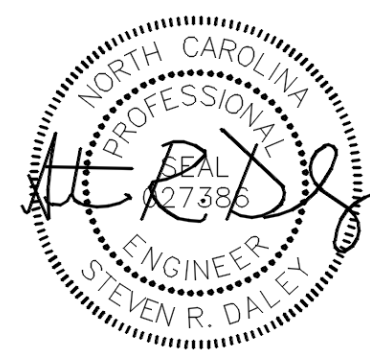




MECHANICAL DUCT SYMBOLS

SYMBOL	DESCRIPTION
	SQUARE DUCT SIZE TAG (WIDTH x HEIGHT)
	ROUND DUCT SIZE TAG (DIAMETER)
	SUPPLY AIR
	OUTDOOR AIR
	RETURN AIR
	EXHAUST AIR
	RELIEF AIR
	SUPPLY AIR DIFFUSER (4-WAY)
	RETURN AIR GRILLE
	RETURN AIR GRILLE WITH SOUND BOOT
	EXHAUST AIR GRILLE
M.C.	MECHANICAL CONTRACTOR
E.C.	ELECTRICAL CONTRACTOR
P.C.	PLUMBING CONTRACTOR
AFB	ABOVE FINISHED FLOOR
DN	DOWN
UP	UP
	THERMOSTAT (4'-0" AFF TO TOP)
	HUMIDISTAT (4'-0" AFF TO TOP)
	SWITCH (4'-0" AFF TO TOP)
	BAROMETRIC PRESSURE SENSOR (4'-0" AFF TO TOP)
	SPACE MOUNTED CO2 SENSOR (4'-0" AFF TO TOP)
	DIFFERENTIAL PRESSURE SENSOR FOR PUMP CONTROL
	DUCT-MOUNTED STATIC-PRESSURE SENSOR
	CARBON MONOXIDE SENSOR
	UNDERCUT DOOR (BY G.C.)
	SECTION CUT — REFERRING DETAIL NUMBER — REFERRING SHEET NUMBER
	CALL OUT — REFERRING DETAIL NUMBER — REFERRING SHEET NUMBER

MECHANICAL PIPING SYMBOLS

SYMBOL	DESCRIPTION
	BUTTERFLY VALVE
	3-PIECE BALL VALVE
	CHECK VALVE
	STRAINER WITH BLOWDOWN VALVE WITH HOSE CONN.
	BALANCING VALVE
	B&G CIRCUIT SETTER
	UNION
	THERMOMETER
	PRESSURE GAGE & COCK
	GAGE COCK
	FLOW SWITCH
	ECCENTRIC REDUCER
	CONCENTRIC REDUCER
	CONTROL VALVE
	GAS COCK
	PRESSURE REDUCING/REGULATING VALVE
	SOLENOID VALVE

MECHANICAL SHEET INDEX

SHEET NUMBER	SHEET NAME
M001	MECHANICAL INDEX, LEGEND, NOTES, AND SCHEDULES
M002	MECHANICAL SCHEDULES
M003	MECHANICAL SCHEDULES
M004	MECHANICAL SEQUENCE OF OPERATION
M005	MECHANICAL POINTS LIST
M010	MAIN LEVEL MECHANICAL PLAN - OVERALL
M012	UPPER LEVEL MECHANICAL PLAN - OVERALL
M013	ROOF MECHANICAL PLAN - OVERALL
M111	MAIN LEVEL MECHANICAL PLAN - BUILDING A (PART 1)
M112	MAIN LEVEL MECHANICAL PLAN - BUILDING A (PART 2)
M113	MAIN LEVEL MECHANICAL PLAN - BUILDING B
M114	MAIN LEVEL MECHANICAL PLAN - BUILDING C
M121	UPPER LEVEL MECHANICAL PLAN - BUILDING A (PART 1)
M122	UPPER LEVEL MECHANICAL PLAN - BUILDING A (PART 2)
M123	UPPER LEVEL MECHANICAL PLAN - BUILDING B
M124	UPPER LEVEL MECHANICAL PLAN - BUILDING C
M211	MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING A (PART 1)
M212	MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING A (PART 2)
M213	MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING B
M214	MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING C
M221	UPPER LEVEL MECHANICAL PIPING PLAN - BUILDING A (PART 1)
M222	UPPER LEVEL MECHANICAL PIPING PLAN - BUILDING A (PART 2)
M223	UPPER LEVEL MECHANICAL PIPING PLAN - BUILDING B
M224	UPPER LEVEL MECHANICAL PIPING PLAN - BUILDING C
M301	ENLARGED MECHANICAL PLANS
M302	MECHANICAL SECTIONS AND ELEVATIONS
M303	MECHANICAL SECTIONS AND ELEVATIONS
M304	MECHANICAL SECTIONS AND ELEVATIONS
M401	MECHANICAL DETAILS
M402	MECHANICAL SCHEMATICS AND DETAILS
M403	MECHANICAL DETAILS
M404	MECHANICAL UL DETAILS

2018 NORTH CAROLINA ENERGY CONSERVATION CODE COMMERCIAL ENERGY EFFICIENCY - MECHANICAL SUMMARY

C401 METHOD OF COMPLIANCE					
☒ 2018 NCECC CHAPTER 4	☐ COMCHECK PROVIDED (2018 NCECC)				
☐ ASHRAE 90.1-2013 PRESCRIPTIVE	☐ COMCHECK PROVIDED (90.1-2013)				
☐ ASHRAE 90.1-2013 PERFORMANCE	☐ ENERGY MODELING DATA PROVIDED				
☐ N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)					
C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS					
☐ C406.2 EFFICIENT MECH EQUIPMENT	☐ C406.5 ON-SITE RENEWABLE ENERGY				
☒ C406.3 REDUCED LTG DENSITY	☐ C406.6 DEDICATED OA SYSTEM				
☐ C406.4 ENHANCED LTG CONTROLS	☐ C406.7 SERVICE WATER HEATING				
C301 CLIMATE ZONE					
3A - CABARRUS COUNTY, NORTH CAROLINA					
DESIGN CONDITIONS					
EXTERIOR (ASHRAE 90.1-2013 TABLE D-1)					
winter dry bulb	18° F.				
summer dry bulb	91° F.				
summer wet bulb	74° F.				
INTERIOR (2018 NCECC SECTION C302.1)					
winter dry bulb	72° F.				
summer dry bulb	75° F.				
C403.2 HEATING & COOLING LOADS AND EQUIPMENT & SYSTEM SIZING					
BUILDING HEATING LOAD	1,787,500 BTUH (peak)				
BUILDING COOLING LOAD	3,053,900 BTUH (peak)				
INSTALLED HEATING CAPACITY	2,270,000 BTUH				
INSTALLED COOLING CAPACITY	3,335,250 BTUH				
C403.2.3 & C406.2 - REQUIRED & INCREASED HVAC EQUIPMENT PERFORMANCE					
SYSTEM DESCRIPTION - 4-PIPE AHU'S WITH SINGLE ZONE REHEAT TERMINAL BOXES, AIR COOLED CHILLER, CAST IRON BOILERS					
☒ MINIMUM HVAC EQUIP EFFICIENCY COMPLIANCE - TABLE C403.2.3					
☐ INCREASED HVAC EQUIP EFFICIENCY COMPLIANCE - 10% OVER TABLE C403.2.3					
EQUIP TYPE	SIZE CATEGORY (BTUH)	SUBCATEGORY	C403.2.3 MINIMUM EFFICIENCY (a)	10% INCREASED EFF. (a)	DESIGN EFFIC.
TABLE C403.2.3(1) - UNITARY AIR CONDITIONERS AND CONDENSING UNITS					
AIR COND. OR COOLED	< 65,000 (<= 5 TONS)	SPLIT SYSTEM & SINGLE PACKAGE	13.0 SEER	14.3 SEER	SEE SCHEDULE
TABLE C403.2.3(2) - ELECTRICALLY OPERATED UNITARY AND APPLIED HEAT PUMPS					
AIR COOLED COOL MODE	< 65,000 (<= 5 TONS)	SPLIT SYSTEM & SINGLE PACKAGE	14.0 SEER	15.4 SEER	SEE SCHEDULE
AIR COOLED HEAT MODE	< 65,000 (<= 5 TONS)	SPLIT SYSTEM & SINGLE PACKAGE	8.2 HSPF	9.0 HSPF	SEE SCHEDULE
TABLE C403.2.3(5) - BOILERS, GAS AND OIL FIRED					
BOILERS GAS FIRED	>= 300,000 Btu/h < 2,500,000 Btu/h	HOT WATER	80% Et	88% Et	SEE SCHEDULE
TABLE C403.2.3(7) - WATER CHILLING PACKAGES					
AIR COOLED CHILLERS	< 150 TONS	10.1 EER 13.7 IPLV	OR	9.7 EER 15.8 IPLV	10% BETTER SEE SCHEDULE
AIR COOLED CHILLERS	>= 150 TONS	10.1 EER 14 IPLV	OR	9.7 EER 16.1 IPLV	10% BETTER SEE SCHEDULE
C403.2.4 THRU C403.2.11					
☒ HVAC SYSTEMS ARE FULLY COMPLIANT WITH THE REQUIREMENTS FOR HVAC SYSTEM CONTROL, VENTILATION, ENERGY RECOVERY, DUCT AND PLENUM INSULATION AND SEALING, PIPING INSULATION, AND SYSTEM COMPLETION.					
C403.2.12 - AIR SYSTEM DESIGN AND CONTROL					
☐ ALL FANS INSTALLED ON THE PROJECT ARE 5 HP OR LESS AND ARE EXEMPT FROM THESE REQUIREMENTS.					
☒ FANS ABOVE 5 HP MEET THE CFM LIMITATIONS SHOWN BELOW:					
OPTION 1 - FAN SYSTEM MOTOR NAMEPLATE HP - TABLE C403.2.12.1(1)					
ALLOWABLE NAMEPLATE MOTOR HP	CONSTANT VOLUME MINIMUM CFM	VARIABLE VOLUME MINIMUM CFM	DESIGN CFM		
7.5	6,818 CFM	5,000 CFM	SEE SCHEDULE		
10	9,091 CFM	6,667 CFM	SEE SCHEDULE		
15	13,636 CFM	10,000 CFM	SEE SCHEDULE		
20	18,182 CFM	13,333 CFM	SEE SCHEDULE		
25	22,727 CFM	16,667 CFM	SEE SCHEDULE		
30	27,272 CFM	20,000 CFM	SEE SCHEDULE		
40	36,364 CFM	26,667 CFM	SEE SCHEDULE		
50	45,455 CFM	33,333 CFM	SEE SCHEDULE		
C403.3 - ECONOMIZERS (PRESCRIPTIVE)					
☒ PROJECT INCLUDES AN AIR OR WATER ECONOMIZER COMPLIANT WITH C403.3					
☐ PROJECT MEETS AN ECONOMIZER EXCEPTION LISTED IN C403.3					
C403.4 - HYDRONIC AND MULTIPLE-ZONE HVAC SYSTEMS CONTROL AND EQUIPMENT (PRESCRIPTIVE)					
☐ PROJECT CONSISTS OF ONLY SINGLE ZONE DX SYSTEMS, EXEMPT FROM THE PRESCRIPTIVE REQUIREMENTS OF C403.4.					
☒ PROJECT CONSISTS OF HVAC SYSTEMS FULLY COMPLIANT WITH THE PRESCRIPTIVE REQUIREMENTS OF C403.4.					
C405.8 - ELECTRICAL MOTORS (MANDATORY REQUIREMENTS).					
☒ ELECTRICAL MOTORS HAVE BEEN SPECIFIED TO MEET MINIMUM EFFICIENCY REQUIREMENTS PER C405.8, EXCEPT WHERE EXEMPT.					
☐ NOT APPLICABLE.					
C408 - SYSTEM COMMISSIONING					
☐ PROJECT AREA IS LESS THAN 10,000 SQUARE FEET AND IS EXEMPT FROM THE SYSTEM COMMISSIONING REQUIREMENTS OF SECTION C408.					
☒ PROJECT AREA IS GREATER THAN 10,000 SQUARE FEET AND REQUIRES SYSTEM COMMISSIONING PER SECTION C408.					

MECHANICAL PIPING SYSTEMS LEGEND

SYMBOL	DESCRIPTION
	CHILLED WATER RETURN
	CHILLED WATER SUPPLY
	CONDENSATE DRAINAGE
	HOT WATER RETURN
	HOT WATER SUPPLY
	NATURAL GAS
	COLD WATER MAKE-UP
	REFRIGERANT

MECHANICAL ACCESSORIES SYMBOL LEGEND

SYMBOL	DESCRIPTION
	AREA SMOKE DETECTOR - DEVICE SHOWN ON POWER PLAN AND NOTED ON SYSTEMS
	RECTANGULAR DUCT FIRE DAMPER W/ ACCESS DOOR (SEE DETAIL)
	RECTANGULAR DUCT COMBINATION FIRE/SMOKE DAMPER W/ ACCESS DOOR (SEE DETAIL)
	ROUND DUCT FIRE DAMPER W/ ACCESS DOOR (SEE DETAIL)
	ROUND DUCT MOUNTED SMOKE DETECTOR. FURNISHED AND CONNECTED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR. CUTTING OF DUCT, INSTALLATION OF DETECTOR, AND DETERMINATION OF SAMPLING TUBE LENGTH SHALL BE THE MECHANICAL CONTRACTOR. PROVIDE REMOTE INDICATING LIGHT WITH EACH DETECTOR.
	RECTANGULAR DUCT MOUNTED DUCT DETECTOR. FURNISHED AND CONNECTED BY ELECTRICAL CONTRACTOR, INSTALLED BY MECHANICAL CONTRACTOR. CUTTING OF DUCT, INSTALLATION OF DETECTOR, AND DETERMINATION OF SAMPLING TUBE LENGTH SHALL BE THE MECHANICAL CONTRACTOR. PROVIDE REMOTE INDICATING LIGHT WITH EACH DETECTOR.
	RECTANGULAR DUCT MOUNTED MOTOR OPERATED DAMPER, INTERLOCK WITH FAN AS INDICATED. (DAMPER BY M.C.)

COMMISSIONING NOTE - 2018 NCECC C408

THIS PROJECT INCLUDES A THIRD PARTY COMMISSIONING AGENT CONTRACTED BY THE OWNER. THE MECHANICAL CONTRACTOR SHALL COORDINATE WITH OWNER'S COMMISSIONING AGENT AND PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR A FULLY COMMISSIONED PROJECT. SEE COMMISSIONING REQUIREMENTS IN THE PROJECT MANUAL FOR FURTHER INFORMATION.

MECHANICAL GENERAL NOTES

SEE SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS. THESE GENERAL NOTES ARE INTENDED TO SUPPLEMENT THE SPECIFICATIONS. IN THE EVENT THAT THE VERBIAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED PRIOR TO BIDDING OR THE MORE STRINGENT SHALL APPLY AT THE ENGINEER'S DISCRETION.

- DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
- ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. THIS INCLUDES ANY MODIFICATIONS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.
- ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. ALL SUPPLY, RETURN AND OUTSIDE AIR DUCTWORK SHALL BE WRAPPED WITH 2" THICK DUCT WRAP WITH VAPOR BARRIER, INSULATION (INCLUDING FLEXIBLE DUCT INSULATION) SHALL HAVE A MINIMUM INSTALLED R-VALUE OF 6.0. TRANSFER DUCTS SHALL BE LINED WITH 1" THICK FIBERGLASS DUCT LINER FOR ACOUSTICAL PURPOSES. DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE.
- ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE NORTH CAROLINA INTERNATIONAL MECHANICAL CODE. SEAL MEDIUM PRESSURE SUPPLY DUCTWORK FOR POSITIVE 2" PRESSURE CLASS, SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 4. SEAL LOW PRESSURE SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK FOR POSITIVE/NEGATIVE 2" PRESSURE CLASS, SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 4.
- ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.
- ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS, TO AVOID INTERFERENCE.
- THE MECHANICAL CONTRACTOR SHALL BALANCE ALL MECHANICAL SYSTEMS TO THE PERFORMANCE SPECIFICATIONS INDICATED ON PLANS AND PROVIDE THE ENGINEER WITH THREE COPIES OF A COMPLETE TEST AND BALANCE REPORT. THE REPORT IS TO BE ISSUED A MINIMUM OF TWO WEEKS PRIOR TO PROJECT COMPLETION. THE TEST AND BALANCE REPORT WILL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER. ANY ADDITIONAL TESTING, ADJUSTING AND BALANCING REQUIRED AT ENGINEER'S REQUEST AFTER REVIEW OF THE INITIAL REPORT SHALL BE PROVIDED AT NO ADDITIONAL COST. TESTING AND BALANCING CONTRACTOR TO CONFIRM FILTERS ARE CLEAN, AND FREE OF DEBRIS PRIOR TO BEGINNING WORK. THE MECHANICAL CONTRACTOR SHALL REPLACE ANY DIRTY FILTERS, AS NEEDED. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR.
- UPON PROJECT COMPLETION, THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER INSTALLATION INFORMATION INCLUDING RECORD SUBMITTALS (WITH ANY SUBMITTAL REVIEW COMMENTS ADDRESSED) AND O&M MANUALS FOR EACH PIECE OF EQUIPMENT INCLUDING ALL SELECTED OPTIONS, THE NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY, FULL CONTROL SYSTEM O&M AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, SCHEMATICS, FULL SEQUENCE OF OPERATION, AND PROGRAMMED SETPOINTS.
- PROVIDE A TEN YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER. PROVIDE A DEDUCTED ALTERNATE PRICE FOR A FIVE YEAR WARRANTY. (SEE NOTE BELOW)
- PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.
- CONDENSATE DRAIN PIPING SHALL BE TYPE 1/2" HARD DRAWN COPPER PIPE INSULATED WITH 3/4" FOAMED PLASTIC PIPE INSULATION (PLENUM RATED). DRAINS FROM AIR HANDLING UNITS SHALL BE TRAPPED. MINIMUM DRAIN SIZE SHALL BE 1/2".
- ALL REFRIGERANT PIPE SHALL BE NITROGENIZED ACR COPPER TUBE. SIZE, INSULATE, AND INSTALL REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATIONS. REFRIGERANT PIPING INSULATION EXPOSED OUTDOORS SHALL BE COVERED WITH AN OUTER ALUMINUM JACKET.
- ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.
- INSTALL THE TOP OF ALL THERMOSTATS, SENSORS, AND SWITCHES AT 4'-0" (MAXIMUM) ABOVE FINISH FLOOR. COORDINATE EXACT THERMOSTAT LOCATION WITH OWNER PRIOR TO INSTALLATION. ANY DEVICE ON A PERIMETER WALL SHALL BE MOUNTED ON A FOAM-FILLED ELECTRICAL BOX, WITH ALL GAPS BETWEEN BOX AND WALL SEALED TO PREVENT INFILTRATION.
- CONTRACTOR SHALL VERIFY LOCATION OF ALL ROOF PENETRATIONS WITH ARCHITECT & OWNER PRIOR TO INSTALLATION.
- ALL ROOF CURBS SHALL EXTEND A MINIMUM OF 8" ABOVE ROOF INSULATION OR AS INDICATED ON THE DRAWINGS, WHICHEVER IS GREATER. IN ADDITION, ALL ROOF CURBS OR EQUIPMENT SUPPORT RAILS THAT SUPPORT EQUIPMENT, PIPING, CONDUIT, ETC. EXPOSED ON THE ROOF SHALL HAVE SUFFICIENT HEIGHT TO MAINTAIN A MINIMUM OF 18" CLEARANCE BELOW SUPPORTED EQUIPMENT FOR ROOF MAINTENANCE.
- CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE.
- DRYER VENT WALL CAPS SHALL BE PROVIDED WITH A BACKDRAFT DAMPER. DRYER VENT SHALL NOT EXCEED A TOTAL EQUIVALENT LENGTH OF 35'-0" WITH A 2.5' DEDUCTION FOR EACH 45° BEND AND A 5' DEDUCTION FOR EACH 90° BEND.
- KITCHEN HOOD EXHAUST DUCT SHALL BE 16 GAUGE CARBON STEEL. ALL JOINTS AND SEAMS SHALL BE CONSTRUCTED WITH A CONTINUOUS LIQUID - TIGHT EXTERNAL WELD. ALL DUCTWORK SHALL SLOPE A MINIMUM OF 1/4 INCH PER FOOT TOWARD HOOD. PROVIDE CLEANOUTS AT EVERY CHANGE OF DIRECTION IN THE EXHAUST DUCT AND AT 20'-0" (MINIMUM) INTERVALS. WRAP ANY PORTION OF KITCHEN HOOD EXHAUST DUCTWORK THAT CANNOT MAINTAIN AN 18" CLEARANCE TO COMBUSTIBLES WITH FIRE RATED DUCT INSULATION PER SPECIFICATION SECTION 230700. THE MECHANICAL CONTRACTOR SHALL PERFORM A LIGHT TEST (AS REQUIRED BY THE MECHANICAL CODE) FOR ALL JOINTS AND SEAMS IN THE PRESENCE OF THE LOCAL AUTHORITY HAVING JURISDICTION PRIOR TO CONCEALING KITCHEN HOOD EXHAUST DUCTWORK.
- THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING RESTRAINTS TO RESIST THE EARTHQUAKE EFFECTS ON THE MECHANICAL SYSTEMS. THE REQUIREMENTS FOR THOSE RESTRAINTS ARE FOUND IN THE LOCAL BUILDING CODE AND ASCE 7. THE ANCHORAGE OF THE MECHANICAL SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE LOCAL BUILDING CODE AND ASCE 7.
- ALL MECHANICAL EQUIPMENT SHALL BE U.L. LISTED AND LABELED AS A COMPLETE PACKAGE, NOT THOUGH INDIVIDUAL COMPONENTS OR PARTS. PROVIDE REQUIRED 3RD PARTY FIELD UL LISTING SERVICES AS REQUIRED TO COMPLY.
- DISHWASHER EXHAUST DUCT SHALL BE STAINLESS STEEL. ALL JOINTS AND SEAMS SHALL HAVE A LIQUID TIGHT CONTINUOUS EXTERNAL WELD. EXHAUST DUCT SHALL SLOPE DOWN IN DIRECTION OF HOOD A MINIMUM OF 1" PER FOOT.
- MINIMUM GAS PIPING SIZE SHALL BE 3/4".
- GAS PIPING AND FITTINGS SHALL BE BLACK STEEL, SCHEDULE 40, IN ACCORDANCE WITH ASTM SPECIFICATION A 106, WITH 150 PSI BLACK MALLEABLE IRON FITTINGS IN ACCORDANCE WITH ASTM SPECIFICATION A 47, GRADE 32510, AND ASA SPECIFICATION B16.3, 125 LB.
- GAS PIPING SHALL BE INSTALLED TO THE REQUIREMENTS OF THE STATE BUILDING CODE AND NIPPA STANDARD NO. 54. ALL PIPING TO BE SUPPORTED BY CLEVIS HANGERS WITH GALVANIZED ROD A MAXIMUM OF 8' ON CENTER. PIPING SHALL BE SUPPORTED BY ROD HANGERS IN THE PIPE RUN 12" OR LESS IN LENGTH FROM THE TOP OF THE PIPE TO THE SUPPORTING STRUCTURE PER THE STATE BUILDING CODE AND ASCE 7.
- GAS PIPING SHALL BE TESTED IN ACCORDANCE WITH THE PROCEDURES DESCRIBED IN NFPA NO 54. ANY OTHER TEST AS REQUIRED BY THE LOCAL GAS INSPECTION DEPARTMENT OR GAS COMPANY SHALL ALSO BE PERFORMED.
- NATURAL GAS PIPING AND FITTINGS ABOVE GRADE: SCHEDULE 40 BLACK STEEL PIPING, TYPE S, SEAMLESS, GRADE B (ASTM A 53) AND 150 PSI MALLEABLE BLACK IRON FITTINGS, GRADE 32510, (ASTM B 16.3) OR FORGED STEEL WELDING TYPE FITTINGS (ASTM A234). PROVIDE THREADED JOINTS FOR PIPE 2" AND SMALLER. PROVIDE WELDED JOINTS (ASME B31.9) FOR PIPE 2 1/2" AND LARGER.
- SPACE GAS PIPING HANGER RODS 8'-0" ON CENTER MAXIMUM AND SPACE TRANSVERSE BRACING 20'-0" ON CENTER MAXIMUM. TRANSVERSE BRACING FOR ONE SECTION MAY ACT AS LONGITUDINAL BRACING FOR THE PIPE SECTION CONNECTED TO IT IF THE BRACING IS INSTALLED WITHIN 24" OF THE ELBOW OR TEE. COORDINATE HANGER LOCATIONS WITH STRUCTURAL DRAWING DETAILS.
- PROVIDE A G.A. CERTIFIED SHUT-OFF VALVES MINIMUM, 125 PSI RATED, NON-LUBRICATED PLUG TYPE WITH BRONZE BODY AND BRONZE PLUG, STRAINERS AND REGULATORS (AS RECOMMENDED BY THE EQUIPMENT MANUFACTURER) FOR ALL EQUIPMENT CONNECTED TO THE NATURAL GAS SYSTEM.
- PAINT ALL GAS PIPING WITH 2 COATS OF YELLOW ENAMEL PAINT APPLIED WITH A BRUSH (2 MIL THICKNESS MINIMUM). PROVIDE PRE-PRINTED LABELS WITH BLACK LETTERING INDICATING THE GAS PRESSURE AND THE WORD "GAS" ON THE PIPE AT 5'-0" CENTERS FOR ALL GAS PIPING.
- ALL CHILLED WATER AND HOT WATER PIPING 2" AND LESS SHALL BE SCHEDULE 40 BLACK STEEL OR HARD-DRAWN TYPE 1 COPPER PIPE AND FITTINGS. ALL CHILLED WATER, HOT WATER PIPING AND CONDENSER WATER PIPING GREATER THAN 2" SHALL BE WELDED SCHEDULE 40 BLACK STEEL. PROVIDE BRONZE VALVES AND FITTINGS WITH COPPER PIPING AND CAST IRON VALVES AND FITTINGS WITH SCHEDULE 40 BLACK STEEL.
- CHILLED WATER PIPING IN MECHANICAL ROOMS SHALL BE INSULATED AND JACKKATED PER SPECIFICATIONS.
- ALL CHILLED WATER AND HOT WATER PIPING SHALL PITCH DOWN

YCH
Architects

ACCESSORIES:

- A - OYRA MIXING BOX WITH MOTORIZED OUTSIDED AIR AND RETURN DAMPERS
- B - PERMANENT MOUNTED FRAMES WITH REPLACEABLE FABRIC FILTERS (ANGULAR FILTERS)
- C - SINGLE WALL METAL VARIABLE FREQUENCY DRIVE WITH BYPASS FOR EACH SUPPLY/RETURN FAN SET
- D - PLENUM SUPPLY FAN (SEE PLANS FOR DISCHARGE LOCATION)
- E - PLENUM RETURN/RELIEF FAN
- F - VERTICAL DRAW THROUGH
- G - HORIZONTAL DRAW THROUGH
- H - 2 SPEED FAN MOTOR (1800/900 RPM)
- I - ANGULAR FILTER SECTION
- K - ECONOMIZER SECTION WITH MOTORIZED OUTSIDE AIR, RETURN AIR, AND RELIEF AIR DAMPERS
- L - 2" PLEATED FILTERS (MERV-8 MINIMUM)
- M - ROOF CURB
- N - INTERLOCK FAN TO RUN CONTINUOUSLY WHEN KITCHEN HOOD EXHAUST FAN IS IN OPERATION
- P - CO2 SENSOR FOR DEMAND LIMITING CONTROL
- Q - INTERNAL VIBRATION ISOLATION
- R - VERTICAL INTAKE PLENUM (SEE PLANS FOR INLET LOCATION)
- S - RETURN AIR BACKDRAFT DAMPER

1. COOLING COIL CAPACITY IS BASED ON 80° F D.B./67° F W.B. E.A.T. AND 56.0° F. D.B./55.5° F. W.B. L.A.T. AND SHALL BE A MINIMUM OF 6 ROWS.
2. MAXIMUM FACE VELOCITY OF COOLING COILS SHALL BE 500 FPM.
3. HEATING COIL CAPACITY IS BASED ON 65° F. E.A.T.
4. ALL AIR HANDLING SHALL HAVE HIGH EFFICIENCY FAN MOTORS.
5. ALL AIR HANDLING UNIT SHALL BE PROVIDED WITH AN PHOTO-ELECTRIC TYPE SMOKE DETECTOR MOUNTED IN THE RETURN DUCT. THE SMOKE DETECTOR SHALL BE FURNISHED AND WIRED FOR UNIT SHUT DOWN AND FIRE ALARM INTERFERENCE. CONTRACTOR SHALL BE INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR.
6. ALL UNITS SHALL HAVE A FACTORY INSTALLED 6" HIGH BASE RAIL, MOUNT AHEAD ON A 4" THICK CONCRETE PAD.
7. CONTRACTOR SHALL INSTALL NEW BELTS AND NEW SET OF MERV 8 PLATED FILTERS AT SUBSTANTIAL COMPLETION, AND PROVIDE SPARE SETS OF BELTS AND FILTERS TO THE OWNER.
8. ALL UNITS SHALL BE DOUBLE WALL CONSTRUCTION WITH 18 GAUGE MINIMUM CASING.
9. ALL UNITS SHALL HAVE A MINIMUM 4" ACCESS SECTION WITH HINGED DOOR BETWEEN EACH SET OF ADJACENT COILS.
10. FAN VFD'S AND BYPASS SHALL BE PROVIDED WITH PHASE LOSS PROTECTION (SEE DETAIL).
11. PROVIDE ONE ATTIC STICK VFD FOR EACH SIZE MOTOR PROVIDED ON THE PROJECT IN MULTIPLE SUPPLY/RETURN FAN CONFIGURATIONS.
12. ALL ELECTRICAL COMPONENTS SERVING AND WITHIN AIR HANDLING UNITS MUST HAVE A MINIMUM SCRR RATING OF 35 KAIC.
13. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

(*) FOR DEVICES INSTALLED IN GYP CEILINGS, PROVIDE MINIMUM FACE SIZE FOR SPECIFIED NECK SIZE.

NOTES:

1. ALL CEILING AND WALL MOUNTED DEVICES SHALL BE FURNISHED WITH AN ENAMEL OFF-WHITE FINISH.
2. ALL DEVICES SHALL BE FURNISHED WITH FRAMES SUITABLE FOR TYPE OF INSTALLATION REQUIRED.
3. ALL AIR DISTRIBUTION DEVICES LOCATED IN KITCHEN, LOCKER ROOMS, AND TOILETS SHALL BE ALL ALUMINUM CONSTRUCTION.
4. ALL DOUBLE DEFLECTION SUPPLY GRILLES SHALL HAVE DAMPER BLADES ADJUSTED TO PROVIDE AIRFLOW PATTERN INDICATED BY FLOW ARROWS ON PLANS. DAMPERS SHALL BE ADJUSTED TO A 30 DEGREE POSITION UNLESS NOTED OTHERWISE ON PLANS.
5. PROVIDE INSTALLED PLENUM WITH ROUND NECK CONNECTION ON SLOT TYPE AIR DISTRIBUTION.

INDOOR UNIT										OUTDOOR UNIT																		
SYMBOL	LOCATION	CFM	COOLING CAPACITY		HEATING CAPACITY		ELECTRICAL DATA				SYMBOL	LOCATION	COOLING CAPACITY		SEER	HEATING CAPACITY		COMPRESSOR	LRA	RLA	FAN FLA	MCA	ELECTRICAL DATA				OPERATING WEIGHT	MANUFACTURER
			BTU/H	SHC (BTU/H)	BTU/H	BTU/H	FAN FLA	MCA	VOLT	PH			BTU/H	SHC (BTU/H)		BTU/H	BTU/H						MOCV	VOLT	PH			
A/C-1	MAIN SERVER A114	915	34,400	22,200	0	0.33	0.0	208 V	1	FTX36NMVJU	CU-1	ROOF	34,400	22,200	17.9	0	0	16.3	0.39	17.0	20	208 V	1	133 lb	RICGNM/VJU			
A/C-2	ELBY MACHINE A205	434	12,000	22,200	0	0.33	0.0	208 V	1	FTX36NMVJU	CU-2	ROOF	34,400	22,200	17.9	0	0	16.3	0.39	17.0	20	208 V	1	133 lb	RICGNM/VJU			
A/C-3	DATA A115	434	12,000	9,500	0	0.33	0.0	208 V	1	FTX12NMVJU	CU-3	ROOF	12,000	9,500	17.9	0	0	7.5	0.19	12.2	15	208 V	1	60 lb	RIK12NMVJU			
A/C-4	DATA AD26	434	12,000	9,500	0	0.33	0.0	208 V	1	FTX12NMVJU	CU-4	ROOF	12,000	9,500	17.9	0	0	7.5	0.19	12.2	15	208 V	1	60 lb	RIK12NMVJU			
A/C-5	DATA A205	434	12,000	9,500	0	0.33	0.0	208 V	1	FTX12NMVJU	CU-5	ROOF	12,000	9,500	17.9	0	0	7.5	0.19	12.2	15	208 V	1	60 lb	RIK12NMVJU			
A/C-6	DATA A236	434	12,000	9,500	0	0.33	0.0	208 V	1	FTX12NMVJU	CU-6	ROOF	12,000	9,500	17.9	0	0	7.5	0.19	12.2	15	208 V	1	60 lb	RIK12NMVJU			

CHILLER #1 TRANE GRAC 400 (AIR-COOLED CHILLER)
40 TONS (MIN); 5% AMBIENT; EVAPORATOR: 80 GPM; 44° F. L.W.T.; 56° F. E.W.T.; 10 MAX. P.D.
ELEC. DATA: 480V-3Ø, 4 COMPRESSORS, 2 CIRCUITS; COMPRESSORS: 18.6 RLA (EACH), 142 RLA (EACH),
120V TO TOTAL, 2.3 RLA (EACH).
UNIT ELECTRICAL DATA: (SINGLE POINT ELECTRICAL CONNECTION) 95 MCA, 125 MCO; 20 AMP,
120V CIRCUIT FOR CONTROLS AND HEATERS.
CHILLER SHALL BE FURNISHED WITH 6 COMPRESSORS WITH TWO INDEPENDENT REFRIGERANT
CIRCUITS, ACROSS THE LINE STARTER, MICROPROCESSOR BASED CONTROL SYSTEM TO MAINTAIN A
CONSTANT LEAVING WATER TEMPERATURE OF 44° F., LEAD-LAG CONTROLS TO MAINTAIN EQUAL
COMPRESSOR RUN TIMES, OPEN PROTOCOL TO ALLOW COMMUNICATION WITH THE BUILDING
AUTOMATION SYSTEM, FACTORY INSTALLED WATER FLOW SWITCH, ARCHITECTURAL LOUVERED
PANELS, PROTECTIVE COIL GUARDS, 5-YEAR COMPRESSOR, PARTS, LABOR, AND REFRIGERANT
WARRANTY.
MAXIMUM SOUND PRESSURE = 89 DBA @ 30'.
OPERATING WEIGHT = 3,543 POUNDS.
PROVIDE CHILLER WITH R-454B REFRIGERANT.
FULL LOAD EFFICIENCY = 11.67 EER, 16.87 EER IPLV

CHILLER #2 TRANE GRAC 380 (AIR-COOLED CHILLER)
40 TONS (MIN); 5% AMBIENT; EVAPORATOR: 320 GPM; 44° F. L.W.T.; 56° F. E.W.T.; 10 MAX. P.D.
ELEC. DATA: 480V-3Ø, 6 COMPRESSORS; 3 CIRCUITS; COMPRESSORS: 294 RLA (EACH), 54 RLA (EACH),
120V TO TOTAL, 2.3 RLA (EACH).
UNIT ELECTRICAL DATA: (SINGLE POINT ELECTRICAL CONNECTION) 367 MCA, 450 MCO; 20 AMP,
120V CIRCUIT FOR CONTROLS AND HEATERS.
CHILLER SHALL BE FURNISHED WITH 6 COMPRESSORS WITH THREE INDEPENDENT REFRIGERANT
CIRCUITS, WYE DELTA STARTER, MICROPROCESSOR BASED CONTROL SYSTEM TO MAINTAIN A
CONSTANT LEAVING WATER TEMPERATURE OF 44° F., LEAD-LAG CONTROLS TO MAINTAIN EQUAL
COMPRESSOR RUN TIMES, OPEN PROTOCOL TO ALLOW COMMUNICATION WITH THE BUILDING
AUTOMATION SYSTEM, FACTORY INSTALLED WATER FLOW SWITCH, ARCHITECTURAL LOUVERED
PANELS, PROTECTIVE COIL GUARDS, 5-YEAR COMPRESSOR, PARTS, LABOR, AND REFRIGERANT
WARRANTY.
MAXIMUM SOUND PRESSURE = 72 DBA @ 30'.
OPERATING WEIGHT = 9,570 POUNDS.
PROVIDE CHILLER WITH R-454B REFRIGERANT.
FULL LOAD EFFICIENCY = 10.37 EER, 16.35 EER IPLV

SYMBOL	LOCATION	TYPE	APPROX.		ELECTRICAL DATA							MANUFACTURER	MODEL NO.	ACCESSORIES	CONTROLS
			CFM	ESP	DRIVE TYPE	FAN RPM	WATTS	H.P.	VOLTAJE-PHASED						
FAN F-1	KITCHEN HOOD	EXHAUST	3,915	150	DIRECT	1340	0	5	480 V 3-Ø	CaptivaAir®			A.E.G.P.Q.		7
FAN F-2	KITCHEN HOOD	MAKE-UP	2,972	0.75	DIRECT	1340	0	2	480 V 3-Ø	CAPTIVAIRE			A2-3-250-25D	A.C.L.O.U.	7
FAN F-3	DISHWASHER	EXHAUST	600	1.00	DIRECT	1641	0	0.25	115 V 1-Ø	GREENHECK			CUE-099-V		8
FAN F-4	EMERGENCY ELEC.	EXHAUST	225	0.25	DIRECT	1550	0	0.033	115 V 1-Ø	GREENHECK			G-070-D	A.B.D.E	1
FAN F-5	MAIN ELEC.	EXHAUST	1,200	0.25	DIRECT	1140	0	0.167	115 V 1-Ø	GREENHECK			G-120-B	A.B.D.E	1
FAN F-6	BOILER	SUPPLY	2,000	0.25	BELT	950	0	0.25	115 V 1-Ø	GREENHECK			SBS-H20-4	A.B.G.J.M	1
FAN F-7	ADMIN/HEALTH	EXHAUST	700	0.50	DIRECT	1635	0	0.167	115 V 1-Ø	GREENHECK			G-095-V		7
FAN F-8	ART ROOM A193	EXHAUST	1,650	0.50	DIRECT	1122	0	0.5	115 V 1-Ø	GREENHECK			G-070-M	A.B.O	7
FAN F-9	KILN A194	EXHAUST	150	0.25	DIRECT	1300	0	0.017	115 V 1-Ø	GREENHECK			G-070-G	A.B.D.E	1
FAN F-10	ART WING TLT	EXHAUST	300	0.35	DIRECT	1550	0	0.05	115 V 1-Ø	GREENHECK			G-080-D	A.B.D.E	5
FAN F-11	KITCHEN TLT AND JANS	EXHAUST	175	0.35	DIRECT	1500	0	0.067	115 V 1-Ø	GREENHECK			G-070-V	A.B.D.E	5
FAN F-12	KINDER/2ND TLT	EXHAUST	900	0.50	BELT	1400	0	0.25	115 V 1-Ø	GREENHECK			GB-100	A.B.D.E	5
FAN F-13	KINDER/2ND CORE	EXHAUST	2,000	0.50	BELT	1150	0	0.333	115 V 1-Ø	GREENHECK			GB-180	A.B.D.E	5
FAN F-14	157' ART ROOM	EXHAUST	975	0.50	BELT	1466	0	0.25	115 V 1-Ø	GREENHECK			GB-100	A.B.O	7
FAN F-15	UPPER GROUP TLT	EXHAUST	1,150	0.35	BELT	719	0	0.25	115 V 1-Ø	GREENHECK			GB-130	A.B.D.E	5
FAN F-17	JANITOR STORAGE A158	EXHAUST	215	0.35	DIRECT	1579	0	0.067	115 V 1-Ø	GREENHECK			G-070-V	A.B.D.E	5
FAN F-18	MECHANICAL MEZZ A238	RELIEF	2,800	0.50	DIRECT	1332	0	1	115 V 1-Ø	GREENHECK			CSP-A3300-V	A.B.G.V	5

BOILER #1 & #2 WEIL-McLAIN BG-588-WF

CAST-IRON SECTIONAL BOILER; 1,135 MBH GROSS OUTPUT; 979 MBH NET OUTPUT; 1,356 MBH INPUT (NATURAL GAS); BURNER - WEBSTER MODEL W81 GAS BURNER, 1/2 H.P., 120V-110; IRI GAS TRIMMER WITH "POUNDS TO INCH" REGULATOR (2 PSI GAS SUPPLY); U.L. LABEL ON BURNER, 50 PSI RELIEF VALVE (ASME).

NOTES:

1. 2 PSIG GAS SERVICE TO BOILERS WITH SHUT-OFF VALVE IS FURNISHED BY THE PLUMBING CONTRACTOR. MECHANICAL CONTRACTOR SHALL PROVIDE GAS PRESSURE REGULATOR/REDUCING VALVE AND MAKE FINAL CONNECTION TO BOILERS.

SYMBOL	SERVICE	HEAD		DESIGN		MOTOR			PH	MANUFACTURER	MODEL	REMARKS
		GPM	(FT)	EFFICIENCY	RPM	H.P.	VOLTAGE	PH				
P-1	CHILLER #1	320	33	72%	1750	1.5	460 V	3	1	Ball & Gossett	e-150-2AD	
P-2	CHILLER #2	320	33	75%	1750	1.5	460 V	3	1	Ball & Gossett	e-150-3AD	
P-3	CHILLED WATER LOOP	200	65	73%	1750	3.5	460 V	3	1	Ball & Gossett	e-150-28B	
P-4	CHILLED WATER LOOP	200	65	73%	1750	3.5	460 V	3	1	Ball & Gossett	e-150-28B	
P-5	HOT WATER LOOP	50	64	50%	1750	3	460 V	3	1	Ball & Gossett	e-150-A.25BC	
P-6	HOT WATER LOOP	50	64	50%	1750	3	460 V	3	1	Ball & Gossett	e-150-A.25BC	
P-7	BOILER #1	50	25	50%	1750	0.75	120 V	1	1	Ball & Gossett	e90-2ACC	
P-8	BOILER #2	50	25	50%	1750	0.75	120 V	1	1	Ball & Gossett	e90-2ACC	

ALL PUMPS SHALL BE FURNISHED WITH HIGH EFFICIENCY MOTORS WITH GROUNDING RINGS.

ALL BASE MOUNTED END SUCTION PUMPS SHALL BE FURNISHED WITH TRIPLE DUTY VALVES AND SUCTION DIFFUSERS.

PUMPS P-2 AND P-6 SHALL RUN IN PARALLEL AND SHALL BE NON-OVERLOADING.

PUMPS P-2 AND P-6 SHALL RUN IN PARALLEL AND SHALL BE NON-OVERLOADING.

PUMPS P-3, P-4, P-5, AND P-6 SHALL BE FURNISHED WITH VARIABLE FREQUENCY DRIVES AND INVERTER DUTY MOTORS.

PUMPS P-1, P-2, P-7, AND P-8 SHALL BE PROVIDED WITH STARTER WITH HAND-OFF-AUTO AND DISCONNECT.

PUMP UPD AND BYPASS SHALL BE PROVIDED WITH PHASE LOSS PROTECTION (SEE DETAIL).

ALL ELECTRICAL COMPONENTS SERVING PUMPS SHALL HAVE A MINIMUM SCOR RATING OF 90 KAIC.

ALL ELECTRICAL COMPONENTS SERVING PUMPS SHALL HAVE A MINIMUM SCOR RATING OF 90 KAIC.

SUMMITTALS FOR NON-OVERLOADING PUMPS SHALL SHOW BOTH SINGLE AND DUAL PUMP OPERATION

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Final Construction Documents

MECHANICAL SCHEDULES

M002

ROOF MOUNTED GRAVITY VENTILATOR SCHEDULE									
SYMBOL	LOCATION	SERVICE	CFM	MAX. THROAT VELOCITY (FPM)	MAX. SP DROP (IN.)	MANUFACTURER	MODEL	ACCESSORIES	
REV-1	JAN C203 ROOF	AHU-1 RELIEF	11,100	800	0.10	GREENHECK	FGR-40X62	A,B,C	
REV-8	MECH A238 ROOF	FCU-1, AHU-8, & AHU-10 RELIEF	10,300	800	0.10	GREENHECK	FGI-42X56	A,B,C	
RIV-2	MECH A217 ROOF	AHU-2 INTAKE	12,900	800	0.10	GREENHECK	FGI-48X60	A,B,C	
RIV-3	MECH A212 ROOF	AHU-3 INTAKE	17,000	800	0.10	GREENHECK	FGI-48X66	A,B,C	
RIV-4	MECH A237 ROOF	AHU-4 INTAKE	14,900	800	0.10	GREENHECK	FGI-42X60	A,B,C	
RIV-5	MECH A237 ROOF	AHU-5 INTAKE	4,200	800	0.10	GREENHECK	FGI-28X34	A,B,C	
RIV-6	MECH A237 ROOF	AHU-6 INTAKE	9,000	800	0.10	GREENHECK	FGI-42X48	A,B,C	
RIV-7	MECH A237 ROOF	AHU-7 INTAKE	8,700	800	0.10	GREENHECK	FGI-42X48	A,B,C	
RIV-8	MECH E152 ROOF	FCU-1, AHU-8, & AHU-10 INTAKE	10,300	800	0.10	GREENHECK	FGI-48X48	A,B,C	
RIV-9	MECH A237 ROOF	AHU-9 INTAKE	6,900	800	0.10	GREENHECK	FGI-40X40	A,B,C	
NOTES:									
1. PROVIDE ALL VENTILATORS WITH FACTORY ROOF CURBS. CURBS AND VENTILATORS SHALL BE INSTALLED LEVEL.									
ACCESSORIES:									
A. ROOF CURB									
B. INSECT SCREEN									
C. GRAVITY BACK DRAFT DAMPER									
D. MOTORIZED DAMPER									
E. WASHABLE ALUMINUM FILTERS									

ELECTRIC HEATER SCHEDULE									
SYMBOL	LOCATION	MANUFACTURER	MODEL NO.	FAN AIRFLOW	H.P.	HEATING ELEMENT POWER	VOLT	PH	
EUH-1	MAIN MECH ROOM	MARKEL	GIG5102N	400 CFM	1/125	3.3 kW	277 V	1	
NOTES:									
1. HEATING CAPACITY BASED ON 65° F. E.A.T.,									
2. PROVIDE EACH UNIT HEATER WITH: DISCONNECT SWITCH, REMOTE THERMOSTAT, ROOF MOUNTED BRACKETS, AND ADJUSTABLE DISCHARGE LOUVERS									
3. PROVIDE EACH WALL HEATER WITH BUILT-IN DISCONNECT SWITCH AND THERMOSTAT, PENCIL-POOF LOUVERS, AND CABINET FOR SURFACE MOUNTING.									
4. THERMOSTATS SHALL BE LOW VOLTAGE, LINE VOLTAGE THERMOSTATS ARE NOT ACCEPTABLE.									

ELECTRIC DUCT HEATER SCHEDULE									
SYMBOL	MANUFACTURER	MODEL NO.	TYPE	CFM	QTY	HEATING ELEMENT POWER	UNIT DIMENSIONS	ELECTRICAL DATA	
EDH-1	INDECO	QUZ	FLANGED	250	1	4 kW	10" x 10"	480 V 3	
EDH-2	INDECO	QUZ	FLANGED	100	1	2 kW	8" x 8"	480 V 3	
EDH-3	INDECO	QUZ	FLANGED	100	1	2 kW	8" x 8"	480 V 3	
NOTES:									
1. ALL HEATERS SHALL BE OPEN-COIL, FLANGED TYPE HEATERS.									
2. ALL HEATERS SHALL HAVE STEP CONTROL WITH 2 STEPS OF CONTROL.									
3. PROVIDE HEATERS WITH THE FOLLOWING BUILT-IN AND PRE-WIRED COMPONENTS: DISCONNECTING TYPE MAGNETIC CONTACTORS, FUSES PER N.E.C., CONTROL VOLTAGE TRANSFORMER, AIR FLOW SWITCH.									

FAN COIL UNIT SCHEDULE (4-PIPE BLOWER COILS WITH HOT WATER PREHEAT)

SYMBOL	(CFM)	DESIGN OA (CFM)	ESP	COOLING COIL					MAX. PD (FT.)	RUNOUT	HEATING COIL					ELECTRICAL DATA				MANUF.	MODEL
				TC (MBH)	SHC (MBH)	GPM	E.W.T. (°F)	L.W.T. (°F)			TC (MBH)	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. PD (FT.)	RUNOUT	MOTOR (HP)	VOLTAGE	PH		
FCU-1	2,800	480	0.5	118.59	82.54	19.7	44°F	56°F	10.0	1 1/2"	90	4.5	180°F	140°F	5.0	1"	1.5	460	3	TRANE	BCH0890
NOTES:																					
1. COOLING CAPACITIES ARE BASED ON 80° F D.B. AND 67° F W.B. E.A.T.																					
2. HEATING CAPACITIES ARE BASED ON 65° F. E.A.T.																					
3. FURNISH ALL UNITS WITH: DDC THERMOSTAT, INSULATED RETURN AIR PLENUM, SECONDARY DRAIN PAN, FILTERS (SEE NOTE 6), DISCHARGE DUCT COLLAR, VIBRATION ISOLATORS.																					
4. MECHANICAL CONTRACTOR SHALL PROVIDE SPARE FAN COIL UNIT MOTORS FOR EACH SIZE MOTOR PROVIDED. MOTORS SHALL BE DELIVERED TO OWNER AT PROJECT COMPLETION.																					
5. CONTROLS CONTRACTOR SHALL PROVIDE INDIVIDUAL CONTROL POWER TRANSFORMER (277V OR 480V) FOR EACH UNIT. POWER WILL BE FROM FAN COIL UNIT CIRCUIT.																					
6. FAN COIL UNITS SHALL HAVE CONSTRUCTION FILTERS REPLACED AT PROJECT COMPLETION WITH DISPOSABLE FILTERS (MERV-8 MINIMUM).																					
7. ACCESS DOORS FOR ALL FAN COIL UNITS SHALL BE HINGED WITH HANDLES FOR EASE OF MAINTENANCE. REMOVABLE PANELS WITH SCREWED SECUREMENTS ARE NOT ACCEPTABLE.																					

VAV BOX SCHEDULE (COOLING ONLY)

SYMBOL	COOLING MAX CFM	COOLING MIN CFM	AIR TEMPS EAT(db)	LAT(db)	ENVIRO-TEC SDR	RUNOUT SIZE
VAV-1.13	500	0	55.0°F	55.0°F	8	10
VAV-2.15	500	0	55.0°F	55.0°F	8	10
VAV-3.18	500	0	55.0°F	55.0°F	8	10
VAV-4.15	500	0	55.0°F	55.0°F	8	10

NOTES:	
1. MINIMUM INLET PRESSURE TO TERMINAL UNITS SHALL BE 1.0" W.G.	
2. MAXIMUM PRESSURE DROP THROUGH TERMINAL UNITS SHALL BE 0.5" S.P.	
3. FURNISH TERMINAL UNITS WITH: FACTORY MOUNTED DDC CONTROLS (SEE NOTE 5), ACOUSTICAL LINING, THERMOSTAT, CONTROL VOLTAGE TRANSFORMER.	
4. MECHANICAL CONTRACTOR SHALL EXTEND CONTROL POWER WIRING (120 V) FROM J-BOX TO VAV BOX. 120 V J-BOX BY ELECTRICAL CONTRACTOR, WIRING FROM J-BOX AND FINAL CONNECTION TO UNIT BY MECHANICAL CONTRACTOR. COORDINATE LOCATION OF 120 V J-BOXES WITH ELECTRICAL CONTRACTOR.	
5. DDC CONTROLS SHALL BE FURNISHED TO THE BOX MANUFACTURER BY THE CONTROLS VENDOR. BOX MANUFACTURER SHALL FACTORY MOUNT AND WIRE CONTROLS. INSTALLATION OF CONTROLS SHALL INCLUDE CONTROLS TRANSFORMER, CONTROL COVER, AND ALL WIRING AND LABOR FOR A COMPLETE AND OPERATIONAL SYSTEM.	

