GENERAL MECHANICAL NOTES:

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE CURRENT 2021 UNIFIED VIRGINIA BUILDING CODE, ALL FEDERAL, STATE, AND CITY CODES, ORDINANCES, AND STANDARDS.
2. PROVIDE OPERATION AND MAINTENANCE MANUALS FOR ALL NEW EQUIPMENT TO OWNER.
3. ALL WORK PROVIDED UNDER THIS CONTRACT SHALL BE PROVIDED WITH A 1-YEAR WARRANTY.
4. IT IS THE INTENT OF THESE DOCUMENTS THAT THE CONTRACTOR PROVIDE ALL LABOR, MATERIAL, EQUIPMENT AND TOOLS FOR THE COMPLETE INSTALLATION OF ALL WORK SHOWN ON THE PLANS AND/OR DESCRIBED HEREIN, INCLUDING ALL DEVISES AND CONTROLS REQUIRED TO PROVIDE A COMPLETE AND FUNCTIONING SYSTEM.
5. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE. NOT ALL FITTINGS, OFFSETS, VENTS, OR DRAINS ARE SHOWN. THE CONTRACTOR SHALL INCLUDE ALL OFFSETS, VENTS, AND DRAINS AS REQUIRED FOR A FULLY FUNCTIONING SYSTEM.
6. IN AREAS WITH UNFINISHED CEILINGS, DUCTWORK AND PIPING SHALL BE ROUTED AS TIGHT TO THE STRUCTURE AS POSSIBLE.
7. ENSURE MECHANICAL EQUIPMENT IS INSTALLED TO PROVIDE SUFFICIENT CLEARANCE FOR COIL PULL, AND MINIMUM MANUFACTURER RECOMMENDED MAINTENANCE ACCESS TO EQUIPMENT.
8. ALL SUPPLY AIR DIFFUSERS, RETURN, AND EXHAUST GRILLES SHALL BE INSTALLED WITH BALANCING DAMPER LOCATED IN DUCT RUN OUT. DIFFUSERS AND GRILLES SHALL HAVE AN OPPOSED BLADE DAMPER ONLY WHEN DUCT DAMPERS ARE INACCESSIBLE.
9. ALL PIPING SHALL BE LABELED FOR ITS USAGE. ALL EQUIPMENT SHALL BE PROVIDED WITH AN ENGRAVED EQUIPMENT TAG.
10. ALL DUCTWORK CONSTRUCTION AND INSTALLATION SHALL COMPLY WITH THE LATEST EDITION OF THE SMACNA DUCT CONSTRUCTION HANDBOOK. DUCTWORK SHALL BE CONSTRUCTED OF GALVANIZED METAL.
11. DUCT INSULATION SHALL BE IN COMPLIANCE WITH THE 2021 IECC STANDARDS AND SHALL BE FIBERGLASS INSULATION, 1.0 LB. DENSITY, 0.27 BTUIN./SQ.FT./°F/HR. MAXIMUM "K" VALUE AT 75°F, WITH FACTORY APPLIED REINFORCED ALUMINUM FOIL VAPOR BARRIER. ALL SUPPLY DUCTWORK SHALL BE INSULATED AS WELL AS OUTSIDE AIR AND EXHAUST DUCTWORK FROM LOUVER TO ERV.
12. PROVIDE CAULKED SEAL AROUND ALL DUCT AND/OR PIPING PENETRATIONS THROUGH NON RATED FULL HEIGHT WALLS TO MINIMIZE SOUND TRANSFER.
13. PROVIDE ALL SUPPLY AIR SYSTEMS WITH A MINIMUM MERV 8 FILTER, UNLESS NOTED OTHERWISE. PROVIDE TEMPORARY AIR FILTERS IN AIR HANDLER UNITS AND RETURN AIR INLETS AND GRILLES DURING CONSTRUCTION AND REPLACE AT COMPLETION. FILTERS SHALL BE INSTALLED SUCH THAT THEY ARE ACCESSIBLE FOR REPLACEMENT AND LOCATED PRIOR TO ANY HEATING OR COOLING COILS.
14. FOR THE AIR CONDITIONING, HEATING AND VENTILATION SYSTEMS THE CONTRACTOR SHALL PROVIDE ALL SERVICES FOR TOTAL SYSTEM AIR TESTING AND BALANCING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING CHANGES IN PULLEYS, BELTS AND DAMPERS WHERE NECESSARY TO OBTAIN THE REQUIRED AIR VOLUME. THE CONTRACTOR SHALL PROVIDE ALL LABOR, ENGINEERING AND TEST EQUIPMENT REQUIRED TO ADJUST, TEST AND BALANCE ALL HEATING, VENTILATING, AIR CONDITIONING AND EXHAUST SYSTEMS. ALL PERSONNEL INVOLVED IN THE WORK SHALL BE EXPERIENCED AND TRAINED SPECIFICALLY IN THE TOTAL BALANCING OF MECHANICAL SYSTEMS. PROVIDE TYPED REPORT TO OWNER/ENGINEER FOR APPROVAL.

