF 2)

UNIT DATA			BASIS OF DESIGN		SUPPLY FAN												EXHAUST FAN											DX COOLING DATA							
TAG	LOCATION	FUNCTION	MANUFACTURER	MODEL	TOTAL AIRFLOW (CFM)	MIN OA (CFM)	ESP (IN WG)	TSP (IN WG)	FAN TYPE	# OF FANS	HP (EACH)	BHP (EACH)	VOLTS	PHASE	FEI	VFD	TOTAL AIRFLOW (CFM)	ESP (IN WG)	TSP (IN WG)	FAN TYPE	# OF FANS	HP (EACH)	BHP (EACH)	VOLTS	PHASE	FEI	VFD	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	ROWS	REFRIG. TYPE
DOAS-1	FIRST FLOOR	VENTILATION	TRANE	CSAA012	4,900	4,900	1.20	4.02	DIRECT-DRIVE PLENUM FAN	1	7.50	5.04	208	3	1.37	Yes	4600	0.80	1.62	DIRECT-DRIVE PLENUM FAN	1	5.00	2.14	208	3	1.45	Yes	245.00	154.60	81.60	68.30	52.32	51.60	6	R-454B

DEDICATED OUTDOOR AIR UNIT SCHEDULE (DX COOLING, GAS HEATING) (PART 2 OF 2)

	GAS HEATING DATA								ENERGY RECOVERY DATA																SUPPLY FILTER DATA		EXHAUST FILTER DATA	ELECTRICAL DATA						GENERAL DATA		
									SUMMER SUPPLY AIR				SUMMER EXHAUST AIR				WINTER SUPPLY AIR				WINTER EXHAUST AIR															
TAG	HEATING AIRFLOW (CFM)	EAT DB (°F)	LAT DB (°F)	INPUT CAPACITY (MBH)	OUTPUT CAPACITY (MBH)	EFF (%)	TURNDOWN RATIO	INLET PRESSURE RANGE (IN WG)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	PREFILTER (MERV)	FILTER (MERV)	PREFILTER (MERV)	MCA (SUPPLY FAN MOTOR)	MCA (EXHAUST FAN MOTOR)	MOCP (SUPPLY FAN MOTOR)	MOCP (EXHAUST FAN MOTOR)	VOLTS	PHASE	EMERGENCY POWER	WEIGHT (LBS)	SCHEDULE NOTES
DOAS-1	4,900	29.13	66.00	250	200	81	10:1	7-14	95.00	77.00	83.69	74.01	75.00	64.00	87.01	67.89	0.00	-1.00	29.13	20.69	70.00	53.00	35.22	32.18	MERV 8	13	8	35	28	60	45	208	3	No	5012	1, 2, 3, 4, 14

CONDENSING UNIT SCHEDULE

UNIT DATA			BASIS OF DESIGN		PERFORMANCE DATA					CONDENSER DATA								ELECTRICAL DATA				GENERAL DATA			
TAG	LOCATION	FUNCTION	MANUFACTURER	MODEL	ACTUAL CAPACITY (TONS)	SUMMER AMBIENT (°F)	WINTER AMBIENT (°F)	EER	IEER	REFRIG. TYPE	REFRIG. CHARGE PER CIRCUIT (LBS)	COMPRESSOR TYPE	# OF COMPRESSOR	# OF CIRCUITS	FAN MOTOR TYPE	# OF FANS	HP (EACH)	MCA	MOCP	VOLTS	PHASE	EMERGENCY POWER	REDUNDANT	WEIGHT (LBS)	SCHEDULE NOTES
CU-1	FIRST FLOOR	COOLING	TRANE	TTA24043DAA	20	91.1	5	10.2	13.2	R-454B	16.7	HERMETIC SCROLL COMPRESSOR	2	2	STANDARD	2	[redacted]	85	110	208	3	No	No	771	

MAKEUP AIR UNIT SCHEDULE (GAS HEAT)

	UNIT DATA			BASIS OF DESIGN		SUPPLY FAN DATA												GAS HEATING DATA								SUPPLY AIR FILTER DATA	GENERAL DATA		
TAG	LOCATION	FUNCTION	TYPE	MANUFACTURER	MODEL	AIRFLOW (CFM)	MIN OA (CFM)	ESP (IN WG)	TSP (IN WG)	FAN TYPE	# OF FANS	HP (EACH)	BHP (EACH)	FEI	VOLTS	PHASE	VFD	AIRFLOW (CFM)	EAT DB (°F)	LAT DB (°F)	INPUT CAPACITY (MBH)	OUTPUT CAPACITY (MBH)	EFF (%)	TURNDOWN RATIO	INLET PRESSURE RANGE (IN WG)	FILTER (MERV)	EMERGENCY POWER	WEIGHT (LBS)	SCHEDULE NOTES
MAU-1	SECOND FLOOR	MAKE UP AIR	INDIRECT FIRED	GREENHECK	IGX-P116-H22-MF-N	4,800	4,800	1.00	1.61	MIXED FLOW	1	3.00	2.23	1.20	208	3	Yes	4,800	5.0	78.1	500.0	405.0	81	26.6:1	6-14	MERV 8	No	1475	1, 2, 4, 14
MAU-2	FIRST FLOOR	MAKE UP AIR	DIRECT FIRED	GREENHECK	DGX-P116-H12-MF	4,200	4,200	0.80	2.14	MIXED FLOW	1	3.00	2.77	1.05	208	3	Yes	4,200	5.0	75.0	369.8	340.2	92	[redacted]	12-14	MERV 8	No	858	2, 4, 14