KITCHEN HOOD SCHEDULE

KITCHEN HOOD FURNISHED AND INSTALLED BY THE KITCHEN EQUIPMENT SUPPLIER. MECHANICAL CONTRACTOR SHALL PROVIDE EXHAUST AND MAKE-UP AIR FANS AND DUCTWORK. SEE KITCHEN EQUIPMENT PLANS AND SPECIFICATIONS FOR EXACT HOOD REQUIREMENTS AND DUCT CONNECTION SIZES.

HOOD AIRFLOW REQUIREMENTS
EXHAUST: 3.915 CFM EXHAUST @ 0.75" S.P. (MAX.)
MAKE-UP: 2.977 CFM SUPPLY @ 0.25" S.P. (MAX.)

PROVIDE A MASTER CONTROL PANEL IN END COMPARTMENT OF HOOD WITH MASTER DISCONNECT SWITCH AND STARTERS FOR BOTH FANS. CONTROL VOLTAGE TRANSFORMER, FIRE CONTROL SYSTEM RELAY AND TERMINAL STRIP, AND CONTROL SWITCHES AND PILOT LIGHTS FOR EXHAUST AND MAKE-UP FANS (PROVIDE SINGLE SWITCH FOR MAKE-UP AND EXHAUST FANS). ALL COMPONENTS SHALL BE UL LISTED AND LABELED. MECHANICAL CONTRACTOR SHALL PROVIDE MANUAL VOLUME DAMPER IN EACH SUPPLY DUCT COLLAR.

HOOD SHALL BE PROVIDED WITH UTILITY DISTRIBUTION SYSTEM. SEE KITCHEN PLANS FOR INFORMATION ON UDS.

NOTES:	
1. KITCHEN HOOD SHALL BE CONSTRUCTED AND INSTALLED PER NFPA 96. KITCHEN HOOD SHALL BE FURNISHED AND INSTALLED BY THE KITCHEN EQUIPMENT SUPPLIER. THE MECHANICAL CONTRACTOR SHALL FURNISH AND INSTALL EXHAUST AND MAKE-UP AIR FANS, DUCTWORK, ASSOCIATED CONTROLS, AND MAKE FINAL CONNECTIONS TO THE HOOD.	
2. FIRE CONTROL SYSTEM SHALL SHUT-DOWN KITCHEN HOOD MAKE-UP AIR FAN UPON ACTIVATION OF FIRE EXTINGUISHING SYSTEM. KITCHEN HOOD EXHAUST FAN SHALL CONTINUE TO OPERATE. PROVIDE INTERLOCK FOR AUTOMATIC OPERATION OF FIRE SUPPRESSION SYSTEM WITH: A. - SOLENOID GAS VALVE (BY DIVISION 22) B. - SHUNT TRIP BREAKER (BY DIVISION 26) C. - HOOD SUPPLY AND EXHAUST FAN D. - DISHWASHER EXHAUST FAN E. - REMOTE MANUAL PULL STATION F. - ALL ASSOCIATED AIR HANDLING UNITS G. - FIRE ALARM SYSTEM NOTIFICATION (BY DIVISION 26)	
3. SEE DRAWING M402 FOR KITCHEN HOOD SYSTEM DETAILS.	
4. KITCHEN HOOD EXHAUST DUCT SHALL BE CONSTRUCTED OF 16 GAUGE CARBON STEEL. ALL JOINTS AND SEAMS SHALL BE SEALED WITH A LIQUID TIGHT CONTINUOUS EXTERNAL WELD. HORIZONTAL KITCHEN HOOD EXHAUST DUCT SHALL SLOPE 1/4" PER FOOT CONTINUOUSLY TOWARD HOOD. WRAP ANY PORTION OF KITCHEN HOOD EXHAUST DUCT THAT CANNOT MAINTAIN AN 18" CLEARANCE TO COMBUSTIBLES WITH FIRE RATED DUCT INSULATION PER SPEC SECTION 230700.	
5. ALL EXPOSED PIPING WITH FIRE SUPPRESSION SYSTEM SHALL TO COVERED WITH A CHROME SLEEVE.	
6. MECHANICAL CONTRACTOR SHALL INSTALL 1/2" CONDUIT IN WALL FOR MANUAL PULL STATION. SEE PLANS FOR LOCATION OF MANUAL PULL STATION.	
7. MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR HOOD CERTIFICATION IN COMPLIANCE WITH LOCAL CODE REQUIREMENTS. CERTIFICATION SHALL BE WITNESSED AND PERFORMED BY A PERSON CERTIFIED THROUGH AAEC, TABE, NEBB OR NRC AND SHALL PROVIDE DOCUMENTATION OF PERFORMANCE TO THE CODE OFFICIAL. ALL EQUIPMENT SHALL BE ENERGIZED AND IN OPERATION DURING THE TEST. TEST SHALL ALSO INCLUDE VERIFYING ACTUAL FLOW RATES VERSUS DESIGN FLOW RATES.	

ADDITIONAL FIRE SUPPRESSION NOTES (IBC):

904.11.1 A MANUAL ACTUATION DEVICE SHALL BE LOCATED AT OR NEAR A MEANS OF EGRESS FROM THE COOKING AREA, A MINIMUM OF 10 FEET AND A MAXIMUM OF 20 FEET FROM THE KITCHEN EXHAUST SYSTEM. THE MANUAL ACTUATION DEVICE SHALL BE LOCATED A MINIMUM OF 3.5 FEET AND A MAXIMUM OF 4 FEET ABOVE THE FLOOR AND CLEARLY INDICATE THE HAZARD PROTECTED. THE MANUAL ACTUATION SHALL REQUIRE A MAXIMUM FORCE OF 40 POUNDS AND A MAXIMUM MOVEMENT OF 14 INCHES TO ACTUATE THE FIRE SUPPRESSION SYSTEM.

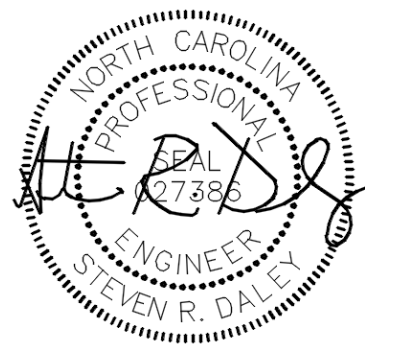
904.11.2 THE ACTUATION OF THE FIRE SUPPRESSION SYSTEM SHALL AUTOMATICALLY SHUT DOWN THE FUEL OF ELECTRICAL POWER SUPPLY TO THE COOKING EQUIPMENT. THE FUEL AND ELECTRICAL SUPPLY RESET SHALL BE MANUAL.

VAV BOX SCHEDULE

SYMBOL	COOLING MAX CFM	COOLING MIN CFM	HEATING EWT	WATER TEMPS EWT	LWT	HOT WATER COIL BTUH	GPM	RUNOUT	AIR TEMPS EAT(db)	LAT(db)	ENVIRO-TEC SDR-WC	RUNOUT SIZE
VAV-1.1	490	130	250	180°F	140°F	11000	1.0	3/4"	55.0°F	95.0°F	8	10
VAV-1.2	900	230	450	180°F	140°F	20000	1.0	3/4"	55.0°F	95.0°F	10	12
VAV-1.3	1,015	260	510	180°F	140°F	22000	1.1	3/4"	55.0°F	95.0°F	10	12
VAV-1.4	1,525	390	770	180°F	140°F	34000	1.7	3/4"	55.0°F	95.0°F	12	14
VAV-1.5	470	120	240	180°F	140°F	11000	1.0	3/4"	55.0°F	95.0°F	8	10
VAV-1.6	900	230	450	180°F	140°F	20000	1.0	3/4"	55.0°F	95.0°F	10	12
VAV-1.7	1,535	390	770	180°F	140°F	34000	1.7	3/4"	55.0°F	95.0°F	12	14
VAV-1.8	1,200	300	600	180°F	140°F	26000	1.3	3/4"	55.0°F	95.0°F	10	12
VAV-1.9	1,235	310	620	180°F	140°F	27000	1.4	3/4"	55.0°F	95.0°F	10	14
VAV-1.10	1,200	300	600	180°F	140°F	26000	1.3	3/4"	55.0°F	95.0°F	10	12
VAV-1.11	1,525	390	770	180°F	140°F	34000	1.7	3/4"	55.0°F	95.0°F	12	14
VAV-1.12	1,650	420	830	180°F	140°F	36000	1.8	3/4"	55.0°F	95.0°F	12	14

VAV-2.1	240	60	120	180°F	140°F	6000	1.0	3/4"	55.0°F	95.0°F	5	8
VAV-2.2	420	110	210	180°F	140°F	10000	1.0	3/4"	55.0°F	95.0°F	8	10
VAV-2.3	310	80	160	180°F	140°F	7000	1.0	3/4"	55.0°F	95.0°F	6	8
VAV-2.4	1,050	270	530	180°F	140°F	23000	1.2	3/4"	55.0°F	95.0°F	10	12
VAV-2.5	1,345	340	680	180°F	140°F	30000	1.5	3/4"	55.0°F	95.0°F	12	14
VAV-2.6	520	130	260	180°F	140°F	12000	1.0	3/4"	55.0°F	95.0°F	8	10
VAV-2.7	1,240	310	620	180°F	140°F	27000	1.4	3/4"	55.0°F	95.0°F	10	14
VAV-2.8	1,540	390	770	180°F	140°F	34000	1.7	3/4"	55.0°F	95.0°F	12	14
VAV-2.9	1,240	310	620	180°F	140°F	27000	1.4	3/4"	55.0°F	95.0°F	10	14
VAV-2.10	1,540	390	770	180°F	140°F	34000	1.7	3/4"	55.0°F	95.0°F	12	14
VAV-2.11	1,240	310	620	180°F	140°F	27000	1.4	3/4"	55.0°F	95.0°F	10	14
VAV-2.12	1,240	310	620	180°F	140°F	27000	1.4	3/4"	55.0°F	95.0°F	10	12
VAV-2.13	1,540	390	770	180°F	140°F	34000	1.7	3/4"	55.0°F	95.0°F	12	14
VAV-2.14	1,650	420	830	180°F	140°F	36000	1.8	3/4"	55.0°F	95.0°F	12	14
VAV-2.16	500	130	250	180°F	140°F	11000	1.0	3/4"	55.0°F	95.0°F	8	10

VAV-3.1	395	100	200	180 °F	140 °F	9000	1.0	3/4"	55.0 °F	95.0 °F	6	8
VAV-3.2	990	250	500	180 °F	140 °F	22000	1.1	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.3	305	80	160	180 °F	140 °F	7500	1.0	3/4"	55.0 °F	95.0 °F	6	8
VAV-3.4	1600	400	800	180 °F	140 °F	35000	1.8	3/4"	55.0 °F	95.0 °F	12	14
VAV-3.5	935	240	470	180 °F	140 °F	21000	1.1	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.6	1220	310	610	180 °F	140 °F	27000	1.4	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.7	1280	320	640	180 °F	140 °F	28000	1.4	3/4"	55.0 °F	95.0 °F	10	16
VAV-3.8	1080	270	540	180 °F	140 °F	24000	1.2	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.9	1050	270	540	180 °F	140 °F	23000	1.2	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.10	1220	310	610	180 °F	140 °F	27000	1.4	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.11	980	250	490	180 °F	140 °F	22000	1.1	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.12	1220	310	610	180 °F	140 °F	27000	1.4	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.13	1280	320	640	180 °F	140 °F	28000	1.4	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.14	1080	270	540	180 °F	140 °F	24000	1.2	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.15	1050	270	530	180 °F	140 °F	23000	1.2	3/4"	55.0 °F	95.0 °F	10	12
VAV-3.16	1420	360	710	180 °F	140 °F	31000	1.6	3/4"	55.0 °F	95.0 °F	12	14
VAV-3.17	1540	390	770	180 °F	140 °F	34000	1.7	3/4"	55.0 °F	95.0 °F	12	14



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CONSULTANT:



CLIENT:



Coltrane-Webb / Beverly Hills
Replacement Elementary School

YCHA COM #: 22339.00

PHASE & DATE:

Final Construction Documents

10/21/2024

REVISIONS:

SHEET TITLE:

MECHANICAL
SEQUENCE OF
OPERATION

ARCHITECTURAL:

M004

SEQUENCE OF OPERATION

A COMPLETE AND OPERATIONAL DDC CONTROL SYSTEM (BAS) SHALL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS (SECTION 230900) AND AS INTENDED ON THESE PLANS. ALL CONTROL POINTS AND EQUIPMENT SEQUENCES OF OPERATION LISTED IN SPECIFICATION SECTION 230900 SHALL BE CONSIDERED IN ADDITION TO THOSE LISTED HERE. IN THE EVENT THAT THE VERBAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED PRIOR TO BIDDING OR THE MORE STRINGENT SHALL APPLY. MECHANICAL CONTRACTOR SHALL COORDINATE ALL BAS INTEGRATION REQUIREMENTS WITH EQUIPMENT VENDORS AND CONTROLS CONTRACTOR PRIOR TO PURCHASING EQUIPMENT AND PROVIDE ALL EQUIPMENT WITH COMMUNICATION/INTERFACE CARDS AS REQUIRED FOR SYSTEM INTEGRATION.

CHILLER PLANT (PRIMARY/SECONDARY WITH AIR COOLED CHILLERS)

THE CHILLED WATER SYSTEM SHALL BE ENABLED TO OPERATE WHEN THE OUTSIDE AIR TEMPERATURE IS ABOVE 50° F OR ANY CHILLED WATER CONTROL VALVE IS COMMANDED OPEN FOR COOLING. THE CHILLED WATER SECONDARY PUMPING SYSTEM SHALL BE STARTED FIRST. AFTER A ONE MINUTE DELAY, THE CHILLER CONTROL PANELS WILL BE ENABLED TO OPERATE THE CHILLERS AND THE PRIMARY CHILLED WATER PUMPS. EACH CHILLER CONTROL PANEL SHALL START EACH PRIMARY CHILLED WATER PUMP PRIOR TO THE START OF THE ASSOCIATED CHILLER. AFTER PROOF OF PRIMARY CHILLED WATER FLOW IN THE CHILLED WATER PRIMARY PIPING THE ASSOCIATED CHILLER WILL START. THE BAS SHALL MONITOR OR DISPLAY PUMP COMMAND AND STATUS. (IF THE CHILLER CONTROL PANEL DOES NOT PROVIDE FOR PUMP CONTROL, THIS SHALL BE ACCOMPLISHED BY THE BAS)

CHILLER SUPPLY TEMPERATURE SHALL BE CONTROLLED BY CHILLER CONTROL PANEL. THE BAS SHALL SEND A CHILLED WATER SUPPLY TEMPERATURE SETPOINT COMMAND TO ALL CHILLER CONTROL PANELS. THE SETPOINT SHALL BE MAINTAINED PER THE RESET SCHEDULE BELOW:

CHILLED WATER SUPPLY TEMPERATURE RESET SCHEDULE (ADD)
44° F CHS AT 85° F OUTSIDE AIR TEMPERATURE (OR ABOVE)
50° F CHS AT 60° F OUTSIDE AIR TEMPERATURE (OR BELOW)
CHS SHALL VARY LINEARLY BETWEEN THE HIGH AND LOW TEMPERATURES (AS MEASURED IN THE CHS LOOP, NOT AT THE BOILERS). THE INITIAL SETPOINT FOR THE CHILLED WATER SUPPLY TEMPERATURE SHALL BE 44° F.

CHILLERS AND PRIMARY PUMPS SHALL BE SETUP IN A LEAD/LAG CONFIGURATION. SMALLER CHILLERS #1 SHALL OPERATE FIRST. LAG PUMP AND DAMPER CHILLER #2 SHALL BE STARTED WHEN SECONDARY LOOP SUPPLY WATER TEMPERATURE RISES ABOVE 4° F ABOVE SETPOINT (ADD), AND LEAD PUMP AND CHILLER SHALL STOP. LEAD CHILLER AND PUMP SHALL BE RE-ENABLED WHEN SECONDARY LOOP SUPPLY WATER TEMPERATURE RISES ABOVE 4° F ABOVE SETPOINT (ADD). THE BAS SHALL GENERATE AN ALARM IF THE CHILLED WATER SUPPLY TEMPERATURE INCREASES 2° ABOVE THE INDICATED HIGH LIMIT FOR A PERIOD OF 10 MINUTES. THE ENERGY MANAGEMENT SYSTEM SHALL MONITOR THE PRIMARY PUMP COMMAND. THE BAS SHALL GENERATE AN ALARM IF THE PUMP FAILS TO RUN, OR IF THE CHILLER CONTROLS INDICATE AN ALARM. WHEN ACTIVATED, CHILLERS SHALL OPERATE FOR A MINIMUM OF 30 MINUTES, AND WHEN DEACTIVATED CHILLERS SHALL REMAIN IDLE FOR A MINIMUM OF 30 MINUTES (ADJUSTABLE).

THE CHILLED WATER SECONDARY PUMPS ARE VARIABLE FLOW PUMPS WITH VARIABLE FREQUENCY DRIVES, SETUP IN A LEAD/LAG CONFIGURATION. THE BAS SHALL START THE VARIABLE SPEED CHILLED WATER SECONDARY PUMPS. SECONDARY PUMP SPEEDS ARE CONTROLLED BY VFD'S. THE BAS SHALL MONITOR THE VFD OPERATING SPEEDS AND ALARM CONDITIONS. THE VARIABLE FREQUENCY DRIVES FOR THE PUMPS SHALL BE CONTROLLED BY DIFFERENTIAL PRESSURE SENSORS IN THE CHILLED WATER PIPING SYSTEM (SEE PIPING PLANS FOR SENSOR LOCATIONS). AS AIR HANDLING EQUIPMENT CONTROL VALVES OPEN, LEAD PUMP SPEED SHALL BE INCREASED VIA VARIABLE FREQUENCY DRIVE TO MAINTAIN SYSTEM PRESSURE SETPOINT. AS SYSTEM PRESSURE FALLS BELOW SETPOINT FOR A PERIOD OF 15 MINUTES (ADD), LAG PUMP SHALL BE STARTED AND PUMP SPEED SHALL BE EQUALIZED BETWEEN THE TWO PUMPS. WHEN SYSTEM PRESSURE IS SATISFIED FOR A PERIOD OF 15 MINUTES (ADD) WITH PUMP SPEEDS BELOW 45%, THE LEAD PUMP SHALL STOP AND THE LAG PUMP SHALL CONTINUE TO RUN. THE INITIAL CHILLED WATER DIFFERENTIAL PRESSURE SETPOINT SHALL BE 12 PSI. THIS SETTING SHALL BE ESTABLISHED DURING TESTING & BALANCING. IF ONE OR MORE OF THE SENSORS ARE BELOW SETPOINT, THE DRIVE SPEED SHALL BE INCREASED IN RESPONSE TO THE SENSOR WITH THE LARGEST DEVIATION BELOW SETPOINT. THE DRIVE SPEED SHALL BE INCREASED IN RESPONSE TO THE SENSOR WITH THE SMALLEST DEVIATION ABOVE SETPOINT. PROVIDE DEAD-BAND AND/OR TIME DELAYS TO PREVENT RAPID CYCLING OF PUMPS. 3-WAY CONTROL VALVES ARE PROVIDED WITH CERTAIN UNITS TO MAINTAIN MINIMUM PUMP FLOW (SEE PIPING PLANS FOR UNIT LOCATIONS). LAG PUMP SHALL START AUTOMATICALLY UPON AUTOMATICALLY UPON FAILURE OF LEAD PUMP, AND AN ALARM INDICATING PUMP FAILURE SHALL BE SENT TO THE BAS.

THE BAS SHALL GENERATE AN ALARM IF THE SYSTEM PRESSURE DEVIATES FROM SETPOINT BY GREATER THAN 6 PSI FOR MORE THAN 5 MINUTES, IF THE LAG PUMP FAILS TO START, OR IF THE VARIABLE FREQUENCY DRIVE INDICATES AN ALARM. THE CHILLED WATER SECONDARY PUMPS SHALL OPERATE FOR 10 MINUTES AFTER ALL CHILLERS ARE COMMANDED TO STOP.

BOILER PLANT (PRIMARY/SECONDARY WITH CAST IRON BOILERS)

THE HOT WATER SYSTEM WILL BE COMMANDED TO RUN IF THE OUTDOOR TEMPERATURE IS BELOW 60° OR ANY HOT WATER CONTROL VALVE IS COMMANDED OPEN FOR HEATING OR DEHUMIDIFICATION.

BOILERS AND HOT WATER PUMPS SHALL BE STOPPED/STARTED BY THE BAS ON A PROGRAMMED BASIS. PRIMARY AND SECONDARY HOT WATER PUMPS SHALL BE ENABLED, WITH LEAD BOILER AND ASSOCIATED PRIMARY HOT WATER PUMP AND LEAD SECONDARY HOT WATER PUMP STARTED BY THE BAS. BOILERS AND PRIMARY PUMPS SHALL BE STAGED BY THE BOILERS FACTORY CONTROLS AND CASCADING SEQUENCES AS REQUIRED TO MAINTAIN A SYSTEM HOT WATER SUPPLY TEMPERATURE PER THE RESET SCHEDULE BELOW.

HOT WATER SUPPLY TEMPERATURE RESET SCHEDULE (ADD)
180° F. HWS AT 30° F. O.A. TEMP. (OR BELOW)
140° F. HWS AT 60° F. O.A. TEMP. (OR ABOVE)
HWS SHALL VARY LINEARLY BETWEEN THE HIGH AND LOW TEMPERATURES (AS MEASURED IN THE HWS LOOP, NOT AT THE BOILERS). THE INITIAL SETPOINT FOR THE HOT WATER SUPPLY TEMPERATURE SHALL BE 180° F.

BOILER STAGING SHALL EQUALIZE BOILER RUN TIME BY ROTATING LEAD BOILER ON A WEEKLY BASIS. AN ALARM SIGNAL SHALL BE SENT TO THE ENERGY MANAGEMENT SYSTEM IF THE HEATING SUPPLY WATER TEMPERATURE DROPS MORE THAN 20° BELOW THE OPERATING SETPOINT FOR A PERIOD OF 10 MINUTES. THE BAS SHALL ALSO GENERATE AN ALARM IF ANY BOILER OR HOT WATER PUMP VARIABLE FREQUENCY DRIVE INDICATES AN ALARM.

THE HOT WATER SECONDARY PUMPS ARE VARIABLE FLOW PUMPS WITH VARIABLE FREQUENCY DRIVES, SETUP IN A LEAD/LAG CONFIGURATION. THE BAS SHALL START THE VARIABLE SPEED SECONDARY HOT WATER PUMPS. SECONDARY PUMP SPEEDS ARE CONTROLLED BY VFD'S. THE BAS SHALL MONITOR THE VFD OPERATING SPEEDS AND ALARM CONDITIONS. THE VARIABLE FREQUENCY DRIVES FOR THE PUMPS SHALL BE CONTROLLED BY DIFFERENTIAL PRESSURE SENSORS IN THE HOT WATER PIPING SYSTEM (SEE PIPING PLANS FOR SENSOR LOCATIONS). AS AIR HANDLING EQUIPMENT CONTROL VALVES OPEN, LEAD PUMP SPEED SHALL BE INCREASED VIA VARIABLE FREQUENCY DRIVE TO MAINTAIN SYSTEM PRESSURE SETPOINT. AS SYSTEM PRESSURE FALLS BELOW SETPOINT FOR A PERIOD OF 15 MINUTES (ADD), LAG PUMP SHALL BE STARTED AND PUMP SPEED SHALL BE EQUALIZED BETWEEN THE TWO PUMPS. WHEN SYSTEM PRESSURE IS SATISFIED FOR A PERIOD OF 15 MINUTES (ADD) WITH PUMP SPEEDS BELOW 45%, THE LEAD PUMP SHALL STOP AND THE LAG PUMP SHALL CONTINUE TO RUN. THE INITIAL HOT WATER DIFFERENTIAL PRESSURE SETPOINT SHALL BE 12 PSI. THIS SETTING SHALL BE ESTABLISHED DURING TESTING & BALANCING. IF ONE OR MORE OF THE SENSORS ARE BELOW SETPOINT, THE DRIVE SPEED SHALL BE INCREASED IN RESPONSE TO THE SENSOR WITH THE LARGEST DEVIATION BELOW SETPOINT. IF ALL OF THE SENSORS ARE ABOVE SETPOINT, THE DRIVE SPEED SHALL BE DECREASED IN RESPONSE TO THE SENSOR WITH THE SMALLEST DEVIATION ABOVE SETPOINT. PROVIDE DEAD-BAND AND/OR TIME DELAYS TO PREVENT RAPID CYCLING OF PUMPS. 3-WAY CONTROL VALVES ARE PROVIDED WITH CERTAIN UNITS TO MAINTAIN MINIMUM PUMP FLOW (SEE PIPING PLANS FOR UNIT LOCATIONS). LAG PUMP SHALL START AUTOMATICALLY UPON FAILURE OF LEAD PUMP, AND AN ALARM INDICATING PUMP FAILURE SHALL BE SENT TO THE BAS.

THE BAS SHALL GENERATE AN ALARM IF THE SYSTEM PRESSURE DEVIATES FROM SETPOINT BY GREATER THAN 6 PSI FOR MORE THAN 5 MINUTES, IF THE LAG PUMP FAILS TO START, OR IF THE VARIABLE FREQUENCY DRIVE INDICATES AN ALARM. THE HOT WATER SECONDARY PUMPS SHALL OPERATE FOR 10 MINUTES AFTER THE BOILER SYSTEM IS COMMANDED TO STOP.

DURING THE UNOCCUPIED MODE, IF THE OA TEMPERATURE DROPS BELOW 32° (ADD), THE PRIMARY PUMPS AND BOILERS SHALL BE ACTIVATED, AND SECONDARY HOT WATER PUMPS SHALL BE ACTIVATED AT LOW SPEED. ALL HOT WATER CONTROL VALVES SHALL BE COMMANDED OPEN.

A LOW VOLTAGE THERMOSTAT SHALL START PUMP ROOM VENTILATION FAN WHEN BOILER ROOM TEMPERATURE RISES ABOVE 85° F (ADJUSTABLE). RELIEF/COMBUSTION AIR LOUVER MOTORIZED DAMPER SHALL BE INTERLOCKED TO OPEN UPON ACTIVATION OF VENTILATION FAN, EITHER BOILER, OR DOMESTIC WATER HEATER.

A CARBON MONOXIDE/OXYGEN DEPLETION SENSOR SHALL BE PROVIDED IN THE BOILER ROOM AND SHALL ACTIVATE AN AUDIBLE AND VISUAL ALARM INSIDE THE BOILER ROOM, ACTIVATE THE VENTILATION FAN, AND SEND AN ALARM TO THE CENTRAL BAS IF ACTIVATED.

A PUSHBUTTON EMERGENCY GAS SHUTOFF SWITCH SHALL BE PROVIDED AT THE BOILER ROOM TO CLOSE A SOLENOID VALVE IN THE GAS LINE SERVING HVAC AND DOMESTIC WATER HEATING EQUIPMENT. ACTIVATION OF THE SWITCH SHALL CLOSE THE GAS VALVE AND ALARM THE CENTRAL BAS (VALVE AND SWITCH BY E.C.)

IN ORDER TO PREVENT LOW RETURN WATER TEMPERATURE, PROVIDE AN ELECTRIC ACTUATED THREE-WAY MIXING VALVE WITH SLOW (1 MINUTE) TRAVEL TIME FOR EACH BOILER. IF THE BOILER RETURN WATER TEMPERATURE IS BELOW 130° F (BAS ADJUSTABLE), THE VALVE SHALL SLOWLY JOG CLOSED, CAUSING BOILER SUPPLY WATER TO BLEND WITH THE RETURN WATER. WHEN THE RETURN WATER TEMPERATURE RETURNS TO 140° F, THE BOILER SUPPLY VALVE SHALL SLOWLY JOG OPEN.

AIR HANDLING UNITS

AIR HANDLING UNITS SHALL BE STOPPED/STARTED ON A TIME OF DAY SCHEDULE THROUGH THE BAS. THIS SCHEDULE SHALL BE MODIFIED BY A START STOP OPTIMIZATION PROGRAM. UPON PROOF OF AIR FLOW FROM THE SUPPLY FAN, AS SENSED BY A RESPECTIVE CURRENT SENSING RELAY, THE NORMALLY CLOSED OUTSIDE AIR DAMPER SHALL BE ENABLED.

WHILE IN THE OCCUPIED MODE, THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY. WHILE IN THE UNOCCUPIED MODE, THE SUPPLY FAN SHALL CYCLE WITH HEATING AND COOLING LOADS. THE CHILLED WATER AND HOT WATER CONTROL VALVES SHALL BE CLOSED TO THE UNIT. UPON A CALL FOR HEATING OR COOLING TO MEET UNOCCUPIED SETPOINTS, THE UNIT FAN SHALL BE STARTED AND THE UNIT SHALL OPERATE AS DESCRIBED BELOW AS REQUIRED BY THE SPACE TEMPERATURE. THE BOILER PLANT OR CHILLER PLANT SHALL ALSO BE STARTED AS REQUIRED TO SATISFY SETPOINTS. THE UNIT AND ASSOCIATED CENTRAL PLANT SHALL OPERATE FOR A MINIMUM OF 30 MINUTES (OR AS REQUIRED TO SATISFY UNOCCUPIED SETPOINT) AND SHALL NOT BE ALLOWED TO RESTART FOR A MINIMUM OF 15 MINUTES FOLLOWING SATISFACTION OF UNOCCUPIED SETPOINT AND SYSTEM SHUT-DOWN.

DEMAND CONTROL VENTILATION:
OUTSIDE AIR INTAKE SHALL BE PROVIDED WITH A MOTORIZED DAMPER. ON UNIT START UP, THE OUTSIDE AIR INTAKE DAMPER SHALL REMAIN CLOSED UNTIL THE RETURN AIR TEMPERATURE RISES ABOVE 65° F (ADD) OR FALLS BELOW 75° F. (ADD). ONCE RETURN AIR TEMPERATURE IS SATISFIED, THE OUTSIDE AIR DAMPER SHALL OPEN TO THE OCCUPIED MINIMUM SETPOINT. OUTSIDE AIR DAMPERS SHALL MODULATE AS REQUIRED TO MAINTAIN MINIMUM OUTSIDE AIR FLOW. THE OUTSIDE AIR INTAKE DAMPER SHALL BE CLOSED WHILE UNIT IS IN THE UNOCCUPIED MODE. BAS SHALL BE CAPABLE OF OPENING AND CLOSING OUTSIDE AIR DAMPERS. CO2 SENSOR MOUNTED IN THE RETURN DUCT SHALL MODULATE THE OUTSIDE AIR DAMPER BASED ON CO2 LEVELS IN THE SPACE. DAMPER SHALL MODULATE OPEN FROM THE OCCUPIED MINIMUM SETPOINT OF 800 PPM TO DESIGN MAXIMUM AT 1200 PPM. AN ALARM SHALL BE ACTIVATED IF THE SPACE CO2 LEVEL RISES ABOVE 1500 PPM. SEE AHU SCHEDULE FOR MINIMUM AND DESIGN OUTSIDE AIR SETPOINTS.

AIRSIDE ECONOMIZER CYCLE:
DURING THE OCCUPIED PERIOD, AND WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 68° F. AND ABOVE 45° F. AND THE OUTDOOR ENTHALPY IS BELOW 25 BTU/LB, THE ECONOMIZER CYCLE SHALL BE ENABLED. UNDER THOSE CONDITIONS, THE OUTDOOR AIR DAMPER CAN MODULATE PAST ITS "DESIGN" POSITION TO FULL OPEN.

MODULATING DAMPER CONTROL:
MODULATING RETURN, RELIEF, AND OUTSIDE AIR DAMPERS SHALL OPERATE IN CONJUNCTION. RELIEF AND OUTSIDE AIR DAMPERS SHALL OPEN TO THE SAME POSITION (BASED ON DEMAND CONTROL VENTILATION OR ECONOMIZER CONTROL), AND RETURN DAMPER SHALL CLOSE TO THE INVERSE POSITION OF THE OUTSIDE AND RELIEF DAMPER SETTINGS.

RETURN FANS:
RETURN FANS SHALL BE PROVIDED WHERE INDICATED IN THE AHU SCHEDULE. RETURN FAN SHALL START ALONG WITH OPENING OF ALL ASSOCIATED RETURN AIR SMOKE DAMPERS AND DIFFUSION DAMPERS. SUPPLY FAN SHALL START AFTER PROOF OF THE RETURN FAN, AND ONCE ALL ASSOCIATED SUPPLY AIR DAMPERS ARE OPEN, VARIABLE FREQUENCY DRIVE SHALL CONTROL RETURN FAN TO MAINTAIN A CONSTANT DIFFERENTIAL FROM THE SUPPLY AIR VOLUME. RETURN FAN CONTROL MAY BE OVERRIDDEN BY A BUILDING PRESSURE SENSOR. IF THE BUILDING PRESSURE GETS OUT OF THE +/- 0.02" STATIC PRESSURE RANGE FOR A PERIOD OF 10 MINUTES, ONCE BUILDING PRESSURE IS SATISFIED, RETURN FAN CONTROL SHALL REVERT BACK TO TRACKING THE SUPPLY FAN.

HUMIDITY CONTROL (WHERE INDICATED):
WITH SYSTEM IN OCCUPIED OR UNOCCUPIED MODE, HUMIDITY CONTROL SYSTEM SHALL BE CAPABLE OF BEING ACTIVATED. UNDER NORMAL OPERATION, UNIT SHALL CONTROLLED AS OUTLINED BELOW. PROVIDE HUMIDISTAT AS INDICATED ON PLANS, IF SPACE OR RETURN AIR HUMIDITY REACHES 65% R.H. (ADD), ALARM SHALL BE SENT AND HUMIDITY CONTROL SEQUENCE SHALL BE ACTIVATED. AIR HANDLING UNIT CHILLED WATER CONTROL VALVE SHALL BE DRIVEN FULL OPEN, AND UNIT REHEAT COIL OR TERMINAL BOX REHEAT SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE. WHEN SPACE HUMIDITY DROPS BELOW 55% R.H. (ADD), BAS SHALL DEACTIVATE HUMIDITY CONTROL SEQUENCE. CONTROL OF UNIT SHALL REVERT BACK AS INDICATED BELOW. BOILERS) AND ASSOCIATED PUMPS) SHALL BE STARTED IF THE HEATING PLANT IS IDLE AT THE TIME THE HUMIDITY CONTROL SEQUENCE IS ACTIVATED.

SMOKE DETECTION & AHU SHUTDOWN:
UPON DETECTION OF SMOKE IN THE AIR HANDLING SYSTEM BY THE DUCT-MOUNTED RETURN AIR SMOKE DETECTOR, AN ALARM CONDITION SHALL BE SENT TO THE BUILDING FIRE ALARM SYSTEM AND ALL AIR HANDLING UNITS SHALL BE SHUTDOWN BY THE BUILDING FIRE ALARM SYSTEM. THE BUILDING FIRE ALARM SYSTEM SHALL PROVIDE ONE DIGITAL OUTPUT TO THE BAS TO INDICATE ACTIVATION OR FAILURE OF ANY SMOKE DETECTOR.

FREEZE PROTECTION:
A MIXED AIR TEMPERATURE SENSOR SHALL BE LOCATED UPSTREAM OF THE FIRST COIL IN THE AHU. UPON A DROP IN TEMPERATURE BELOW 40° F AT THE MIXED AIR SENSOR, AN ALARM SHALL BE SENT TO THE CENTRAL BAS. THE OUTSIDE AIR DAMPER SHALL BE OVERRIDEN TO THE MINIMUM OCCUPIED POSITION. AFTER A TIME DELAY OF 20 MINUTES (ADD), THE CONTROL OF THE OA DAMPER SHALL RETURN TO NORMAL OPERATION. MIXED AIR TEMPERATURE SHALL HAVE SOFTWARE RESET AND A 20 MINUTE DELAY (ADD).

A FREEZE-STAT SHALL BE LOCATED DOWNSTREAM OF THE PREHEAT COIL, UPSTREAM OF THE COOLING COIL, AND SHALL SHUT DOWN THE AHU FANS AND ALARM THE CENTRAL BAS IF THE TEMPERATURE IS BELOW 38° F. THE SECONDARY CHILLED WATER PUMP AND THE HOT WATER PUMP SHALL START, AND THE HOT WATER AND CHILLED WATER CONTROL VALVES AT THE AIR HANDLING UNIT SHALL OPEN FULLY. FREEZE-STAT SHALL HAVE MANUAL RESET ONLY.

CONSTANT VOLUME (CV) AIR HANDLING UNITS:
A TEMPERATURE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE. CHILLED WATER CONTROL VALVE SHALL MODULATE OPEN TO THE COIL ON A RISE IN TEMPERATURE ABOVE SENSOR SETPOINT. AS THE TEMPERATURE SPACE FALLS BELOW SETPOINT, CHILLED WATER CONTROL VALVE SHALL CLOSE AND HOT WATER CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE. THE TEMPERATURE SENSOR SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION THAT WILL PLACE THE SYSTEM IN THE OCCUPIED MODE FOR A PERIOD OF UP TO 2 HOURS.

SINGLE ZONE VARIABLE VOLUME (SZVAV) AIR HANDLING UNITS:
A TEMPERATURE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE. THE UNIT SUPPLY FAN SHALL START AT LOW SPEED. ON A RISE IN TEMPERATURE ABOVE SETPOINT, THE CHILLED WATER CONTROL VALVE SHALL OPEN TO THE CHILLED WATER COIL. ON A CONTINUED RISE IN TEMPERATURE, VARIABLE FREQUENCY DRIVE SHALL INCREASE AIR FLOW TO SATISFY SPACE TEMPERATURE REQUIREMENTS. AS THE SPACE TEMPERATURE DROPS BELOW SETPOINT, THE FAN SPEED SHALL RESET FROM MAXIMUM TO MINIMUM. AS THE SPACE TEMPERATURE CONTINUES TO DROP, THE CHILLED WATER CONTROL VALVE SHALL CLOSE TO THE COOLING COIL AND THE HOT WATER CONTROL VALVE SHALL OPEN TO THE HEATING COIL. ON A CONTINUED DROP IN SPACE TEMPERATURE, THE SUPPLY FAN SPEED SHALL INCREASE TO MAINTAIN SETPOINT. THE TEMPERATURE SENSOR SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION THAT WILL PLACE THE SYSTEM IN THE OCCUPIED MODE FOR A PERIOD OF UP TO 2 HOURS.

VARIABLE AIR VOLUME (VAV) AIR HANDLING UNITS:
A DISCHARGE AIR TEMPERATURE SENSOR SHALL CONTROL CHILLED WATER CONTROL VALVE TO MAINTAIN SUPPLY AIR TEMPERATURE PER THE RESET SCHEDULE BELOW.

SUPPLY AIR TEMPERATURE RESET SCHEDULE (ADD)
55° F. LAT AT 70° F. O.A. TEMP. (OR ABOVE)
60° F. LAT AT 30° F. O.A. TEMP. (OR ABOVE)
SUPPLY AIR TEMPERATURE SHALL VARY LINEARLY BETWEEN THE HIGH AND LOW TEMPERATURES. THE INITIAL SETPOINT FOR THE DISCHARGE AIR SUPPLY TEMPERATURE SHALL BE 60° F. SUPPLY AIR TEMPERATURE SETPOINT SHALL HAVE A HIGH LIMIT OF OF 62° REGARDLESS OF OUTSIDE AIR TEMPERATURE. WHEN ANY ZONE ON THE AHU HAS A CALL FOR COOLING.

THE STATIC PRESSURE SENSOR IN THE SUPPLY DUCT SHALL MODULATE THE VARIABLE FREQUENCY DRIVE TO MAINTAIN THE SETPOINT ESTABLISHED DURING FINAL TESTING AND BALANCING. THE PRELIMINARY SETPOINT SHALL BE 1.0" STATIC PRESSURE. THIS SETPOINT SHALL BE RESET BASED ON THE ZONE REQUIRING THE MOST PRESSURE, I.E., THE SETPOINT IS RESET LOWER UNTIL ONE TERMINAL BOX DAMPER IS NEARLY WIDE OPEN.

THERMOSTATS & TEMPERATURE SENSORS:

THERMOSTATS AND TEMPERATURE SENSORS SHALL BE PROVIDED WHERE INDICATED ON THE DRAWINGS, AND PER THE SPECIFICATIONS. THERMOSTATS SHALL HAVE A THUMBWHEEL DIAL, INITIALLY SET IN THE OCCUPIED MODE FOR COOLING TO 75° AND HEATING TO 70°. THERMOSTATS SHALL HAVE A 3" RANGE IN WHICH THEY ARE SATISFIED IF SET TO 70°, SATISFIED ANYWHERE BETWEEN 68.5° AND 71.5°. SLIDE BAR SHALL HAVE THE CAPABILITY TO ADJUST THE HEATING AND COOLING SETPOINTS BY 3" IN EITHER DIRECTION, BUT MAINTAIN A MINIMUM 4" SPREAD BETWEEN THE HEATING AND COOLING SETPOINT. UNOCCUPIED SETTINGS SHALL BE 85° COOLING AND 60° HEATING. ALL SETPOINTS SHALL BE VERIFIED WITH THE OWNER BEFORE PROGRAMMING, AND FULLY ADJUSTABLE THROUGH THE BAS.

VARIABLE AIR VOLUME BOXES:

THE VARIABLE VOLUME (VAV) TERMINAL UNITS SHALL BE CONTROLLED INDEPENDENT OF SYSTEM PRESSURE FLUCTUATIONS BY AN APPLICATION SPECIFIC DDC CONTROLLER UTILIZING ELECTRIC ACTUATION.

OCCUPIED AND UNOCCUPIED OPERATIONS ARE THE SAME. A TEMPERATURE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE SETPOINT. UPON A RISE IN SPACE TEMPERATURE ABOVE SETPOINT, THE VOLUME DAMPER SHALL MODULATE OPEN AS REQUIRED TO MAINTAIN SPACE TEMPERATURE. UPON A DROP IN SPACE TEMPERATURE BELOW SETPOINT, THE VOLUME DAMPER SHALL MODULATE CLOSED UNTIL THE MINIMUM DAMPER POSITION IS REACHED. UPON CONTINUED DROP IN SPACE TEMPERATURE BELOW SETPOINT, THE HOT WATER CONTROL VALVE SHALL MODULATE OPEN TO THE HEATING COIL. IF THE SPACE TEMPERATURE DROPS ONE MORE DEGREE, THE TERMINAL UNIT DAMPER SHALL MODULATE OPEN UNTIL THE MAX HEATING CFM IS REACHED (AS INDICATED IN THE SCHEDULE). AS THE TEMPERATURE RISES ABOVE SETPOINT, THE HOT WATER CONTROL VALVE SHALL MODULATE CLOSED AND THE DAMPER SHALL RETURN TO THE MINIMUM POSITION.

WHEN WARM AIR IS SENSED BY THE TERMINAL UNIT DURING MORNING WARM-UP, THE DAMPER SHALL RESPOND TO THE SPACE TEMPERATURE. THE TERMINAL UNIT DAMPER SHALL OPEN TO HEATING SETPOINT ON A CALL FOR HEATING AND SHALL REMAIN CLOSED IF THE SPACE TEMPERATURE IS AT OR ABOVE OCCUPIED SETPOINT. HOT WATER CONTROL VALVE SHALL REMAIN CLOSED DURING MORNING WARM-UP. TERMINAL BOXES SERVING ELECTRICAL OR TELECOM ROOMS REMAIN CLOSED DURING MORNING WARM-UP.

THE TEMPERATURE SENSOR SHALL BE PROVIDED WITH AN OVERRIDE FUNCTION THAT WILL PLACE THE SYSTEM IN THE OCCUPIED MODE FOR A PERIOD OF UP TO 2 HOURS. THE OVERRIDE SHALL ACTIVATE THE SYSTEM AHU AND THE HEATING OR COOLING CENTRAL PLANT AS REQUIRED TO MAINTAIN SPACE TEMPERATURE.

HEAT TAPE:

HEAT TAPE FOR ABOVE GRADE EXTERIOR PIPING AND CHILLER HEATER SHALL PROVIDE FREEZE PROTECTION FOR EXTERIOR CHILLED WATER SYSTEM. A TEMPERATURE SENSOR SHALL BE PROVIDED WITHIN THE INSULATION ON ALL EXTERIOR PIPING WITH HEAT TAPE TO VERIFY HEAT TAPE OPERATION. IF TEMPERATURE FALLS BELOW 35° F. (ADD), AN ALARM SHALL BE SENT AND THE ASSOCIATED CHILLER PRIMARY CHILLED WATER PUMP SHALL BE STARTED.

LIGHTING AND RECEPTACLE CONTROL SYSTEM:

BAS SHALL INTERFACE WITH LIGHTING AND RECEPTACLE CONTACTORS PROVIDED BY THE ELECTRICAL CONTRACTOR (SEE ELECTRICAL PLANS). BAS SHALL MONITOR AND CONTROL BOTH LIGHTING AND RECEPTACLE CONTACTORS AND PROVIDE TIME SCHEDULE CONTROL, AND REMOTE OPERATION (ON/OFF) OF ALL LIGHTING AND RECEPTACLE ZONES THROUGH THE BAS VIA BAS PROVIDED RELAYS AS THE INPUT FOR THE CONTACTORS. BAS RELAY WIRING SHALL BE PROVIDED BY THE MECHANICAL CONTROLS CONTRACTOR. PANIC BUTTON ACTUATION SHALL ALSO BE AN INPUT ON THE BAS TO TURN LIGHTING OFF. RESET SHALL PUT LIGHTING BACK ON SCHEDULE. SEE SEQUENCE OF OPERATION AND DIVISION OF LABOR ON THE EBOOK OF THE ELECTRICAL PLANS.

DUCTLESS SPLIT SYSTEMS:

DUCTLESS SPLIT SYSTEM UNITS SHALL BE PROVIDED WITH STAND ALONE CONTROLS. PROGRAMMABLE THERMOSTATS BY UNIT MANUFACTURER, SEPARATE FROM THE CENTRAL DDC SYSTEM. DDC VENDOR SHALL PROVIDE TEMPERATURE SENSOR FOR THOSE ROOMS THAT WILL ALARM DDC SYSTEM IF TEMPERATURE EXCEEDS 80°. INDOOR UNIT FANS SHALL BE STARTED AND STOPPED WITH THERMOSTAT CALL FOR COOLING. UPON A RISE IN SPACE TEMPERATURE ABOVE THERMOSTAT SETPOINT, UNIT COMPRESSOR SHALL ACTIVATE TO SATISFY SPACE CONDITIONS.

WALL/UNIT HEATERS:

A BUILT-IN THERMOSTAT SHALL OPERATE WALL/UNIT HEATER AND FAN TO MAINTAIN A SETPOINT OF 49° (ADD). ONCE THE UNIT HEATER IS ENERGIZED, IT WILL RUN FOR AT LEAST FIVE MINUTES TO AVOID SHORT CYCLING.

MISC. EXHAUST FANS:

PROVIDE WALL SWITCHES, WALL THERMOSTATS, INTERLOCKS, ETC. AS INDICATED ON THE FAN SCHEDULE TO CONTROL FANS AS INDICATED ON PLANS. BOILER ROOM AND ELECTRICAL ROOM THERMOSTATS SHALL BE SET AT 85° F. (USE ADJUSTABLE, BAS REMOTE).

TOILET EXHAUST FANS:

CENTRAL BAS SHALL OPERATE EXHAUST FANS ON A PROGRAMMED SCHEDULE. FANS SHALL RUN WHEN ASSOCIATED ZONE IS IN THE OCCUPIED MODE, AND BE OFF WHEN ASSOCIATED ZONE IS IN THE UNOCCUPIED MODE.

FAN COIL UNITS:

FAN COIL UNITS SHALL BE STOPPED/STARTED ON A PROGRAMMED BASIS THROUGH THE BAS.

WHILE IN THE OCCUPIED MODE, THE SUPPLY FAN SHALL OPERATE CONTINUOUSLY AND THE MOTORIZED OUTSIDE AIR DAMPER SHALL OPEN TO THE POSITION TO PROVIDE SCHEDULED OUTSIDE AIR QUANTITY. A WALL MOUNTED TEMPERATURE SENSOR SHALL BE UTILIZED TO MAINTAIN SPACE TEMPERATURE. CHILLED WATER CONTROL VALVE SHALL MODULATE OPEN TO THE COIL ON A RISE IN TEMPERATURE ABOVE SENSOR SETPOINT. AS THE TEMPERATURE FALLS BELOW SETPOINT, CHILLED WATER CONTROL VALVE SHALL CLOSE AND HOT WATER CONTROL VALVE SHALL MODULATE OPEN TO MAINTAIN SPACE TEMPERATURE.

WHILE IN THE UNOCCUPIED MODE, THE UNIT SUPPLY FAN SHALL BE OFF, THE CHILLED WATER AND HOT WATER CONTROL VALVES SHALL BE CLOSED TO THE UNIT, THE MOTORIZED OUTSIDE AIR DAMPER SHALL BE CLOSED, AND THE SPACE TEMPERATURE SETPOINTS SHALL BE SET TO UNOCCUPIED SETTINGS. UPON A CALL FOR HEATING OR COOLING TO MEET UNOCCUPIED SETPOINTS, THE UNIT FAN SHALL BE STARTED AND THE HOT OR CHILLED WATER CONTROL VALVES SHALL BE OPENED TO THE HEATING OR COOLING COIL AS REQUIRED BY THE SPACE TEMPERATURE. THE BOILER PLANT OR CHILLER PLANT SHALL ALSO BE STARTED AS REQUIRED TO SATISFY SETPOINTS. THE UNIT AND ASSOCIATED CENTRAL PLANT SHALL OPERATE FOR A MINIMUM OF 30 MINUTES (OR AS REQUIRED TO SATISFY UNOCCUPIED SETPOINT) AND SHALL NOT BE ALLOWED TO RESTART FOR A MINIMUM OF 15 MINUTES (ADD) FOLLOWING SATISFACTION OF UNOCCUPIED SETPOINT AND SYSTEM SHUT-DOWN.

BAS SHALL PROVIDE ECONOMIZER OPERATION TO PROVIDE "FREE COOLING" WHEN OUTDOOR AIR CONDITIONS ALLOW. UPON BAS DETERMINATION THAT OUTSIDE AIR ENTHALPY IS BELOW RETURN AIR ENTHALPY IN COOLING MODE, THE OUTSIDE AIR DAMPER SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE. IF "ECONOMIZER" CONTROL IS INSUFFICIENT TO MAINTAIN SETPOINT, THE UNIT COOLING CYCLE SHALL FUNCTION AS OUTLINED ABOVE. UPON A DROP IN SPACE TEMPERATURE BELOW SETPOINT, MOTORIZED OUTSIDE AIR DAMPER SHALL CLOSE TO THE VENTILATION POSITION AND HEATING COIL CONTROL VALVE SHALL OPEN.

RELIEF FANS SHALL BE PROVIDED WHERE INDICATED IN FAN SCHEDULE. VARIABLE FREQUENCY DRIVE SHALL CONTROL RELIEF FAN TO MAINTAIN BUILDING PRESSURE BETWEEN -0.02" AND +0.02", AS MEASURED BY A BUILDING PRESSURE SENSOR. RELIEF FAN SHALL SHUT DOWN WHEN BUILDING PRESSURE IS SATISFIED.

A FREEZE-STAT SHALL BE LOCATED IN THE MIXED AIR STREAM TO SHUT-DOWN SUPPLY FAN IF THE MIXED AIR TEMPERATURE FALLS BELOW 40° F. FREEZE-STAT SHALL HAVE MANUAL RESET ONLY.