General Multizone

Standard Case: 2021 VA Mechanical Code Ventilation Rate Procedure

Zone	Occupancy Category	Area of Zone (sf) **Az**	People Outdoor Air Rate (CFM/person) **Rp**	Table 403.3.1.1 Area Outdoor Air Rate (CFM/SF) **Ra**	Occupancy Density (#/1000 sf)	Number of Occupants Calculated from Occupancy Density **Pz**	People Outdoor Air Flow Rate Required in this Zone **Rp*Pz**	Area Outdoor Air Flow Rate Required in this Zone **Ra*Az**	Breathing Zone Outdoor Air Flow Required in this Zone (CFM) **Vbz** =Rp*Pz+Ra*Az	Table 6-2 Zone Air Distribution Effectiveness **Ez**	Zone Outdoor Air Flow Required in this Zone (CFM) **Voz** =Vbz/Ez	Zone Primary Air Flow (Minimum VAV position if VAV System) (CFM) **Vpz**	Zone Primary Outdoor Fraction in this Zone **Zp** =Voz/Vpz	Exhaust
110 - Mechanical	Storage	219	0	0.06	0	-	-	13	13	1	13	175	0.08	-
108 - Classroom	Classroom	252	10	0.12	35	8.8	88	30	118	1	118	300	0.39	-
107 - Classroom	Classroom	195	10	0.12	35	6.8	68	23	92	1	92	250	0.37	-
106 - Classroom	Classroom	195	10	0.12	35	6.8	68	23	92	1	92	250	0.37	-
105 - Classroom	Classroom	195	10	0.12	35	6.8	68	23	92	1	92	250	0.37	-
104 - Classroom	Classroom	195	10	0.12	35	6.8	68	23	92	1	92	250	0.37	-
103 - School Office	Office Space	121	5	0.06	5	0.6	3	7	10	1	10	100	0.10	-
100 - Vestibule	Corridor	54	0	0	0	0	0	0	0	1	0	0	0.00	-
101 - Lobby	Lobby	777	5	0.06	10	8	39	47	85	1	85	825	0.10	-
116 - Yoga Studio	Fitness	514	20	0.06	10	5.1	103	31	134	1	134	400	0.33	-
102 - Hall	Corridor	695	0	0.06	0	0	0	42	42	1	42	550	0.08	-
115 - Electrical Room	Storage	81	0	0.12	0	0	0	10	10	1	10	DUCT TRANSFER	0.00	-
112 - Womens Restroom & 111 - WUDU	Toilet Room	392	-	-	-	-	-	-	-	1	-	-	-	350
113 - Mens Restroom & 114 - WUDU	Toilet Room	456	-	-	-	-	-	-	-	1	-	-	-	400
113A - Cust closet	storage	20	0	0.12	0	0	0	2	2	1	2	0	0.00	
112A - Cust closet	storage	20	0	0.12	0	0	0	2	2	1	2	0	0.00	
		4381				**49.6**					**784**			

Resulting O/A CFM required for RTU-1 Serving these zones

General Single Zone System

Standard Case: 2021 VA Mechanical Code Ventilation Rate Procedure

Zone	Occupancy Category	Area (sf) **Az**	People Outdoor Air Rate (CFM/person) **Rp**	Table 403.3.1.1 Area Outdoor Air Rate (CFM/SF) **Ra**	Occupancy Density (unless known) (#/1000 sf)	Number of Occupants (If Known) **Pz**	Number of Occupants Calculated from Occupancy Density **Pz**	People Outdoor Air Flow Rate **Rp*Pz**	Area Outdoor Air Flow Rate **Ra*Az**	Breathing Zone Outdoor Air Flow (CFM) **Vbz** =Rp*Pz+Ra*Az	Table 6-2 Zone Air Distribution Effectiveness **Ez**	Zone Outdoor Air Flow (CFM) **Voz** =Vbz/Ez	Zone Outdoor Air Flow for Single Zone System **Vot** = Voz
214 - Multi-Purpose	GYM/PLAY AREA	5797	20	0.18	7	-	40.6	811.6	1043.5	1855.0	1	1855	1855
211 - Storage	Storage	190	0	0.12	0	0	0.0	0.0	15.2	15.2	1	15	15
214A - Storeage	Storage	341	0	0.12	0	0	0.0	0.0	27.3	27.3	1	27	27
							41					1898	

Resulting O/A CFM required for RTU-2 Serving these zones.