VRF FAN COIL UNIT SCHEDULE

UNIT DATA			BASIS OF DESIGN		PERFORMANCE DATA				HEATING DATA			COOLING DATA						ELECTRICAL DATA				GENERAL DATA		
TAG	LOCATION	FUNCTION	MANUFACTURER	MODEL	TYPE	AIRFLOW (CFM)	OA AIRFLOW (CFM)	ESP (IN WG)	CAPACITY (MBH)	EAT DB (°F)	LAT DB (°F)	TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	EAT DB (°F)	EAT WB (°F)	LAT DB (°F)	LAT WB (°F)	MCA	MOCP	VOLTS	PHASE	EMERGENCY POWER	WEIGHT (LBS)	SCHEDULE NOTES
FCU-1	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ07PBVJU	DUCTED CONCEALED CEILING	315	100	0.40	8.5	70	94.4	6.5	5.5	75.0	63.0	59.8	59.3	0.6	15	208	1	No	55.1	5, 6
FCU-2	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXAQ07PVJU	WALL MOUNTED	260	0	0.00	8.5	70	99.8	6.4	5.4	75.0	63.0	61.3	56.0	0.3	15	208	1	No	26.5	7
FCU-3	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ09PBVJU	DUCTED CONCEALED CEILING	315	100	0.40	10.5	70	100.1	8.2	6.6	75.0	63.0	60.1	56.1	0.6	15	208	1	No	55.1	5, 6
FCU-4	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ30PBVJU	DUCTED CONCEALED CEILING	1,095	325	0.80	34.0	70	98.3	25.8	20.1	75.0	63.0	58.5	58.3	2.8	15	208	1	No	101.4	5, 6
FCU-5	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ15PBVJU	DUCTED CONCEALED CEILING	560	75	0.80	16.5	70	96.8	12.9	10.3	75.0	63.0	60.5	58.3	1.5	15	208	1	No	79.4	5, 6
FCU-6	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ18PBVJU	DUCTED CONCEALED CEILING	635	255	0.80	20.0	70	98.7	15.5	13.2	75.0	63.0	57.7	56.0	1.6	15	208	1	No	79.4	5, 6
FCU-7	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ30PBVJU	DUCTED CONCEALED CEILING	1,095	450	0.80	34.0	70	98.3	25.8	20.1	75.0	63.0	59.2	58.3	2.8	15	208	1	No	101.4	5, 6
FCU-8	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ15PBVJU	DUCTED CONCEALED CEILING	560	110	0.80	16.5	70	96.8	12.9	10.3	75.0	63.0	59.9	58.3	1.5	15	208	1	No	79.4	5, 6
FCU-9	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXAQ12PVJU	WALL MOUNTED	290	0	0.00	13.5	70	112.4	10.3	7.6	75.0	63.0	54.6	51.2	0.4	15	208	1	No	26.5	7
FCU-10	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ72MVJU	DUCTED CONCEALED CEILING	2,050	185	0.95	81.0	70	106.0	61.9	47.8	75.0	63.0	56.9	53.8	9.0	15	208	1	No	302.0	5, 6
FCU-11	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ12PBVJU	DUCTED CONCEALED CEILING	450	45	0.40	13.5	70	97.3	10.3	8.2	75.0	63.0	60.9	58.4	1.4	15	208	1	No	61.2	5, 6
FCU-12A	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ48PBVJU	DUCTED CONCEALED CEILING	1,370	225	0.80	54.0	70	105.7	41.3	30.5	75.0	63.0	54.9	54.9	3.4	15	208	1	No	101.4	5, 6
FCU-12B	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ18PBVJU	DUCTED CONCEALED CEILING	635	35	0.80	20.0	70	98.7	15.5	13.2	75.0	63.0	56.0	56.0	1.6	15	208	1	No	79.4	5, 6
FCU-13	FIRST FLOOR	INDOOR UNIT	DAIKIN	FXMQ36PBVJU	DUCTED CONCEALED CEILING	1,130	215	0.80	40.0	70	102.2	31.0	24.2	75.0	63.0	56.7	55.5	2.9	15	208	1	No	101.4	5, 6
FCU-14	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXAQ07PVJU	WALL MOUNTED	260	0	0.00	8.5	70	99.8	6.4	5.4	75.0	63.0	58.9	56.0	0.3	15	208	1	No	26.5	7
FCU-15	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ09PBVJU	DUCTED CONCEALED CEILING	315	160	0.40	10.5	70	100.1	8.2	6.6	75.0	63.0	59.8	56.1	0.6	15	208	1	No	55.1	5, 6
FCU-16	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ07PBVJU	DUCTED CONCEALED CEILING	315	45	0.40	8.5	70	94.4	6.5	5.5	75.0	63.0	60.1	59.3	0.6	15	208	1	No	55.1	5, 6
FCU-17	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ15PBVJU	DUCTED CONCEALED CEILING	560	165	0.80	16.5	70	96.8	12.9	10.3	75.0	63.0	60.9	58.3	1.5	15	208	1	No	79.4	5, 6
FCU-18	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ18PBVJU	DUCTED CONCEALED CEILING	635	390	0.80	20.0	70	98.7	15.5	13.2	75.0	63.0	59.4	56.0	1.6	15	208	1	No	79.4	5, 6
FCU-19	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ15PBVJU	DUCTED CONCEALED CEILING	560	390	0.80	16.5	70	96.8	12.9	10.3	75.0	63.0	61.2	58.3	1.5	15	208	1	No	79.4	5, 6
FCU-20	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXAQ07PVJU	WALL MOUNTED	260	0	0.00	8.5	70	99.8	6.4	5.4	75.0	63.0	63.1	56.0	0.3	15	208	1	No	26.5	7
FCU-21	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ07PBVJU	DUCTED CONCEALED CEILING	315	0	0.40	8.5	70	94.4	6.5	5.5	75.0	63.0	62.7	59.3	0.6	15	208	1	No	55.1	5, 6
FCU-22	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ24PBVJU	DUCTED CONCEALED CEILING	690	135	0.80	27.0	70	105.7	20.6	16.0	75.0	63.0	56.0	53.8	1.8	15	208	1	No	79.4	5, 6
FCU-23A	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ96MVJU	DUCTED CONCEALED CEILING	2,540	230	1.10	108.0	70	108.7	82.5	61.2	75.0	63.0	57.8	53.1	10.1	15	208	1	No	302.0	5, 6
FCU-23B	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ96MVJU	DUCTED CONCEALED CEILING	2,540	235	1.10	108.0	70	108.7	82.5	61.2	75.0	63.0	57.8	53.1	10.1	15	208	1	No	302.0	5, 6
FCU-24	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ36PBVJU	DUCTED CONCEALED CEILING	1,130	495	0.80	40.0	70	102.2	31.0	24.2	75.0	63.0	55.7	55.5	2.9	15	208	1	No	101.4	5, 6
FCU-25	SECOND FLOOR	INDOOR UNIT	DAIKIN	FXMQ36PBVJU	DUCTED CONCEALED CEILING	1,130	500	0.80	40.0	70	102.2	31.0	24.2	75.0	63.0	55.7	55.5	2.9	15	208	1	No	101.4	5, 6

VRF OUTDOOR UNIT SCHEDULE

UNIT DATA			BASIS OF DESIGN		COMPRESSOR DATA (PER MODULE)					COOLING CAPACITY		HEATING CAPACITY		ELECTRICAL DATA (PER MODULE)				GENERL DATA (PER MODULE)		
TAG	LOCATION	FUNCTION	MANUFACTURER	MODEL	CAPACITY (TONS)	REFRIG TYPE	TYPE	EER	IEER	CAPACITY (MBH)	AMBIENT (°F)	CAPACITY (MBH)	AMBIENT (°F)	MCA	MOCP	VOLTS	PHASE	EMERGENCY POWER	WEIGHT (LBS)	SCHEDULE NOTES
ODU-1	ROOF	HEAT RECOVERY	DAIKIN	REYQ336AATJA (REYQ168AATJA + REYQ168AATJA)	14	R-410A	INVERTER COMPRESSOR	10.5	22.1	254.6	95.0	199.2	5.0	54.9	60.0	208	3	No	787	
ODU-2	ROOF	HEAT RECOVERY	DAIKIN	REYQ384AATJA (REYQ192AATJA + REYQ192AATJA)	16	R-410A	INVERTER COMPRESSOR	10.7	22.0	311.0	95.0	259.7	5.0	59.8	60.0	208	3	No	957	

