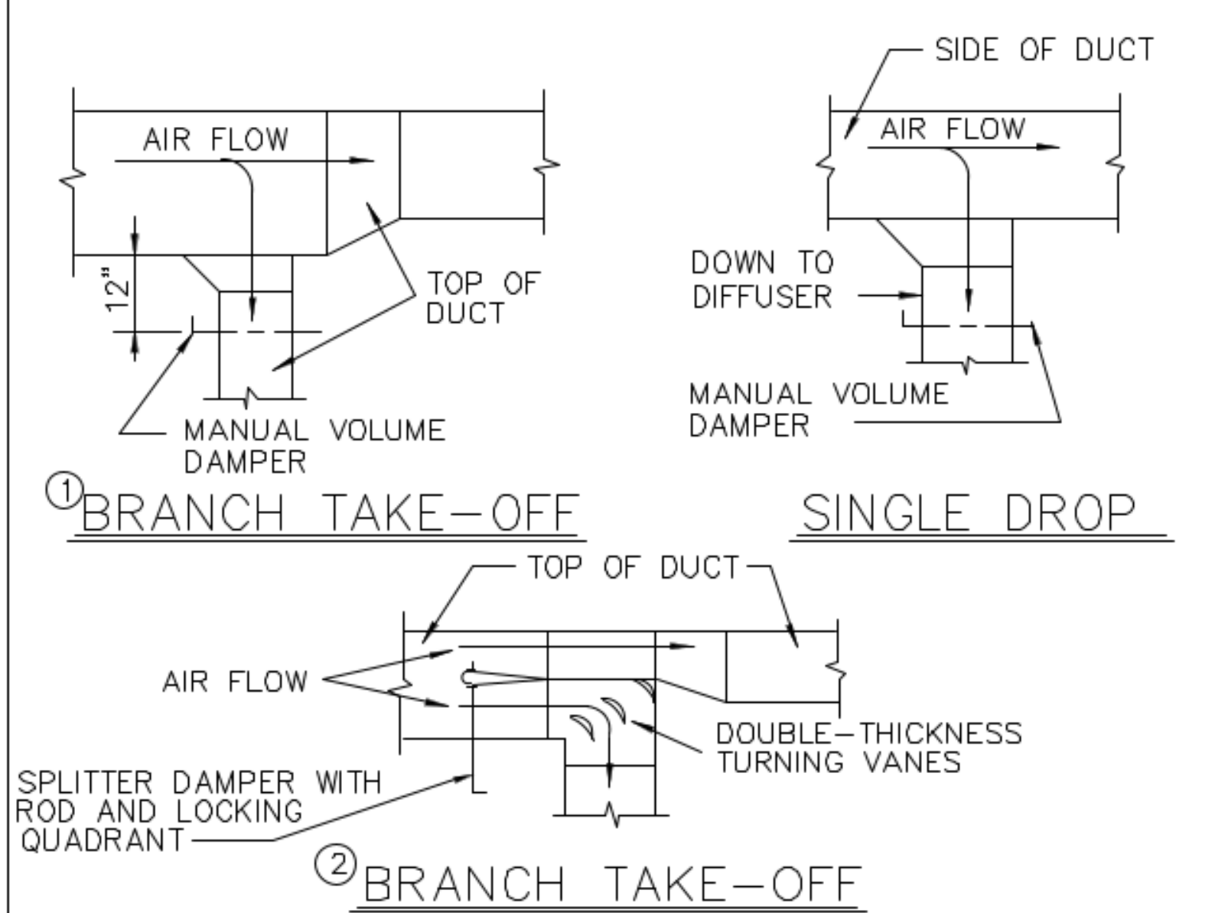
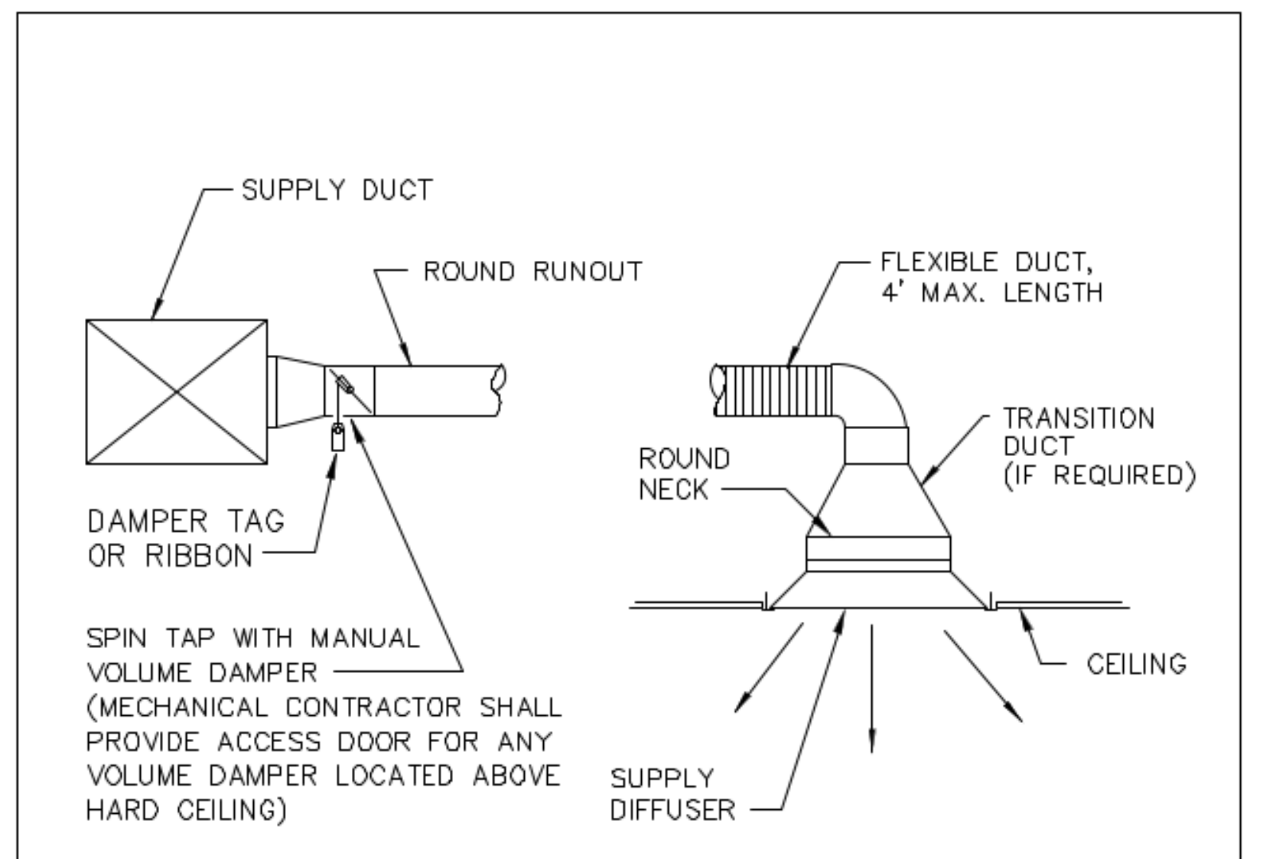


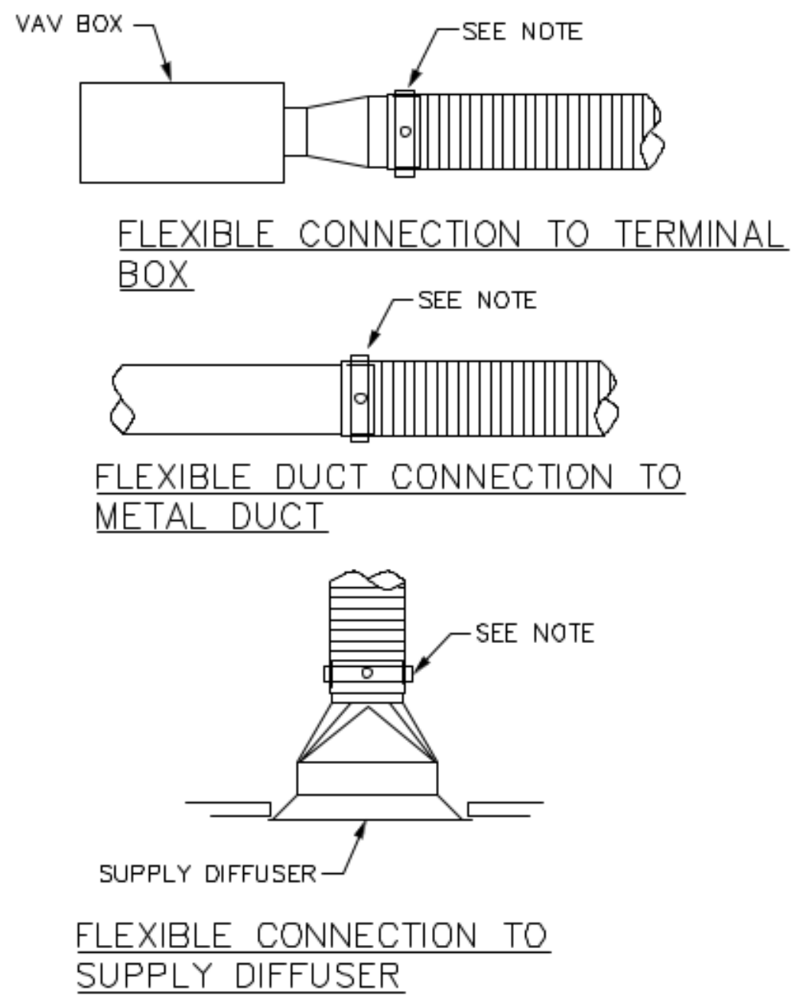
NOTE:
1. USE BRANCH TAKE-OFF ① WHEN MAIN AND BRANCH DUCTS ARE DIFFERENT DEPTHS
2. USE BRANCH TAKE-OFF ② WHEN MAIN AND BRANCH DUCTS ARE SAME DEPTHS

1 DUCTWORK DETAILS
NO SCALE



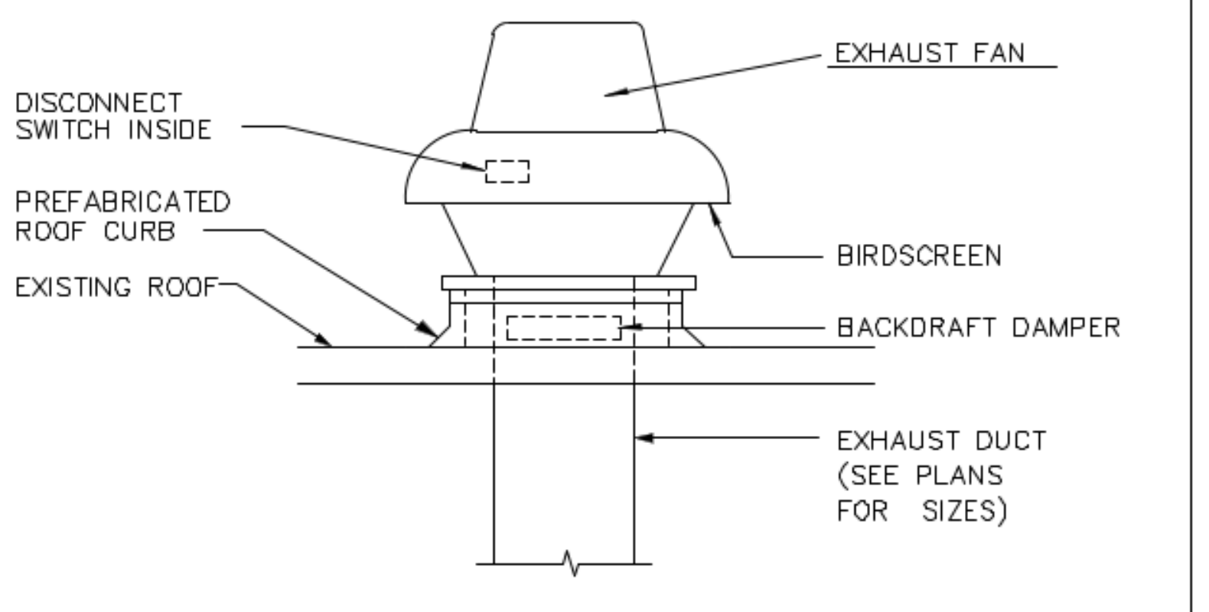
NOTE:
ALL MANUAL VOLUME DAMPERS (FOR INSULATED DUCTWORK) SHALL BE PROVIDED WITH AN ELEVATED REGULATOR (STAND-OFF) EQUAL TO DURO DYNE SRST SERIES. STAND SHALL EXTEND A MINIMUM OF 2" BEYOND DUCTWORK WITH EXTENDED TAB/SHAFT.

2 SPIN TAP TO ROUND NECK DIFFUSER
NO SCALE



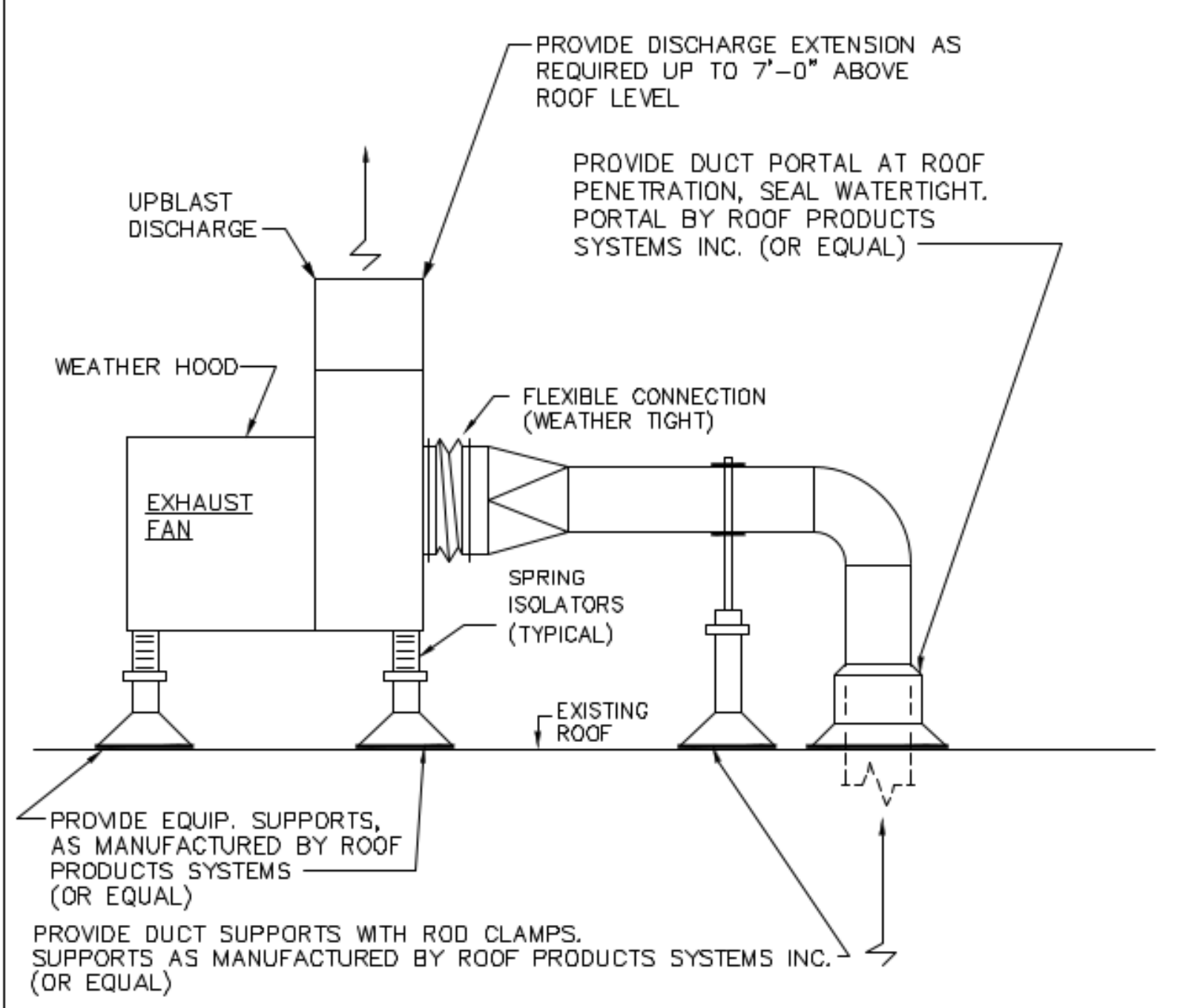
NOTE:
ALL FLEXIBLE DUCT CONNECTIONS TO SHEET METAL SHALL BE SECURED WITH NYLON STRAP AND 2 SHEET METAL SCREWS (MIN.)

3 FLEX. CONNECTION DETAIL
NO SCALE

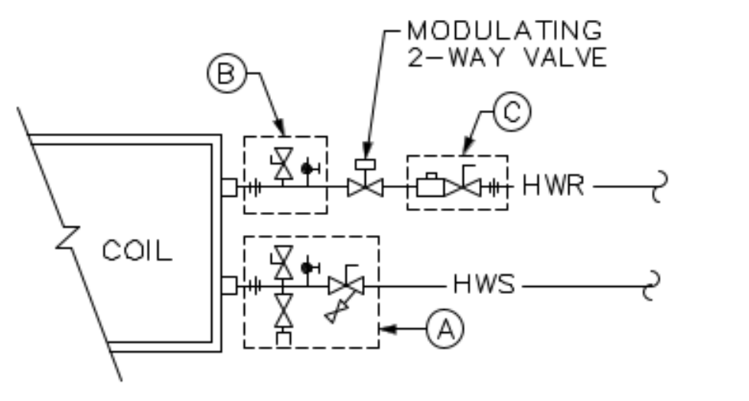


NOTE: SECURE FAN TO CURB WITH NON-FERROUS SCREWS. MIN. 2 PER SIDE, 4-INCHES FROM CORNERS AND MAX. 12-INCHES ON CENTER. PROVIDE EDPM WASHERS FOR BOTH SIDES OF ROOF CURB.

4 EXHAUST FAN DETAIL
NO SCALE



5 UTILITY EXHAUST FAN DETAIL
NO SCALE



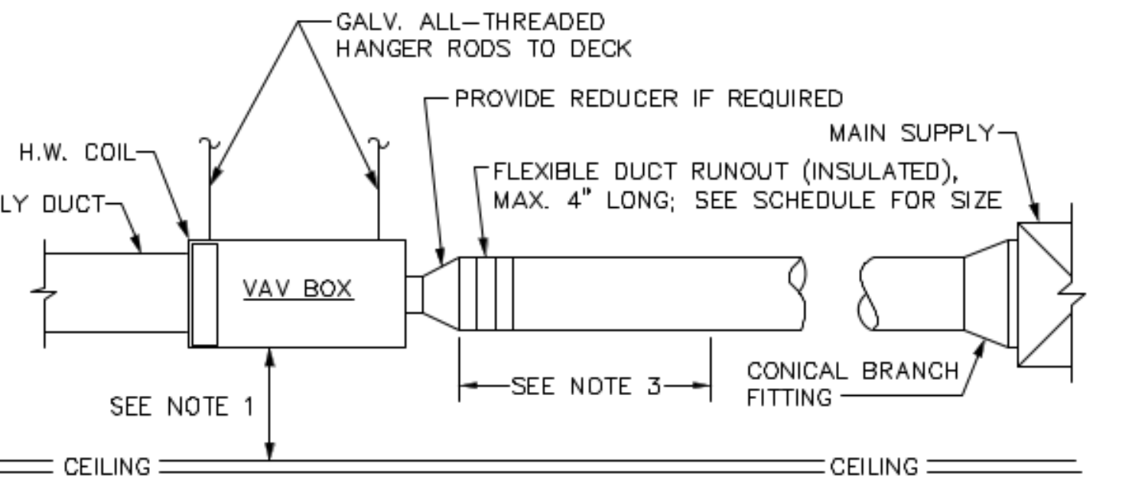
Ⓐ COMBINATION Y-STRAINER, BALL VALVE, COMBINATION PRESSURE & TEMPERATURE TEST VALVES AND MANUAL AIR VENT, AND DRAIN VALVE WITH ¾" HOSE CONNECTION, AND UNION

Ⓑ COMBINATION PRESSURE & TEMPERATURE TEST VALVES AND MANUAL AIR VENT, AND UNION

Ⓒ AUTOMATIC CONTROL VALVE ASSEMBLY WITH BALL VALVE AND STAINLESS STEEL FLOW CONTROL CARTRIDGE, AND UNION

NOTES:
1. PROVIDE 8" OF STRAIGHT PIPE BETWEEN BOX AND VALVE ASSEMBLY. PROVIDE 36" CLEAR SPACE IN FRONT OF CONTROLLER BOX FOR ACCESS, AND LOCATE CONTROLS AND PIPING ON SAME SIDE.
2. A PIPE SUPPORT SHALL BE PROVIDED WITHIN 18" OF THE BOX CONNECTIONS.

6 TERMINAL BOX PIPING DETAIL
NO SCALE



NOTES:
1. MECH. CONTR. INSTALL BOX WITHIN 18" OF CEILING AND PROVIDE ACCESS DOOR IN CEILING IF REQUIRED FOR BOX ACCESS.
2. SEE 6/M002 FOR COIL PIPING DETAIL.
3. PROVIDE MINIMUM OF FOUR DUCT DIAMETERS OF STRAIGHT DUCT PRIOR TO BOX (I.E. 24" STRAIGHT DUCT FOR 6" INLET), THIS DUCT CAN BE FLEX INSTALLED STRAIGHT..
4. PROVIDE 36" CLEAR SPACE IN FRONT OF CONTROLLER BOX FOR ACCESS, AND LOCATE CONTROLS AND PIPING ON SAME SIDE.

