



CMA HYUNDAI WINCHESTER RENOVATION 3951 VALLEY PIKE WINCHESTER VA, CMA008a

CMA

3985 VALLEY PIKE WINCHESTER, VA 23062

Professional Certification:

100% Bid Set 2023.07.27

No. Issue / Revision Date

Drawn By: MRB

Checked By: GWB

Plot Date:

Sheet Number

M001

Sheet Title GENERAL NOTES, SYMBOLS AND ABBREVIATIONS

Project Number IDC #23-010 File Name

Table with 3 columns: Abbreviation, Description, and Unit/Measure. Includes terms like AAV, AC, ACU, AFF, AHU, @, AFMS, AS, ATG, AV, @, BC, BDD, BDR, BEL, BFP, BHP, BLDG, BOD, BOP, BTUH, CA, CC, CD, CFM, CH, CHR, CHS, CLG, COND, COP, CU, CUH, CV, CW, CR, CS, DB, DC, F, DH, DN, DOAS, DP, DX, EA, EA, EAT, EER, EF, EFF, EG, EL, ER, ERV, ESP, ET, EUH, EW, EX, EXT, FOU, FD, FLA, FL, FLEX, FO, FPM, FPMB, FSD, FT, FT2, FTR, GAL, GC, GIH, GPM, GR, GRH, GS, GUH, GV, H, HC, HCWR, HCWS, HGRH, HP, HPR, HPS, HR, HRC, HRV.

Table with 2 columns: General Notes and Mechanical Requirements. Includes sections like GENERAL MECHANICAL REQUIREMENTS, 1. Materials, equipment, and systems shall meet all pertinent requirements... 2. Bidders shall be licensed contractors... 3. Bidders shall thoroughly acquaint themselves with the conditions under which the work is to be performed... 4. The systems shown on the drawings shall be provided to serve all fixtures, equipment, and areas within the Contract Limit Lines...

Table with 4 columns: Symbol, Description, Symbol, Description. Lists various mechanical symbols such as RECTANGULAR DUCT, ROUND DUCT, FLAT OVAL DUCT, VOLUME DAMPER, FIRE DAMPER W/ACCESS DOOR, SMOKE DAMPER W/ ACCESS DOOR, STATIC PRESSURE SENSOR, MOTOR OPERATED DAMPER, FLEXIBLE CONNECTION, SOUND LINED DUCTWORK, CAPPED DUCTWORK, DUCTWORK TRANSITIONS, ROUND TO RECTANGULAR TRANSITION, DUCTWORK TRANSITION, RISE AND DROP IN DUCTWORK, TURNING VANES, RADIUS ELBOW, SUPPLY DUCT DOWN, SUPPLY DUCT UP, RETURN DUCT DOWN, RETURN DUCT UP, EXHAUST DUCT DOWN, EXHAUST DUCT UP, AIR TITE FITTING W/INTEGRAL VOLUME DAMPER, TOP AIR TITE FITTING CONNECTION, DOUBLE LINE FLEXIBLE DUCT, SINGLE LINE FLEXIBLE DUCT.

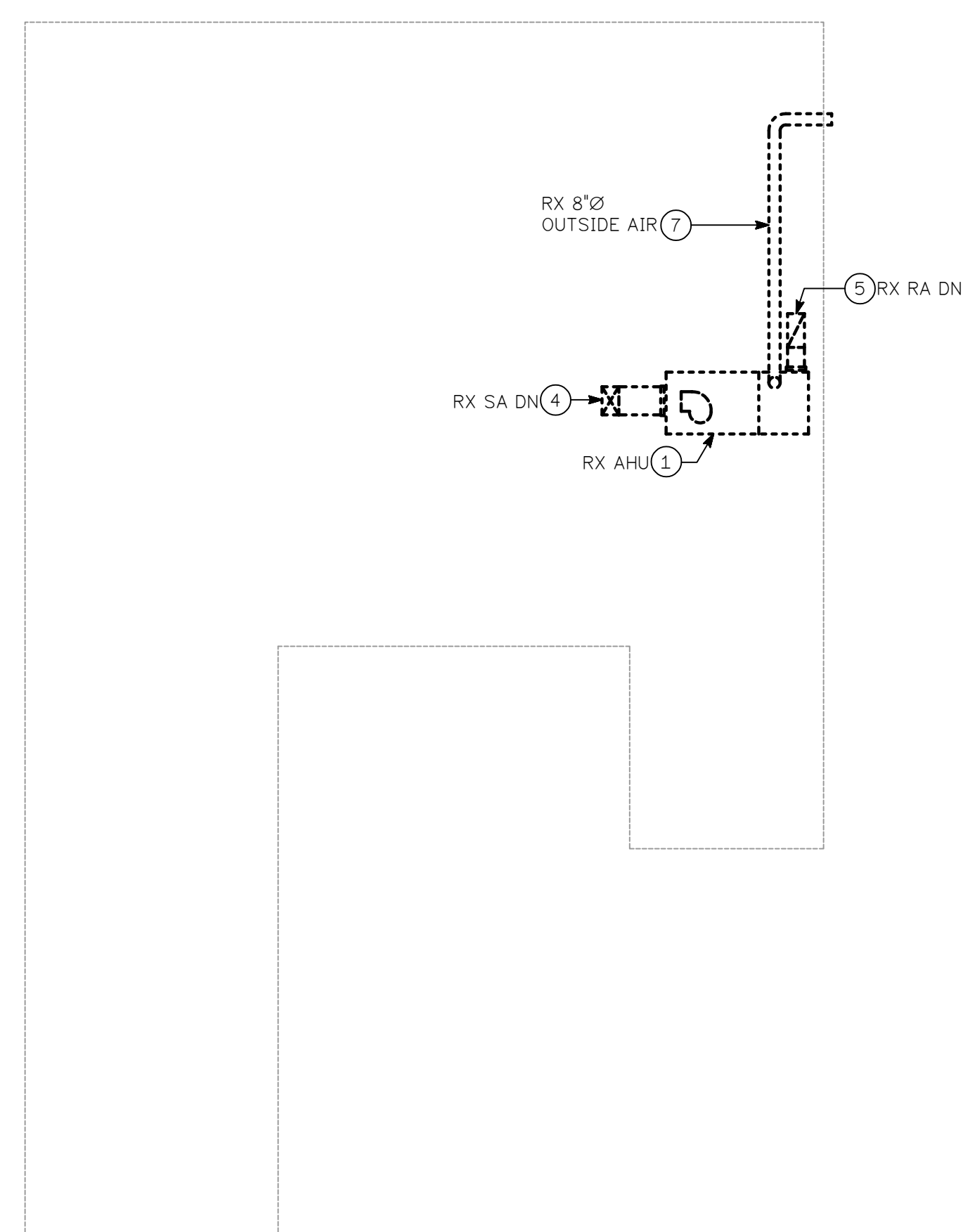
NOTE: ALL SYMBOLS ARE SHOWN FOR REFERENCE ONLY. CONTRACTOR SHALL NOTE THAT NOT ALL SYMBOLS MAY BE USED, AS WELL AS NOT ALL SYMBOLS USED MAY BE LISTED. REFER TO PROJECT SPECIFIC NOTES FOR ADDITIONAL INFORMATION.

Table with 2 columns: Drawing Conventions. Includes symbols for NEW WORK - HEAVY AND SOLID LINES, EXISTING TO REMAIN - LIGHT AND SOLID LINES, REMOVE EXISTING - HEAVY AND DASHED LINES.

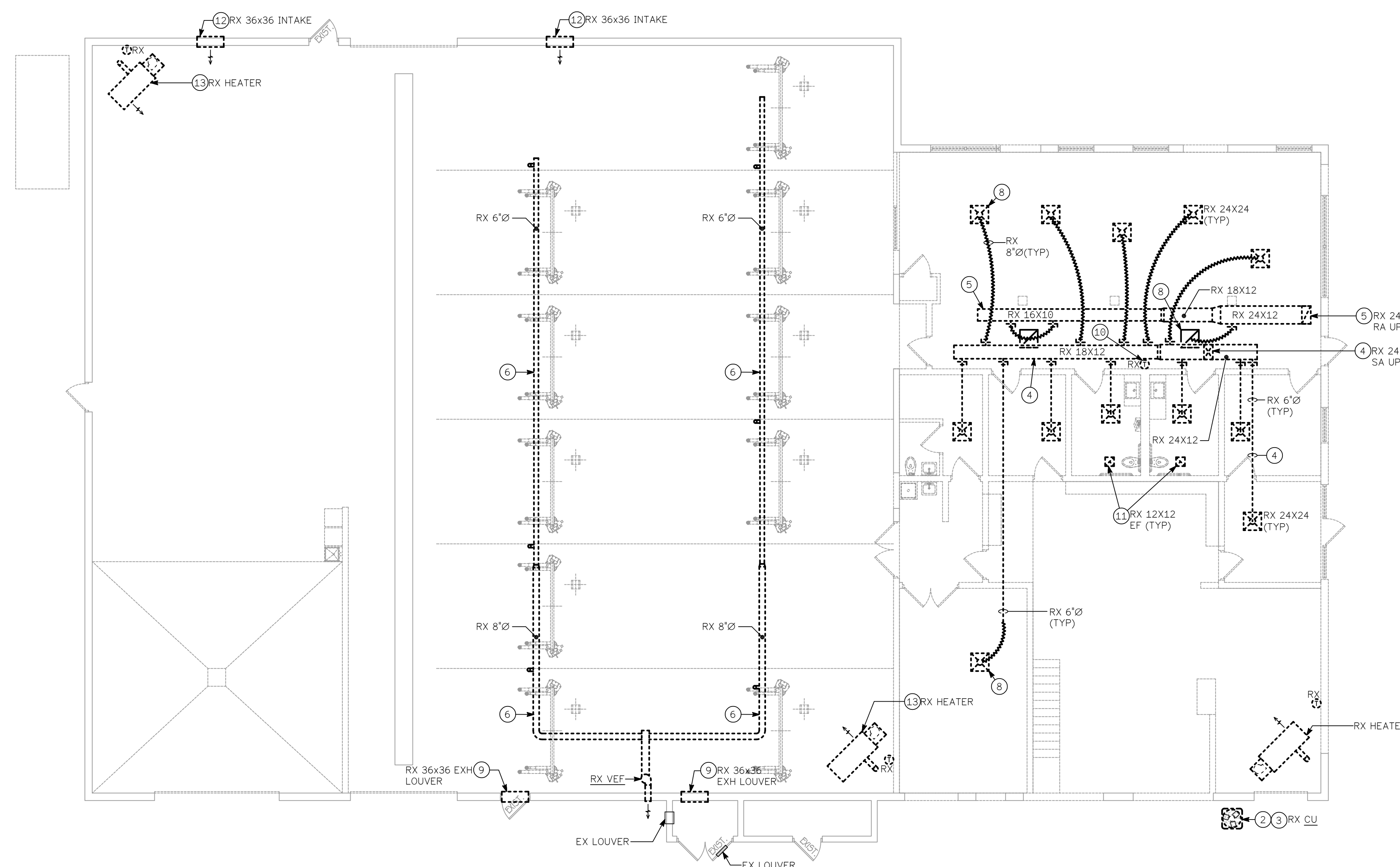
Table with 2 columns: Notice to Contractors. Includes text: ALL CONTRACTORS PRIOR TO BID SUBMISSION PROCESS SHALL VISIT PROPOSED WORK SITE AND FIELD VERIFY ALL EXISTING CONDITIONS. ANY CONDITIONS THAT DIFFER FROM THAT SHOWN ON THESE PLANS SHALL BE REPORTED TO ARCHITECT/ENGINEER SO THAT NEW AND REVISED BID DRAWINGS OR INFORMATION MAY BE ISSUED. MODIFICATIONS TO SCOPE OF WORK WHICH RESULT FROM CONTRACTORS NEGLIGENCE TO VISIT THE SITE PRIOR TO SUBMITTING BID, SHALL BE THE CONTRACTORS SOLE RESPONSIBILITY.

DRAWING NOTES

1. REMOVE EXISTING FLOOR MOUNTED AIR HANDLING UNIT AND ALL ASSOCIATED APPURTENANCES.
2. REMOVE EXISTING OUTDOOR GRADE MOUNTED CONDENSING UNIT AND ALL ASSOCIATED APPURTENANCES.
3. REMOVE EXISTING RS & RL PIPING FROM INDOOR UNITS TO OUTDOOR UNITS.
4. REMOVE EXISTING SUPPLY AIR DUCTWORK AND ALL ASSOCIATED DUCTWORK BACK TO LOCATION SHOWN ON DRAWING.
5. REMOVE EXISTING RETURN AIR DUCTWORK AND ALL ASSOCIATED DUCTWORK BACK TO LOCATION SHOWN ON DRAWING.
6. REMOVE EXISTING VEHICLE EXHAUST AIR DUCTWORK AND ALL ASSOCIATED DUCTWORK BACK TO LOCATION SHOWN ON DRAWING.
7. REMOVE EXISTING OUTSIDE AIR DUCTWORK AND ALL ASSOCIATED DUCTWORK BACK TO LOCATION SHOWN ON DRAWING.
8. REMOVE EXISTING AIR DEVICE AND ALL ASSOCIATED DUCTWORK BACK TO LOCATION SHOWN (TYPICAL).
9. REMOVE EXISTING EXHAUST AIR LOUVER AND PATCH PENETRATION.
10. REMOVE EXISTING THERMOSTAT AND ALL ASSOCIATED CONTROL WIRING.
11. REMOVE EXISTING CEILING MOUNTED EXHAUST FAN AND ALL ASSOCIATED DUCTWORK AND APPURTENANCES.
12. REMOVE EXISTING INTAKE AIR LOUVER AND PATCH PENETRATION.
13. REMOVE EXISTING HEATER.



MECHANICAL MEZZANINE PLAN - DEMOLITION
SCALE: 1/8" = 1'-0"



MECHANICAL FLOOR PLAN - DEMOLITION
SCALE: 1/8" = 1'-0"

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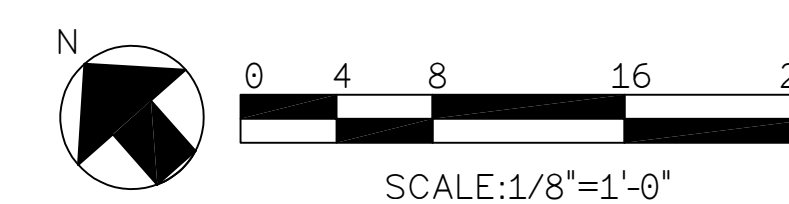
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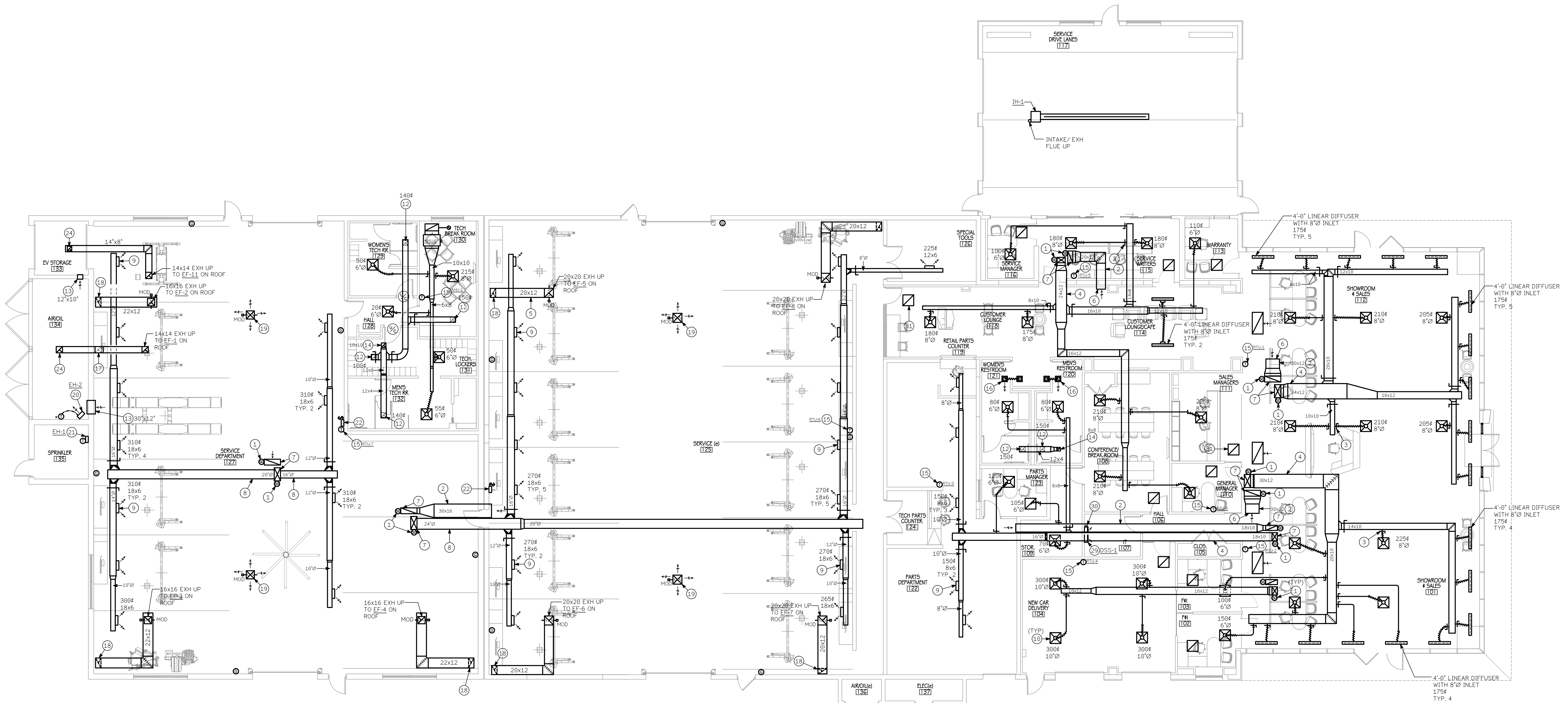
100% Bid Set	2023.07.27
No. Issue / Revision	Date
Drawn By: MRB	
Checked By: GWB	
Plot Date:	

Sheet Number
M-101
Sheet Title
**MECHANICAL FLOOR
PLAN AND MEZZ PLAN
- DEMOLITION**

Project Number
IDC #23-010

File Name





MECHANICAL - FLOOR PLAN

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

DRAWING NOTES

125 (E) SERVICE SHOP VENTILATION ANALYSIS:

0.75 CFM/SQ.FT. OF "MECHANICAL" EXHAUST IS REQUIRED BY THE 2018 INTERNATIONAL MECHANICAL CODE, SECTION 403, DURING OCCUPIED TIMES.