INDOOR BRANCH SELECTOR SCHEDULE

UNIT DATA		BASIS OF DESIGN		PERFORMANCE DATA			ELECTRICAL DATA				GENERAL DATA		
TAG	LOCATION	MANUFACTURER	MODEL	SERVICE	# OF PORTS	CAPACITY (MBH)	MCA	MOCP	VOLTS	PHASE	EMERGENCY POWER	WEIGHT (LBS)	SCHEDULE NOTES
BS-1	FIRST FLOOR	DAIKIN	BSQ36TAVJ	ODU-1	1	36	0.1	15	208	1	No	27	
BS-2	FIRST FLOOR	DAIKIN	BS8Q54TVJ	ODU-1	8	290	0.8	15	208	1	No	73	
BS-3	FIRST FLOOR	DAIKIN	BSQ36TAVJ	ODU-1	1	36	0.1	15	208	1	No	27	
BS-4	FIRST FLOOR	DAIKIN	BS8Q54TVJ	ODU-1	8	290	0.8	15	208	1	No	73	
BS-5	SECOND FLOOR	DAIKIN	BSQ36TAVJ	ODU-2	1	36	0.1	15	208	1	No	27	
BS-6	SECOND FLOOR	DAIKIN	BSQ36TAVJ	ODU-2	1	36	0.1	15	208	1	No	27	
BS-7	SECOND FLOOR	DAIKIN	BS8Q54TVJ	ODU-2	8	290	0.8	15	208	1	No	73	
BS-8	SECOND FLOOR	DAIKIN	BS8Q54TVJ	ODU-2	8	290	0.8	15	208	1	No	73	

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ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

HVAC SCHEDULES

SHEET NUMBER

M701

PROJECT SCHEDULE NOTES

1	PROVIDE 6" BASE RAIL.
2	PROVIDE STAINLESS STEEL HEAT EXCHANGER.
3	PROVIDE MANUFACTURERS REFRIGERANT LEAK DETECTION KIT AND MONITOR.
4	MANUFACTURER PROVIDED DISCONNECT.
5	PROVIDE INTEGRAL CONDENSATE PUMP.
6	PROVIDE WITH RETURN SIDE FILTER BOX WITH MERV-13 FILTER.
7	PROVIDE FIELD MOUNTED CONDENSATE PUMP.
8	MANUFACTURER PROVIDED THREADED DRAIN CONNECTION IN FAN BODY.
9	MANUFACTURER PROVIDED EXPLOSION VENT, SPARK DETECTION AND EXTINGUISHING SYSTEM WITH WATER BOOSTER PUMP, COMPRESSED AIR DRYER, AND NOISE ATTENUATOR.

PROJECT SCHEDULE NOTES

10	PROVIDE WITH INTEGRAL THERMOSTAT AND SUMMER FAN SWITCH.
11	PROVIDE MAGNETIC DOOR SWITCH FOR OPERATION.
12	PROVIDE INTAKE PLENUM WITH 12" DUCT CONNECTION ABOVE CEILING.
13	PROVIDE INTAKE PLENUM ABOVE DIFFUSER IN CEILING.
14	PROVIDE UNIT MOUNTED VFD
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PROJECT SCHEDULE NOTES

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PROJECT SCHEDULE NOTES

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FAN SCHEDULE

UNIT DATA			BASIS OF DESIGN		PERFORMANCE DATA						MOTOR DATA						GENERAL DATA					
TAG	LOCATION	FUNCTION	MANUFACTURER	MODEL	FAN TYPE	FLOW (CFM)	ESP (IN WG)	DRIVE TYPE	SOUND RATING (SONES)	FEI	HP	BHP	VOLTS	PHASE	VFD	EMERGENCY POWER	DAMPER TYPE	REDUNDANT	GREASE RATED	SMOKE RATED	WEIGHT (LBS)	SCHEDULE NOTES
EF-1	SECOND FLOOR	WELDING EXHAUST	GREENHECK	USF-16	CENTRIFUGAL FAN	2,800	4.00	BELT	27	1.32	5.00	2.66	208	3	No	No	MOTORIZED	No	No	No	355	1, 4, 8
EF-2	SECOND FLOOR	PLASMA CUTTER EXHAUST	GREENHECK	USF-13	CENTRIFUGAL FAN	2,000	4.00	BELT	27	1.34	3.00	1.91	208	3	No	No	MOTORIZED	No	No	No	296	1, 4, 8
EF-3	ROOF	FABRICATION LAB EXHAUST	GREENHECK	USF-12	CENTRIFUGAL FAN	1,500	6.00	DIRECT	53	1.16	3.00	2.31	208	3	No	No	MOTORIZED	No	No	No	217	4

DUST COLLECTOR SCHEDULE

UNIT DATA		BASIS OF DESIGN		BLOWER DATA					MOTOR DATA						GENERAL DATA					
TAG	LOCATION	MANUFACTURER	MODEL	FAN TYPE	FLOW (CFM)	ESP (IN WG)	DRIVE TYPE	SOUND RATING (SONES)	HP	BHP	VOLTS	PHASE	VFD	EMERGENCY POWER	DAMPER TYPE	WIDTH	LENGTH	HEIGHT	WEIGHT (LBS)	SCHEDULE NOTES
DC-1	MECHANICAL YARD	MICRO AIR	FRP8	BACKWARD INCLINE PLUG FAN	7,300	14.53	DIRECT	0	40.00	34.30	208	3	No	No	NRV EXPLOSION ISOLATION	4' - 0 1/2"	4' - 6"	17' - 6 1/2"	2,622	9

CABINET UNIT HEATER SCHEDULE (ELECTRIC)

UNIT DATA				BASIS OF DESIGN		PERFORMANCE DATA			ELECTRICAL DATA					
TAG	TYPE	INLET TYPE	OUTLET TYPE	MANUFACTURER	MODEL	AIRFLOW (CFM)	EAT DB (°F)	LAT DB (°F)	CAPACITY (KW)	STAGES	VOLTS	PHASE	EMERGENCY POWER	SCHEDULE NOTES
CUH-1	CEILING RECESSED	FRONT	FRONT	MARKEL	6333D	250	40.0	110.0	3.00	2	208	3	No	4, 10
CUH-2	CEILING RECESSED	FRONT	FRONT	MARKEL	6333D	250	40.0	110.0	3.00	2	208	3	No	4, 10

UNIT HEATER SCHEDULE (ELECTRIC)

UNIT DATA		BASIS OF DESIGN		PERFORMANCE DATA				ELECTRICAL DATA					
TAG	TYPE	MANUFACTURER	MODEL	AIRFLOW (CFM)	EAT DB (°F)	LAT DB (°F)	THROW (FT)	CAPACITY (KW)	STAGES	VOLTS	PHASE	EMERGENCY POWER	SCHEDULE NOTES
UH-1	FAN FORCED WASHDOWN	MARKEL	F3F5505T	400	50.0	90.0	20	5.00	2	208	3	No	4, 10

AIR CURTAIN SCHEDULE

UNIT DATA			BASIS OF DESIGN		FAN DATA					GENERAL DATA			
TAG	LOCATION	TYPE	MANUFACTURER	MODEL	AIRFLOW (CFM)	# OF FANS	HP (EACH)	VOLTS	PHASE	LENGTH (IN)	EMERGENCY POWER	WEIGHT (LBS)	SCHEDULE NOTES
AC-1	RESPITE GARDEN ENTRY	UNHEATED	POWERED AIRE INC.	EVE-2-72	1960	2	0.20	120	1	72	No	94	4, 11