7 VAV BOX DETAIL
NO SCALE

MECHANICAL DRAWING INDEX

DRAWING NUMBER	DRAWING NAME
M100	MECHANICAL LEGEND, NOTES, SCHEDULES AND DETAILS
M301A	FIRST FLOOR MECHANICAL PLAN A
M301B	FIRST FLOOR MECHANICAL PLAN B
M302	FIRST FLOOR MECHANICAL PLAN – MAKER SPACE AREA
M310	FIRST FLOOR MECHANICAL PLAN – TOILET CONVERSIONS
M500	MECHANICAL UL DETAILS

MECHANICAL GENERAL NOTES

1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
2. 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. PROVIDE PARTS CATALOG FOR ALL EQUIPMENT IN SUBMITTALS.
3. ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. UNLESS OTHERWISE NOTED, SUPPLY 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. RETURN DUCTWORK AND TRANSFER DUCTS SHALL BE LINED WITH 1" THICK FIBERGLASS DUCT LINER FOR ACOUSTICAL PURPOSES. DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE. LINED DUCTWORK DOES NOT ALSO REQUIRE WRAP.
4. ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE NORTH CAROLINA MECHANICAL CODE. SEAL MEDIUM PRESSURE SUPPLY DUCTWORK FOR POSITIVE 3" 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.
5. ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.
6. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS, TO AVOID INTERFERENCE.
7. THE CM AT RISK SHALL HIRE AN INDEPENDENT TEST AND BALANCE CONTRACTOR TO 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. HVAC SYSTEMS AND BAS SHALL BE FULLY OPERATIONAL PRIOR TO T&B PROCESS. 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. TAB CONTRACTOR TO CONFIRM PERMANENT FILTERS AND FRAMES ARE INSTALLED, CLEAN, AND FREE OF DEBRIS PRIOR TO BEGINNING WORK. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED NEBB OR AABC TEST AND BALANCE CONTRACTOR.
8. 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.
9. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.
10. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.
11. CONDENSATE DRAIN PIPING SHALL BE TYPE 'L' HARD DRAWN COPPER, SEE SPECIFICATIONS FOR INSULATION REQUIREMENTS (ALL INSULATION SHALL BE PLENUM RATED). DRAINS FROM AIR HANDLING UNITS SHALL BE TRAPPED. MINIMUM DRAIN SIZE SHALL BE ¾".
12. MECHANICAL CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE.

MECHANICAL GENERAL NOTES (CONTINUED)

13. ALL HOT WATER PIPING 2" AND LESS SHALL BE HARD-DRAWN TYPE-L COPPER PIPE AND FITTINGS. ALL HOT WATER PIPING GREATER THAN 2" SHALL BE SCHEDULE-40 BLACK STEEL. PROVIDE BRONZE VALVES AND FITTINGS WITH COPPER PIPNG AND CAST IRON VALVES AND FITTINGS WITH SCHEDULE 40 BLACK STEEL.
14. HOT WATER PIPING SHALL BE INSULATED PER THE SPECIFICATIONS. INSULATION SHALL HAVE A FACTORY APPLIED PRESSURIZED VAPOR BARRIER JACKET WITH PRESSURE SENSITIVE ADHESIVE SELF-SEALING LAP. ALL FITTINGS SHALL HAVE PVC FITTING COVERS. ALL PIPING OUTSIDE SHALL HAVE A BITUMINOUS COATING ALUMINUM JACKET AND PVC FITTING COVERS. ALL INSULATION SHALL BE PLENUM RATED.
15. ALL HOT WATER PIPING SHALL PITCH DOWN IN DIRECTION OF FLOW WITH MANUAL AIR VENTS AT ALL HIGH POINTS AND ½" DRAIN VALVES AT ALL LOW POINTS.
16. FUME HOOD EXHAUST DUCT SHALL BE CONSTRUCTED OF STAINLESS STEEL, WITH WELDED JOINTS AND SEAMS. PREP ROOM AND CHEMICAL STORAGE EXHAUST DUCTWORK SHALL BE CONSTRUCTED OF APPROVED G90 GALVANIZED SHEET STEEL WITH NOMINAL THICKNESS OF 18 GAUGE. DUCTWORK AND EXHAUST SYSTEM SHALL MEET THE REQUIREMENTS OF NCMC SECTION 510.

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

C401 METHOD OF COMPLIANCE

☐ 2018 NCECC CHAPTER 4
☐ ASHRAE 90.1–2013 PRESCRIPTIVE
☐ ASHRAE 90.1–2013 PERFORMANCE
■ N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)
☐ COMCHECK PROVIDED (2018 NCECC)
☐ COMCHECK PROVIDED (90.1–2013)
☐ ENERGY MODELING DATA PROVIDED

GRILLE AND DIFFUSER SCHEDULE

SYMBOL	SERVICE	CFM RANGE	FACE SIZE (*)	NECK SIZE	TYPE	OBD	PRICE
A	SUPPLY	285 – 500	24x24	12x12	LOUVERED	NO	SMD
B	RET/EXH	455 – 800	24x24	16x16	CUBE CORE	NO	80
C	S/R/E	805 – 1400	24x24	22x20	CUBE CORE	NO	80

(*) – 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.

VAV BOX SCHEDULE

SYMBOL	COOLING MAX CFM	COOLING MIN CFM	HEATING CFM	WATER TEMPS		HOT WATER COIL			AIR TEMPS		TITUS DESV	RUNOUT SIZE
				EAT	LAT	BTUH	GPM	RUNOUT	EAT	LAT		
3.1	1250	320	630	180	140	21000	1.1	3/4	55	85.9	10	14

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 STAND ALONE CONTROLS (SEE NOTE 5), ACOUSTICAL LINING, THERMOSTAT, CONTROL VOLTAGE TRANSFORMER.
4. MECHANCIAL 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. PROVIDE VAV BOX WITH STAND ALONE CONTROLS, UNIT SHALL NOT BE TIED INTO THE EXISTING BUILDING BAS. SEE SPECIFICATION SECTION 230993 FOR SEQUENCE OF OPERATION AND POINTS LIST.
6. MINIMUM HOT WATER RUNOUT SIZE TO BOXES SHALL BE 3/4".

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	ABBR.
Ⓣ	THERMOSTAT / TEMP SENSOR (4'-0" AFF TO TOP)	
Ⓢ	SWITCH (4'-0" AFF TO TOP)	
☒	SUPPLY AIR DIFFUSER (4-WAY)	
⧅	RETURN AIR GRILLE	
◫	EXHAUST AIR GRILLE	
	DOUBLE LINE DUCTWORK	
	FLEXIBLE DUCTWORK	
EX FD	FIRE DAMPER W/ ACCESS DOOR (EXISTING)	
EX FSD	COMBINATION FIRE/SMOKE DAMPER W/ ACCESS DOOR (EXISTING)	
	EXISTING DOUBLE LINE DUCTWORK	
	EXISTING SINGLE LINE DUCTWORK	
	EXISTING DUCTWORK TO BE REMOVED	
⊗	POINT OF EXISTING TO NEW CONNECTION	
◑	POINT OF DISCONNECTION	
20x14	20"x14" RECTANGULAR DUCT	
8"ø	8" DIAMETER ROUND DUCT	
AFF	ABOVE FINISHED FLOOR	
DN	DOWN	
UP	UP	
S/A	SUPPLY AIR	
O/A	OUTDOOR AIR	
R/A	RETURN AIR	
E/A	EXHAUST AIR	
L/A	RELIEF AIR	
CHS	CHILLED WATER SUPPLY	CHS
CHR	CHILLED WATER RETURN	CHR
HWS	HOT WATER SUPPLY	HWS
HWR	HOT WATER RETURN	HWR
	BUTTERFLY VALVE	
OR	3-PIECE BALL VALVE	
	CHECK VALVE	
	STRAINER WITH BLOWDOWN VALVE WITH HOSE CONN.	
	BALANCING VALVE	
	B&G CIRCUIT SETTER	
	CONTROL VALVE	

FAN SCHEDULE

SYMBOL	LOCATION	TYPE	CFM	APPROX. S.P.	DRIVE	FAN RPM	ELECTRICAL DATA			MANUFACTURER	ACCESSORIES	CONTROLS
							WATTS	H.P.	VOLTAGE	GREENHECK		
F-1	FUME HOOD 216	EXHAUST	870	0.5"	BELT	1005	--	¼	277V-1ø	USF-13-B2	A,B,T	9
F-2	FUME HOOD 217	EXHAUST	870	0.5"	BELT	1005	--	¼	277V-1ø	USF-13-B2	A,B,T	9
F-3	FUME HOOD 220	EXHAUST	870	0.5"	BELT	1005	--	¼	277V-1ø	USF-13-B2	A,B,T	9
F-4	MAKERSPACE 301A	EXHAUST	1300	0.5"	DIRECT	1150	--	½	277V-1ø	G-140-VG	A,B,D,E	4
F-5	PREP 219	EXHAUST	350	0.375"	DIRECT	1000	121	–	277V-1ø	SP-A410	A,B,G,O	6
F-6	PREP 204	EXHAUST	175	0.375"	DIRECT	1088	26	–	120V-1ø	SP-A390-VG	A,B,G,O	6
F-7	PREP 205	EXHAUST	175	0.375"	DIRECT	1088	26	–	120V-1ø	SP-A390-VG	A,B,G,O	6
F-8	PREP 210	EXHAUST	125	0.375"	DIRECT	1041	12	–	120V-1ø	SP-A90-130-VG	A,B,G,O	6
F-9	PREP 213	EXHAUST	125	0.375"	DIRECT	1041	12	–	120V-1ø	SP-A90-130-VG	A,B,G,O	6
F-10	PREP 230	EXHAUST	125	0.375"	DIRECT	1041	12	–	120V-1ø	SP-A90-130-VG	A,B,G,O	6
F-11	PREP 232	EXHAUST	125	0.375"	DIRECT	1041	12	–	120V-1ø	SP-A90-130-VG	A,B,G,O	6

ACCESSORIES

A: DISCONNECT SWITCH
B: GRAVITY BACKDRAFT DAMPER
C: MOTORIZED BACKDRAFT DAMPER
D: PREFAB. ROOF CURB
E: BIRDSCREEN
F: ACOUSTICAL LINING
G: HANGING BRACKETS WITH VIBRATION ISOLATION
H: WL, WALL LOUVER DISCHARGE
J: RCC OR GRS ROOF CAP (FLAT ROOF) OR RJ ROOF CAP (PITCHED ROOF)
K: WALL MOUNTING COLLAR
L: INLET GUARD
M: 2" WASHABLE ALUMINUM FILTERS
N: MOTORSIDE FAN GUARD
O: EXHAUST GRILLE
P: U.L. 762
Q: VENTED ROOF CURB EXTENSION
R: COMBINATION KITCHEN HOOD FAN CURB
S: MAGNETIC STARTER WITH AUXILIARY CONTACTS
T: PROVIDE DRAIN PLUG ACCESSORY
U: PRESSURE SENSING SWITCH
V: 170,000 BTUH DIRECT FIRED MODULATING LP GAS HEATER WITH INTEGRAL CONTROLS TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 60'F
W: 140,000 BTUH DIRECT FIRED MODULATING LP GAS HEATER WITH INTEGRAL CONTROLS TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 60'F
X: 185,000 BTUH DIRECT FIRED MODULATING LP GAS HEATER WITH INTEGRAL CONTROLS TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 70'F
Y: ECM MOTOR FOR VARIABLE SPEED CONTROL
Z: VARIABLE FREQUENCY DRIVE

CONTROLS

1: WALL MOUNTED THERMOSTAT (REVERSE ACTING, SET FOR 80°)
2: INTERLOCK WITH ROOM LIGHT SWITCH (FAN SHALL OPERATE WHEN LIGHT IS ON IN ANY ROOM SERVED BY FAN)
3: WALL MOUNTED TWIST TIMER WITH 0-3 HOUR RANGE WITH IDENTIFICATION LABEL
4: WALL MOUNTED TWIST TIMER WITH 0-30 MINUTE RANGE WITH IDENTIFICATION LABEL
5: CONTROLLED BY BUILDING AUTOMATION SYSTEM
6: CONTINUOUS OPERATION
7: INTERLOCK WITH KITCHEN HOOD CONTROLS
8: INTERLOCK WITH DISHWASHER
9: INTERLOCK WITH FUME HOOD
10: WALL MOUNTED PUSH BUTTON SWITCH/STARTER WITH IDENTIFICATION LABEL
11: INTERLOCK WITH CO SENSOR
12: INTERLOCK WITH BAROMETRIC PRESSURE SENSOR
13: INTERLOCK WITH PAINT BOOTH

NOTES:

(*) – STORAGE BUILDING ALTERNATE #4
1. ALL FANS SHALL BE U.L. LISTED AND LABELED AND SHALL BE AMCA CERTIFIED FOR SOUND AND AIR FLOW. ALL HIGH SCHOOL BUILDING FANS INSTALLED INSIDE, ABOVE, OR ADJACENT TO OCCUPIED SPACES SHALL HAVE A MAXIMUM 9.0 INLET SONE LEVEL.
2. MECHANICAL CONTRACTOR SHALL PROVIDE MAGNETIC STARTER WITH AUXILLARY CONTACTS AS REQUIRED.
3. PROVIDE ALL DIRECT DRIVE FANS WITH SPEED CONTROLLERS.

MECHANICAL DEMOLITION NOTES

1. THE MECHANICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BEGINNING WORK TO DETERMINE THE LEVEL OF DEMOLITION REQUIRED AND INCLUDE ALL NECESSARY PRICING IN THEIR BID.
2. IT IS THE MECHANICAL CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL EXISTING DUCTWORK AND PIPING. ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND MECHANICAL PLANS SHOULD BE BROUGHT TO THE ATTENTION OF THE MECHANICAL ENGINEER.
3. THE MECHANICAL CONTRACTOR SHALL FIELD VERIFY ALL EXISTING FIRE DAMPERS ARE LOCATED WHERE INDICATED ON DRAWINGS. ALL NEW AND EXISTING DUCTWORK PENETRATING NEW RATED WALLS SHALL BE PROVIDED WITH A 1½-HOUR (TYPE-B) FIRE DAMPER WHETHER INDICATED ON PLANS OR NOT.
4. EXISTING GRILLES/DIFFUSERS AND RUN OUTS MAY BE REUSED IF SIZED ADEQUATELY TO PROVIDE THE AIR QUANTITIES INDICATED. ANY GRILLES/DIFFUSERS BEING REUSED SHALL BE CLEANED AND VERIFIED TO BE IN GOOD WORKING CONDITION.
5. M.C. SHALL VERIFY ALL EXISTING SUPPLY AND RETURN AIR DUCT TO REMAIN IS INSULATED WITH VAPOR BARRIER INTACT. IF EXISTING DUCT IS NOT INSULATED WITH EITHER DUCT LINER OR WRAP, M.C. SHALL PROVIDE 2" THICK DUCT WRAP WITH VAPOR BARRIER (MIN. R-VALUE OF 5.0).
6. M.C. SHALL VERIFY ALL EXISTING PIPING SYSTEMS TO REMAIN ARE INSULATED WITH VAPOR BARRIER INTACT. IF ANY PORTION OF THE PIPING SYSTEM IS MISSING INSULATION OR DETERMINED DURING ANY PHASE OF THE PROJECT AS DEFECTIVE, THAT PORTION SHALL BE PROVIDED WITH NEW INSULATION. MINOR TEARS ON EXISTING PIPING MAY BE REPAIRED WITH TAPES, ADHESIVE, OR SEALANT. EXISTING PIPING SYSTEMS SHALL INCLUDE CHILLED WATER, HOT WATER, REFRIGERANT, AND A/C CONDENSATE DRAIN PIPING. THE MECHANICAL CONTRACTOR SHALL MAKE PROVISIONS IN THEIR BASE BID TO COVER ALL COSTS NECESSARY ACHIEVE A CONTINUOUS VAPOR BARRIER THROUGHOUT THESE EXISTING SYSTEMS. REFER TO SPECIFICATIONS SECTION 230700/ MECHANICAL GENERAL NOTES FOR INSULATION MATERIAL REQUIREMENTS.
7. FOR ALL EXISTING HVAC EQUIPMENT AND DUCTWORK NOTED TO REMAIN AND SERVING AREA OF RENOVATION, MECHANICAL CONTRACTOR SHALL INSPECT EQUIPMENT (AND ANY ASSOCIATED CONTROLS, VALVES, DAMPERS, ETC.) TO VERIFY PROPER WORKING ORDER. MECHANICAL CONTRACTOR TO SERVICE AND CLEAN EXISTING HVAC UNITS TO ENSURE DESIGN AIRFLOW AND COOLING/HEATING CAPACITIES ARE OBTAINED. ANY EQUIPMENT FOUND TO BE INOPERABLE OR SHORT OF DESIGN CAPACITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROJECT COMPLETION. PROVIDE CLEAN FILTERS IN ALL UNITS AT COMPLETION OF PROJECT. DAMAGED DUCTWORK SHALL BE REPAIRED.

COMMISSIONING NOTE

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.

PHASING NOTE

THIS PROJECT WILL BE CONSTRUCTED IN PHASES. PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR ALL PHASING. REFER TO THE GENERAL DRAWINGS FOR PHASING REQUIREMENTS AND GENERAL CONTRACTOR FOR PHASING DATES. COORDINATE PHASING REQUIREMENTS WITH THE GENERAL CONTRACTOR AN OTHER SUB CONTRACTORS. ALL WORK MUST BE COMPLETED PRIOR TO MOVING TO THE NEXT PHASE OF WORK.

EXISTING UNIT VENTILATOR UNIT SCHEDULE FOR REFERENCE ONLY (FIELD VERIFY ARRANGEMENTS AND MODEL #S)

UNIT NUMBER	LOCATION	TOTAL AIR FLOW (CFM)	EXT. STATIC PRESSURE (IN. H_2O)	COOLING COIL							HEATING COIL						ELECTRICAL DATA				MODEL NO.
				TOTAL CAPACITY	SENSIBLE CAPACITY	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	RUNOUT SIZE	TOTAL CAPACITY	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	RUNOUT SIZE	FAN (H.P.)	VOLTS	PHASE	Hz	
UV-A	CLASSROOM	750	0.50"	27,500	17,600	5.5	45	57	10'	1"	35,000	2.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-3000
UV-B	CLASSROOM	1000	0.50"	34,400	23,900	7.0	45	57	10'	1"	45,000	2.5	180	140	5'	3/4"	1/2	277	1	60	AAF AH-4000
UV-C	CLASSROOM	1250	0.50"	47,100	33,700	8.5	45	57	10'	1 1/4"	55,000	3.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-5000
UV-D	CLASSROOM	1500	0.50"	59,000	38,600	10.0	45	57	10'	1 1/4"	65,000	3.5	180	140	5'	3/4"	1/2	277	1	60	AAF AH-6000
UV-E	CLASSROOM	2000	0.50"	67,900	46,800	11.5	45	57	10'	1 1/4"	87,000	4.5	180		5'	1"	1/2	277	1	60	AAF AH-8000
UV-F	KITCHEN	2000	0.25"	67900	46,800	11.5	45	57	10'	1 1/4"	87,000	4.5	180	140	5'	1"	1/3	277	1	60	AAF AH-8000
UV-G	MEDIA CENTER	1250	0.50"	47,100	33,700	8.5	45	57	10'	1 1/4"	55,000	3.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-5000

VENTILATION CALCULATIONS (NCMC 2018, SECT 403):

ROOM NUMBER	ROOM NAME	OCCUPANCY CLASSIFICATION	Rp **(CFM/PERSON)**	Ra **(CFM/SQ.FT.)**	OCCUPANT DENSITY **PEOPLE/1000 SQ.FT.**	EXHAUST AIRFLOW **(CFM/SQ.FT.)**	Az AREA **(SQ. FT.)**	Pz CALCULATED OCCUPANCY **(PEOPLE)**	RpPz CALCULATED PEOPLE O/A **(CFM)**	RaAz CALCUATED AREA O/A **(CFM)**	Vbz PEOPLE + AREA O/A **(CFM)**
	EXISTING AHU-3										
301A	MAKER SPACE CLASSROOM **(NEW)**	CLASSROOMS (AGES 5-8)	7.5	0	25		775	19	145	0	145
301	EXISTING MEDIA CENTER	MEDIA CENTER	10	0.12	25		4030	101	1008	484	1491
302	EXISTING WORKROOM	OFFICE SPACE	5	0.06	5		743	4	19	45	63
301	EXISTING MEDIA CENTER	LIBRARY	5	0.12	10		4030	40	202	484	685
						TOTALS	9578	164	1373	1012	2385
										PROVIDED	**2650**
											EX O/A @AHU-3

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02-10-22

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North Carolina License Number C-0914

E.E. WADDELL HS RENOVATIONS
CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE, NC 28217