1 CFM/SQ.FT. OF VENTILATION EXHAUST IS REQUIRED BY THE N.E.C. CODE, SECTION 511, DURING OCCUPIED TIMES, IN ORDER TO "DE-CLASSIFICATION" THE SPACE.

TOTAL FLOOR AREA = 6,120 SQ.FT.

THEREFORE, A MECHANICAL EXHAUST SYSTEM WILL BE DESIGNED PROVIDING (4) FANS AT 1,530 CFM EACH OF VENTILATION, INTERLOCKED WITH GAS DETECTION SYSTEM.

TOTAL VENTILATION PROVIDED: 6,120 CFM = 1 CFM/SQ.FT.

127 SERVICE SHOP VENTILATION ANALYSIS:

0.75 CFM/SQ.FT. OF "MECHANICAL" EXHAUST IS REQUIRED BY THE 2018 INTERNATIONAL MECHANICAL CODE, SECTION 403, DURING OCCUPIED TIMES.

1 CFM/SQ.FT. OF VENTILATION EXHAUST IS REQUIRED BY THE N.E.C. CODE, SECTION 511, DURING OCCUPIED TIMES, IN ORDER TO "DE-CLASSIFICATION" THE SPACE.

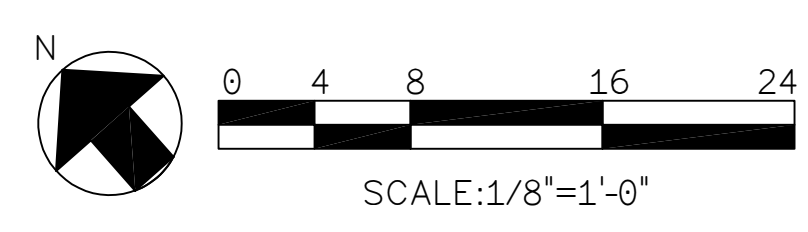
TOTAL FLOOR AREA = 4,950 SQ.FT.

THEREFORE, A MECHANICAL EXHAUST SYSTEM WILL BE DESIGNED PROVIDING (3) FANS AT 1,650 CFM EACH OF VENTILATION, INTERLOCKED WITH GAS DETECTION SYSTEM.

TOTAL VENTILATION PROVIDED: 4,950 CFM = 1 CFM/SQ.FT.

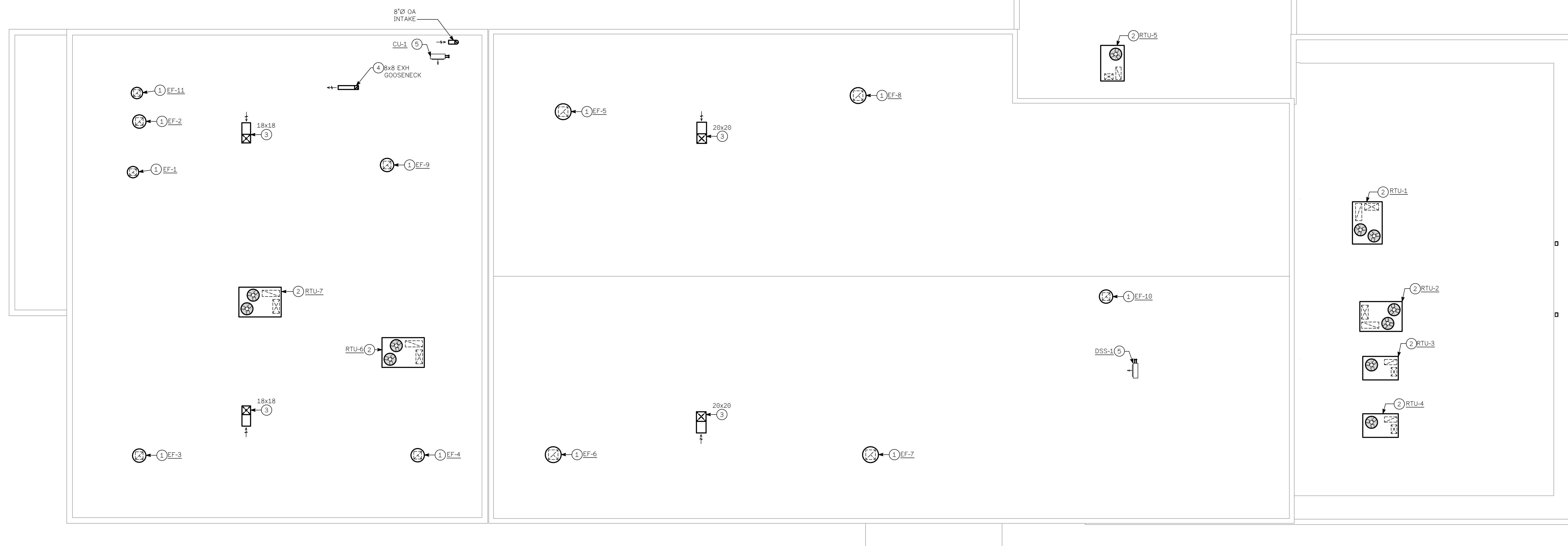
THE VEHICLE EXHAUST SYSTEM WILL BE DESIGNED AND INSTALLED BY THE OWNERS VENDOR UNDER A SEPERATE PERMIT SUBMISSION

- PHOTOELECTRIC DUCT MOUNTED SMOKE DETECTOR WITH 12"x12" ACCESS DOOR FOR TUBE INSPECTION. UNIT SHALL BE SYSTEM SENSOR INNOVIA/RFLX SERIES, PHOTOELECTRIC MODEL #4228 (4 WIRES) OR APPROVED EQUAL. PROVIDE WALL MOUNTED SYSTEM SENSOR MODEL #A1253 OR APPROVED EQUAL WITH REMOTE AUDIBLE/VISUAL ALARM DEVICE NEXT TO THERMOSTAT (TYPICAL).
- RETURN AIR DUCTWORK SUPPORTED FROM STRUCTURE ABOVE CEILING (TYPICAL).
- MANUAL BALANCING DAMPER (TYPICAL).
- SUPPLY AIR DUCTWORK SUPPORTED FROM STRUCTURE ABOVE CEILING (TYPICAL).
- EXHAUST AIR DUCTWORK SUPPORTED FROM STRUCTURE ABOVE CEILING (TYPICAL).
- FULL SIZE OPEN END SOUND LINED RETURN AIR DUCTWORK WITH ELBOW AND 1"x1" WIRE MESH TO COVER OPENING.
- DUCTWORK UP THRU ROOF. TRANSITION IN VERTICAL AS REQUIRED FOR CONNECTION TO UNIT CURB OPENING.
- LINK ROUND SPIRAL SUPPLY AIR DUCTWORK SUPPORTED FROM STRUCTURE ABOVE WITH AIR DRAFT CABLING OR AS RECOMMENDED BY MANUFACTURER. DUCTWORK SHALL BE DOUBLE WALL, INSULATED WITH SELF-SEALING/GASKETED CONNECTIONS.
- SUPPLY AIR REGISTER MOUNTED IN SIDE/BOTTOM OF ROUND DUCTWORK WITH NECK SIZE AND AIR QUANTITY INDICATED. LINK RDS-3 OR APPROVED EQUAL WITH INTEGRAL VOLUME CONTROL AND DOUBLE DEFLECTION LOUVERS SET AT 30° LEFT/RIGHT.
- 24"x24" CEILING MOUNTED SUPPLY AIR DIFFUSER WITH NECK SIZE AND AIR QUANTITY INDICATED (TYPICAL). PROVIDE RIGID/FLEXIBLE DUCTWORK BACK TO MAIN WITH AIR-TITE FITTING AND MANUAL VOLUME DAMPER.
- 24"x24" CEILING MOUNTED RETURN AIR GRILLE WITH NECK SIZE AND AIR QUANTITY INDICATED (TYPICAL). PROVIDE RIGID/FLEXIBLE DUCTWORK BACK TO MAIN WITH AIR-TITE FITTING AND MANUAL VOLUME DAMPER.
- 10"x10" CEILING MOUNTED EXHAUST AIR REGISTER WITH AIR QUANTITY INDICATED (TYPICAL).
- AIR TRANSFER OPENING IN WALL 12" ABOVE FLOOR, SIZE AS INDICATED, WITH FULL SIZE SLEEVE AND 1"x1" WIRE MESH TO COVER OPENINGS ON BOTH SIDES.
- EXHAUST AIR DUCTWORK UP THRU ROOF TO FAN.
- WALL MOUNTED THERMOSTAT MOUNTED 48" ABOVE FLOOR WITH LOCKABLE COVER AND INTERLOCKED WITH UNIT INDICATED.
- 12"x12" CEILING MOUNTED AIR TRANSFER GRILLES WITH #20 CONNECTING DUCTWORK (TYPICAL).
- EXHAUST AIR DUCTWORK DROPPING DOWN FROM HIGH ABOVE, THRU WALL TO HIGH IN AIR/OIL ROOM CEILING.
- EXHAUST DUCTWORK SUPPORTED HIGH AND UP THRU ROOF TO FAN WITH LOW-LEAKAGE MOTORIZED DAMPER. EXTEND DUCTWORK ABOVE FLOOR TO 12" ABOVE FLOOR WITH 1"x1" WIRE MESH OVER OPENING. COORDINATE ALL DROPS WITH EXISTING PIPING IN THE AREA.
- MAKEUP AIR DUCTWORK UP THRU ROOF TO GOOSENECK WITH LOW-LEAKAGE MOTORIZED DAMPER. EXTEND DOWN TO 24" BELOW BOTTOM OF ROOF STRUCTURE WITH 1"x1" WIRE MESH OVER OPENING.
- ELECTRIC UNIT HEATER SUPPORTED FROM STRUCTURE AT 8'4" ABOVE FLOOR. INTERLOCK WITH REVERSE-ACTING THERMOSTAT MOUNTED ON WALL 48" ABOVE FLOOR, SET AT 60°F. REFER TO SCHEDULE.
- WALL MOUNTED ELECTRIC HEATER INTERLOCKED WITH THERMOSTAT, REFER TO SCHEDULE.
- GAS DETECTOR MAIN CONTROL PANEL MOUNTED ON WALL 48" ABOVE FLOOR WITH MANUAL OVERRIDE SWITCH. INTERLOCK PANEL WITH REMOTE CO SENSORS, MAKEUP DAMPER AND EXHAUST SYSTEM FANS/DAMPER. REFER TO CONTROL SEQUENCE OF OPERATION.
- REMOTE CARBON MONOXIDE AND TOXIC/EXPLOSIVE GAS SENSORS MOUNTED ON WALL 48" ABOVE FLOOR AND INTERLOCKED WITH GAS CONTROL PANEL (TYPICAL).
- EXHAUST DUCTWORK SUPPORTED HIGH, EXTEND OVER THRU WALL AND UP THRU ROOF TO FAN. EXTEND DOWN TO 18" ABOVE FLOOR WITH OPENING AND 1"x1" WIRE MESH TO COVER OPENING. REFER TO FAN SCHEDULE FOR MORE INFORMATION.
- SUPPLY AIR DUCTWORK SUPPORTED AS HIGH AS POSSIBLE EXPOSED, WITH 1" INTERNAL LINING AND NO EXTERNAL DUCT WEAR.
- SUPPLY AIR REGISTER MOUNTED IN SIDE AND/OR BOTTOM OF DUCTWORK WITH NECK SIZE AND AIR QUANTITY INDICATED (TYPICAL). REGISTER SHALL HAVE DOUBLE DEFLECTION LOUVERS WITH OPPOSED SLUICE DAMPER.
- SUPPLY AIR DUCTWORK EXTENDED OUT TO GRILLE ON FACE OF WALL, SIZE AS INDICATED.
- DOOR LOUVER, SIZE AS INDICATED.
- WALL MOUNTED DUCTLESS SPLIT SYSTEM SEE SCHEDULE AND DETAIL FOR MORE INFORMATION.
- EXTEND RS & RL PIPING FROM INDOOR UNITS TO OUTDOOR UNITS; CONTRACTOR SHALL ROUTE PIPING IN THE FIELD, SIZE AND TRAP PER MANUFACTURERS RECOMMENDATIONS.
- 24"x24" CEILING MOUNTED RETURN AIR GRILLE WITH FULL SIZE NECK (TYPICAL).



DRAWING NOTES ①④

1. ROOF MOUNTED EXHAUST FAN ON 14" FACTORY CURB. REFER TO SCHEDULE.
2. GAS FIRED ROOFTOP UNIT ON 14" FACTORY CURB. COORDINATE EXACT LOCATION WITH STRUCTURAL DRAWINGS. REFER TO SCHEDULE.
3. MAKEUP AIR DUCTWORK UP THRU ROOF TO GOOSENECK.
4. EXHAUST AIR DUCTWORK UP THRU ROOF TO GOOSENECK.
5. OUTDOOR ROOF MOUNTED SPLIT SYSTEM HEAT PUMP. SEE SCHEDULE AND DETAIL FOR MORE INFORMATION. TRAP AND SIZE REFRIGERANT PIPING PER MANUFACTURER'S RECOMMENDATIONS. (COORDINATE EXACT LOCATION IN FIELD WITH LANDLORD.)