General Multizone

Standard Case: 2021 VA Mechanical Code Ventilation Rate Procedure

Zone	Occupancy Category	Area of Zone (sf) **Az**	People Outdoor Air Rate (CFM/person) **Rp**	Table 403.3.1.1 Area Outdoor Air Rate (CFM/SF) **Ra**	Occupancy Density (unless known) (#/1000 sf)	Number of Occupants Calculated from Occupancy Density **Pz**	People Outdoor Air Flow Rate Required in this Zone **Rp*Pz**	Area Outdoor Air Flow Rate Required in this Zone **Ra*Az**	Breathing Zone Outdoor Air Flow Required in this Zone (CFM) **Vbz** =Rp*Pz+Ra*Az	Table 6-2 Zone Air Distribution Effectiveness **Ez**	Zone Outdoor Air Flow Required in this Zone (CFM) **Voz** =Vbz/Ez	Zone Primary Air Flow (Minimum VAV position if VAV System) (CFM) **Vpz**	Zone Primary Outdoor Fraction in this Zone **Zp** =Voz/Vpz	Exhaust
213 - Imans Office	Office Space	143	5	0.06	5	0.7	4	9	9	1	9	150	0.06	-
204 - Library/Conference	Conf. Room	341	5	0.06	50	17.1	85	20	106	1	106	500	0.21	-
205 - Womens Lounge	Breakroom	452	5	0.06	10	4.5	23	27	50	1	50	500	0.10	-
206 - Aux. Classroom	Classroom	193	10	0.12	35	6.8	68	23	91	1	91	300	0.30	-
207 - VT Student Lounge	Breakroom	553	5	0.06	10	5.5	28	33	61	1	61	975	0.06	-
203 - Hall	Corridor	645	0	0.06	0	0.0	0	39	39	1	39	600	0.06	-
212 - Men's Restrooms	toilet room	112	0	0	0	0.0	0	0	0	1	0	100	0.00	150
210 - Women's Restrooms	toilet room	112	0	0	0	0.0	0	0	0	1	0	10	0.00	150
201 - Lobby	Lobby	1439	5	0.06	10	14	72	86	158	1	158	1200	0.13	-
		3990				**49**					**513**			

Resulting O/A CFM required for RTU-3 Serving these zones

HVAC LEGEND

DUCTWORK

- SUPPLY AIR DUCT, (RECTANGULAR)
- RETURN AIR DUCT, (RECTANGULAR)
- T — TEMPERATURE SENSOR
- H — HUMIDITY SENSOR
- 12x6 — RECTANGULAR DUCTWORK (1ST FIG. SIDE SHOWN, 2ND SIDE NOT SHOWN)
- 12"Ø — ROUND DUCTWORK
- FLEXIBLE DUCT, (ROUND)
- CEILING DIFFUSER (RECTANGULAR)

AIR DEVICE TAG

100 / 12 - A - 3 — 100 = AIRFLOW (CFM); 12 - A - 3 = INLET SIZE - TAG - # OF THROW DIRECTIONS

24-B — INLET SIZE - TAG (RETURN ONLY)

EQUIPMENT TAG

AHU-1 — EQUIPMENT TYPE ABREVIATION; UNIT MARK #

EQUIPMENT TAG

AHU / 1 — EQUIPMENT TYPE ABREVIATION; UNIT MARK #

- MVD, MANUAL VOLUME DAMPER
- M — MOTORIZED CONTROL DAMPER

AIR BALANCE SCHEDULE

OUTDOOR AIR		EXHAUST AIR		PRESSURIZATION ANAYSIS	
UNIT ID	CFM	UNIT ID	CFM		CFM
RTU-1	800	EF-1	800	TOTAL OUTDOOR AIR	4,430
RTU-2	1,930	EF-2	300	TOTAL EXHAUST AIR	2,865
RTU-3	600	EF-3	500	BLDG. PRESSURIZATION	+1,565
MUA-1	1,100	HEF-1	1,265	FIRST FLOOR PRESS.	+0
				SECOND FLOOR PRESS.	+1,565
TOTAL	4,430	TOTAL	2,865		

CODE COMPLIANCE

1.	GOVERNING CODES & REGULATIONS	2021 VIRGINIA CONSTRUCTION CODE (IBC 2021 AMENDED)
		2021 VIRGINIA EXISTING BUILDING CODE (IEBC 2021 AMENDED)
		2021 VIRGINIA MECHANICAL CODE (IMC 2021 AMENDED)
		2020 VIRGINIA ELECTRICAL CODE (NFPA 70, 2020 AMENDED)
		2021 VIRGINIA PLUMBING CODE (IPC 2021 AMENDED)
		2021 VIRGINIA FUEL GAS CODE (IFGC 2021 AMENDED)
		2021 VIRGINIA ENERGY CONSERVATION CODE