AIR DEVICE SCHEDULE

UNIT DATA		BASIS OF DESIGN			LINEAR DATA			GENERAL DATA			
TAG	FUNCTION	MANUFACTURER	MODEL	FACE SIZE	LENGTH (IN)	# OF SLOTS	SLOT WIDTH (IN)	MATERIAL	INTEGRAL VOLUME DAMPER	MAX NC	SCHEDULE NOTES
S1	SUPPLY	PRICE	ASPD	24" X 24"				ALUMINUM	No	30	
S2	SUPPLY	PRICE	ASPD	12" X 12"				ALUMINUM	No	30	
S3	SUPPLY	PRICE	SDG	NECK SIZE + 1.75"				ALUMINUM	Yes	30	
S4	SUPPLY	PRICE	620	NECK SIZE + 1.75"				ALUMINUM	No	30	
S5	SUPPLY	PRICE	SDS100		48	2	1	ALUMINUM	No	30	13
R1	RETURN	PRICE	80	24" X 12"				ALUMINUM	No	30	
R2	RETURN	PRICE	80	24" X 24"				ALUMINUM	No	30	
R3	RETURN	PRICE	635	NECK SIZE + 1.75"				ALUMINUM	No	30	
R4	RETURN	PRICE	SDR100		48	2	1	ALUMINUM	No	30	12
E1	EXHAUST	PRICE	80	12" X 12"				ALUMINUM	No	30	
E2	EXHAUST	PRICE	80	24" X 12"				ALUMINUM	No	30	
E3	EXHAUST	PRICE	97L	NECK SIZE + 1.75"				ALUMINUM	No	30	

LOUVER SCHEDULE

UNIT DATA			BASIS OF DESIGN		DIMENSIONS			PERFORMANCE DATA			
TAG	LOCATION	FUNCTION	MANUFACTURER	MODEL	LENGTH (IN)	HEIGHT (IN)	WIDTH (IN)	AIRFLOW (CFM)	MAX APD (IN WG)	DAMPER TYPE	SCHEDULE NOTES
L-1	115 MECH	INTAKE/EXHAUST	GREENHECK	ESD-635	74	28	6	4,800	0.050	MOTORIZED	
L-2	234 MECH	INTAKE	GREENHECK	ESD-635	64	44	6	4,800	0.050	MOTORIZED	

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STATE OF OHIO
RENAE FOCHESATO
E-00911 FOCHESATO
REGISTERED
PROFESSIONAL ENGINEER
01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

HVAC SCHEDULES

SHEET NUMBER

M702

CITY OF COLUMBUS - BUILDING & ZONING SERVICES * PLAN APPROVAL ENDORSED BY THE CHIEF BUILDING OFFICIAL * APP # ADDC2445310 * DATE: 3/26/2025

DEDICATED OUTDOOR AIR SYSTEM UNIT (DOAS)