MECHANICAL - ROOF PLAN
SCALE: 1/8" = 1'-0"

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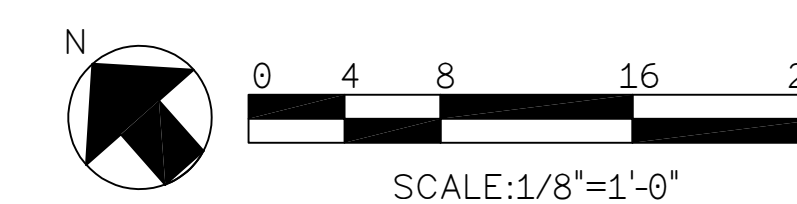
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WINCHESTER, VA
23602

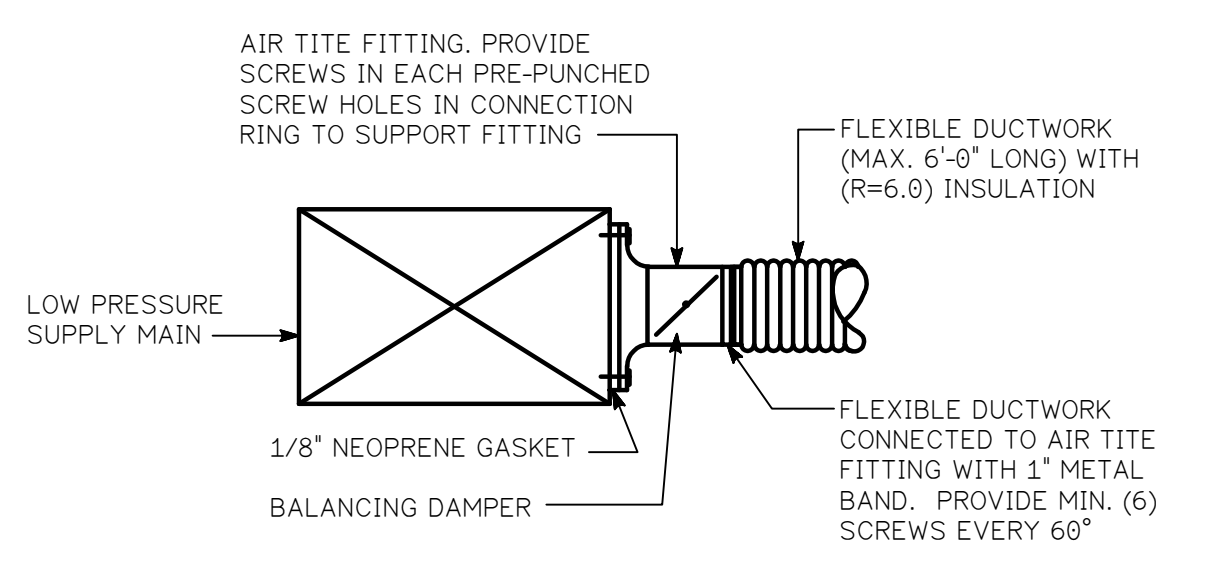
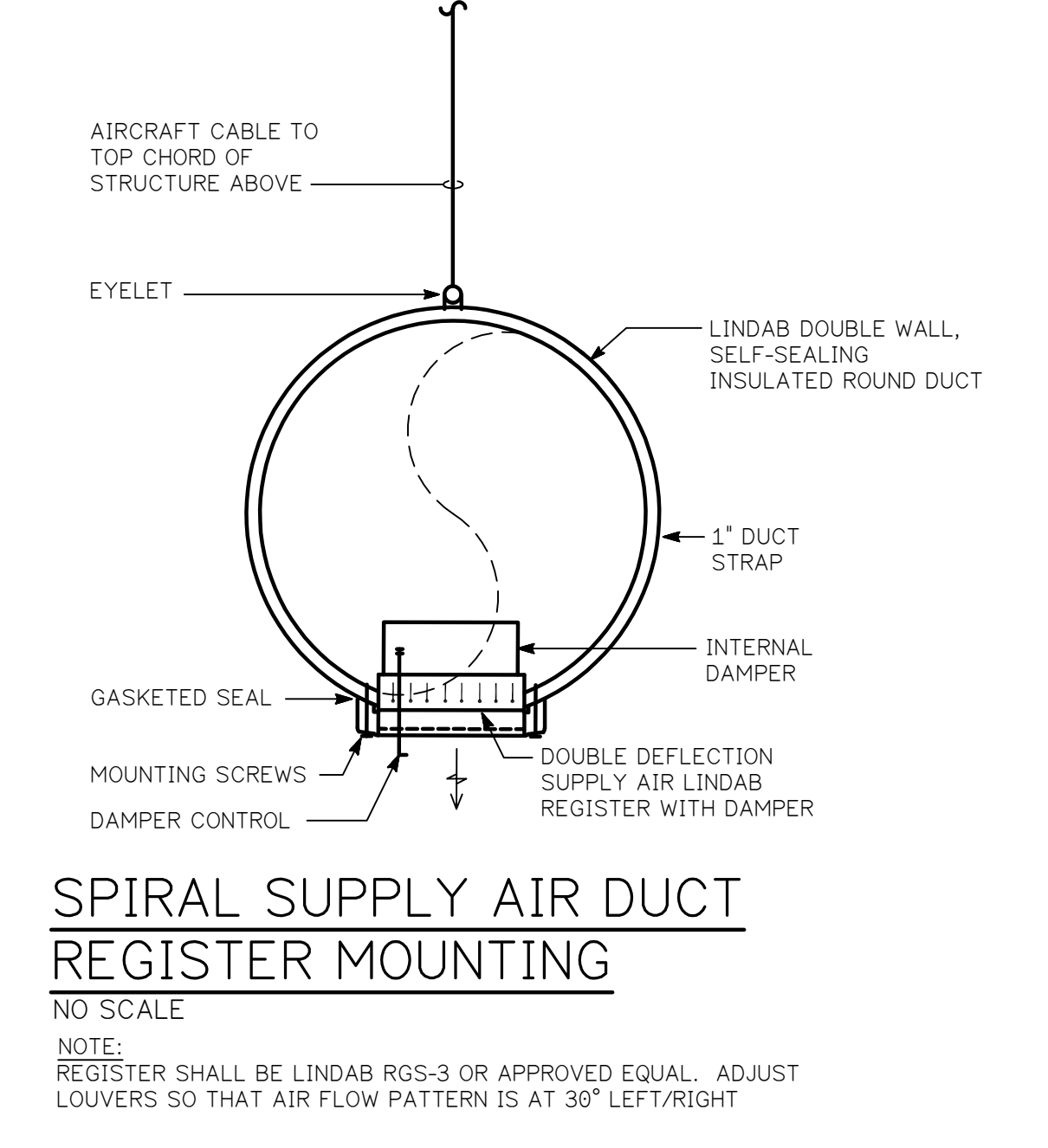