PROJECT NO: 602716
DATE: 11-19-2021

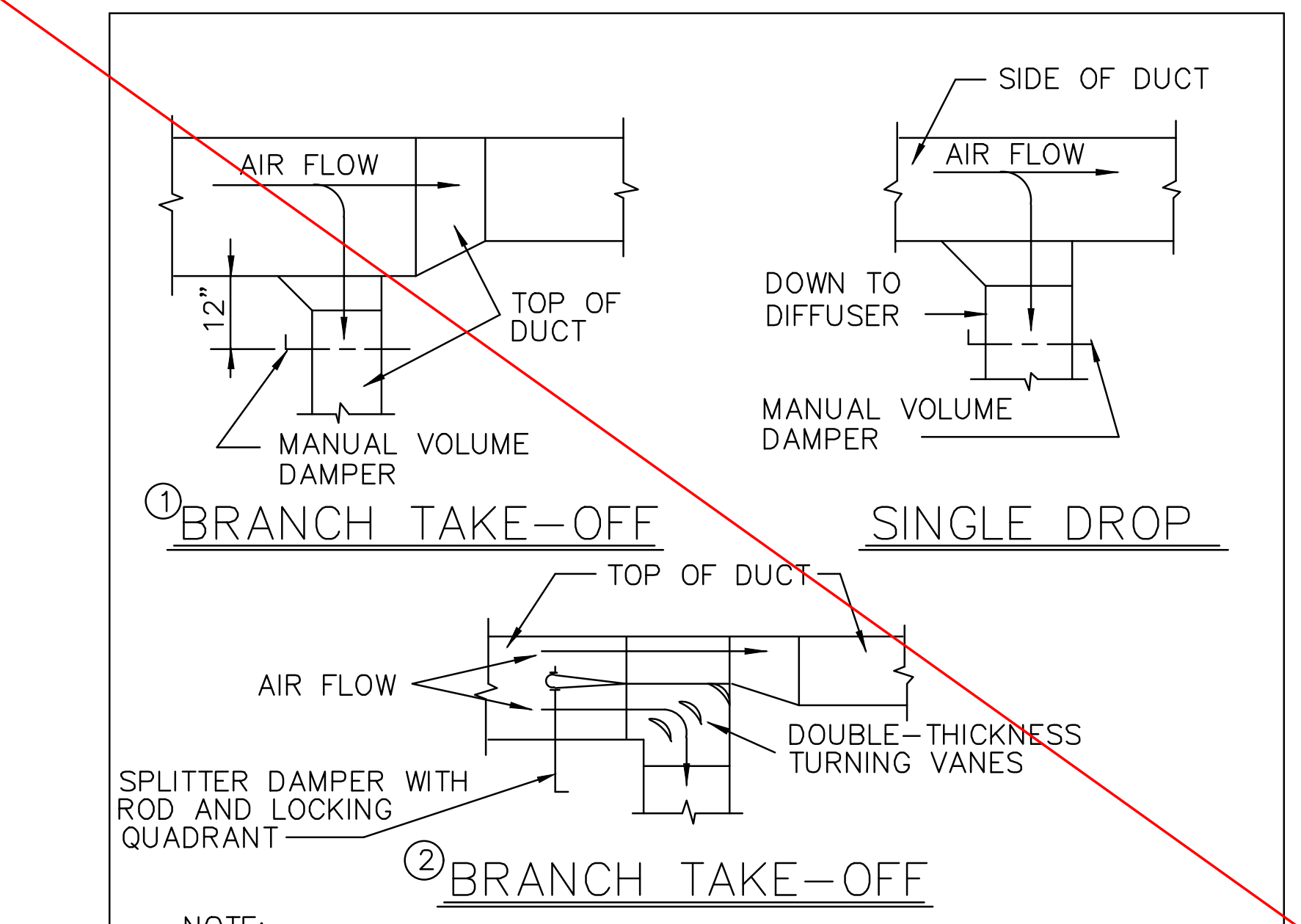
REVISIONS

DATE	DESCRIPTION
12-10-21	REVISION 1
02-10-22	ADDENDUM 1

MECHANICAL LEGEND, NOTES, SCHEDULES AND DETAILS

M100
1 of 6

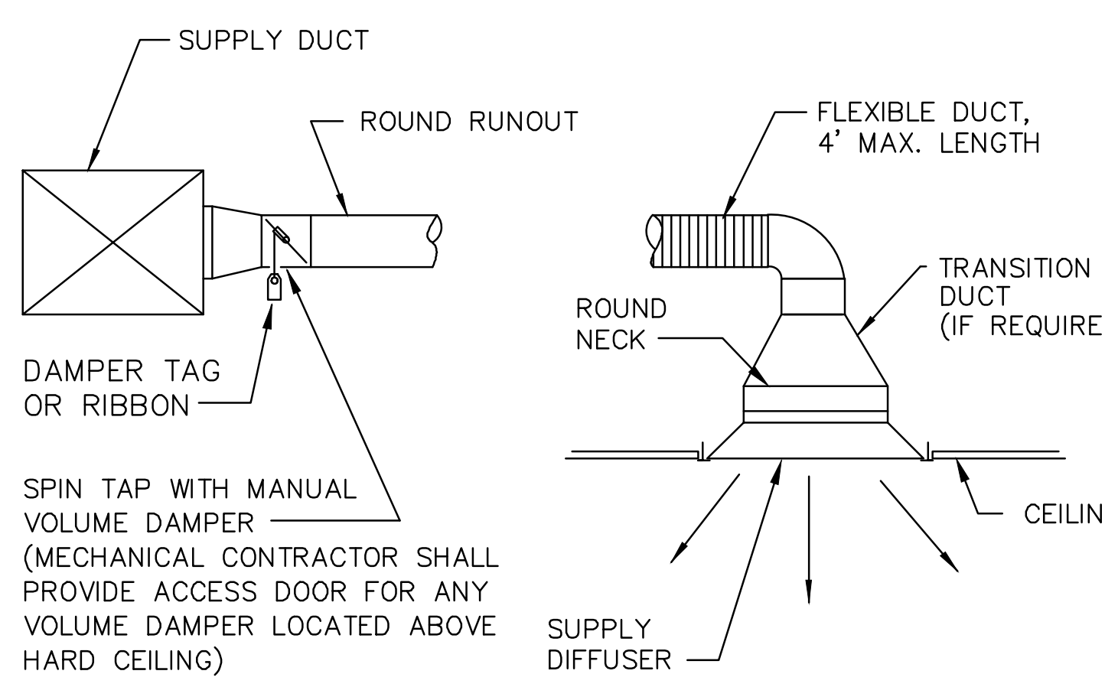
Opt # 21-0107



NOTE:

1. USE BRANCH TAKE-OFF ① WHEN MAIN AND BRANCH DUCTS ARE DIFFERENT DEPTHS
2. USE BRANCH TAKE-OFF ② WHEN MAIN AND BRANCH DUCTS ARE SAME DEPTHS

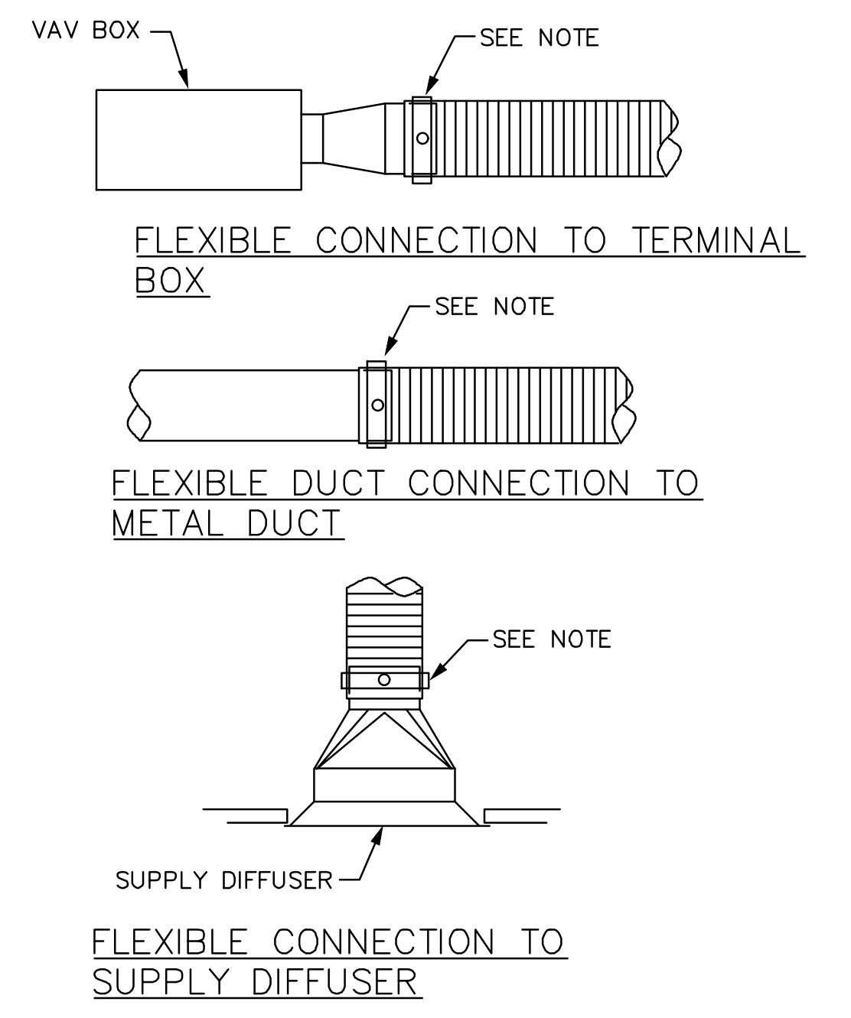
1 DUCTWORK DETAILS
NO SCALE



NOTE:

ALL MANUAL VOLUME DAMPERS (FOR INSULATED DUCTWORK) SHALL BE PROVIDED WITH AN ELEVATED REGULATOR (STAND-OFF) EQUAL TO DURO DYNE SRST SERIES. STAND SHALL EXTEND A MINIMUM OF 2" BEYOND DUCTWORK WITH EXTENDED TAB/SHAFT.

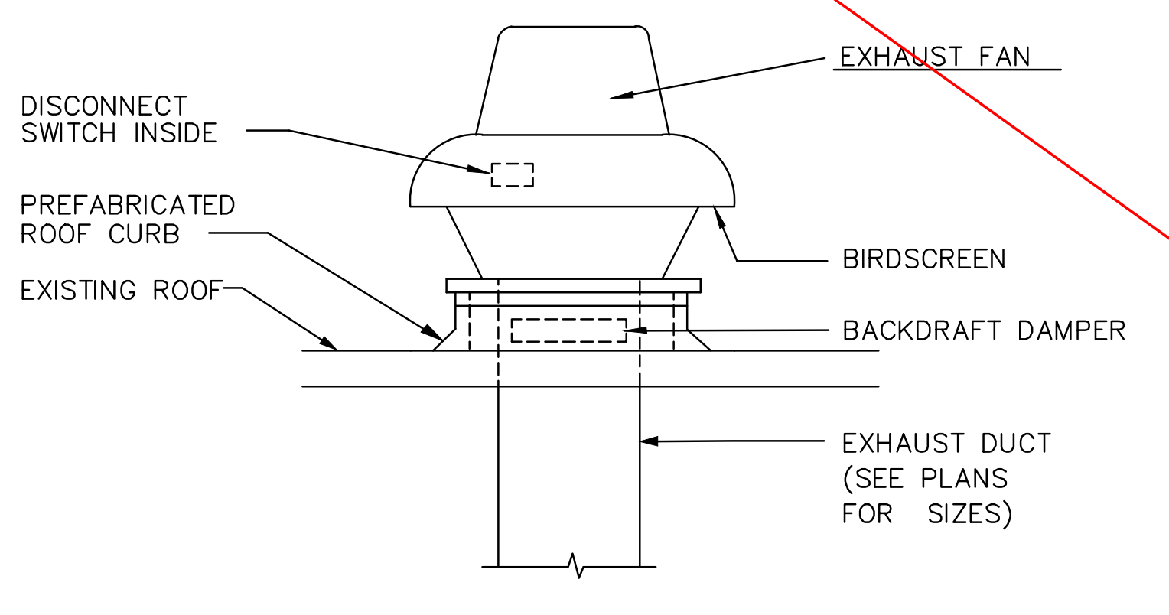
2 SPIN TAP TO ROUND NECK DIFFUSER
NO SCALE



NOTE:

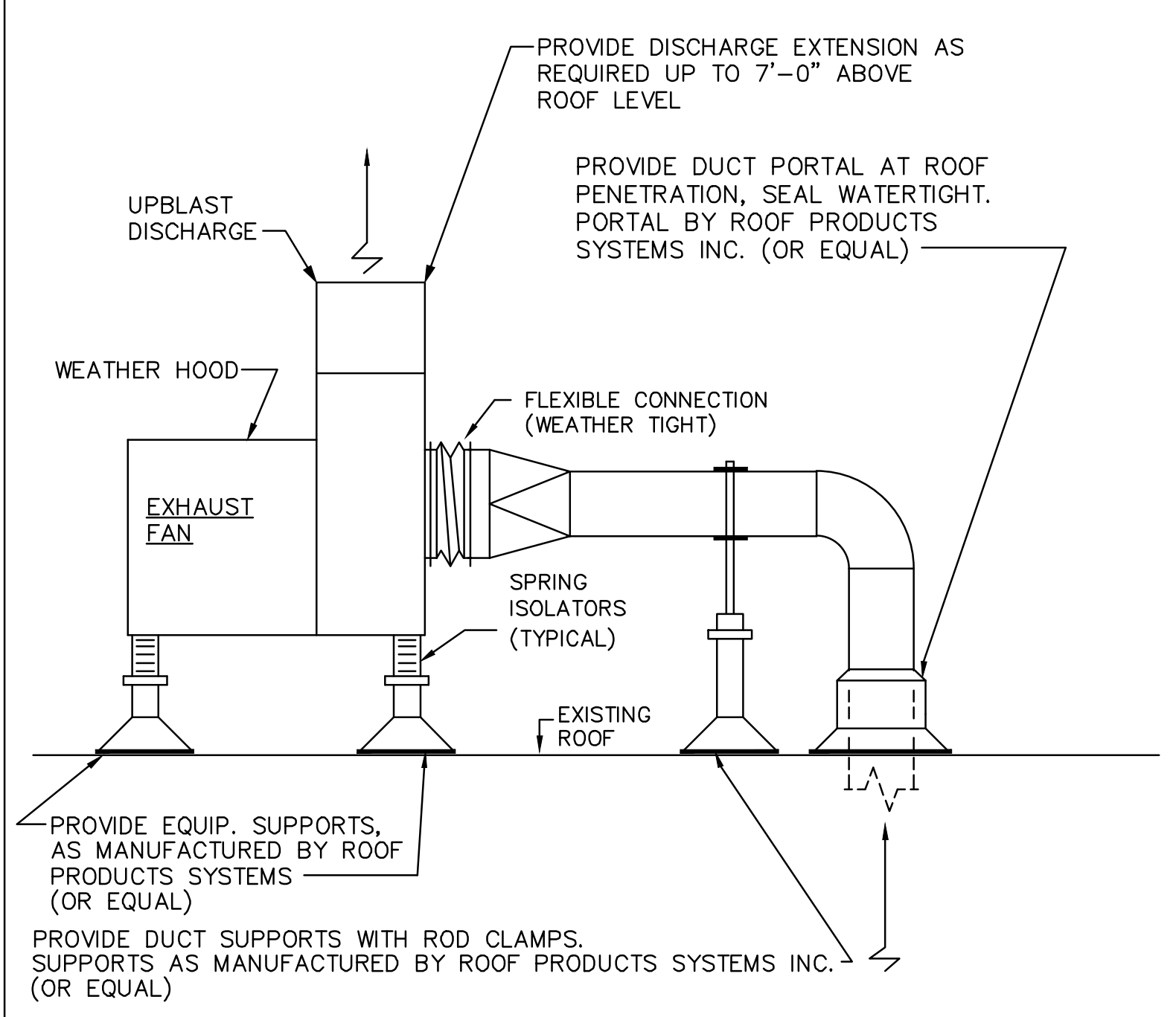
ALL FLEXIBLE DUCT CONNECTIONS TO SHEET METAL SHALL BE SECURED WITH NYLON STRAP AND 2 SHEET METAL SCREWS (MIN.).

3 FLEX. CONNECTION DETAIL
NO SCALE

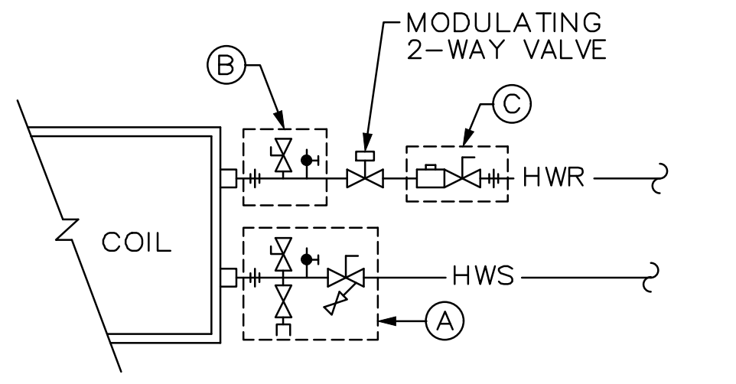


NOTE: SECURE FAN TO CURB WITH NON-FERROUS SCREWS. MIN. 2 PER SIDE, 4-INCHES FROM CORNERS AND MAX. 12-INCHES ON CENTER. PROVIDE EDPM WASHERS FOR BOTH SIDES OF ROOF CURB.

4 EXHAUST FAN DETAIL
NO SCALE



5 UTILITY EXHAUST FAN DETAIL
NO SCALE



Ⓐ COMBINATION Y-STRAINER, BALL VALVE, COMBINATION PRESSURE & TEMPERATURE TEST VALVES AND MANUAL AIR VENT, AND DRAIN VALVE WITH ¾" HOSE CONNECTION, AND UNION

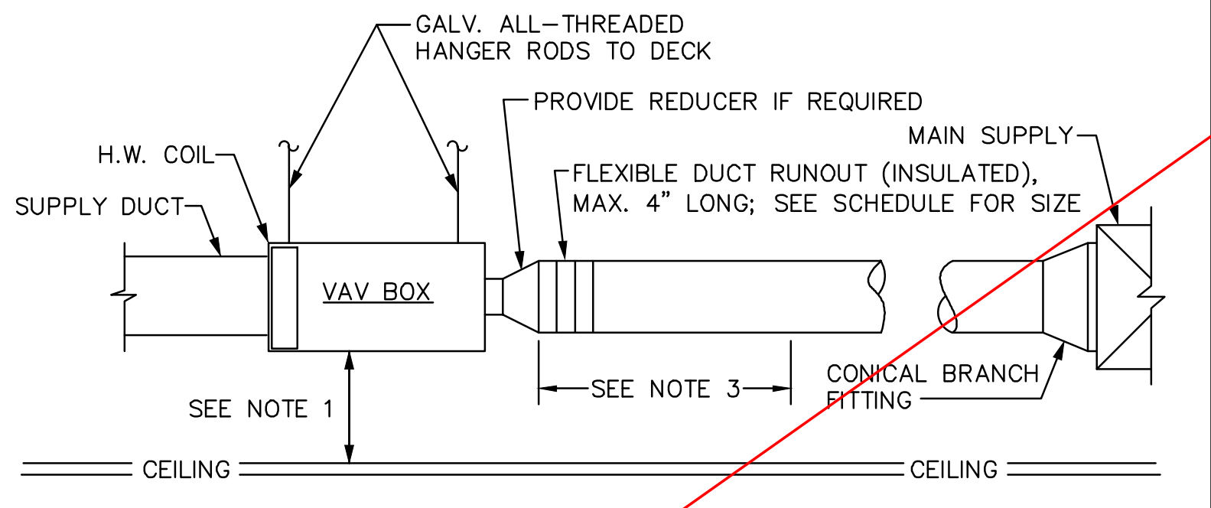
Ⓑ COMBINATION PRESSURE & TEMPERATURE TEST VALVES AND MANUAL AIR VENT, AND UNION

Ⓒ AUTOMATIC CONTROL VALVE ASSEMBLY WITH BALL VALVE AND STAINLESS STEEL FLOW CONTROL CARTRIDGE, AND UNION

NOTES:

1. PROVIDE 8" OF STRAIGHT PIPE BETWEEN BOX AND VALVE ASSEMBLY. PROVIDE 36" CLEAR SPACE IN FRONT OF CONTROLLER BOX FOR ACCESS, AND LOCATE CONTROLS AND PIPING ON SAME SIDE.
2. A PIPE SUPPORT SHALL BE PROVIDED WITHIN 18" OF THE BOX CONNECTIONS.

6 TERMINAL BOX PIPING DETAIL
NO SCALE



NOTES:

1. MECH. CONTR. INSTALL BOX WITHIN 18" OF CEILING AND PROVIDE ACCESS DOOR IN CEILING IF REQUIRED FOR BOX ACCESS.
2. SEE 6/M002 FOR COIL PIPING DETAIL.
3. PROVIDE MINIMUM OF FOUR DUCT DIAMETERS OF STRAIGHT DUCT PRIOR TO BOX (I.E. 24" STRAIGHT DUCT FOR 6" INLET), THIS DUCT CAN BE FLEX INSTALLED STRAIGHT..
4. PROVIDE 36" CLEAR SPACE IN FRONT OF CONTROLLER BOX FOR ACCESS, AND LOCATE CONTROLS AND PIPING ON SAME SIDE.

7 VAV BOX DETAIL
NO SCALE

MECHANICAL DRAWING INDEX

DRAWING NUMBER	DRAWING NAME
M100	MECHANICAL LEGEND, NOTES, SCHEDULES AND DETAILS
M301A	FIRST FLOOR MECHANICAL PLAN A
M301B	FIRST FLOOR MECHANICAL PLAN B
M302	FIRST FLOOR MECHANICAL PLAN – MAKER SPACE AREA
M310	FIRST FLOOR MECHANICAL PLAN – TOILET CONVERSIONS
M500	MECHANICAL UL DETAILS

MECHANICAL GENERAL NOTES

1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.
2. 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. PROVIDE PARTS CATALOG FOR ALL EQUIPMENT IN SUBMITTALS.
3. ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. UNLESS OTHERWISE NOTED, SUPPLY 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. RETURN DUCTWORK AND TRANSFER DUCTS SHALL BE LINED WITH 1" THICK FIBERGLASS DUCT LINER FOR ACOUSTICAL PURPOSES. DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE. LINED DUCTWORK DOES NOT ALSO REQUIRE WRAP.
4. ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE NORTH CAROLINA MECHANICAL CODE. SEAL MEDIUM PRESSURE SUPPLY DUCTWORK FOR POSITIVE 3" 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.
5. ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.
6. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS, TO AVOID INTERFERENCE.
7. THE CM AT RISK SHALL HIRE AN INDEPENDENT TEST AND BALANCE CONTRACTOR TO 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. HVAC SYSTEMS AND BAS SHALL BE FULLY OPERATIONAL PRIOR TO T&B PROCESS. 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. TAB CONTRACTOR TO CONFIRM PERMANENT FILTERS AND FRAMES ARE INSTALLED, CLEAN, AND FREE OF DEBRIS PRIOR TO BEGINNING WORK. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED NEBB OR AABC TEST AND BALANCE CONTRACTOR.
8. 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.
9. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.
10. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.
11. CONDENSATE DRAIN PIPING SHALL BE TYPE 'L' HARD DRAWN COPPER, SEE SPECIFICATIONS FOR INSULATION REQUIREMENTS (ALL INSULATION SHALL BE PLENUM RATED). DRAINS FROM AIR HANDLING UNITS SHALL BE TRAPPED. MINIMUM DRAIN SIZE SHALL BE ¾".
12. MECHANICAL CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE.

MECHANICAL GENERAL NOTES (CONTINUED)

13. ALL HOT WATER PIPING 2" AND LESS SHALL BE HARD-DRAWN TYPE-L COPPER PIPE AND FITTINGS. ALL HOT WATER PIPING GREATER THAN 2" SHALL BE SCHEDULE-40 BLACK STEEL. PROVIDE BRONZE VALVES AND FITTINGS WITH COPPER PIPNG AND CAST IRON VALVES AND FITTINGS WITH SCHEDULE 40 BLACK STEEL.
14. HOT WATER PIPING SHALL BE INSULATED PER THE SPECIFICATIONS. INSULATION SHALL HAVE A FACTORY APPLIED PRESSURIZED VAPOR BARRIER JACKET WITH PRESSURE SENSITIVE ADHESIVE SELF-SEALING LAP. ALL FITTINGS SHALL HAVE PVC FITTING COVERS. ALL PIPING OUTSIDE SHALL HAVE A BITUMINOUS COATING ALUMINUM JACKET AND PVC FITTING COVERS. ALL INSULATION SHALL BE PLENUM RATED.
15. ALL HOT WATER PIPING SHALL PITCH DOWN IN DIRECTION OF FLOW WITH MANUAL AIR VENTS AT ALL HIGH POINTS AND ½" DRAIN VALVES AT ALL LOW POINTS.
16. FUME HOOD EXHAUST DUCT SHALL BE CONSTRUCTED OF STAINLESS STEEL, WITH WELDED JOINTS AND SEAMS. PREP ROOM AND CHEMICAL STORAGE EXHAUST DUCTWORK SHALL BE CONSTRUCTED OF APPROVED G90 GALVANIZED SHEET STEEL WITH NOMINAL THICKNESS OF 18 GAUGE. DUCTWORK AND EXHAUST SYSTEM SHALL MEET THE REQUIREMENTS OF NCMC SECTION 510.