1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNIT:
   A. DOAS-1
2. THESE DOAS ARE CONSTANT AIR VOLUME UNITS. THE UNITS HAVE A DRAW THROUGH CONFIGURATION AND CONSIST OF A SUPPLY FAN, EXHAUST FAN, ENERGY RECOVERY CORE, FILTERS, NATURAL GAS HEATER, DIRECTION EXPANSION COOLING COIL, OUTSIDE AIR DAMPER, EXHAUST AIR DAMPER AND AIR FLOW MEASURING DEVICES. DOAS IS PROVIDED WITH SUPPLY FAN VFD AND EXHAUST FAN VFD FOR BALANCING PURPOSES ONLY. ONCE DOAS IS BALANCED, VFD'S SHALL BE LOCKED AT THAT SPEED.
3. SEQUENCE OF OPERATION FOR DOAS SHALL BE THE MANUFACTURER'S HARDWARE AND SOFTWARE WITH STANDARD OPERATING FUNCTIONS. THE DOAS SHALL OPERATE UNDER THEIR INTERNAL CONTROLS.
4. ALL SETPOINTS, SCHEDULES, ALARMS, AND OPERATION FEATURES SHALL BE THROUGH THE MANUFACTURER'S CENTRAL CONTROLLER. ALL FEATURES SHALL ALSO BE CAPABLE OF BEING VIEWED, ADJUSTED AND MONITORED THROUGH THE BAS.
5. SYSTEM OPERATION: THE DOAS SHALL OPERATE BASED ON AN OCCUPIED/UNOCCUPIED TIME OF DAY SCHEDULE WITH MANUAL OVERRIDE THROUGH THE BAS TO PLACE A UNIT IN OCCUPIED MODE. AT THE EXPIRATION OF THIS TIME CONTROLLED OVERRIDE, THE UNIT SHALL AUTOMATICALLY RETURN TO THE SCHEDULE.
6. SYSTEM START UP/DOAS OCCUPIED MODE: DURING THE OCCUPIED MODE, THE UNIT SHALL OPERATE TO MAINTAIN THE DISCHARGE SETPOINTS OF 55 DEGREE F IN COOLING (ADJ.) AND 75 DEGREE F IN HEATING (ADJ.) WHEN THE DOAS IS ENABLED TO START, THE UNIT'S EXHAUST AND OUTDOOR AIR DAMPERS SHALL OPEN. ONCE THE DAMPERS ARE IN THE CORRECT POSITION, AS DETERMINED BY DAMPER END SWITCHES, THE SUPPLY AND EXHAUST FANS SHALL START. THE OUTSIDE AIR AND EXHAUST AIR DAMPERS SHALL BE NORMALLY CLOSED. AN AIRFLOW MEASURING STATION SHALL MEASURE THE AMOUNT OF OUTSIDE AND EXHAUST AIR.
7. MORNING WARM UP / COOL DOWN: THE BAS SHALL ENABLE THE DOAS TO START IN ADVANCE OF THE SCHEDULED OCCUPIED TIME, VIA AN ADAPTIVE OPTIMAL START SEQUENCE. THE ADAPTIVE OPTIMAL START SHALL MINIMIZE THE UNOCCUPIED WARM-UP OR COOL-DOWN PERIOD WHILE STILL ACHIEVING COMFORT CONDITIONS BY THE START OF SCHEDULED OCCUPIED PERIOD. THE UNIT SHALL ENTER A MORNING WARM UP / COOL DOWN MODE IF NECESSARY BASED ON SPACE TEMPERATURE. SHOULD THE SPACE TEMPERATURES NOT REACH THE OCCUPIED SETPOINT BEFORE THE SCHEDULED OCCUPIED TIME, OR REACH SETPOINT TOO EARLY, THE ADAPTIVE OPTIMAL START SEQUENCE SHALL AUTOMATICALLY ADJUST FOR SUBSEQUENT START.
8. NIGHT SETBACK / DOAS UNOCCUPIED MODE: THE BAS SHALL SHUTDOWN THE DOAS USING THE SYSTEM SHUTDOWN SEQUENCE.
9. SUPPLY FAN CONTROL: THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN UNLESS SHUTDOWN ON SAFETIES. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE AN ADJUSTABLE MINIMUM RUNTIME. THE SUPPLY FAN SHALL OPERATE AT A CONSTANT SPEED DURING OPERATION. SUPPLY FAN SHALL BE MONITORED FOR FAILURE, STATUS, START/STOP, RUNTIME, AND HAND POSITION THROUGH THE BAS.
10. EXHAUST FAN CONTROL: THE EXHAUST FAN SHALL BE INTERLOCKED IN UNISON WITH THE SUPPLY FAN AND RUN ANYTIME THE UNIT IS COMMANDED TO RUN UNLESS SHUTDOWN ON SAFETIES. TO PREVENT SHORT CYCLING, THE EXHAUST FAN SHALL HAVE AN ADJUSTABLE MINIMUM RUNTIME. THE EXHAUST FAN SHALL MODULATE TO MAINTAIN POSITIVE BUILDING PRESSURE WITH A SETPOINT OF +0.05" (ADJUSTABLE). EXHAUST FAN SHALL BE MONITORED FOR FAILURE, STATUS, START/STOP, RUNTIME, AND HAND POSITION THROUGH THE BAS.
11. COOLING CONTROL: COOLING SHALL BE ENABLED WHENEVER DEHUMIDIFICATION IS REQUIRED OR OUTSIDE AIR TEMPERATURE IS GREATER THAN 60 DEGREE F (ADJ.) AND ECONOMIZER IS DISABLED OR FULLY OPEN, DISCHARGE TEMPERATURE IS ABOVE SETPOINT, AND SUPPLY FAN STATUS IS ON. THE DIRECT EXPANSION COOLING SHALL MODULATE TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT 55 DEGREE F (ADJ.). THE CONTROLS SHALL PROHIBIT THE UNIT FROM SIMULTANEOUSLY COOLING AND HEATING.
12. HEATING CONTROL: HEATING CONTROL SHALL BE ENABLED WHENEVER DEHUMIDIFICATION IS REQUIRED OR THE OUTSIDE AIR TEMPERATURE IS BELOW 55 DEGREE F (ADJ.), DISCHARGE TEMPERATURE IS BELOW SETPOINT, AND SUPPLY FAN STATUS IS ON. MODULATE THE GAS HEATING ELEMENT TO MAINTAIN A DISCHARGE SUPPLY AIR SETPOINT OF 68 DEGREE F (ADJ.). THE CONTROLS SHALL PROHIBIT THE UNIT FROM SIMULTANEOUSLY COOLING AND HEATING.
13. DEHUMIDIFICATION MODE: THE CONTROLLER SHALL MEASURE THE EXHAUST AIR HUMIDITY AND OVERRIDE THE COOLING SEQUENCE TO MAINTAIN EXHAUST AIR HUMIDITY AND OVERRIDE THE COOLING SEQUENCE TO MAINTAIN EXHAUST AIR HUMIDITY AT OR BELOW 60% RH (ADJ.) FOR THE AREA SERVED BY THE UNIT DURING DEHUMIFICATION, REHEAT SHALL BE MODULATED TO MAINTAIN A SETPOINT OF 1 DEGREE F (ADJ.) LESS THAN THE DISCHARGE COOLING SETPOINT. IF DEHUMIDIFICATION MODE IS ENABLED AND THE UNIT IS IN SUPPLY TEMPERATURE RESET MODE, THE COOLING COIL DISCHARGE AIR TEMPERATURE SHALL BE RESET DOWN TO 54 DEGREE F (ADJ.) AND MODULATE THE HEATING ELEMENT. DEHUMIDIFICATION SHALL BE ENABLED WHENEVER THE SUPPLY FAN STATUS IS ON AND EXHAUST AIR HUMIDITY EXCEEDS 60% RH (ADJ.) FOR 5 MINUTES (ADJ.). DEHUMIDIFICATION SHALL REMAIN ACTIVE UNTIL THE EXHAUST AIR HUMIDITY DROPS BELOW A 5% RH DEADBAND (ADJ.).
14. ECONOMIZER OPERATION: THE FIXED PLATE ENERGY RECOVERY CORE IS EQUIPPED WITH A BYPASS DAMPER ON THE OUTSIDE AIR PATH. THE BYPASS DAMPER WILL OPEN WHEN THE UNIT ENTERS THE ECONOMIZER OPERATING STATE AND CLOSE WHEN THE UNIT LEAVES THE ECONOMIZER OPERATING STATE.
15. THE BAS GRAPHICS SHALL MAP THE TEMPERATURE, HUMIDITY, BUILDING AND SPACE PRESSURIZATION, SEPARATELY FOR VISUAL INDICATION ON BUILDING PERFORMANCE.
16. SYSTEM SHUTDOWN: WHEN A UNIT IS COMMANDED OFF, THE SUPPLY AND EXHAUST FANS SHALL BE DISABLED, THE OUTDOOR AIR AND EXHAUST DAMPERS SHALL CLOSE, AND THE HEATING SHALL BE DISABLED AND DIRECT EXPANSION COOLING SHALL BE 100% OFF.
17. THE BAS SHALL MONITOR:
   A. THE SUPPLY AND EXHAUST FANS STATUS VIA CURRENT SENSORS AND FAN VFDS.
   B. EXHAUST AIR, OUTDOOR AIR, TEMPERATURES UPSTREAM/DOWNSTREAM OF THE HEAT EXCHANGERS, HEATING DISCHARGE AIR, COOLING COIL DISCHARGE AIR, AND SUPPLY AIR TEMPERATURES.
   C. EXHAUST AIR INTAKE, EXHAUST AIR DISCHARGE, OUTDOOR AIR HEAT EXCHANGER DISCHARGE, AND SUPPLY AIR HUMIDITY.
   D. OUTSIDE AIRFLOWS VIA AIRFLOW MONITORS.
   E. COOLING AND HEATING STATUS.
   F. SPACE/UNIT AND BUILDING PRESSURES.
   G. PRESSURE DROP ACROSS ALL FILTERS.
   H. THE MOTORIZED DAMPERS POSITIONS AND DAMPER END SWITCHES.
   I. EXHAUST, OUTDOOR, AND SUPPLY AIRFLOWS VIA AIRFLOW MONITORS.
   J. ALL ALARMS FROM MANUFACTURER'S INTEGRAL CONTROLLER.
18. SYSTEM ALARMS AND SAFETIES:
   A. IF A FAN IS NOT SENSED TO BE OPERATING OR THE MOTORIZED DAMPERS FAIL TO OPEN OR CLOSE WHEN REQUIRED, ALARM THE BAS.
   B. DUCT SMOKE DETECTOR: THE DUCT SMOKE DETECTOR SHALL BE HARDWIRED TO STOP THE DOAS SUPPLY AND EXHAUST FANS ON AN ALARM CONDITION. IN THE EVENT OF SMOKE BEING DETECTED, THE UNIT SHALL BE SHUTDOWN AS SPECIFIED IN THE SYSTEM SHUTDOWN SEQUENCE AND AN ALARM GENERATED. UNIT SHALL REQUIRE A MANUAL RESET.
   C. HIGH STATIC PRESSURE: IF THE SUPPLY AIR DUCT STATIC PRESSURE EXCEEDS 4" W.G. (ADJ.), OR THE EXHAUST AIR DUCT STATIC PRESSURE EXCEEDS -3" W.G. (ADJ.) A HIGH PRESSURE SWITCH SHALL TRIP THE SUPPLY AND EXHAUST FANS AND AN ALARM GENERATED.
   D. DIRTY FILTERS: WHEN THE DIFFERENTIAL PRESSURE EXCEEDS THE FILTER MANUFACTURER'S RECOMMENDATIONS FOR DIRTY FILTERS, AN ALARM SHALL BE GENERATED THROUGH THE BAS. CONTRACTOR TO FIELD VERIFY MANUFACTURER'S RECOMMENDED DIFFERENTIAL SETTING.
   E. HIGH HUMIDITY: ALARM THE BAS IF THE SUPPLY AIR HUMIDITY LEVEL RISES TO 80% RH (ADJUSTABLE) OR HIGHER.
   F. CONDENSATE DRAIN PAN OVERFLOW PROTECTION: PROVIDE A CONDENSATE DRAIN PAN FLOAT OR HIGH LIMIT WATER SENSOR TO PREVENT DRAIN PAN OVERFLOW DUE TO A CLOG IN ASSOCIATED DRAIN PIPING. IF HIGH LIMIT IS DETECTED, ALARM THE BAS.
   G. OUTDOOR AIR DELIVERY MONITORING: PROVIDE A DIRECT OUTDOOR AIR MEASUREMENT DEVICE CAPABLE OF MEASURING THE OUTDOOR AIR FLOW. ALARM THE BAS CENTRAL MONITORING STATION IF THE OUTDOOR AIR CFM DROPS 10% (ADJ.) BELOW THE DESIGN VALUE.
   H. FROST PREVENTION CONTROL -
      a. TIMED CONTROL METHOD (STANDARD OPTION) - WHEN THE OUTSIDE AIR IS BELOW 32F (ADJUSTABLE) THE BYPASS DAMPER WILL OPEN FOR 5 MINUTES (ADJUSTABLE) EVERY 60-MINUTE PERIOD (ADJUSTABLE). EXHAUST AIR CONTINUES TO RUN THOUGH THE CORE DURING THIS TIME TO REMOVE FROST BUILDUP.
      b. RETURN AIR HUMIDITY (SELECTABLE OPTION) - THE UNIT WILL MONITOR RETURN AIR TEMPERATURE AND HUMIDITY, OUTSIDE AIR TEMPERATURE, AND EXHAUST AIR TEMPERATURE. ASSUMING AN OUTDOOR AIR RELATIVE HUMIDITY OF 95% THE UNIT WILL CALCULATE THE POINT AT WHICH CONDENSATE WILL DEVELOP IN THE EXHAUST AIR. WHEN THE EXHAUST AIR REACHES THIS TEMPERATURE THE BYPASS DAMPER IN THE OUTDOOR AIR PATH OPENS AND EXHAUST AIR CONTINUES TO RUN THROUGH THE CORE TO PREVENT FROST BUILDUP.
   I. SUPPLY AND EXHAUST FAN FAILURE, HAND POSITION, RUNTIME EXCEEDED.
   J. HIGH AND LOW EXHAUST AIR HUMIDITY GREATER THAN 70% AND 35% (ADJ.).
   K. HIGH AND LOW EXHAUST AIR TEMPERATURE GREATER THAN 90 DEGREE F AND 45 DEGREE F (ADJ.)
   L. HIGH AND LOW SUPPLY AIR TEMPERATURE GREATER THAN 120 DEGREE F AND 45 DEGREE F (ADJ.)
   M. BAS FAILURE: IF COMMUNICATION IS LOST WITH THE BAS, THE DOAS SHALL USE ITS DEFAULT SETPOINTS AND OPERATE IN NORMAL MODE.
19. THE CONTROL BANDS, SETPOINT INCREMENT VALUES, SETPOINT DECREMENT VALUES AND ADJUSTMENT FREQUENCIES SHALL BE ADJUSTED AND TUNED TO MAINTAIN A MAXIMUM STATIC PRESSURE OPTIMIZATION WITH STABLE SYSTEM CONTROL AND MAXIMUM COMFORT CONTROL.