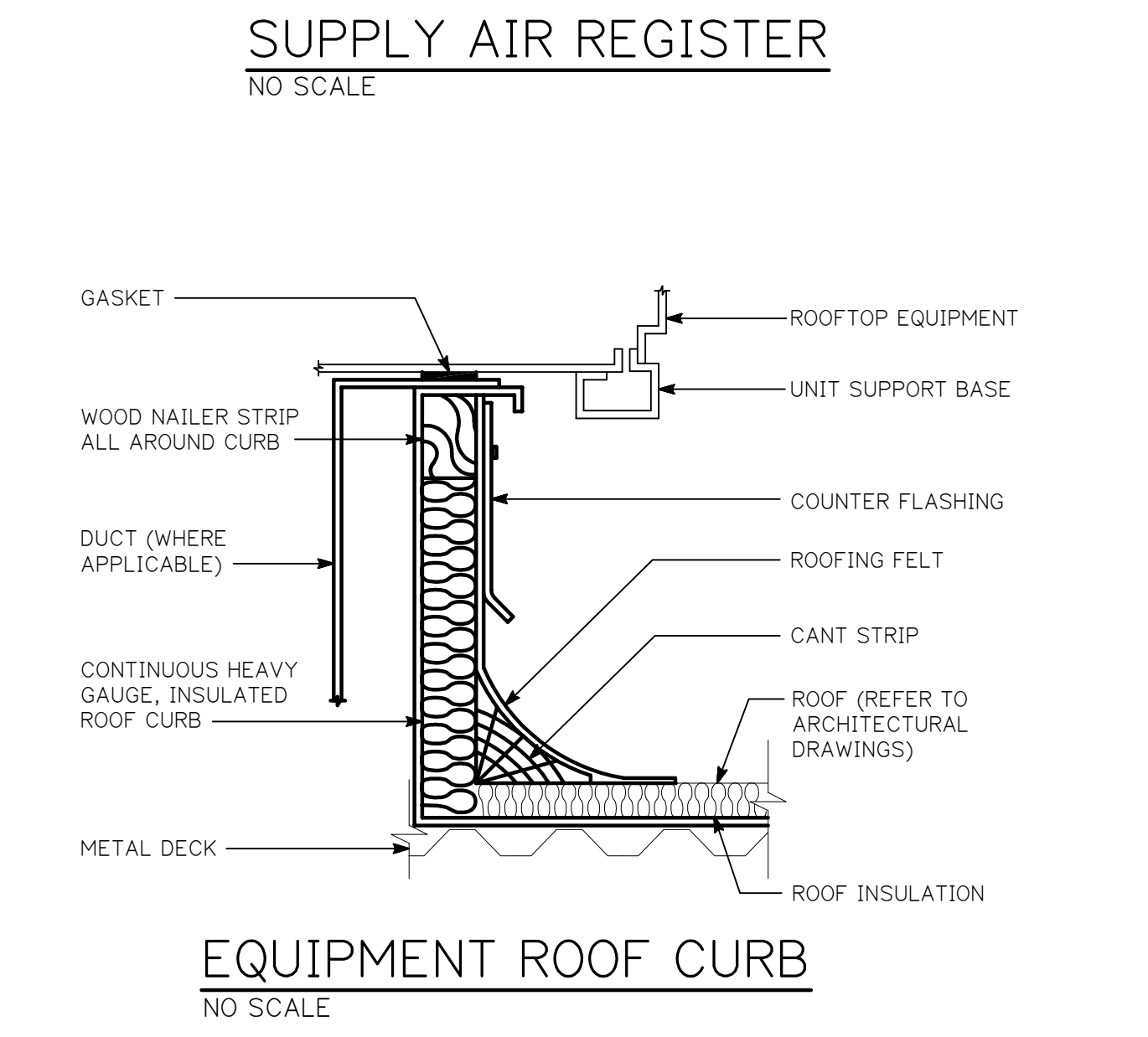
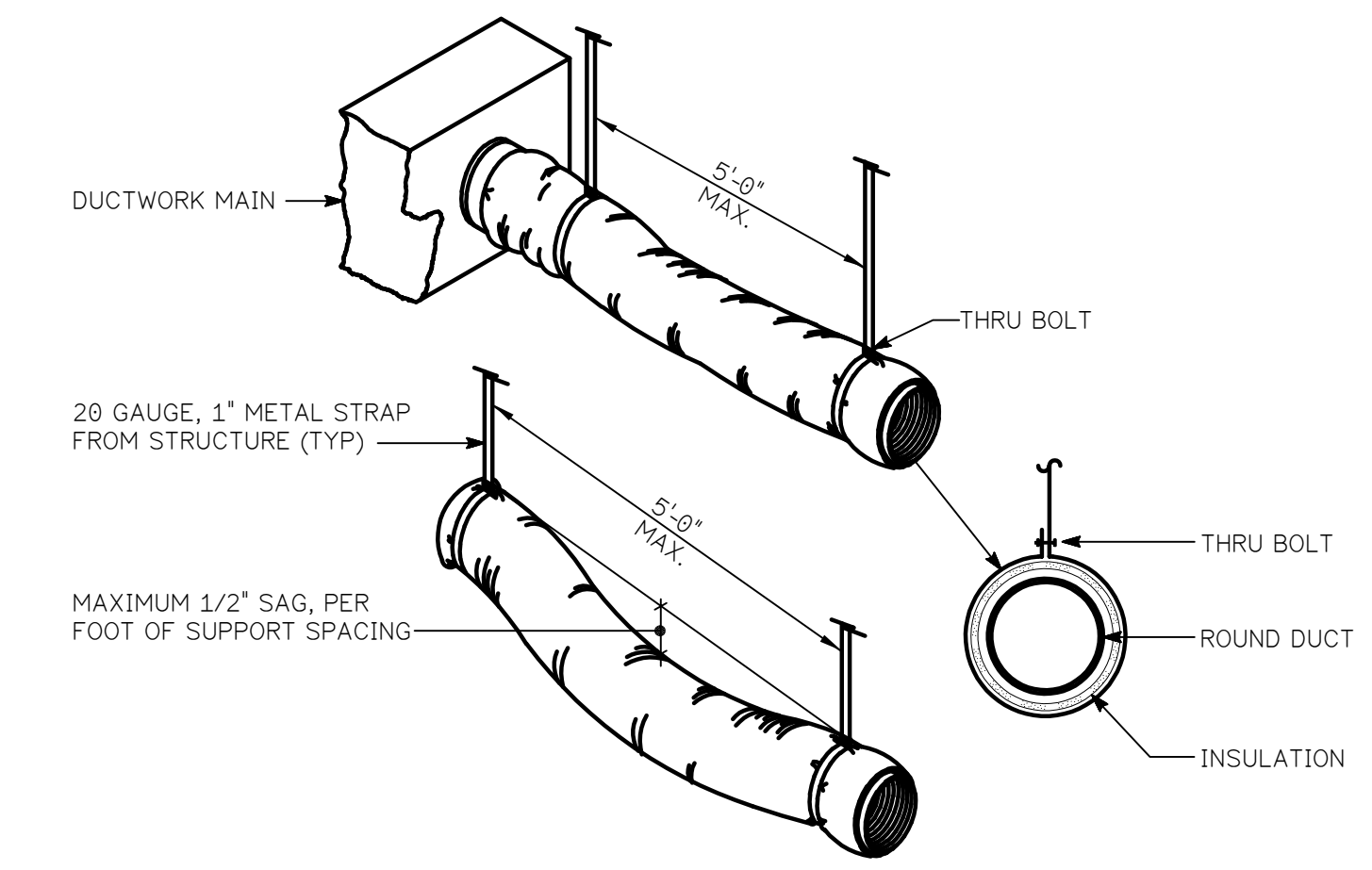
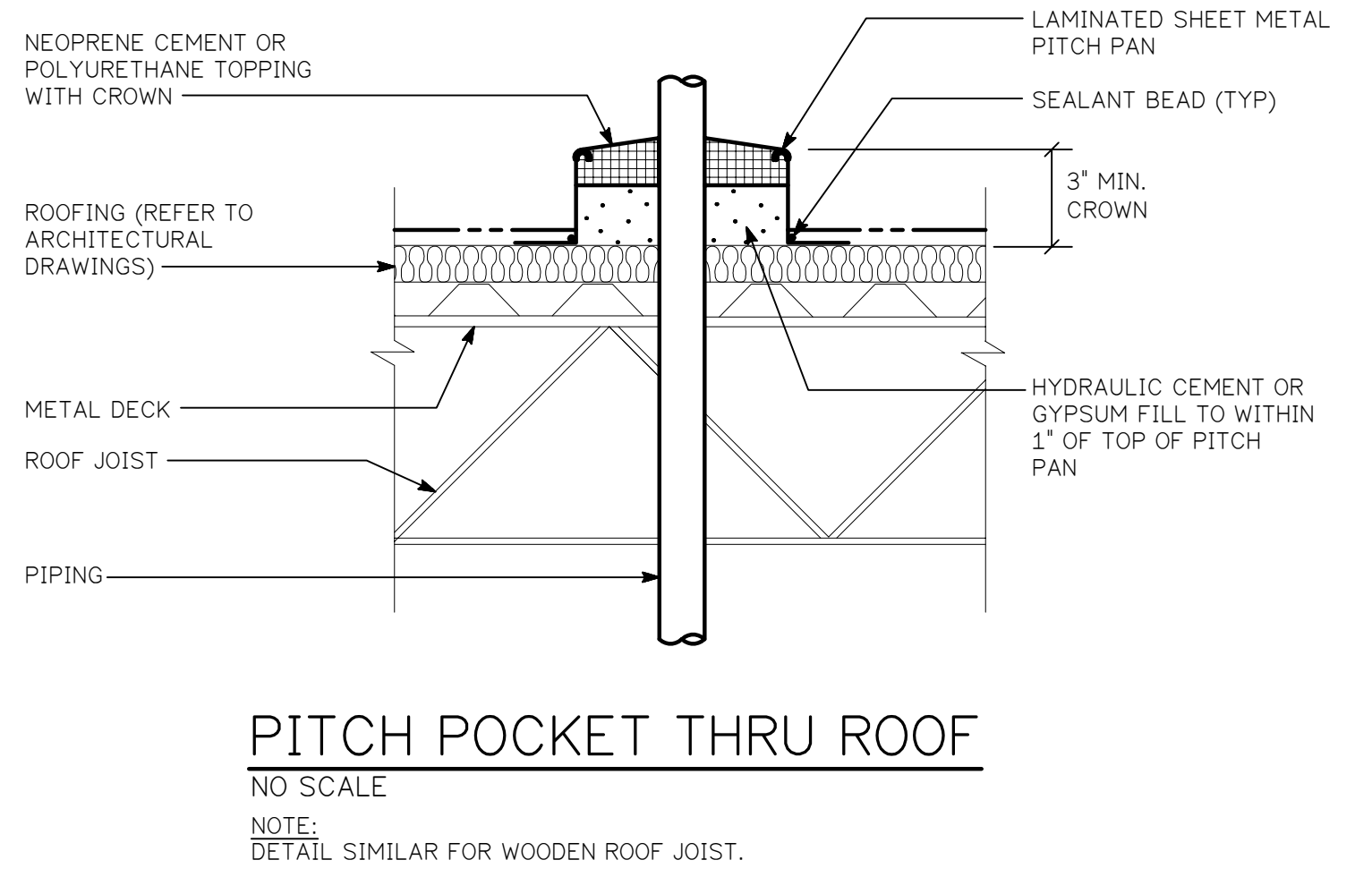
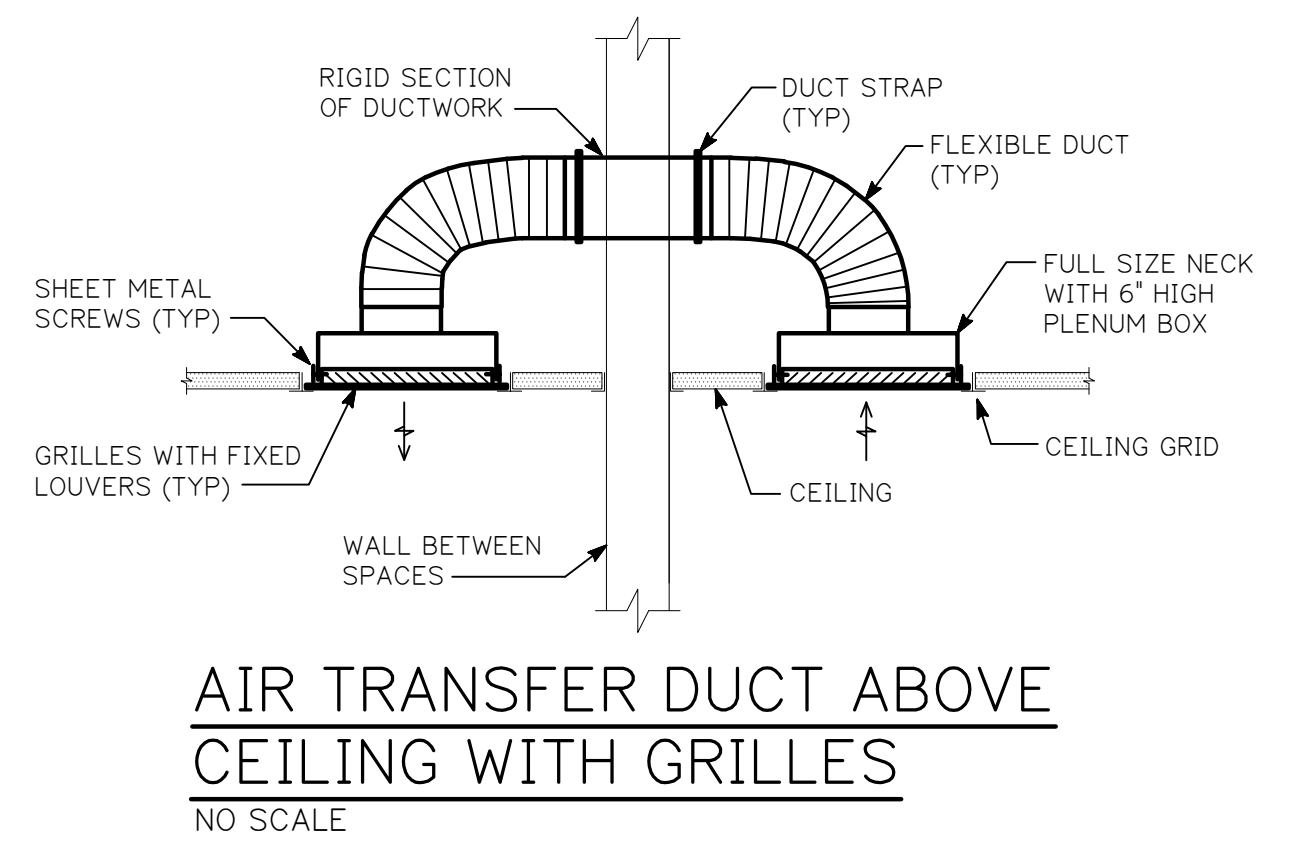
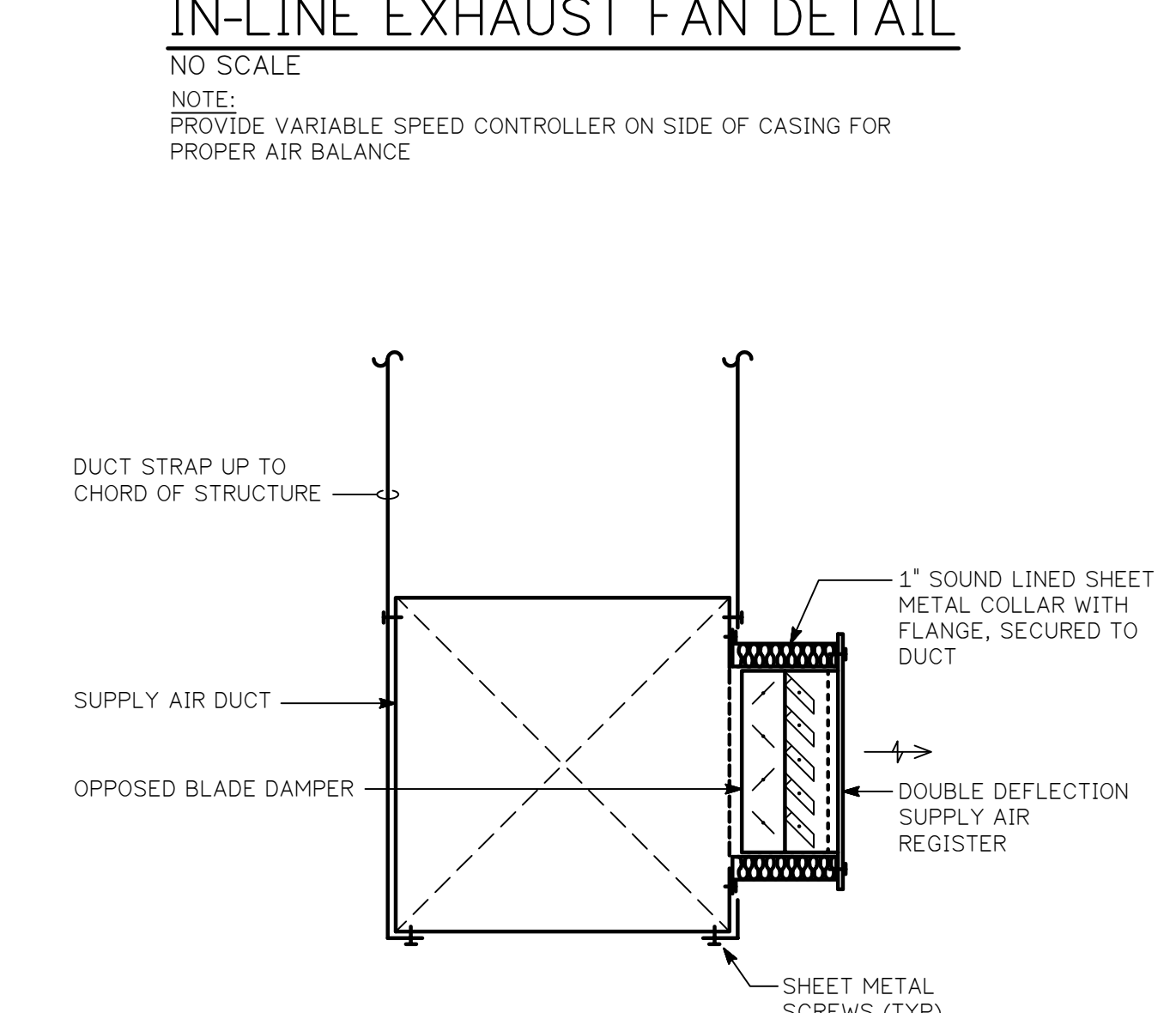
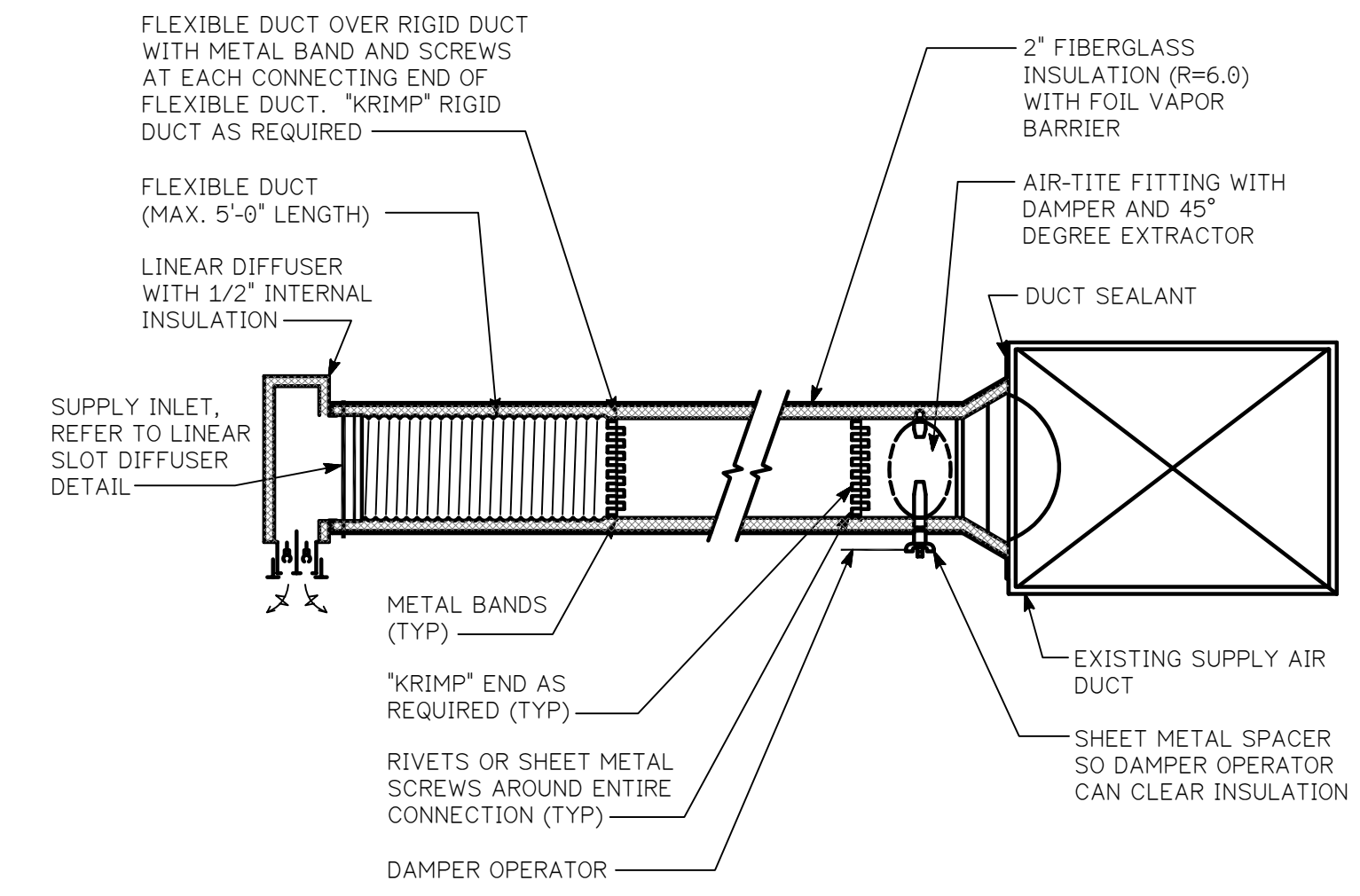
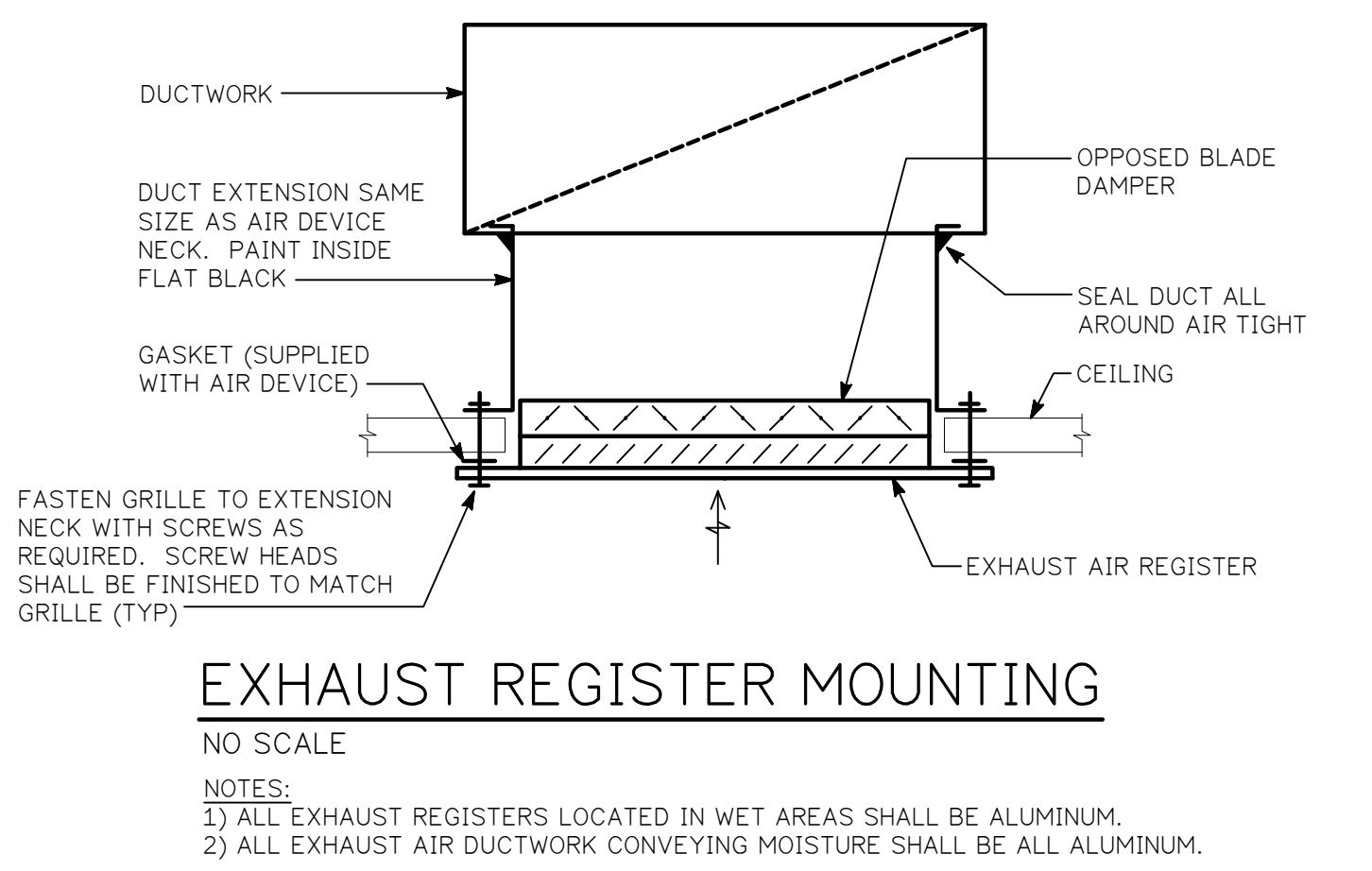