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

C401 METHOD OF COMPLIANCE

☐ 2018 NCECC CHAPTER 4
☐ ASHRAE 90.1-2013 PRESCRIPTIVE
☐ ASHRAE 90.1-2013 PERFORMANCE
■ N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)
☐ COMCHECK PROVIDED (2018 NCECC)
☐ COMCHECK PROVIDED (90.1-2013)
☐ ENERGY MODELING DATA PROVIDED

GRILLE AND DIFFUSER SCHEDULE

SYMBOL	SERVICE	CFM RANGE	FACE SIZE (*)	NECK SIZE	TYPE	OBD	PRICE
A	SUPPLY	285 – 500	24x24	12x12	LOUVERED	NO	SMD
B	RET/EXH	455 – 800	24x24	16x16	CUBE CORE	NO	80
C	S/R/E	805 – 1400	24x24	22x20	CUBE CORE	NO	80

(*) – 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.

VAV BOX SCHEDULE

SYMBOL	COOLING MAX CFM	COOLING MIN CFM	HEATING CFM	WATER TEMPS		HOT WATER COIL			AIR TEMPS		TITUS DESV	RUNOUT SIZE
				EAT	LAT	BTUH	GPM	RUNOUT	EAT	LAT		
3.1	1250	320	630	180	140	21000	1.1	3/4	55	85.9	10	14

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 STAND ALONE CONTROLS (SEE NOTE 5), ACOUSTICAL LINING, THERMOSTAT, CONTROL VOLTAGE TRANSFORMER.
4. MECHANCIAL 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. PROVIDE VAV BOX WITH STAND ALONE CONTROLS, UNIT SHALL NOT BE TIED INTO THE EXISTING BUILDING BAS. SEE SPECIFICATION SECTION 230993 FOR SEQUENCE OF OPERATION AND POINTS LIST.
6. MINIMUM HOT WATER RUNOUT SIZE TO BOXES SHALL BE 3/4".

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	ABBR.
Ⓣ	THERMOSTAT / TEMP SENSOR (4'-0" AFF TO TOP)	
Ⓢ	SWITCH (4'-0" AFF TO TOP)	
☒	SUPPLY AIR DIFFUSER (4-WAY)	
⧅	RETURN AIR GRILLE	
⧄	EXHAUST AIR GRILLE	
	DOUBLE LINE DUCTWORK	
	FLEXIBLE DUCTWORK	
EX FD	FIRE DAMPER W/ ACCESS DOOR (EXISTING)	
EX FSD	COMBINATION FIRE/SMOKE DAMPER W/ ACCESS DOOR (EXISTING)	
	EXISTING DOUBLE LINE DUCTWORK	
	EXISTING SINGLE LINE DUCTWORK	
	EXISTING DUCTWORK TO BE REMOVED	
⊗	POINT OF EXISTING TO NEW CONNECTION	
◑	POINT OF DISCONNECTION	
20x14	20"x14" RECTANGULAR DUCT	
8"ø	8" DIAMETER ROUND DUCT	
AFF	ABOVE FINISHED FLOOR	
DN	DOWN	
UP	UP	
S/A	SUPPLY AIR	
O/A	OUTDOOR AIR	
R/A	RETURN AIR	
E/A	EXHAUST AIR	
L/A	RELIEF AIR	
CHS	CHILLED WATER SUPPLY	CHS
CHR	CHILLED WATER RETURN	CHR
HWS	HOT WATER SUPPLY	HWS
HWR	HOT WATER RETURN	HWR
	BUTTERFLY VALVE	
OR	3-PIECE BALL VALVE	
	CHECK VALVE	
	STRAINER WITH BLOWDOWN VALVE WITH HOSE CONN.	
	BALANCING VALVE	
	B&G CIRCUIT SETTER	
	CONTROL VALVE	

MECHANICAL DEMOLITION NOTES

1. THE MECHANICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BEGINNING WORK TO DETERMINE THE LEVEL OF DEMOLITION REQUIRED AND INCLUDE ALL NECESSARY PRICING IN THEIR BID.
2. IT IS THE MECHANICAL CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL EXISTING DUCTWORK AND PIPING. ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND MECHANICAL PLANS SHOULD BE BROUGHT TO THE ATTENTION OF THE MECHANICAL ENGINEER.
3. THE MECHANICAL CONTRACTOR SHALL FIELD VERIFY ALL EXISTING FIRE DAMPERS ARE LOCATED WHERE INDICATED ON DRAWINGS. ALL NEW AND EXISTING DUCTWORK PENETRATING NEW RATED WALLS SHALL BE PROVIDED WITH A 1½-HOUR (TYPE-B) FIRE DAMPER WHETHER INDICATED ON PLANS OR NOT.
4. EXISTING GRILLES/DIFFUSERS AND RUN OUTS MAY BE REUSED IF SIZED ADEQUATELY TO PROVIDE THE AIR QUANTITIES INDICATED. ANY GRILLES/DIFFUSERS BEING REUSED SHALL BE CLEANED AND VERIFIED TO BE IN GOOD WORKING CONDITION.
5. M.C. SHALL VERIFY ALL EXISTING SUPPLY AND RETURN AIR DUCT TO REMAIN IS INSULATED WITH VAPOR BARRIER INTACT. IF EXISTING DUCT IS NOT INSULATED WITH EITHER DUCT LINER OR WRAP, M.C. SHALL PROVIDE 2" THICK DUCT WRAP WITH VAPOR BARRIER (MIN. R-VALUE OF 5.0).
6. M.C. SHALL VERIFY ALL EXISTING PIPING SYSTEMS TO REMAIN ARE INSULATED WITH VAPOR BARRIER INTACT. IF ANY PORTION OF THE PIPING SYSTEM IS MISSING INSULATION OR DETERMINED DURING ANY PHASE OF THE PROJECT AS DEFECTIVE, THAT PORTION SHALL BE PROVIDED WITH NEW INSULATION. MINOR TEARS ON EXISTING PIPING MAY BE REPAIRED WITH TAPES, ADHESIVE, OR SEALANT. EXISTING PIPING SYSTEMS SHALL INCLUDE CHILLED WATER, HOT WATER, REFRIGERANT, AND A/C CONDENSATE DRAIN PIPING. THE MECHANICAL CONTRACTOR SHALL MAKE PROVISIONS IN THEIR BASE BID TO COVER ALL COSTS NECESSARY ACHIEVE A CONTINUOUS VAPOR BARRIER THROUGHOUT THESE EXISTING SYSTEMS. REFER TO SPECIFICATIONS SECTION 230700/ MECHANICAL GENERAL NOTES FOR INSULATION MATERIAL REQUIREMENTS.
7. FOR ALL EXISTING HVAC EQUIPMENT AND DUCTWORK NOTED TO REMAIN AND SERVING AREA OF RENOVATION, MECHANICAL CONTRACTOR SHALL INSPECT EQUIPMENT (AND ANY ASSOCIATED CONTROLS, VALVES, DAMPERS, ETC.) TO VERIFY PROPER WORKING ORDER. MECHANICAL CONTRACTOR TO SERVICE AND CLEAN EXISTING HVAC UNITS TO ENSURE DESIGN AIRFLOW AND COOLING/HEATING CAPACITIES ARE OBTAINED. ANY EQUIPMENT FOUND TO BE INOPERABLE OR SHORT OF DESIGN CAPACITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROJECT COMPLETION. PROVIDE CLEAN FILTERS IN ALL UNITS AT COMPLETION OF PROJECT. DAMAGED DUCTWORK SHALL BE REPAIRED.

FAN SCHEDULE

SYMBOL	LOCATION	TYPE	CFM	APPROX. S.P.	DRIVE	FAN RPM	ELECTRICAL DATA			MANUFACTURER	ACCESSORIES	CONTROLS
							WATTS	H.P.	VOLTAGE	GREENHECK		
F-1	FUME HOOD 216	EXHAUST	870	0.5"	BELT	1005	--	¼	277V-1ø	USF-13-B2	A,B,T	9
F-2	FUME HOOD 217	EXHAUST	870	0.5"	BELT	1005	--	¼	277V-1ø	USF-13-B2	A,B,T	9
F-3	FUME HOOD 220	EXHAUST	870	0.5"	BELT	1005	--	¼	277V-1ø	USF-13-B2	A,B,T	9
~~F-4~~	~~MAKERSPACE 301A~~	~~EXHAUST~~	~~1300~~	~~0.5"~~	~~DIRECT~~	~~1150~~	~~--~~	~~½~~	~~277V-1ø~~	~~G-140-VG~~	~~A,B,D,E~~	~~4~~
F-5	PREP 219	EXHAUST	350	0.375"	DIRECT	1000	121	–	277V-1ø	SP-A410	A,B,G,O	6

ACCESSORIES

A: DISCONNECT SWITCH
B: GRAVITY BACKDRAFT DAMPER
C: MOTORIZED BACKDRAFT DAMPER
D: PREFAB. ROOF CURB
E: BIRDSCREEN
F: ACOUSTICAL LINING
G: HANGING BRACKETS WITH VIBRATION ISOLATION
H: WL, WALL LOUVER DISCHARGE
J: RCC OR GRS ROOF CAP (FLAT ROOF) OR RJ ROOF CAP (PITCHED ROOF)
K: WALL MOUNTING COLLAR
L: INLET GUARD
M: 2" WASHABLE ALUMINUM FILTERS
N: MOTORSIDE FAN GUARD
O: EXHAUST GRILLE
P: U.L. 762
Q: VENTED ROOF CURB EXTENSION
R: COMBINATION KITCHEN HOOD FAN CURB
S: MAGNETIC STARTER WITH AUXILIARY CONTACTS
T: PROVIDE DRAIN PLUG ACCESSORY
U: PRESSURE SENSING SWITCH
V: 170,000 BTUH DIRECT FIRED MODULATING LP GAS HEATER WITH INTEGRAL CONTROLS TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 60°F
W: 140,000 BTUH DIRECT FIRED MODULATING LP GAS HEATER WITH INTEGRAL CONTROLS TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 60°F
X: 185,000 BTUH DIRECT FIRED MODULATING LP GAS HEATER WITH INTEGRAL CONTROLS TO MAINTAIN DISCHARGE AIR TEMPERATURE OF 70°F
Y: ECM MOTOR FOR VARIABLE SPEED CONTROL
Z: VARIABLE FREQUENCY DRIVE

CONTROLS

1: WALL MOUNTED THERMOSTAT (REVERSE ACTING, SET FOR 80°)
2: INTERLOCK WITH ROOM LIGHT SWITCH (FAN SHALL OPERATE WHEN LIGHT IS ON IN ANY ROOM SERVED BY FAN)
3: WALL MOUNTED TWIST TIMER WITH 0-3 HOUR RANGE WITH IDENTIFICATION LABEL
4: WALL MOUNTED TWIST TIMER WITH 0-30 MINUTE RANGE WITH IDENTIFICATION LABEL
5: CONTROLLED BY BUILDING AUTOMATION SYSTEM
6: CONTINUOUS OPERATION
7: INTERLOCK WITH KITCHEN HOOD CONTROLS
8: INTERLOCK WITH DISHWASHER
9: INTERLOCK WITH FUME HOOD
10: WALL MOUNTED PUSH BUTTON SWITCH/STARTER WITH IDENTIFICATION LABEL
11: INTERLOCK WITH CO SENSOR
12: INTERLOCK WITH BAROMETRIC PRESSURE SENSOR
13: INTERLOCK WITH PAINT BOOTH

NOTES:

(*) – STORAGE BUILDING ALTERNATE #4

1. ALL FANS SHALL BE U.L. LISTED AND LABELED AND SHALL BE AMCA CERTIFIED FOR SOUND AND AIR FLOW. ALL HIGH SCHOOL BUILDING FANS INSTALLED INSIDE, ABOVE, OR ADJACENT TO OCCUPIED SPACES SHALL HAVE A MAXIMUM 9.0 INLET SONE LEVEL.
2. MECHANICAL CONTRACTOR SHALL PROVIDE MAGNETIC STARTER WITH AUXILLARY CONTACTS AS REQUIRED.
3. PROVIDE ALL DIRECT DRIVE FANS WITH SPEED CONTROLLERS.

COMMISSIONING NOTE

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.

PHASING NOTE

THIS PROJECT WILL BE CONSTRUCTED IN PHASES. PROVIDE ALL NECESSARY TIME, MATERIALS, AND PROCEDURES REQUIRED FOR ALL PHASING. REFER TO THE GENERAL DRAWINGS FOR PHASING REQUIREMENTS AND GENERAL CONTRACTOR FOR PHASING DATES. COORDINATE PHASING REQUIREMENTS WITH THE GENERAL CONTRACTOR AN OTHER SUB CONTRACTORS. ALL WORK MUST BE COMPLETED PRIOR TO MOVING TO THE NEXT PHASE OF WORK.

EXISTING UNIT VENTILATOR UNIT SCHEDULE FOR REFERENCE ONLY (FIELD VERIFY ARRANGEMENTS AND MODEL #S)

UNIT NUMBER	LOCATION	TOTAL AIR FLOW (CFM)	EXT. STATIC PRESSURE (IN. H_2O)	COOLING COIL							HEATING COIL						ELECTRICAL DATA				MODEL NO.
				TOTAL CAPACITY	SENSIBLE CAPACITY	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	RUNOUT SIZE	TOTAL CAPACITY	GPM	E.W.T. (°F)	L.W.T. (°F)	MAX. P.D.	RUNOUT SIZE	FAN (H.P.)	VOLTS	PHASE	Hz	
UV-A	CLASSROOM	750	0.50"	27,500	17,600	5.5	45	57	10'	1"	35,000	2.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-3000
UV-B	CLASSROOM	1000	0.50"	34,400	23,900	7.0	45	57	10'	1"	45,000	2.5	180	140	5'	3/4"	1/2	277	1	60	AAF AH-4000
UV-C	CLASSROOM	1250	0.50"	47,100	33,700	8.5	45	57	10'	1 1/4"	55,000	3.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-5000
UV-D	CLASSROOM	1500	0.50"	59,000	38,600	10.0	45	57	10'	1 1/4"	65,000	3.5	180	140	5'	3/4"	1/2	277	1	60	AAF AH-6000
UV-E	CLASSROOM	2000	0.50"	67,900	46,800	11.5	45	57	10'	1 1/4"	87,000	4.5	180		5'	1"	1/2	277	1	60	AAF AH-8000
UV-F	KITCHEN	2000	0.25"	67900	46,800	11.5	45	57	10'	1 1/4"	87,000	4.5	180	140	5'	1"	1/3	277	1	60	AAF AH-8000
UV-G	MEDIA CENTER	1250	0.50"	47,100	33,700	8.5	45	57	10'	1 1/4"	55,000	3.0	180	140	5'	3/4"	1/2	277	1	60	AAF AH-5000

VENTILATION CALCULATIONS (NCMC 2018, SECT 403):

ROOM NUMBER	ROOM NAME	OCCUPANCY CLASSIFICATION	Rp **(CFM/PERSON)**	Ra **(CFM/SQ.FT.)**	OCCUPANT DENSITY **PEOPLE/1000 SQ.FT.**	EXHAUST AIRFLOW **(CFM/SQ.FT.)**	Az AREA **(SQ. FT.)**	Pz CALCULATED OCCUPANCY **(PEOPLE)**	RpPz CALCULATED PEOPLE O/A **(CFM)**	RaAz CALCUATED AREA O/A **(CFM)**	Vbz PEOPLE + AREA O/A **(CFM)**
	EXISTING AHU-3										
301A	MAKER SPACE CLASSROOM **(NEW)**	CLASSROOMS (AGES 5-8)	7.5	0	25		775	19	145	0	145
301	EXISTING MEDIA CENTER	MEDIA CENTER	10	0.12	25		4030	101	1008	484	1491
302	EXISTING WORKROOM	OFFICE SPACE	5	0.06	5		743	4	19	45	63
301	EXISTING MEDIA CENTER	LIBRARY	5	0.12	10		4030	40	202	484	685
						TOTALS	9578	164	1373	1012	2385
										PROVIDED	**2650**
											EX O/A @AHU-3

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12-10-21

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E.E. WADDELL HS RENOVATIONS
CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE , NC 28217

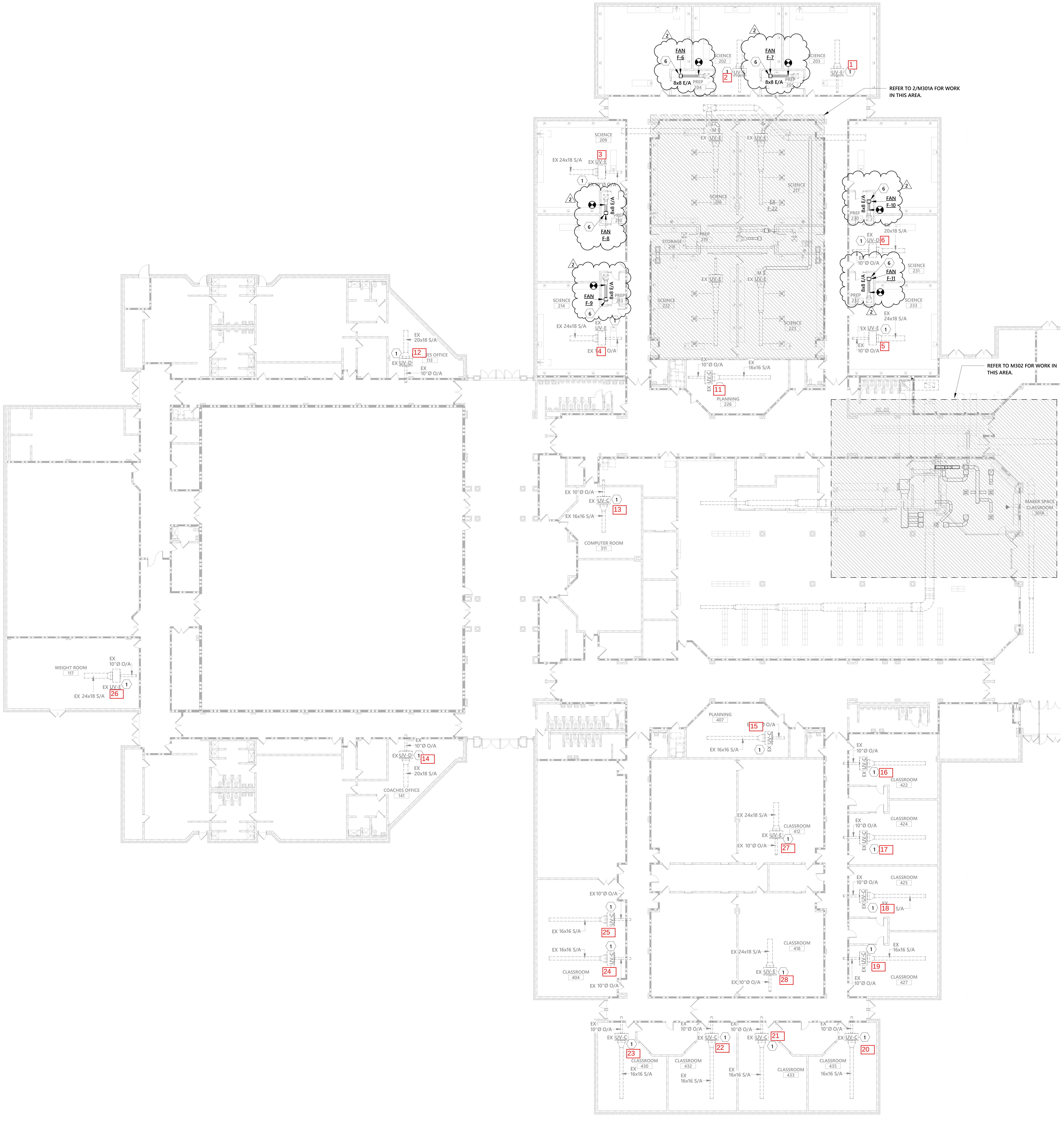
PROJECT NO: 602716
DATE: 11-19-2021

REVISIONS	
DATE	DESCRIPTION
12-10-21	REVISION 1

MECHANICAL LEGEND, NOTES, SCHEDULES AND DETAILS

M100

Opt # 21-0107
1 of 6



1 FIRST FLOOR MECHANICAL PLAN OVERALL-A

1/16" = 1'-0"

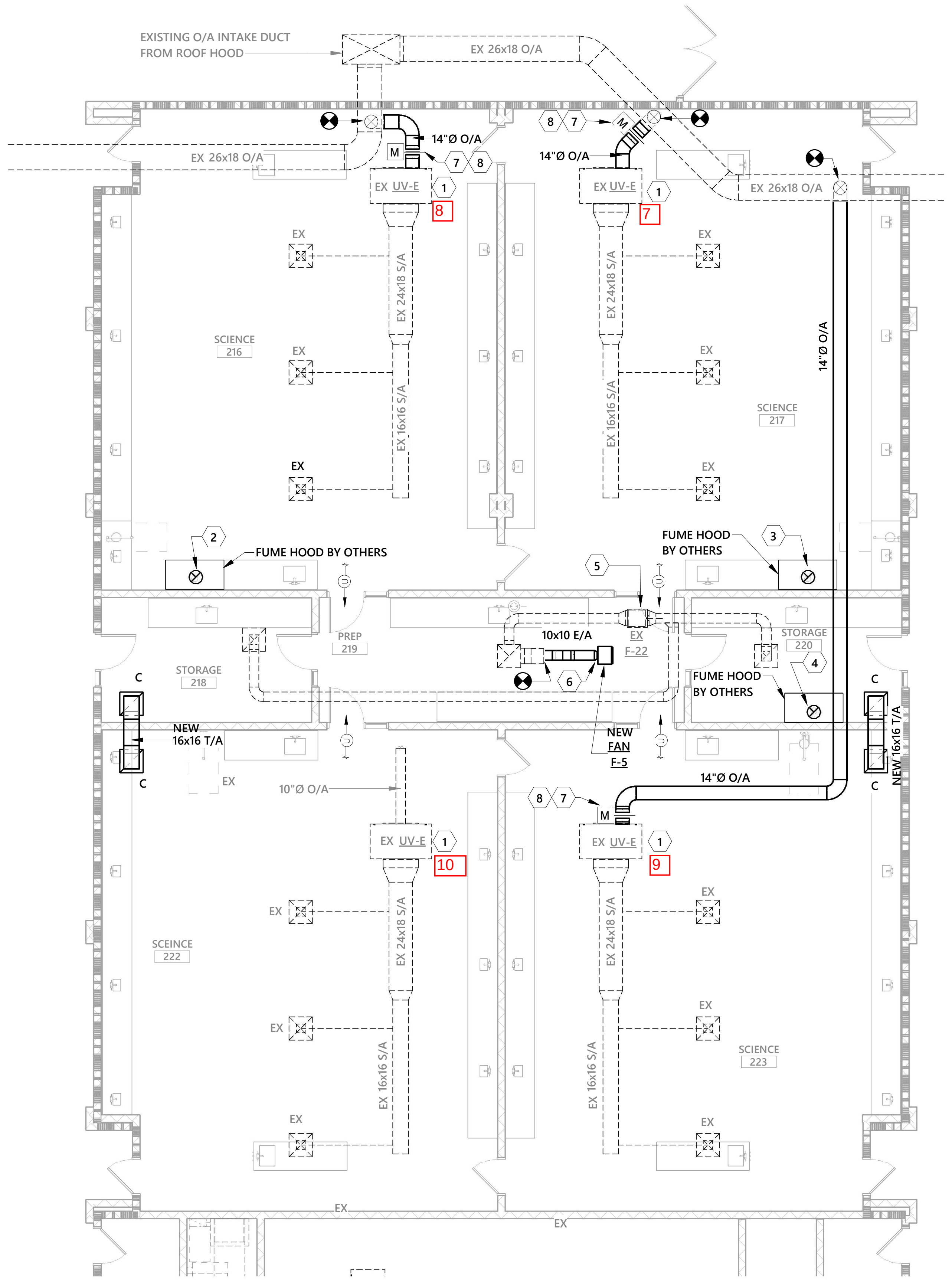
KEYED NOTES

1. EXISTING UNIT VENTILATOR NOTE: REPLACE MOTOR, MOTOR COUPLING, FAN WHEEL, END BEARING, AND SHAFT.
2. 14"Ø E/A UP TO FAN F-1 ON ROOF; PROVIDE TRANSITION TO HOOD AS REQUIRED.
3. 14"Ø E/A UP TO FAN F-2 ON ROOF; PROVIDE TRANSITION TO HOOD AS REQUIRED.
4. 14"Ø E/A UP TO FAN F-3 ON ROOF; PROVIDE TRANSITION TO HOOD AS REQUIRED.
5. REMOVE EXISTING EXHAUST FAN ON/OFF SWITCH AND INTERLOCK WITH BAS TO RUN CONTINUOUSLY DURING OCCUPIED MODE.
6. REMOVE EXISTING EXHAUST FAN AND REPLACE WITH NEW FAN. REFER TO SCHEDULE FOR FURTHER DETAILS.
7. REMOVE EXISITING 10"Ø O/A DUCT AND CAP AT WALL PETRATION. RECONNECT NEW 14"Ø O/A DUCT WITH MOTORIZED DAMPER AND CONNECT TO EXISTING 26X18 O/A DUCT ON THIS SIDE OF CORRIDOR WALL.
8. INTERLOCK DAMPER OPERATION WITH FUME HOOD. BALANCE/OPERATE DAMPER TO 225 CFM WHEN FUME HOOD IS OFF AND 900 CFM WHEN FUME HOOD IS RUNNING.