UPON DETECTION OF SMOKE IN THE FAN COIL UNIT SYSTEM BY THE DUCT-MOUNTED RETURN AIR SMOKE DETECTOR, AN ALARM CONDITION SHALL BE SENT TO THE BUILDING FIRE ALARM SYSTEM AND THE FAN COIL UNIT SHALL BE SHUTDOWN BY THE BUILDING FIRE ALARM SYSTEM. THE BUILDING FIRE ALARM SYSTEM SHALL PROVIDE ONE DIGITAL OUTPUT TO THE BAS TO INDICATE ACTIVATION OR FAILURE OF ANY SMOKE DETECTOR.

DOMESTIC HOT WATER SYSTEM:

BAS SHALL HAVE GLOBAL CONTROL OVER DOMESTIC WATER HEATING SYSTEM. WATER HEATERS SHALL CYCLE ON AND OFF BASED ON THEIR WATER LOOP TEMPERATURES, TO MAINTAIN 140° FOR WALL AND 110° FOR WALL-2. AN ALARM SHALL BE GENERATED SHOULD EITHER LOOP TEMPERATURE DROP FROM SETPOINT BY 10° EITHER HIGH OR LOW. AN ALARM SHALL ALSO BE GENERATED SHOULD THE DOMESTIC HW TEMPERATURE DEVIATE FROM SETPOINT BY 10° EITHER HIGH OR LOW. CIRCULATION PUMPS SHALL OPERATE ON A SCHEDULED BASIS BASED ON BUILDING OCCUPANCY. THE PUMPS SHALL BE CAPABLE OF OPERATING ON SEPARATE SCHEDULES, SHOULD THE KITCHEN SCHEDULE DIFFER FROM THE ENTIRE BUILDING. A TEMPERATURE SENSOR SHALL BE MOUNTED IN THE END OF THE LINE CAPABLE OF OVERRIDING THE PUMPS SHOULD THE LOOP TEMPERATURE FALL BELOW 130° FOR C2.1 OR 100° FOR C2.2. BAS SHALL ALSO MONITOR BOTH DOMESTIC HW TEMPERATURES AND DOMESTIC WATER SUPPLY TEMPERATURE FOR TRACKING PURPOSES. SEE PLUMBING PLANS FOR ALL TEMPERATURE SENSOR LOCATIONS.

KITCHEN GAS AND METERING SYSTEM:

PROVIDE GAS AND WATER FLOW METERS AS INDICATED ON PLUMBING DRAWINGS FOR SEPARATE MONITORING OF KITCHEN SYSTEMS.

KITCHEN EQUIPMENT FREEZER AND COOLER CONTROL:

PROVIDE NEW WALL MOUNTED TEMPERATURE SENSORS TO MONITOR THE TEMPERATURES IN THE FREEZER AND COOLER.

HVAC SCHEDULING:

INITIAL SCHEDULES OF OPERATION SHALL BE COORDINATED AND CONFIRMED BY THE OWNER, AND PROGRAMMED BY THE CONTROLS CONTRACTOR. MODIFICATION OF SCHEDULES SHALL BE A PART OF REQUIRED OWNER TRAINING. DISCREET SCHEDULES SHALL BE PROVIDED FOR EACH AIR HANDLING UNIT.

SCHOOL CALENDAR SHALL BE PROGRAMMED INTO THE BAS SUCH THAT THE SYSTEMS REMAIN UNOCCUPIED ON DAYS THE SCHOOL IS CLOSED AND ON TEACHER WORKDAYS.

ADMINISTRATION AREA SHALL REMAIN IN THE OCCUPIED MODE DURING THE SUMMER, EXACT HOURS TO BE COORDINATED WITH THE OWNER.

REMAINING AIR HANDLING UNITS SHALL BE INITIALLY SET TO BE IN THE OCCUPIED MODE FROM 30 MINUTES BEFORE THE OPENING BELL TO 30 MINUTES PRIOR TO THE CLOSING BELL, UNTIL MODIFIED BY START/STOP OPTIMIZATION. AFTER HOURS OPERATION FOR ALL ZONES SHALL BE COORDINATED WITH THE OWNER WITH INPUT FROM THE KITCHEN, ATHLETIC, LIBRARY, AND FINE ARTS STAFF.

START/STOP OPTIMIZATION:

BAS SHALL PROVIDE START/STOP OPTIMIZATION (SSO) FOR ALL EQUIPMENT AND SYSTEMS. SSO SHALL BE CAPABLE OF LEARNING BUILDING THERMAL CHARACTERISTICS AND RESPOND TO VARIABLE CONDITIONS. SSO SHALL START/STOP CONTROLLED EQUIPMENT AS LATE AS POSSIBLE PRIOR TO OCCUPIED TIME PERIOD AND AS EARLY AS POSSIBLE PRIOR TO UNOCCUPIED TIME PERIOD. SSO SHALL BE CALCULATED BASED ON OUTDOOR AIR TEMPERATURE, ZONE TEMPERATURES, AND CONTROL SETPOINT/SETBACK TEMPERATURES.

EMERGENCY HVAC SHUT-DOWN SWITCH:

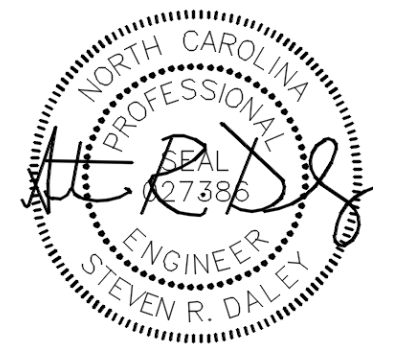
PROVIDE AN EMERGENCY HVAC SHUT-DOWN SWITCH IN THE ADMINISTRATION AREA, BEHIND THE RECEPTION DESK, WITH A COVER AND A LABEL INDICATING ITS FUNCTION. ACTIVATION OF SWITCH SHALL DE-ENERGIZE ALL HVAC SYSTEMS AND SEND AN ALARM TO THE CENTRAL BAS.

NOTES:

- SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- ALL CONTROL SETPOINTS SHALL BE ADJUSTABLE AND TENDABLE BY THE USER AND ADDITIONAL/REPLACEMENT CONTROLLERS SHALL BE PROGRAMMABLE WITHOUT ASSISTANCE. FROM THE CONTROLS MANUFACTURER, THIS SHALL BE COVERED AS PART OF TRAINING WITH OWNER, SCHOOL STAFF, AND MAINTENANCE DEPARTMENT. INDICATED SCHEDULES AND SETPOINTS SHOULD BE USED FOR ORIGINAL SYSTEM SET-UP. ANY CHANGES IN SETPOINT SETTINGS REQUIRED FOR INTENDED SYSTEM OPERATION SHALL BE APPROVED BY THE ENGINEER AND SHALL BE DISCREETLY INDICATED ON THE AS-BUILT DRAWINGS.
- CURRENT SENSORS (CT) SHALL BE PROVIDED IN THE PIPING OF EACH PUMP TO VERIFY PUMP STATUS.
- PHOTOELECTRIC TYPE SMOKE DETECTORS WILL BE PROVIDED BY THE ELECTRICAL CONTRACTOR, INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR AND WIRED TO SHUT-DOWN THE UNIT BY THE ELECTRICAL CONTRACTOR.
- ELECTRICAL CONTRACTOR SHALL PROVIDE A DEDICATED 120V CIRCUIT IN A J-BOX FOR CONTROL POWER. CONTROLS CONTRACTOR SHALL EXTEND 120V POWER FROM J-BOX TO CONTROL PANELS, DAMPER ACTUATORS, TRANSFORMERS, ETC. AS REQUIRED FOR INSTALLATION OF THE CONTROL SYSTEM. ALL CONTROL TRANSFORMERS SHALL BE SEPARATELY INTERNALLY FUSED OR HAVE MANUAL RESETS.
- BAS SHALL ALLOW GLOBAL OPERATION OF HOT WATER AND CHILLED WATER CONTROL VALVES, AND GLOBAL CONTROL OF THERMOSTAT SETPOINTS.
- CONTROLS CONTRACTOR SHALL PROVIDE A MINIMUM OF 24 HOURS OF OWNER TRAINING PROVIDED BY A FACTORY CERTIFIED REPRESENTATIVE. COORDINATE THROUGH THE MECHANICAL CONTRACTOR AND CONSTRUCTION MANAGEMENT FIRM.
- THE SEQUENCE OF OPERATION AND POINTS LIST IS INTENDED TO COMMUNICATE THE MINIMUM REQUIREMENTS AND GENERAL DESIGN INTENT TO THE CONTROLS CONTRACTOR AND IS NOT INTENDED TO BE A FULLY DEVELOPED OR COMPLETE SEQUENCE OF OPERATION. IN THE CONTROLS SUBMITTAL THE CONTROLS CONTRACTOR SHALL FULLY DEVELOP THE SEQUENCE OF OPERATIONS FOR ALL SYSTEMS IDENTIFIED AND SHALL PRESENT ALL SETPOINTS, CONTROL PARAMETERS, TIME DELAYS, ALARM POINTS, ETC. AS REQUIRED TO COMPLY WITH THE DESIGN INTENT. THE CONTROLS CONTRACTOR SHALL INCORPORATE STANDARD FEATURES SUCH AS MINIMUM RUN TIME DELAYS AND DEAD BANDS TO PREVENT SHORT CYCLING. ALL MONITORED POINTS SHALL INCLUDE EARLY HIGH/LOW ALARM NOTIFICATIONS PRIOR TO REQUIRED CORRECTIVE ACTIONS OR UNIT SHUT-DOWNS. CONTROL CONTRACTOR SHALL SPECIFY IN THE CONTROL SUBMITTAL FAIL-SAFE POSITION FOR OUT OF RANGE, FAIL-SAFE POSITIONING FOR OPEN CIRCUITS OR LOSS OF COMMUNICATION.
- ALARMS THROUGH THE BAS SYSTEM SHALL BE VISIBLE ON THE INDIVIDUAL GRAPHICS THEMSELVES, NOT ONLY ON THE SUMMARY PAGE.



PROFESSIONAL SEALS:



21-2024

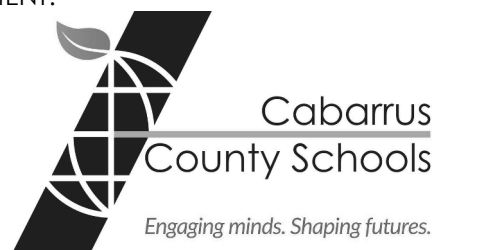
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Replacement Elementary School

61 Spring St NW, Concord NC 28025

HA COM#: 22339.00

ASE & DATE:

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/21/2024

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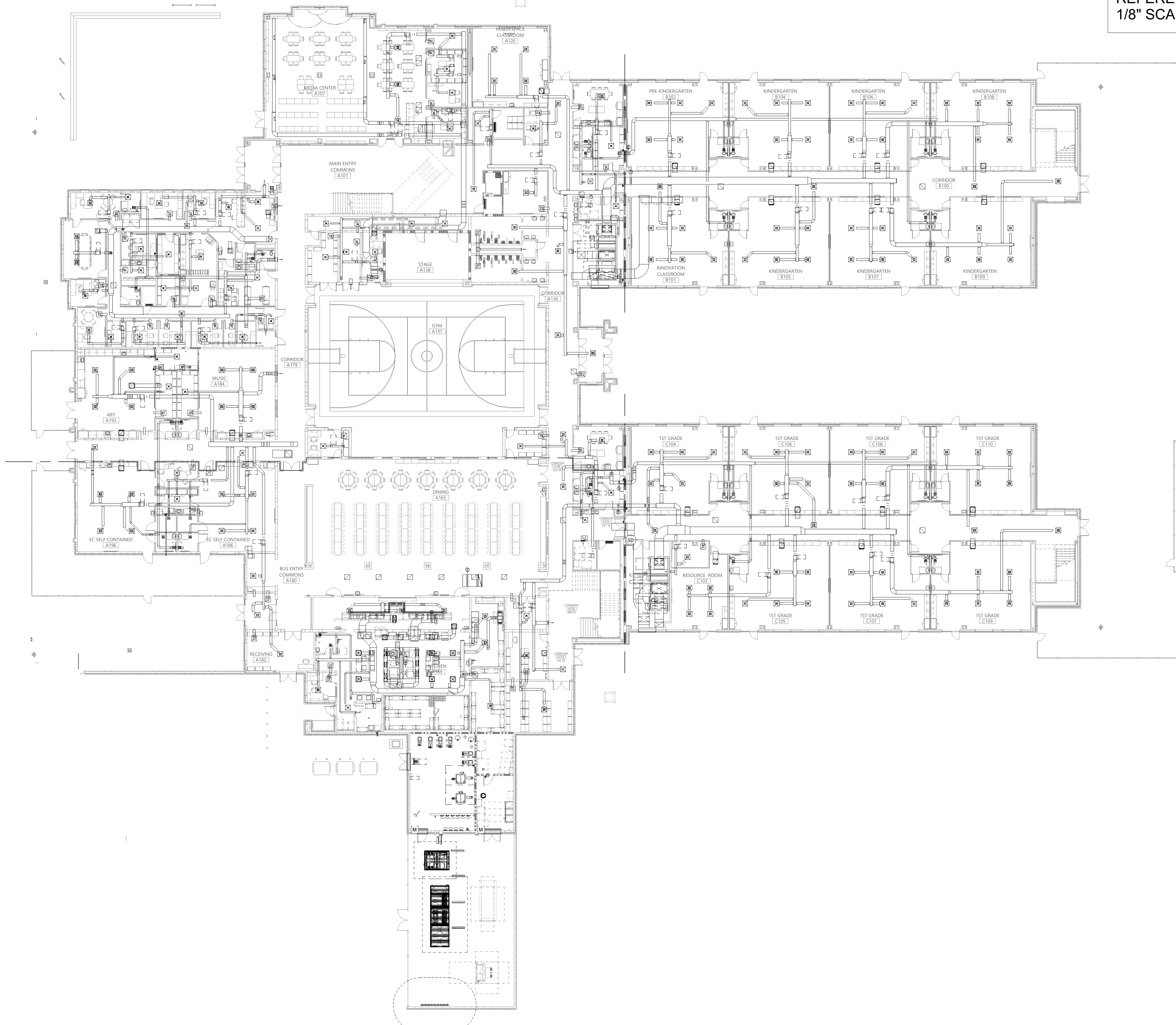
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MAIN LEVEL
MECHANICAL PLAN -
OVERALL

ARCHITECTURAL:

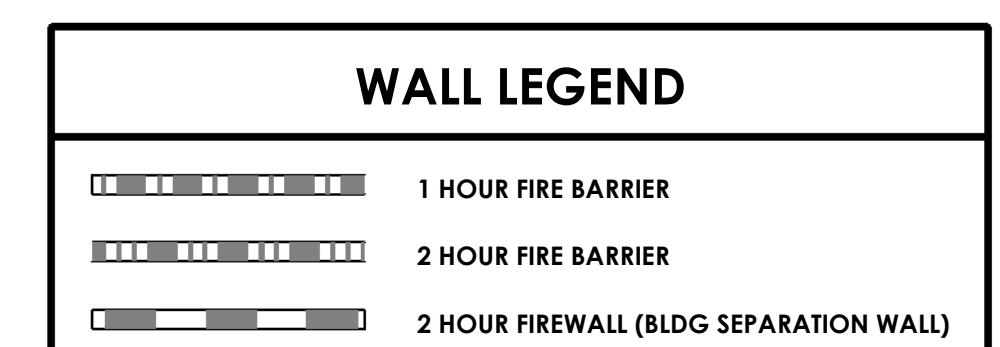
M101

Sheet No. 6 of 32 OPTIMA# 24-020

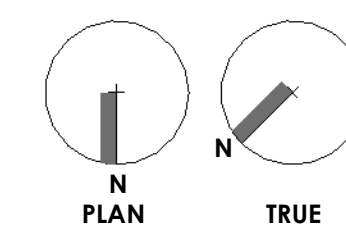
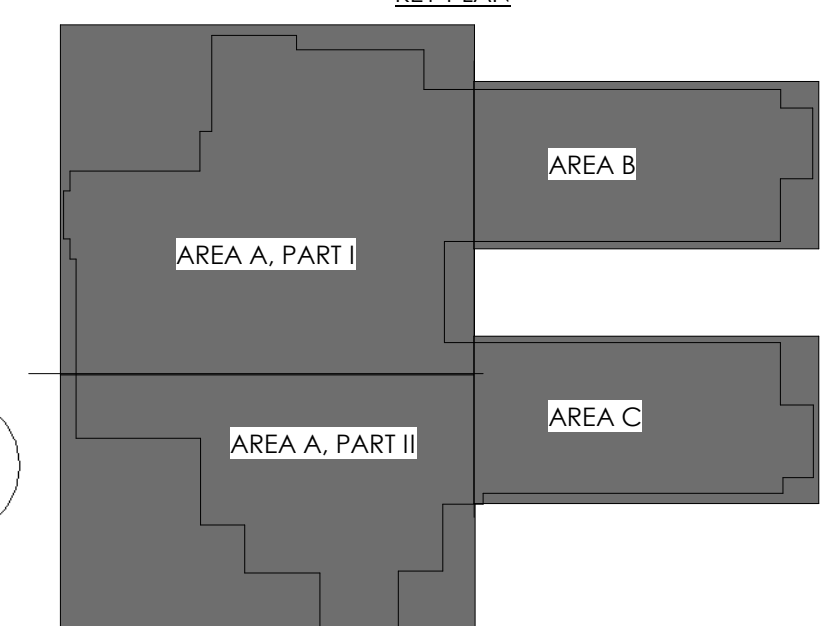
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1 MAIN LEVEL FLOOR PLAN - MECHANICAL PLAN - OVERALL
1/16" = 1'-0"



KEY PLAN



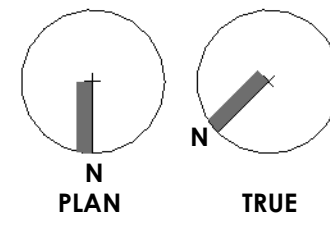
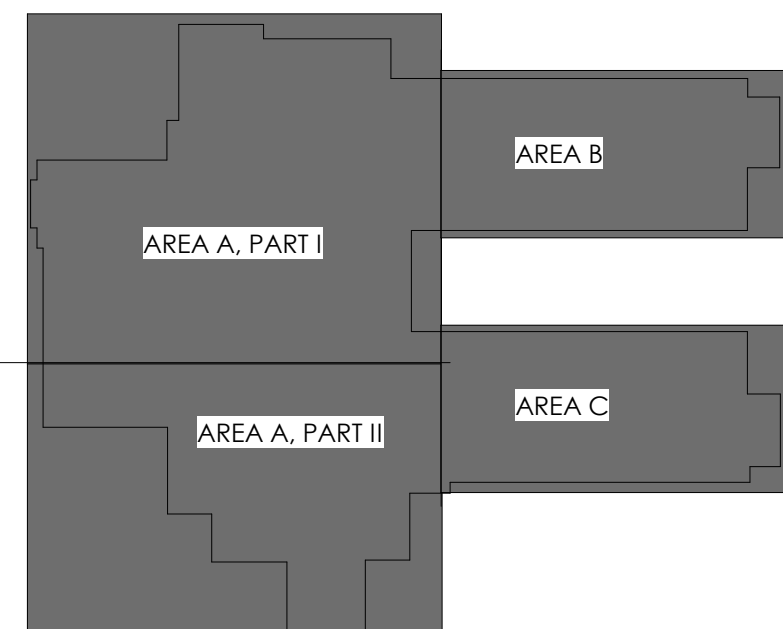


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1 UPPER LEVEL MECHANICAL PLAN - OVERALL
1/16" = 1'-0"

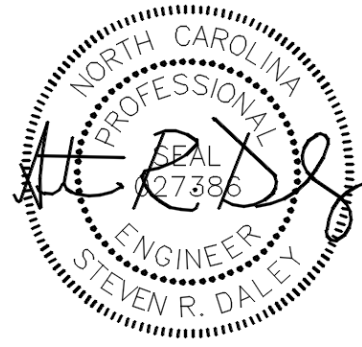
WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)

KEY PLAN



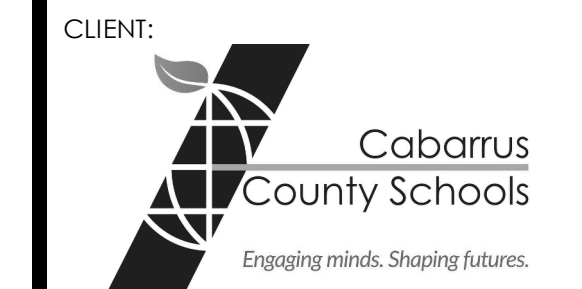
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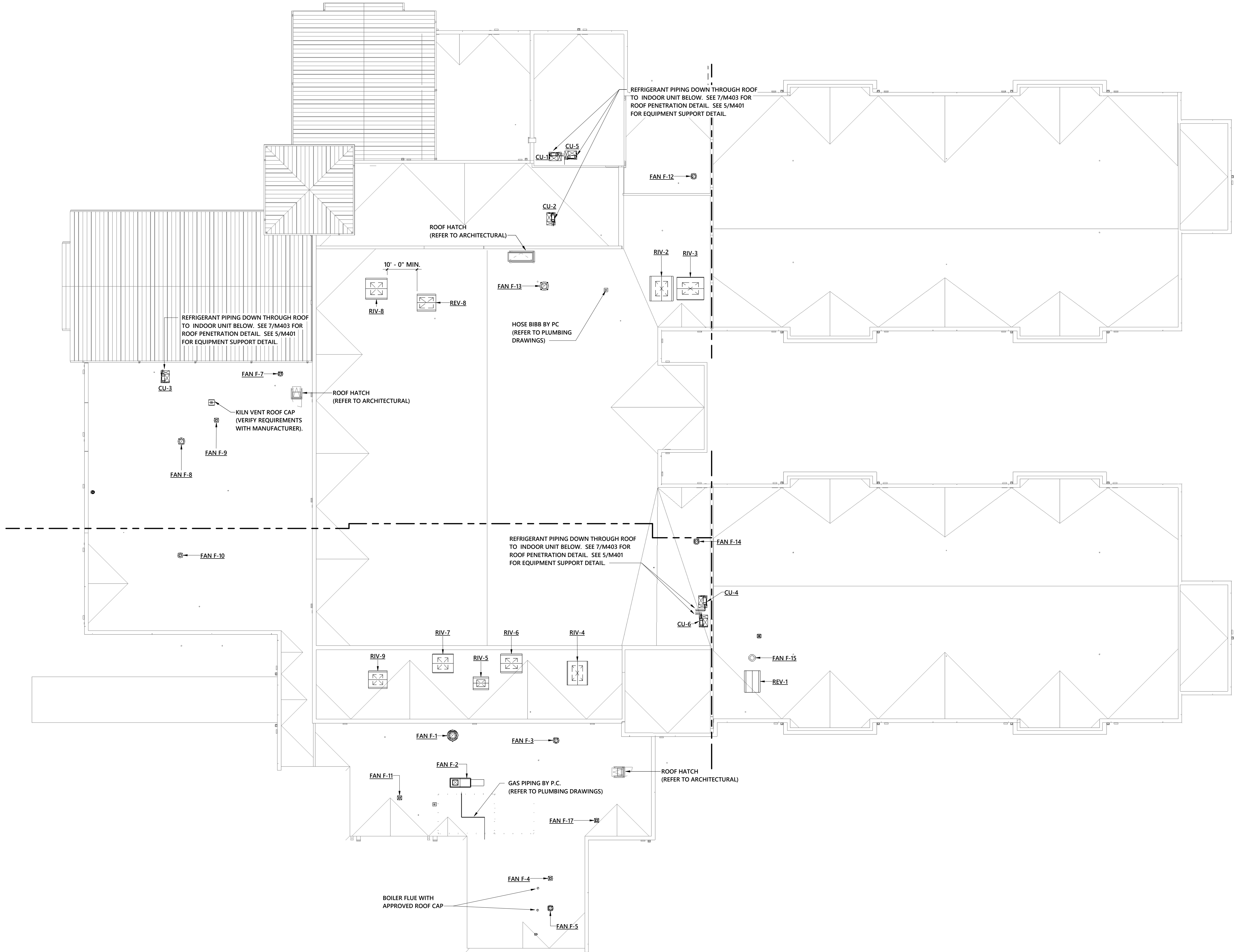
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UPPER LEVEL
MECHANICAL PLAN -
OVERALL

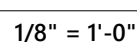
ARCHITECTURAL:

M102

NOTE:
MECHANICAL CONTRACTOR SHALL LOCATE EXHAUST FANS,
OUTLETS, GAS FLUES, ETC. A MINIMUM OF 10'-0" FROM ANY OUTSIDE
AIR INTAKE.



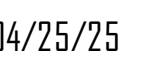
1 ROOF PLAN MECHANICAL - OVERALL
1/16" = 1'-0"



MAIN LEVEL MECHANICAL PLAN - BUILDING A (PART 1)



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8 Revision 8	04/25/25
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SHEET TITLE:

**MAIN LEVEL
MECHANICAL PLAN-
BUILDING A (PART 2)**

ARCHITECTURAL:

M112

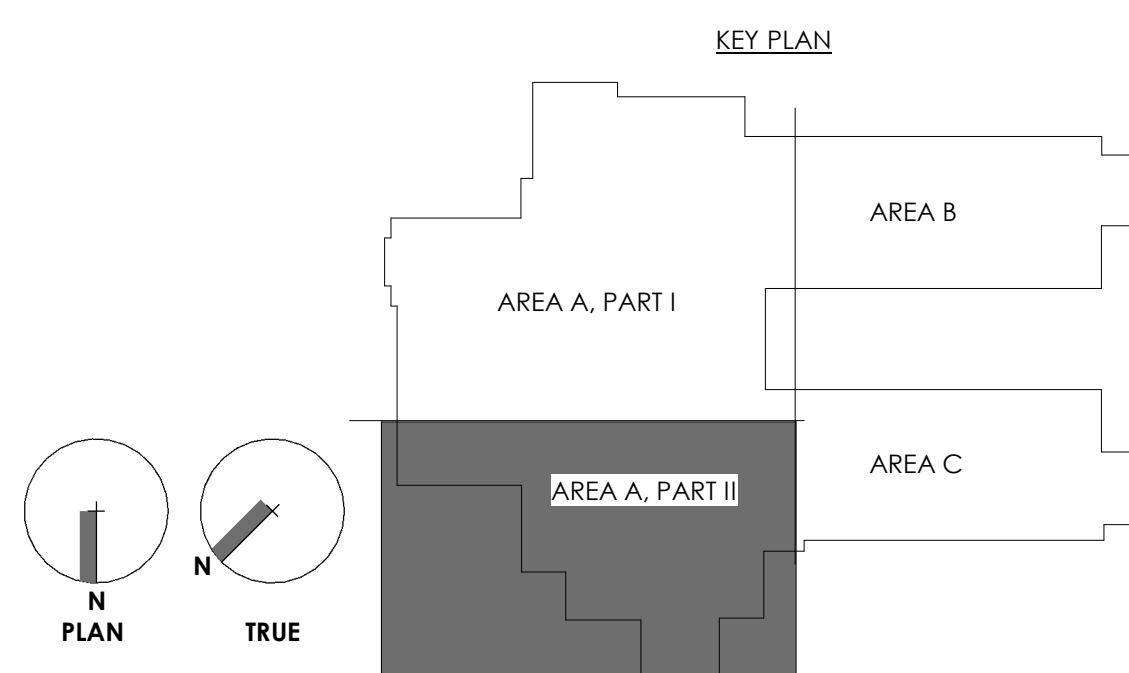


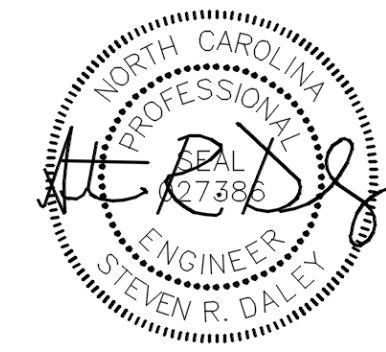
KITCHEN AIR BALANCE SCHEDULE			
MECHANICAL EQUIPMENT (SYSTEM)	EXHAUST	MAKE-UP	OUTSIDE AIR
KITCHEN HOOD EXHAUST (F-1)	3,915		
KITCHEN HOOD MAKE-UP (F-2)		2,977	
DISHWASHER EXHAUST (F-3)	600		
JAN/TLT (F-1X)	175		
AHU-5			680
AHU-6			1,150 (MIN.)
SUB-TOTALS	4,690	2,977	1,830
TOTALS	4,690	4,807	

NET PRESSURE SUPPLIED TO KITCHEN AREA: 117 CFM (POSITIVE)

WALL LEGEND

	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)





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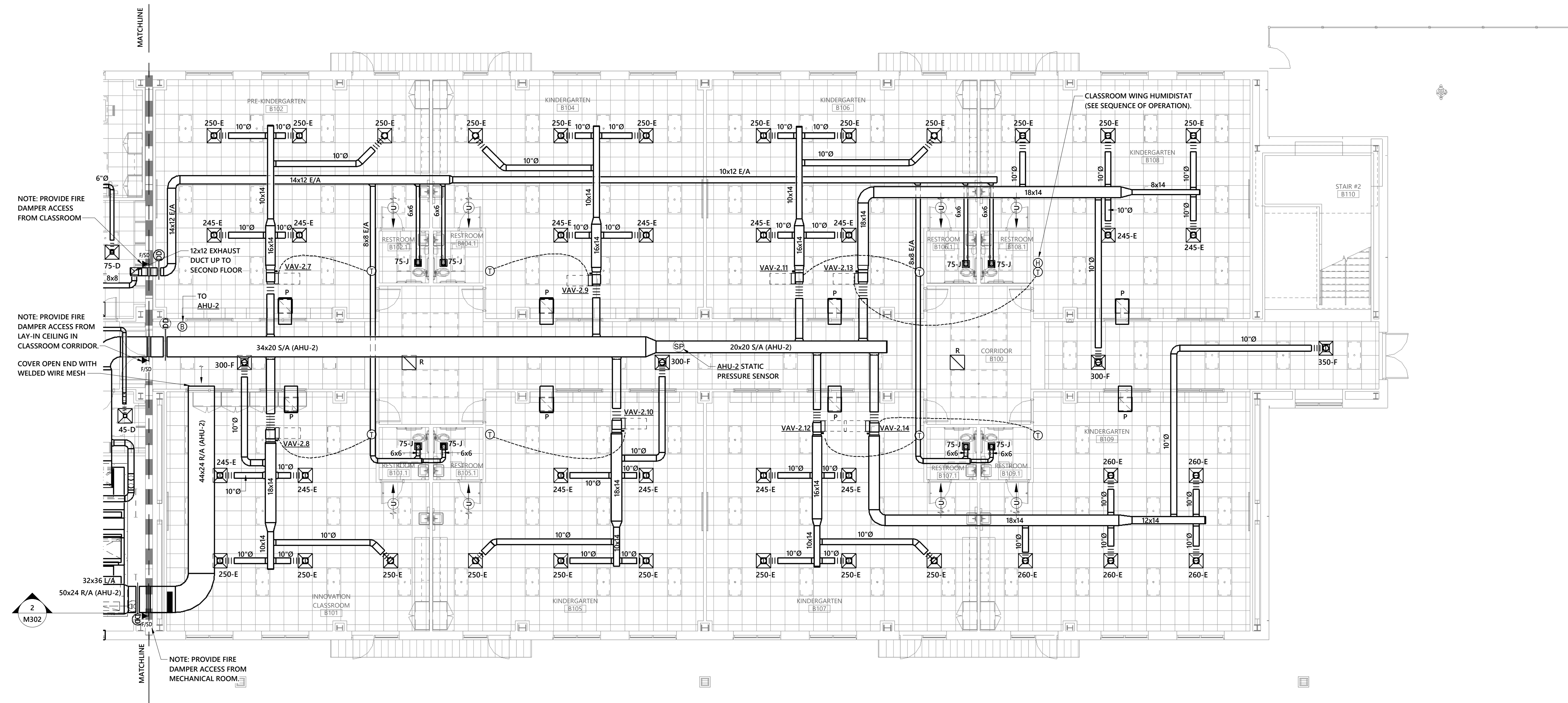
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SHEET TITLE:
**MAIN LEVEL
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BUILDING B**

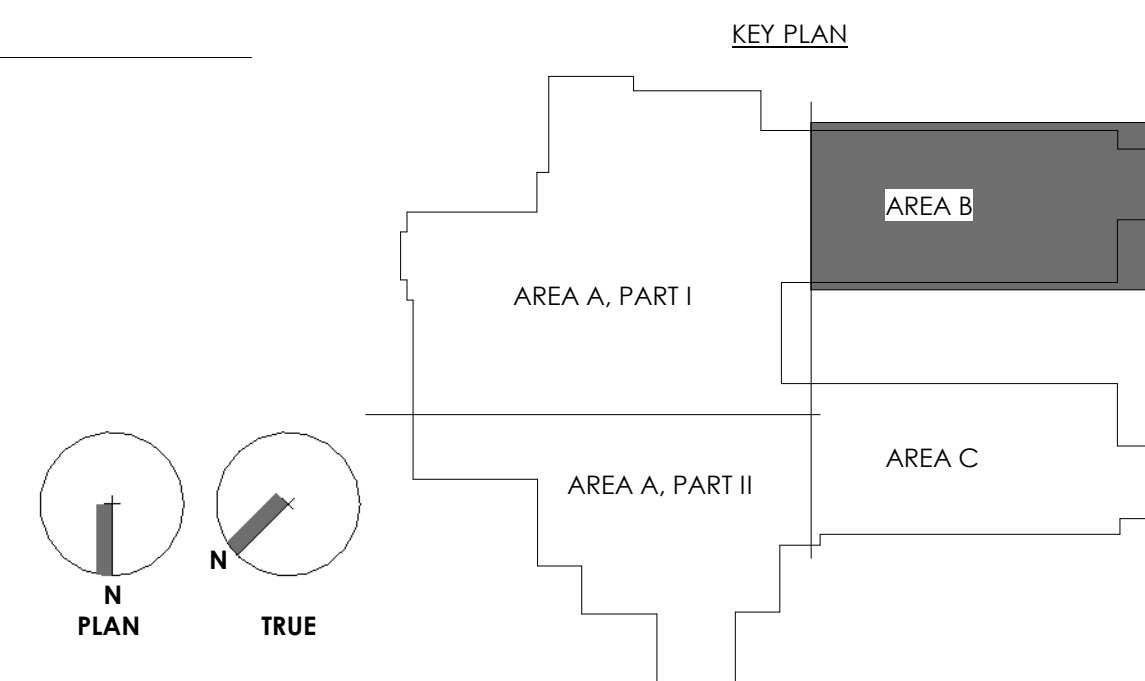
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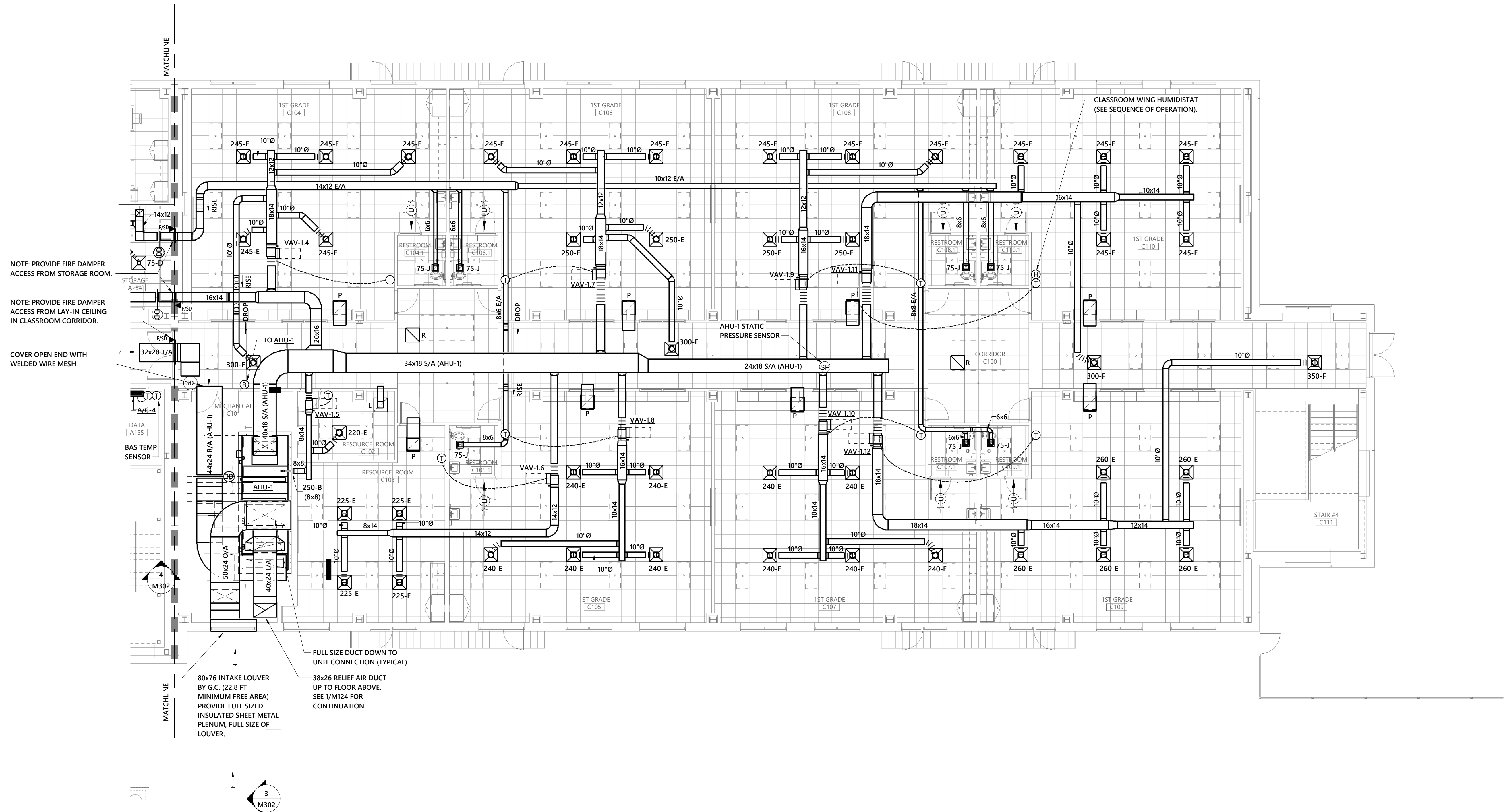
M113



1 MAIN LEVEL MECHANICAL PLAN - BUILDING B
1/8" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)

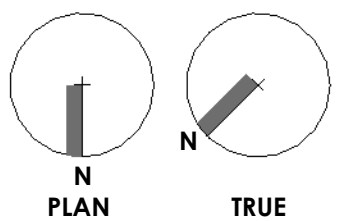
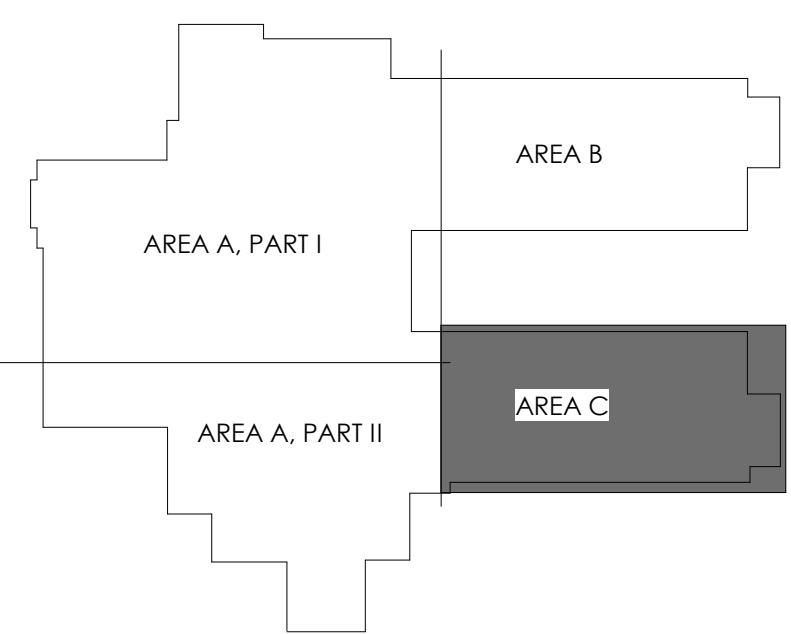


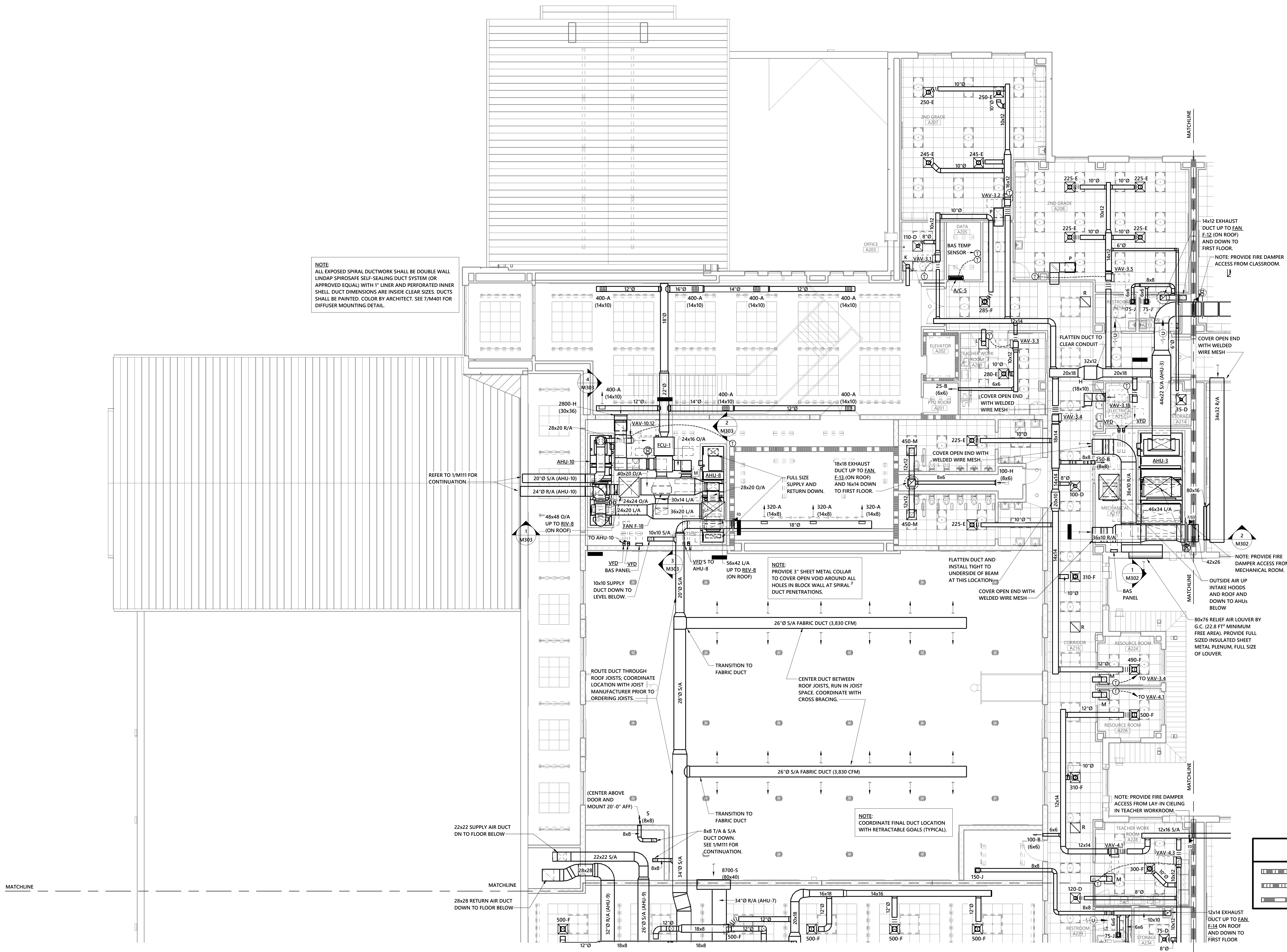


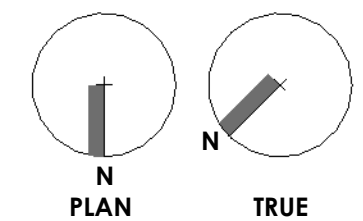
1 MAIN LEVEL MECHANICAL PLAN - BUILDING C
1/8" = 1'-0"

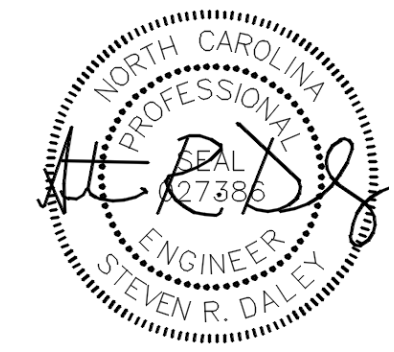
WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)

KEY PLAN









10-21-2024

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Replacement Elementary School**

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YCHA COM #: 22339.00

PHASE & DATE:
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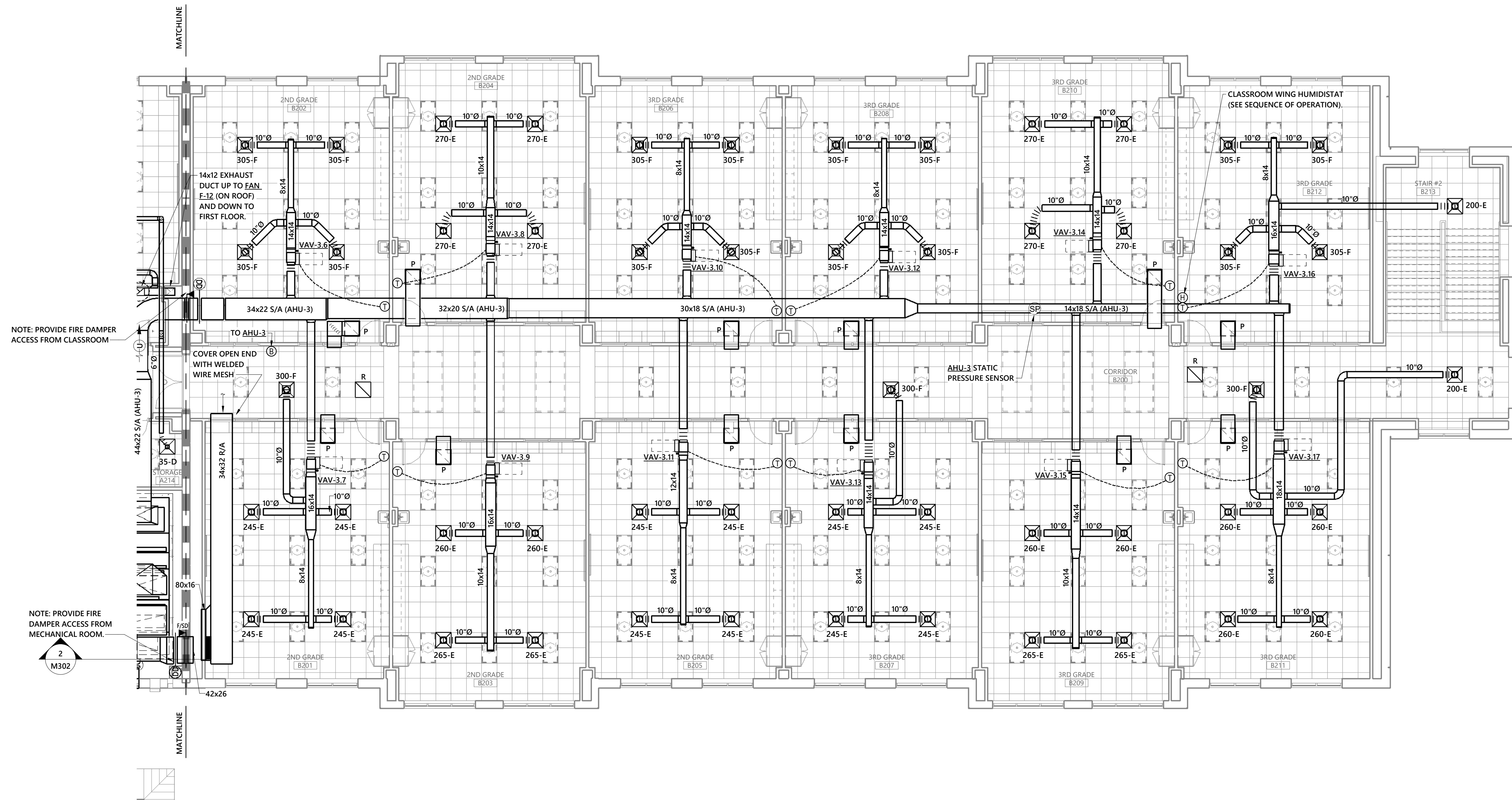
10/21/2024

REVISIONS:

SHEET TITLE:
**UPPER LEVEL
MECHANICAL PLAN -
BUILDING B**

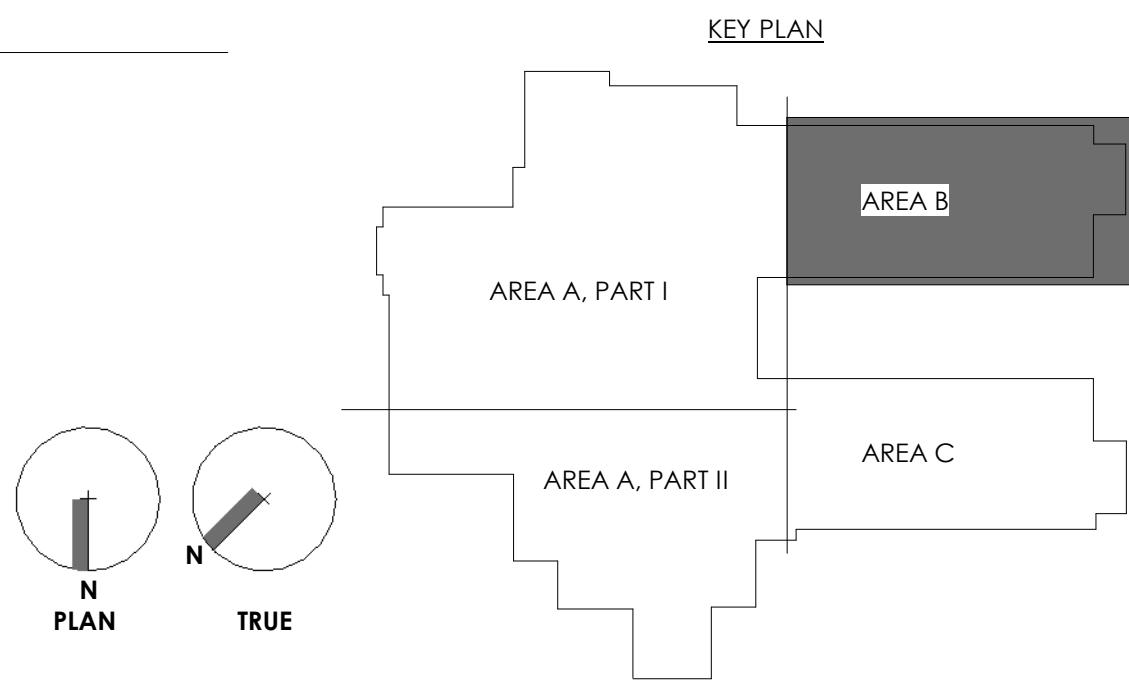
ARCHITECTURAL:

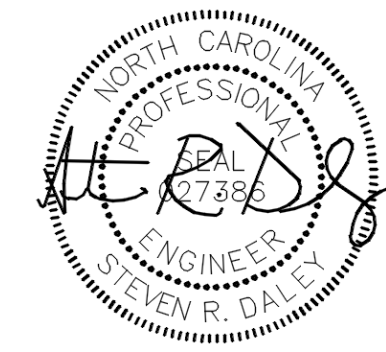
M123



1 UPPER LEVEL MECHANICAL PLAN - BUILDING B
1/8" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)





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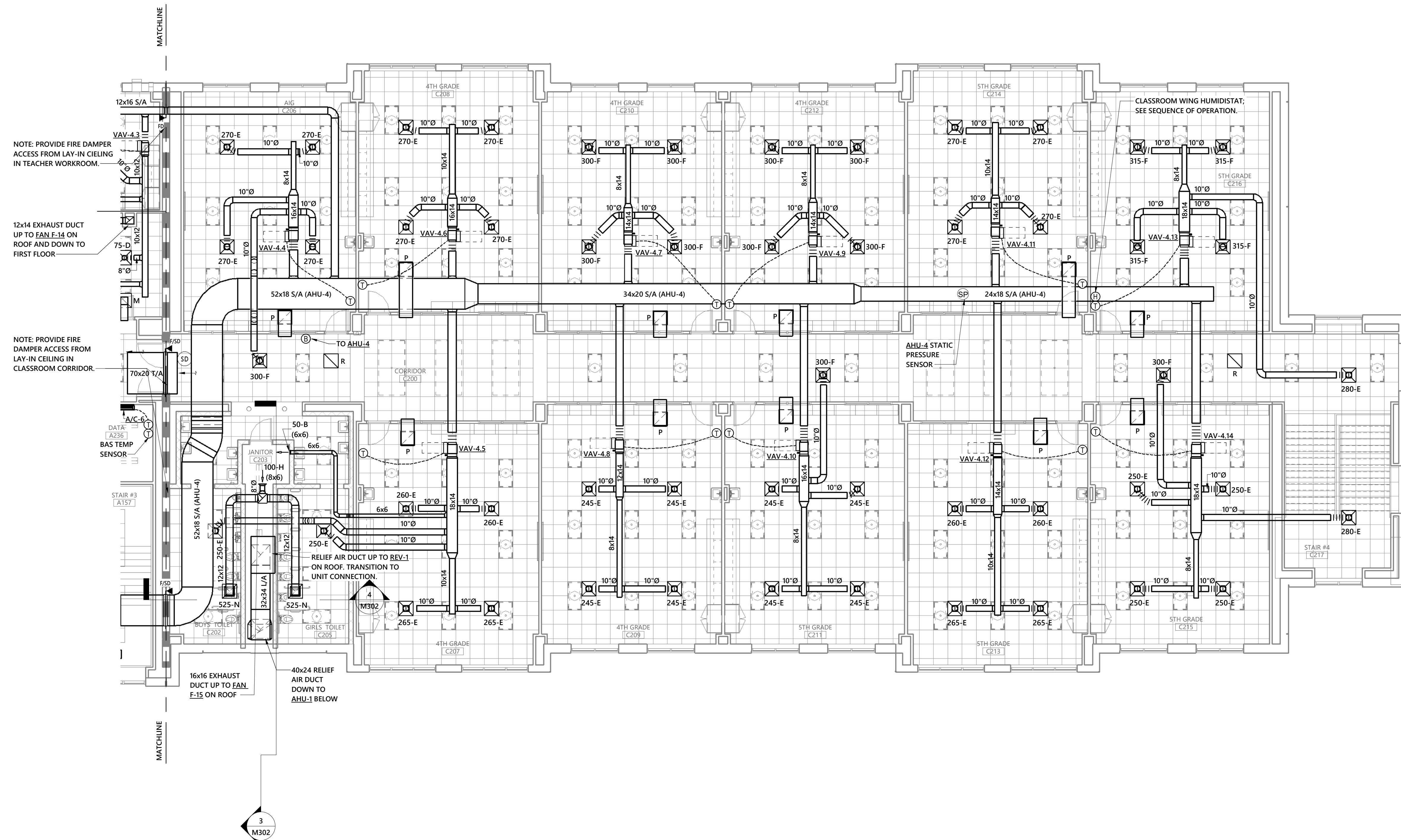
10/21/2024

REVISIONS:

SHEET TITLE:
**UPPER LEVEL
MECHANICAL PLAN-
BUILDING C**

ARCHITECTURAL:

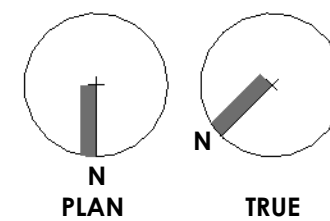
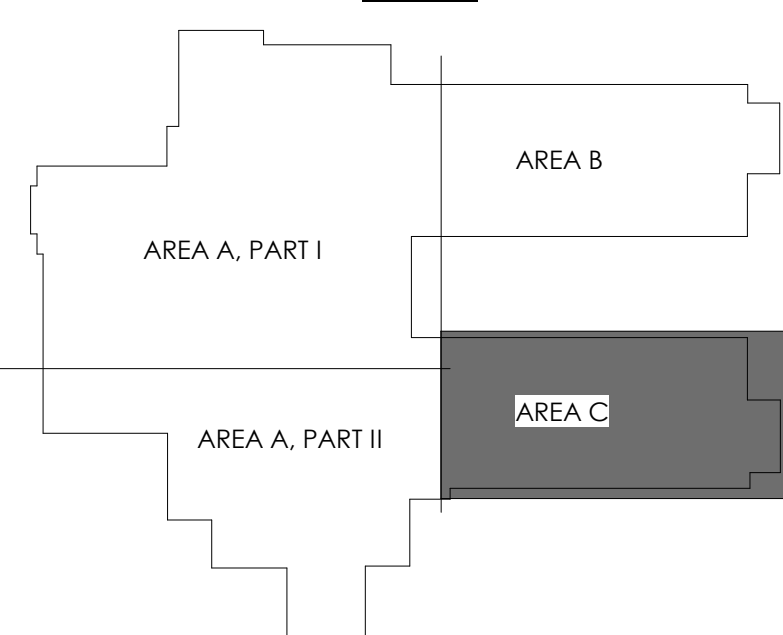
M124

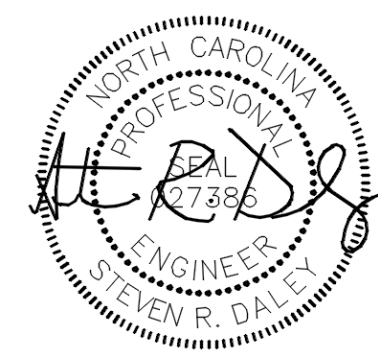


1 UPPER LEVEL MECHANICAL PLAN- BUILDING C
1/8" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)

KEY PLAN





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CLIENT:



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YCHA COM #: 22339.00

PHASE & DATE:

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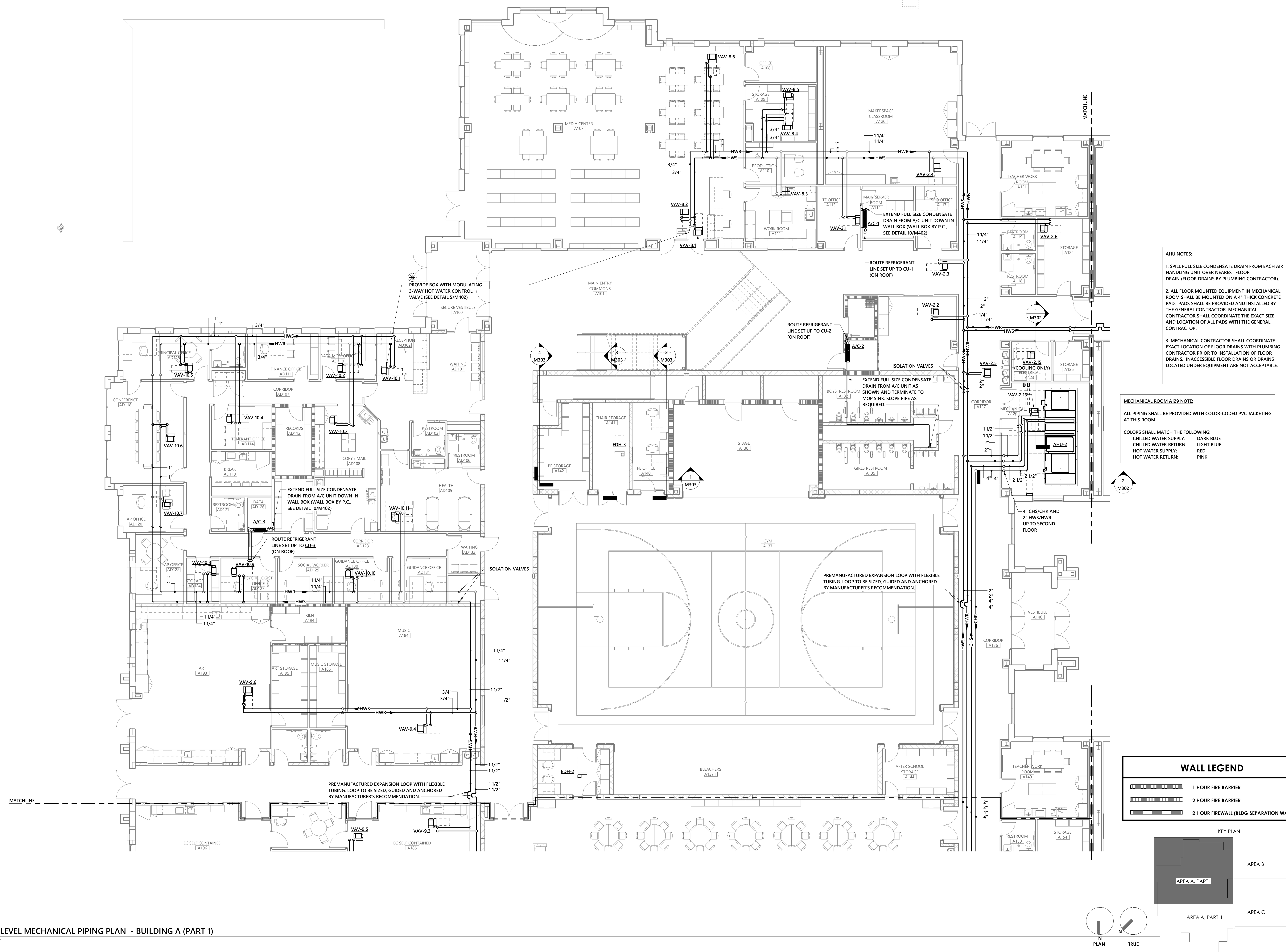
10/21/2024

REVISIONS:

SHEET TITLE:

MAIN LEVEL
MECHANICAL PIPING
PLAN - BUILDING A
(PART 1)

ARCHITECTURAL:

M211**AHU NOTES:**

1. SPILL FULL SIZE CONDENSATE DRAIN FROM EACH AIR HANDLING UNIT OVER NEAREST FLOOR DRAIN (FLOOR DRAINS BY PLUMBING CONTRACTOR).
2. ALL FLOOR MOUNTED EQUIPMENT IN MECHANICAL ROOM SHALL BE MOUNTED ON A 4" THICK CONCRETE PAD. PADS SHALL BE PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT SIZE AND LOCATION OF ALL PADS WITH THE GENERAL CONTRACTOR.
3. MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION OF FLOOR DRAINS WITH PLUMBING CONTRACTOR PRIOR TO INSTALLATION OF FLOOR DRAINS. INACCESSIBLE FLOOR DRAINS OR DRAINS LOCATED UNDER EQUIPMENT ARE NOT ACCEPTABLE.

MECHANICAL ROOM A129 NOTE:

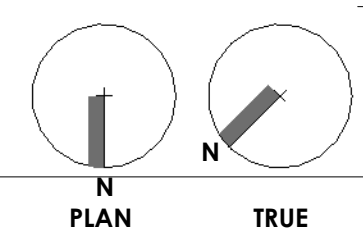
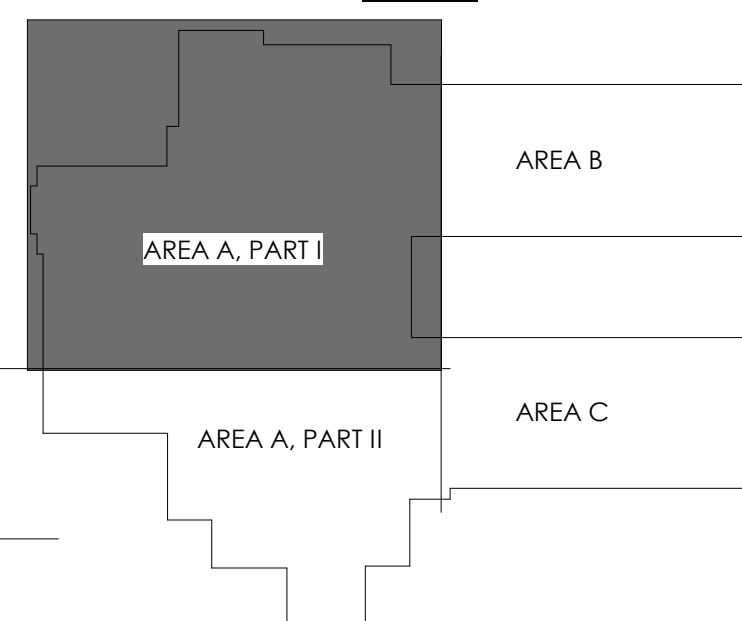
ALL PIPING SHALL BE PROVIDED WITH COLOR-CODED PVC JACKETING AT THIS ROOM.

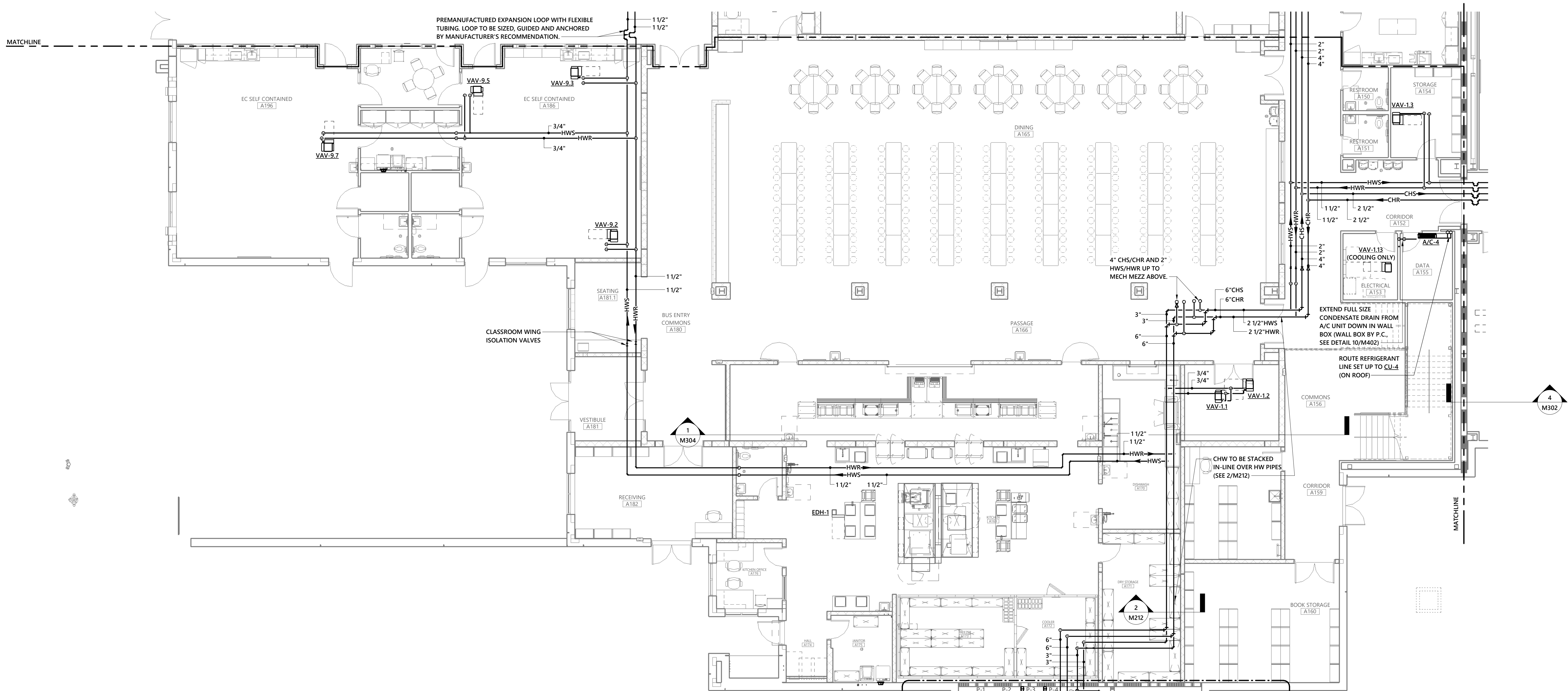
COLORS SHALL MATCH THE FOLLOWING:

CHILLED WATER SUPPLY:	DARK BLUE
CHILLED WATER RETURN:	LIGHT BLUE
HOT WATER SUPPLY:	RED
HOT WATER RETURN:	PINK

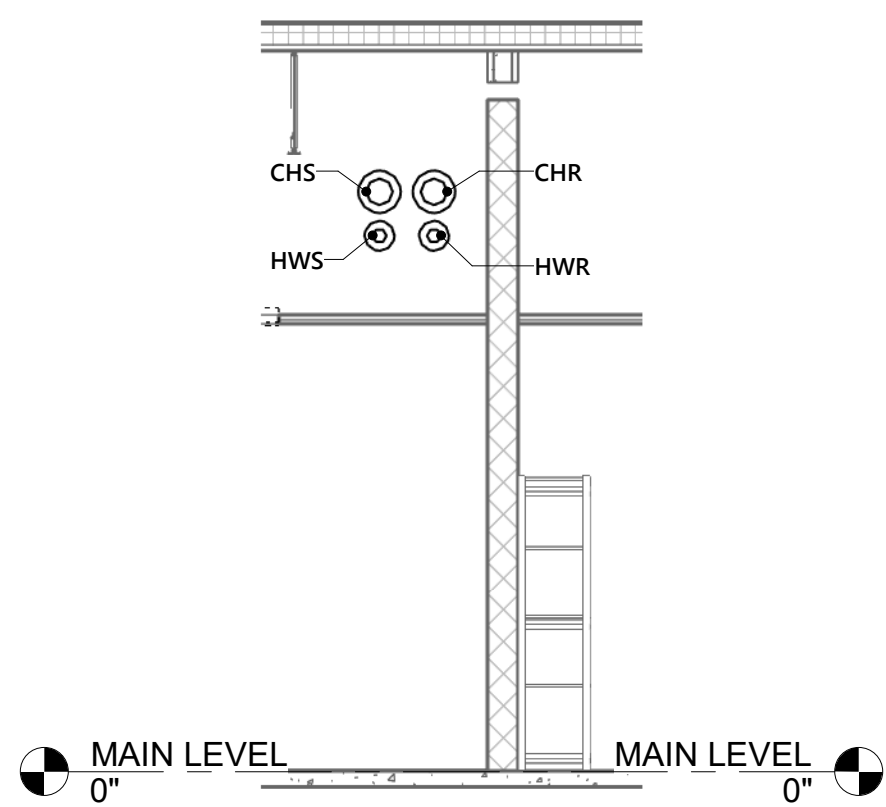
WALL LEGEND

- | | |
|--|--|
| | 1 HOUR FIRE BARRIER |
| | 2 HOUR FIRE BARRIER |
| | 2 HOUR FIREWALL (BLDG SEPARATION WALL) |

KEY PLAN



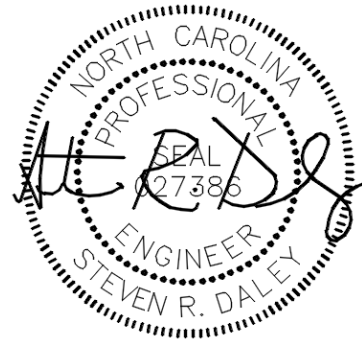
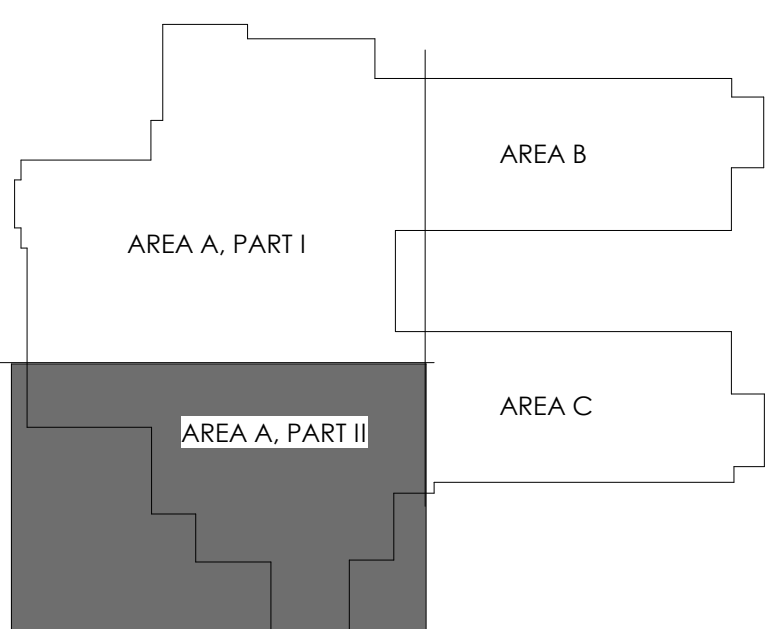
1 MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING A (PART 2)
1/8" = 1'-0"



2 SECTION AT STACKED CHW AND HW PIPE
1/4" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)

KEY PLAN



10-21-2024

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PHASE & DATE:
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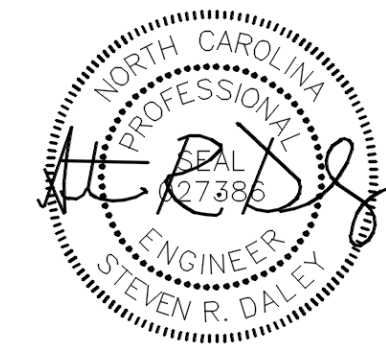
10/21/2024

REVISIONS:

SHEET TITLE:
MAIN LEVEL
MECHANICAL PIPING
PLAN - BUILDING A
(PART 2)

ARCHITECTURAL:

M212



10-21-2024

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CONSULTANT:

optima
engineering
1827 South Tryon St., Suite 300, Charlotte, NC 28203
Phone: 704.338.1392 - www.optimaengineering.com
North Carolina License Number C-0914

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Cabarrus
County Schools
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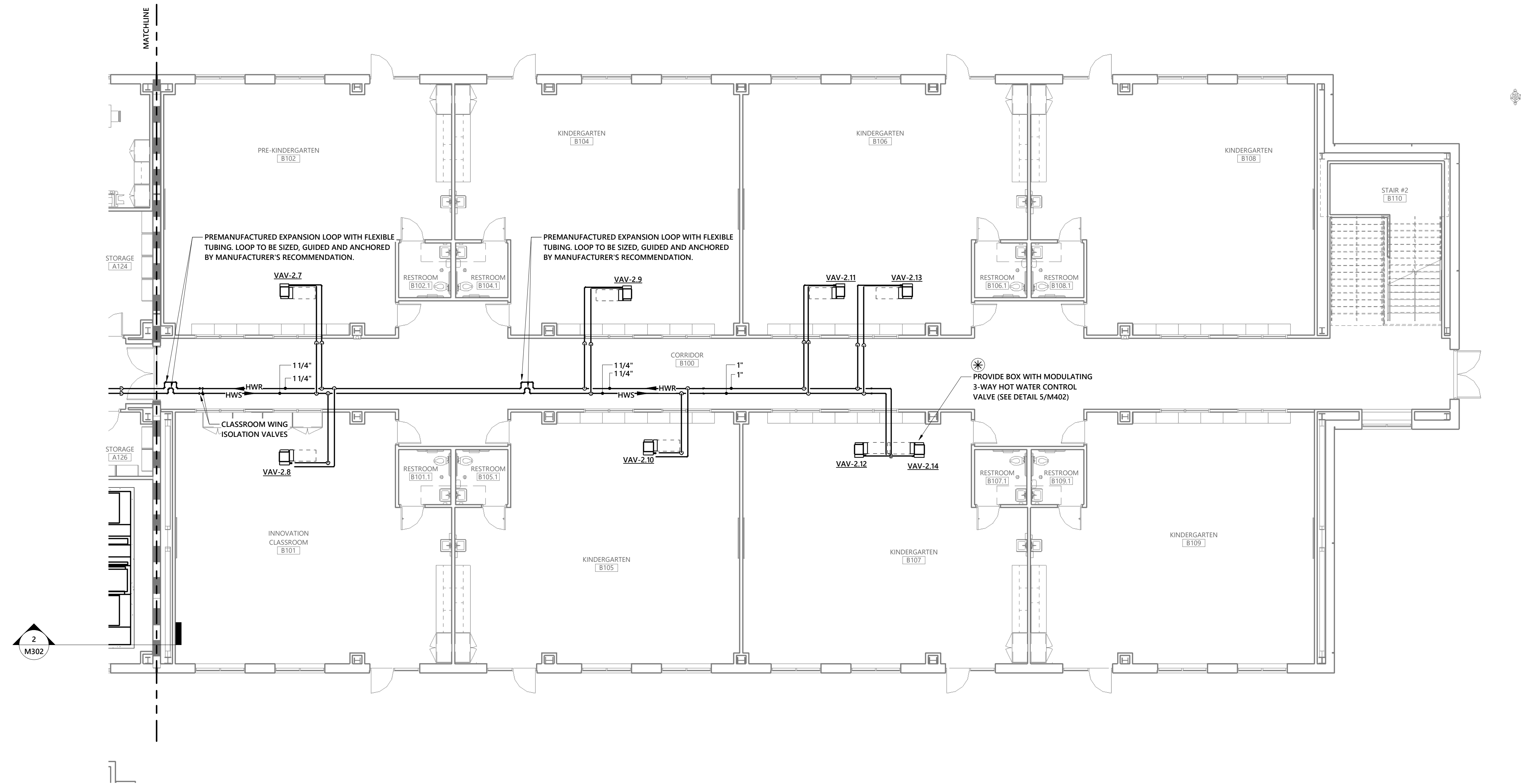
10/21/2024

REVISIONS:

SHEET TITLE:
**MAIN LEVEL
MECHANICAL PIPING
PLAN - BUILDING B**

ARCHITECTURAL:

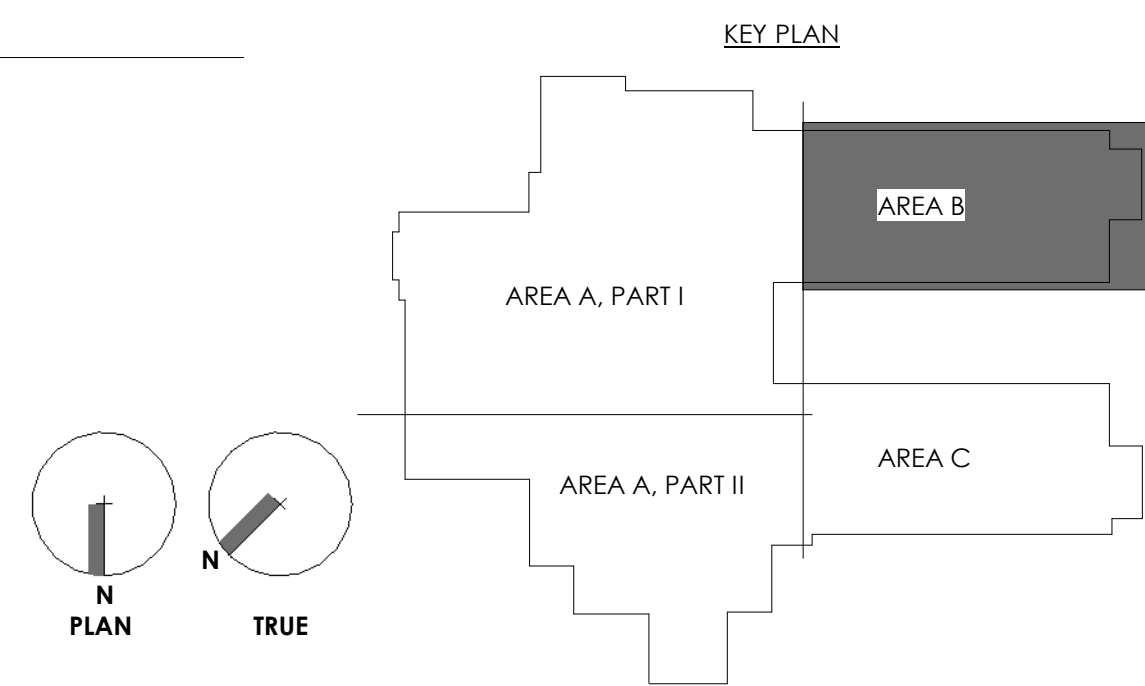
M213

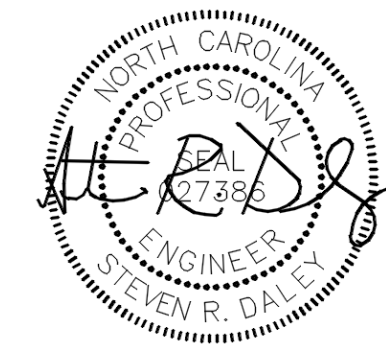


1 MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING B
1/8" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)

KEY PLAN

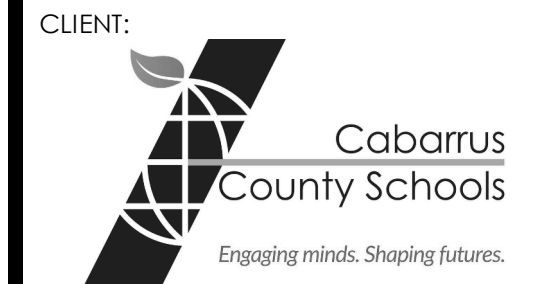




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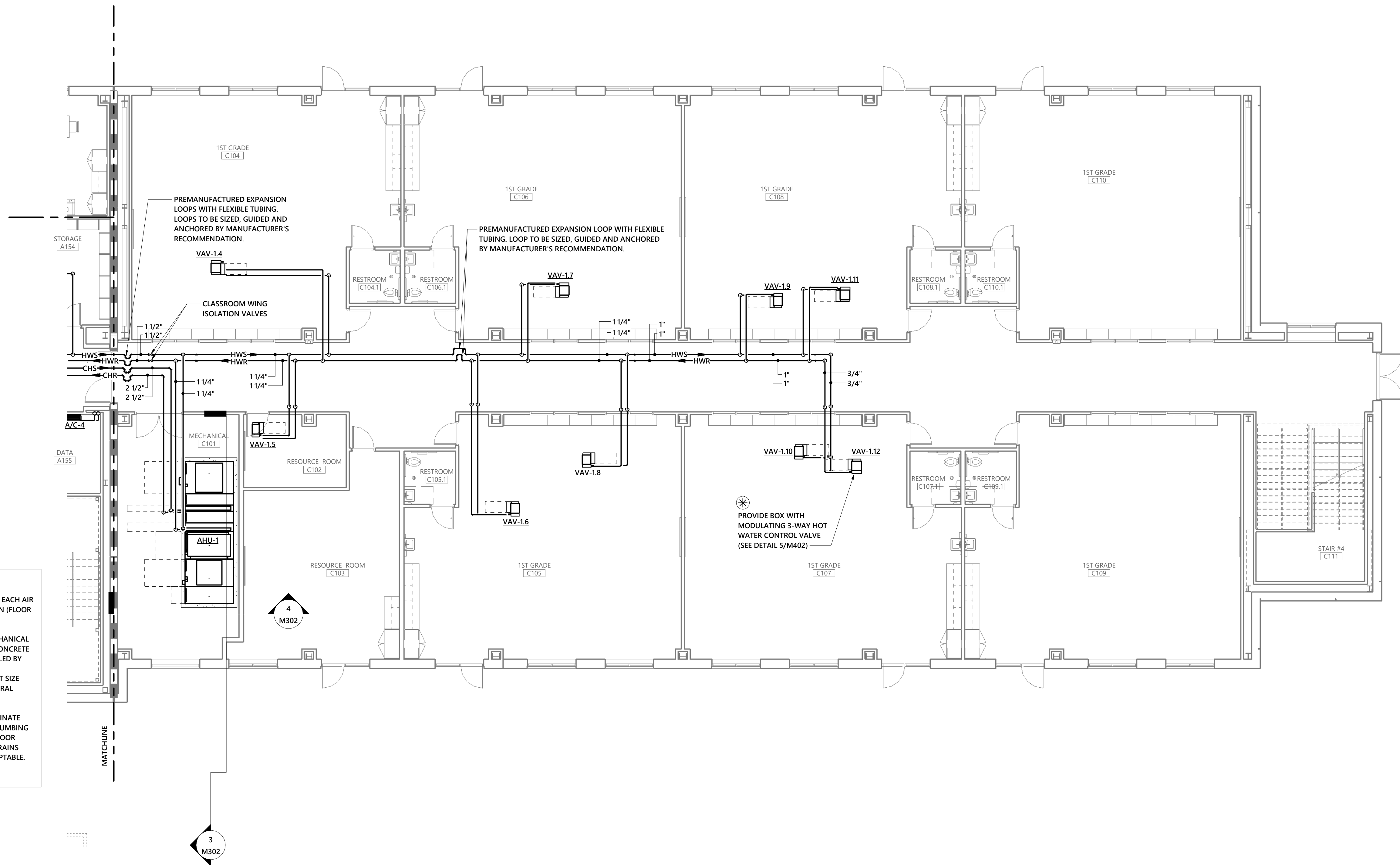
10/21/2024

REVISIONS:

SHEET TITLE:
**MAIN LEVEL
MECHANICAL PIPING
PLAN - BUILDING C**

ARCHITECTURAL:

M214

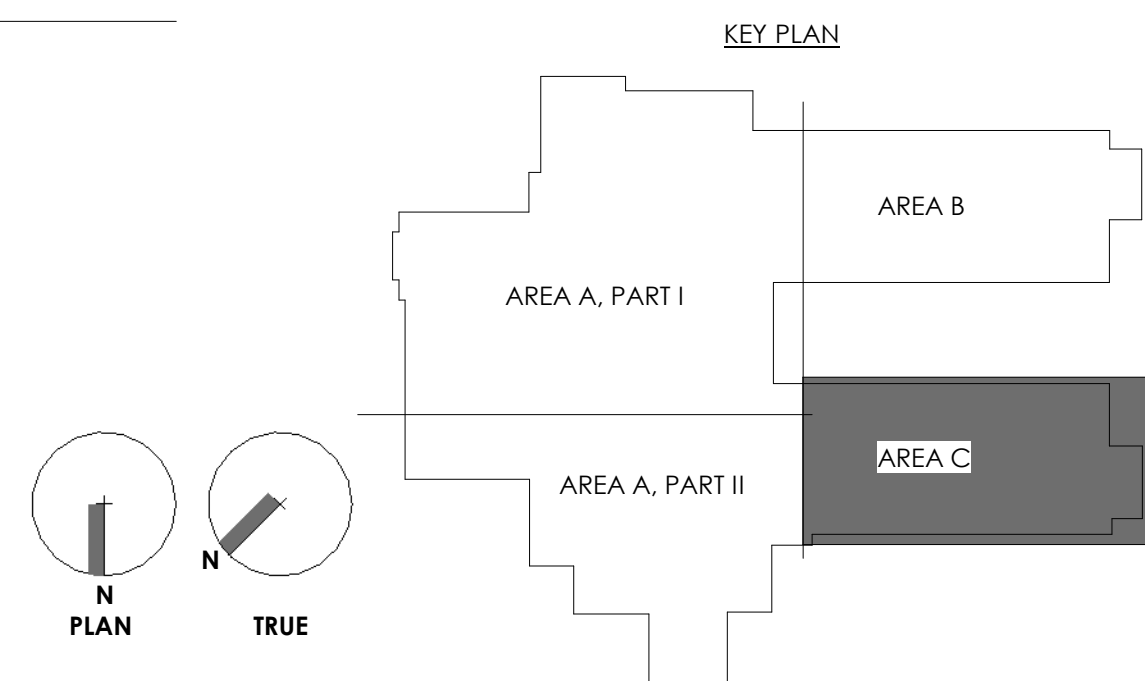


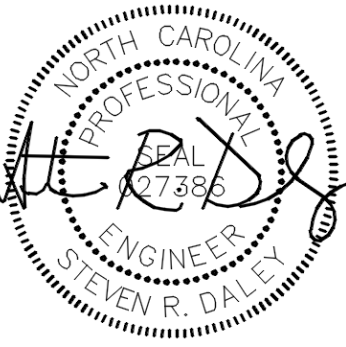
AHU NOTES:

1. SPILL FULL SIZE CONDENSATE DRAIN FROM EACH AIR HANDLING UNIT OVER NEAREST FLOOR DRAIN (FLOOR DRAINS BY PLUMBING CONTRACTOR).
2. ALL FLOOR MOUNTED EQUIPMENT IN MECHANICAL ROOM SHALL BE MOUNTED ON A 4" THICK CONCRETE PAD. PADS SHALL BE PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT SIZE AND LOCATION OF ALL PADS WITH THE GENERAL CONTRACTOR.
3. MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION OF FLOOR DRAINS WITH PLUMBING CONTRACTOR PRIOR TO INSTALLATION OF FLOOR DRAINS. INACCESSIBLE FLOOR DRAINS OR DRAINS LOCATED UNDER EQUIPMENT ARE NOT ACCEPTABLE.

1 MAIN LEVEL MECHANICAL PIPING PLAN - BUILDING C
1/8" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)





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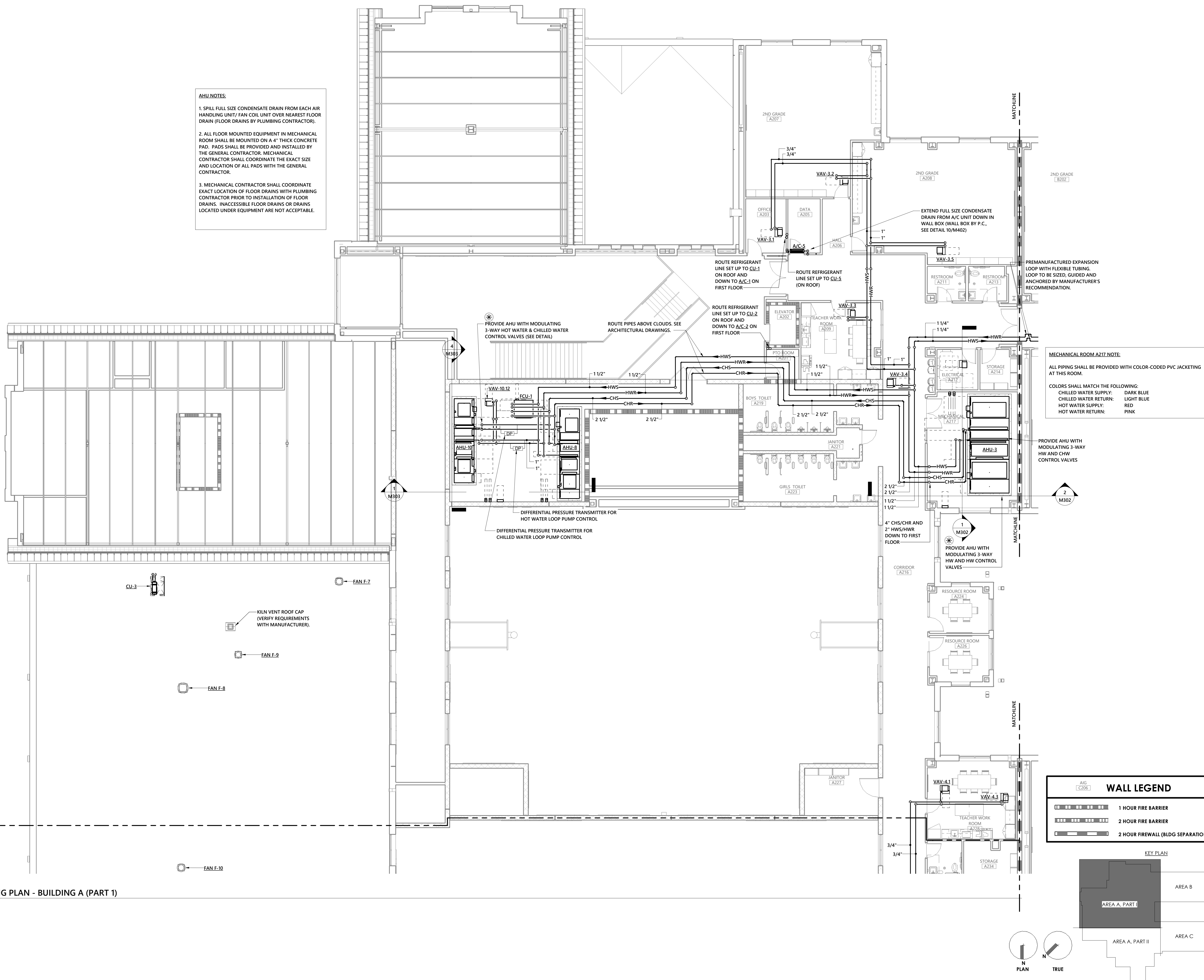
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REVISIONS:

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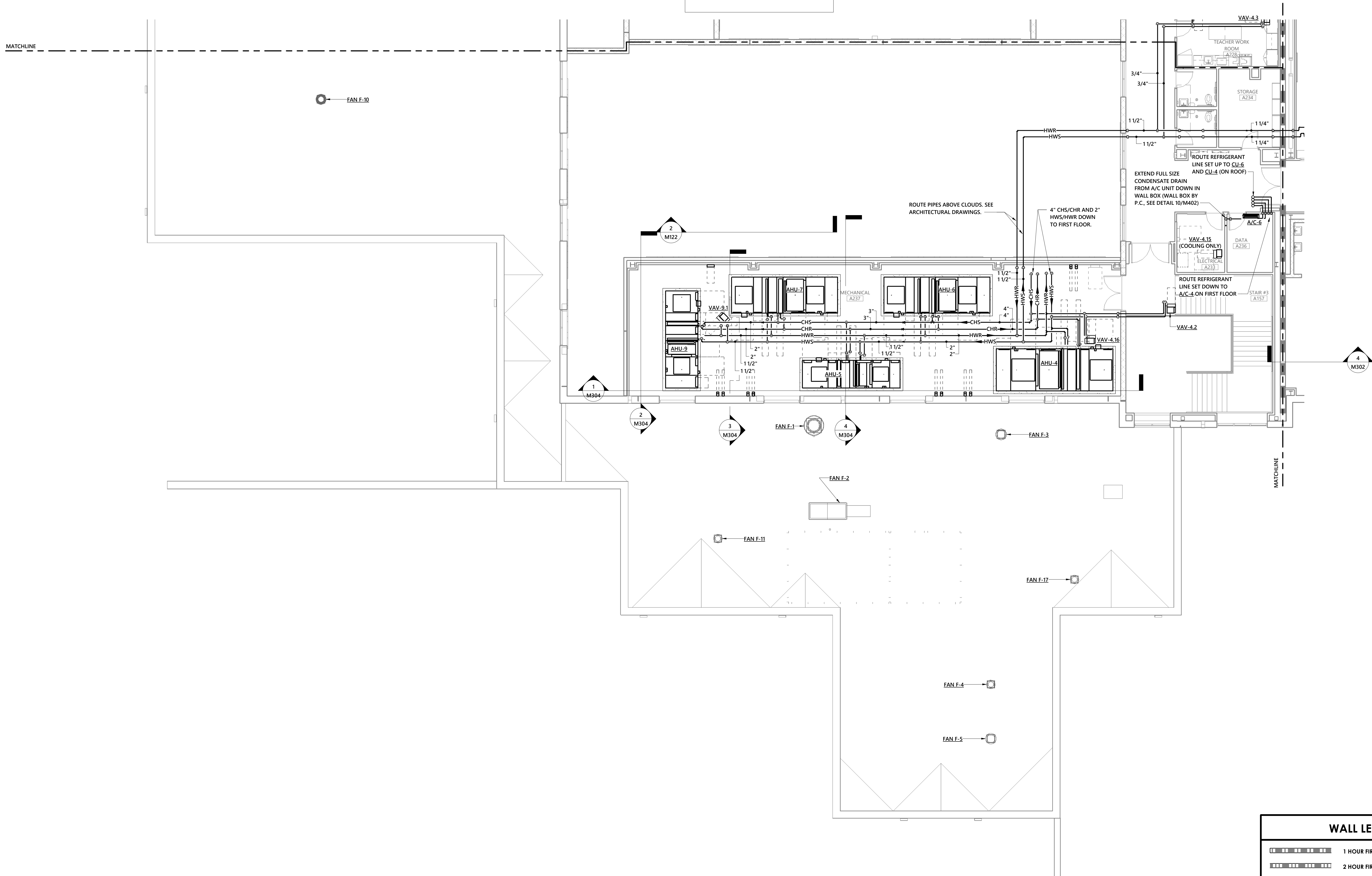
UPPER LEVEL
MECHANICAL PIPING
PLAN - BUILDING A
(PART 1)

ARCHITECTURAL:

M221

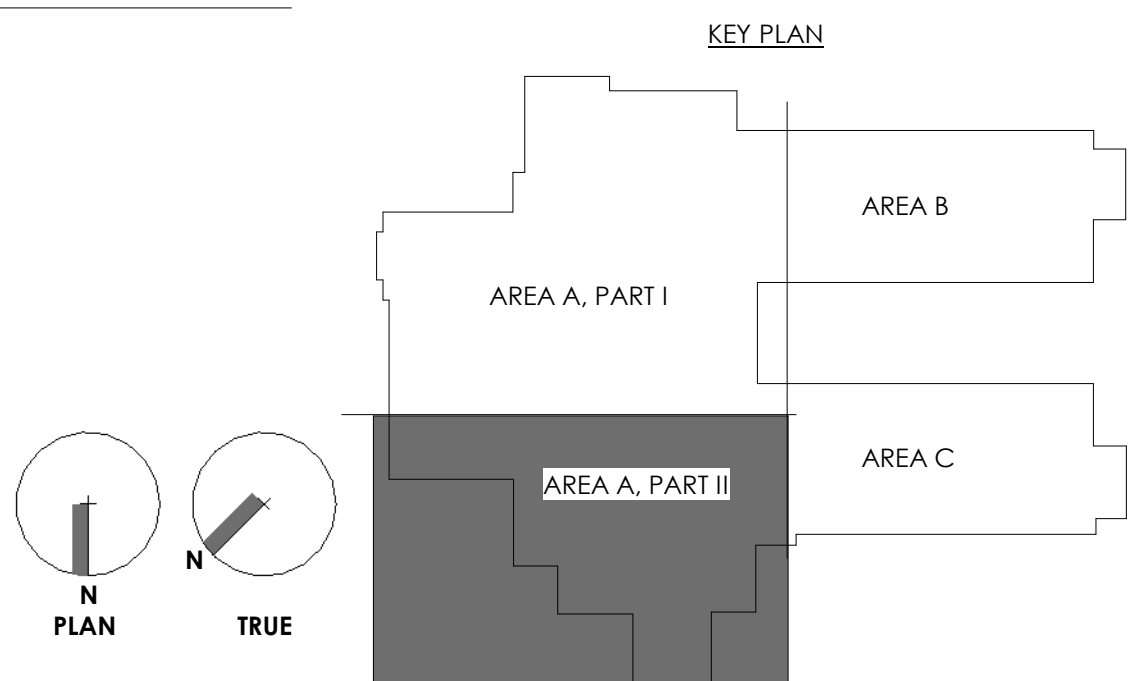
AHU NOTES:

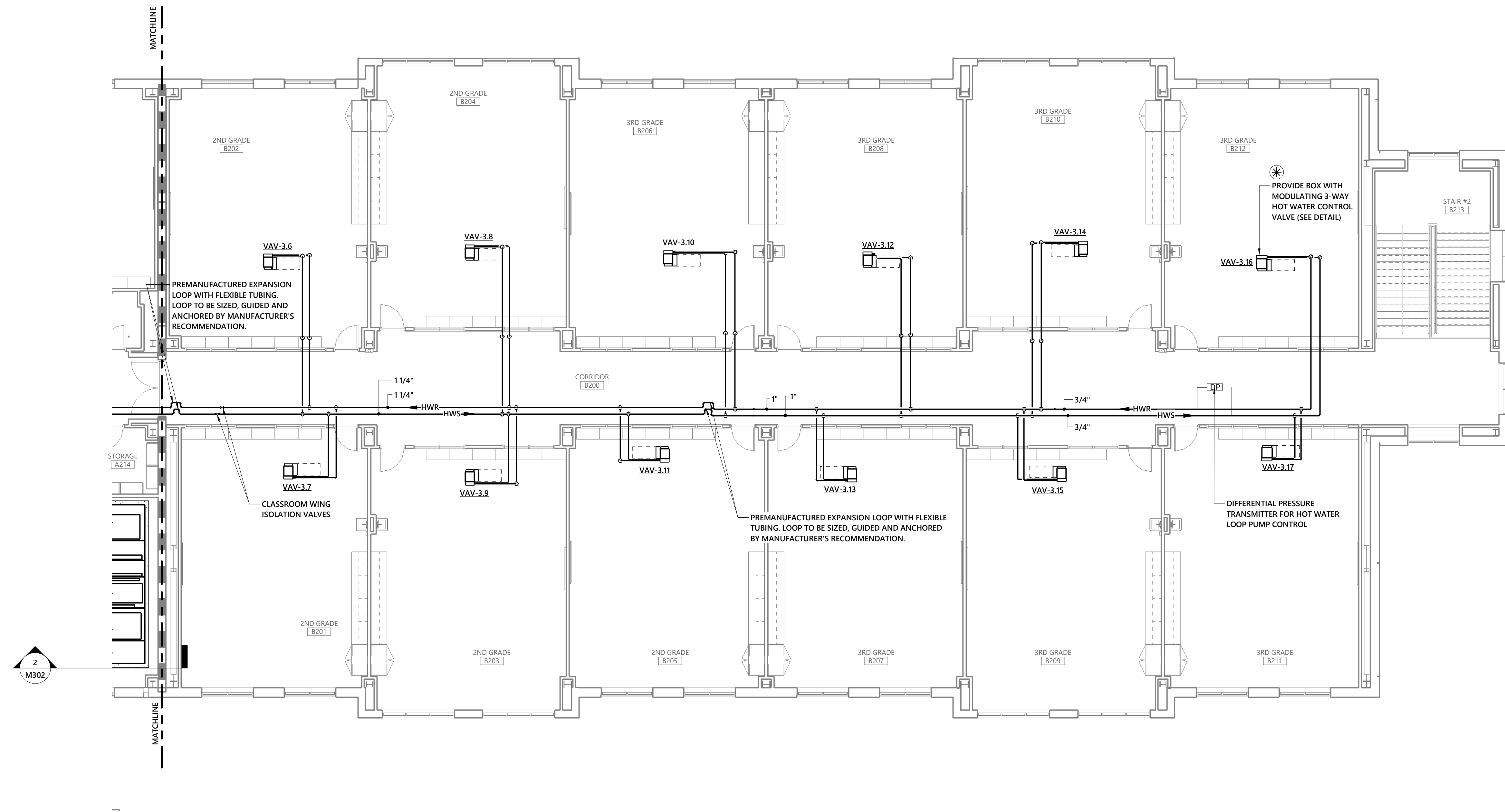
1. SPILL FULL SIZE CONDENSATE DRAIN FROM EACH AIR HANDLING UNIT OVER NEAREST FLOOR DRAIN (FLOOR DRAINS BY PLUMBING CONTRACTOR).
2. ALL FLOOR MOUNTED EQUIPMENT IN MECHANICAL ROOM SHALL BE MOUNTED ON A 4" THICK CONCRETE PAD. PADS SHALL BE PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT SIZE AND LOCATION OF ALL PADS WITH THE GENERAL CONTRACTOR.
3. MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION OF FLOOR DRAINS WITH PLUMBING CONTRACTOR PRIOR TO INSTALLATION OF FLOOR DRAINS. INACCESSIBLE FLOOR DRAINS OR DRAINS LOCATED UNDER EQUIPMENT ARE NOT ACCEPTABLE.