DRAWING INDEX

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MECHANICAL OVERVIEW SHEET

ISNRV BUILDING EXPANSION
Blacksburg, VA

COMMONWEALTH OF VIRGINIA
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10/28/2024
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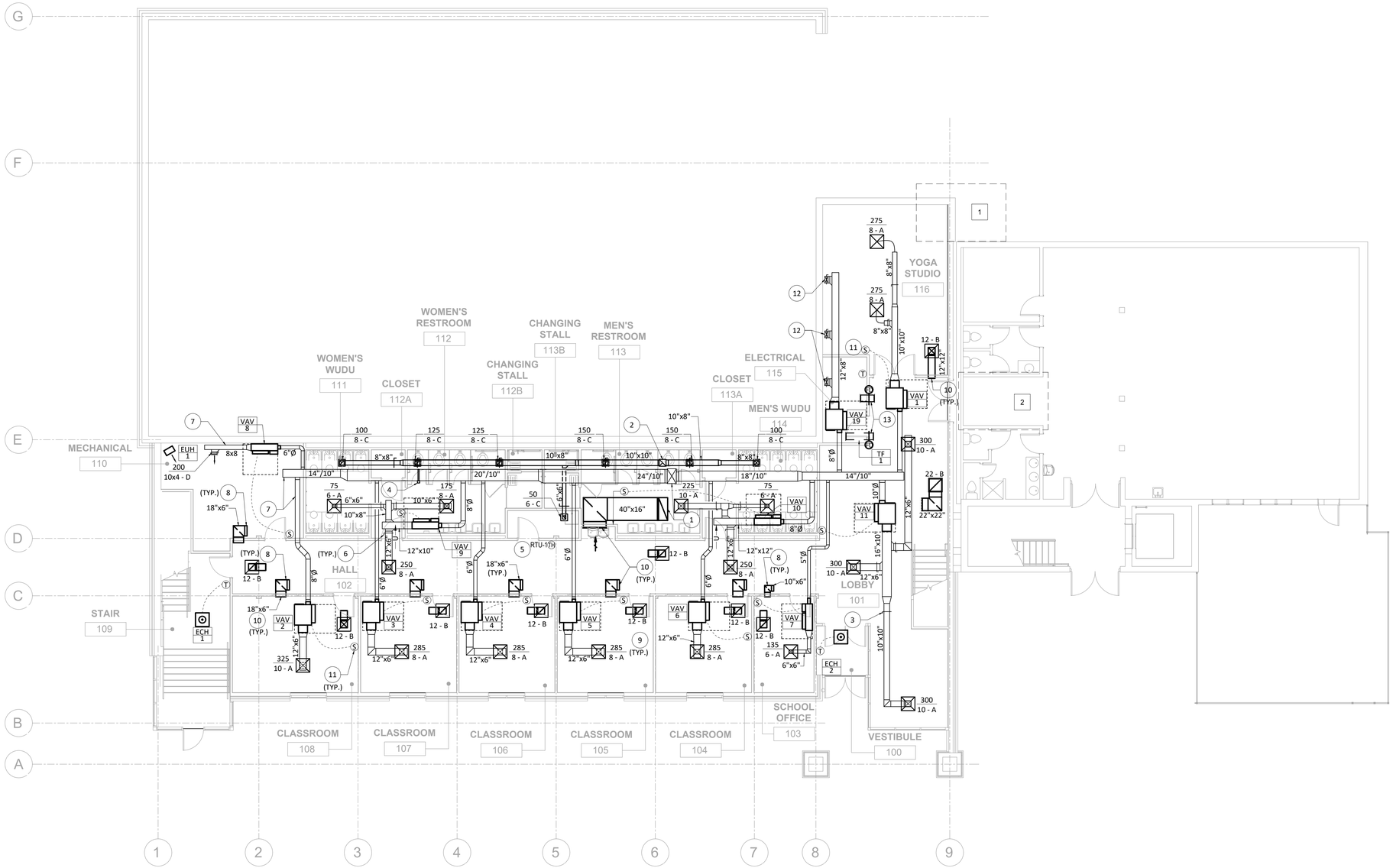

1 M100 MECHANICAL FIRST FLOOR PLAN

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

GENERAL NOTES:

1. COORDINATE ALL ROOF OPENINGS WITH STRUCTURAL DRAWINGS.
2. ALL DUCTWORK SHALL BE RUN TIGHT TO THE STRUCTURE ABOVE UNLESS OTHERWISE NOTED.
3. DUCT AND FLEX DUCT RUNOUTS SHALL BE EQUAL TO DIFFUSER NECK SIZE.
4. REFER TO VAV BOX SCHEDULE FOR VAV BOX INLET DUCT SIZES.
5. COORDINATE SUPPLY & RETURN AIR DEVICES WITH ARCHITECTURAL AND ELECTRICAL REFLECTED CEILING PLANS.
6. REFER TO ARCHITECTURAL PLANS FOR ANY ROOM NAMES NOT SHOWN.

KEYED NOTES: (X)

1. SUPPLY AND RETURN DOWN FROM ABOVE.
2. EXHAUST DOWN FROM ABOVE.
3. BALANCING DAMPER LOCATED IN AN ACCESSIBLE LOCATION (TYPICAL).
4. PROVIDE DUCT STATIC PRESSURE PROBE AND TUBING. CONNECT TO TRANSDUCER AT RTU PROVIDED BY MANUFACTURER. PROVIDE FITTING AT SUPPLY DUCT PENETRATION SO TUBE DOESN'T KINK.
5. PROVIDE NEW COMBINATION THERMOSTAT/RELATIVE HUMIDITY SENSOR ON WALL AT 5'-0" A.F.F. COORDINATE EXACT LOCATION WITH CLIENT AND BUILDING CONDITIONS.
6. PROVIDE CABLE OPERATED BALANCING DAMPER WHERE DAMPER IS LOCATED ABOVE GYP. BOARD CEILING.
7. EXPOSED DUCTWORK, GRILLES, REGISTERS, AND DIFFUSERS TO BE FIELD PAINTED. REFER TO ARCHITECTURAL DRAWINGS FOR FURTHER INFORMATION.
8. TRANSFER AIR DUCT INTERNALLY LINED.
9. RETURN AIR GRILLE WITH PLENUM RETURN. SEE DETAIL ON SHEET M300. DUCTWORK SHALL BE SAME SIZE AS RETURN GRILL NECK.
10. COVER OPEN END OF DUCT WITH 1/2" x 1/2" WIRE MESH SCREEN (WMS).
11. PROVIDE TEMPERATURE SENSOR LOCATED 5'-0" A.F.F. COORDINATE EXACT LOCATION WITH CLIENT AND BUILDING CONDITIONS.
12. 12"x8" SUPPLY DUCT UP TO FLOOR REGISTER ON FLOOR ABOVE (TYPICAL).
13. 12"x12" DUCT. PROVIDE FIRE DAMPER. COVER OPEN END DUCTWORK WITH 1/2" x 1/2" WMS.