SCIENCE CLASSROOM AIR BALANCE

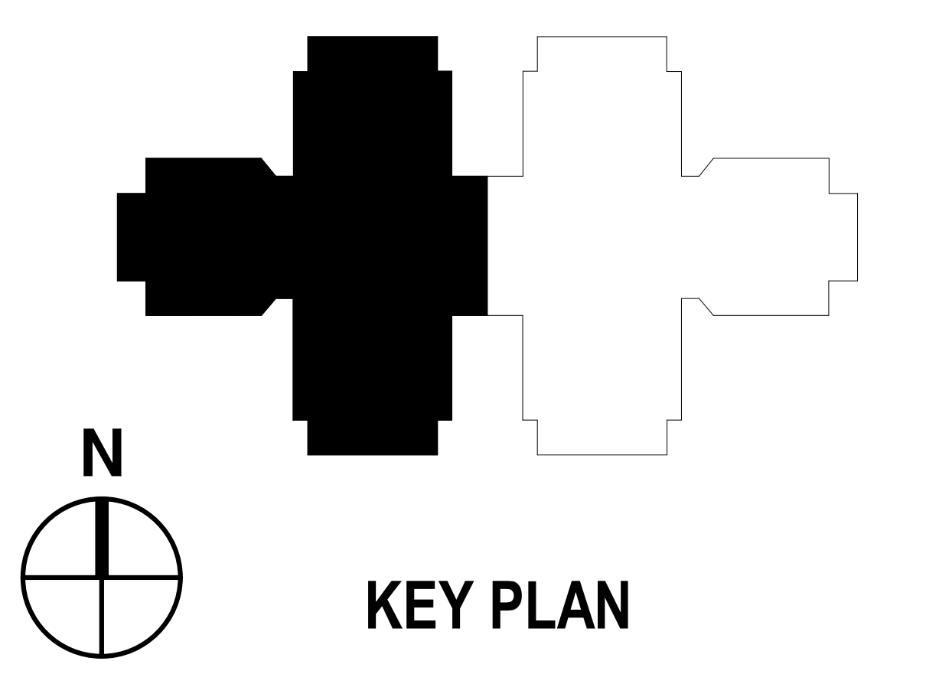
		EXHAUST	OA
EXISTING	F-22	400	
NEW	F-5	350	
EXISTING	UV-E		225
EXISTING	UV-E		225
EXISTING	UV-E		225
EXISTING	UV-E		225
TOTAL		750	900

150 NET BALANCE



2 FIRST FLOOR MECHANICAL PLAN - SCIENCE CLASSROOM AREA

1/8" = 1'-0"



KEY PLAN

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E.E. WADDELL HS RENOVATIONS

CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE , NC 28217

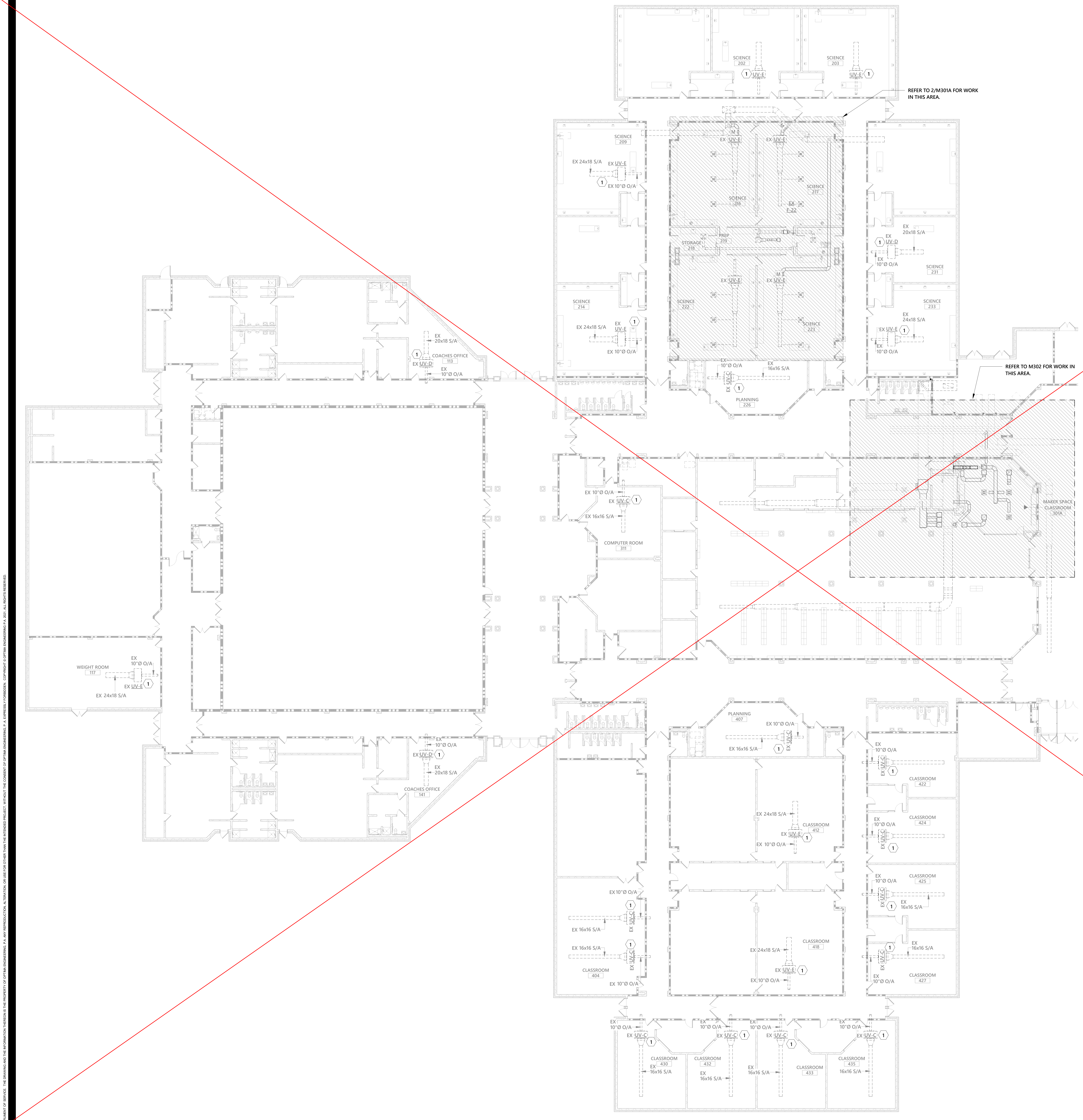
PROJECT NO: 602716
DATE: 11-19-2021

REVISIONS	
DATE	DESCRIPTION
12-10-21	REVISION 1
02-10-22	ADDENDUM 1

FIRST FLOOR
MECHANICAL PLAN A

M301A
2 of 6

Opt # 21-0107



1 FIRST FLOOR MECHANICAL PLAN OVERALL-A

1/16" = 1'-0"

KEYED NOTES

1. EXISTING UNIT VENTILATOR NOTE: REPLACE MOTOR, MOTOR COUPLING, FAN WHEEL, END BEARING, AND SHAFT.
2. 14"Ø E/A UP TO FAN F-1 ON ROOF; PROVIDE TRANSITION TO HOOD AS REQUIRED.
3. 14"Ø E/A UP TO FAN F-2 ON ROOF; PROVIDE TRANSITION TO HOOD AS REQUIRED.
4. 14"Ø E/A UP TO FAN F-3 ON ROOF; PROVIDE TRANSITION TO HOOD AS REQUIRED.
5. REMOVE EXISTING EXHAUST FAN ON/OFF SWITCH AND INTERLOCK WITH BAS TO RUN CONTINUOUSLY DURING OCCUPIED MODE.
6. REMOVE EXISTING EXHAUST FAN AND REPLACE WITH NEW FAN. REFER TO SCHEDULE FOR FURTHER DETAILS.
7. REMOVE EXISITING 10"Ø O/A DUCT AND CAP AT WALL PETRATION. RECONNECT NEW 14"Ø O/A DUCT WITH MOTORIZED DAMPER AND CONNECT TO EXISTING 26X18 O/A DUCT ON THIS SIDE OF CORRIDOR WALL.
8. INTERLOCK DAMPER OPERATION WITH FUME HOOD. BALANCE/OPERATE DAMPER TO 225 CFM WHEN FUME HOOD IS OFF AND 900 CFM WHEN FUME HOOD IS RUNNING.

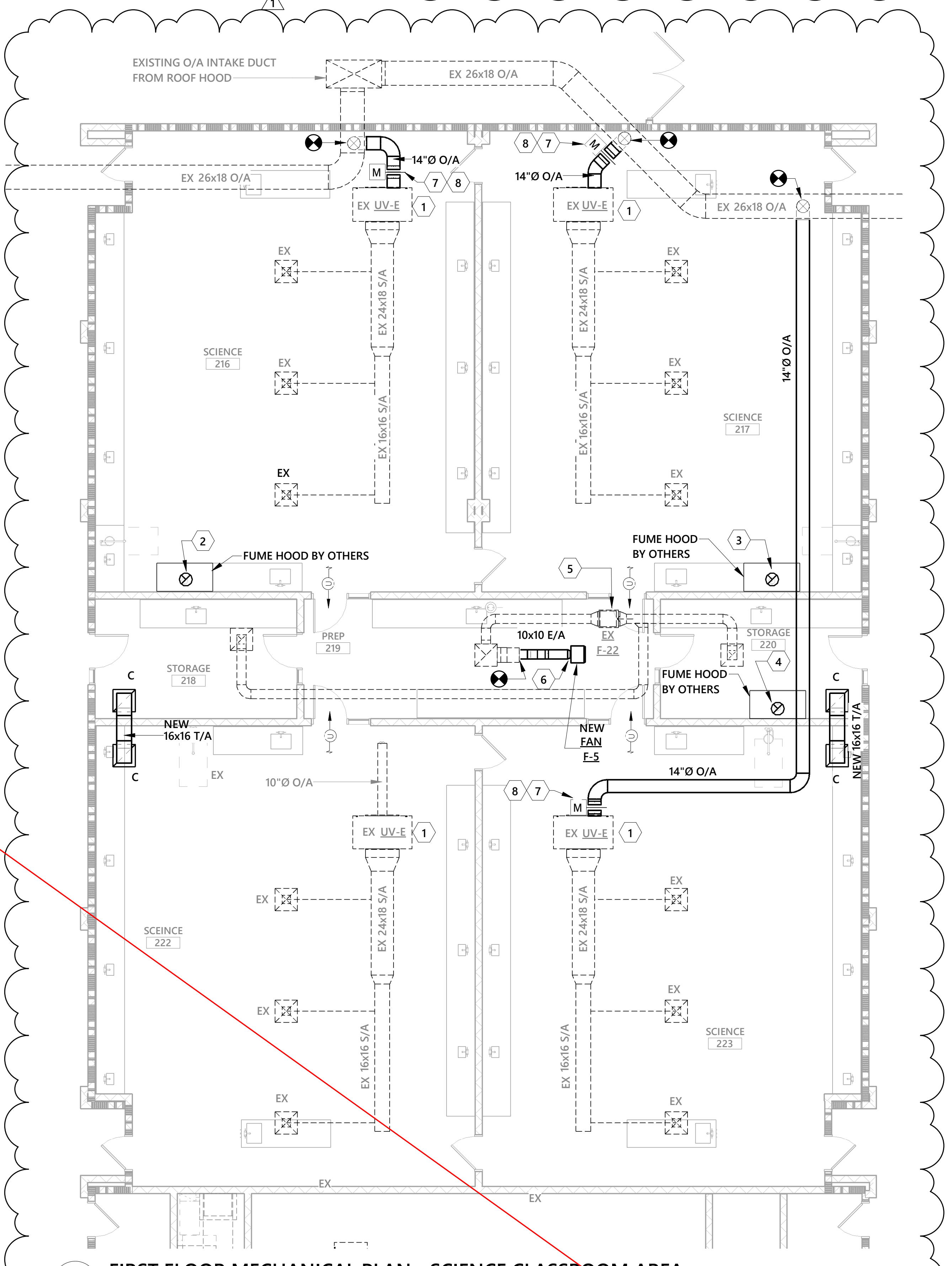
1

SCIENCE CLASSROOM AIR BALANCE

		EXHAUST	OA
EXISTING	F-22	400	
NEW	F-5	350	
EXISTING	UV-E		225
EXISTING	UV-E		225
EXISTING	UV-E		225
EXISTING	UV-E		225
TOTAL		750	900

150 NET BALANCE

1



2 FIRST FLOOR MECHANICAL PLAN - SCIENCE CLASSROOM AREA

1/8" = 1'-0"

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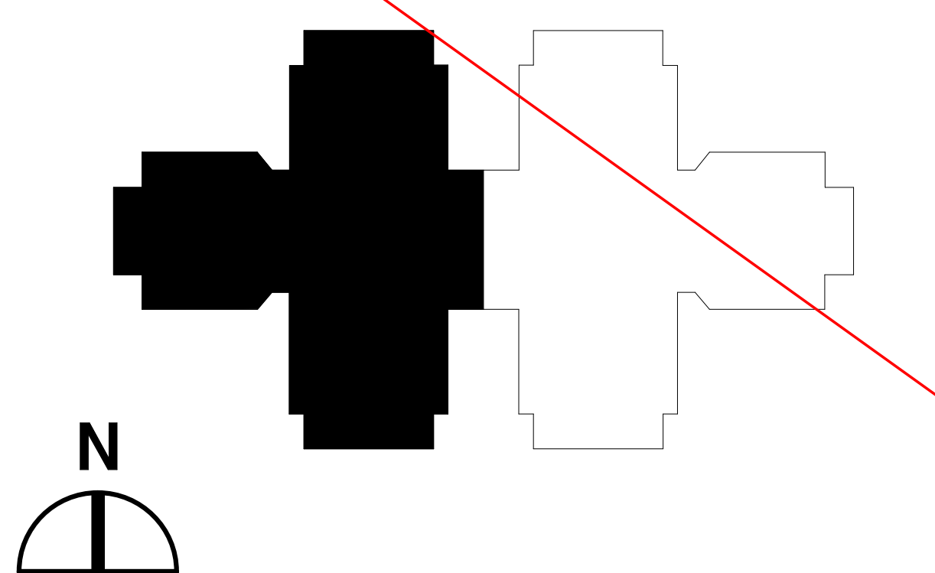
E.E. WADDELL HS RENOVATIONS

CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE , NC 28217

PROJECT NO: 602716
DATE: 11-19-2021

REVISIONS

DATE	DESCRIPTION
12-10-21	REVISION 1



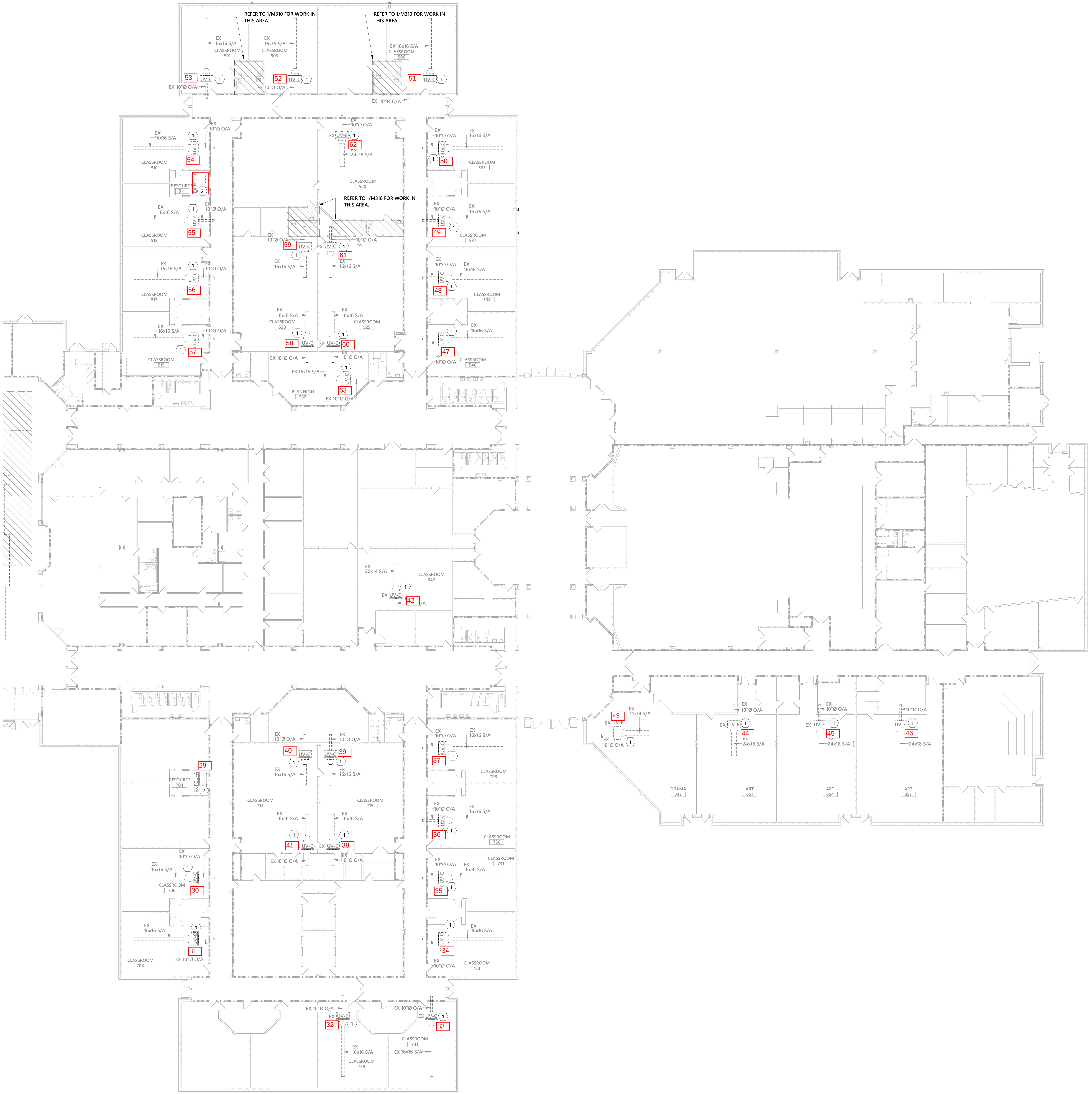
KEY PLAN

FIRST FLOOR
MECHANICAL PLAN A

M301A

2 of 6

Opt # 21-0107

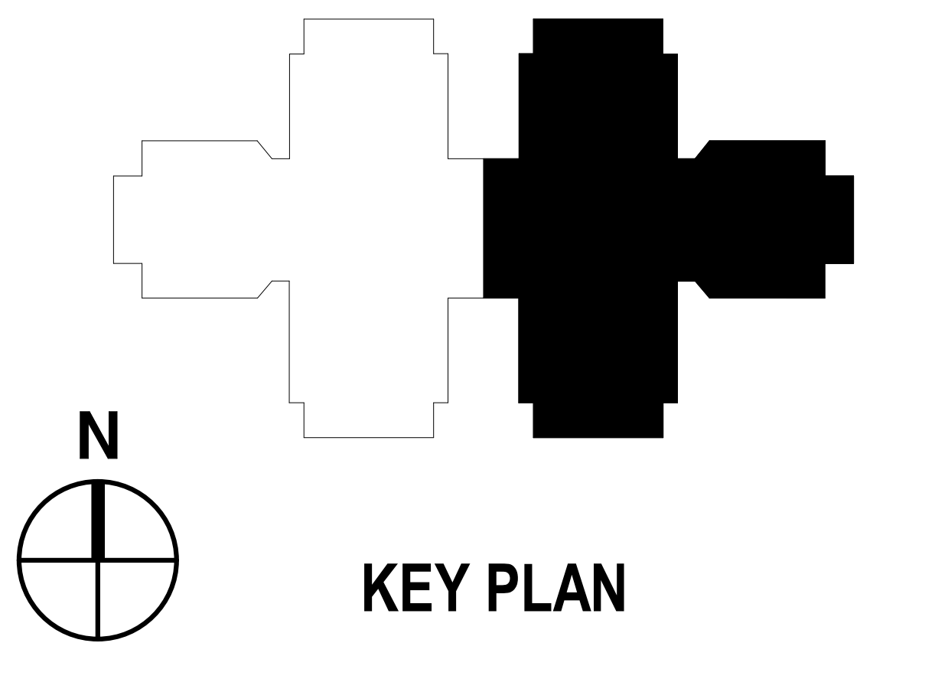


① FIRST FLOOR MECHANICAL PLAN OVERALL-B

1/16" = 1'-0"

KEYED NOTES

1. <u>EXISTING UNIT VENTILATOR NOTE:</u> REPLACE MOTOR, MOTOR COUPLING, FAN WHEEL, END BEARING, AND SHAFT.
2. <u>EXISTING FAN COIL UNIT NOTE:</u> REPLACE MOTOR, MOTOR COUPLING, FAN WHEEL, END BEARING, AND SHAFT.