VARIABLE REFRIGERANT FLOW (VRF) SYSTEM

1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNITS:
   A. FC-1 THRU FC-25 / ODU-1 AND ODU-2
2. THE SEQUENCE OF OPERATION FOR THE VRF SYSTEM SHALL BE THE MANUFACTURER'S HARDWARE AND SOFTWARE WITH STANDARD OPERATING FUNCTIONS. THE VRF SYSTEM, INCLUDING THE OUTDOOR HEAT PUMP UNITS, INDOOR FAN COILS, AND BRANCH SELECTOR BOXES SHALL OPERATE UNDER THEIR INTERNAL CONTROLS. THE INDOOR AND OUTDOOR UNIT CONTROLS SHALL BE INTERLOCKED PER THE MANUFACTURER'S RECOMMENDATION. THE VRF CONTROL SYSTEM WILL CONTROL ALL THERMAL EXPANSION VALVES, COMPRESSOR OPERATION, ETC.
3. ALL SETPOINTS, SCHEDULES, ALARMS, AND OPERATION FEATURES SHALL BE THROUGH THE MANUFACTURER'S CONTROLS. ALL FEATURES SHALL ALSO BE CAPABLE OF BEING BEING VIEWED, ADJUSTED AND MONITORED THROUGH THE BAS.
4. THE FACTORY SUPPLIED, WALL-MOUNTED THERMOSTAT/CONTROLLER SHALL CONTROL THE INDIVIDUAL INDOOR FAN COIL UNITS TO MAINTAIN SPACE TEMPERATURE SETPOINT.
5. THE VRF SYSTEM SHALL OPERATE ON A TIME OF DAY OCCUPIED/UNOCCUPIED SCHEDULE. OCCUPANCY SHALL BE PREDETERMINED BY THE OWNER AND PROGRAMMED INTO THE VRF CONTROL SYSTEM.
6. VRF SYSTEM SHALL BE CAPABLE TO SIMULTANEOUSLY PROVIDE HEATING AND COOLING TO DIFFERENT SPACES.
7. ALL OCCUPIED SPACES SERVED BY THE VRF SYSTEM SETPOINT SHALL BE 75°F SUMMER AND 70°F WINTER (ALL ADJ.).
8. ALL UNOCCUPIED SPACES SERVED BY THE VRF SYSTEM SETPOINT SHALL BE 85°F SUMMER AND 60°F WINTER (ALL ADJ.).
   A. INTERLOCK CONTROLS OF FC-4 WITH MAU-1 TO PREVENT SIMULTANEOUS HEATING AND COOLING.
9. A BACNET INTERFACE SHALL BE PROVIDED FOR ALARM AND MONITORING THROUGH THE BAS CONTROL SYSTEM.
10. ALL FAN COIL UNITS SHALL HAVE AN AUXILIARY CONDENSATE OVERFLOW SWITCH INTERLOCKED TO SHUTDOWN THE FAN COIL UNITS AND ALARM BAS.
11. BAS SHALL MONITOR ALL ALARMS FROM THE VRF CONTROLLERS.