MECHANICAL DEMO NOTES :

1. REMOVE ALL EXISTING HVAC SYSTEM SERVING EXISTING STORAGE ROOM BEING REMOVED.
2. REMOVE ALL MECHANICAL AIR DEVICES AND DUCTWORK SERVING EXISTING WUDU BEING REMOVED. DEMO BACK TO MAINS AND CAP.

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MECHANICAL FIRST FLOOR PLAN

ISNRV BUILDING EXPANSION
Blacksburg, VA

COMMONWEALTH OF VIRGINIA
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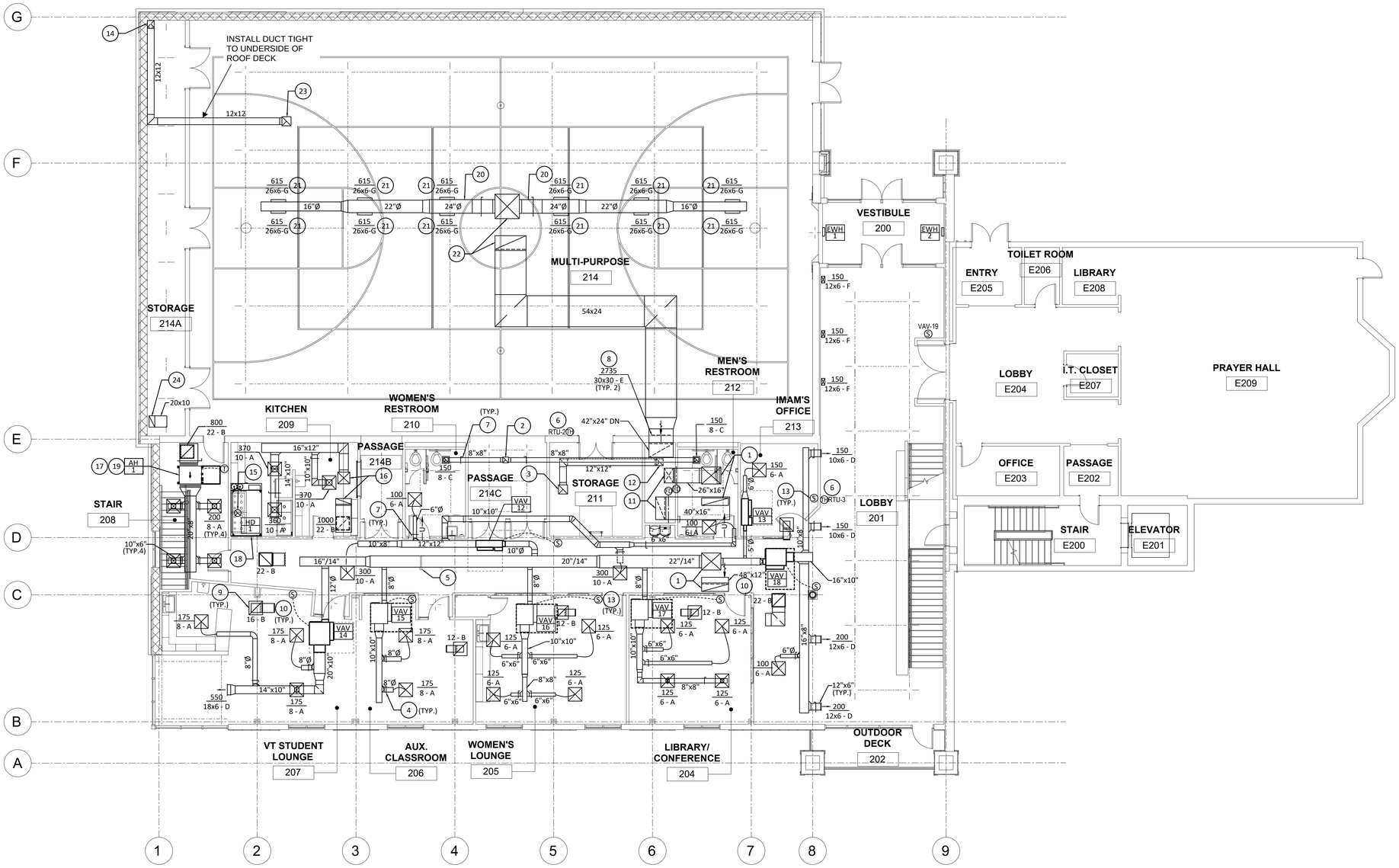

MECHANICAL SECOND FLOOR PLAN

1 M101 SCALE = 1/8"=1'-0"

GENERAL NOTES:

1. COORDINATE ALL ROOF OPENINGS WITH STRUCTURAL DRAWINGS.
2. ALL DUCTWORK SHALL BE RUN TIGHT TO THE STRUCTURE ABOVE UNLESS OTHERWISE NOTED.
3. REFER TO VAV BOX SCHEDULE FOR VAV BOX INLET DUCT SIZES.
4. COORDINATE EXACT SUPPLY & RETURN AIR DEVICE LOCATIONS WITH ARCHITECTURAL AND ELECTRICAL REFLECTED CEILING PLANS.
5. REFER TO ARCHITECTURAL PLANS FOR ANY ROOM NAMES NOT SHOWN.
6. THE NEBB CERTIFIED CONTRACTOR IS RESPONSIBLE FOR BALANCING AIR QUANTITIES AS SHOWN ON THE PLANS FOR THE HVAC EQUIPMENT.
7. ALL DUCTWORK AND EQUIPMENT LAYOUTS ARE DIAGRAMMATIC AND INTEND TO SHOW A GENERAL ARRANGEMENT AND CONNECTION POINTS. ALL ELEVATIONS AND OFFSETS ARE NOT NECESSARILY SHOWN. CONTRACTOR SHALL COORDINATE WITH ALL BUILDING SYSTEMS TO PERFORM THE NEW WORK. FURNISH NECESSARY OFFSETS, AVOID CONFLICT WITH OTHER SYSTEMS AND BUILDING STRUCTURE.
8. ALL EXPOSED SUPPLY AND MAKE-UP AIR DUCTWORK SHALL BE INTERNALLY INSULATED PER THE SPECIFICATIONS.
9. ALL EXHAUST DUCTS FOR THE HOODS SHALL BE CONSTRUCTED USING RADIUS ELBOWS ONLY. NO TEES OR SHARP 90-DEGREE BENDS WILL BE ALLOWED.
10. ALL BLACK IRON GREASE EXHAUST DUCTS SHALL BE INSULATED WITH (2) LAYERS OF 1-1/2" FIRE BARRIER DUCT WRAP BY 3M OR EQUIVALENT MANUFACTURER.

KEYED NOTES: (X)

1. SUPPLY AND RETURN DUCT UP TO ROOFTOP UNIT (RTU) ON ROOF ABOVE. PROVIDE TRANSITIONS AS REQUIRED.
2. 10"x10" EXHAUST UP TO EF ON ROOF ABOVE. PROVIDE ALL NECESSARY TRANSITIONS AND FITTINGS AS REQUIRED.
3. 16"x16" EXHAUST UP TO EF ON ROOF ABOVE. PROVIDE ALL NECESSARY TRANSITIONS AND FITTINGS AS REQUIRED.
4. BALANCING DAMPER LOCATED IN AN ACCESSIBLE LOCATION.
5. PROVIDE DUCT STATIC PRESSURE PROBE AND TUBING. CONNECT TO TRANSDUCER AT RTU PROVIDED BY MANUFACTURER. PROVIDE FITTING AT SUPPLY DUCT PENETRATION SO TUBE DOESN'T KINK.
6. PROVIDE NEW COMBINATION THERMOSTAT/RELATIVE HUMIDITY SENSOR ON WALL AT 5'-0" A.F.F. COORDINATE EXACT LOCATION WITH CLIENT AND BUILDING CONDITIONS.
7. PROVIDE CABLE OPERATED BALANCING DAMPER WHERE DAMPER IS LOCATED ABOVE GYP. BOARD CEILING.
8. (2) LOW WALL HEAVY DUTY GYM RETURN GRILLES STACK VERTICALLY. BOTTOM GRILLE SHALL BE AT LEAST 1'-0" ABOVE FINISHED FLOOR.
9. RETURN AIR GRILLE WITH PLENUM RETURN. SEE DETAIL ON SHEET M300.
10. COVER OPEN END OF DUCT WITH 1/2" x 1/2" WIRE MESH SCREEN (WMS).
11. SUPPLY AND RETURN DOWN IN CHASE TO THE FLOOR BELOW.
12. EXHAUST DUCT DOWN IN CHASE TO THE FLOOR BELOW.
13. PROVIDE TEMPERATURE SENSOR LOCATED 5'-0" A.F.F. COORDINATE EXACT LOCATION WITH CLIENT AND BUILDING CONDITIONS.
14. 12x12 EXHAUST DUCT DOWN TO BELOW CEILING OF STORAGE ROOM 214A. TERMINATE EXHAUST DUCTWORK JUST BELOW CEILING AND COVER OPEN END WITH WMS.
15. 12"Ø WELDED 16 GAUGE BLACK IRON DUCT FROM KITCHEN HOOD UP THRU ROOF TO HOOD EXHAUST FAN (HEF-1), REFER TO CAPTIVEAIRE DETAILS SHEET M-500 THRU M-502 FOR GREASE DUCT CONSTRUCTION. PROVIDE NECESSARY TRANSITION TO ROOF CURB. MAINTAIN 18 INCH CLEARANCE TO COMBUSTIBLES OR INSULATE WITH A U.L. APPROVED GREASE DUCT INSULATION. PROVIDE ACCESS DOORS AND CLEANOUTS AS REQUIRED BY CODE.
16. FULL SIZE SUPPLY & RETURN DUCTS DOWN FROM MUA ON ROOF ABOVE.
17. PROVIDE REFRIGERANT PIPING (LIQUID & GAS) TO/FROM INDOOR AIR HANDLER UP TO ASSOCIATED OUTDOOR UNIT ON ROOF. ROUTE AND SIZE REFRIGERANT PIPING PER MANUFACTURER RECOMMENDATIONS.
18. REFER TO DRAWINGS M500 AND M501 FOR KITCHEN HOOD DETAILS, SCHEDULES, AND SPECIFICATIONS.
19. PROVIDE CONDENSATE PUMP. ROUTE 1" CONDENSATE DRAIN TO NEAREST BUILDING DRAIN OR THRU EXTERIOR WALL AND DOWN TO SPILL ON GRADE. PROVIDE SPLASH BLOCK.
20. BOTTOM OF LARGEST DUCT AT 21FT AFF. ALL TRANSITIONS SHALL BE SYMMETRICAL.
21. INSTALL SUPPLY REGISTERS AT 45° DOWN FROM HORIZONTAL. ADJUST BLADES FOR EVEN DISTRIBUTION.
22. 42x42 SUPPLY FROM UNIT ABOVE AND 54x24 RETURN DUCT UP TO RTU.
23. 12x12 EXHAUST UP TO EF ON ROOF ABOVE. PROVIDE ALL NECESSARY TRANSITIONS AND FITTINGS AS REQUIRED.
24. 20x10 TRANSFER DUCT DIRECTLY ABOVE STORAGE 214A CEILING. LOCATE OUTLET DUCT INTO STORAGE ROOM DIRECTLY BELOW CEILING AND COVER OPEN END WITH WMS.