KEY PLAN

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E.E. WADDELL HS RENOVATIONS

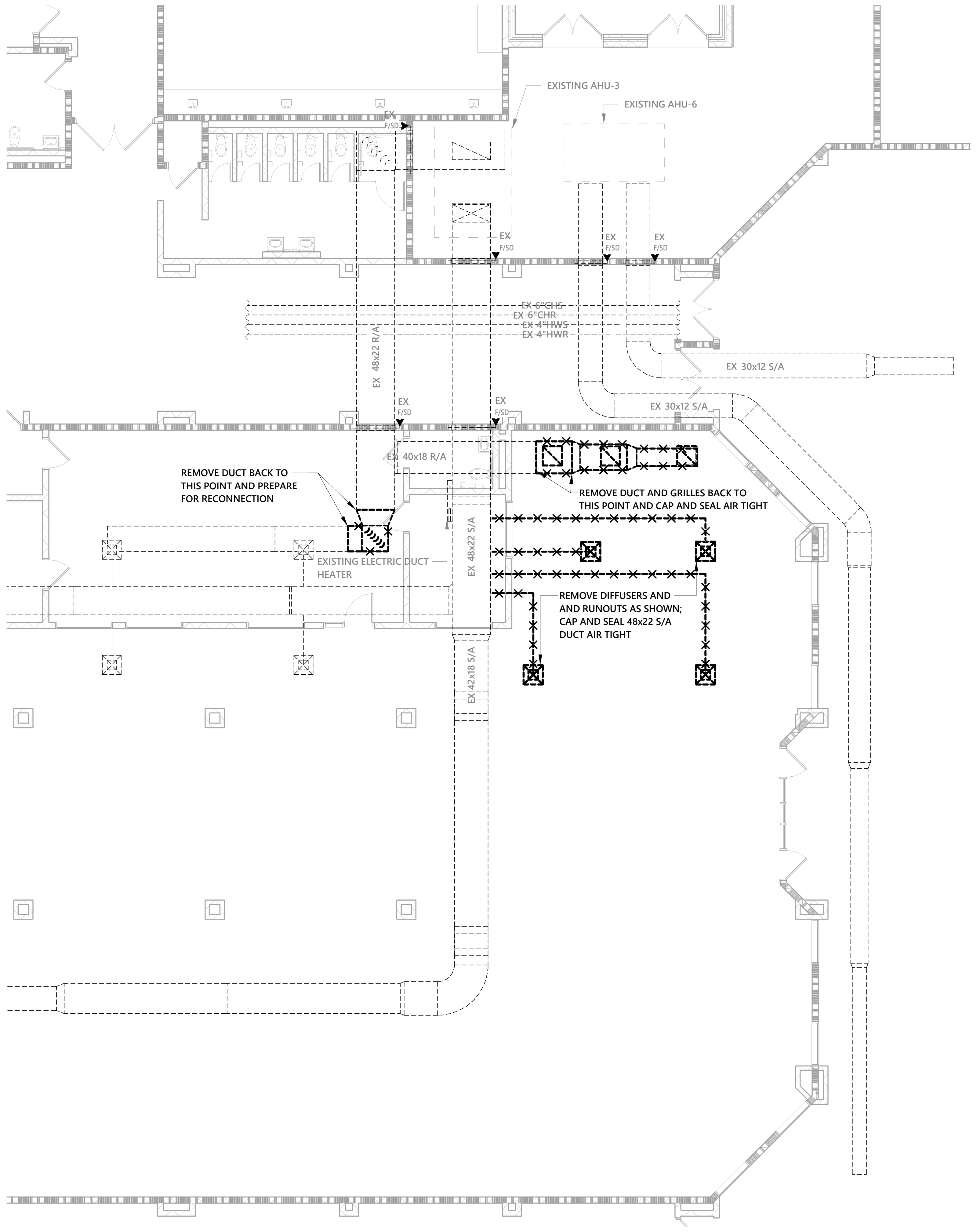
CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE , NC 28217

PROJECT NO:	602716
DATE:	11-19-2021
REVISIONS	
DATE	DESCRIPTION

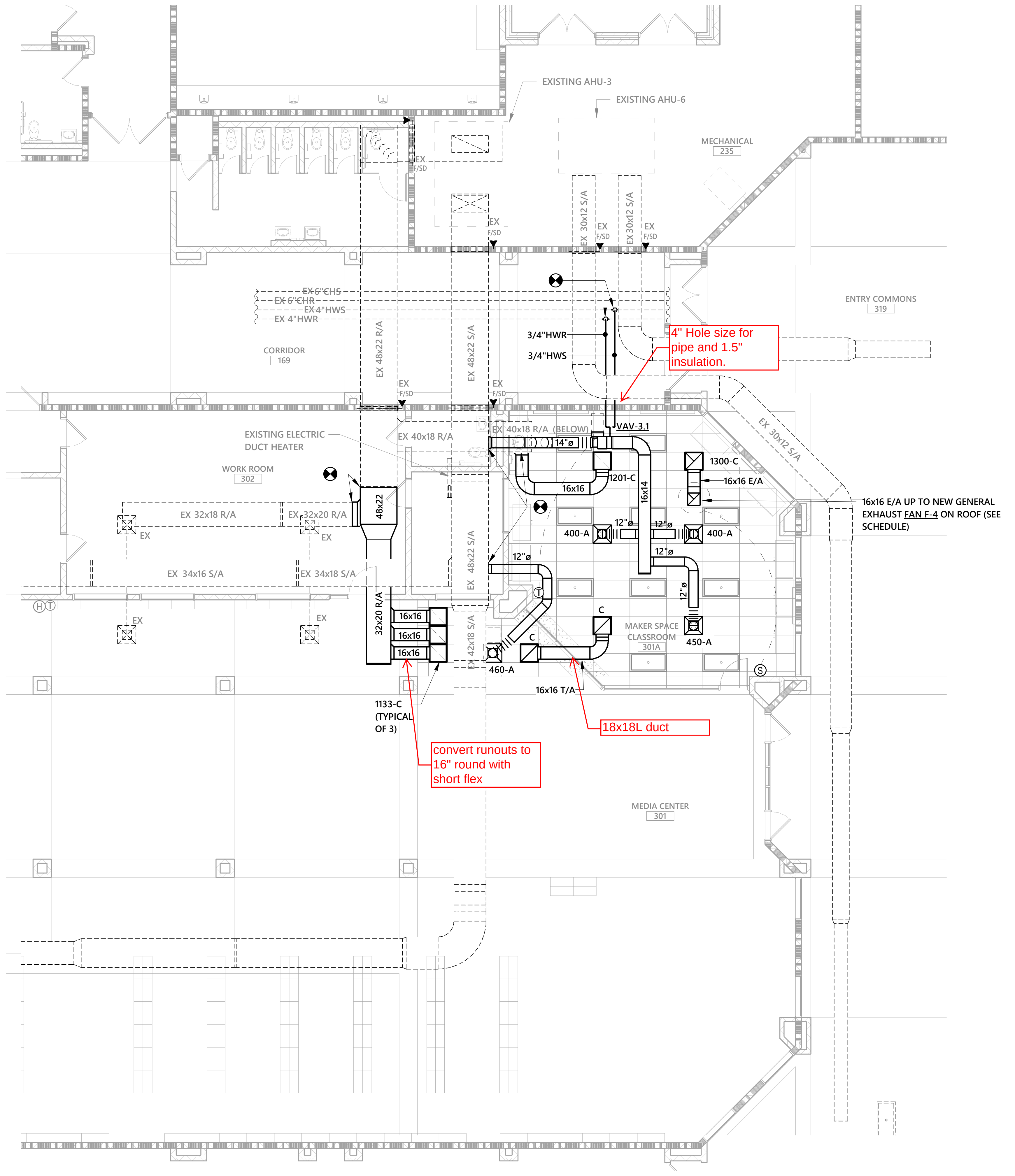
FIRST FLOOR
MECHANICAL PLAN B

M301B

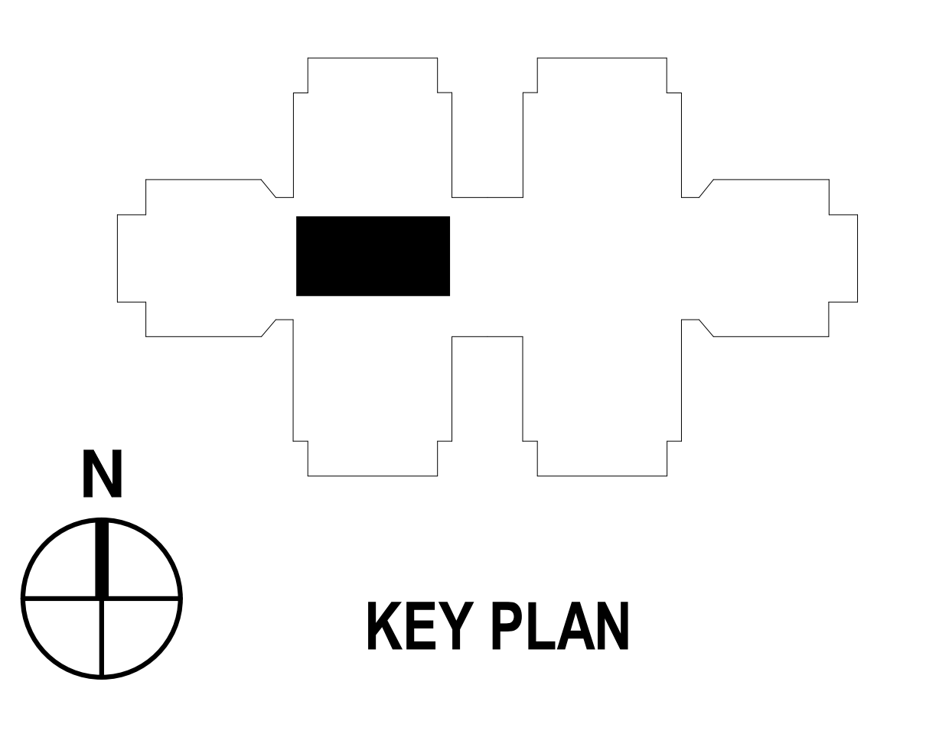
Opt # 21-0107



① FIRST FLOOR MECHANICAL PLAN - MAKER SPACE AREA - DEMOLTION
1/8" = 1'-0"



② FIRST FLOOR MECHANICAL PLAN - MAKER SPACE AREA - NEW WORK
1/8" = 1'-0"



KEY PLAN

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CHARLOTTE-MECKLENBURG SCHOOLS
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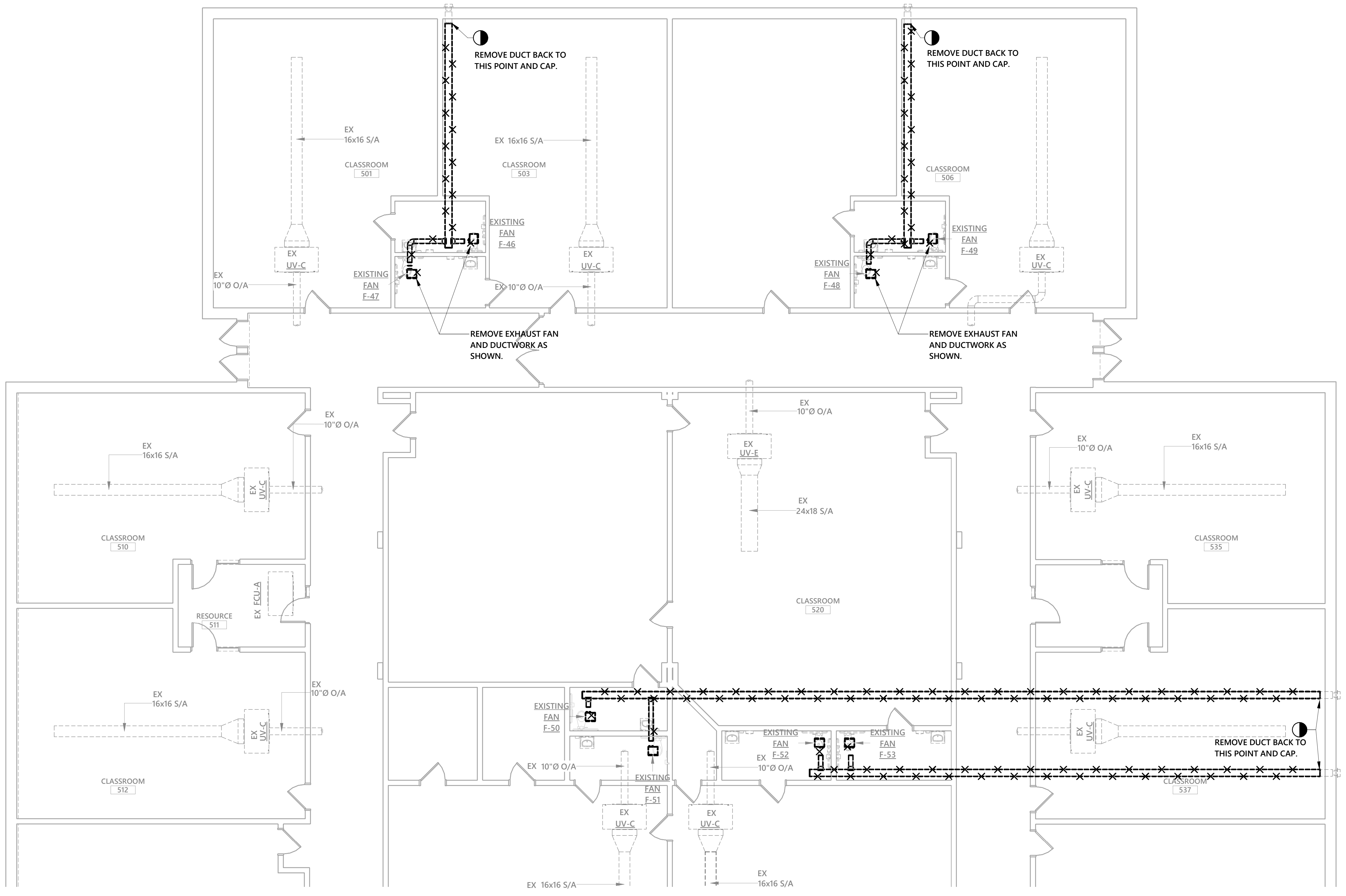
PROJECT NO: 602716
DATE: 11-19-2021

REVISIONS	
DATE	DESCRIPTION

FIRST FLOOR
MECHANICAL PLAN -
MAKER SPACE AREA

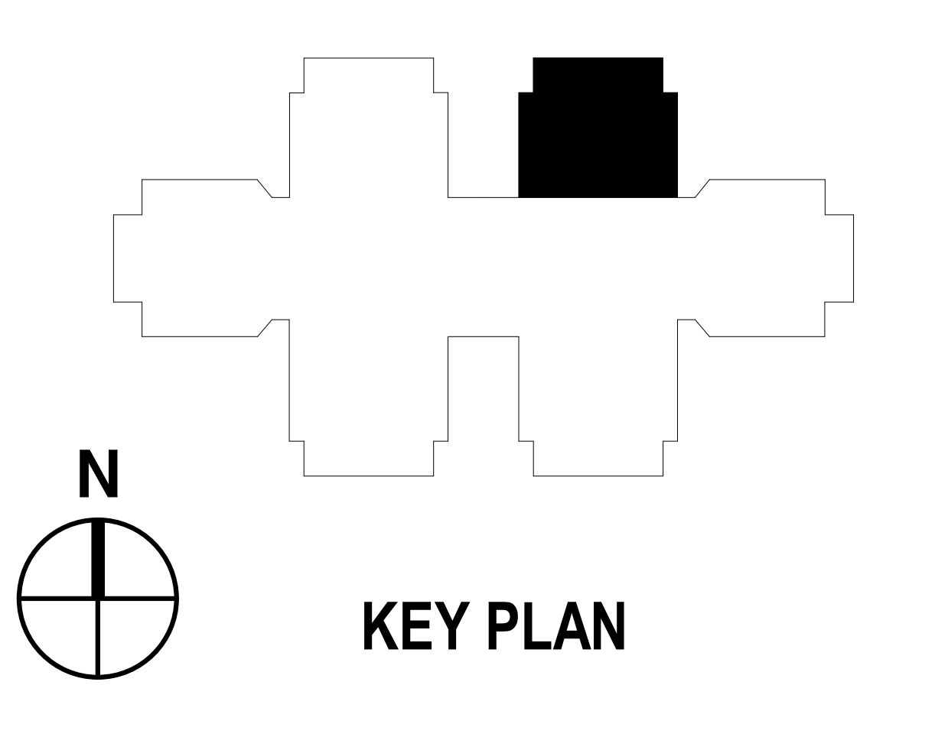
M302
4 of 6

Opt # 21-0107



1 FIRST FLOOR MECHANICAL PLAN - TOILET CONVERSIONS

1/8" = 1'-0"



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E.E. WADDELL HS RENOVATIONS

CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE , NC 28217

PROJECT NO: 602716
DATE: 11-19-2021

REVISIONS	
DATE	DESCRIPTION

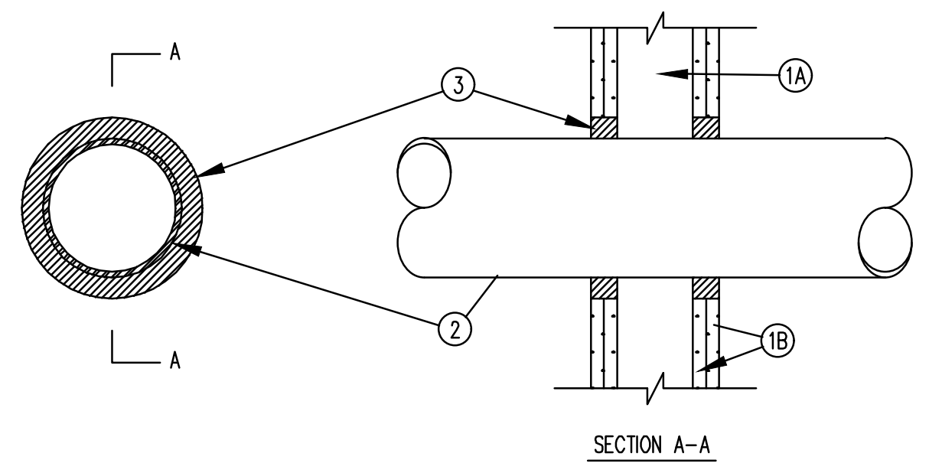
FIRST FLOOR MECHANICAL PLAN - TOILET CONVERSIONS

M310

System No. W-L-1054

METAL PIPE THROUGH GYPSUM WALL ASSEMBLY

F Ratings – 1 and 2 Hr (See Items 1 and 3)
T Rating – 0 Hr
L Rating At Ambient – Less Than 1 CFM/Sq Ft
L Rating At 400 F – 4 CFM/Sq Ft


SECTION A–A

1. Wall Assembly -- The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   - A. Studs -- Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides.
   - B. Gypsum Board* -- 5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 32-1/4 in. for steel stud walls. Max diam of opening is 14-1/2 in. for wood stud walls.
     The F Rating of the firestop system is equal to the fire rating of the wall assembly.
2. Through-Penetrants -- One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space shall be min 0 in. to max 2-1/4 in. Pipe may be installed with continuous point contact. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   - A. Steel Pipe -- Nom 30 in diam (or smaller) Schedule 10 (or heavier) steel pipe.
   - B. Iron Pipe -- Nom 30 in. diam (or smaller) cast or ductile iron pipe.
   - C. Conduit -- Nom 4 in diam (or smaller) steel electrical metallic tubing or 6 in. diam steel conduit.
   - D. Copper Tubing -- Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.
   - E. Copper Pipe -- Nom 6 in. diam (or smaller) regular (or heavier) copper pipe.
3. Fill, Void or Cavity Material* -- Sealant -- Min 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point or continuous contact locations between pipe and wall, a min 1/2 in. diam bead of fill material shall be applied at the pipe wall interface on both surfaces of wall .

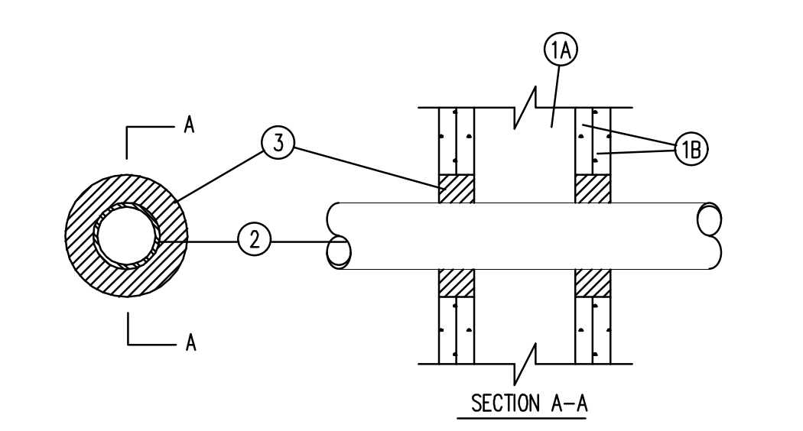
*Bearing the UL Classification Mark

1 U.L SYSTEM NO W-L-1054 DETAIL
NO SCALE

System No. W-L-2098

PVC PIPE THROUGH GYPSUM WALL ASSEMBLY

F Ratings – 1 and 2 Hr (See Item 1)
T Ratings – 1 and 2 Hr (See Item 1)
L Rating At Ambient – Less Than 1 CFM/Sq Ft
L Rating At 400 F – 4 CFM/Sq Ft


SECTION A–A

1. Wall Assembly -- The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   - A. Studs -- Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
   - B. Gypsum Board* -- 5/8 in. thick, 4 ft wide with square or tappered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 4-3/8 in.