WALL LEGEND		
	1 HOUR FIRE BARRIER	
	2 HOUR FIRE BARRIER	
	2 HOUR FIREWALL (BLDG SEPARATION WALL)	

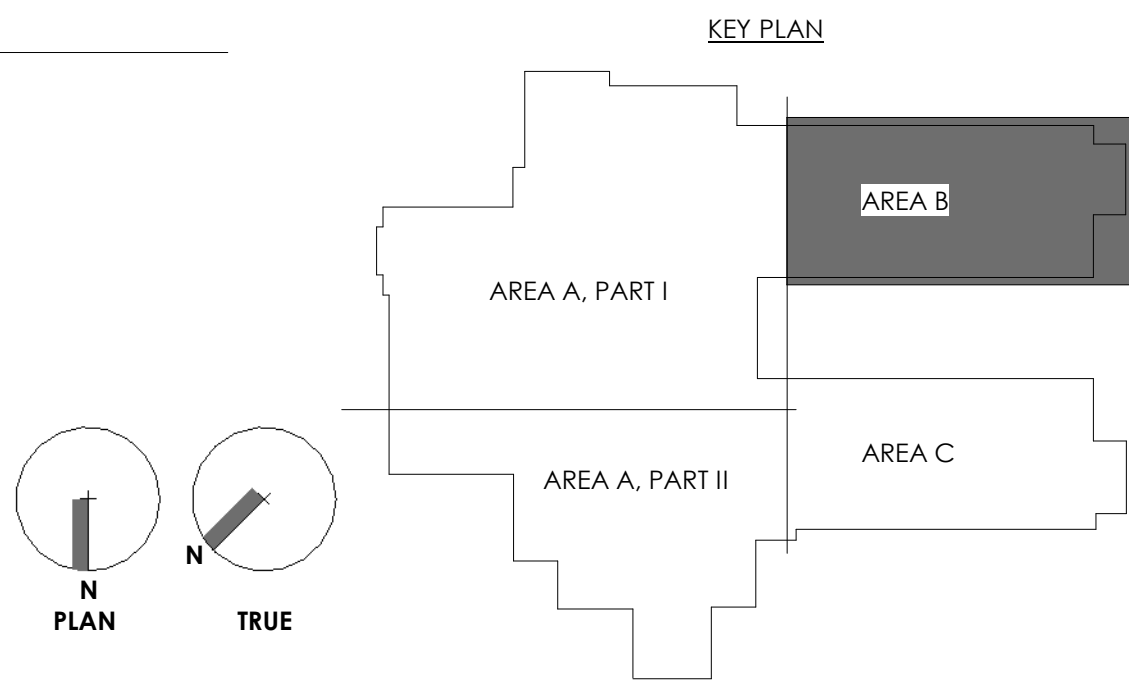
1 UPPER LEVEL MECHANICAL PIPING PLAN - BUILDING A (PART 2)
1/8" = 1'-0"

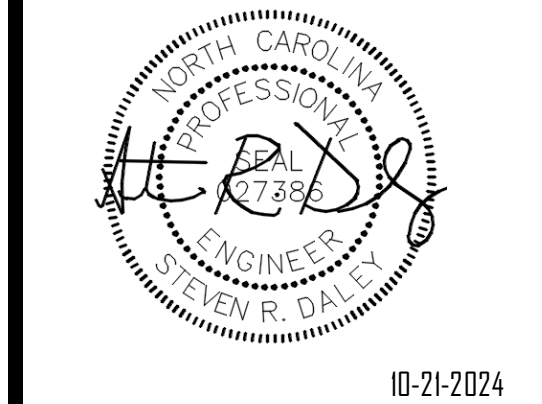




1 UPPER LEVEL MECHANICAL PIPING PLAN - BUILDING B
1/8" = 1'-0"

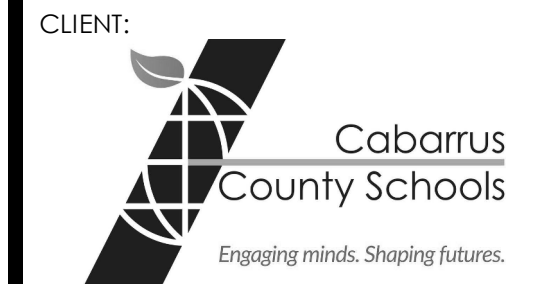
WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)





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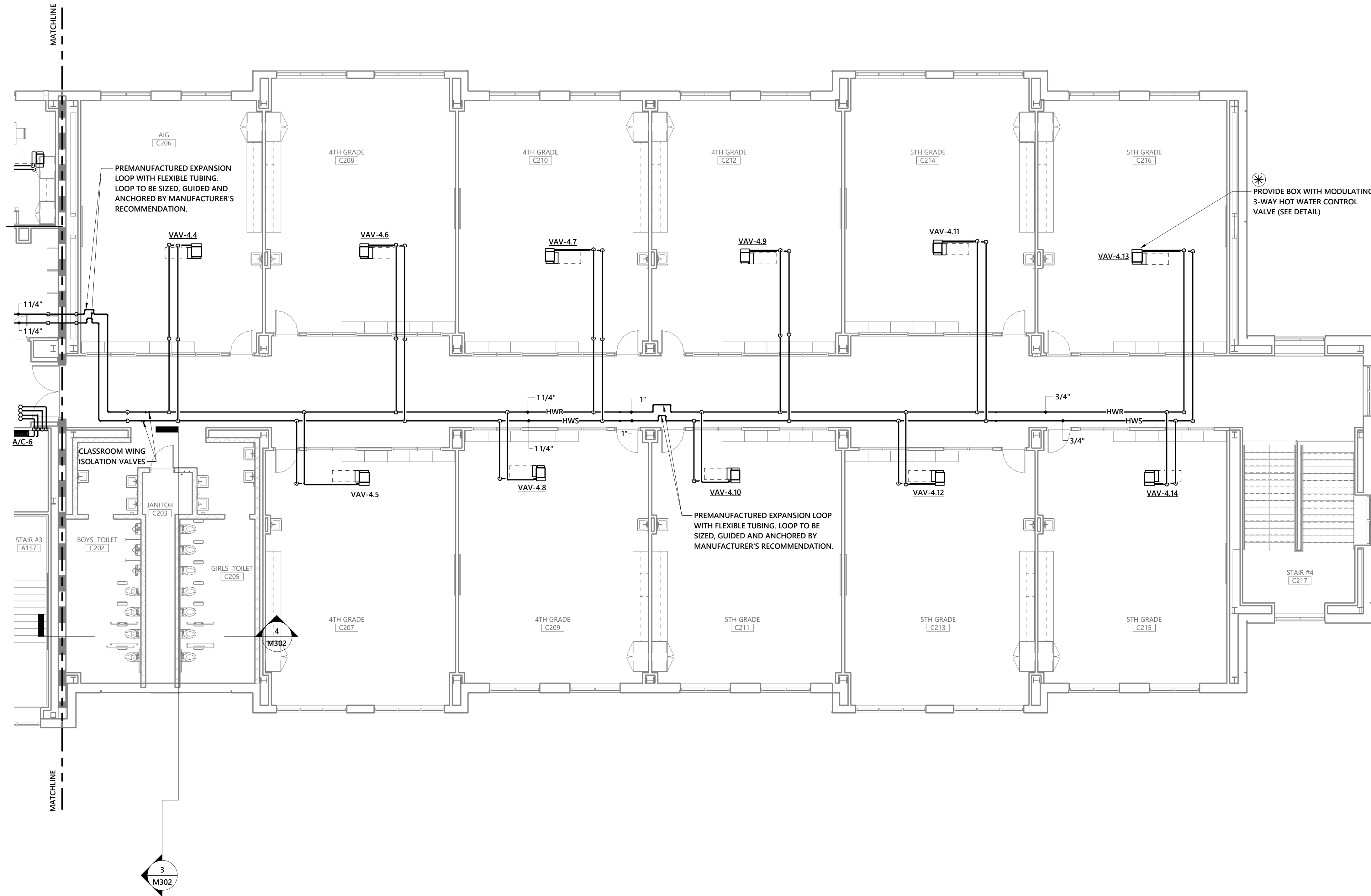
10/21/2024

REVISIONS:

SHEET TITLE:
**UPPER LEVEL
MECHANICAL PIPING
PLAN - BUILDING C**

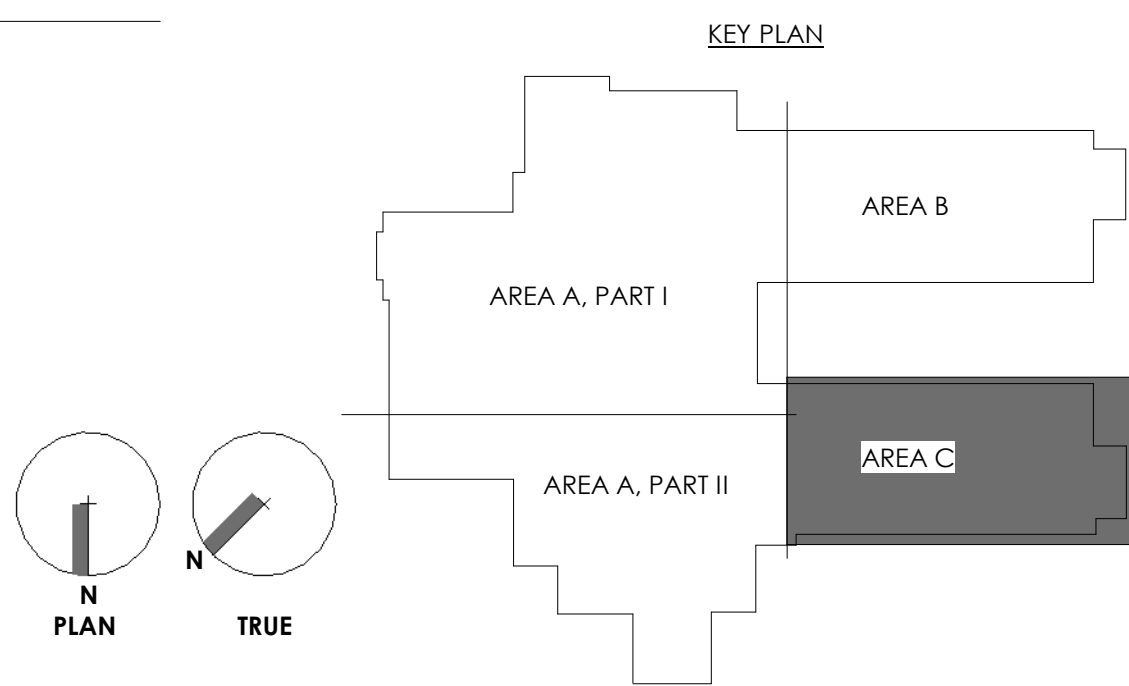
ARCHITECTURAL:

M224



1 UPPER LEVEL MECHANICAL PIPING PLAN MECHANICAL - BUILDING C
1/8" = 1'-0"

WALL LEGEND	
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)



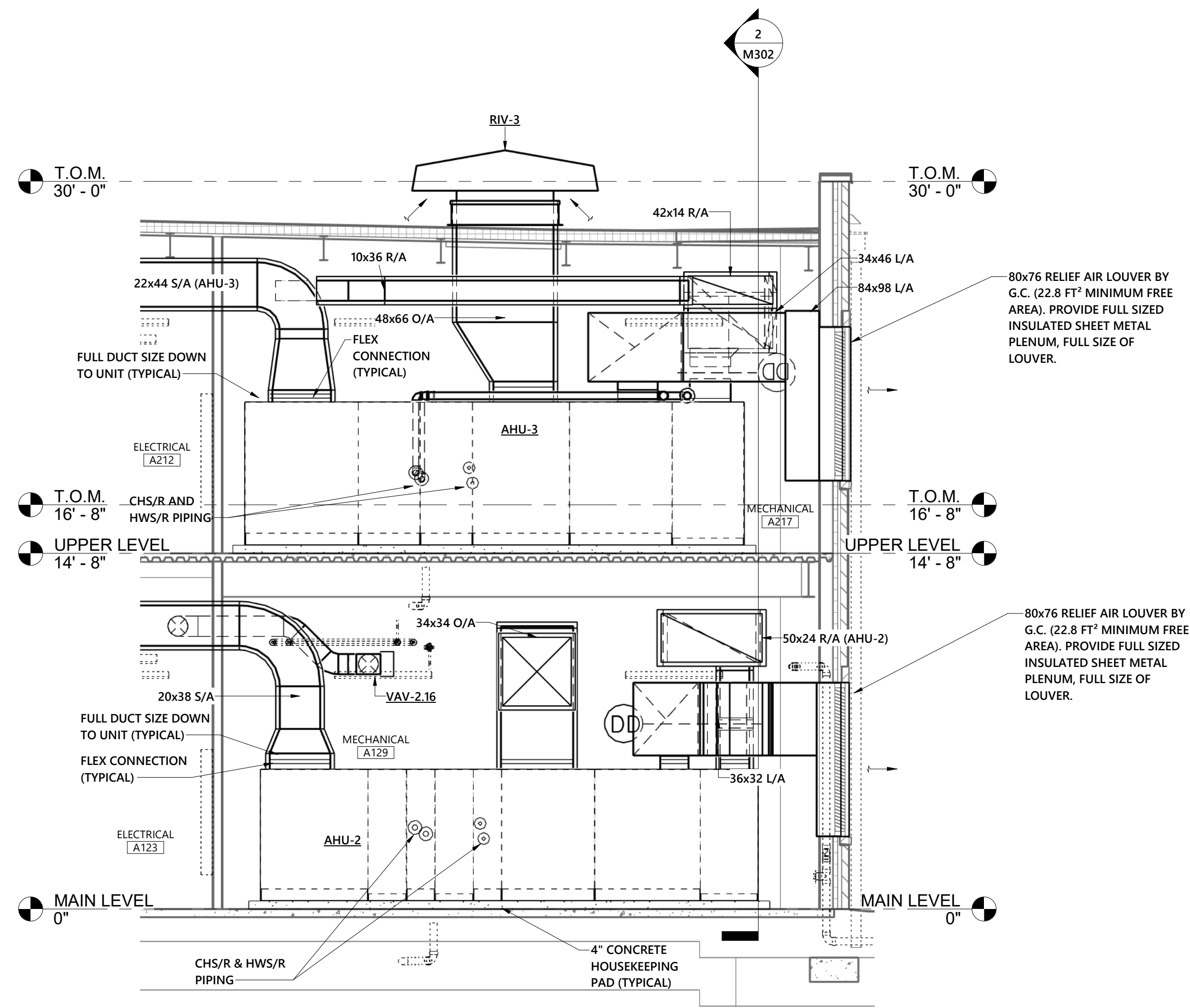


1. ALL PIPING ABOVE GRADE SHALL HAVE ELECTRIC HEAT TAPE INSTALLED AT 10 WATTS PER LINEAR FOOT (120V-10). HEAT TAPE SHALL BE FURNISHED WITH THERMOSTAT AND SHALL BE INSTALLED PRIOR TO INSTALLING INSULATION. PIPE INSULATION SHALL BE COVERED WITH AN OUTER ALUMINUM JACKET SEALED WATERTIGHT.
2. CHILLERS SHALL BE MOUNTED ON A 6" THICK CONCRETE PAD. PADS SHALL BE PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT SIZE AND LOCATION OF ALL PADS WITH THE GENERAL CONTRACTOR.
3. PROVIDE THRUST BLOCKS AT ALL CHANGES OF DIRECTION PER PREINSULATED PIPE MANUFACTURERS' RECOMMENDATIONS.
4. ALL FLOOR MOUNTED EQUIPMENT IN MECHANICAL ROOM SHALL BE MOUNTED ON A 4" THICK CONCRETE PAD. PADS SHALL BE PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL COORDINATE THE EXACT SIZE AND LOCATION OF ALL PADS WITH THE GENERAL CONTRACTOR.
5. MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION OF FLOOR DRAINS WITH PLUMBING CONTRACTOR PRIOR TO INSTALLATION OF FLOOR DRAINS. INACCESSIBLE FLOOR DRAINS OR DRAINS LOCATED UNDER EQUIPMENT ARE NOT ACCEPTABLE.
6. SPILL FULL SIZE CONDENSATE DRAIN FROM EACH AIR HANDLING UNIT OVER NEAREST FLOOR DRAIN (FLOOR DRAINS TO BE PROVIDED BY CONTRACTOR).

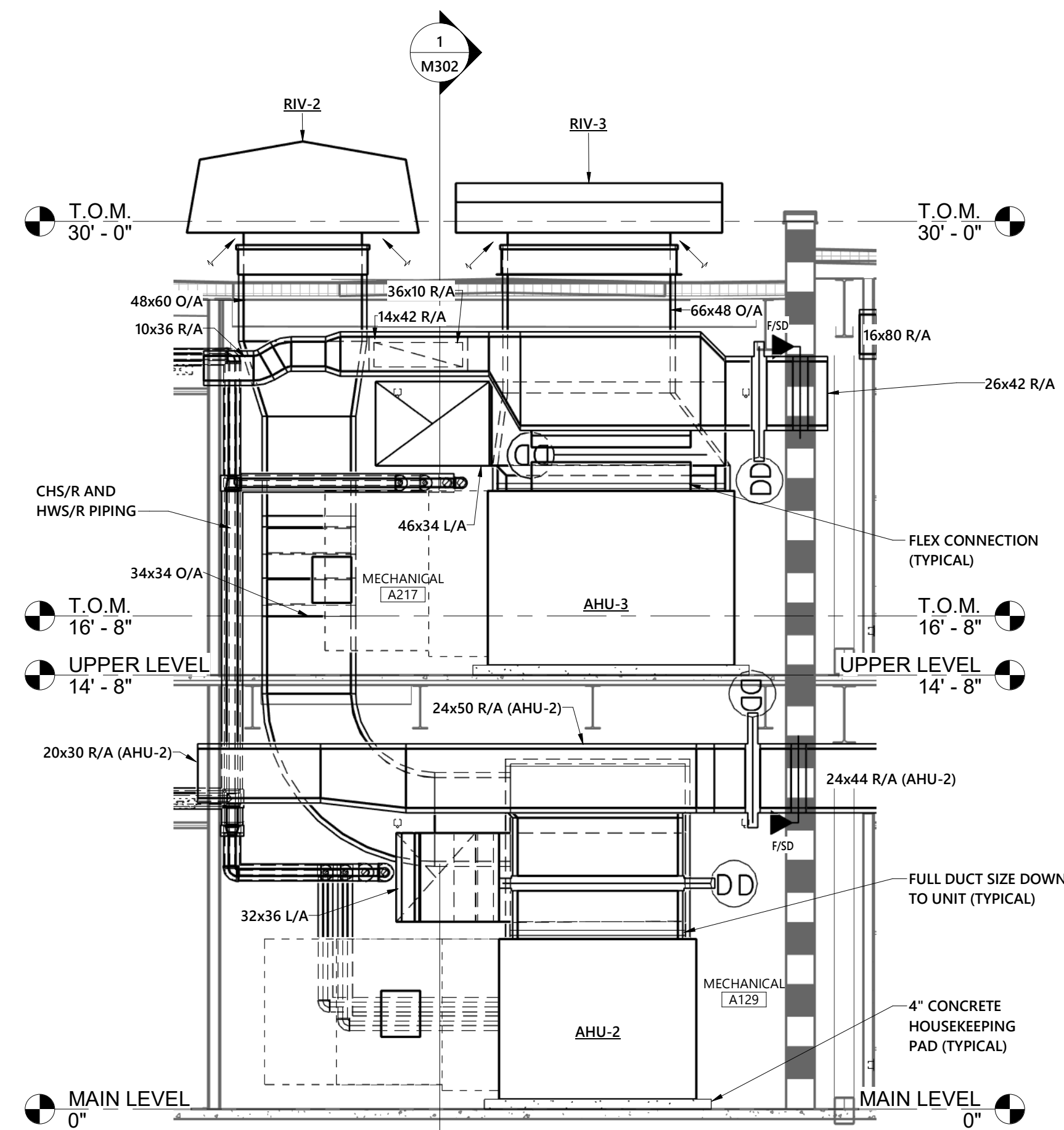


WALL LEGEND

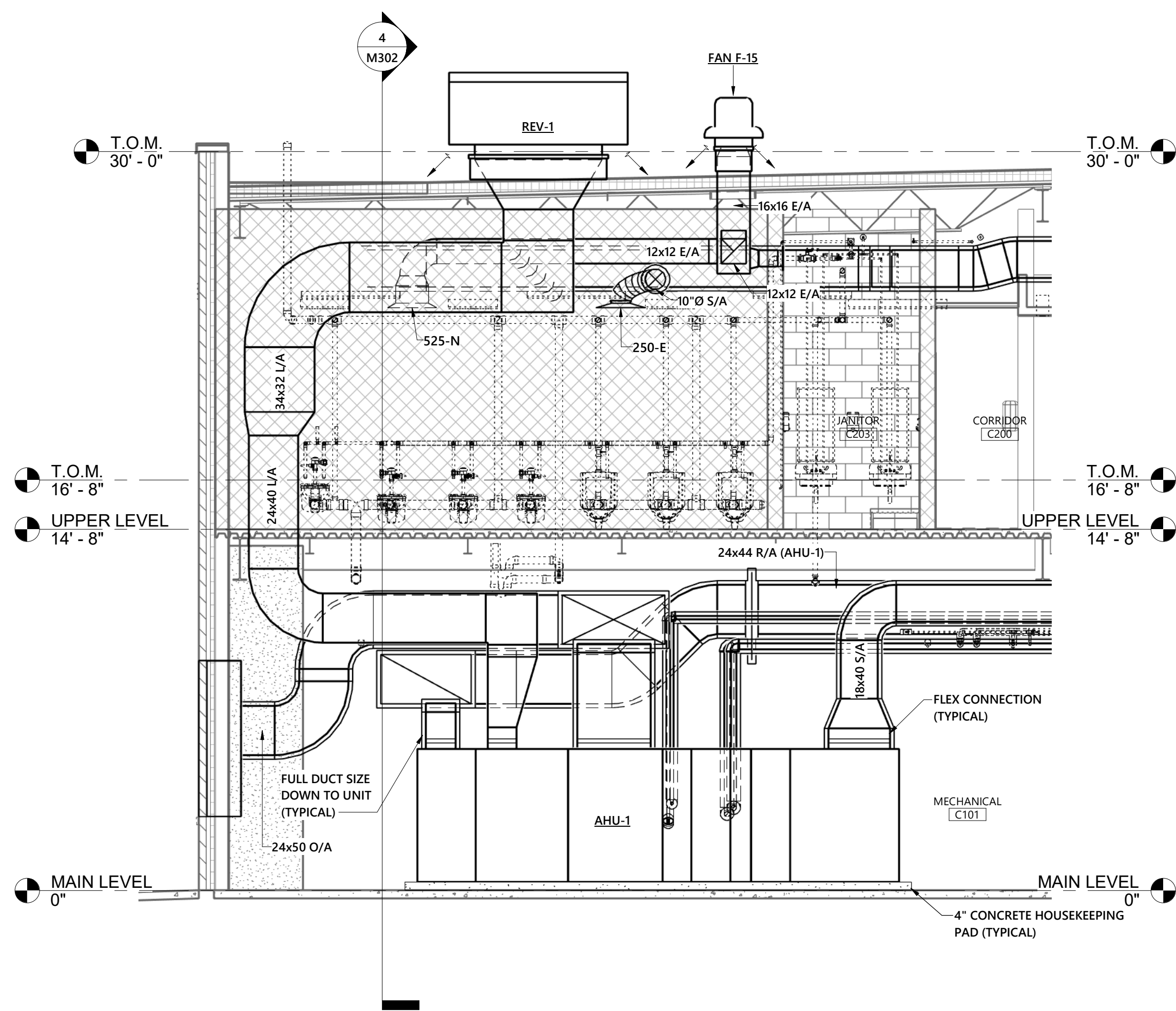
	1 HOUR FIRE BARRIER
	2 HOUR FIRE BARRIER
	2 HOUR FIREWALL (BLDG SEPARATION WALL)



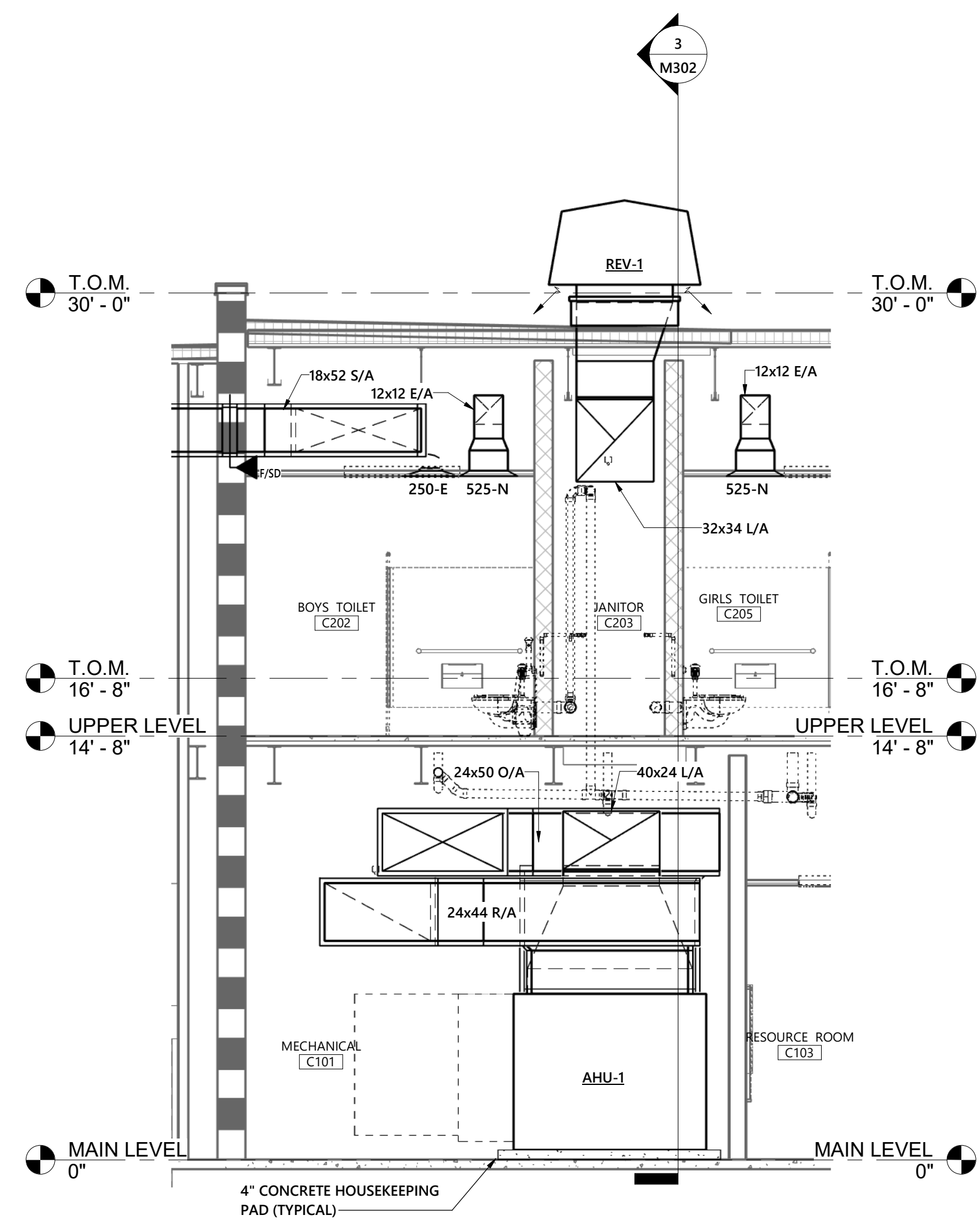
1 MECHANICAL A129 SECTION 1
1/4" = 1'-0"



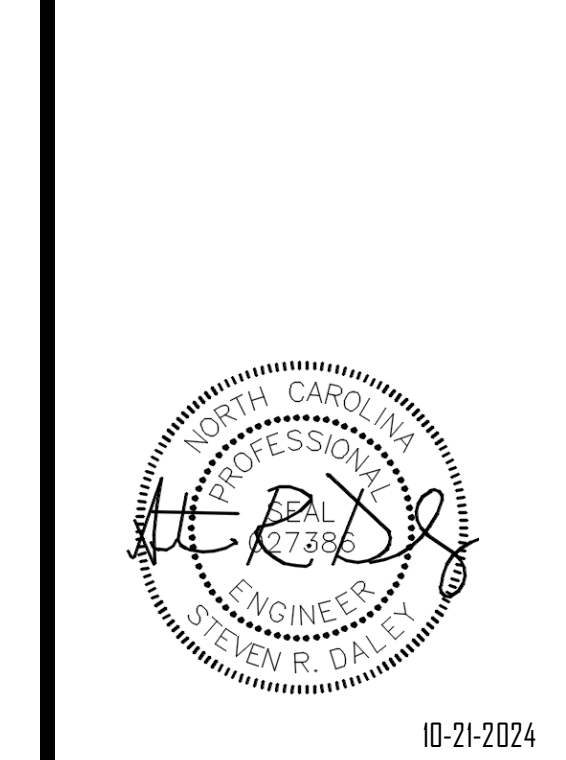
2 MECHANICAL A129 SECTION 2
1/4" = 1'-0"



3 MECHANICAL C101 SECTION 1
1/4" = 1'-0"



4 MECHANICAL C101 SECTION 2
1/4" = 1'-0"



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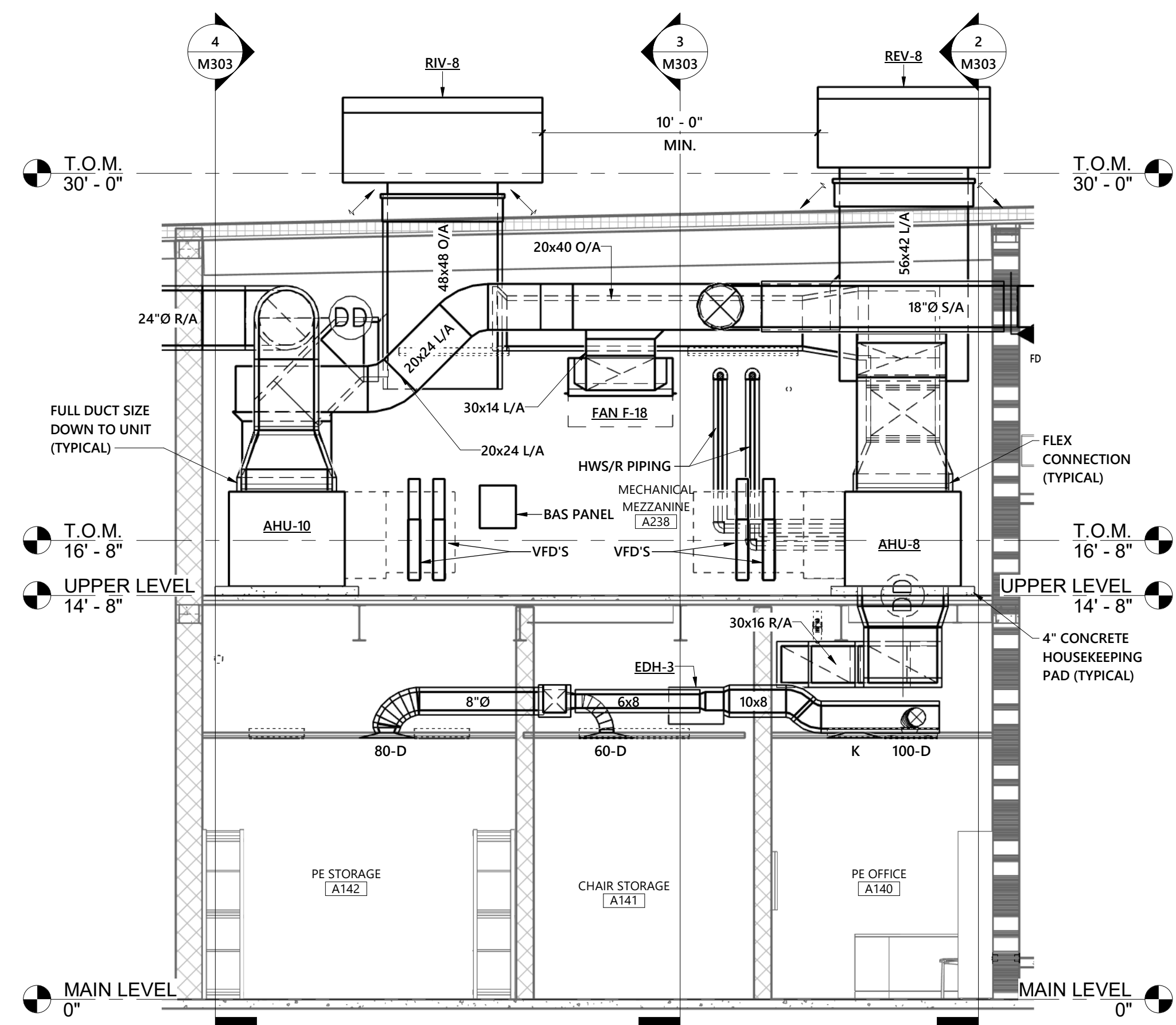
10/21/2024

REVISIONS:

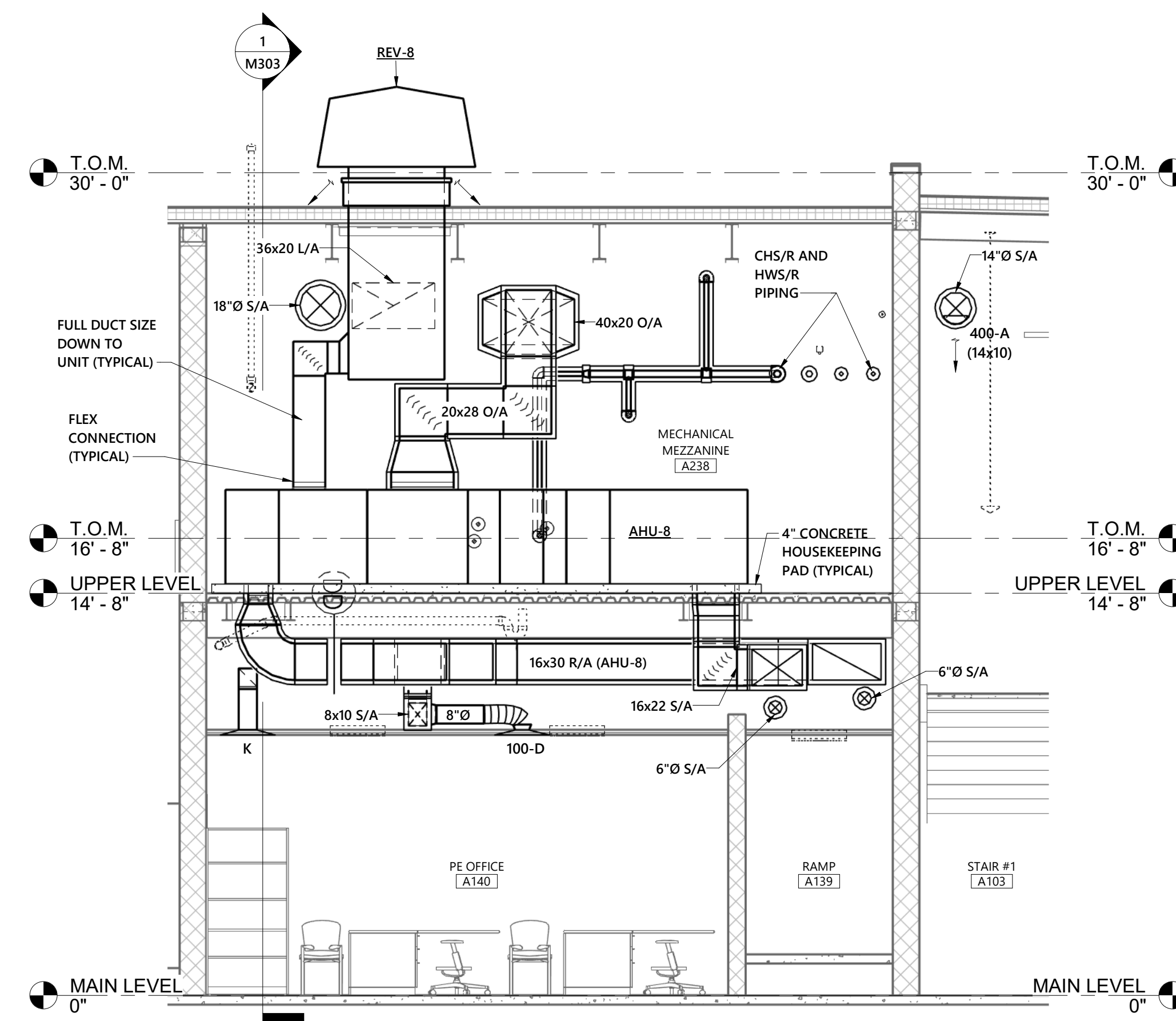
SHEET TITLE:
**MECHANICAL
SECTIONS AND
ELEVATIONS**

ARCHITECTURAL:

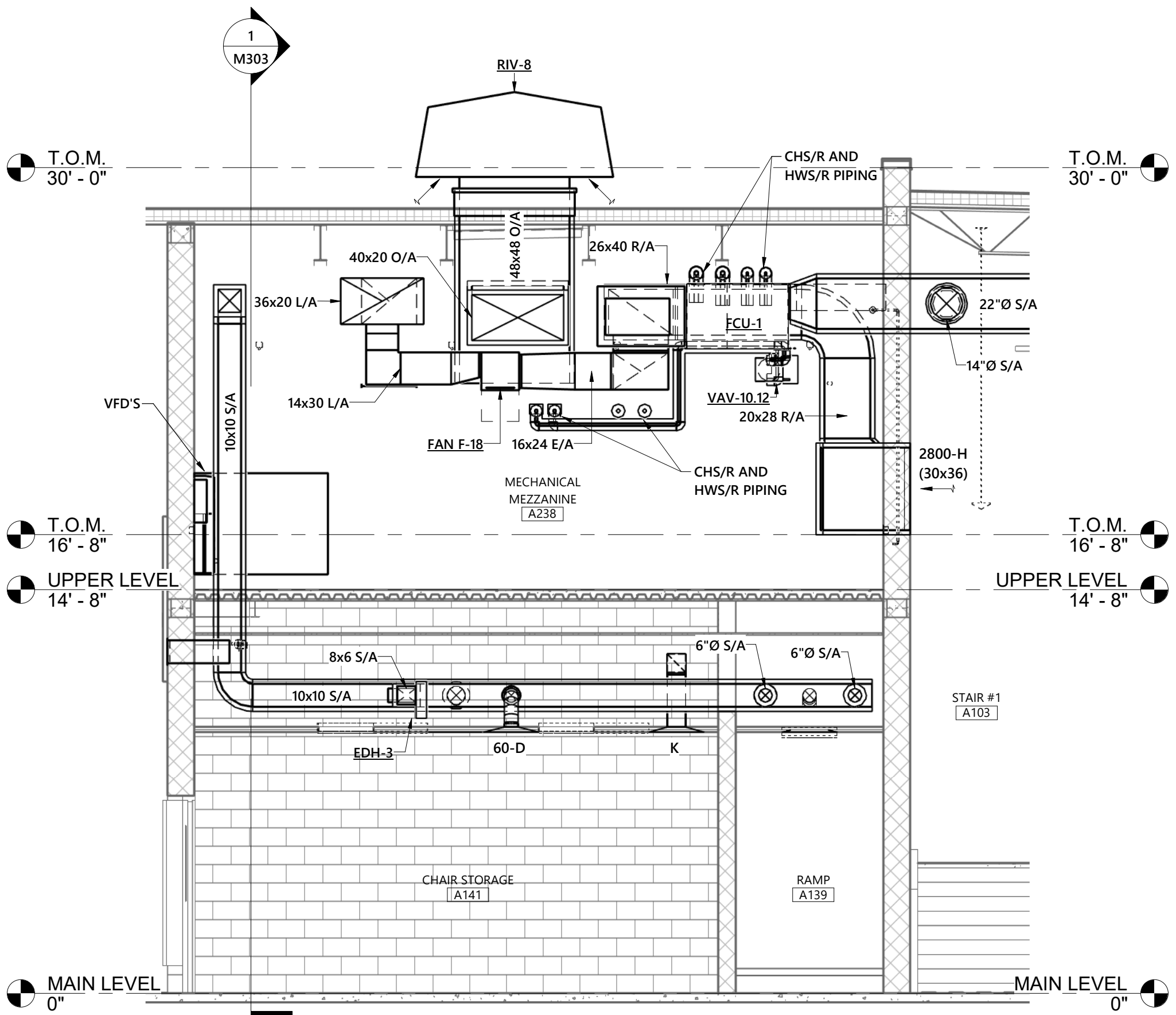
M303



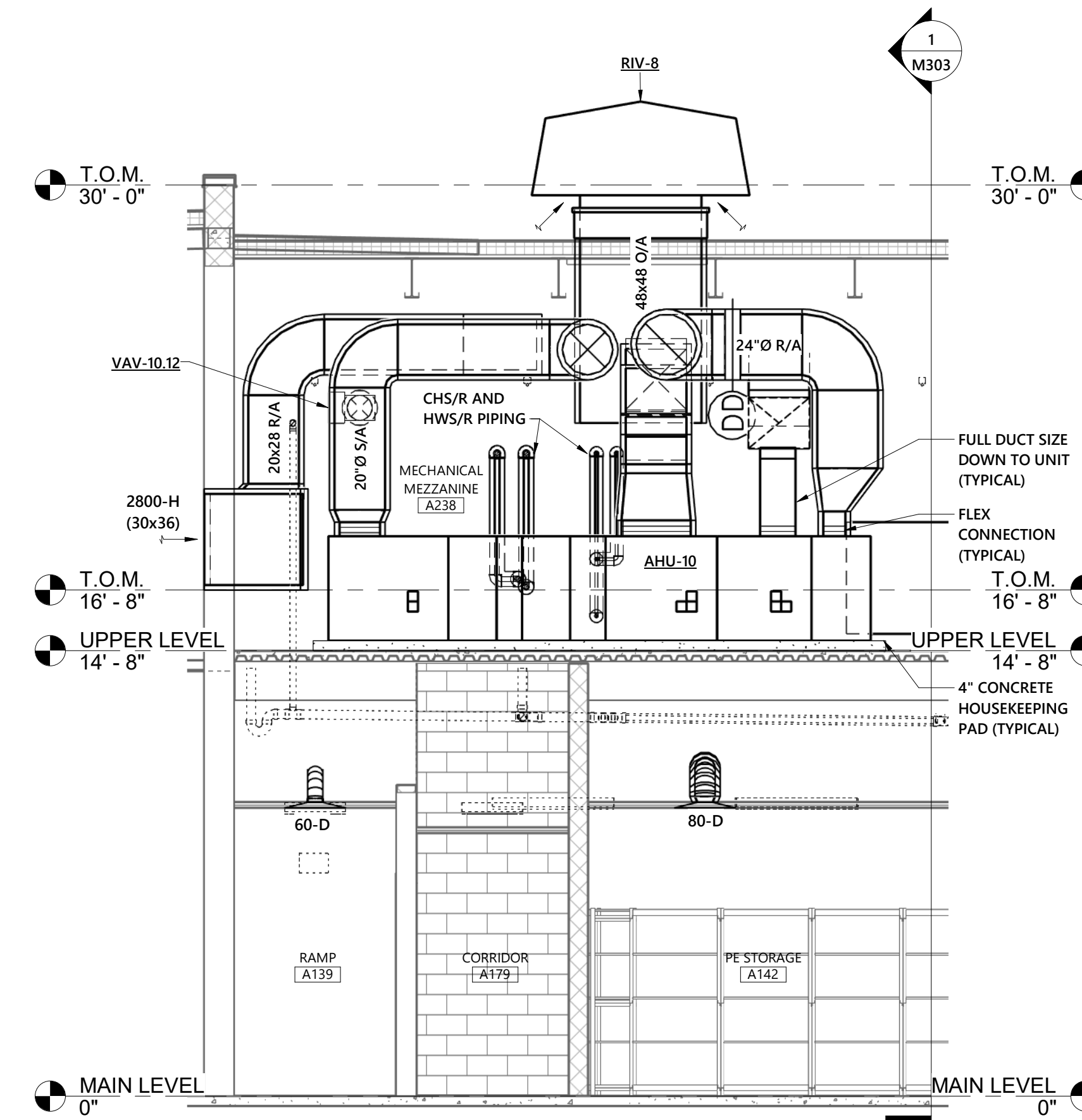
1 MECHANICAL MEZZANINE A238 SECTION 1
1/4" = 1'-0"



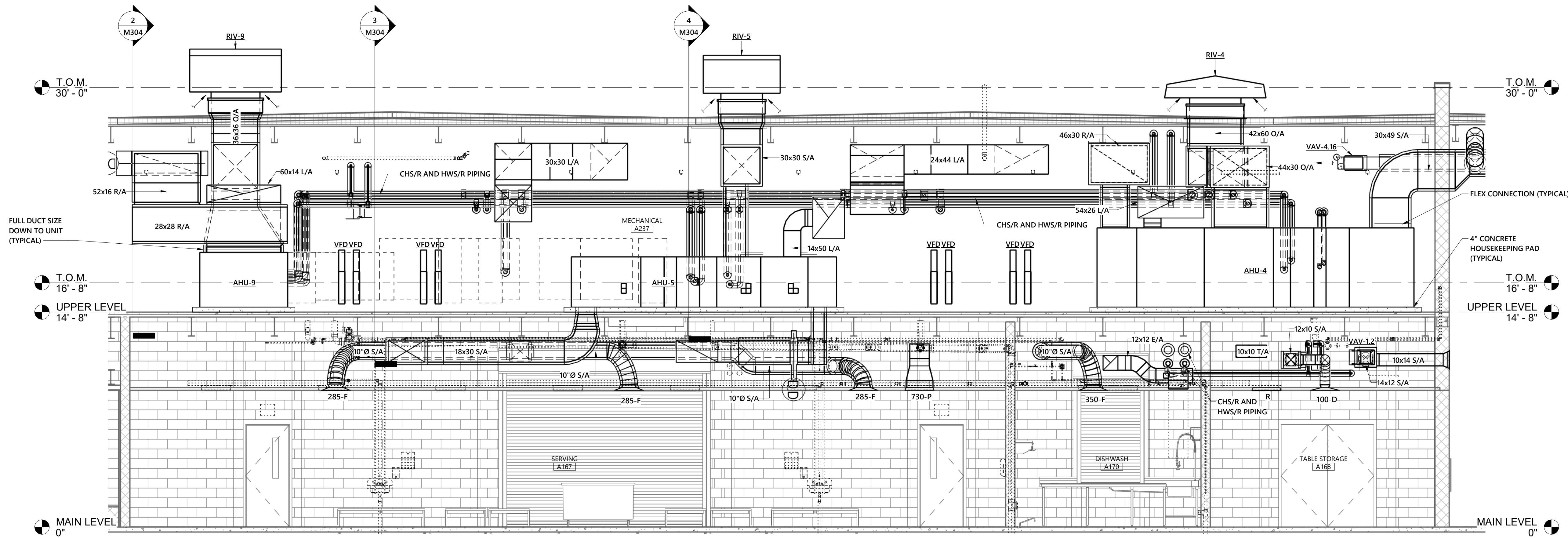
2 MECHANICAL MEZZANINE A238 SECTION 2
1/4" = 1'-0"



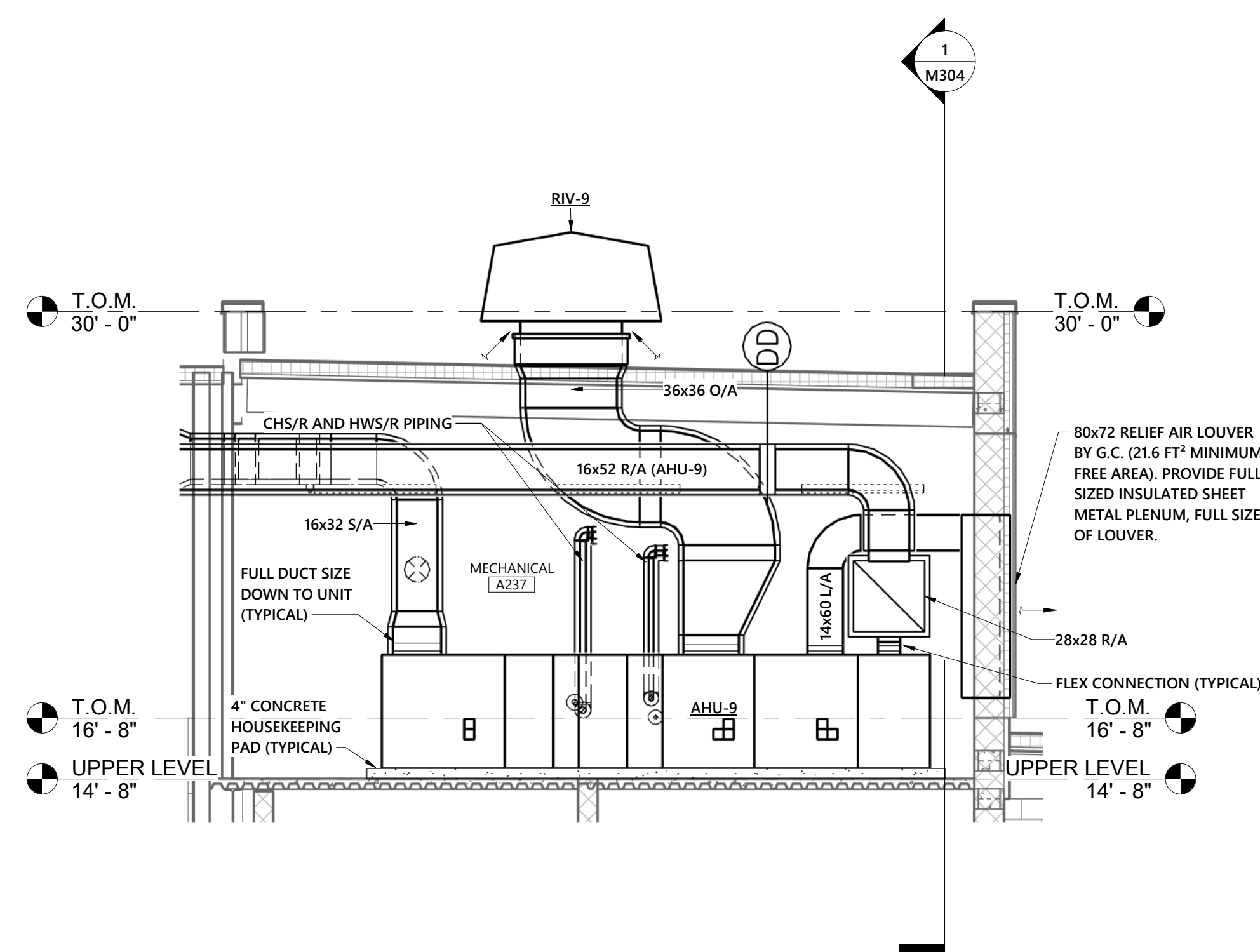
3 MECHANICAL MEZZANINE SECTION 3
1/4" = 1'-0"