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MECHANICAL SECOND FLOOR PLAN

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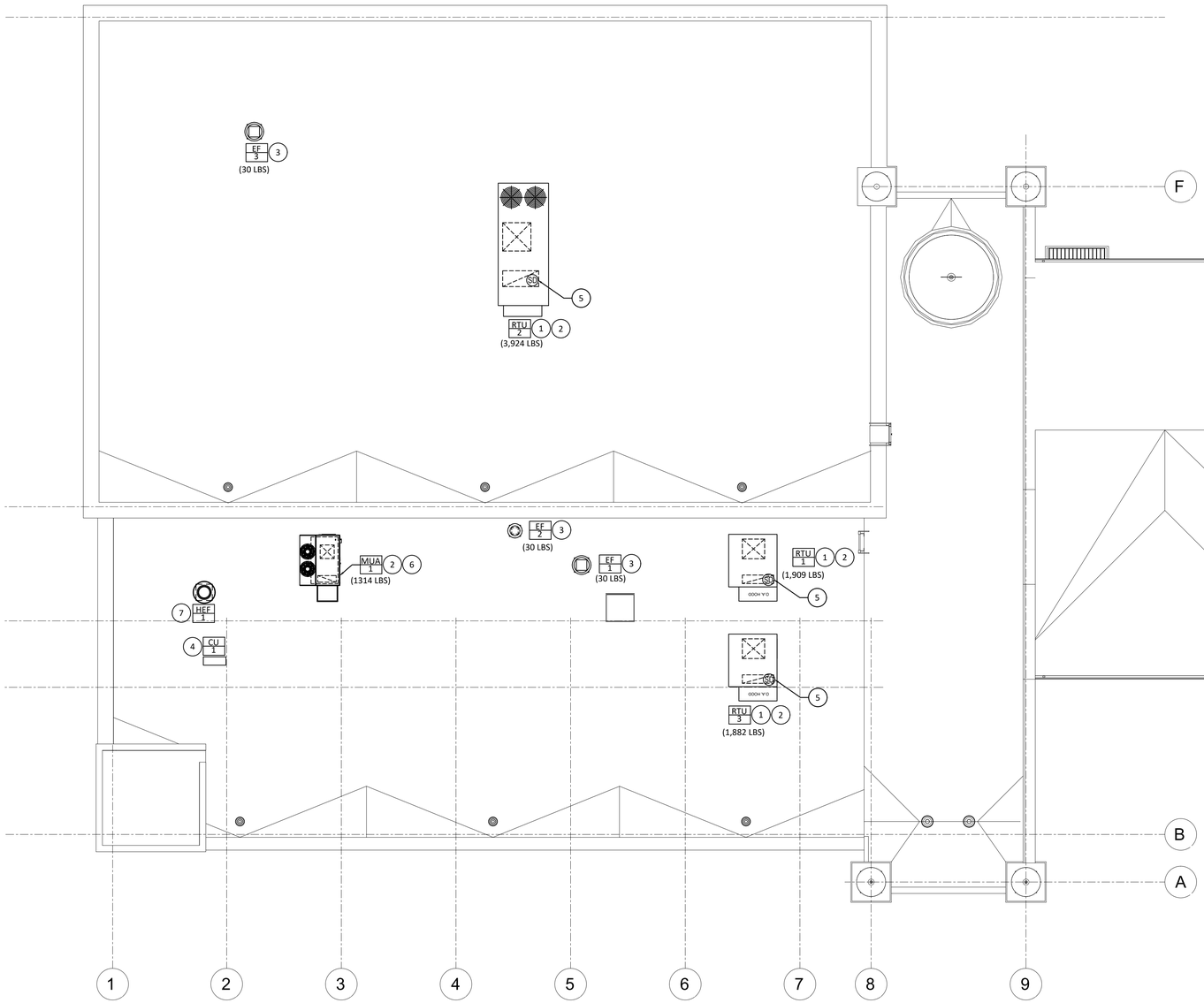