The hourly F and T Ratings of the firestop system are equal to the hourly fire rating of the wall assembly in which it is installed.

2. Through Penetrants -- One nonmetallic pipe installed within the firestop system. Pipe to be rigidly supported on both sides of floor or wall assembly. The space between pipe and periphery of opening shall be min 3/4 in. to max 1-1/4 in. Pipe to be rigidly supported on both sides of the floor or wall assembly. The following types and sizes of nonmetallic pipes may be used:
   - A. Polyvinyl Chloride (PVC) Pipe -- Nom 2 in. diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) piping system.
   - B. Chlorinated Polyvinyl Chloride (CPVC) Pipe -- Nom 2 in. diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) piping systems.
3. Fill, Void or Cavity Materials* -- Sealant -- Installed to completely fill the annular space between the pipes and gypsum wallboard on both sides of wall.

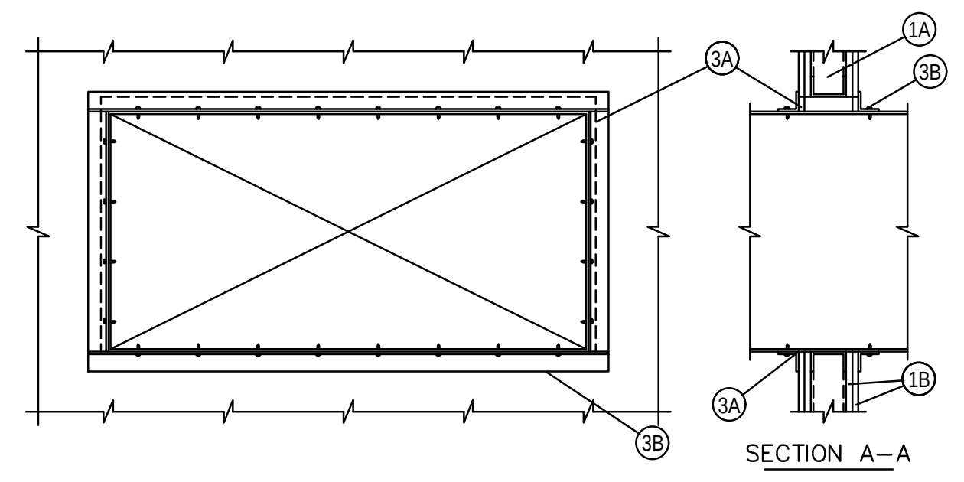
*Bearing the UL Classification Mark

5 U.L SYSTEM NO W-L-2098 DETAIL
NO SCALE

System No. W-L-7040

UNINSULATED RECTANGULAR DUCT (WITHOUT DAMPER) THROUGH GYPSUM WALL ASSEMBLY

F Ratings —1 and 2 Hrs (See Items 1 and 3)
T Rating —0 Hr


SECTION A–A

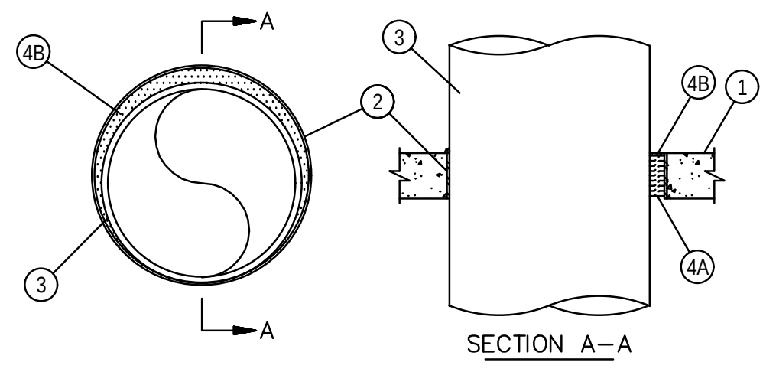
1. Wall Assembly —The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the Fire Resistance Directory and shall include the following construction features:
A. Studs —Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. Additional framing members shall be used to completely frame around opening.
B. Gypsum Board* —Nom 5/8 in. thick with square or tapered edges. The gypsum wallboard type, number of layers and sheet orientation shall be as specified in the individual Wall and Partition Design Number. Max area of opening is 1300 in. with the dimension of 50 in. The hourly F rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Steel Duct —Nom 24 in. by 48 in. (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed within the firestop system. The annular space shall be min 0 (point contact) in. to a max 2 in. Duct to be rigidly supported on both sides of the wall assembly.
3. Firestop System —The firestop system shall consist of the following:
A. Fill, Void or Cavity Material*—Sealant —Min 5/8 in. thickness of fill material applied within annulus flush with both surfaces of wall. At point contact location, a min 1/2 in. diam bead of fill material shall be applied to the wall/duct interface on both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC —FS-ONE Sealant, CP601S Elastomeric Firestop Sealant or CP606 Flexible Sealant.
B. Steel Retaining Angle —No. 18 MSG (0.048 in.) galv steel angles cut to fit contour of duct with a 2 in. overlap on the duct and a min 1 in. overlap on the gypsum board assembly on both sufaces of wall. 2 in. leg of angle secured to duct with min No. 8 by 3/4 in. long sheet metal screws, spaced a max of 6 in. OC. When bead of fill material is used at joint contact locations, angles shall be installed prior to full material curing.
*Bearing the UL Classification Mark

10 U.L SYSTEM NO W-L-7040 DETAIL
NO SCALE

System No. C-AJ-1226

METAL PIPE THROUGH CONCRETE WALL ASSEMBLY

F Rating — 3 Hr
T Rating — 0 Hr
L Rating At Ambient — Less Than 1 CFM/Sq Ft
L Rating At 400 F — 4 CFM/Sq Ft


SECTION A–A

1. Floor or Wall Assembly -- Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 32 in.
2. Metallic Sleeve -- (Optional) Nom 32 in. diam (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces or extending a max of 3 in. above floor or beyond both surfaces of wall.
2A. Sheet Metal Sleeve -- (Optional) Max 6 in. diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. below the bottom of the deck and a max of 1 in. above the top surface of the concrete floor.
2B. Sheet Metal Sleeve -- (Optional) – Max 12 in. diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approx mid-height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. larger than the sleeve diam. The sleeve is to be cast in place and may extend a max of 4 in. below the bottom of the deck and a max of 1 in. above the top surface of the concrete floor.
3. Through-Penetrant -- One metallic pipe, tube or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between penetrant and periphery of opening shall be min 0 in. (point contact) to max 1-7/8 in. Penetrant may be installed with continuous point contact. Penetrant to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic penetrants may be used:
A. Steel Pipe -- Nom 30 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe -- Nom 30 in. diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe -- Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing -- Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.
E. Conduit -- Nom 6 in. diam (or smaller) steel conduit.
F. Conduit -- Nom 4 in. diam (or smaller) steel electrical metallic tubing (EMT).
4. Firestop System -- The firestop system shall consist of the following:
A. Packing Material -- Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or sleeve or from both surfaces of wall or sleeve as required to accommodate the required thickness of fill material.
B. Fill, Void or Cavity Material* -- Sealant -- Min 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or sleeve or with both surfaces of wall or sleeve. At the point or continuous contact locations between penetrant and concrete or sleeve, a min 1/4 in. diam bead of fill material shall be applied at the concrete or sleeve/ pipe penetrant interface on the top surface of floor and on both surfaces of wall.

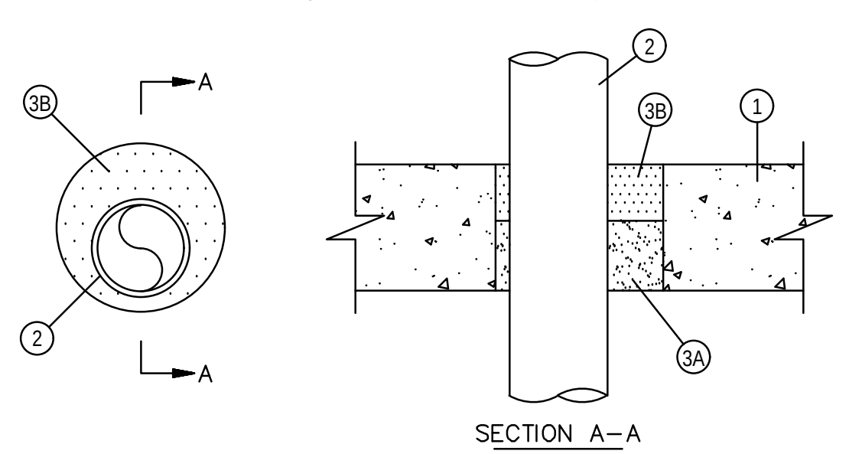
*Bearing the UL Classification Mark

2 U.L SYSTEM NO C-AJ-1226 DETAIL
NO SCALE

System No. C-AJ-2141

PVC PIPE THROUGH CONCRETE WALL ASSEMBLY

F Rating -- 3 Hr
T Rating -- 2 Hr
L Ratings At Ambient -- Less Than 1 CFM/Sq Ft
L Rating At 400 F -- 4 CFM/Sq Ft


SECTION A–A

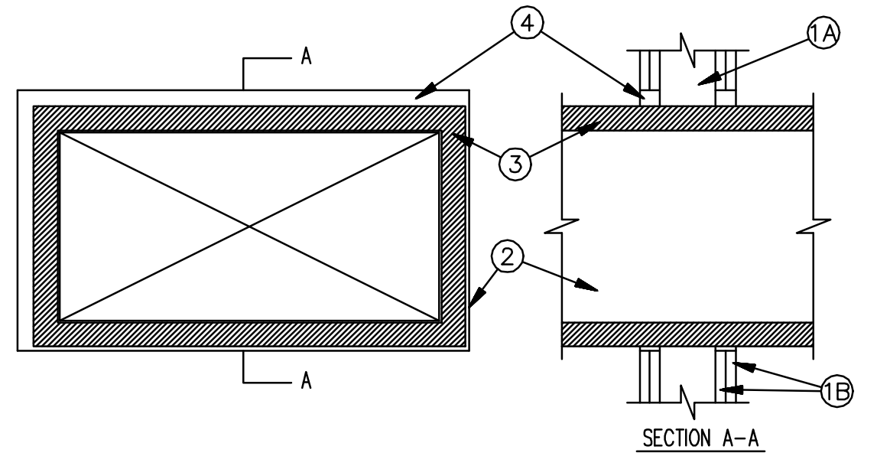
1. Floor or Wall Assembly —Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 6 in.
See Concrete Blocks* (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Through Penetrants —One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe or conduit and the periphery of the opening shall be a min 1/2 in. to a max 2 in. The pipe or conduit to be rigidly supported on both sides of floor or wall. The following types and sizes of pipes or conduits may be used:
A. Polyvinyl Chloride (PVC) Pipe —Nom 3 in. diam (or smaller) Schedule 40 PVC pipe for use in closed (process or supply) piping systems.
B. Chlorinated Polyvinyl Chloride (CPVC) Pipe —Nom 3 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) piping systems.
3. Firestop System —The firestop system shall consist of the following:
A. Forming Material* —Min 2-1/2 in. thickness of forming material foamed into opening as a permanent form. Forming material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC —CF810, CF812 or CF511 Foam Sealant
B. Fill, Void or Cavity Material* —Sealant —Min 2 in. thickness of fill material applied within annulus flush with top surface of floor or within both surfaces of wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC —FS-ONE Sealant
*Bearing the UL Classification Mark

6 U.L SYSTEM NO C-AJ-2141 DETAIL
NO SCALE

System No. W-L-7059

INSULATED RECTANGULAR DUCT (WITHOUT DAMPER) THROUGH GYPSUM WALL ASSEMBLY

F Ratings – 1 and 2 Hr
T Rating – 1/2 and 3/4 Hr


SECTION A–A

1. Wall Assembly The 1 or 2 fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400 Series or Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   - A. Studs Wall framing shall consist of channel studs. Steel studs to be min 2-1/2 in . wide and spaced max 24 in. OC. The opening in the wll to accommodate the steel duct (item 2) shall be framed on all sides using lengths of studs installed between the vertical studs and attached to the studs at each end. The framed opening in the wall shall be a nom 6 in. wide and 12 in. or higher than the width and height of the steel duct.
   - B. Wallboard, Gypsum* 5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in teh individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max area of opening is 395 sq. in. with max dimensions of 26-3/4 in. for steel studs.
2. Steel Duct Nom 24 in. by 12 in. (or smaller) 24 guage (or heavier) steel duct. to be installed eccentrically within the opening. the annular space shall be min 1 in. to max 1-3/4. Duct to be rigidly supported on both sides of the wall assembly.
3. Batt and Blanket* – Max 1-1/2 thick glass fiber batt or blankett (min. 3.4 pcf) jacketed on the outside with a foil-scrim-kraft facing. compressed 50% such that the annular space within the firestop system shall be min 1/4 in. to max 1 in. See Batts and Blankets (BKNV) category in the Building Materials Directory for names manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a smoke Developed Index 50 or less may be used.
4. Fill, Void or Cavity Material* – Sealant Min 5/8 in. or 1-1/4 in. thickness of fill material applied within the annulus, flush with both surfaces of wall for 1 or 2 hr walls, respectively. If voids develops after the fill material cures, the voids shall be sealed with additional fill material.

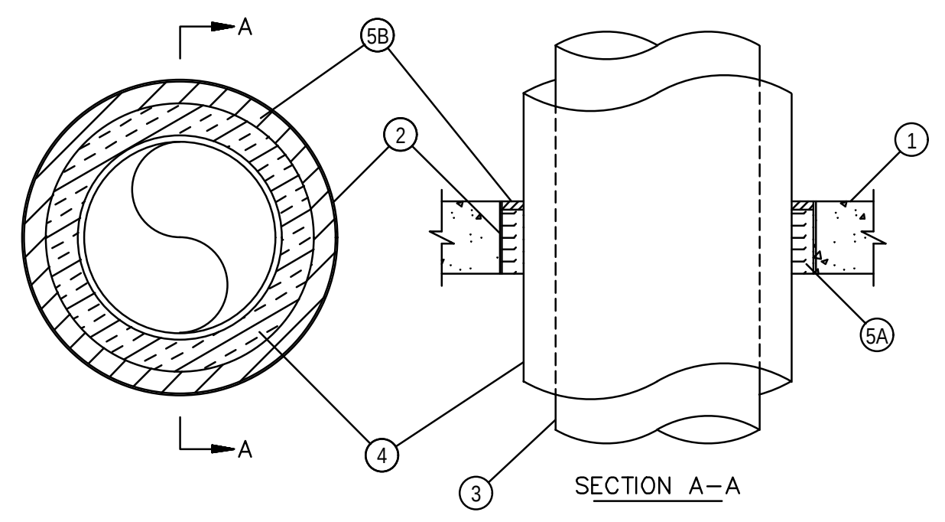
*Bearing the UL Classification Mark

11 U.L SYSTEM NO W-L-7059 DETAIL
NO SCALE

System No. C-AJ-5091

INSULATED METAL PIPE THROUGH CONCRETE WALL ASSEMBLY

F Rating — 2 Hr
T Rating — 1 Hr
L Rating At Ambient — 4 CFM/Sq Ft
L Rating At 400 F — Less Than 1 CFM/Sq Ft


SECTION A–A

1. Floor or Wall Assembly —Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 19-1/2 in.
See Concrete Blocks (CAZT) category in the Fire Resistance directory for names of manufacturers.
2. Metallic Sleeve —(Optional) —Nom 20 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
2A. Sheet Metal Sleeve —(Optional) – Max 6 in. diam, min 26 ga galv steel provided with a 26 ga galv steel square flange spot welded to the sleeve at approximately mid- height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. above the top surface of the floor.
2B. Sheet Metal Sleeve —(Optional) – Max 12 in. diam, min 24 ga galv steel provided with a 24 ga galv steel square flange spot welded to the sleeve at approximately mid- height, or flush with bottom of sleeve in floors, and sized to be a min of 2 in. larger than the sleeve diam. The sleeve is to be cast in place flush with bottom surface of floor and may extend a max of 1 in. above the top surface of the floor.
3. Through Penetrants —One metallic pipe or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or tubing may be used:
A. Steel Pipe —Nom 12 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe —Nom 12 in. diam (or smaller) cast or ductile iron pipe.
C. Copper Pipe —Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.
D. Copper Tubing —Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.
4. Pipe Covering -- Nom 2 in. thick hollow cylindrical heavy density (min 3.5 pcf) glass fiber units jacketed on the outside with an all-service jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the edge of the periphery of the opening shall be min 1/2 in. to a max 2-1/4 in.
e-017,I0.4;See Pipe Equipment Covering -- Materials -- (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4A. Pipe Covering -- (Not Shown) -- As an alternate to Item 4, max 2 in. thick cylindrical calcium silicate (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 8 AWG stainless steel wire spaced max 12 in. OC. The annular space shall be min 1/2 in. to max 2-1/4 in.
5. Firestop System -- The firestop system shall consist of the following:
A. Packing Material -- Min 4 in. thickness of min 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material.
B. Fill, Void or Cavity Material* -- Sealant -- Min 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.

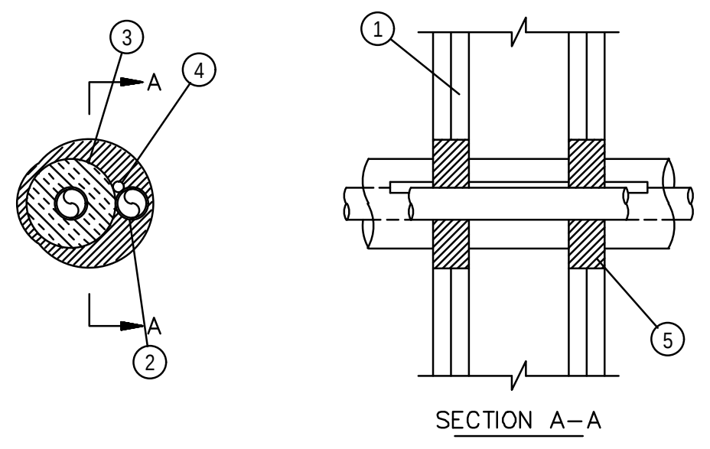
*Bearing the UL Classification Mark

3 U.L SYSTEM NO C-AJ-5091 DETAIL
NO SCALE

System No. W-L-8047

HVAC LINE SET THROUGH GYPSUM WALL ASSEMBLY

F Rating -- 2 Hr
T Rating -- 1/4 Hr


SECTION A–A

1. Wall Assembly -- The 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
A. Studs -- Wall framing shall consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced max 16 in. OC. Steel studs to be min 3-1/2 in. wide and spaced max 24 in. OC.
B. Gypsum Board* -- The gypsum board type, thickness number of layers, fastener type and sheet orientation shall be specified in the individual Wall and Partition Design in the UL Fire Resistance Directory. Max diam of opening is 4-1/2 in.
2. Through Penetrants -- One or more pipe or tubing to be installed concentrically or eccentrically within the opening. The space between any penetrant and the periphery of the opening shall be min 0 in. (point contact) to max 1-1/4 in. Pipes or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
A. Copper Tube -- Nom 1 in. diam (or smaller) Type L (or heavier) copper tube.
B. Copper Pipe -- Nom 1 in. diam (or smaller) Regular (or heavier) copper pipe.
3. Tube Insulation – Plastics+ -- Nom 3/4 in. thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. Tube insulation to be installed on one or more of the metallic pipes or tubes.
See Plastics+ (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation material meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.
4. Cables -- Max of one 4 pair No. 18 AWG (or smaller) cable with PVC insulation and jacket materials.
5. Fill, Void or Cavity Material – Sealant* -- Min 1-1/4 in. thickness of fill material applied within annulus between penetrants and gypsum board, flush with both surfaces of wall. At point contact, a 1/4 in. bead of fill material shall be applied at the penetrant/gypsum board interface on both sides of wall.

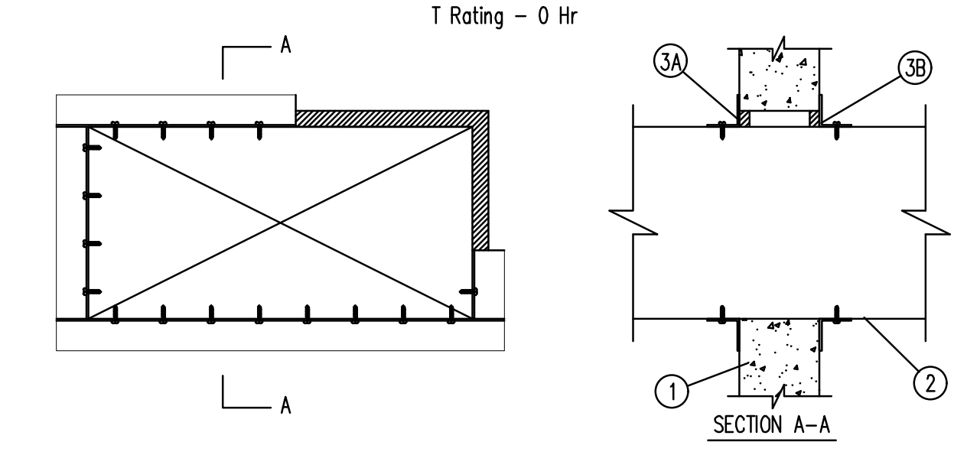
*Bearing the UL Classification Mark

7 U.L SYSTEM NO W-L-8047 DETAIL
NO SCALE

System No. W-J-7021

UNINSULATED RECTANGULAR DUCT (WITHOUT DAMPER) THROUGH CONCRETE WALL ASSEMBLY

F Rating – 1 and 2 Hr (See Item 3)
T Rating – 0 Hr


SECTION A–A

1. Wall Assembly Min 5 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max area of opening is 1300 in. with a max dimension of 50 in.
   See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Steel Duct Nom 24 in. by 48 in. (or smaller) No. 24 gauge (or heavier) galv steel duct to be installed within the firestop system. The annular space shall be min 0 (point of contact) in. to a max 2 in. Duct to be rigidly supported on both sides of the wall assembly
3. Firestop System The firestop system shall consist of the following:
   - A. Fill, Void or Cavity Material* – Sealant Min 5/8 in. thickness of fill material applied within annulus flush with both surfaces of wall. At point contact location, min 1/2 in. diam bead of fill material shall be applied to the wall/duct interface on both surfaces of wall.
   - B. Steel Retaining Angle Min No. 18 MSG (0.048 in.) galv steel angles cut to fit contour of duct with a 2 in. overlap on the duct and a min 1 in. overlap on the gypsum board assembly on both surfaces of wall. 2 in. leg of angle secured to duct with min No. 8 by 3/4 in. long sheet metal screws, spaced a max of 6 in. OC.