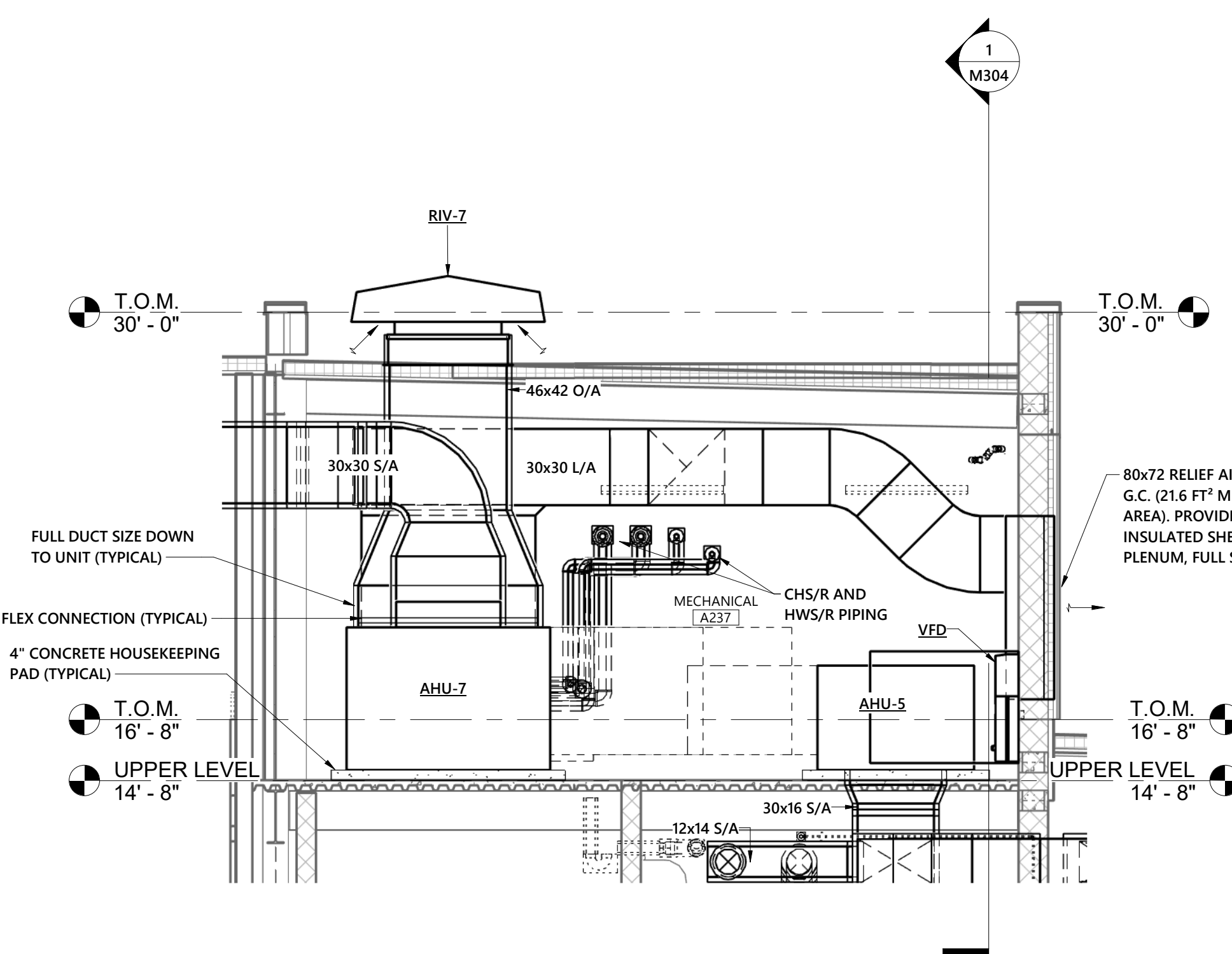
4 MECHANICAL MEZZANINE SECTION 4
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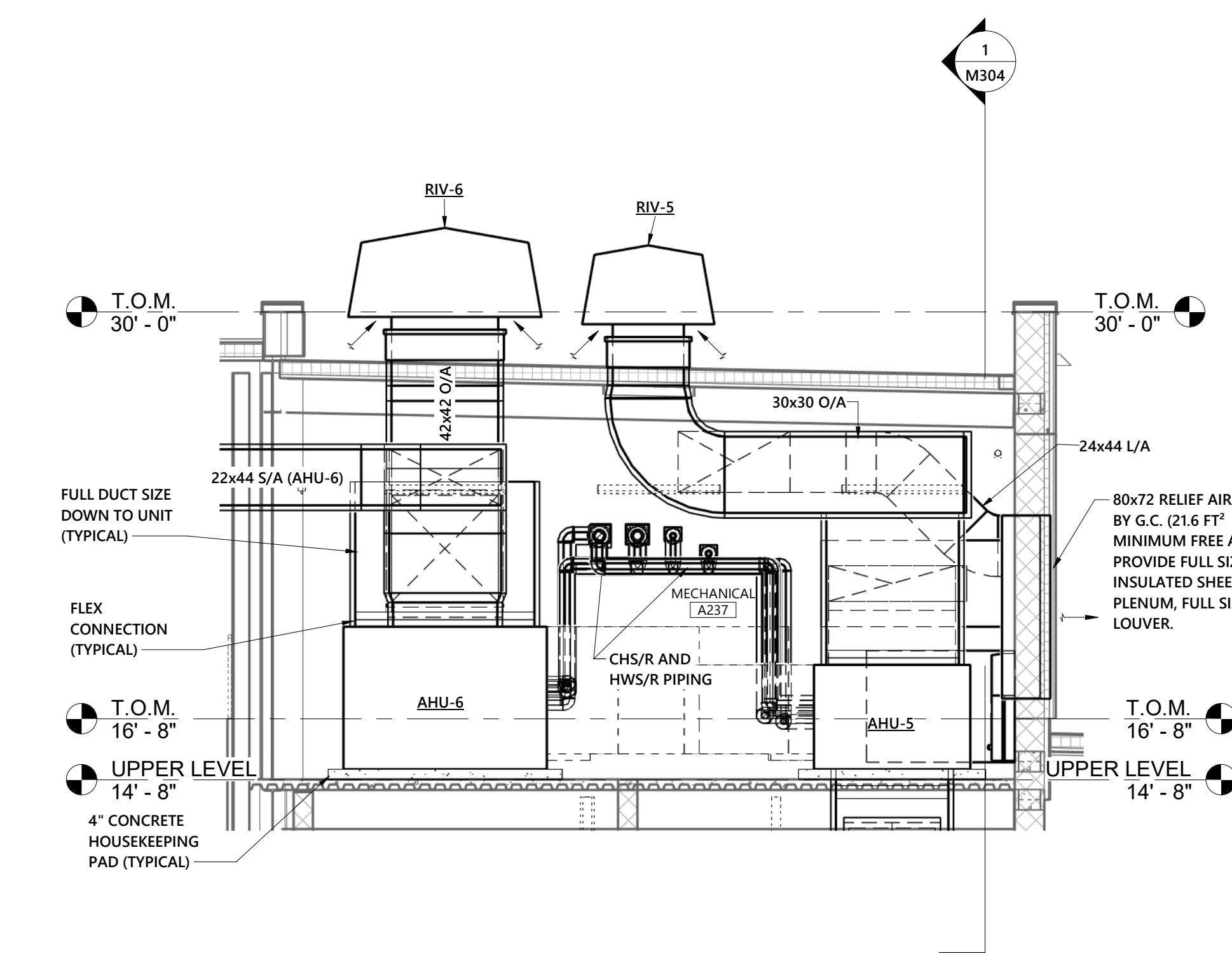
1 MECHANICAL A247 SECTION 1
1/4" = 1'-0"



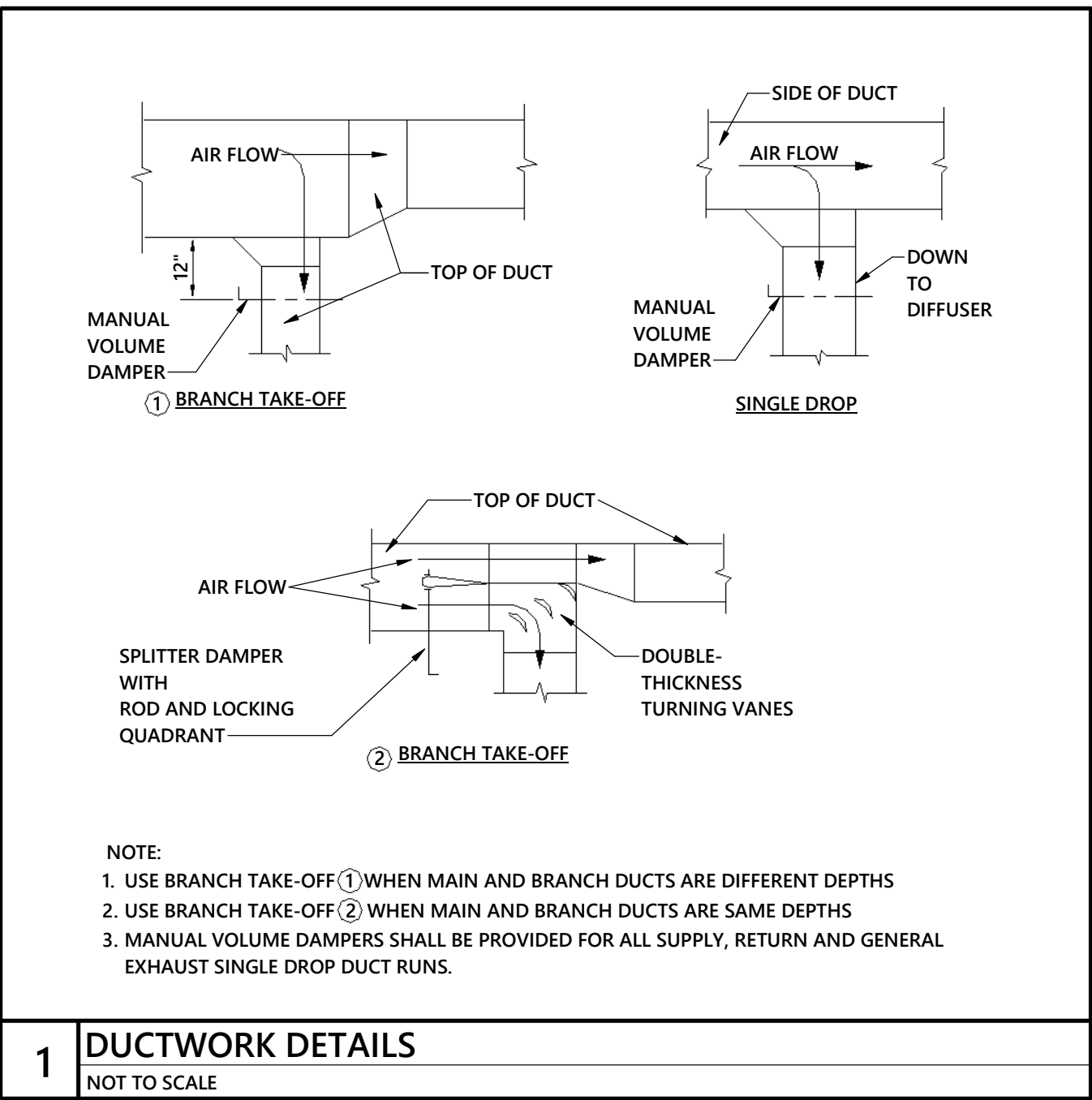
2 MECHANICAL A247 SECTION 2
1/4" = 1'-0"



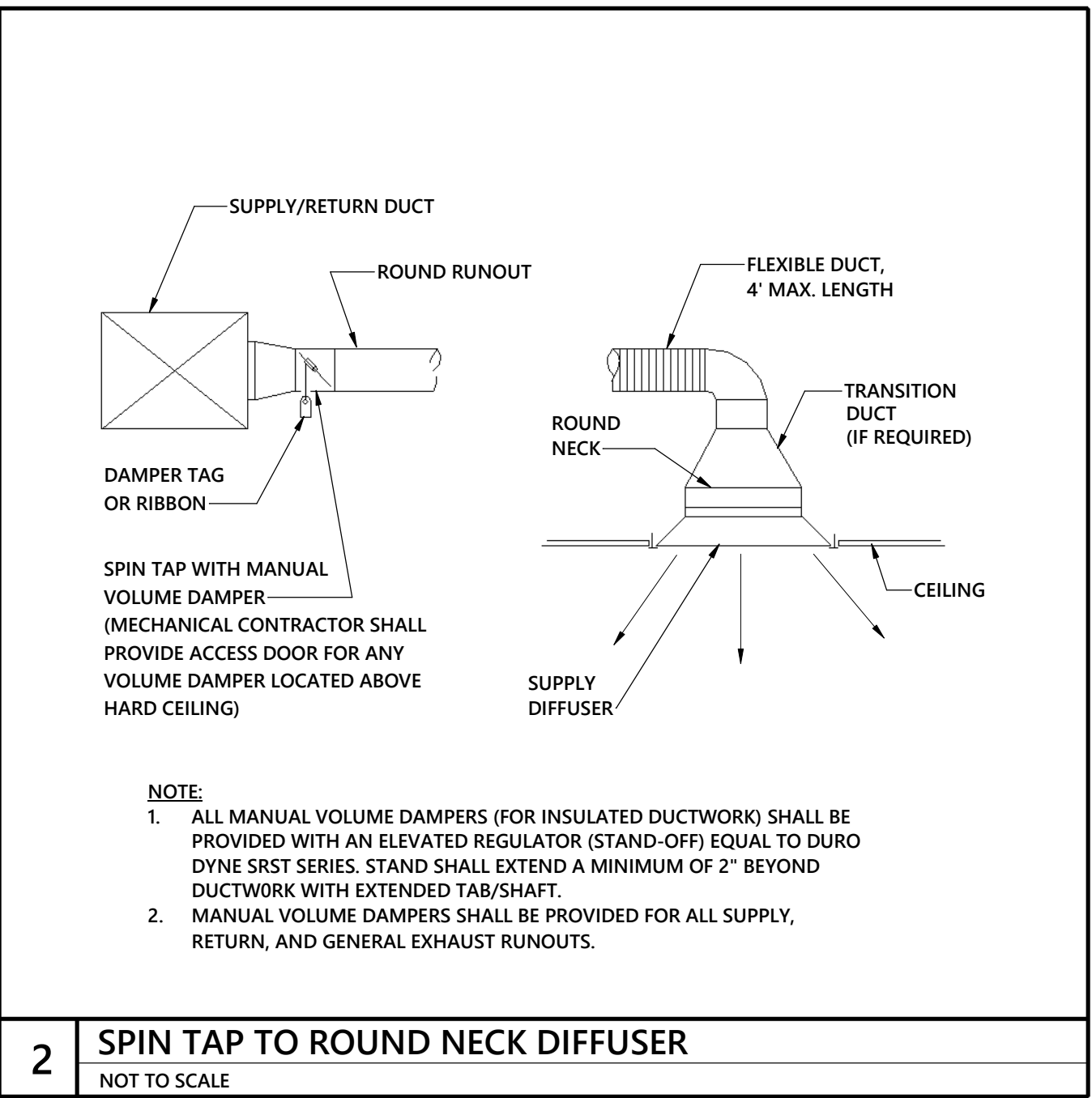
3 MECHANICAL A247 SECTION 3
1/4" = 1'-0"



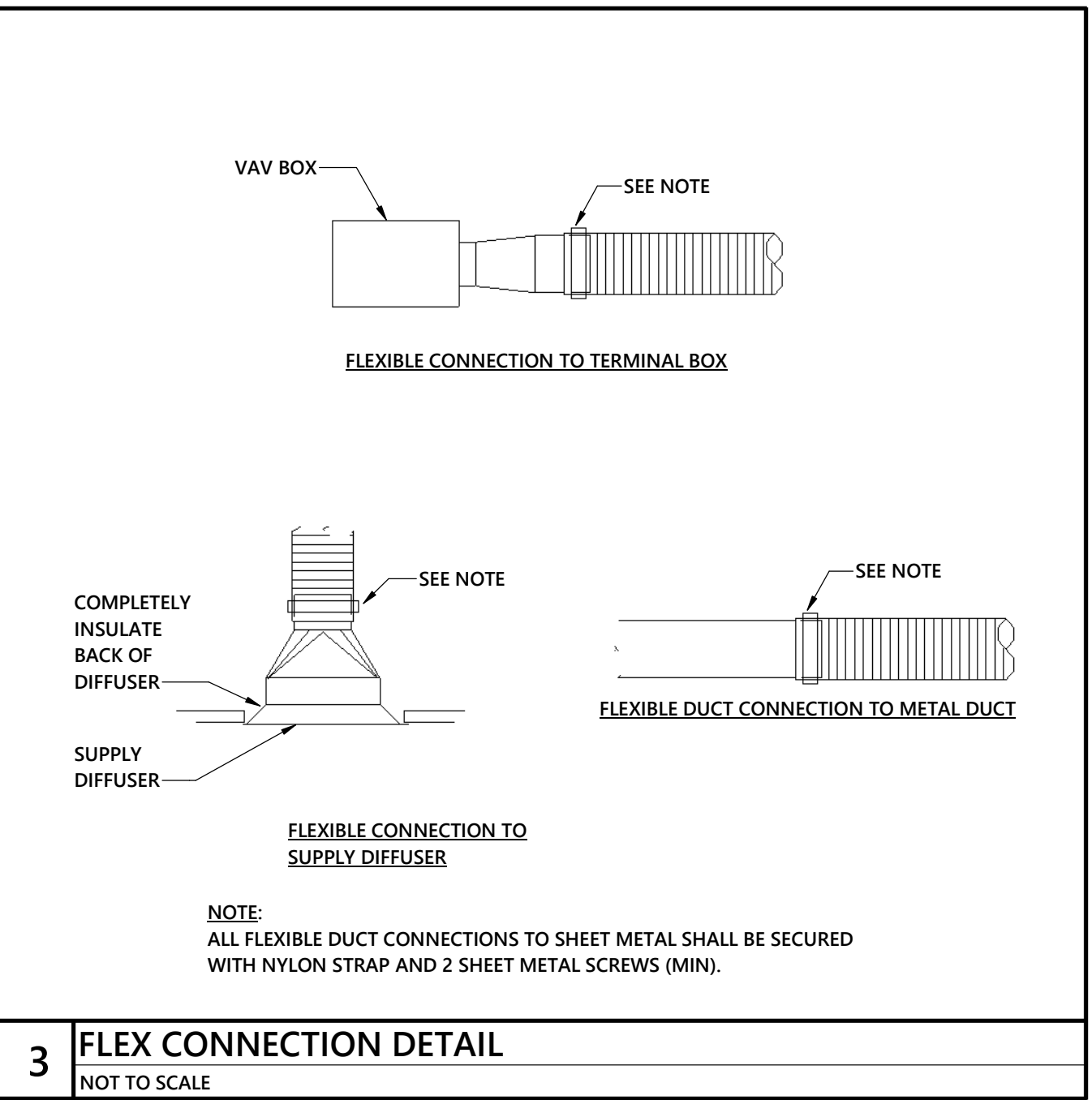
4 MECHANICAL A247 SECTION 4
1/4" = 1'-0"