MAKEUP AIR UNITS

1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNITS:
   A. MAU-1 (INTERLOCKED WITH EF-1 AND EF-2)
   B. MAU-2 (INTERLOCKED WITH PAINT BOOTH)
2. MAU ARE VARIABLE AIR VOLUME 100% OUTSIDE AIR UNITS. THE UNITS HAVE A DRAW THROUGH CONFIGURATION AND CONSIST OF A SUPPLY FAN, FILTER, NATURAL GAS INDIRECT FIRED BURNER, OUTSIDE AIR DAMPER, AND AIR FLOW MEASURING DEVICES. THE MAU'S ARE PROVIDED WITH A SUPPLY FAN VFD.
3. SEQUENCE OF OPERATION FOR MAU SHALL BE THE MANUFACTURER'S HARDWARE AND SOFTWARE WITH STANDARD OPERATING FUNCTIONS. THE MAU SHALL OPERATE UNDER THEIR INTERNAL CONTROLS.
4. ALL SETPOINTS, SCHEDULES, ALARMS, AND OPERATION FEATURES SHALL BE THROUGH THE MANUFACTURER'S CENTRAL CONTROLLER. ALL FEATURES SHALL ALSO BE CAPABLE OF BEING VIEWED, ADJUSTED, AND MONITORED THE BAS.
5. SYSTEM OPERATION: THE MAU SHALL OPERATE WHEN INTERLOCKED EQUIPMENT IS SWITCHED ON. IF ONLY ONE OF THE EXHAUST FANS IS SWITCHED ON, THE MAU SHALL PROVIDE THE LOW CFM. IF BOTH EXHAUST FANS ARE SWITCHED ON AT THE SAME TIME, THE MAU SHALL PROVICE THE HIGH CFM.
   A. LOW CFM: 2,400 CFM
   B. HIGH CFM: 4,800 CFM
6. SYSTEM START UP: ONCE A SIGNAL IS PROVIDED FROM INTERLOCKED EQUIPMENT, THE MAU IS ENABLED TO START, AND THE OUTDOOR AIR DAMPER SHALL OPEN. ONCE THE DAMPER IS IN THE CORRECT POSITION, AS DETERMINED BY DAMPER END SWITCHES, THE SUPPLY FAN SHALL START. IF THE OUTSIDE AIR TEMPERATURE IS LESS THAN 55 DEGREE F (ADJ), THE UNIT SHALL AUTOMATICALLY GO INTO HEATING MODE AND THE HEATING ELEMENT SHALL MODULATE TO MAINTAIN SETPOINT. IF THE OUTSIDE AIR TEMPERATURE IS ABOVE 55 DEGREE F (ADJ.), THEN THE HEATING IS LOCKED OUT, BUT THE FAN SHALL RUN AT THE AIRFLOW RATE.
7. SUPPLY FAN CONTROL: THE SUPPLY FAN SHALL RUN ANYTIME THE UNIT IS COMMANDED TO RUN UNLESS SHUTDOWN ON SAFETIES. THE SUPPLY FAN SHALL BE INTERLOCKED TO OPERATE WITH THEIR ASSOCIATED EXHAUST FAN. TO PREVENT SHORT CYCLING, THE SUPPLY FAN SHALL HAVE AN ADJUSTABLE MINIMUM RUNTIME. SUPPLY FAN SHALL BE MONITORED FOR FAILURE, STATUS, AND START/STOP. SUPPLY AIRFLOW SHALL BE MONITORED THROUGH THE BAS.
8. HEATING CONTROL: NATURAL GAS BURNER SHALL BE HARDWIRED FOR ENABLE/DISABLE, STATUS, AND MODULATING CONTROL. HEATING CONTROL SHALL BE ENABLED WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 55 DEGREE F (ADJ.) AND SUPPLY FAN STATUS IS ON. UPON A DROP IN SPACE TEMPERATURE, MODULATE THE GAS HEATING ELEMENT TO MAINTAIN THE DISCHARGE AIR TEMPERATURE (DAT) AT 70 DEGREE (ADJ). DAT SHALL NOT EXCEED 90 DEGREE F (ADJ.).
9. OUTSIDE AIR CONTROL: OPEN OA DAMPER TO 100% OPEN IN CONJUNCTION WITH THE SUPPLY FAN OPERATION.
10. SYSTEM SHUTDOWN: WHEN A UNIT IS COMMANDED OFF, THE HEATING SHALL BE DISABLED. THE SUPPLY FAN SHALL BE DISABLED, AND THE OUTDOOR AIR DAMPER SHALL CLOSE.
11. THE BAS SHALL MONITOR:
   A. FAN STATUS VIA CURRENT SENSORS AND FAN VFD.
   B. THE MOTORIZED DAMPER'S POSITIONS AND DAMPER END SWITCHES.
   C. HEATING STATUS
   D. OUTDOOR AIR AND SUPPLY AIR TEMPERATURE.
   E. SUPPLY AIRFLOW VIA AIRFLOW MONITORS.
   F. PRESSURE DROP ACROSS FILTER.
   G. ALL ALARMS FROM MANUFACTURER'S INTEGRAL CONTROLLER.
12. SYSTEM ALARMS AND SAFETIES:
   A. IF A FAN IS NOT SENSED TO BE OPERATING OR THE MOTORIZED DAMPERS FAIL TO OPEN OR CLOSE WHEN REQUIRED, ALARM THE BAS.
   B. HIGH STATIC PRESSURE: IF THE SUPPLY AIR DUCT STATIC PRESSURE EXCEEDS 3" W.G. (ADJ.), A HIGH PRESSURE SWITCH SHALL TRIP THE SUPPLY FAN AND AN ALARM GENERATED.
   C. DIRTY FILTERS: WHEN THE DIFFERENTIAL PRESSURE EXCEEDS THE FILTER MANUFACTURER'S RECOMMENDATIONS FOR DIRTY FILTERS, AN ALARM SHALL BE GENERATED THROUGH THE BAS. CONTRACTOR TO FIELD VERIFY MANUFACTURER'S RECOMMENDED DIFFERENTIAL SETTING.
   D. GAS BURNER FAILURE, ALARM THE BAS.
   E. BAS FAILURE: IF COMMUNICATION IS LOST WITH THE BAS, THE MAU SHALL USE ITS DEFAULT SETPOINTS AND OPERATE IN NORMAL MODE.
   F. OUTDOOR AIR DELIVERY MONITORING: PROVIDE A DIRECT OUTDOOR AIR MEASUREMENT DEVICE CAPABLE OF MEASURING THE OUTDOOR AIRFLOW. ALARM THE BAS IF THE OUTDOOR AIR CFM DROPS 10% (ADJ.) BELOW THE DESIGN VALUE.

CABINET UNIT HEATERS (ELECTRIC)

1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNITS:
   A. CUH-1, CUH-2, AND UH-1
2. THE UNIT CONSISTS OF A SUPPLY FAN, ELECTRIC HEATING COIL, AND FILTER.
3. THE UNIT SHALL BE STARTED AND STOPPED THROUGH INTEGRAL SELF CONTAINED CONTROLS AND MONITORED THROUGH THE BAS.
4. AN INTEGRAL THERMOSTAT/TEMPERATURE SENSOR SHALL CYCLE THE FAN AND ELECTRIC HEATING COIL TO MAINTAIN THE DESIRED SPACE TEMPERATURE OF 50 DEGREE F (ADJ.).
5. ALARM THE BAS SYSTEM IF THE UNIT FAILS TO OPERATE AS DETERMINED BY A CURRENT SENSOR.