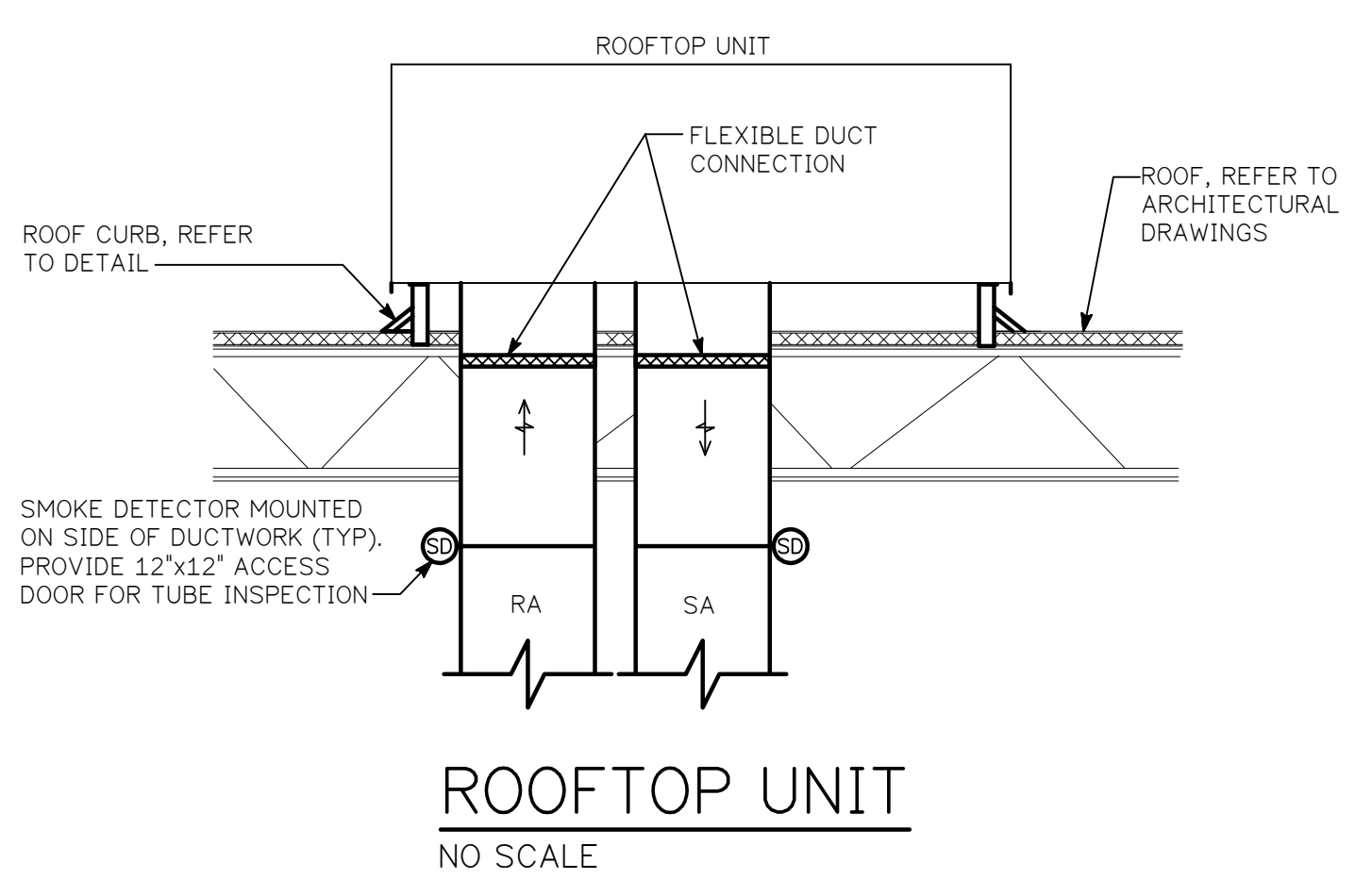
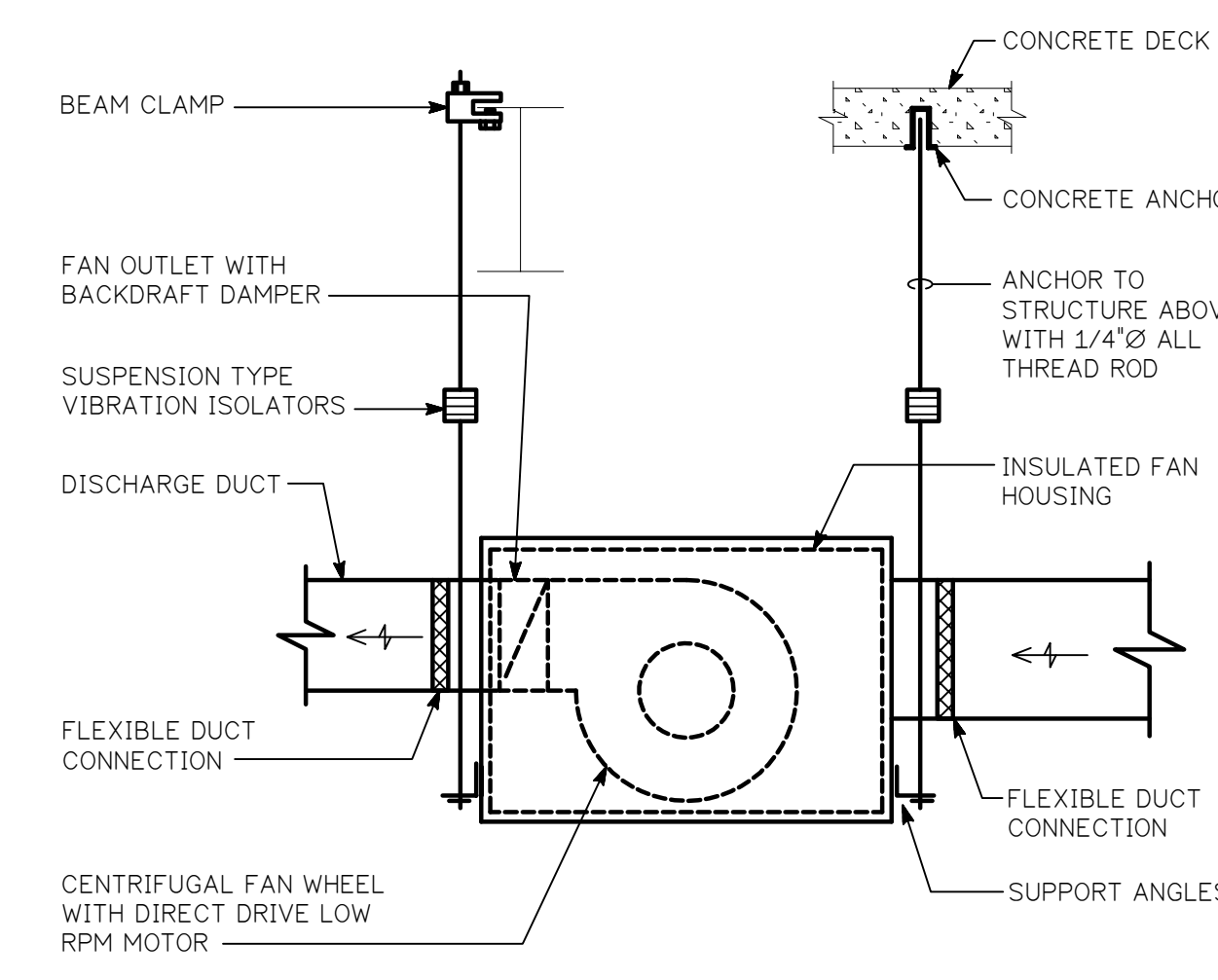
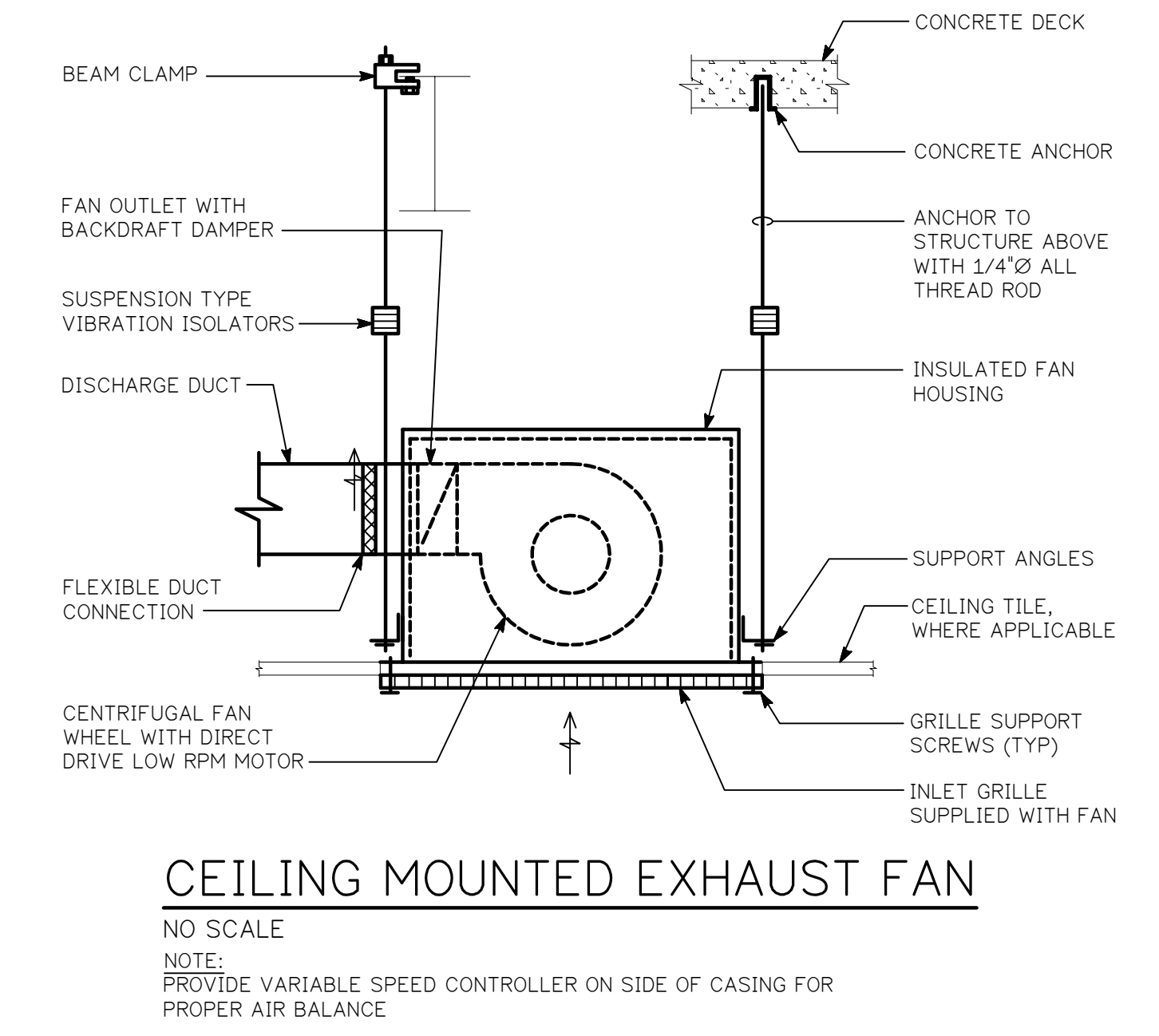
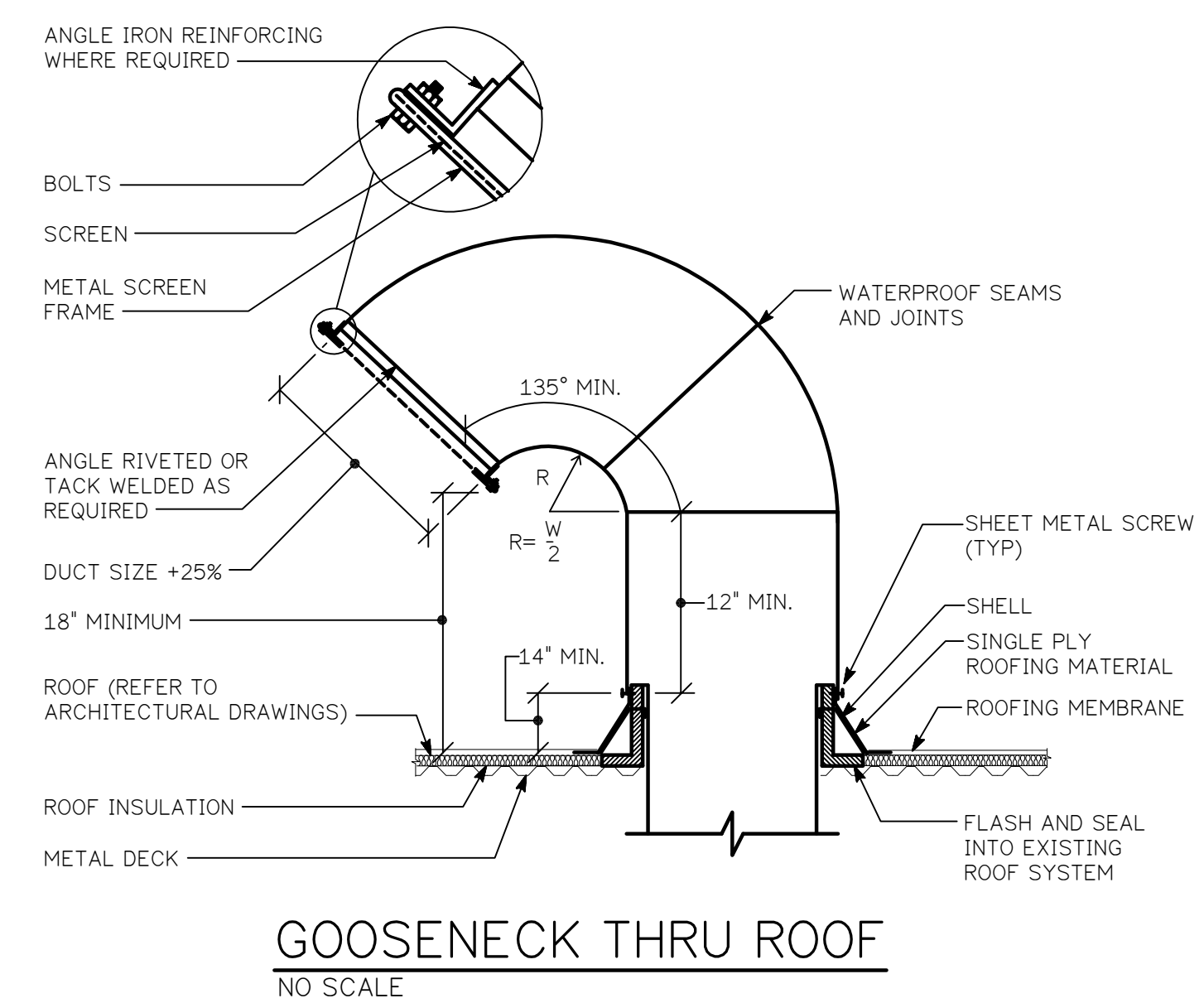
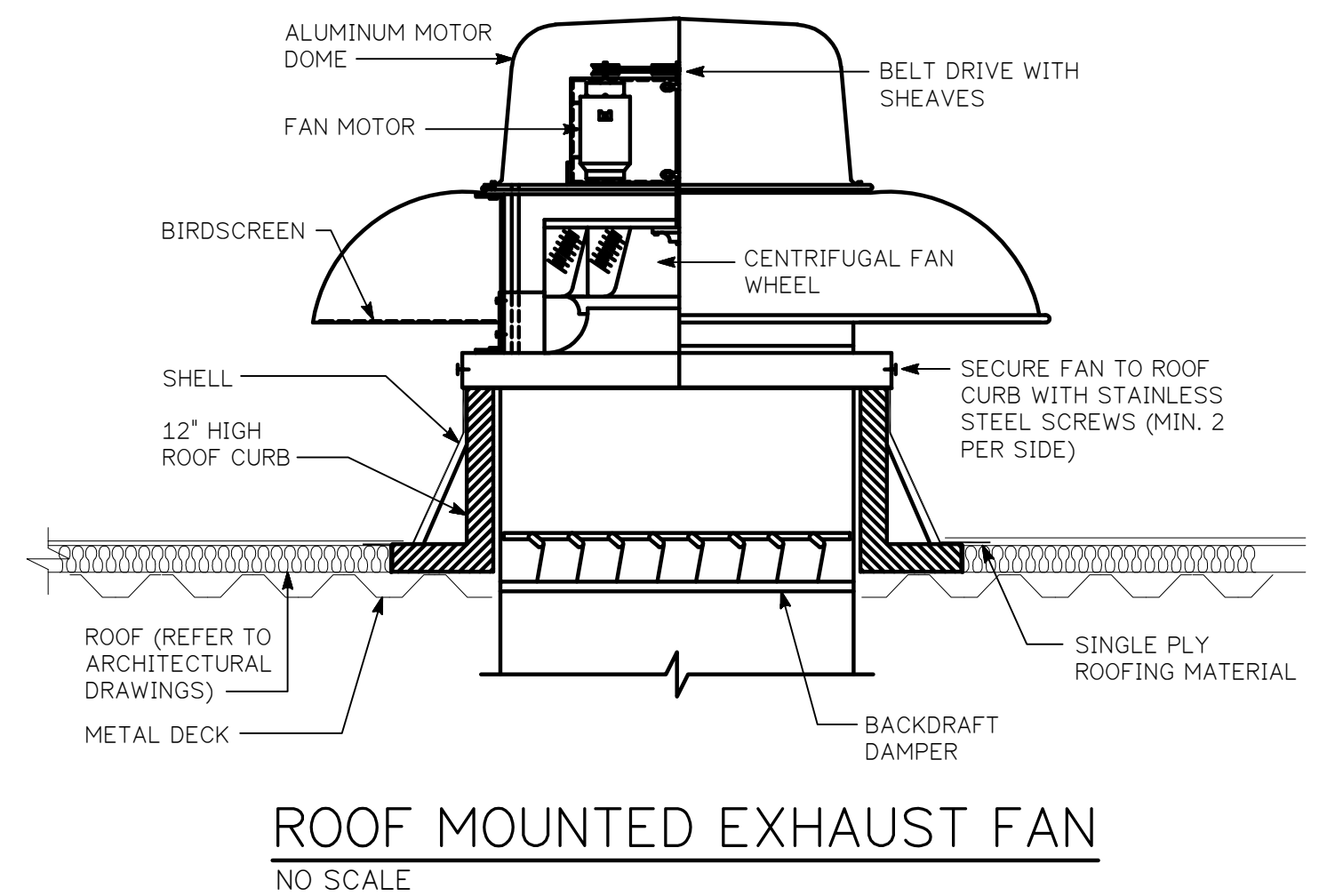
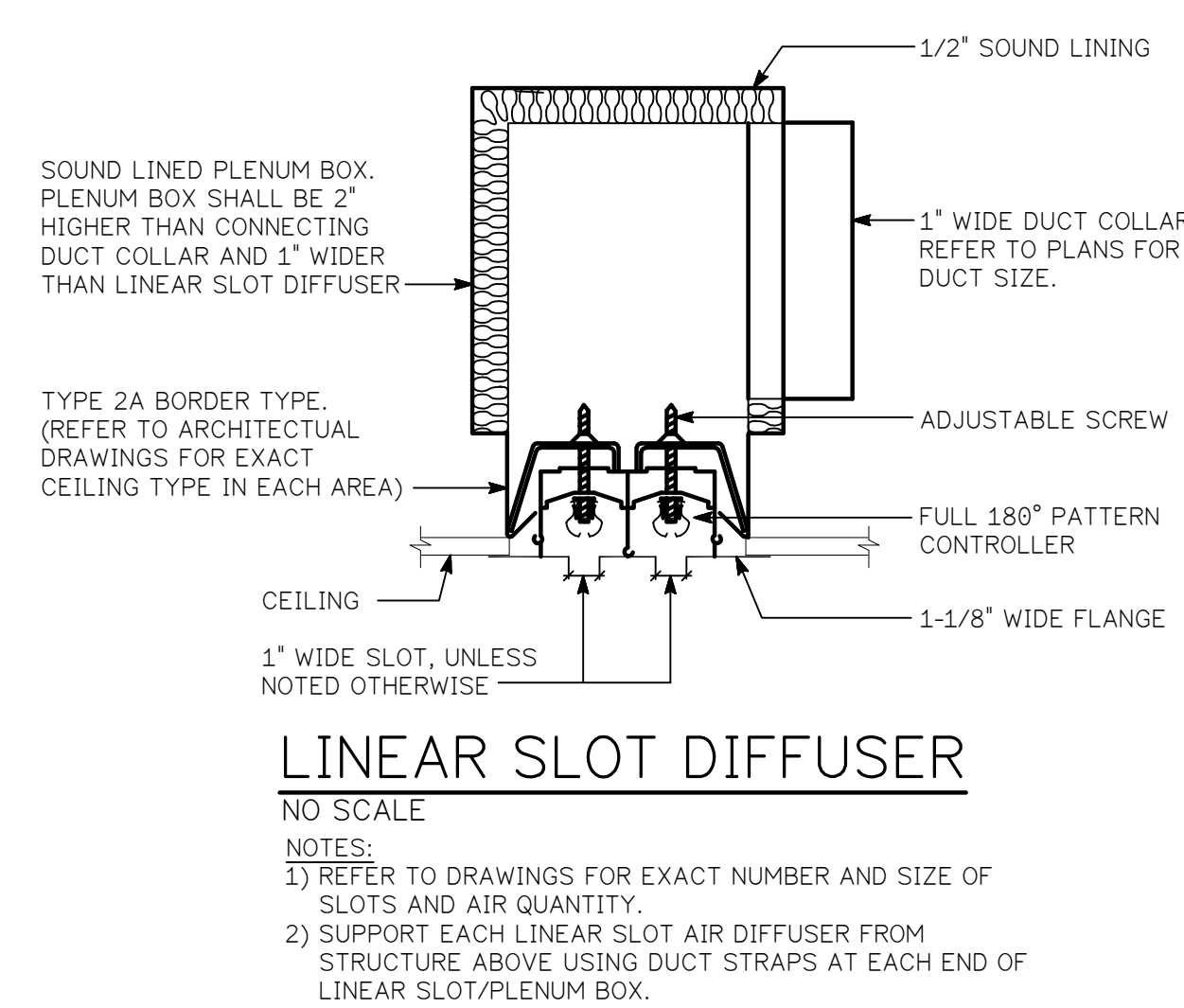
Professional Certification:

No.	Issue / Revision	Date
100%	Bid Set	2023.07.27
	Drawn By:	MRB
	Checked By:	GWB
	Plot Date:	-

Sheet Number
M-103
Sheet Title
**MECHANICAL
ROOF PLAN**

Project Number: IDC #23-010
File Name:

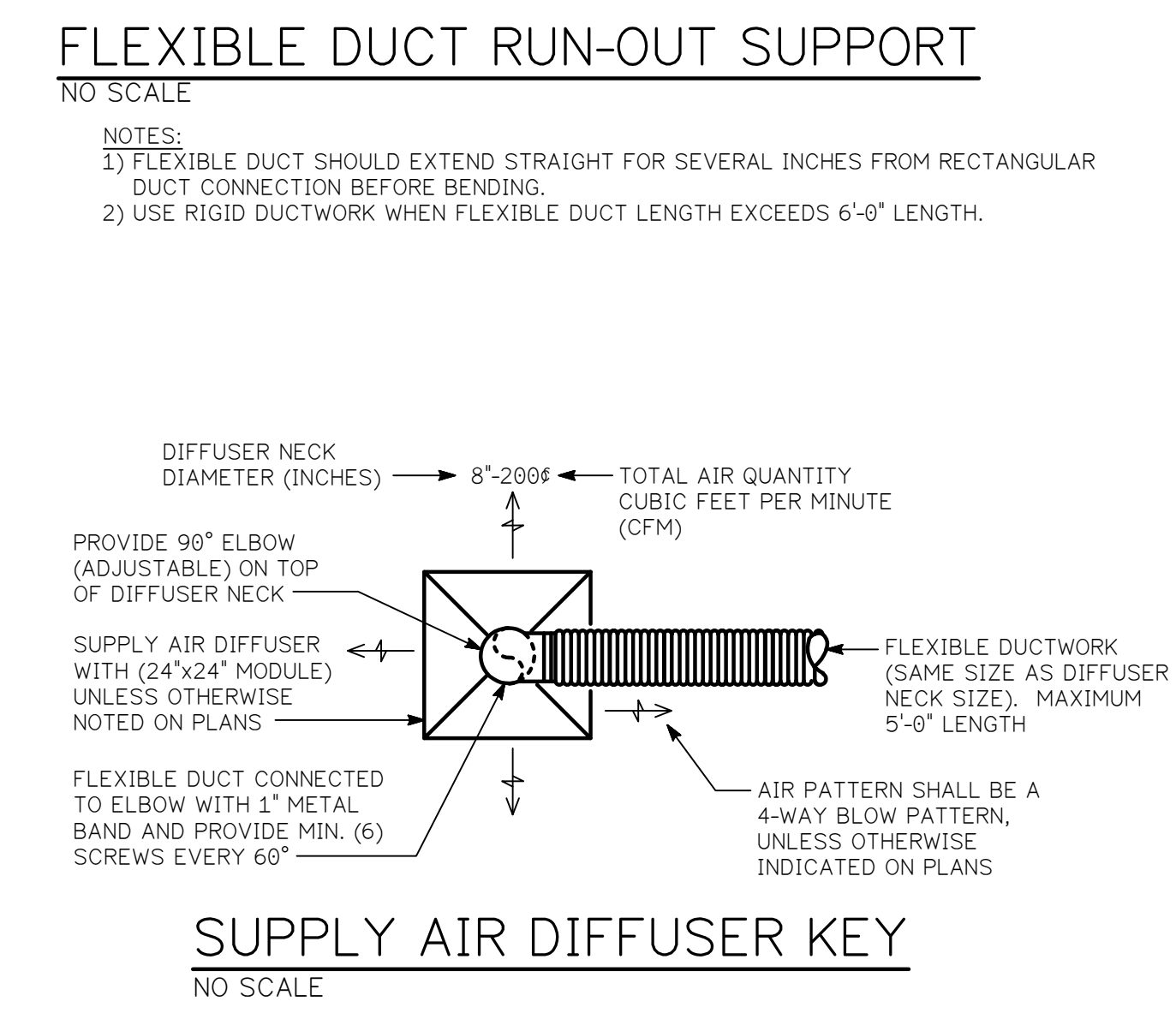




AIR-TITE SIZE CHART

DUCTSIZE	CONNECTION RING	DUCTSIZE	CONNECTION RING
5"	8"	9"	12"
6"	9"	10"	13"
7"	10"	11"	15"
8"	11"	12"	17"

NOTE:
WHERE CONNECTION RING SIZE IS LARGER THAN SUPPLY DUCT, THEN CONNECTION RING SHALL BE CRIMPED OVER DUCT AND CONNECTED, SCREWED & SEALED ON TOP AND BOTTOM OF SUPPLY DUCT.



COMcheck Software Version 4.1.5.5
Mechanical Compliance Certificate

Project Information

Energy Code: 2018 IECC
 Project Title: Winchester, Virginia
 Location: Winchester, Virginia
 Climate Zone: 4a
 Project Type: New Construction

Construction Site: _____ Owner/Agent: _____ Designer/Contractor: _____

Additional Efficiency Package(s)

Credits: 1.0 Required 0.0 Proposed

Mechanical Systems List

Quantity System Type & Description

- 1 RTU-1 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 144 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 96 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 12.00 EER, Required Efficiency: 11.00 EER + 12.6 IEER
 Fan System: RTU-1 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 1 Supply, Constant Volume, 3000 CFM, 2.4 motor nameplate hp, 0.0 fan efficiency grade
- 1 RTU-2 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 100 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 74 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 12.00 EER, Required Efficiency: 11.00 EER + 12.6 IEER
 Fan System: RTU-2 (Showroom and Office - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 2 Supply, Constant Volume, 2800 CFM, 2.9 motor nameplate hp, 0.0 fan efficiency grade
- 1 RTU-3 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 90 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 74 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 15.00 SEER, Required Efficiency: 14.00 SEER
 Fan System: RTU-3 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 3 Supply, Single-Zone VAV, 1200 CFM, 2.4 motor nameplate hp, 0.0 fan efficiency grade
- 1 RTU-4 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 90 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 41 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 15.00 SEER, Required Efficiency: 14.00 SEER
 Fan System: RTU-4 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 4 Supply, Constant Volume, 1200 CFM, 2.4 motor nameplate hp, 0.0 fan efficiency grade

Project Title: _____ Report date: 06/30/23
 Data filename: Untitled.cck Page 1 of 18

Quantity System Type & Description

- 1 RTU-5 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 90 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 69 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 15.00 EER, Required Efficiency: 11.00 EER + 12.6 IEER
 Fan System: RTU-5 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 5 Supply, Constant Volume, 2000 CFM, 2.9 motor nameplate hp, 0.0 fan efficiency grade
- 1 RTU-6 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 176 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 130 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 12.00 EER, Required Efficiency: 11.00 EER + 12.6 IEER
 Fan System: RTU-6 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 6 Supply, Constant Volume, 4000 CFM, 5.0 motor nameplate hp, 0.0 fan efficiency grade
- 1 RTU-7 (Single Zone):
 Heating: 1 each - Central Furnace, Gas, Capacity = 144 kBtu/h
 Proposed Efficiency = 80.00% E1, Required Efficiency: 80.00 % E1 or 80% AFUE
 Cooling: 1 each - Single Package DX Unit, Capacity = 114 kBtu/h, Air-Cooled Condenser, Air Economizer
 Proposed Efficiency = 12.00 EER, Required Efficiency: 11.00 EER + 12.6 IEER
 Fan System: RTU-7 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 7 Supply, Constant Volume, 3400 CFM, 3.7 motor nameplate hp, 0.0 fan efficiency grade
- 1 AHU-1 (Single Zone):
 Heating: 1 each - Central Furnace, Electric, Capacity = 19 kBtu/h
 No minimum efficiency requirement applies
 Cooling: 1 each - Packaged Terminal Unit, Capacity = 18 kBtu/h, Air-Cooled Condenser, Unknown Economizer
 Proposed Efficiency = 16.00 EER, Required Efficiency: 9.50 EER
 Fan System: AHU-1 - Compliance (Motor nameplate HP method) : Passes
 Fans:
 FAN 8 Supply, Constant Volume, 531 CFM, 0.3 motor nameplate hp, 0.0 fan efficiency grade

Mechanical Compliance Statement

Compliance Statement: The proposed mechanical design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed mechanical systems have been designed to meet the 2018 IECC requirements in COMcheck Version 4.1.5.5 and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title _____ Signature _____ Date _____

Project Title: _____ Report date: 06/30/23
 Data filename: Untitled.cck Page 2 of 18

GAS FIRED ROOFTOP UNIT SCHEDULE

ITEM#	AREA SERVED	NOMINAL TONS	FAN DATA				R-410A COOLING DATA (BTUH)				HEATING DATA (BTUH)				ELECTRICAL		WEIGHT (LBS.)	MODEL #	MANUFACTURER		
			C.F.M.	OUTSIDE AIR	H.P.	E.S.P.	TYPE	TOTAL	SENSIBLE	ENTERING AIR		EER/SEER	INPUT	OUTPUT	TEMP. RISE °F	NO. STAGES				VOLTS/PHASE	MCA/FUSE
										DB°F	WB°F										
RTU-1	SHOWROOM	7.5	3,000	633	2.4	1.0	BELT	96,400	67,200	77.3	65.3	12.0	180,000	144,000	44.4	2	460V/3Ø	22.8/25	1085	ZYG08E4B3AB1C321A4	JCI
RTU-2	SHOWROOM AND PARTS	6.0	2,600	370	2.9	1.0	BELT	74,300	53,600	75.7	64.3	12.0	125,000	100,000	35.6	2	460V/3Ø	18.8/25	909	ZYG07E4B1AB1C321A2	JCI
RTU-3	PARTS DEPT	3.0	1,200	210	2.4	1.0	BELT	40,600	26,700	76.9	64.9	15.0	112,000	90,000	69.4	2	230V/3Ø	23.9/30	627	ZYG04E2C1AB1C321A4	JCI
RTU-4	NEW CAR DELIVERY	3.0	1,200	360	2.4	1.0	BELT	41,000	27,500	78.7	66.1	15.0	112,000	90,000	69.4	2	460V/3Ø	12.9/15	627	ZYG04E2C1AB1C321A4	JCI
RTU-5	CUSTOMER AREA	5.0	2,000	520	2.9	1.0	BELT	64,600	45,900	78.7	66.5	15.0	112,000	90,000	41.7	2	460V/3Ø	16.5/20	736	ZYG06E4C1AB1C321A4	JCI
RTU-6	SERVICE	10.0	4,000	948	5.0	1.0	BELT	129,600	96,100	80.2	66.6	12.0	220,000	176,000	40.7	2	460V/3Ø	27.8/30	1113	ZYG12E4C3AB1C321A3	JCI
RTU-7	SERVICE	8.5	3,400	747	3.7	1.0	BELT	113,900	85,600	79.8	66.2	12.0	180,000	144,000	39.2	2	460V/3Ø	23.5/25	1085	ZYG09E4C3AB1C321A2	JCI

NOTES:

EXHAUST FAN SCHEDULE

ITEM#	AREA SERVED	C.F.M.	SONES	H.P./WATTS	FAN TYPE	E.S.P.	DRIVE TYPE	R.P.M.	ELECTRICAL DATA	CONTROL	WEIGHT (LBS.)	MODEL #	MANUFACTURER
EF-1	134 AIR / OIL	540	8.5	1/6 H.P.	ROOF	0.25"	BELT	1,412	115V/1Ø	24/7	40	89ACEB	COOK
EF-2,3,4	127 SHOP VENTILATION	1,650	10.7	1/4 H.P.	ROOF	0.25"	BELT	1,574	115V/1Ø	GAS PANEL	75	135ACEB	COOK
EF-5,6,7,8	125 SHOP VENTILATION	1,530	8.1	1/4 H.P.	ROOF	0.25"	BELT	1,725	115V/1Ø	GAS PANEL	75	135ACEB	COOK
EF-9	TECH RESTROOMS	530	8.5	1/6 H.P.	ROOF	0.25"	BELT	1,412	115V/1Ø	24/7	40	89ACEB	COOK
EF-10	CUSTOMER RESTROOMS	300	8.5	1/6 H.P.	ROOF	0.25"	BELT	1,412	115V/1Ø	24/7	40	79ACEB	COOK
EF-11	133 EV STORAGE	200	7.1	1/6 H.P.	ROOF	0.25"	BELT	1,257	115V/1Ø	24/7	40	79ACEB	COOK

- NOTES:
 1) 1/3 H.V.A.C. TIME CLOCK SHALL ALLOW FAN TO RUN CONTINUOUSLY DURING OCCUPIED TIMES.
 2) REVERSE-ACTING THERMOSTAT SHALL ENERGIZE FAN WHEN AMBIENT TEMPERATURE RISES ABOVE 85°F (ADJUSTABLE).
 3) FANS EF-1,2,3,4,5,6 SHALL BE INTERLOCKED WITH CO SENSOR/GAS CONTROL PANEL AND MANUAL ON/OFF OVERRIDE SWITCH.