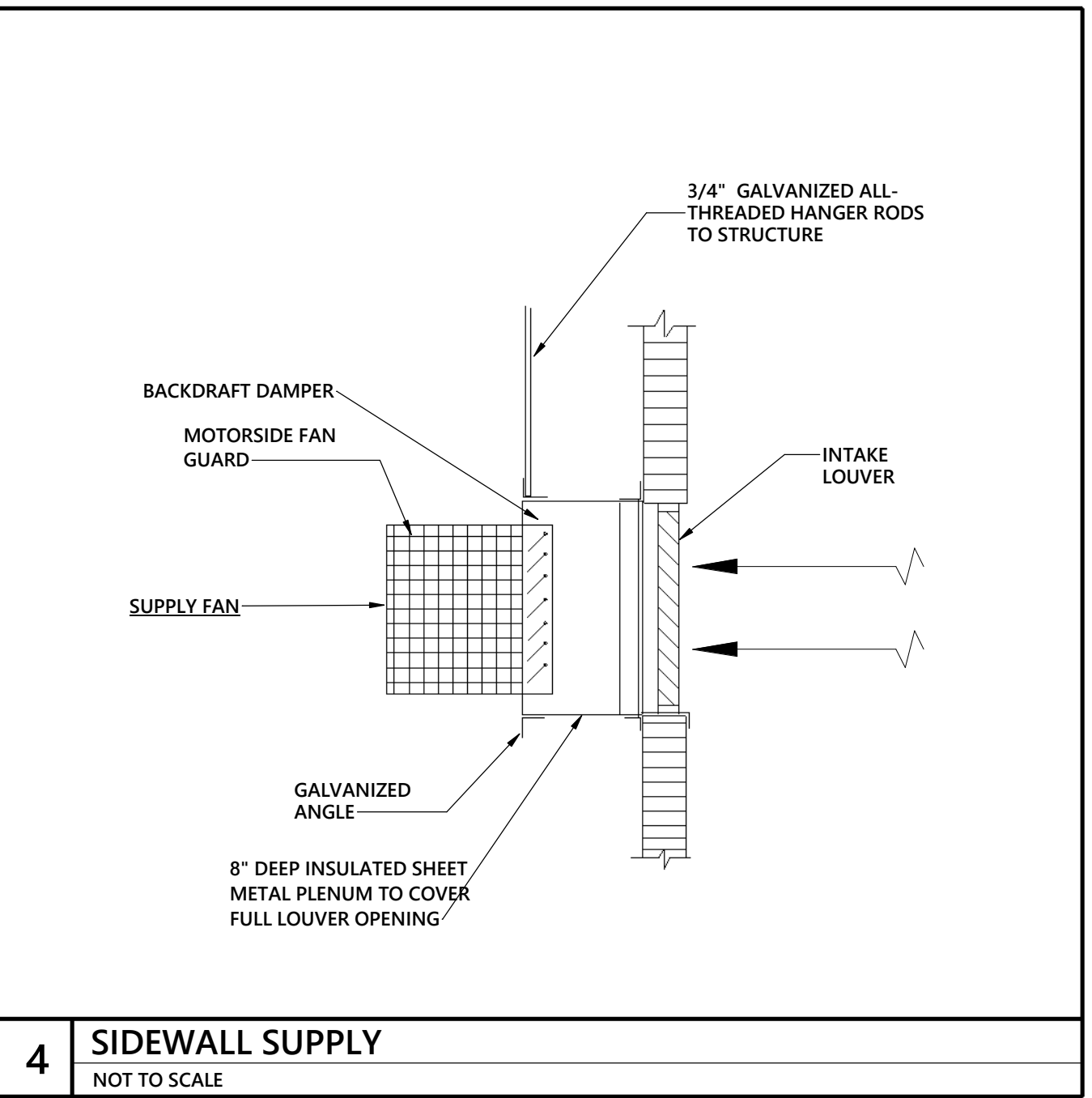
1 DUCTWORK DETAILS
NOT TO SCALE



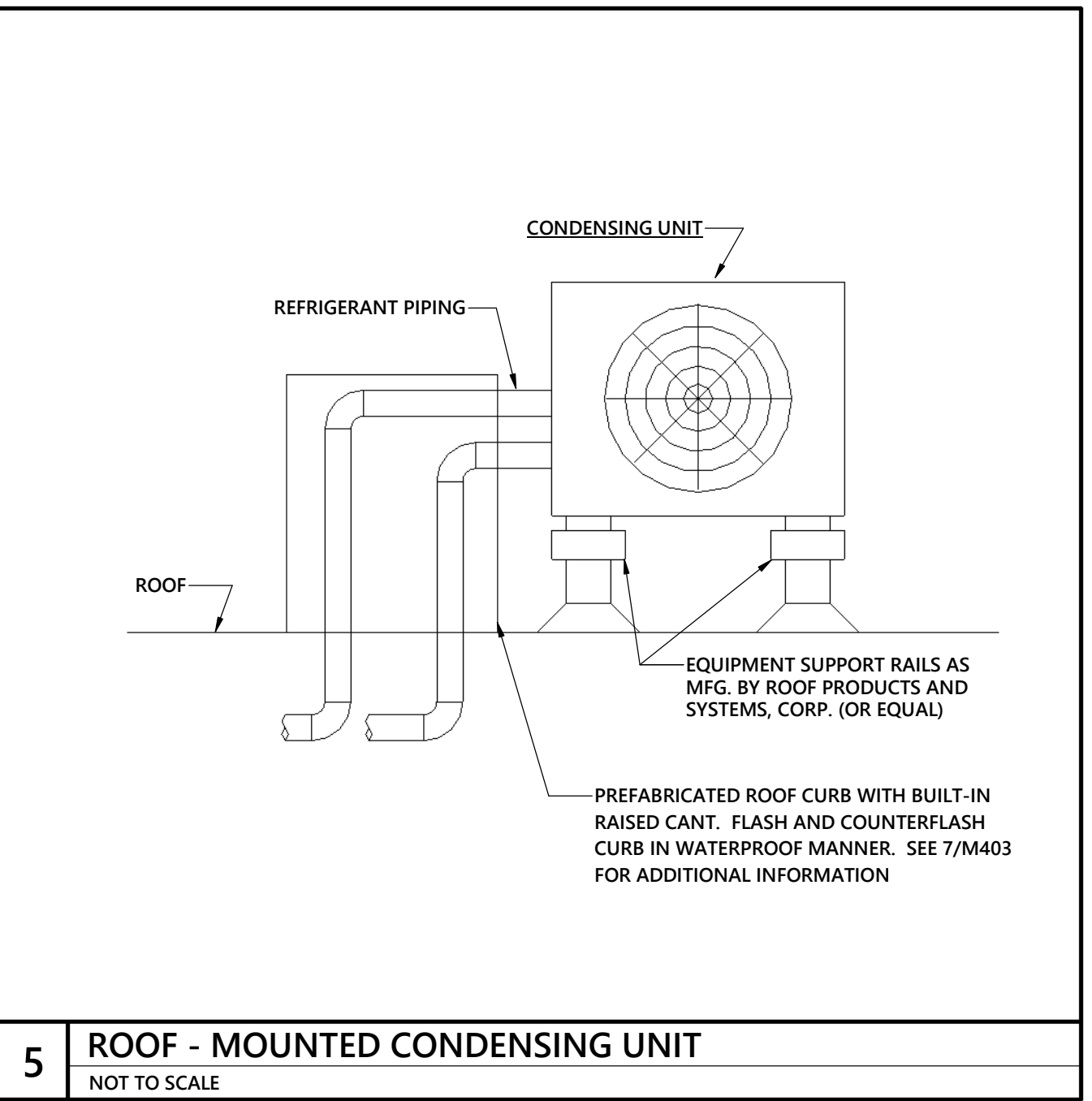
2 SPIN TAP TO ROUND NECK DIFFUSER
NOT TO SCALE



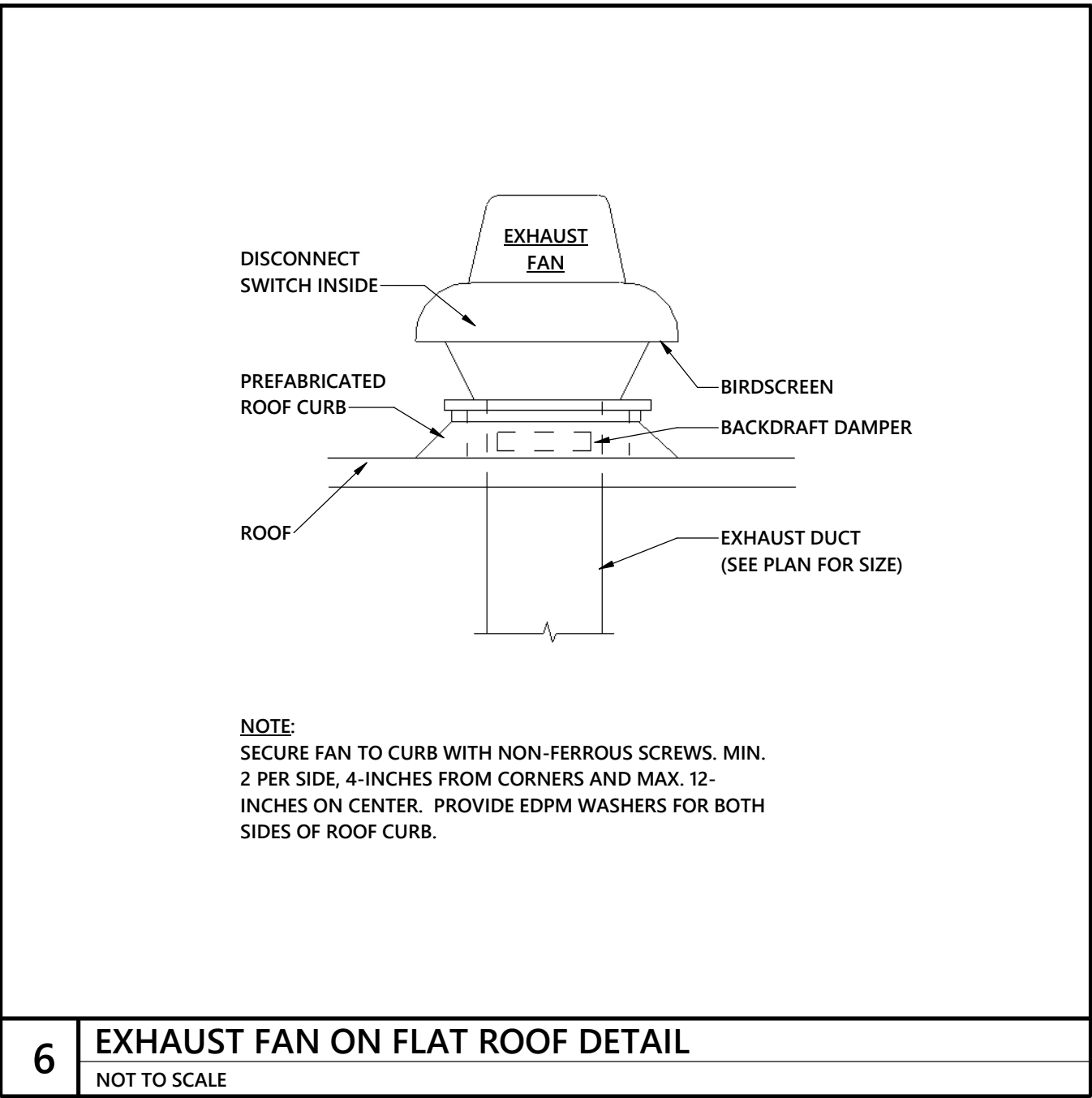
3 FLEX CONNECTION DETAIL
NOT TO SCALE



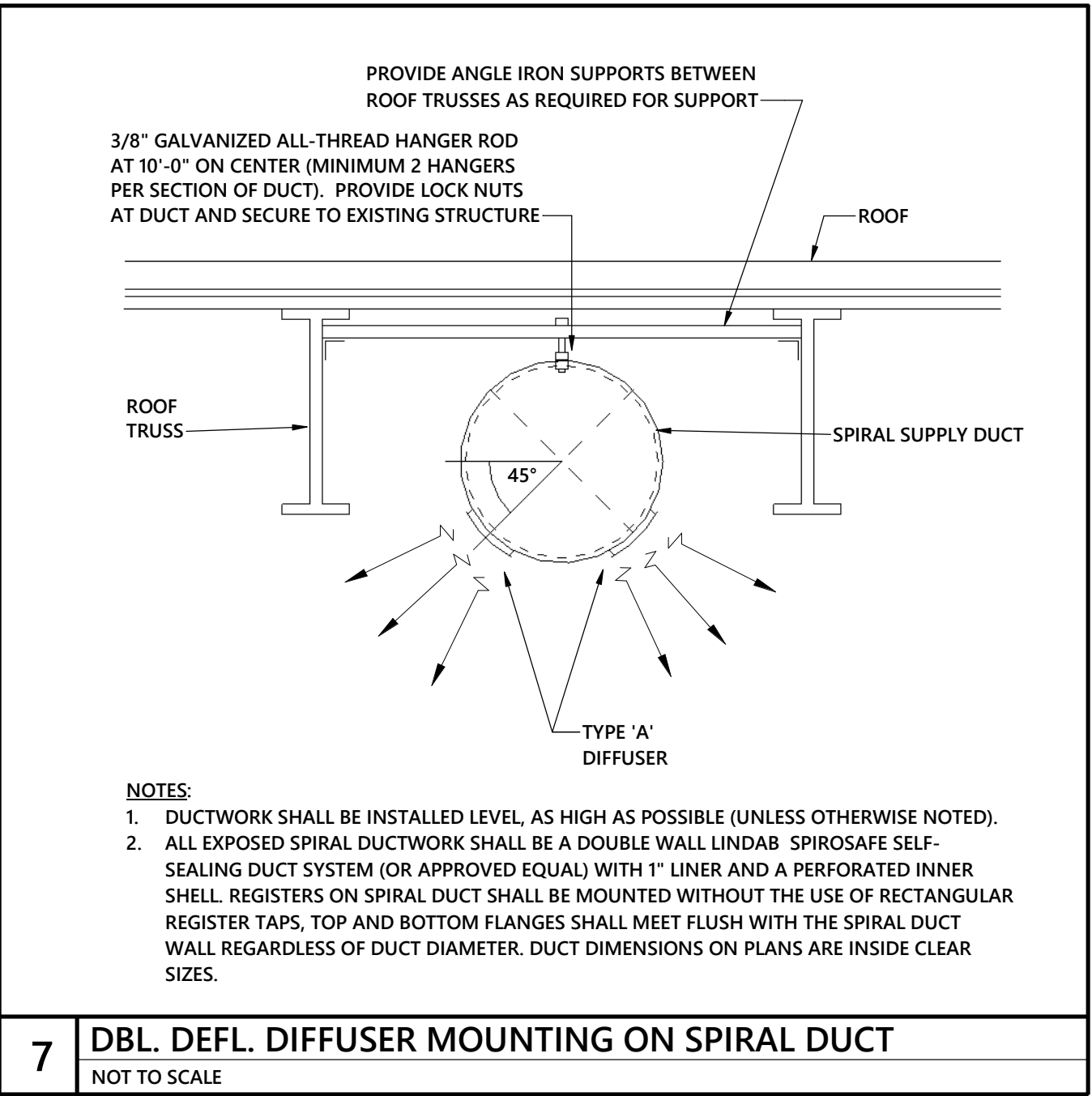
4 SIDEWALL SUPPLY
NOT TO SCALE



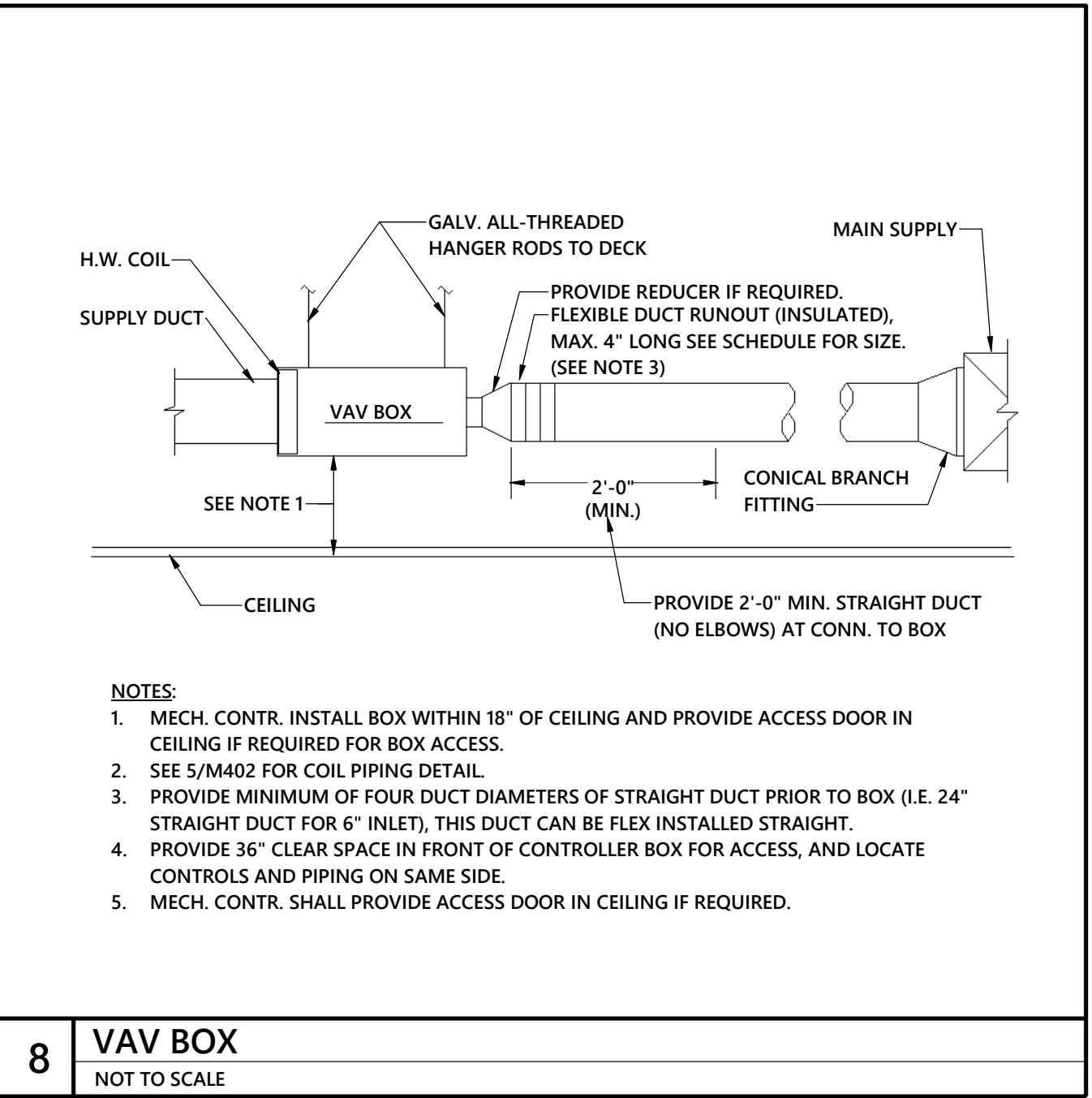
5 ROOF - MOUNTED CONDENSING UNIT
NOT TO SCALE



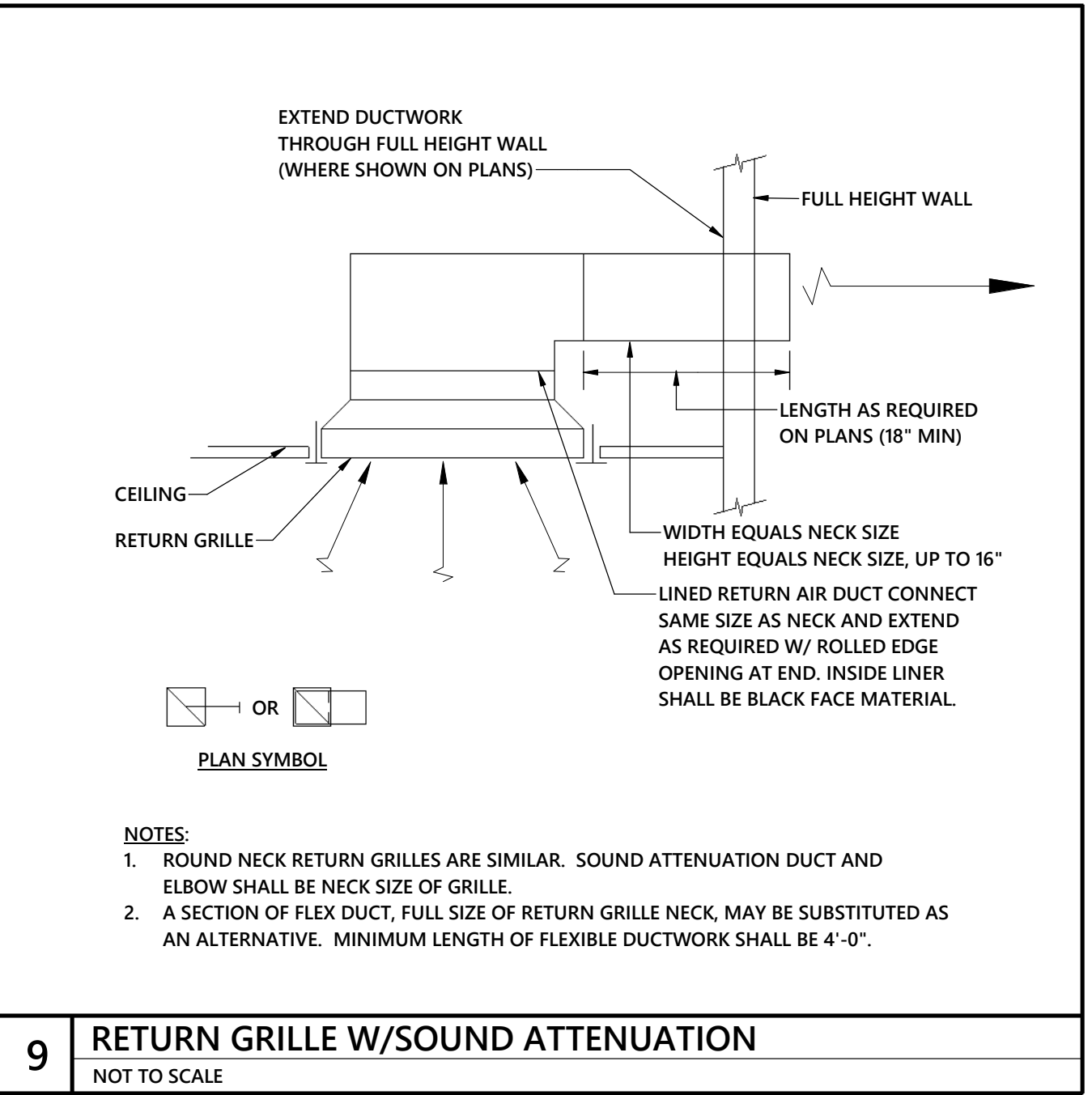
6 EXHAUST FAN ON FLAT ROOF DETAIL
NOT TO SCALE



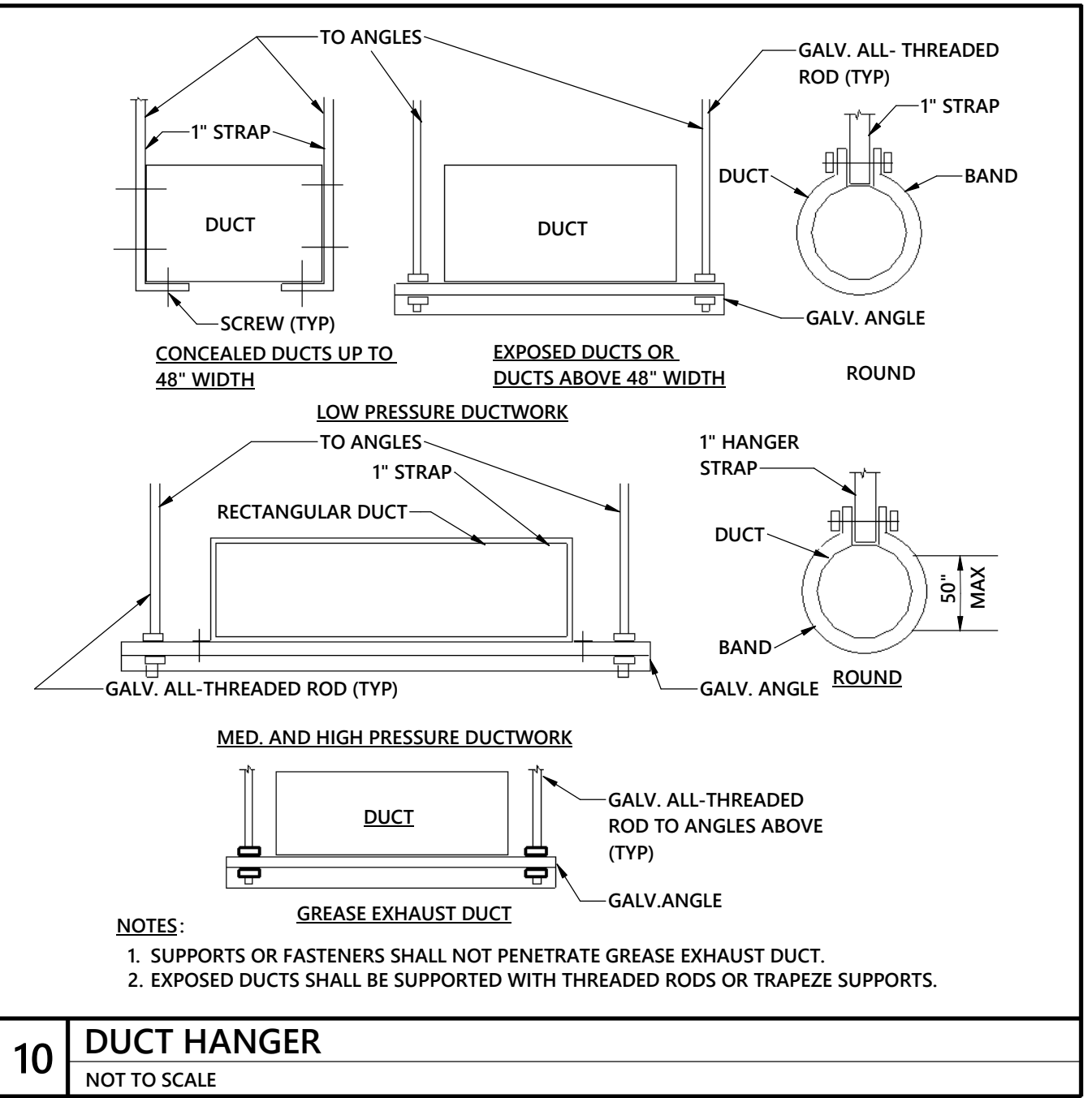
7 DBL. DEFL. DIFFUSER MOUNTING ON SPIRAL DUCT
NOT TO SCALE



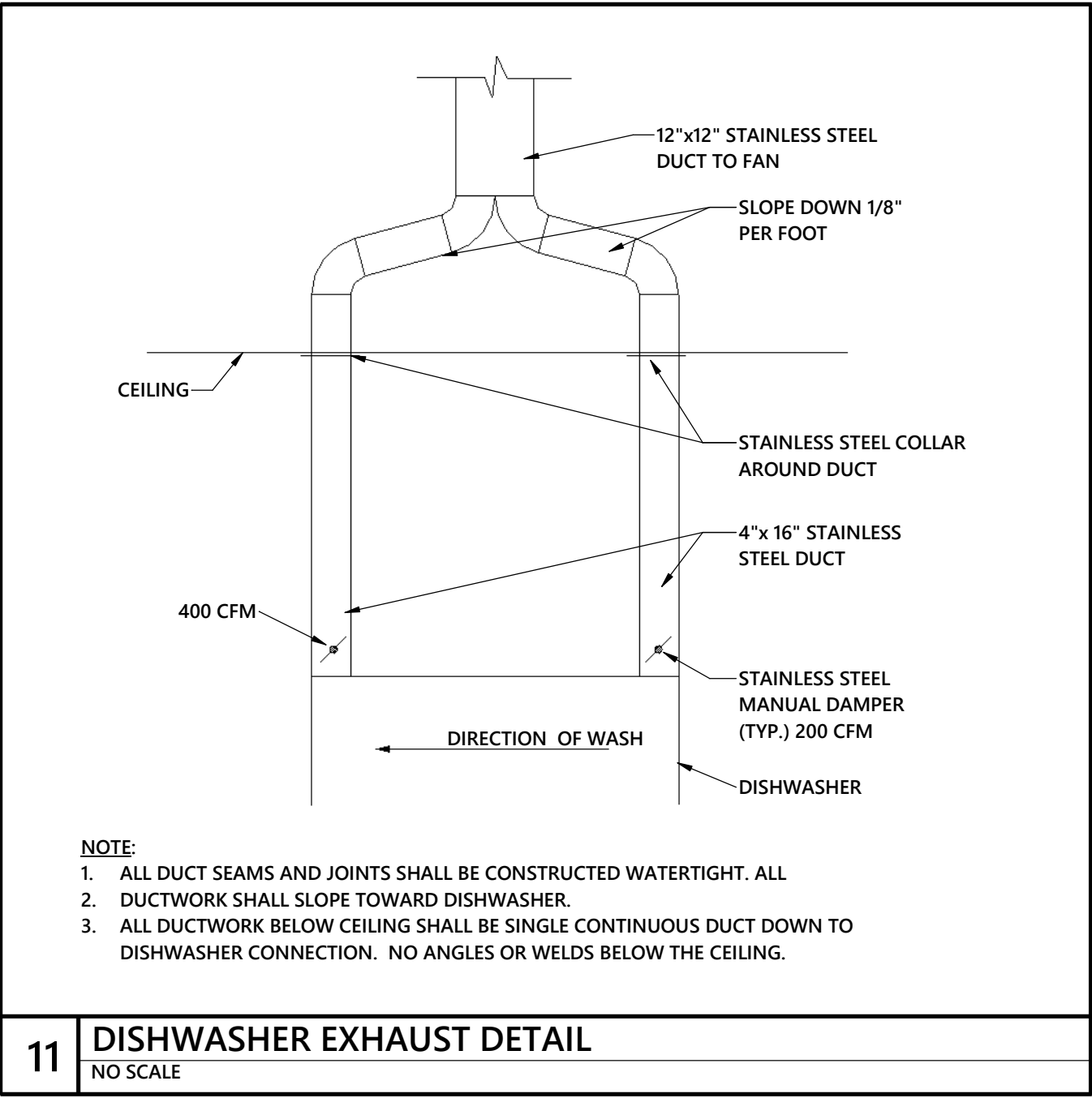
8 VAV BOX
NOT TO SCALE



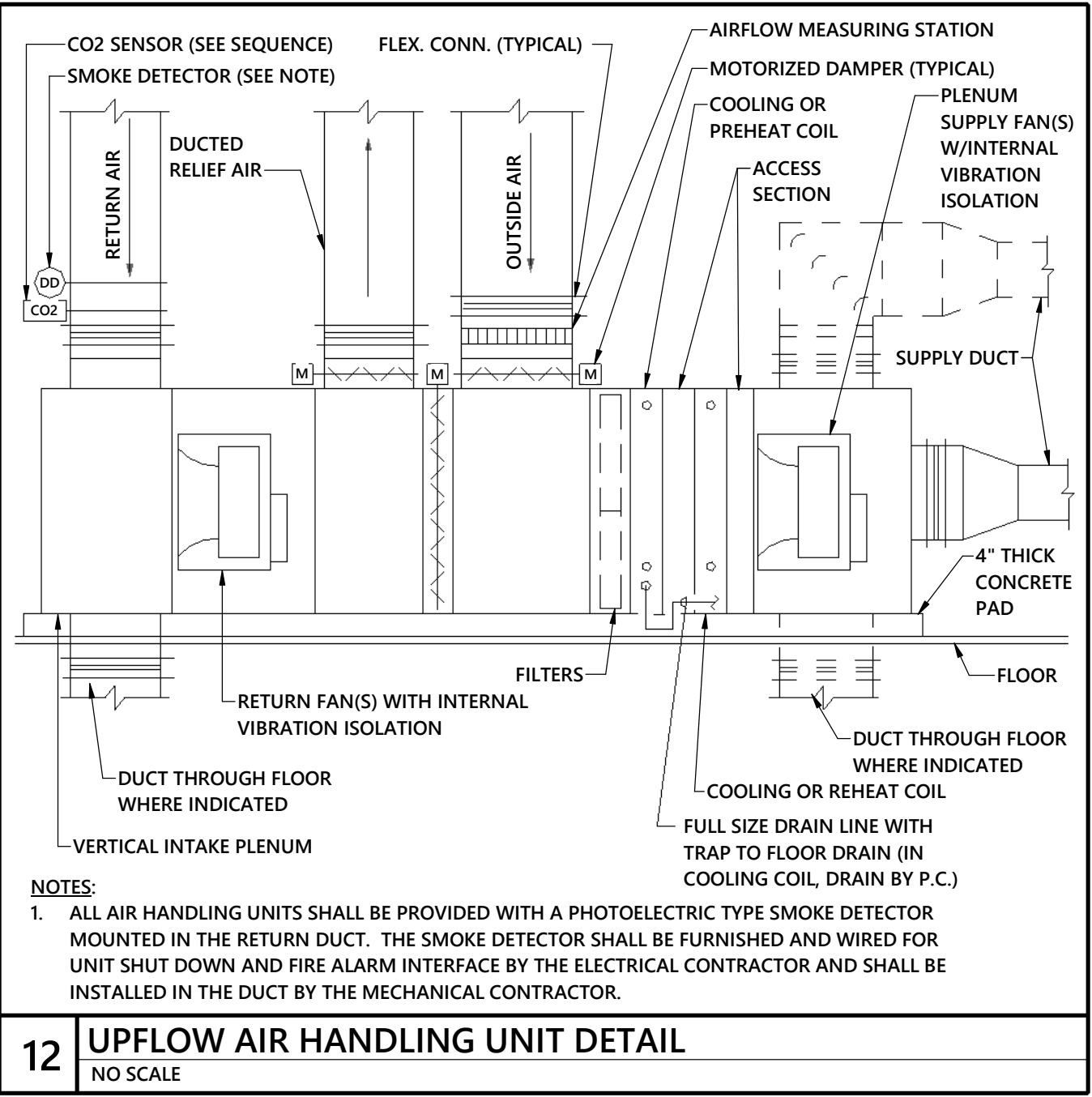
9 RETURN GRILLE W/SOUND ATTENUATION
NOT TO SCALE



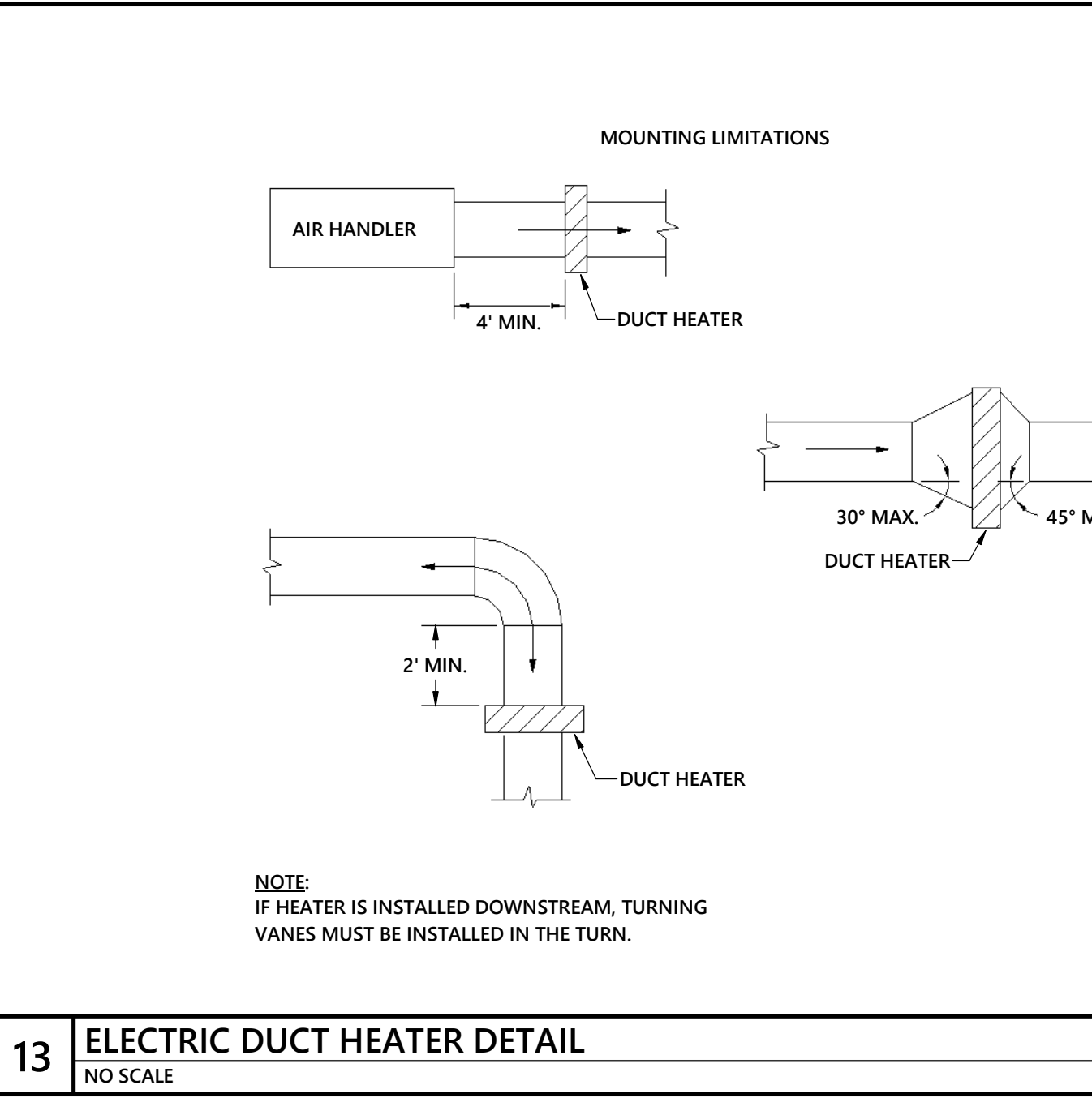
10 DUCT HANGER
NOT TO SCALE



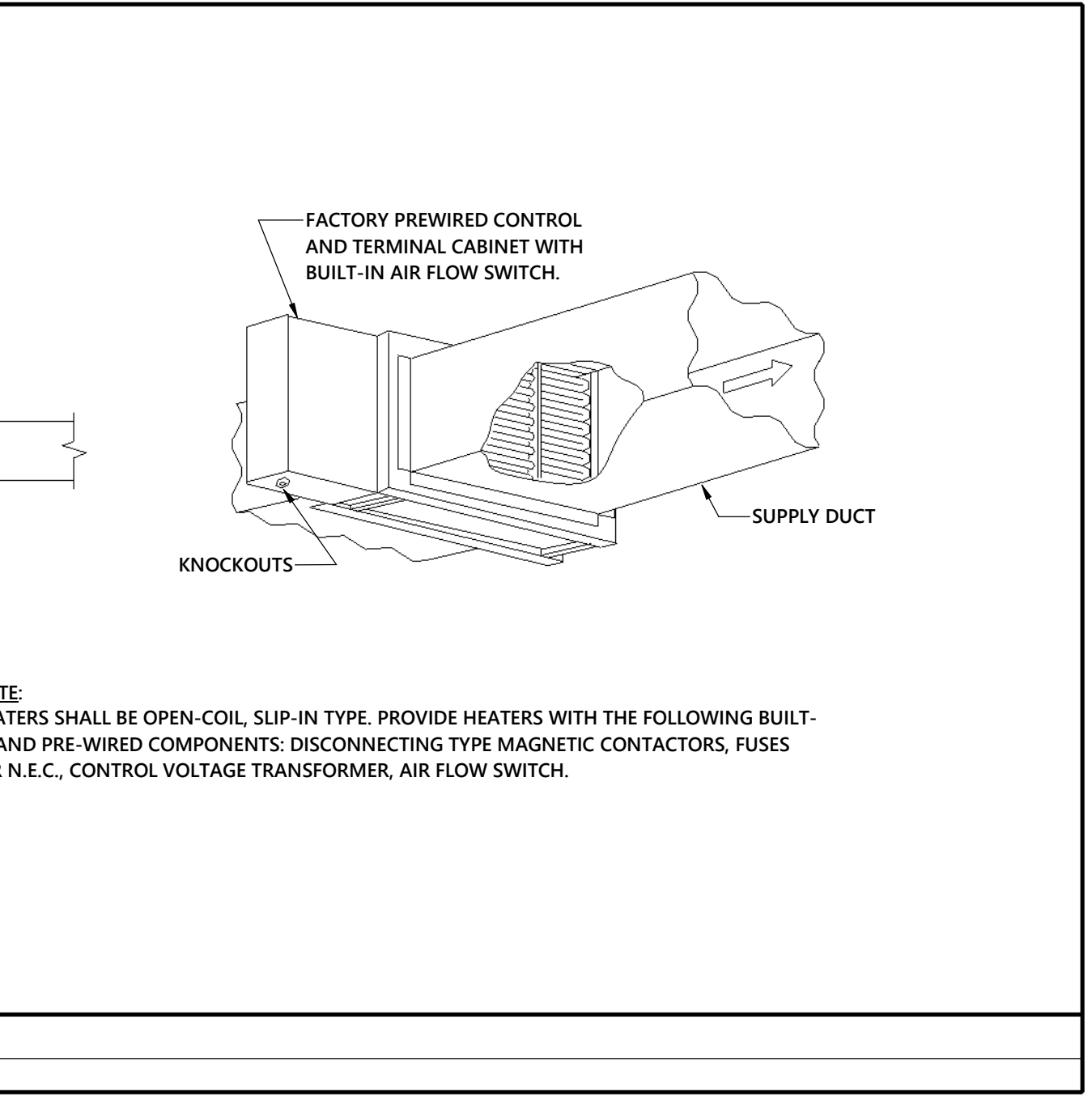
11 DISHWASHER EXHAUST DETAIL
NO SCALE



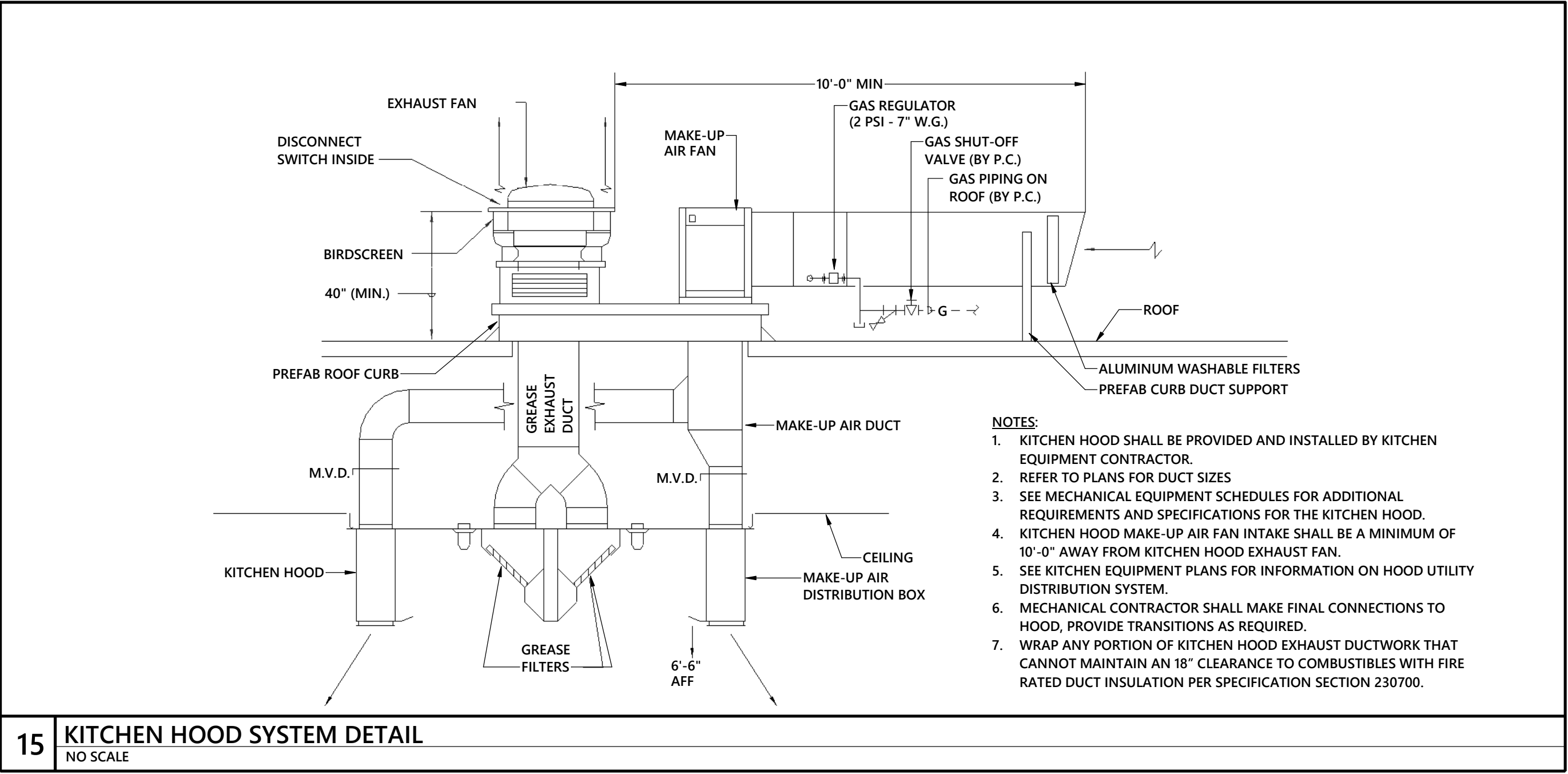
12 UPFLOW AIR HANDLING UNIT DETAIL
NO SCALE



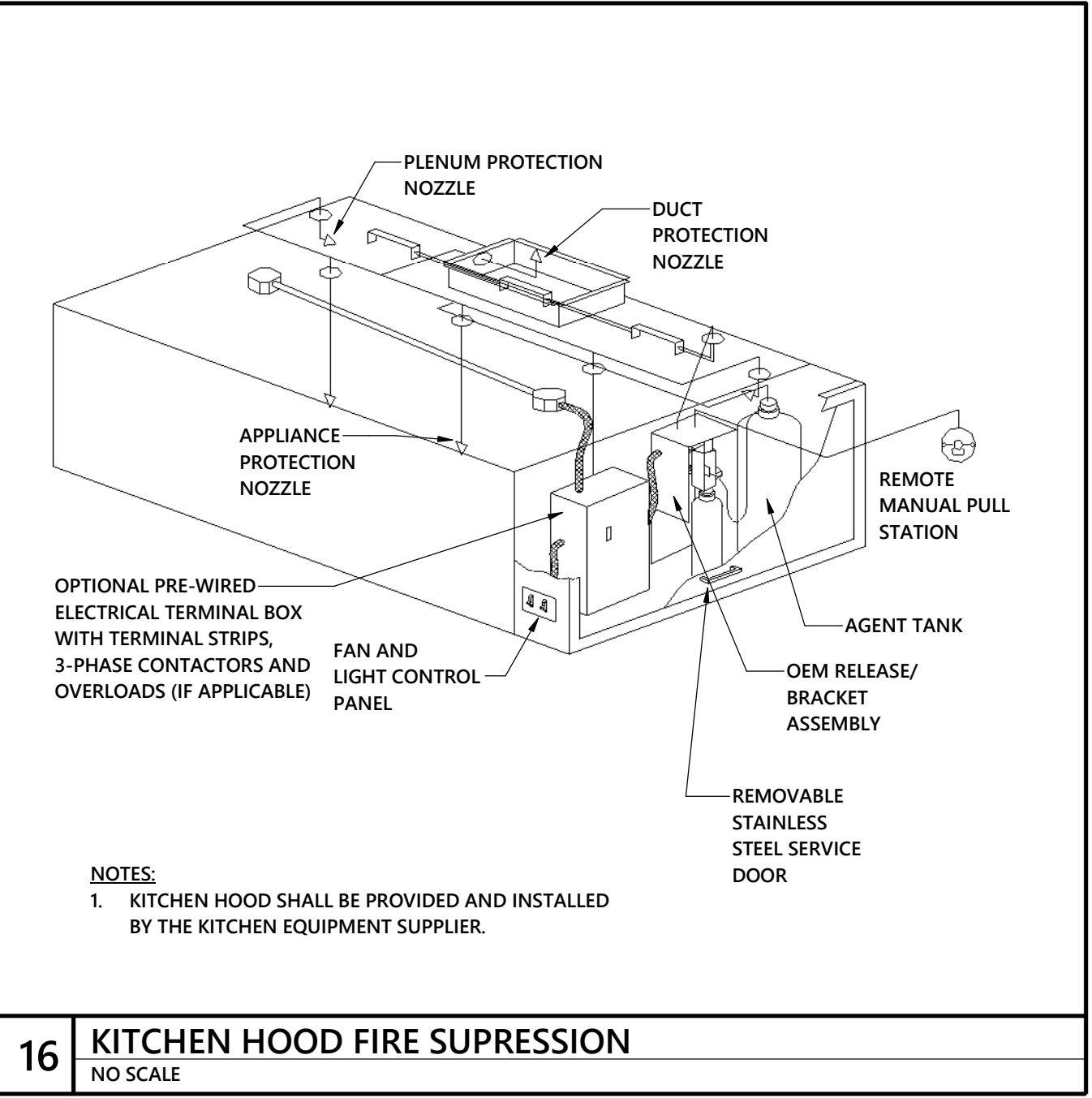
13 ELECTRIC DUCT HEATER DETAIL
NO SCALE



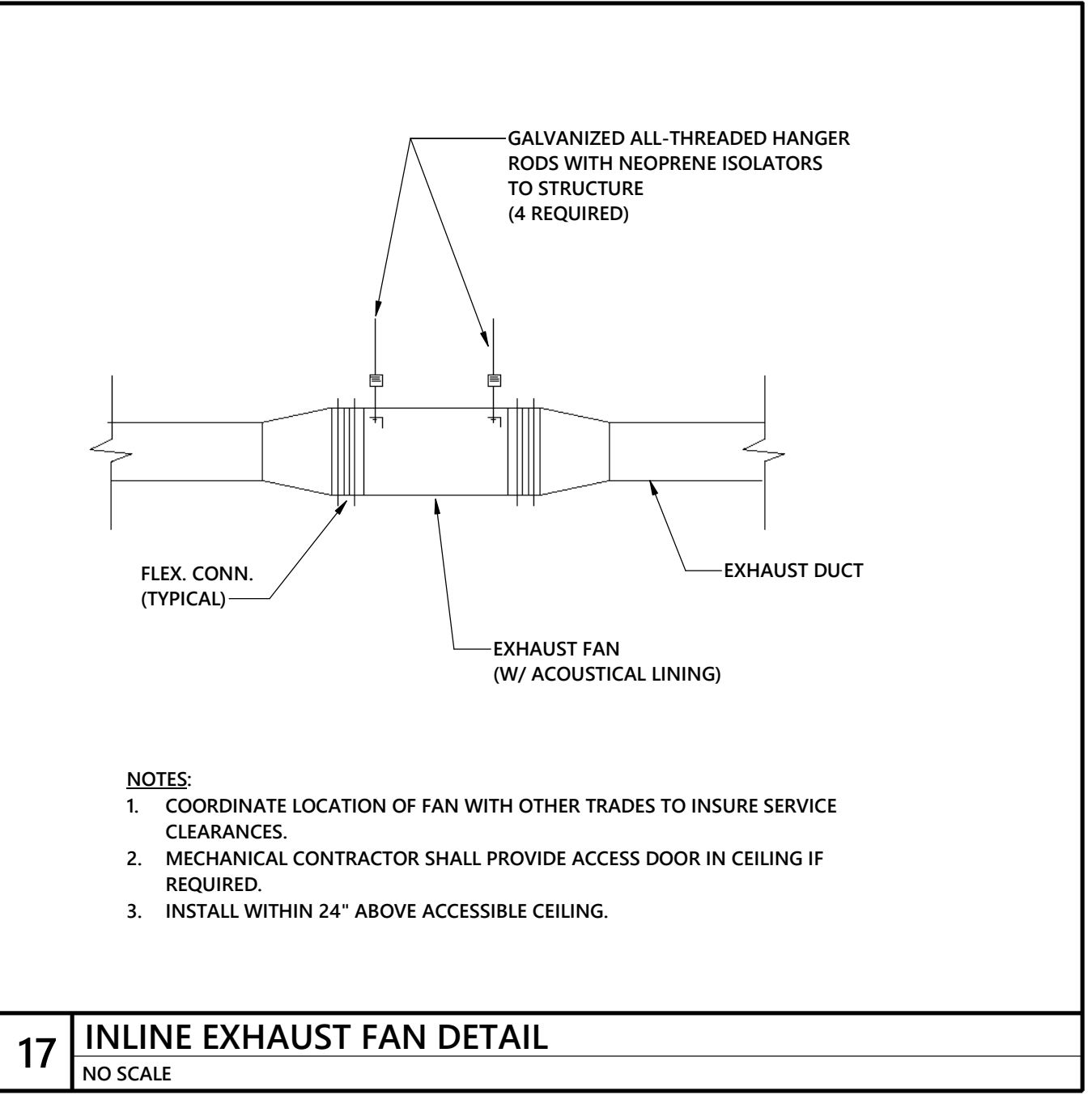
14 GRAVITY VENTILATOR DETAIL
NO SCALE



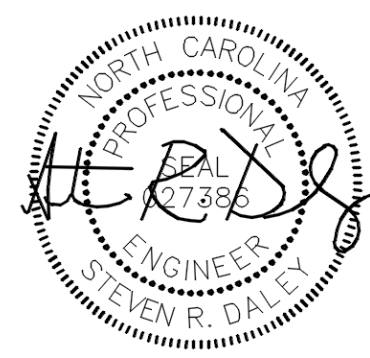
15 KITCHEN HOOD SYSTEM DETAIL
NO SCALE



16 KITCHEN HOOD FIRE SUPPRESSION
NO SCALE



17 INLINE EXHAUST FAN DETAIL
NO SCALE



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CONSULTANT:



CLIENT:



Coltrane-Webb / Beverly Hills Replacement Elementary School

61 Spring St NW, Concord NC 28025

YCHA COM #: 22339.00

PHASE & DATE:
Final Construction Documents

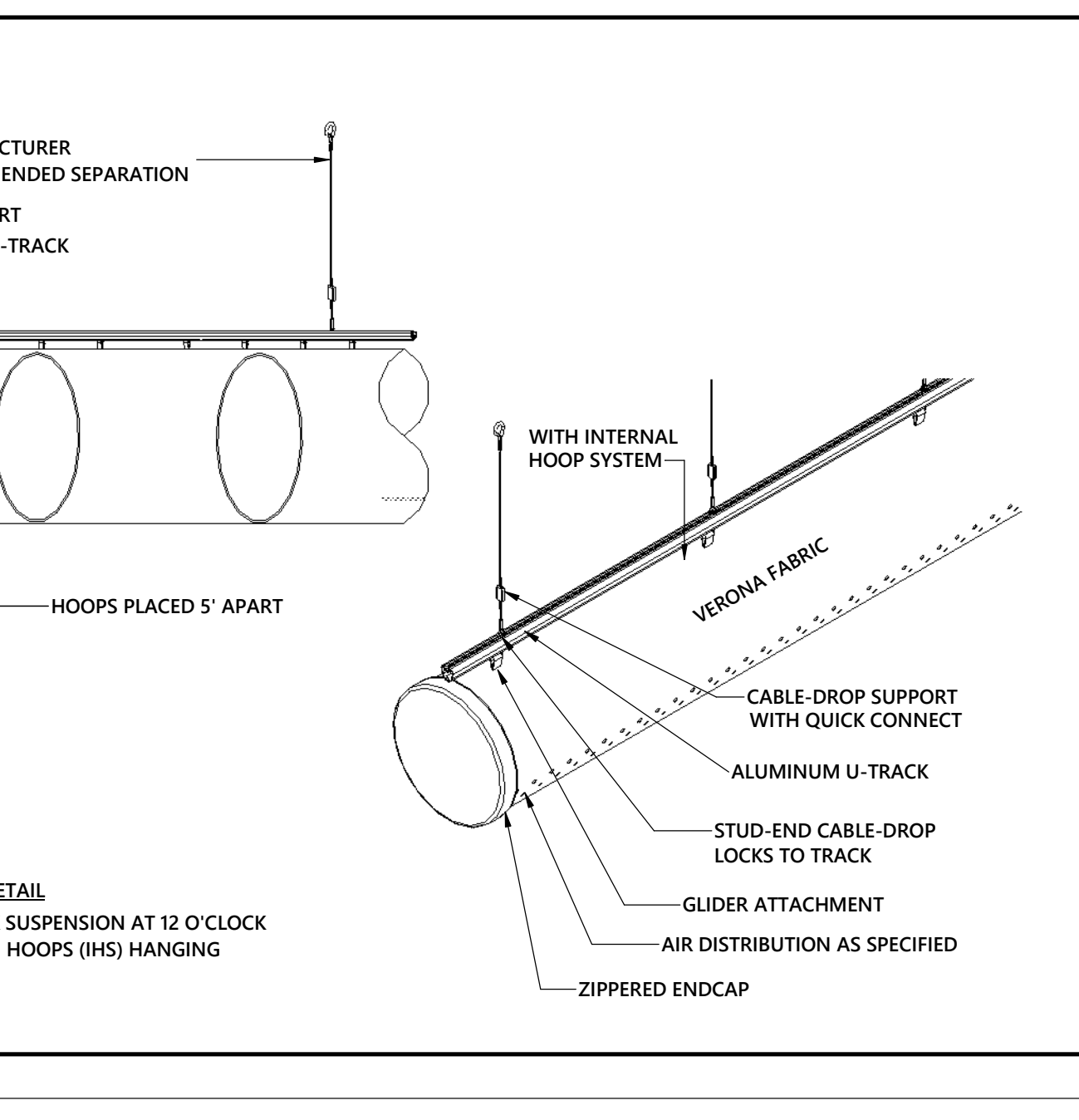
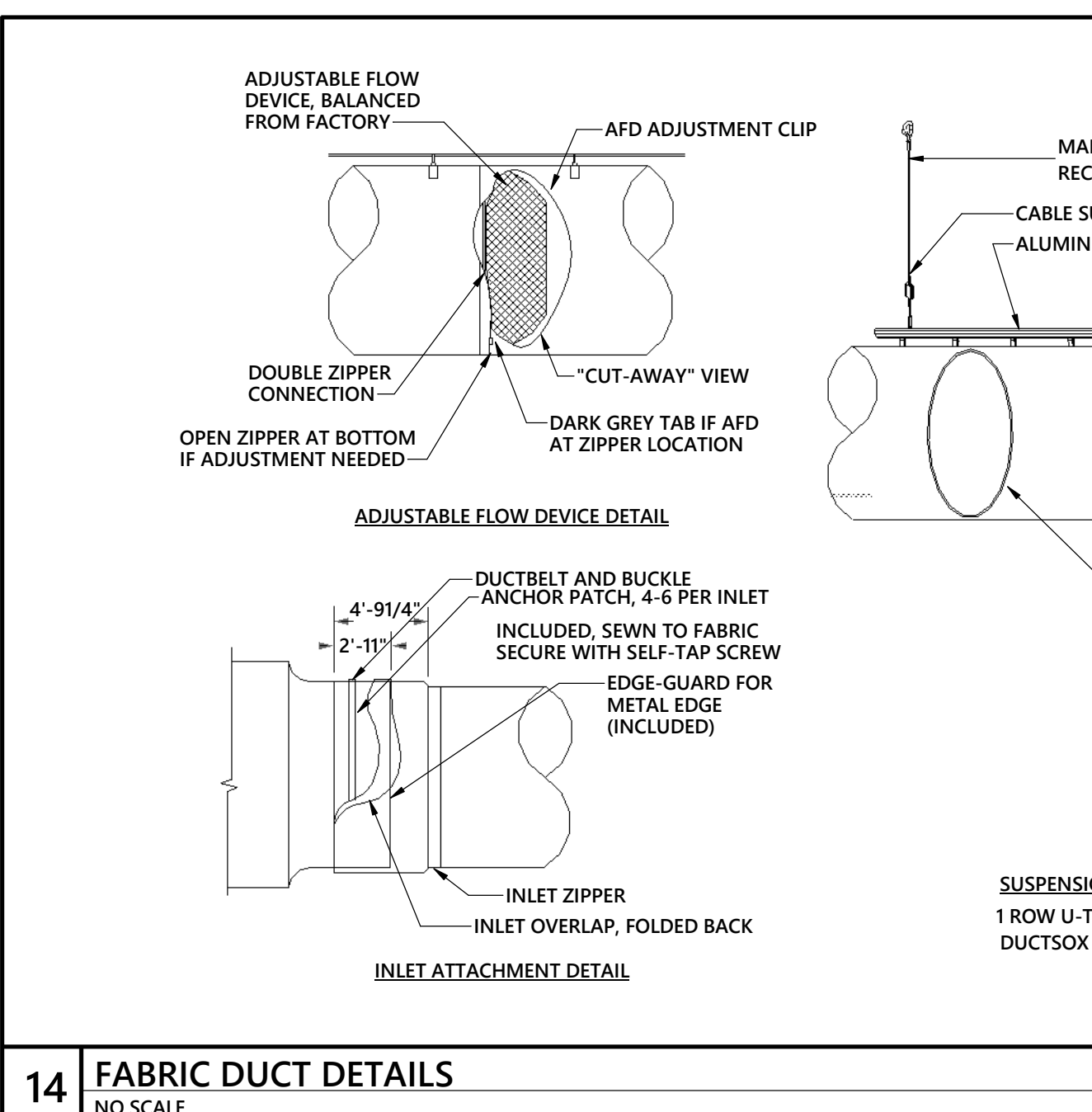
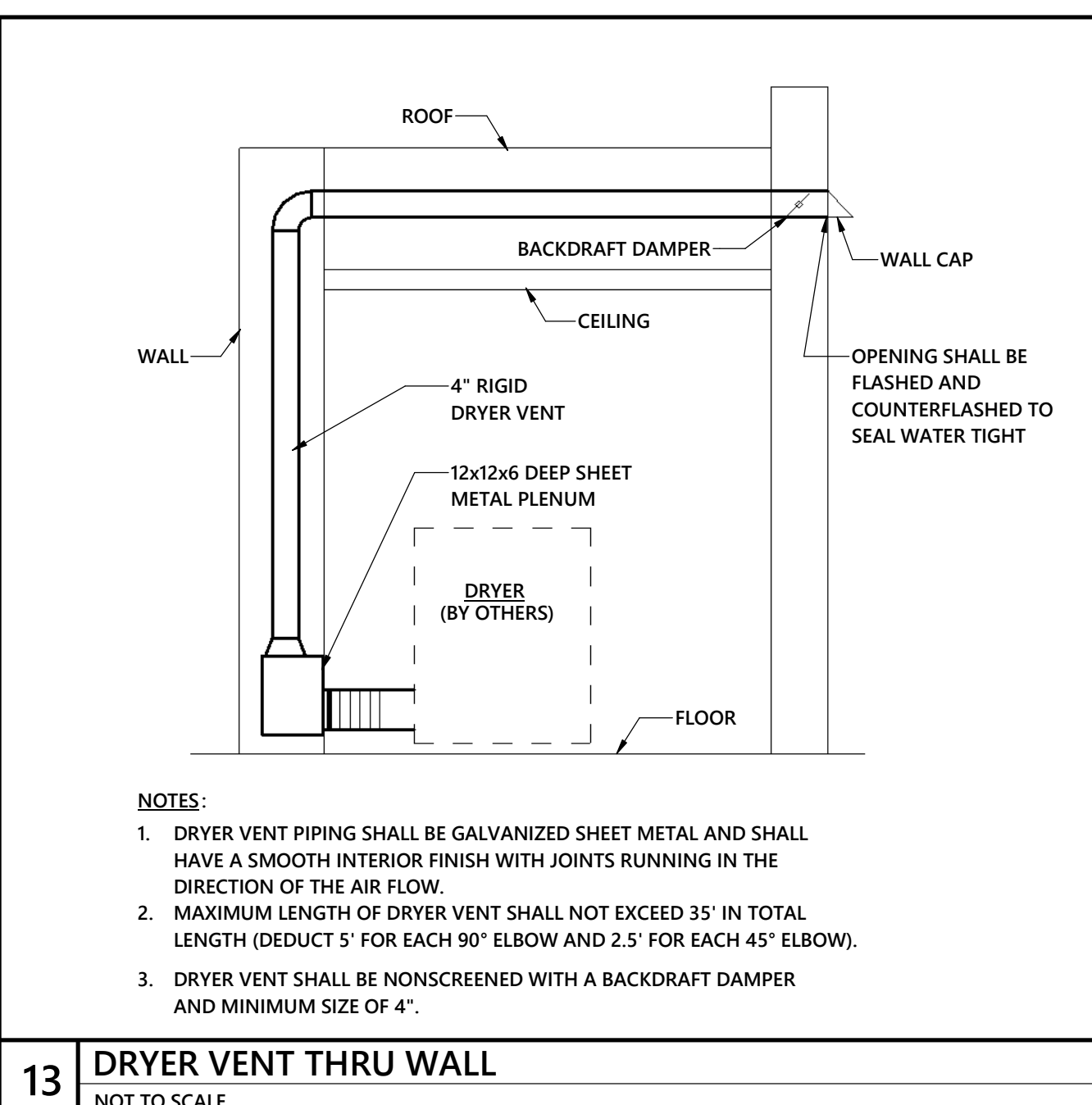
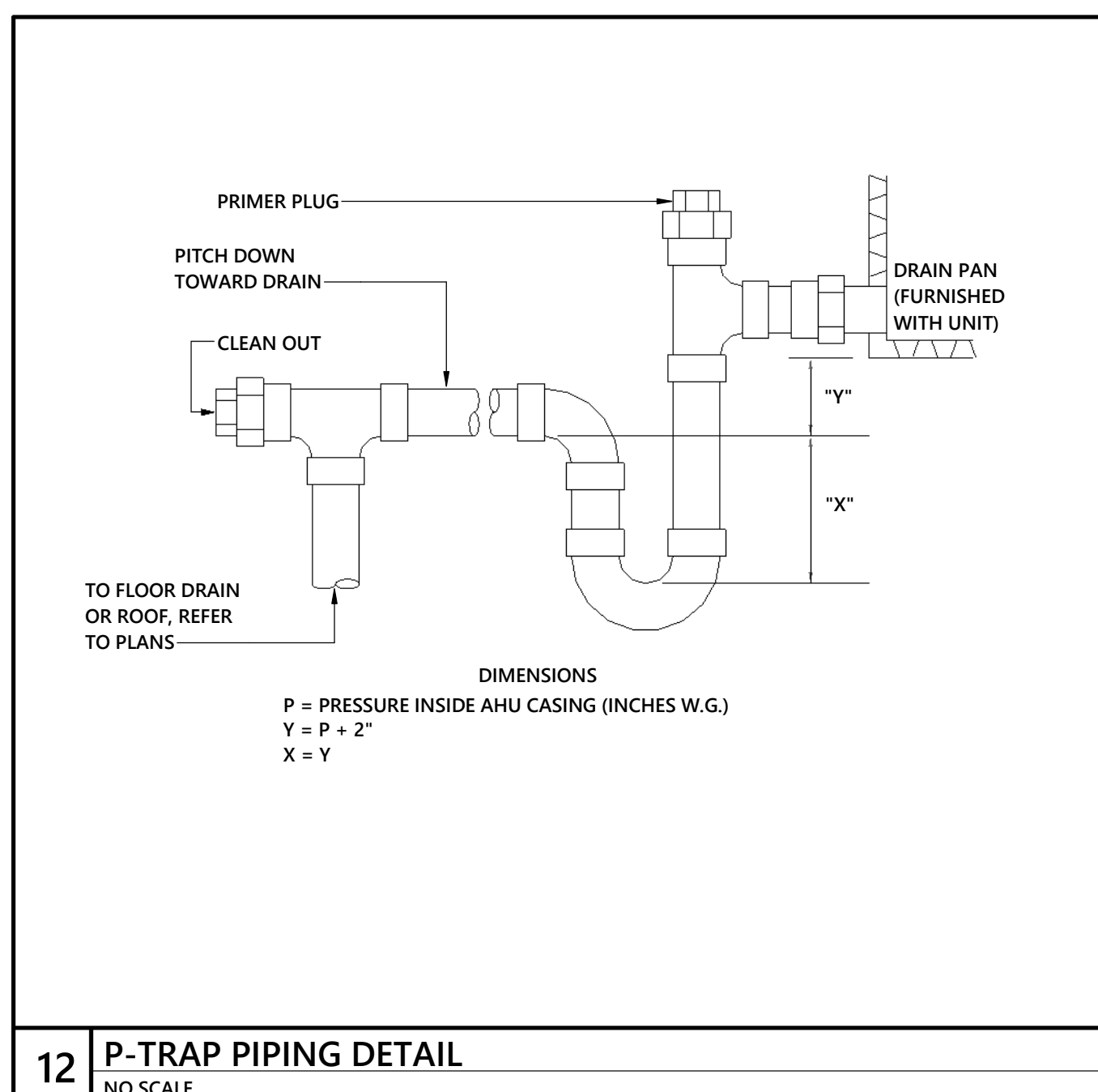
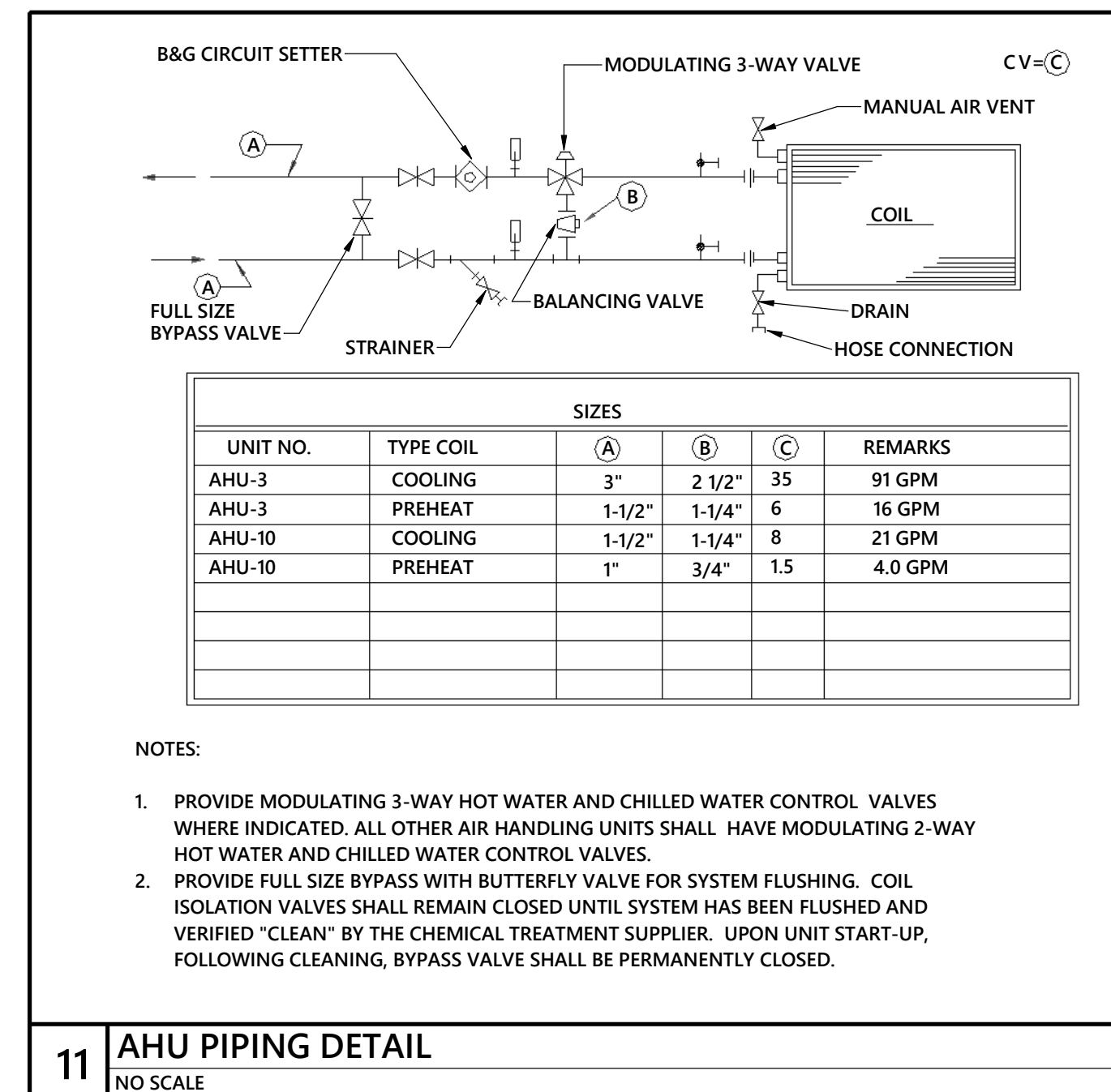
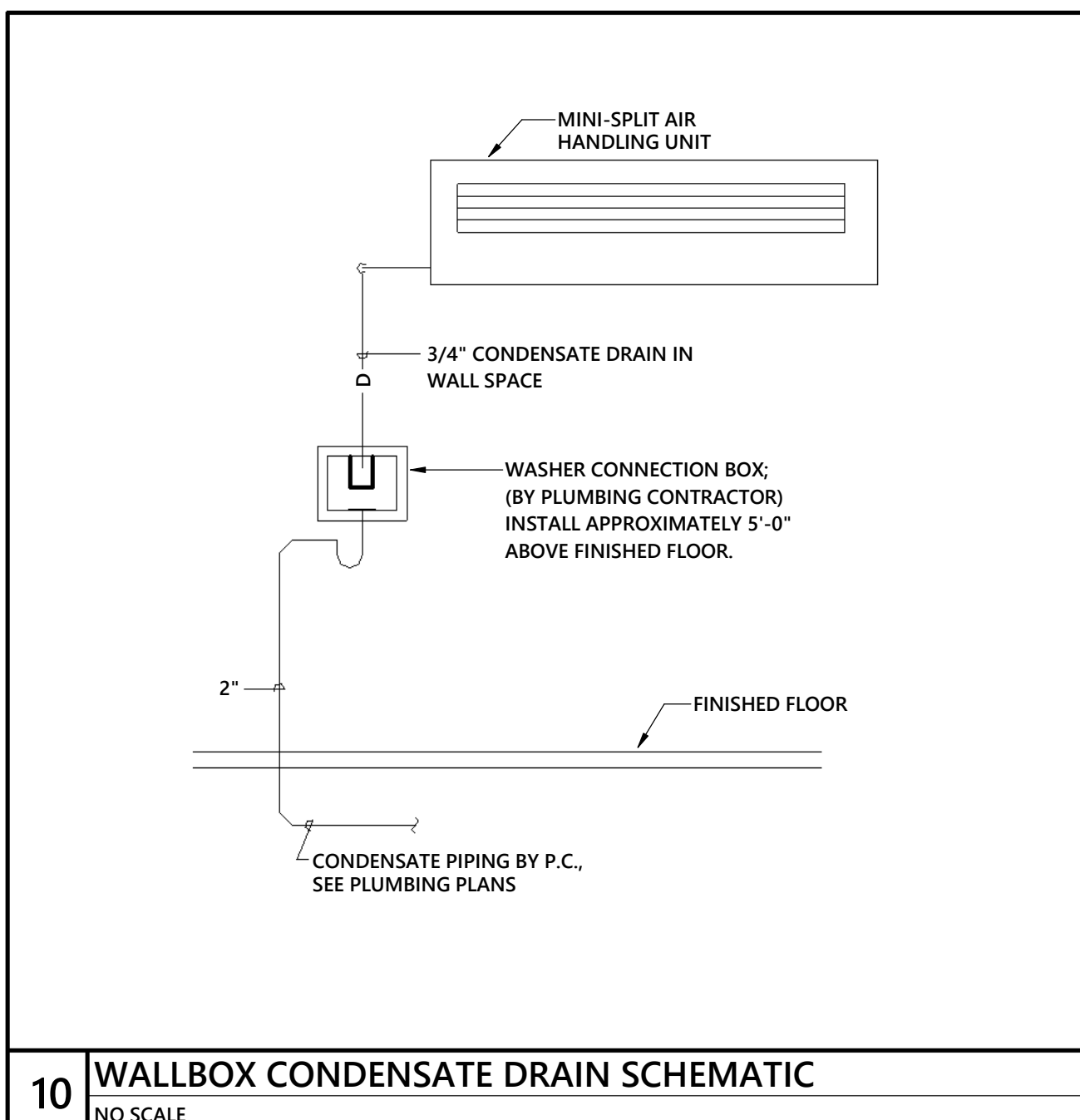
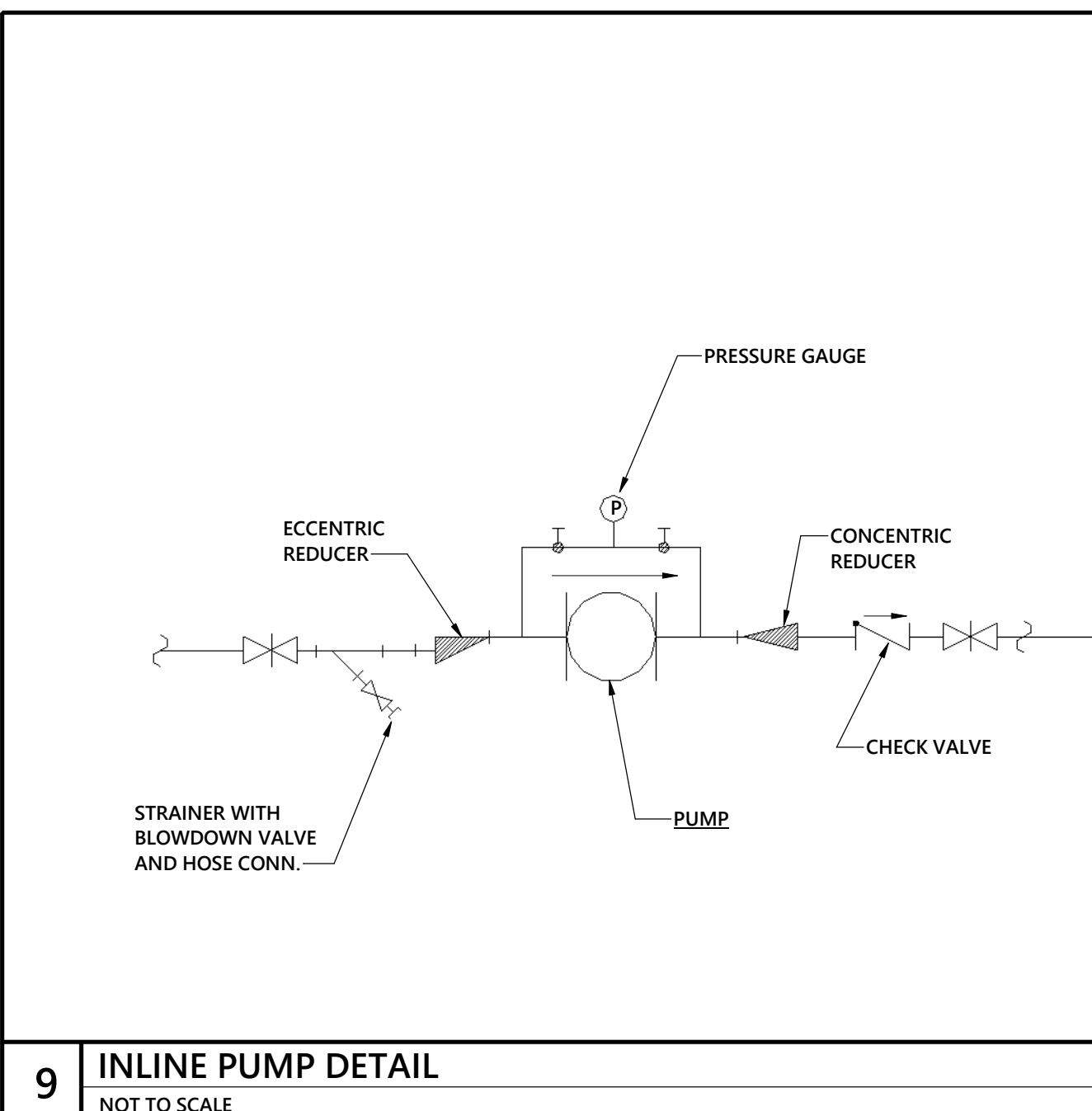
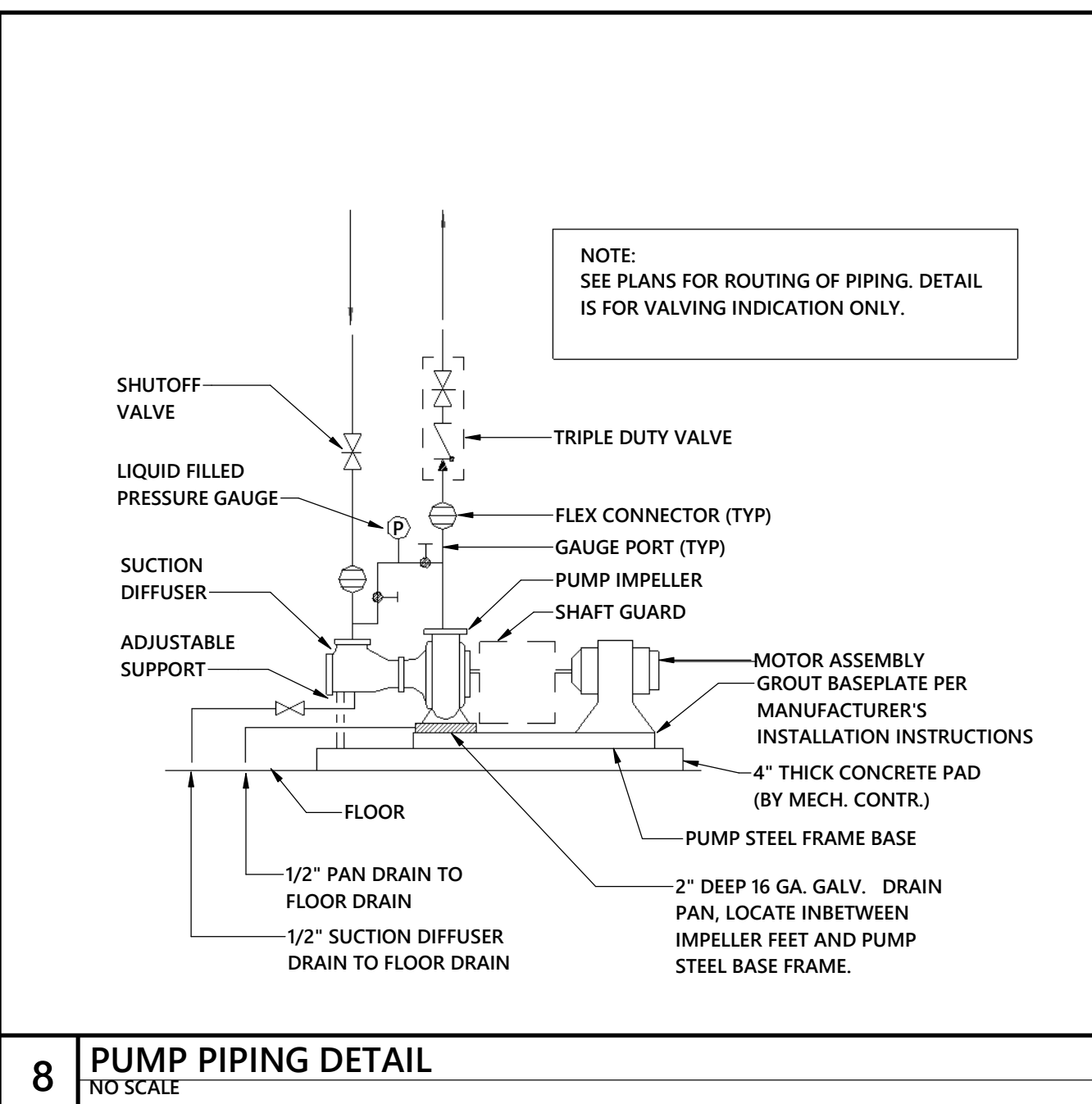
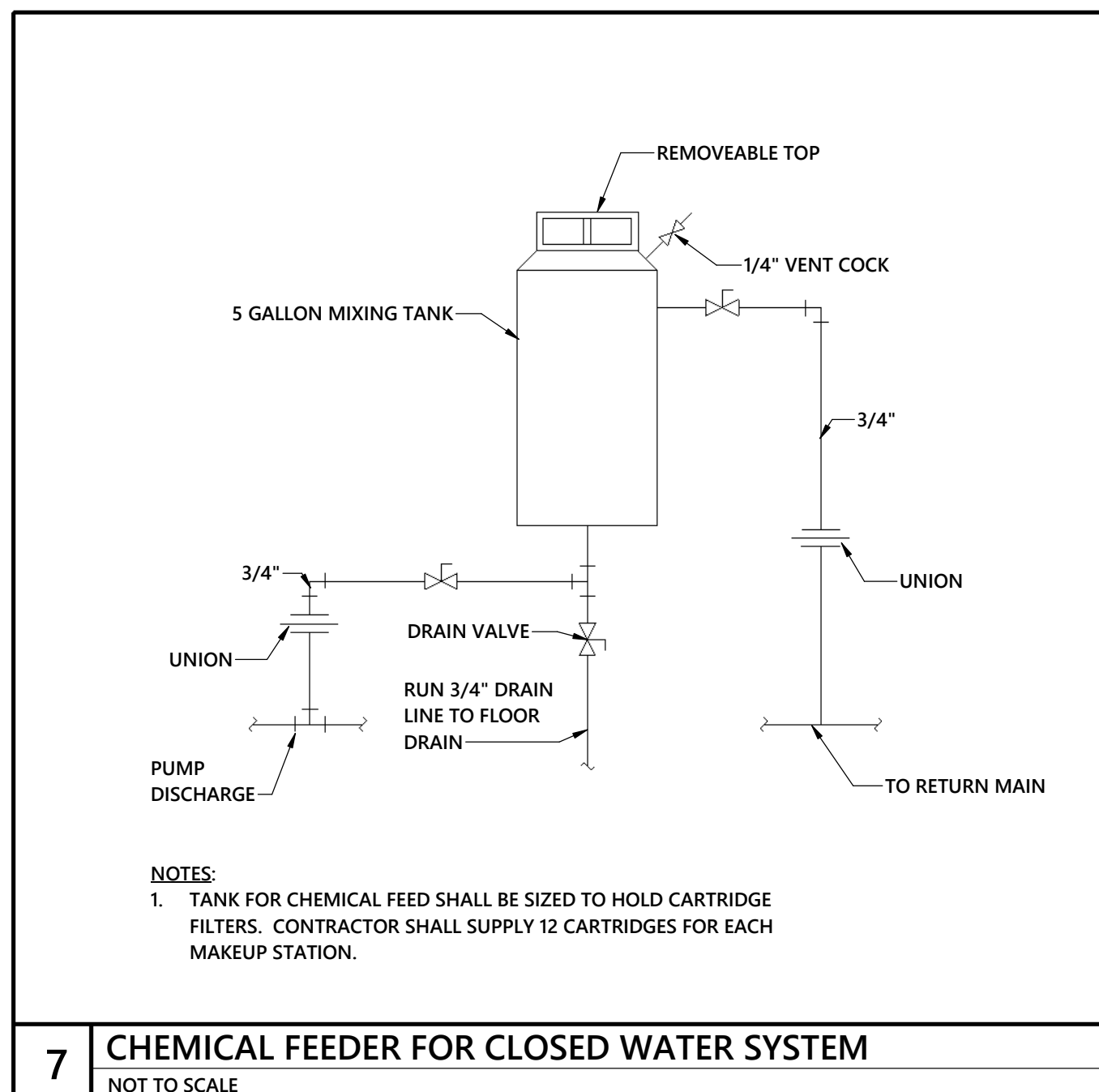
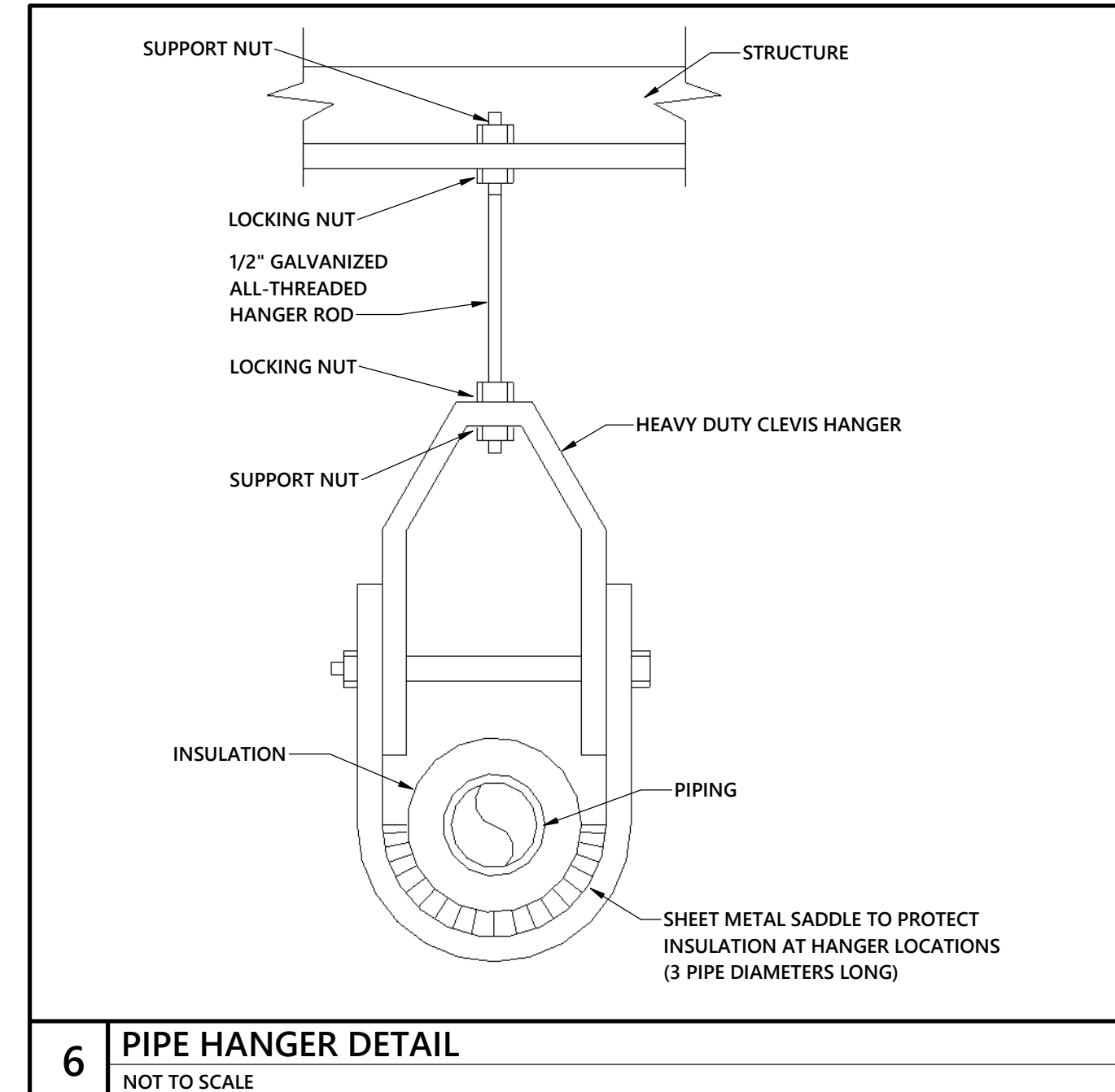
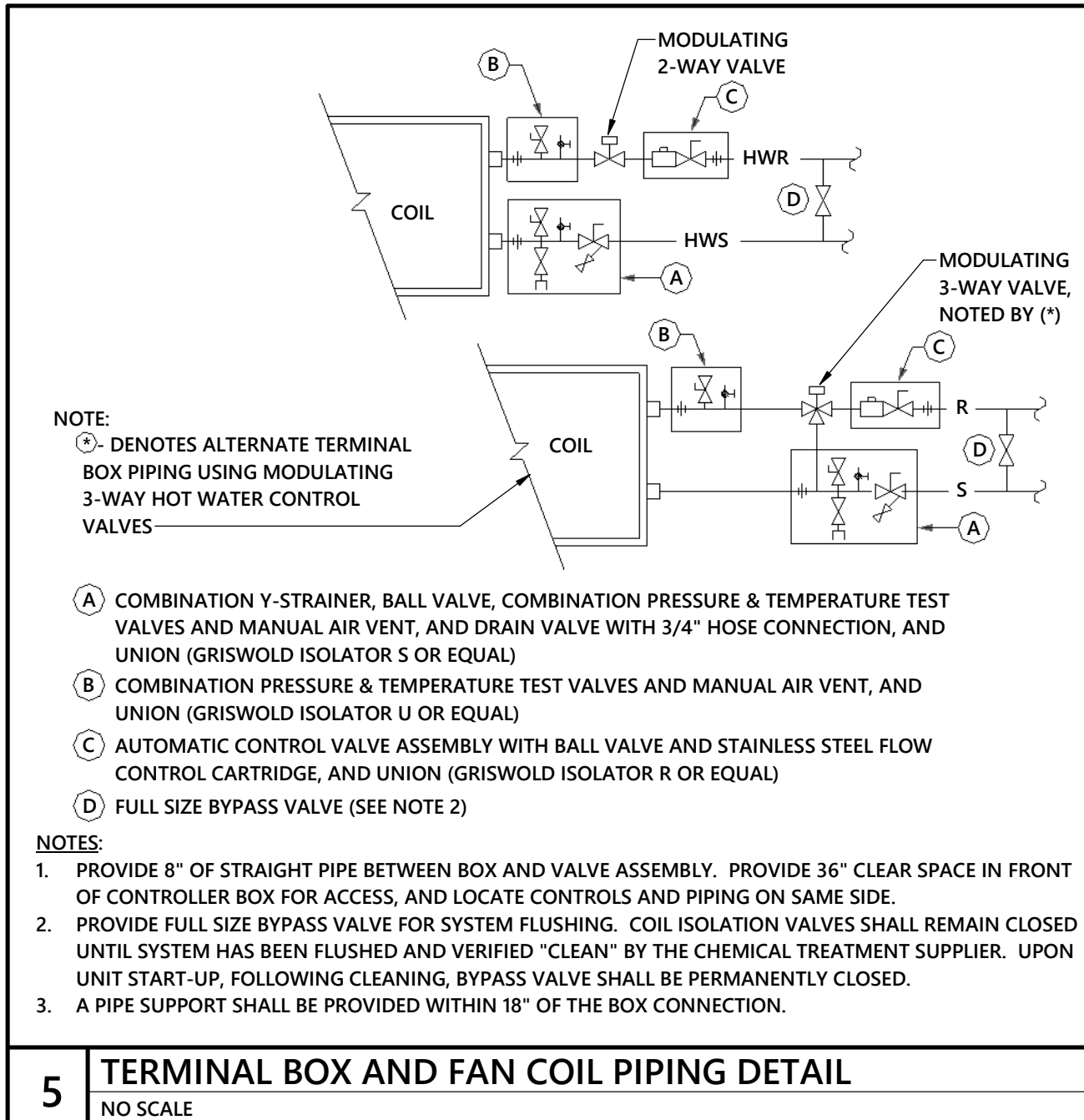
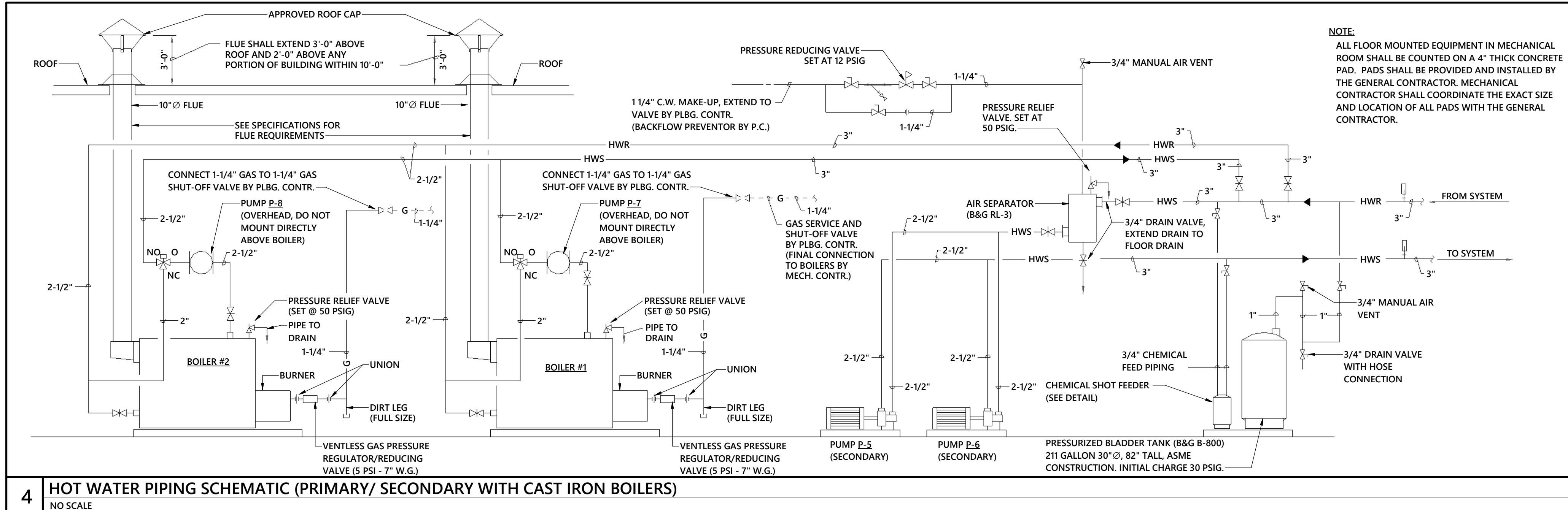
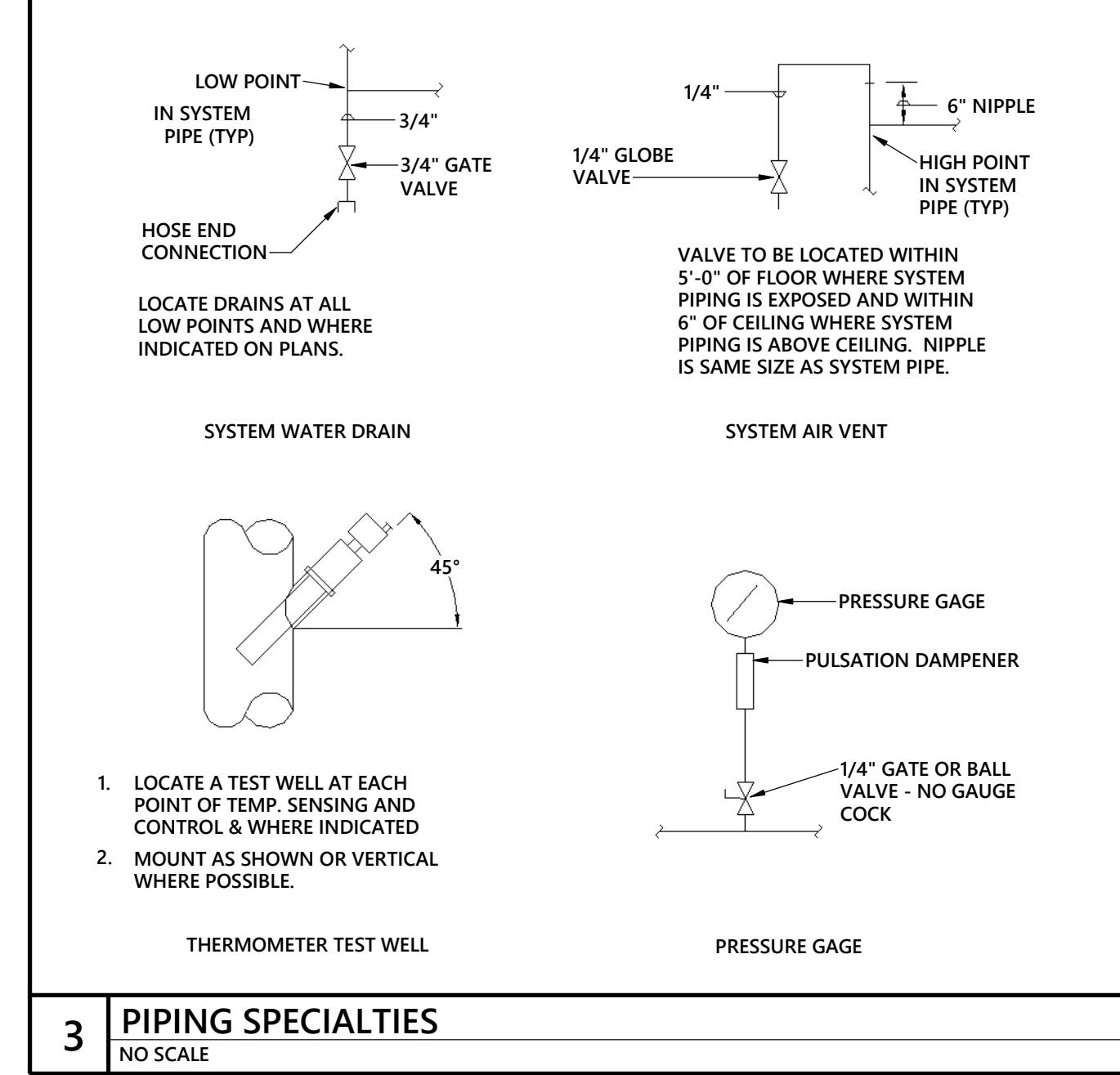
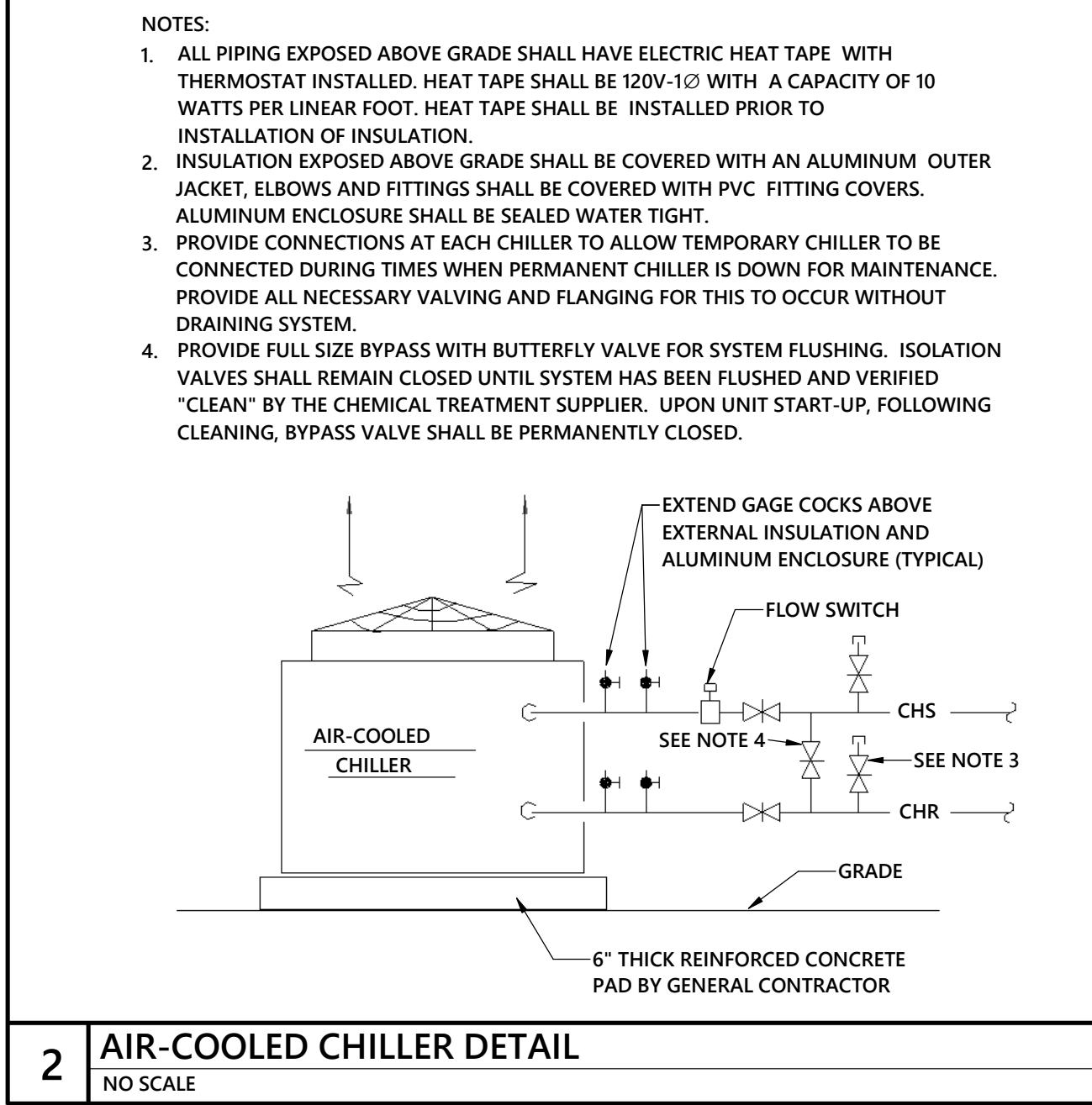
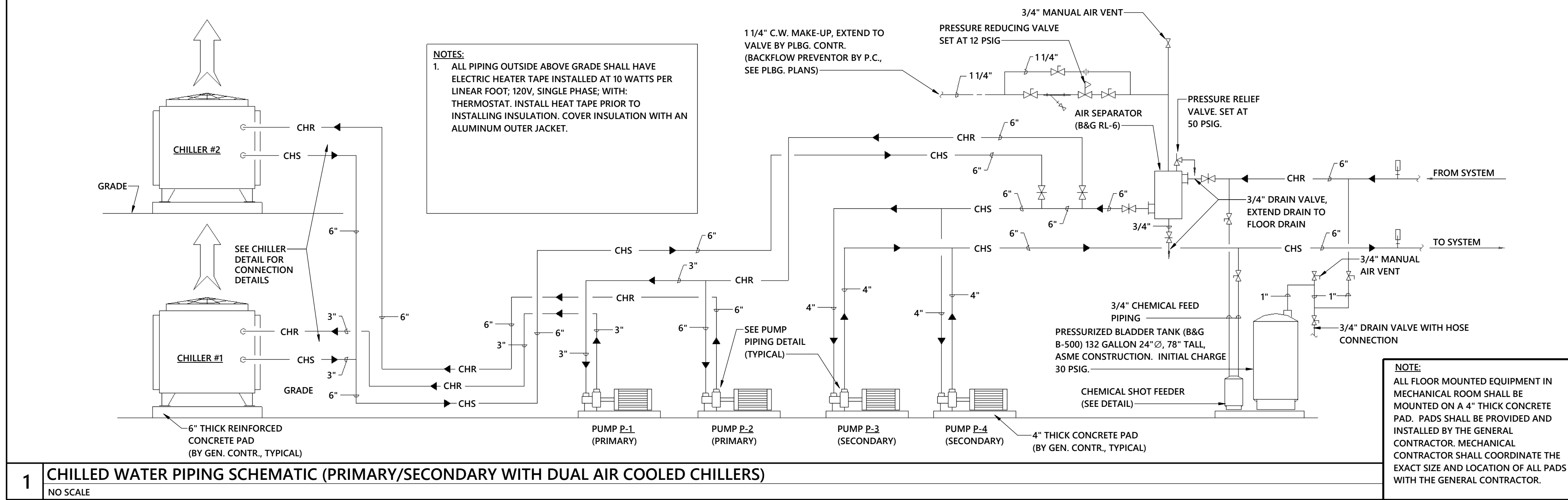
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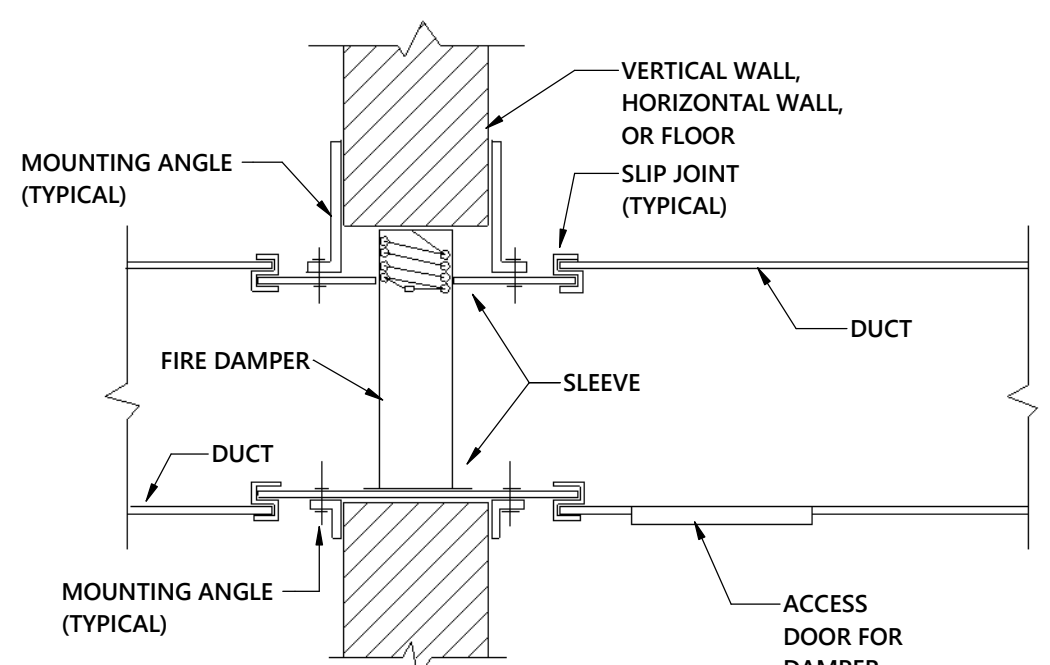
REVISIONS:

SHEET TITLE:
MECHANICAL SCHEMATICS AND DETAILS

ARCHITECTURAL:

M402



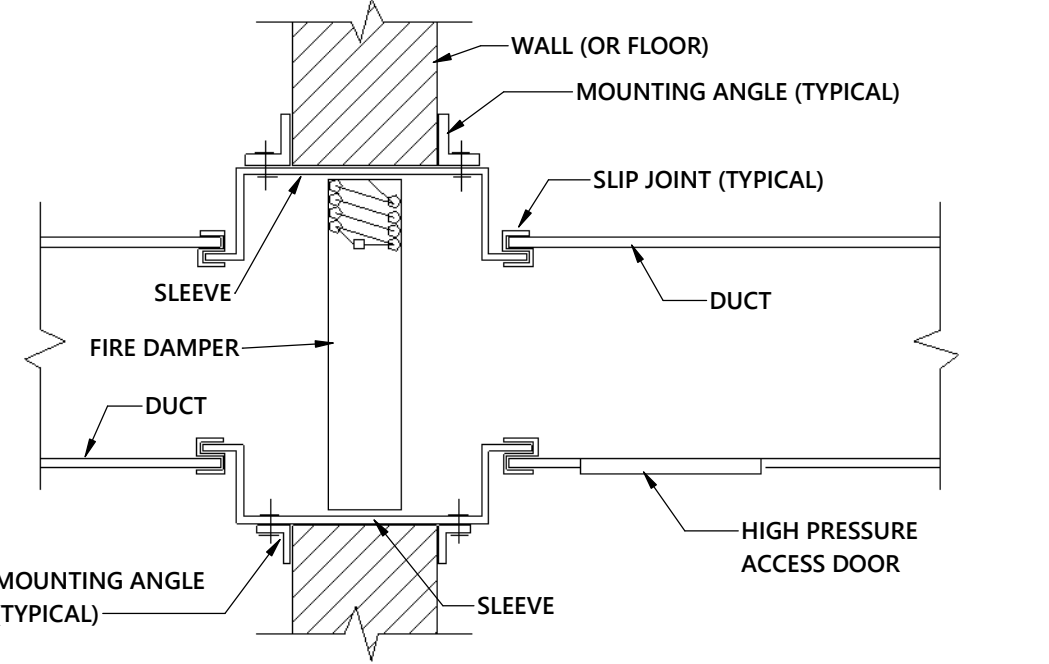


NOTE: DAMPERS SHALL BE INSTALLED AS PER MFG. INSTRUCTIONS.

FIRE DAMPER SHALL BE RUSKIN TYPE DIBD2 STYLE B 1 1/2 HOUR UL, INSTALLED IN ACCORDANCE WITH NFPA. ACCESS DOOR SHALL BE RUSKIN MODEL ADC2 LOCATED ON ACCESSIBLE CEILING SIDE OF WALL. IF ACCESSIBLE CEILING NOT AVAILABLE, MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOOR IN CEILING (OR WALL) TO MATCH FINISH COLOR. DAMPER SHALL BE EQUIPPED FOR HORIZONTAL OR VERTICAL MOUNTING AS REQUIRED. WHERE ROUND DUCTS REQUIRE A DAMPER, AN ENCLOSURE WITH ROUND DUCT CONNECTION WILL BE REQUIRED WITH TYPE B DAMPER INSIDE. ALL MODELS ARE RUSKIN (APPROVED EQUAL ACCEPTABLE).

1

DAMPER - LOW PRESSURE FIRE
NOT TO SCALE

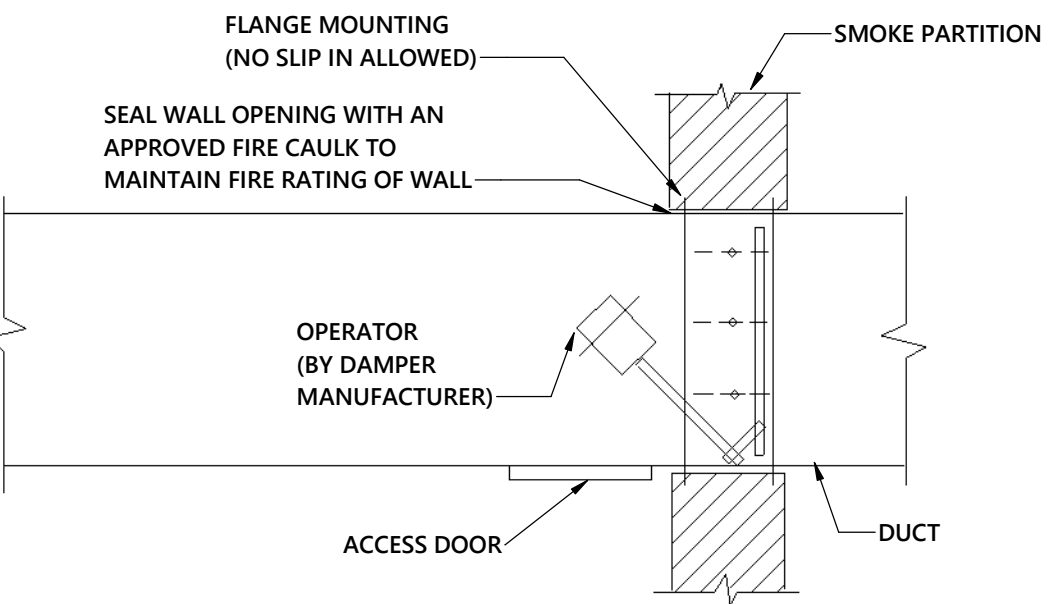


NOTE: DAMPER SHALL BE INSTALLED PER THE MFG'S RECOMMENDATIONS.

FIRE DAMPER SHALL BE RUSKIN TYPE (R02 STYLE C OR (ROUND), CO (OVAL), 1 1/2 HOUR UL, INSTALLED IN ACCORDANCE WITH NFPA. ACCESS DOOR SHALL BE RUSKIN TYPE ADHP-3 LOCATED ON ACCESSIBLE CEILING SIDE OF WALL. IF ACCESSIBLE CEILING NOT AVAILABLE, MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOOR IN CEILING (OF WALL) TO MATCH FINISH COLOR. DAMPER SHALL BE EQUIPPED FOR HORIZONTAL OR VERTICAL MOUNTING AS REQUIRED. ALL MODELS ARE RUSKIN (APPROVED EQUAL ACCEPTABLE)

2

DAMPER - HIGH OR MEDIUM PRESSURE FIRE
NOT TO SCALE



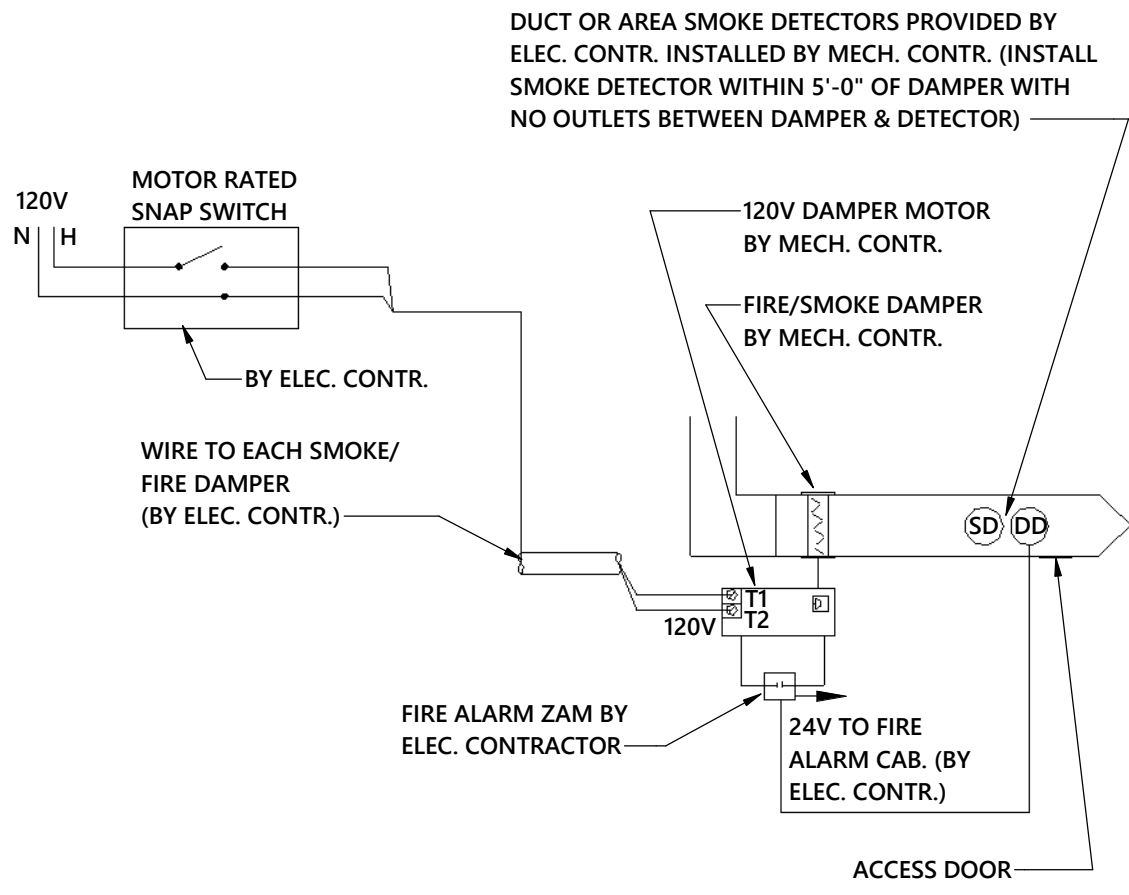
NOTE: DAMPERS SHALL BE INSTALLED AS PER MFG. INSTRUCTIONS.

COMBINATION FIRE/SMOKE DAMPER SHALL BE RUSKIN FSD60, 1 1/2 HOUR FIRE DAMPER, UL555 & UL555S WITH MECHANICAL ATTACHED BLADE AND FLEXIBLE STAINLESS STEEL JAMB SEALS. DAMPER SHALL BE U.L. LISTED. INSTALLED IN ACCORDANCE WITH NFPA. ACCESS DOOR SHALL BE RUSKIN MODEL ADC2 LOCATED ON ACCESSIBLE SIDE OF WALL. IF ACCESSIBLE CEILING IS NOT AVAILABLE, MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOOR IN CEILING (OR WALL) TO MATCH FINISH COLOR. ALL MODEL NUMBERS ARE RUSKIN, (APPROVED EQUALS ACCEPTABLE).

NOTE: DAMPER ACTUATOR SHALL BE FURNISHED BY THE MANUFACTURER AND FACTORY INSTALLED. COMPLETE ASSEMBLY SHALL BE U.L. RATED.

3

DAMPER - LOW PRESSURE COMBINATION FIRE/SMOKE
NOT TO SCALE

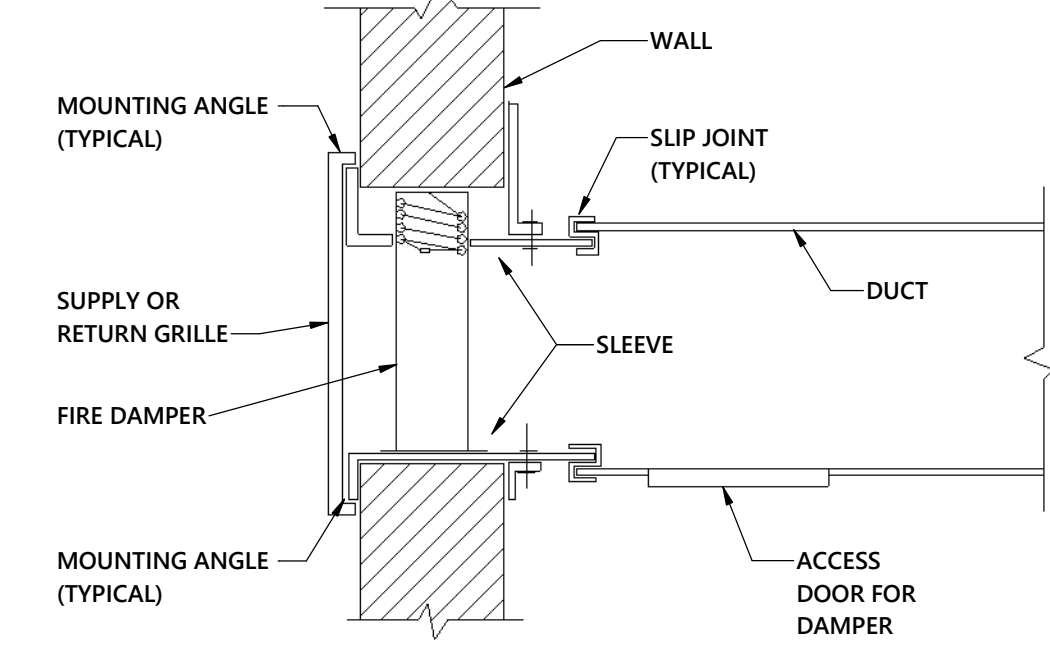


NOTE:

- ALL FIRE/SMOKE DAMPERS SUPPLIED AND INSTALLED BY MECHANICAL CONTRACTOR. ALL FIRE ALARM WIRING INSTALLED BY ELECTRICAL CONTRACTOR. 120V WIRING TO DAMPER PROVIDED AND INSTALLED BY ELECTRICAL CONTRACTOR.
- DAMPER SHALL BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.

4

SMOKE/FIRE DAMPER WIRING
NOT TO SCALE

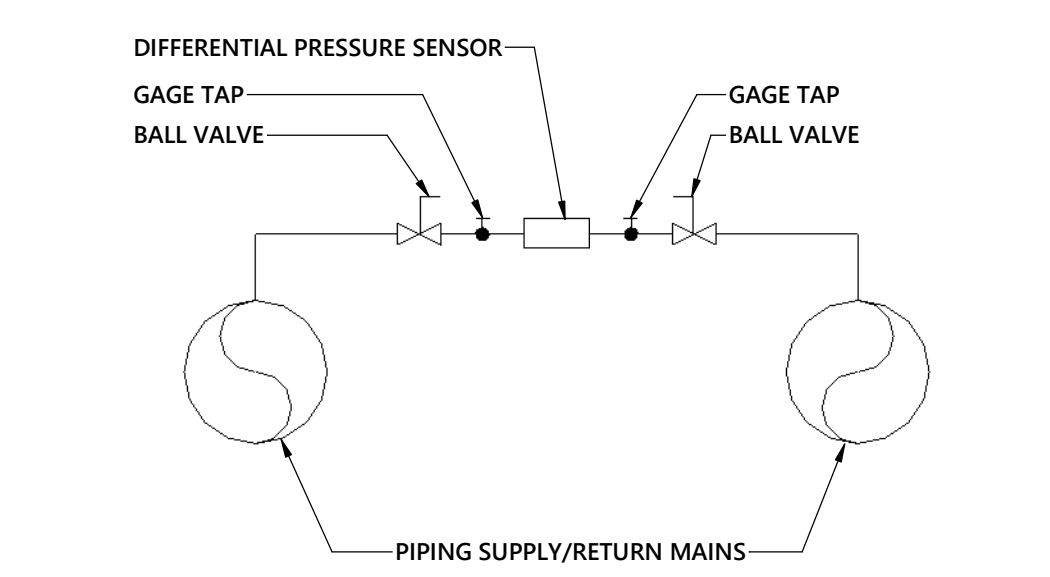


NOTE: DAMPERS SHALL BE INSTALLED AS PER MFG. INSTRUCTIONS.

FIRE DAMPER SHALL BE RUSKIN DIBD20 STYLE G, CURTAIN TYPE, UL, INSTALLED IN ACCORDANCE WITH NFPA. ACCESS DOOR SHALL BE RUSKIN MODEL ADC2 LOCATED ON ACCESSIBLE CEILING SIDE OF WALL. IF ACCESSIBLE CEILING NOT AVAILABLE, MECHANICAL CONTRACTOR SHALL PROVIDE ACCESS DOOR IN CEILING (OR WALL) TO MATCH FINISH COLOR. DAMPER SHALL BE EQUIPPED FOR HORIZONTAL OR VERTICAL MOUNTING AS REQUIRED. ALL MODELS ARE RUSKIN (APPROVED EQUAL ACCEPTABLE).

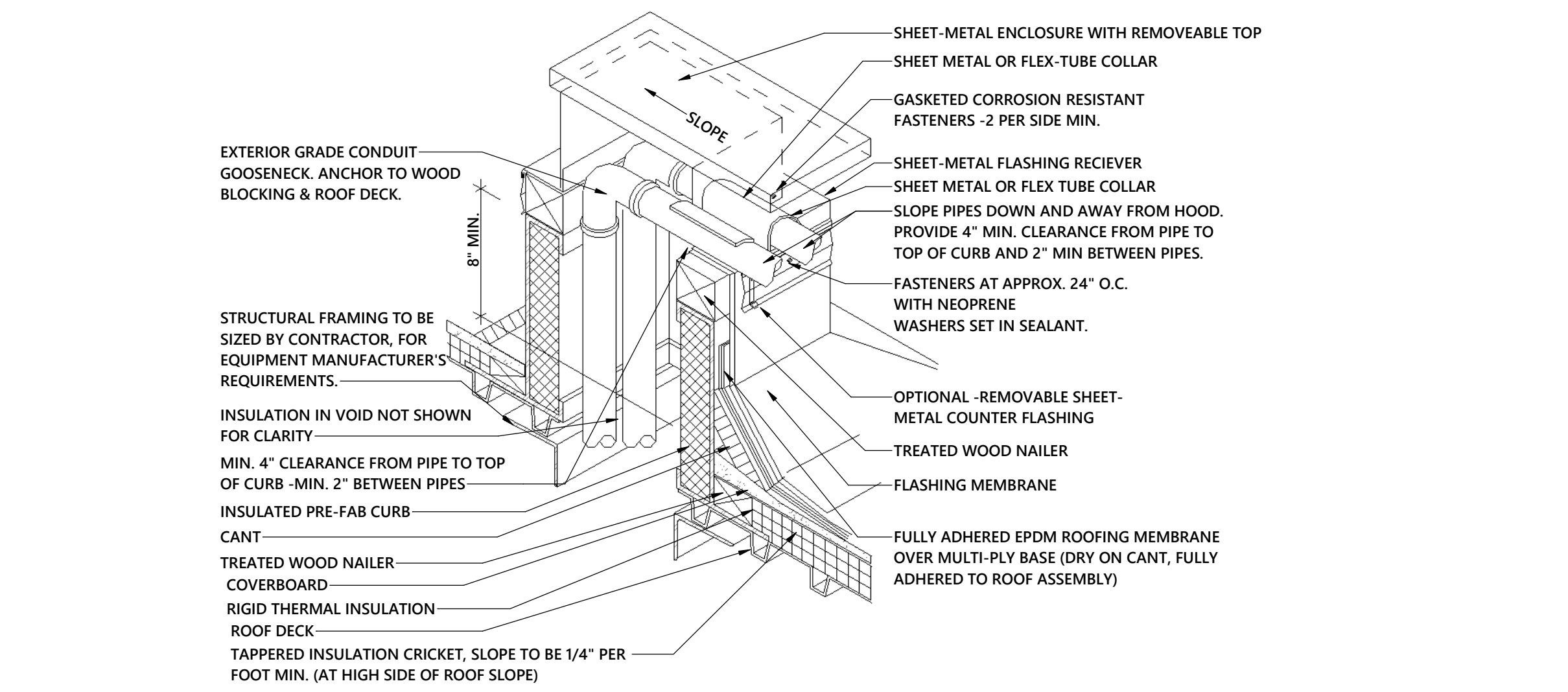
5

DAMPER - LOW PRESSURE FIRE W/GRILLE
NOT TO SCALE



6

DIFFERENTIAL, PRESSURE SENSOR PIPING DETAIL
NO SCALE

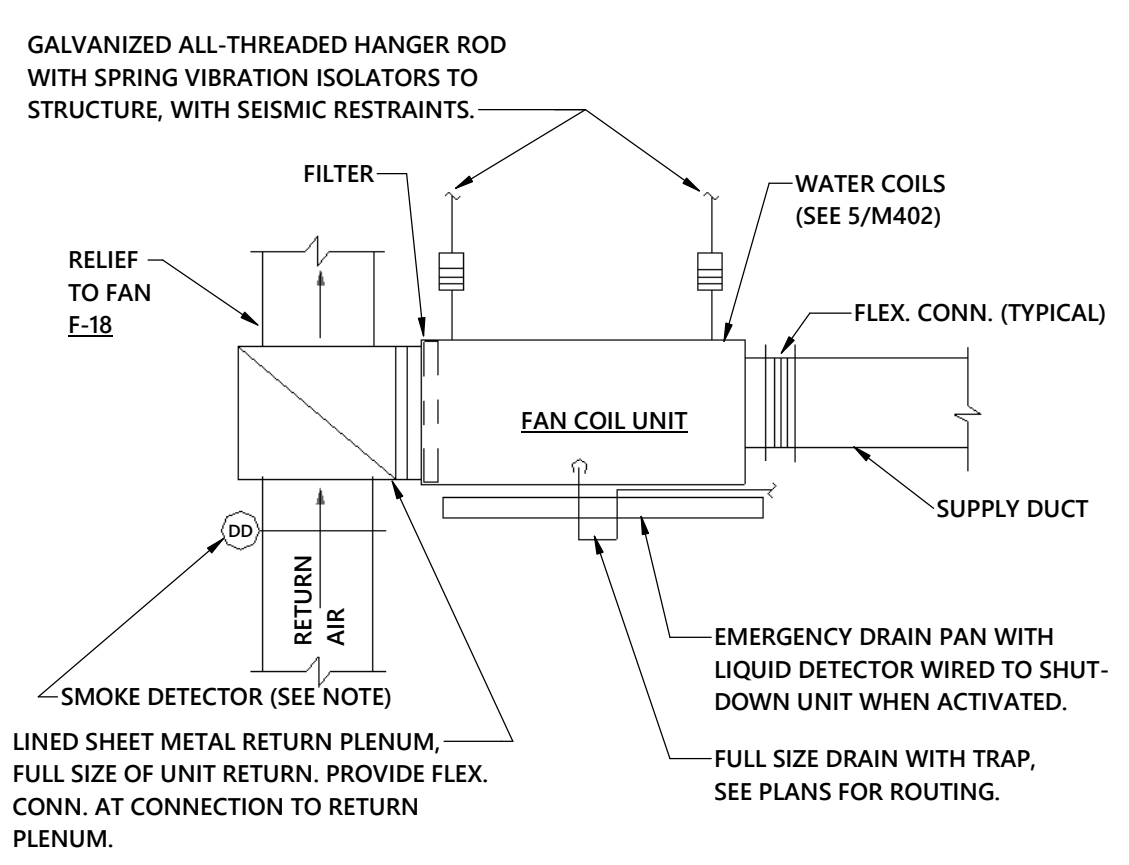


7

MULTIPLE PIPE PENETRATION DETAIL - TYPICAL
NO SCALE

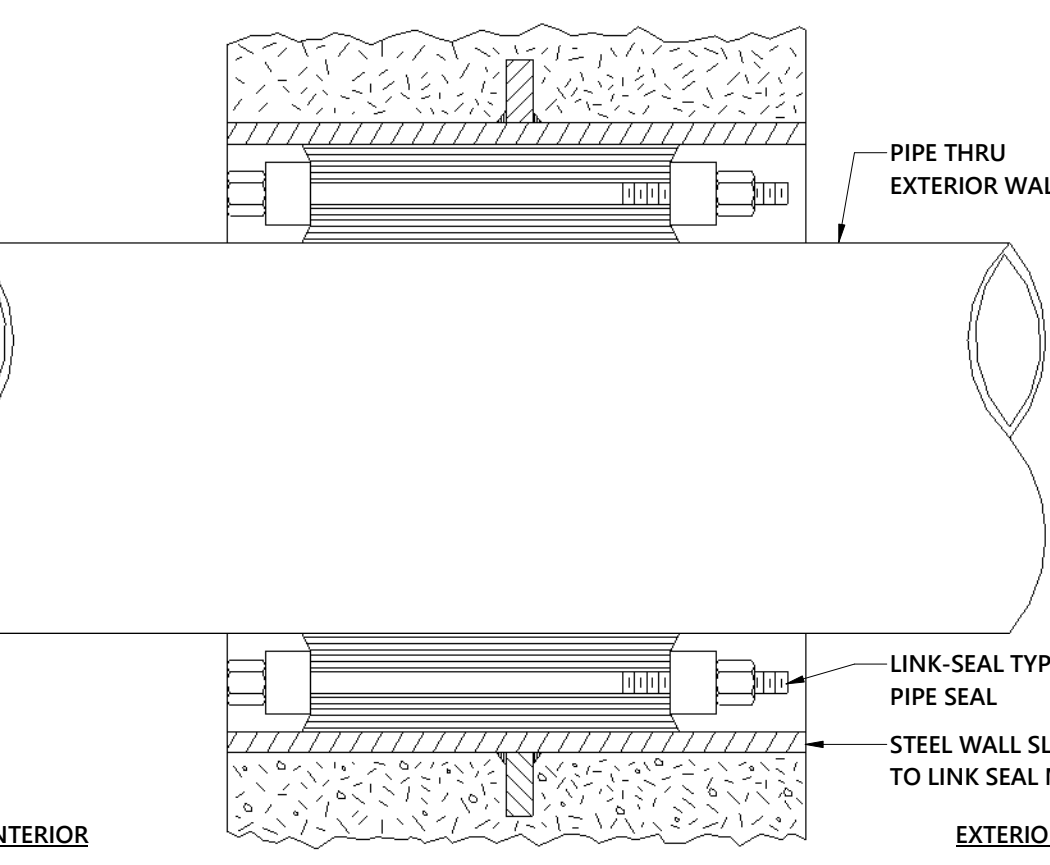
NOTES

- MECHANICAL CONTRACTOR SHALL COORDINATE EXACT LOCATION OF INDOOR UNIT WITH DUCTWORK, PLUMBING, ELECTRICAL, ETC. TO MAINTAIN FILTER AND MAINTENANCE ACCESS CLEARANCES.
- SEE PLANS FOR SIZE AND ROUTING OF DUCTWORK.
- SEE S/M402 FOR PIPING DETAILS.
- ALL FAN COIL UNITS SHALL BE PROVIDED WITH A PHOTOELECTRIC TYPE SMOKE DETECTOR MOUNTED IN THE RETURN DUCT. THE SMOKE DETECTOR SHALL BE FURNISHED AND WIRED FOR UNIT SHUT DOWN AND FIRE ALARM INTERFACE BY THE ELECTRICAL CONTRACTOR AND SHALL BE INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR.



8

FAN COIL UNIT DETAIL
NOT TO SCALE



9

WALL PIPE PENETRATION SEAL
NOT TO SCALE

YCH

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Sheet No. 31 of 32 OPTIMA# 24-0205