EXHAUST FANS (CONSTANT VOLUME, AND ON/OFF)

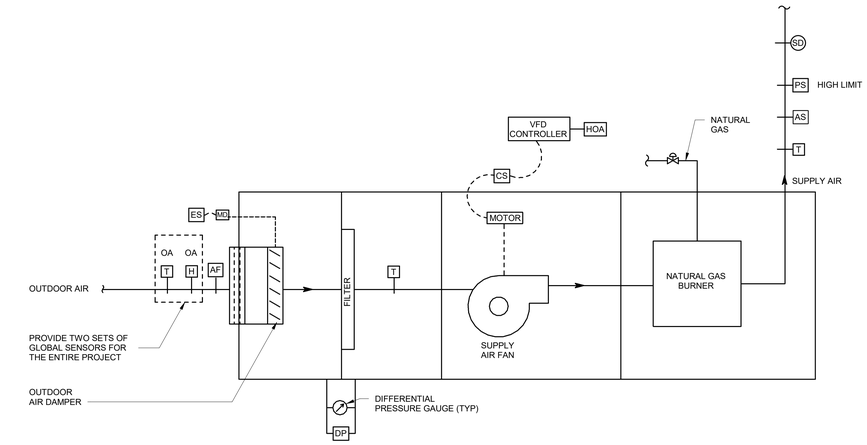
1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNITS:
   A. EF-1 THRU EF-3
2. THESE EXHAUST FANS ARE CONSTANT AIR VOLUME FANS.
3. SYSTEM START UP: THE FAN SHALL BE CAPABLE OF BEING STARTED AND STOPPED MANUALLY USING A WALL SWITCH IN THE SPACE. THE ASSOCIATED MOTORIZED DAMPER SHALL OPEN, VERIFY DAMPER IS IN CORRECT POSITION VIA DAMPER END SWITCH, AND THEN THE FAN SHALL START. FAN SHALL BE INTERLOCKED TO DAMPER SO THAT FAN CANNOT START UNTIL DAMPER IS FULLY OPEN..
4. UPON DEACTIVATION OF FAN, THE ASSOCIATED MOTORIZED DAMPER SHALL CLOSE.
5. THE BAS SYSTEM SHALL MONITOR:
   A. THE STATUS OF THE FAN VIA A CURRENT SENSOR.
   B. DAMPER POSITION AND DAMPER END SWITCH, IF APPLICABLE.
6. SYSTEM ALARMS AND SAFETIES:
   A. IF A FAN IS NOT SENSED TO BE OPERATING, ALARM THE BAS SYSTEM.
   B. IF DAMPER FAILS TO OPEN OR CLOSE WHEN REQUIRED, ALARM THE BAS SYSTEM.

DOOR AIR CURTAIN

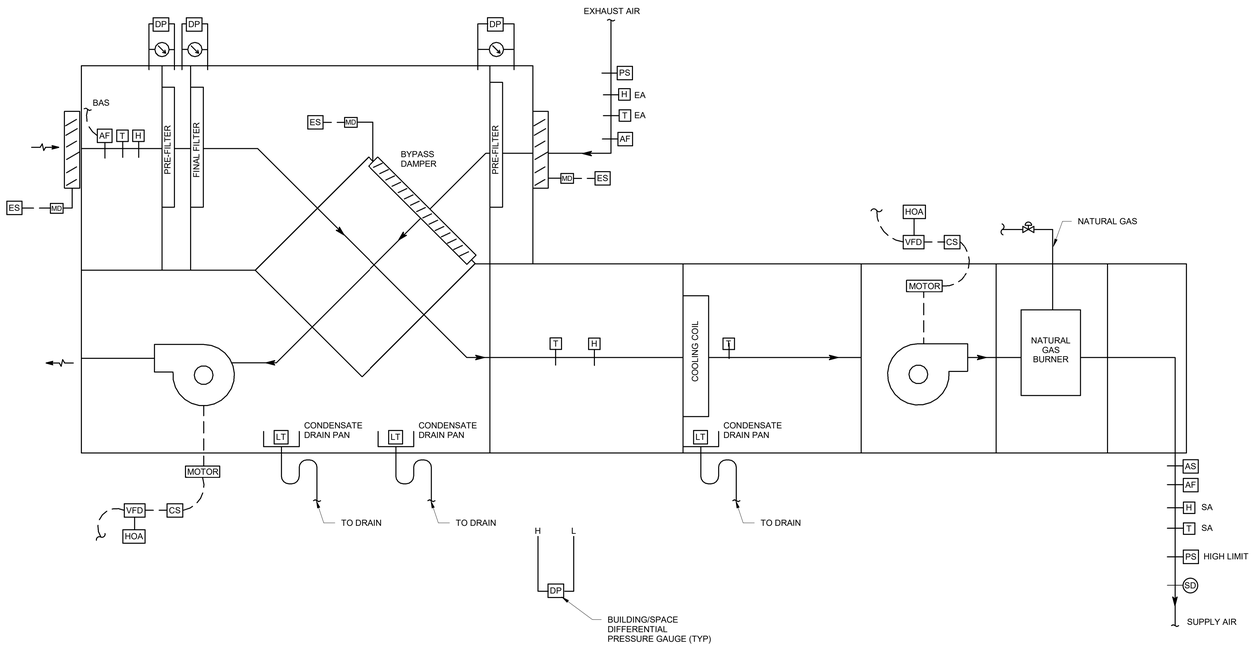
1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNITS:
   A. AC-1
2. UNIT CONSISTS OF A SUPPLY FAN AND FILTER.
3. THE UNIT SHALL BE CONTROLLED USING A WALL MOUNTED HAND/OFF/AUTO SWITCH.
4. THE UNIT'S FAN SHALL BE CONTROLLED BY A DOOR SWITCH WITH TIME DELAY WHEN THE SWITCH IS IN "AUTO" MODE.
5. ALARM THE BAS SYSTEM IF THE UNIT FAILS TO OPERATE AS DETERMINED BY A CURRENT SENSOR.

DUST COLLECTOR

1. THIS SEQUENCE OF OPERATION APPLIES TO THE FOLLOWING UNITS:
   A. DC-1
2. UNIT CONSISTS OF A FAN AND DUST COLLECTION BARREL.
3. THE UNIT SHALL BE CONTROLLED USING A WALL MOUNTED SWITCH IN THE WOOD SHOP.
4. SEQUENCE OF OPERATION FOR THE UNIT SHALL BE THE MANUFACTURER'S HARDWARE AND SOFTWARE WITH STANDARD OPERATING FUNCTIONS. THE UNIT SHALL OPERATE UNDER THEIR INTERNAL CONTROLS.
5. SYSTEM ALARMS AND SAFETIES:
   A. IF THE FAN IS NOT SENSED TO BE OPERATING, ALARM THE BAS.
   B. IF THE SPARK DETECTION AND EXTINGUISHING SYSTEM IS ACTIVATED, ACTIVATE AUDIO AND VISUAL ALARMS AND ALARM THE BAS.



2 | M801 — GAS FIRED MAKEUP AIR UNIT CONTROL DIAGRAM — NTS



1 | M801 — DEDICATED OUTDOOR AIR UNITS (DOAS) CONTROL DIAGRAM — NTS

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STATE OF OHIO — RENAE FOCHESATO — E-90911 — REGISTERED PROFESSIONAL ENGINEER
01/20/2025

ISSUE/REVISION

I/R	DATE	DESCRIPTION
1	11.01.2024	Issue for Permit

PROJECT NUMBER

60708192

SHEET TITLE

HVAC SEQUENCE OF OPERATIONS / CONTROLS

SHEET NUMBER

M801

Last Plotted: 1/17/2025 8:43:07 AM
Filename: Autodesk Docs://BP-AAECH (USA) 60708192 CCAD Center for Creative Collaboration/60708192_ACH_R22_CCAD_M.rvt

CITY OF COLUMBUS - BUILDING & ZONING SERVICES * PLAN APPROVAL ENDORSED BY THE CHIEF BUILDING OFFICIAL * APP # ADDC2445310 * DATE: 3/26/2025