DUCTLESS SPLIT SYSTEM HEAT PUMP SCHEDULE

ITEM#	AREA SERVED	INDOOR UNIT				OUTDOOR UNIT							
		TOTAL COOLING (MBH)	TOTAL HEATING (MBH)	FAN MAX CFM	WEIGHT (LBS)	MODEL #	MANUFACTURER	SEER	ELEC DATA	MCA/MOP	WEIGHT (LBS)	MODEL #	MANUFACTURER
DSS-1	IT ROOM 107	12	12	425	29	PKA-A12HA7	MITSUBISHI	18.5	208/1	11/28	99	PUZ-A12NK47	MITSUBISHI

- NOTES:
 1) RATED CAPACITY IS BASED ON INDOOR EAT OF 80°F DB/67°F WB.
 2) INDOOR UNITS SHALL BE POWERED FROM OUTDOOR UNITS WITH A SINGLE POINT CONNECTION.
 3) MAXIMUM REFRIGERANT PIPING LENGTH SHALL BE 100'.
 4) PROVIDE CONDENSATE PUMP OPTION.
 5) PROVIDE WALL MOUNTED REMOTE TEMPERATURE CONTROLLER, BY MANUFACTURER AND ASSOCIATES CONTROL WIRING BETWEEN INDOOR AND OUTDOOR UNITS.
 6) ELECTRICAL DISCONNECT BY EC.
 7) THERMAL OVERLOAD SWITCH FAN, HIGH PRESSURE SWITCH, OVER CURRENT PROTECTION INVERTER CIRCUIT.
 8) PROVIDE ALL REFRIGERANT VALVES, FILTERS AND ALL PIPING ACCESSORIES AS REQUIRED BY MANUFACTURER.

ELECTRIC HEATER SCHEDULE

ITEM#	AREA SERVED	TYPE	FAN DATA			HEATING DATA				ELECTRICAL DATA	WEIGHT (LBS.)	MOUNTING HEIGHT	MODEL #	MANUFACTURER
			C.F.M.	H.P.	R.P.M.	BTUH	KW	TEMP. RISE °F	NO. STAGES					
EH-1	135 SPRINKLER	WALL	100	1/100	-	16,378	4.8	27.0	1	277V/1Ø	25	8' A.F.F.	AWH4507F	BERKO
EH-2	134 AIR/OIL	UNIT	350	1/100	1,600	17,065	5.0	45.1	1	277V/1Ø	25	8'-0"	HUHA527	BERKO

NOTE:
 UNIT SHALL BE COMPLETE WITH FAN AND SAFTEY CONTROLS, 24-VOLT TRANSFORMER AND WALL MOUNTED THERMOSTAT.

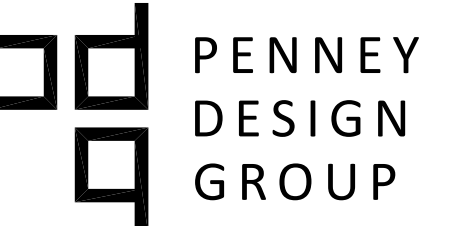
GAS FIRED INFRA-RED RADIANT TUBE HEATER SCHEDULE

ITEM#	AREA SERVED	REFLECTOR DATA			HEATING DATA (BTUH)		INTAKE/FLUE SIZE	CLEARANCES TO COMBUSTIBLES					ELECTRICAL DATA	WEIGHT (LBS.)	MINIMUM MOUNTING HEIGHT	MODEL #	MANUFACTURER
		OVERALL LENGTH	TUBE LENGTH	TUBE DIA.	NO. STAGES	INPUT (HIGH)		INPUT (LOW)	SIDES	ABOVE	BELOW	ENDS					
		22'-3"	20'-0"	4'Ø	2	75,000	50,000	4'Ø/4'Ø	24"	6"	60"	15"	12"	115V/1Ø	75	13'-0"	LTS-75
IRH-1	SERVICE DRIVE LANES																

- NOTES:
 1) FLUE/INTAKE PIPING SHALL BE CATEGORY III, TYPE 'B', WITH WALL CAP.
 2) UNITS SHALL BE COMPLETE WITH TWO STAGE GAS VALVE AND 2-STAGE THERMOSTAT.
 3) ALL UNITS SHALL BE COMPLETE WITH LIMIT SAFETY CONTROLS, BLOCKED VENT SHUTOFF, 24-VOLT TRANSFORMER AND ENERGY CUT-OFF DEVICE.

SPLIT SYSTEM HEAT PUMP AIR HANDLING UNIT SCHEDULE

ITEM #	AREA SERVED	FAN DATA				DX COOLING DATA (R410A)			HEAT PUMP HEATING DATA		INDOOR UNIT				OUTDOOR UNIT									
		C.F.M.	E.S.P.	H.P.	R.P.M.	C.F.M. O.A.	TOTAL BTU/HR.	SENS. BTU/HR.	# COIL ROWS	ENTERING AIR		ELECTRICAL DATA	MCA/ MOP	WEIGHT (LBS.)	MODEL	MANUFACTURER	SEER	ELECTRICAL DATA	MCA/ MOP	WEIGHT (LBS.)	MODEL #	MANUFACTURER		
										DB°F	WB°F												BTU/HR.	H.S.P.F.
AHU-1/CU-1	TECH AREA	531	0.15	-	MEDIUM	75	18,000	17,100	-	80	67	18,800	9.5	208V/1Ø	1 / 15	84	DHR18NDB21S	JCI	16.0	208V/1Ø	17 / 25	115	DHR18CSB21S	JCI



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M-601
 Sheet Title
MECHANICAL SCHEDULES

Project Number: IDC #23-010 File Name:

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-1

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
112 Showroom & Sales	2150	0.12	258	15	33	7.5	247.5	506	0.8	633	3000	0.22
TOTAL	2150		258		33		247.5	506		633	3000	0.22
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 635 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.93 Uncorrected Outdoor Air Intake = 505.5 Total required Outdoor Air V _{out} = 544 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-2

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
101 Showroom & Sales	1100	0.12	132	15	17	7.5	127.5	260	0.8	325	2300	0.15
102 F&I	125	0.06	8	5	1	5	5	13	0.8	17	150	0.12
103 F&I	108	0.06	7	5	1	5	5	12	0.8	15	100	0.15
105 Closet	30	0.12	4	0	0	0	0	4	0.8	5	0	0
106 Hall	91	0.06	6	0	0	0	0	6	0.8	8	50	0.16
TOTAL	1454		157		19		137.5	295		370	2600	0.16
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 370 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.99 Uncorrected Outdoor Air Intake = 294.5 Total required Outdoor Air V _{out} = 298 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-3

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
109 Storage	137	0.06	9	0	0	0	0	9	0.8	12	70	0.18
119 Retail Parts Counter	50	0.06	3	5	1	5	5	8	0.8	10	100	0.1
120 Mens Restroom	145	0	0	0	0	0	0	0	0.8	0	80	0
121 Womens Restroom	145	0	0	0	0	0	0	0	0.8	0	80	0
122 Parts Department	1055	0.12	127	0	0	0	0	127	0.8	159	600	0.27
123 Parts Manager	107	0.06	7	5	1	5	5	12	0.8	15	120	0.13
124 Tech Counter Parts	100	0.06	6	5	1	5	5	11	0.8	14	150	0.1
TOTAL	1739		152		3		15	167		210	1200	0.27
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 210 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.88 Uncorrected Outdoor Air Intake = 167 Total required Outdoor Air V _{out} = 190 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-4

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
104 New Car Delivery	610	0.12	74	15	10	7.5	75	149	0.8	187	1200	0.16
TOTAL	610		74		10		75	149		187	1200	0.16
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 360 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.99 Uncorrected Outdoor Air Intake = 149 Total required Outdoor Air V _{out} = 151 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-5

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
108 Conf/Break Room*	405	0.06	25	30	16	5	80	105	0.8	132	420	0.32
110 General Manager	114	0.06	7	5	1	5	5	12	0.8	15	80	0.19
111 Sales Manager*	206	0.06	13	5	3	5	15	28	0.8	35	225	0.16
113 Warranty	108	0.06	7	5	1	5	5	12	0.8	15	110	0.14
114 Customer Lounge/Cafe	437	0.06	27	30	14	5	70	97	0.8	122	350	0.35
115 Service Writers *	294	0.06	18	5	4	5	20	38	0.8	48	360	0.14
116 Service Manager	96	0.06	6	5	1	5	5	11	0.8	14	100	0.14
118 Customer Lounge	507	0.06	31	30	16	5	80	111	0.8	139	395	0.4
TOTAL	2167		134		56		280	414		520	2000	0.4
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 555 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.75 Uncorrected Outdoor Air Intake = 414 Total required Outdoor Air V _{out} = 552 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-6

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
125 Service	6120	0.12	735	0	0	0	0	735	0.8	919	3775	0.25
126 Special Tools	187	0.12	23	0	0	0	0	23	0.8	29	225	0.13
TOTAL	6307		758		0		0	758		948	4000	0.25
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 950 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.9 Uncorrected Outdoor Air Intake = 758 Total required Outdoor Air V _{out} = 843 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - RTU-7

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
127 Service Department	4970	0.12	597	0	0	0	0	597	0.8	747	3400	0.22
TOTAL	4970		597		0		0	597		747	3400	0.22
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE ROOFTOP UNIT WILL BE SET AT 750 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.93 Uncorrected Outdoor Air Intake = 597 Total required Outdoor Air V _{out} = 642 CFM												

2018 INTERNATIONAL MECHANICAL CODE - VENTILATION CHART - AHU-1

SPACE NAME	A _z (FT ²)	R _a AREA OUTDOOR AIR RATE (CFM/FT ²)	R _a A _z AREA OUTDOOR AIR (CFM)	OCCUPANT LOAD RATE (# PEOPLE / 1,000FT ²)	P ₂ TOTAL # OF PEOPLE	R _p OCCUPANT OUTDOOR AIR RATE (CFM/ PERSON)	R _p P ₂ OCCUPANT OUTDOOR AIR (CFM)	V _{bz} BREATHING ZONE OUTDOOR AIR (CFM)	E _z ZONE AIR DISTRIBUTION EFFECTIVENESS	V _{oz} ZONE OUTDOOR AIR	V _{sz} TOTAL SUPPLY AIR TO SPACE	Z _p OUTDOOR AIR FRACTION
128 Hall	74	0.06	5	0	0	0	0	5	0.8	7	20	0.35
129 Womens Tech RR	169	0	0	0	0	0	0	0	0.8	0	50	0
130 Tech Break Room *	225	0.06	14	30	8	5	40	54	0.8	68	215	0.32
131 Tech Lockers	177	0	0	0	0	0	0	0	0.8	0	50	0
132 Mens Tech RR	215	0	0	0	0	0	0	0	0.8	0	55	0
TOTAL	863		19		8		40	59		75	390	0.35
NOTES:												
1) * OCCUPANCY LOAD IS HIGHER THEN MINIMUM OCCUPANT LOAD.												
2) THE AIR HANDLING UNIT WILL BE SET AT 222 CFM OUTSIDE AIR.												
System Ventilation Efficiency E _v = 0.8 Uncorrected Outdoor Air Intake = 59 Total required Outdoor Air V _{out} = 74 CFM												



SCALE: 1/4"=1'-0"

MECHANICAL SPECIFICATIONS

SECTION 15010 - BASIC MECHANICAL REQUIREMENTS

- The work of each of the following sections includes furnishing and installing the material, equipment and systems complete as specified and/or indicated on the drawings. The installations, when finished, shall be complete and coordinated, ready for satisfactory service.
- All work under this contract shall be done in strict accordance with all applicable municipal, state, county, NFPA, International and local codes that govern each particular trade.
- The contractor shall make applications and pay all charges for all necessary permits, licenses and inspections as required under the above codes. Upon completion of the work, the customary certifications of approval shall be furnished. The contractor shall also coordinate and make all required submissions to the local utility companies as required.
- No materials or equipment shall be used in the work until approved. Before submission of the shop drawings, and not more than thirty (30) days after award of the contract, the contractor shall submit for approval, a complete list of all materials and equipment which he intends to furnish, giving manufacturer and catalog numbers. A complete list of proposed sub-contractors shall also be submitted.
- The contractor shall examine all drawings and specifications and shall visit the site and inspect the existing conditions in person. Certain areas may have been in-accessible at the time of the engineers survey and may only be visible during or after the demolition phase; therefore, those H.V.A.C. systems and coordination of those systems, shall become the responsibility of the contractors. Failure to comply with this requirement shall not relieve the contractors of their responsibilities for complying with the intent of the contract documents.
- The drawings indicate the general arrangement of the mechanical installations. Details of proposed departures due to actual field conditions or other causes shall be submitted for approval prior to installation. Reworking of completed items due to improper field coordination shall be at the contractor's expense.
- Provide sufficient access and clearance for all items of equipment requiring servicing and maintenance, such as valves, dampers, controls, drives, drains, vents, starters, switches, filters, traps and major items of equipment.
- The contractor shall perform all necessary cutting and patching as required to complete the installation of the all mechanical work. Patching of walls, floors, ceilings, roof, etc. shall match the adjacent surfaces.
- The contractor shall prepare three (3) copies of a record and information booklet. The booklet shall be bound in a three ring loose-leaf binder. Provide the following data in the booklet:
 - Catalog data on each piece of equipment furnished
 - Approved shop drawings on each piece of equipment furnished
 - Maintenance, operation and lubrication instruction on each piece of equipment furnished
 - Simplified temperature control diagrams of all H.V.A.C. systems
 - Manufacturer's and contractor's guarantees
 - Air balancing reports
 - Commissioning reports as required
 - Schedule/description of all service work/maintenance inspections required by the paragraphs of this section
- All parts of the heating, ventilating, air conditioning and exhaust systems shall be adjusted, checked, balanced and tested by an independent A.A.B.C. or N.E.B.B. certified testing and balancing contractor approved by the owner. The contractor shall put all systems and equipment into full operation, and shall test and balance all devices to within ten (10) percent of capacities indicated on the drawings. Submit copies of the balancing reports to the architect. Permanently mark the position of each balancing damper.
- Upon completion of the mechanical installations, the contractor shall provide a complete set of prints of the contract drawings which shall be legibly marked in red pencil to show all changes and departures of the installation as compared with the original design. They shall be suitable for use in preparation of as-built drawings.
- All new installations, including all materials and labor shall be guaranteed for a period of one (1) year from date of owner acceptance. The above shall not in any way void or abrogate equipment manufacturer's guarantee or warranty. Certificates of guarantee shall be delivered to the owner.
- Contractor shall also provide one (1) year free service to keep the equipment in operating condition. This service shall be provided and rendered upon request when notified of any equipment malfunction.
- In addition to the first year warranty period, the contractor shall provide, at no additional cost to the owner, a minimum of four (4) service calls and maintenance inspections. A complete outline of the required maintenance and the proposed schedule shall be included in a "record and information booklet", for review and acceptance by the owner/representative and engineer. The inspections are to be performed at three (3) month intervals for a total of four (4) service calls and inspections during the first year warranty period plus the original system start-up commissioning. The service work and inspections shall include, but not be limited to the following:
 - Replace all H.V.A.C. air filters before occupancy
 - Lubricate all motor and fan bearings as required
 - Clean drain pans and drain lines
 - Check and tighten all electrical connections as required
 - Inspect all belts for adjustment and condition, replace as required
 - Check operating pressures and refrigerant charge
 - Inspect all controls for correct operation and calibrate as required
 - Perform all maintenance as outlined in the equipment manufacturers operation and maintenance manuals. Upon completion of each scheduled inspection, the contractor shall deliver to the building owner or owners representative, within (48) hours of completion, two(2) copies of the completed inspection report for record purposes.
- The service contractor shall, at the ninth month, advise the owner of the termination date of the above services. This contractor shall also provide the owner with a detailed proposal, reflecting annual escalation, for the continuation of the services and inspections described above.