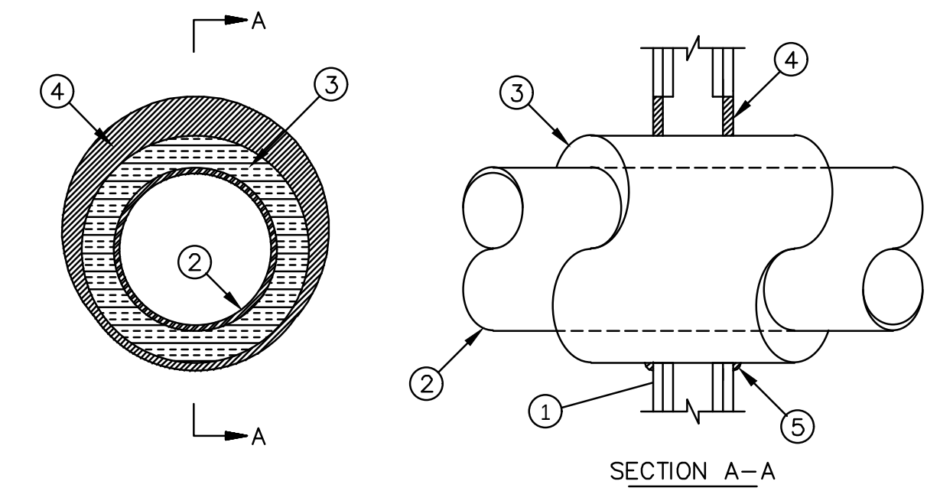
*Bearing the UL Classification Marking

12 U.L SYSTEM NO W-J-7021 DETAIL
NO SCALE

System No. W-L-5029

INSULATED METAL PIPE THROUGH GYPSUM WALL ASSEMBLY

F Ratings –1 and 2 Hr (See Item 1)
T Ratings –1/2, 3/4, 1, 1-1/2 and 1-3/4 Hr (See Item 3)
L Rating At Ambient –4 CFM/Sq Ft
L Rating At 400 F –Less Than 1 CFM/Sq Ft


SECTION A–A

1. Wall Assembly -- The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
A. Studs -- Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
B. Gypsum Board* -- 5/8 in. thick, 4 ft wide, with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual Wall and Partition Design. Max diam of opening is 18-5/8 in.
The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.
2. Through Penetrants -- One metallic pipe or tubing to be centered within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes or tubing may be used:
A. Steel Pipe -- Nom 12 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.
B. Iron Pipe -- Nom 12 in. diam (or smaller) cast or ductile iron pipe.
C. Copper Tubing -- Nom 6 in. diam (or smaller) Type L (or heavier) copper tubing.
D. Copper Pipe -- Nom 6 in. diam (or smaller) Regular (or heavier) copper pipe.
3. Pipe Covering* -- Nom 1, 1-1/2 or 2 in. thick hollow cylindrical heavy density (min 3.5 pcf) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product.
See Pipe and Equipment Covering – Materials (BRGU) category in the Building Material DIrectory for the names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Incex of 25 or less and a Smoke Developed Index of 50 or less may be used.
The hourly T Rating of the firestop system is dependent on the hourly fire rating of the wall assembly in which it is installed, the size and type of through penetrant and the pipe covering thickness, as shown in the table below:

Wall Assembly Rating Hr	Through Penetrant		Pipe Covering Thkns In.	Annular Space		T Rating Hr
	Type +	Max Diam In.		Min In.	Max In.	
1	A	4	1	0	1-1/2	1/2
1	B or C	2	1 or 1-1/2	0	1-1/2	1/2
1	A	4	1-1/2	0	1-1/2	1
1	A	12	2	0	1-7/8	3/4
1	B or C	6	2	0	1-7/8	1
2	A	4	1	0	1-1/2	1
2	B or C	4	1 or 1-1/2	0	1-1/2	1
2	B or C	6	2	0	1-7/8	1
2	A	4	1-1/2	0	1-1/2	1-3/4
2	A	12	2	0	1-7/8	1-1/2
2	B or C	6	2	0	1-7/8	1

+Indicates penetrant type as itemized in Item 2.
3A. Pipe Covering* -- (Not Shown) -- As an alternate to Item 3, max 2 in. thick cylindrical calcium silicate (min 14 pcf) units sized to the outside diam of the pipe or tube may be used. Pipe insulation secured with stainless steel bands or min 8 AWG stainless steel wire spaced max 12 in. OC. When the alternate pipe covering is used, the T Rating shall be determined from the table above.
See Pipe and Equipment Covering -- Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. Fill, Void or Cavity Material* -- Sealant -- Min 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall . At the point contact location between pipe covering and gypsum board, a min 1/2 in. diam bead of fill material shall be applied at the pipe covering/gypsum board interface on both surfaces of wall.

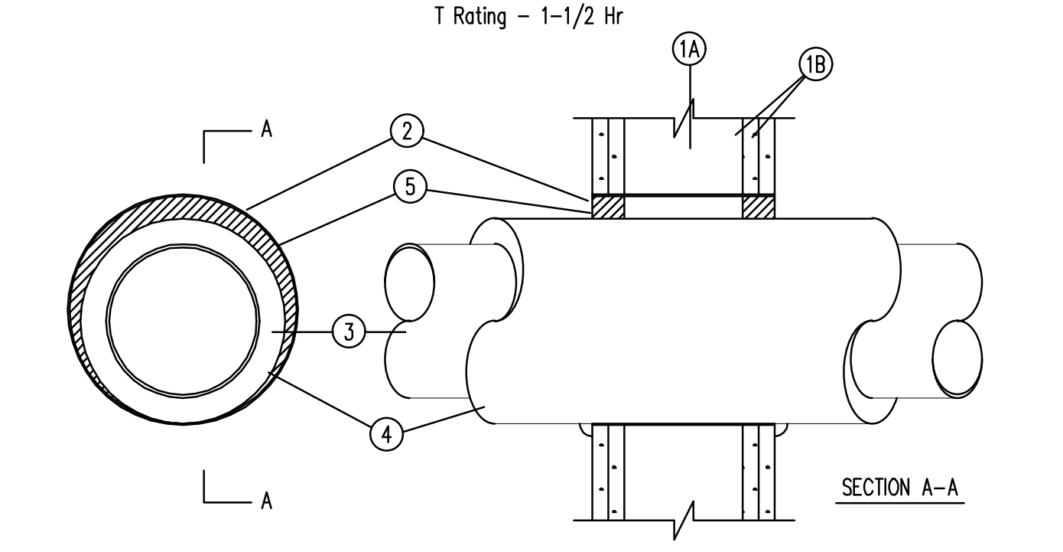
*Bearing the UL Classification Mark

4 U.L SYSTEM NO W-L-5029 DETAIL
NO SCALE

System No. W-L-7018

INSULATED ROUND DUCT (WITHOUT DAMPER) THROUGH GYPSUM WALL ASSEMBLY

F Rating – 2 Hr
T Rating – 1-1/2 Hr


SECTION A–A

1. Wall Assembly – The 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   - A. Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
   - B. Wallboard, Gypsum* – Two layers of nom 5/8 in. thick gypsum wallboard as specified in the individual Wall and Partition Design No. Max diam of opening is 9 in.
2. Metallic Sleeve – Cylindrical sleeve fabricated from min 0.016 in. thick (No. 28 gauge) galv steel sheet steel and having a min 2 in. lap along the longitudinal seam. Length of sleeve to be 1/8 in. less than thickness of wall. Sleeve to be installed by coiling the sheet metal to a diameter smaller than the through opening, inserting the coil through the openings and releasing the coil to let it uncoil against the circular cutouts in the gypsum wallboard layers.
3. Steel Duct – Nom 6 in. diam (or smaller) No. 28 gauge (or heavier) galv steel duct to be installed concentrically within the firestop system. Duct to be rigidly supported on both sides of the wall assembly.
4. Pipe Covering* – Nom 1 in. thick hollow cylindrical heavy density (3.5 pcf) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Tranverse joints secured with metal fasteners or with butt tape supplied with the product. The annular space between the insulated pipe and the steel sleeve shall be min 0 in. (point contact) to max 1 in.
   See Pipe Equipment Covering – Materials – (BRGU) Category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
5. Fill, Void or Cavity Material* – Sealant – Min 1-1/4 in. depth of sealant applied within the annulus, flush with each surface of the wall assembly. At the point contact location between insulated pipe and wall, a min 1/2 in. diam bead of sealant shall be applied on both surfaces of wall, lapping 1/4 in. beyond the periphery of e opening.

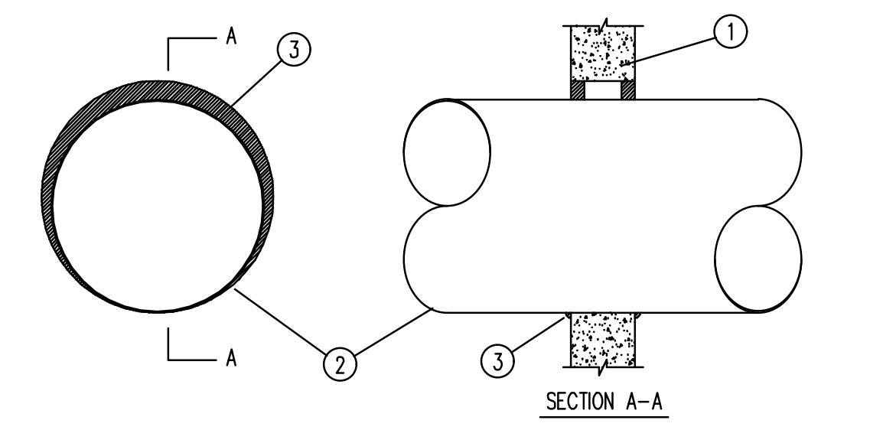
*Bearing the UL Classification Marking

8 U.L SYSTEM NO W-L-7018 DETAIL
NO SCALE

System No. W-J-7022

UNINSULATED ROUND DUCT (WITHOUT DAMPER) THROUGH CONCRETE BLOCK WALL ASSEMBLY

F Ratings – 1 and 2 Hr (See Items 1 and 3)
T Rating – 0 Hr


SECTION A–A

1. Wall Assembly – Min 4-3/4 in. and 5 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete for 1 and 2 hr rated assemblies, respectively. Wall may also be constructed of any UL Classified Concrete Blocks*. Max diam of opening is 21-1/2 in.
   See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. Through Penetrant – Nom galv steel duct to be installed concentrically or eccentrically within the firestop system. The annular space between duct and periphery of the opening shall be min 0 in. (point contact) and max 1-1/2 in. Duct to be rigidly supported on both sides of wall assembly.
   - A. Spiral Wound HVAC Duct Nom 20 in. diam (or smaller) No. 24 MSG (or heavier) galv steel spiral wound duct.
   - B. Sheet Metal Duct Nom 12 in. diam (or smaller) No. 28 MSG (or heavier) galv sheet steel duct.
3. Fill, Void or Cavity Material* – Sealant – Min 5/8 in. and 1-1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall assembly for 1 or 2 hr rated walls, respectively. At the point contact location between duct and periphery of opening, a min 1/2 in. diam bead of sealant shall be applied at the periphery/duct interface on both surfaces of wall assembly.

*Bearing the UL Classification Marking

13 U.L SYSTEM NO W-J-7022 DETAIL
NO SCALE

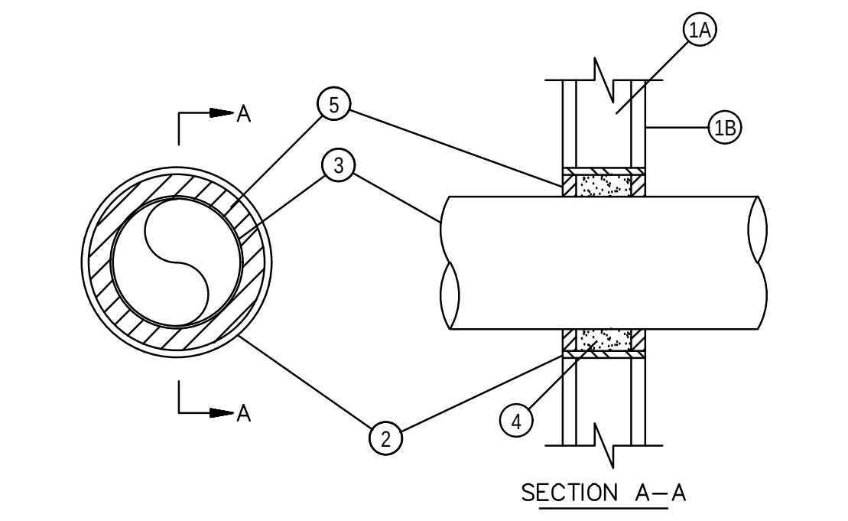
PIPE AND DUCTWORK WALL PENETRATION NOTES (MECHANICAL)

1. ALL INSULATED METAL PIPING PENETRATING A ONE HOUR OR MORE RATED ASSEMBLY SHALL BE SEALED AROUND INSULATION ON BOTH SIDES OF WALL WITH AN APPROVED FIRE STOP WRAP/STRIP MATERIAL. NUMBER OF WRAPS AROUND INSULATION WITHIN WALL OPENING SHALL BE AS REQUIRED FOR THICKNESS OF INSULATION AND MFG. RECOMMENDATIONS. COVER EXPOSED SURFACE AND SEAMS WITH AN APPROVED FIRE STOP CAULK ON BOTH SIDES OF WALL.
2. ALL NON-INSULATED METAL PIPING PENETRATING A ONE HOUR WALL OR MORE RATED WALL OR FLOOR SHALL BE SEALED AROUND PIPE ON BOTH SIDES OF WALL WITH AN APPROVED FIRE STOP CAULK. THICKNESS SHALL BE AS RECOMMENDED BY MANUFACTURER FOR WALL RATING REQUIRED TO MAINTAIN U.L. CLASSIFICATION.
3. ALL METAL DUCTWORK LESS THAN 100 SQUARE INCHES PENETRATING A ONE HOUR FIRE PARTITION SHALL BE CONSTRUCTED OF STEEL A MINIMUM OF 0.0217" IN THICKNESS, NOT HAVE OPENINGS THAT COMMUNICATE THE CORRIDOR WITH ADJACENT SPACES OR ROOMS, BE INSTALLED ABOVE A CEILING, NOT TERMINATE AT A WALL REGISTER IN THE RATED WALL, AND HAVE A MINIMUM 12" LONG BY 0.060" THICK STEEL SLEEVE CENTERED IN EACH DUCT OPENING. THE SLEEVE SHALL BE SECURED TO BOTH SIDES OF THE WALL AND ALL FOUR SIDES OF THE SLEEVE WITH MINIMUM 1.5"x1.5"x0.060" STEEL RETAINING ANGLES. ANGLES SHALL BE SCURED TO THE SLEEVE AND THE WALL WITH NO. 10 SCREWS, ANNULAR SPACE BETWEEN THE STEEL SLEEVE AND THE WALL OPENING SHALL BE FILLED WITH ROCK (MINERAL) WOOL BATTING ON ALL SIDES. DUCT PENETRATIONS EXCEEDING 100 SQUARE INCHES SHALL HAVE A FIRE DAMPER INSTALLED IN THE WALL AS DETAILED.
4. ALL DUCTWORK PENETRATING A FIRE BARRIER (REGARDLESS OF HOUR RATING), RATED FLOOR, OR TWO HOUR (OR MORE) RATED PARTITION SHALL BE PROVIDED WITH A FIRE DAMPER INSTALLED AS DETAILED.
5. NO FLEXIBLE DUCTWORK WILL BE ALLOWED TO PENETRATE ONE HOUR WALLS, TWO HOUR WALLS, SMOKE WALLS, CORRIDOR WALLS OR WALLS CLOSED-OFF TO STRUCTURE. METAL RIGID DUCTWORK SHALL EXTEND A MINIMUM OF 5'-0" FROM WALL BEFORE THE FIRST AIR DISTRIBUTION DEVICE IS INSTALLED OR BEFORE FLEXIBLE DUCT IS STARTED. FLEXIBLE DUCTWORK IN A SINGLE DUCT RUN IS ALLOWED ON ONE SIDE OF A RATED WALL BUT NOT BOTH SIDES.
6. ACCEPTABLE MANUFACTURERS OF FIRE STOP MATERIALS ARE AS FOLLOWS:
   NELSON FLAMESEAL PUTTY+
   CROUSE-HINDS CABLE BARRIER SYSTEM
   DOW CORNING FIRE STOP SEALANT/FOAM
   3M FIRE BARRIER
   T&B FLAMESAFE
   THERMAFIBER BRAND SAFING
   ALL MATERIALS AND METHODS OF INSTALLATION SHALL BE U.L. APPROVED FOR THAT INSTALLATION. SHOP DRAWING SUBMITTALS OF MATERIALS AND METHOD OF INSTALLATION, INCLUDING DRAWINGS, SHALL BE SUBMITTED TO THE ARCHITECT FOR REVIEW.
7. WHEN A PIPE, WIRE, OR DUCT PENETRATES A NON-RATED SMOKETIGHT PARTITION, THE MECHANICAL CONTRACTOR SHALL SEAL AROUND ALL PIPES WIRES AND DUCTS WITH SEALANT MATERIAL TO MAKE IT SMOKETIGHT. SEE ARCHITECTURAL PLANS FOR LOCATION OF THESE PARTITIONS.
8. SEE ARCHITECTURAL PLANS FOR WALL TYPES.
9. ALL RATED WALL PENETRATIONS SHALL BE IN ACCORDANCE WITH UNDERWRITERS LABORATORIES PENETRATION FIRESTOP SYSTEM REQUIREMENTS. ALL MATERIALS USED IN PENETRATION FIRESTOP SYSTEMS SHALL BE APPROVED BY UNDERWRITERS LABORATORIES AND SHALL BE U.L. LABELED.
10. PENETRATIONS OF NONRATED WALLS, PARTITIONS AND FLOORS OF NON-COMBUSTIBLE CONSTRUCTION SHALL BE FIRESTOPPED WITH NONCOMBUSTIBLE MATERIALS. PENETRATIONS OF NONRATED WALLS, PARTITIONS AND FLOOR OF COMBUSTIBLE CONSTRUCTION SHALL BE FIRESTOPPED WITH MATERIALS EQUIVALENT TO TWO INCHES OF WOOD. FIRESTOPPING SHALL COMPLY WITH ASTM E-814.

System No. W-L-7017

UNINSULATED ROUND DUCT (WITHOUT DAMPER) THROUGH GYPSUM WALL ASSEMBLY

F Rating – 1 Hr
T Rating – 0 Hr


SECTION A–A

1. Wall Assembly -- The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

A. Studs -- Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 2-1/2 in. wide and spaced max 24 in. OC.
B. Gypsum Board* -- One layer of nom 5/8 in. thick gypsum wallboard, as specified in the individual Wall and Partition Design. Max diam of opening is 8-5/8 in.

2. Metallic Sleeve -- Nom 8 in. diam (or smaller) Schedule 40 (or heavier) steel sleeve cast into wall assembly with joint compound and installed flush with wall surfaces.

3. Air Duct -- Nom 6 in. diam (or smaller) prefabricated No. 28 MSG galv sheet metal duct. A min 1/2 to max 1-1/2 in. annular space is required within the firestop system. Duct to be rigidly supported on both sides of wall assembly.

4. Forming Material* -- Foamed plastic forming material foamed into opening as a permanent form. Forming material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material.

5. Fill, Void or Cavity Material* -- Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall.

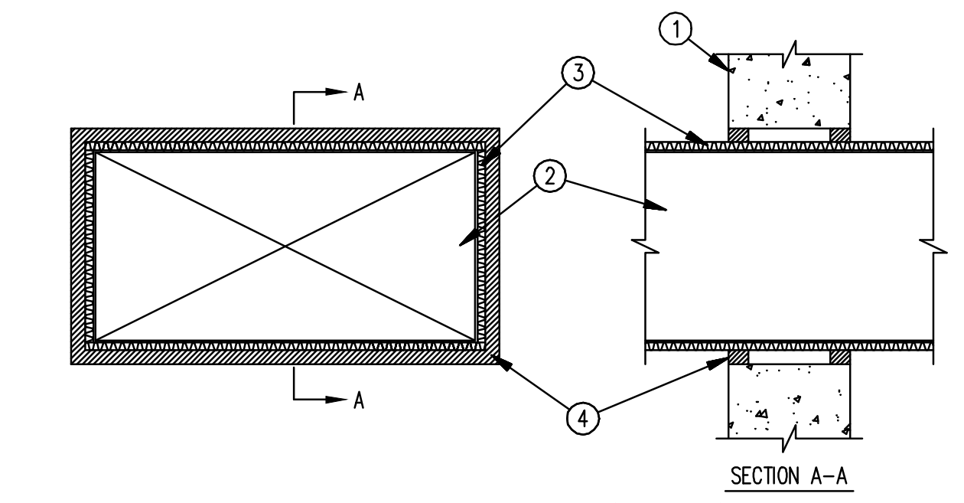
*Bearing the UL Classification Mark

9 U.L SYSTEM NO W-L-7017 DETAIL
NO SCALE

System No. W-J-7029

INSULATED RECTANGULAR DUCT (WITHOUT DAMPER) THROUGH CONCRETE WALL ASSEMBLY

F Rating – 1 & 2 Hr
T Rating – 1/2 & 3/4 Hr


SECTION A–A

1. Wall Assembly - Min 5 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blocks*. Max area of opening is 395 sq in. with max dimensions of 26-3/4 in.

See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. Steel Duct - Nom 24 in. by 12 in. (or smaller) No. 24 gauge (or heavier) steel duct to be installed eccentrically within the opening. The annular space shall be min 1 in. to max 1-3/4 in. Steel duct to be rigidly supported on both sides of wall assembly.

3. Batt and Blanket* - Max 1-1/2 in. thick glass fiber batt or blanket (min 3/4 pcf) jacketed on the outside with a foil-scrim-kraft facing. Longitudinal and transverse joints sealed with aluminum foil tape. During the installation of the fill material, the batt or blanket shall be compressed 50% such that the annular space within the firestop system shall be min 1/4 in. to max 1 in.

See Batts and Blankets (BKNV) category in the Building Materials Directory for names of manufacturers. Any batt or blanket meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index 50 or less may be used.

4. Fill, Void or Cavity Material* - Sealant - Min 5/8 in. or 1-1/4 in. thickness of fill material applied within annulus, flush with both surfaces of wall for 1 or 2 hr walls, respectively. If voids develops after the fill material cures, the voids shall be sealed with additional fill material.

*Bearing the UL Classification Mark

14 U.L SYSTEM NO W-J-7029 DETAIL
NO SCALE

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11-19-21

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E.E. WADDELL HS RENOVATIONS

CHARLOTTE-MECKLENBURG SCHOOLS
7030 NATIONS FORD ROAD, CHARLOTTE , NC 28217

PROJECT NO: 602716
DATE: 11-19-2021

REVISIONS	
DATE	DESCRIPTION

MECHANICAL UL DETAILS

M500