SECTION 15250 - MECHANICAL INSULATION

- All rectangular supply and return air ductwork shall be insulated with fiberglass insulation. All insulation shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-development index of not more than 50 when tested in accordance with ASTM E84.
- Ductwork shall be wrapped with nominal 2" thick glass fiber blanket insulation with 'installed' thermal conductivity 'K' value of 0.25 at 75°F mean temperature and thermal resistance 'R' value of 6.0 at 1-1/2" compressed thickness. Owens Corning "SOFTTR" fiberglass type 100 with foil faced vapor barrier. Insulation shall be neatly installed and suitable for 40°F-250°F duct temperatures.
- All exposed spiral supply air ductwork shall be Linx, double wall with standard 1" inner wall fiberglass insulation and self-sealing/gasketed joints, or approved equal.
- All refrigerant suction piping shall have 1" of armflex insulation. Liquid line piping shall not require insulation. All insulation exposed to weather shall be 100% coated with a "UV" inhibitor for protection from solar radiation.
- All interior duct lining shall be as specified under section 15590. All interior rectangular ductwork exposed within condition spaces may be provided with interior lining only, with no external duct wrap. Refer to drawings for additional notes. Interior lining shall not be used for ductwork system conveying wet/moist air (ie: shower rooms, dishwasher hoods, etc.).

SECTION 15500 - HEATING, VENTILATING & AIR CONDITIONING (HVAC)

- The work to be performed shall include all labor, materials and equipment necessary to furnish and install complete, all H.V.A.C. mechanical equipment as shown on drawings and/or hereinafter specified. It is the intent that the systems be installed complete with all items necessary to provide satisfactory service.
- All existing H.V.A.C. units serving the project areas shall be fully serviced including but not limited to: check/charge refrigerant, check/replace belts, change filters, check/clean heating and cooling coils, lubricate, rebalance, etc. and verify proper operation to ensure maximum capacity.
- All heating, ventilating and air conditioning equipment which contains compressors shall be provided with extended warranties covering the compressors for a minimum of four (4) years.
- Packaged Rooftop Heating/Cooling Units:**

All rooftop units shall be factory assembled, piped, internally wired and fully charged with R-410A refrigerant. Cooling and heating capacities shall be rated in accordance with AHRI standards and unit design shall be certified by the American Gas Association (AGA), specifically for outdoor applications using natural gas. All cooling units shall be Underwriters' Laboratory listed. All units shall be designed for outdoor rooftop level installation. Exterior surfaces of all units shall be phosphatized, zinc-coated steel with epoxy resin primer and baked enamel finish.

All casing panels shall be 20 gauge steel, gasketed and insulated with one (1) inch, one (1) pound density foil-faced glass fiber. Insulation shall be on the heat exchanger and evaporation section. Cabinet construction shall allow for all maintenance on one side of the unit.

Refrigeration cycle controls shall include condenser fan, evaporator fan and compressor contractor. Compressor shall be equipped with a combination internal winding thermostat/current overload. Internal high pressure relief shall also be provided. All units shall have direct drive, hermetic sealed compressors. Compressors shall be equipped with over temperature, over current and high pressure controls. Crank case heaters shall be standard on all models.

Evaporator coil shall be seamless copper tubing mechanically bonded to aluminum fins and shall be factory pressure and leak tested at 225 psig.

Both evaporator and condenser coil shall have drain pans. Evaporator pan shall be internally sealed and insulated. Threaded drain connection shall be provided in evaporator section with a drain opening in condensing section.

Condenser coil shall be seamless copper tubing mechanically bonded to aluminum fins. Each coil shall be factory pressure and leak tested at 425 psig.

Indoor air fan shall be belt/direct drive, forward curved, centrifugal type. Motor shall have thermal overload protection and permanently lubricated fan and motor bearings. Motor/blower assembly shall be isolated from unit with rubber mounts. Fans shall be capable of 2-speeds.

Condenser fan shall be direct-drive, statically and dynamically balanced, upflow propeller type. Weatherproofed permanent split capacitor fan motor shall have built-in thermal overload and permanently lubricated sleeve bearings.

Gas-fired heating section shall be completely assembled, wired and piped. Design shall be certified by AGA, specifically for outdoor application.

Electronic ignition system shall light pilot each time the thermostat calls for heat. Flame sensor shall prove pilot flame and turn on main burners. Should a loss of pilot flame occur the main valve shall close and the spark shall reoccur within 0.8 seconds. When the thermostat is satisfied, both pilot and main burner shall be extinguished.

Forced combustion blower shall insure flame stability under varying wind conditions and shall provide higher combustion efficiency and location flexibility.

Heat exchanger shall be aluminumized steel. Heat exchanger shall be factory tested for leaks, stress relieved and of free floating design. Heat exchanger shall be located upstream of the cooling coil for minimum condensation. Design shall be certified by AGA specifically for outdoor application. Burners shall be stamped and seam-welded with 20 gauge aluminumized steel.

Low ambient temperature operation shall be standard down to 40 degree F.

Each rooftop unit shall be complete with a factory supplied supply and return bottom discharge casing, full roof curb, convience outlet and enthalpy-controlled low-leakage economizer with barometer relief damper.

Units shall be as manufactured by York, Trane, Carrier or approved equal.

- Electric wall heaters:**
Wall heater shall be as manufactured by Berko or approved equal. Refer to drawings for capacities. Heater shall be complete with automatic reset thermal protection, metal sheath element, heavy duty concealed thermostat with disconnect, shaded 2-pole motor, anodized aluminum frame and shall be U.L. listed.
- Electric unit heaters:**
Unit heater shall be as manufactured by Berko or approved equal. Heaters shall be complete with automatic reset thermal protection, metal sheath element, heavy duty concealed thermostat with disconnect, shaded 2-pole motor, anodized aluminum frame and shall be U.L. Listed.
- Smoke detectors:**
Detectors shall be installed in the supply and return air ductwork for all system supplying equal or greater than 2,000 cfm of air and shall be U.L. 268A, NFPA 98A, NFPA 72 and FM approved and listed. They shall contain a photoelectric type detector and air sampling chamber with sampling tubes extending through the width of the air duct. Unit shall be System Sensor InnovalFlex series, photoelectric model D4120 (4 wire) or approved equal, with an ionization type detector and self-contained control unit.

Contractor shall provide and install a wall/ceiling mounted remote audible/visual alarm device with red trouble light and green power light, located in a public and visible location near the general area of the rooftop unit, which shall be System Sensor model APA151 or approved equal and compatible with smoke detector provided.

In areas where smoke detector maintenance and inspection is not easily accessible, contractor shall also provide a wall/ceiling mounted remote test/reset device (with key). Device shall be System Sensor model RTS151KEY or approved equal and compatible with smoke detector provided.

Coordinate installation of all detection devices with the controls contractor. Detectors connected to the building fire alarm system specified in Division 16-Electrical, shall be coordinated with the voltage and signal contact configuration.

SECTION 15880 - AIR DISTRIBUTION

- Furnish all labor and materials necessary to complete the sheet metal work associated with the heating, ventilating, air conditioning and exhaust systems, and other miscellaneous items shown and required.
- All supply, return, make-up air and exhaust ductwork shall be constructed and installed in accordance with the sheet metal and air conditioning contractors national association (SMACNA) standards and ASHRAE standards.
- Flexible ductwork shall be Hart & Cooley type F216 or approved equal. Flexible duct shall comply with NFPA bulletin 90A and shall be U.L. Listed as class 1 air duct and connectors, standard 181, with R-6 value insulation and microbial resistant. Maximum length of runout shall not exceed 6'-0".
- Support horizontal ducts with hangers spaced not more than six (6) feet apart. Use strap hangers for ducts up to thirty (30) inches wide, angle hangers or rods for ducts over thirty (30) inches wide. Strap hangers to be one (1) inch wide, 20 gauge minimum; fasten to sides and bottom of duct with sheet metal screws.
- Ducts shall be straight and smooth on the inside, with joints neatly finished. Ducts shall be suspended from the construction and shall be free from vibration. Curved elbows shall have a center radius equal to one and one-half (1-1/2) times the width of the duct. All square turns shall be vanned. Vanes consisting of curved metal blades shall permit the air to make abrupt turns without turbulence.
- All joints, seams and connections in the heating, ventilating, and air conditioning and exhaust system ductwork shall be sealed air tight. Sealant shall be as manufactured by Hard Cast Inc. or approved equal and shall consist of a mineral impregnated woven fiber tape and an actuator adhesive. Sealant shall be SMANCA and U.L. approved, with a flame spread of 10 and a smoke developed of 0, non-toxic and non-flammable. Sealant shall be approved for operating temperatures from 0 degrees F. to 200 degrees F. Sealant system shall be installed in strict accordance with the manufacturer's recommendations and when applied shall provide a permanent seal without any deterioration.
- All rectangular supply and return air ductwork within fifteen (15) feet of each air handling unit shall be lined on the interior for sound attenuation. Lining shall have a one (1) inch thickness and shall be glued with one hundred (100) percent coverage and additionally secured with pins. Increase duct sizes indicated two (2) inches direction to accommodate the interior lining. Dimensions shown on drawings are clear inside dimensions. Liner shall be a non-fibrous elastomeric thermal (and acoustical) material, closed cell, moisture resistant with anti-microbial agent. Material shall meet ASTM E84 25/50 fire rating (NFPA 99A & 90B), ASTM G 21 & 22, VOC guidelines, ASTM C 518, etc.. Lining shall be Nomaco K-Flex Gray, Evonikfoams Solcooustic or approved equal.
- Supply air diffusers shall have all steel construction with louvered face and finished with #26 off-white enamel. Titus model TMS, Metal-Aire, Krueger or approved equal.
- Supply air registers shall have all steel construction with 3/4" spaced, double deflection louvers, opposed blade damper and finished with #26 off-white enamel. Titus model 300F, Metal-Aire, Krueger or approved equal.
- Exposed spiral supply air ductwork registers shall have all steel construction supply air registers with 3/4" spaced, double deflection louvers, internal volume damper and finished with #26 off-white enamel. Linx model RGS-3 or approved equal.
- Return air grilles shall have all steel construction with 1/2" spaced louvers, 35 degree deflection and finished with #26 off-white enamel. Titus model 355R, Metal-Aire, Krueger or approved equal.
- Exhaust air registers shall have all steel construction with 1/2" spaced louvers, 35 degree deflection, opposed blade damper and finished with #26 off-white enamel. Titus model 355R, Metal-Aire, Krueger or approved equal.
- Motorized control dampers shall be low leakage extruded aluminum airfoil with a maximum of 3 cfm/sq.ft. leakage rate at 1" static pressure and shall be AMCA listed as a Class 1A damper. Damper shall be Ruskin CD-50 or approved equal. Actuator shall be 120 VAC, with fail safe spring return and brushless DC motor
- Roof mounted exhaust fans shall be designed for roof mounted applications with factory curb. Housing shall be spun aluminum with a non overloading backward inclined wheel. Motors shall be located out of air stream with positive cooling by ambient air. Unit shall be complete with disconnect switch, roof curb, back draft damper, starter and vibration isolators for entire motor and drive assembly. Unit shall be as manufactured by Cook or approved equal.

SECTION 15950 - CONTROLS

- The controls contractor under this heading shall furnish and install all wiring and equipment necessary for a complete operational system including: automatic temperature controls, ventilation systems, exhaust systems, economizer systems, etc. as indicated on the drawings. The system shall include all necessary thermostats, relays, switches, transformers, contactors, etc. required for successful operation of all equipment as described in the sequence operations. Electrical work in connection with all control systems shall be performed by the controls contractor and coordinated with the electrical contractor as needed to provide a full and complete package.
- Each rooftop unit shall be controlled by a wall mounted Honeywell model T-7350 heating/cooling thermostat with a (7) day/(24) hour program clock capable of (2) occupied/non-occupied periods, with (2) heating/(2) cooling setpoints, remote temperature sensor capability (up to 9') and auxiliary contact for Honeywell economizer controls. Thermostat assembly shall be compatible with the air handling unit's economizer and/or accessory package as specified under section 15590. Coordinate control requirements with the proposed equipment. Dual heating/ cooling thermostats shall have a minimum 5 degree deadband.
- The controls contractor shall be responsible for the commissioning of the project (as required) to assure a fully functional, fine-tuned H.V.A.C. system upon occupancy. The commissioning of the project shall be performed in accordance with ASHRAE guidelines and shall be defined as verification of the proper operation of all equipment, alarms, safeties, controls and any energy management systems serving the mechanical systems installed or modified on this project. Proper operation is defined as the activation of all controls, field or factory installed, to assure the correct sequencing of equipment and systems, including activation of all operating and safety controls, as hereinbefore described. The controls contractor shall report all system deficiencies to the general contractor, who shall instruct the proper trade to correct any deficiencies.

SECTION 15990 - TESTING, ADJUSTING AND BALANCING

- Perform testing, adjusting, and balancing, using the services of an independent testing and balancing agency regularly engaged in the testing and balancing of air and water systems and associated equipment and piping systems. The agency selected shall be a certified member of the Associated Air Balance Council (AABC). The agency shall be independent of the installing personnel or equipment supplier for this project.
- Work shall be performed in accordance with the agenda specified herein. Procedures and methods specified herein shall be followed and, if not specifically specified herein, shall be performed in accordance with the AABC MN-1; NEBB Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems; SMACNA HVAC Systems Testing, Adjusting and Balancing; ASHRAE Handbook, HVAC Applications; and ASHRAE Handbook, HVAC Systems and Equipment.
- Prior to beginning work, submit to Engineer the following:
 - Instrument Calibration Data showing instruments to be used in TAB work and date calibrated. Instruments shall be calibrated within 12 months of beginning work.
 - Sample forms if those being used are not standard forms of NEBB or AABC.
 - Certification certificates of NEBB or AABC certified professional signing the TAB report.
- Projects involves existing equipment and conditions. Contractor shall visit the site before beginning work to investigate issues with existing work.
- Prior to beginning TAB work, each piece of equipment shall be cleaned and filters replaced. Testing and balancing shall not begin until each system has been completed and is in full working order. Put all heating, ventilating, and air-conditioning systems and equipment, including controls, into full operation and continue the operation of the systems during each working day of testing and balancing.
- Prior to beginning TAB work, inspect HVAC system installation. Note any issues or deficiencies that would prevent successful Testing, Adjusting, and Balancing of the HVAC systems and notify the Engineer.
- Airflows for supply air and return systems shall be adjusted to within +/- 10%. Airflows for outside air and Exhaust systems shall be adjusted to within -5% to +10%. Water flows for water systems shall be balanced to +/- 5%. Other quantities being adjusted shall be per NEBB or AABC standards.
- The TAB report shall be submitted to the engineer for approval. The report shall include, at a minimum, the following information:
 - Deficiencies found during Testing, Adjusting, and Balancing
 - Equipment
 - Installation Date - For new equipment
 - Equipment Tag/Name
 - Capacity
 - Model Number and Serial Number
 - Electrical Data - Voltage, Amperage, Horsepower
 - Area in Building Served
 - Airflow
 - Total Static Pressure / External Static Pressure
 - RPM
 - Brake Horsepower / Amperes
 - Entering Air Temperature
 - Leaving Air Temperature
 - Outdoor Air Temperature
 - Air outlets
 - Plan with outlet identification marked up
 - Room served
 - Outlet identification
 - Design and recorded velocities
 - Design and recorded CFM's
- TAB Contractor shall assist in resolving deficiencies identified in TAB work and Engineer's review of TAB report.
- Following final approval of Certified Reports by the Engineer, the settings of all valves, dampers, and other adjustment devices shall be permanently marked by the Contractor so that adjustment can be restored if disturbed at any time Devices shall not be marked until after final acceptance.



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