MECHANICAL ROOF PLAN

1 M102 **SCALE = 1/8"=1'-0"**

KEYED NOTES: (X)

1. FURNISH AND INSTALL NEW ROOFTOP UNIT (RTU) AS INDICATED. PROVIDE NEW ROOF CURB, ALL NECESSARY EQUIPMENT SUPPORTS, VIBRATION ISOLATORS, DUCTWORK TRANSITIONS, CONTROL WIRING, AND ELECTRICAL POWER WIRING. FOR ELECTRICAL SCOPE OF WORK REFER TO ELECTRICAL DRAWINGS.
2. NEW ROOFTOP UNIT LOCATION IS APPROXIMATE AND MUST BE FIELD VERIFIED AND COORDINATED WITH STRUCTURAL.
3. FURNISH AND INSTALL NEW ROOF MOUNTED EXHAUST FAN (EF) AND ROOF CURB. FOR ELECTRICAL SCOPE OF WORK REFER TO ELECTRICAL DRAWINGS.
4. FURNISH AND INSTALL NEW CONDENSING UNIT. PROVIDE SUPPORT RAILS. REFRIGERANT PIPING SHALL BE INSULATED (PVC CLADDING ON ALL EXTERIOR REFRIGERANT PIPING). REFRIGERANT PIPING TO/FROM INDOOR UNIT SHALL BE SIZED AND ROUTED PER MANUFACTURERS RECOMMENDATIONS.
5. FACTORY INSTALLED DUCT MOUNTED SMOKE DETECTOR IN THE RETURN DUCT. SMOKE DETECTOR TO BE WIRED BY ELECTRICAL CONTRACTOR AND INTERLOCKED WITH BUILDING FIRE ALARM SYSTEM.
6. FURNISH AND INSTALL MAKEUP AIR UNIT (MUA), FACTORY ROOF CURB, ALL NECESSARY EQUIPMENT SUPPORTS, VIBRATION ISOLATORS, AND CONTROL WIRING. FLASH AND COUNTERFLASH AND SEAL ALL PENETRATIONS AND JOINTS WATER TIGHT. PROVIDE REQUIRED SERVICE CLEARANCES FOR EQUIPMENT MAINTENANCE. REFER TO DRAWING M502 FOR SCHEDULES, DETAILS, AND SPECIFICATIONS. FOR ELECTRICAL SCOPE OF WORK REFER TO ELECTRICAL DRAWINGS.
7. FURNISH AND INSTALL HOOD EXHAUST FAN (HEF), FACTORY ROOF CURB, ALL NECESSARY EQUIPMENT SUPPORTS, VIBRATION ISOLATORS, AND CONTROL WIRING. FLASH AND COUNTERFLASH AND SEAL ALL PENETRATIONS AND JOINTS WATER TIGHT. PROVIDE REQUIRED SERVICE CLEARANCES FOR EQUIPMENT MAINTENANCE. REFER TO DRAWING M502 FOR SCHEDULES, DETAILS, AND SPECIFICATIONS. FOR ELECTRICAL SCOPE OF WORK REFER TO ELECTRICAL DRAWINGS.

GENERAL NOTES:

1. COORDINATE ALL ROOF OPENINGS WITH STRUCTURAL DRAWINGS.
2. REFER TO DRAWING M200 AND SPECIFICATIONS FOR RTU CURB INFORMATION.
3. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ROOF SLOPE.
4. ALL HVAC EQUIPMENT SHALL BE INSTALLED IN STRICT COMPLIANCE WITH APPLICABLE CODES AND ORDINANCES INCLUDING INTERNATIONAL MECHANICAL CODE AND LOCATION CODES AND OSHA REGULATIONS.
5. MAINTAIN MINIMUM CLEARANCES ON ALL SIDES OF EQUIPMENT AS PER MANUFACTURER REQUIREMENTS AND TECHNICAL RECOMMENDATIONS.
6. ALL EXHAUST FANS, PLUMBING VENTS, AND OTHER EXHAUST OUTLETS SHALL BE LOCATED A MINIMUM 10'-0" FROM ANY FRESH AIR INTAKES.
7. ALL MECHANICAL EQUIPMENT, FLUES, AND VENTS SHALL BE LOCATED A MINIMUM OF 10'-0" FROM EDGE OF ROOF.

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MECHANICAL ROOF PLAN

ISNRV BUILDING EXPANSION
Blacksburg, VA

COMMONWEALTH OF VIRGINIA
JOHN N. BERG, JR
Lic. No. 051165
10/28/2024
PROFESSIONAL ENGINEER

FIVE DESIGN ARCHITECTURE

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REVISIONS

No.	DESCRIPTION	DATE

M102

SHEET 97 OF 122

PACKAGED ROOFTOP HEAT PUMP UNIT SCHEDULE

MARK	SUPPLY AIR FLOW (CFM)	OUTDOOR AIR FLOW (CFM)	MINIMUM AIR FLOW (CFM)	SUPPLY FAN ESP (IN H20)	SUPPLY FAN HP	COOLING PERFORMANCE EAT DB/WB (°F)	COOLING PERFORMANCE LAT DB/WB (°F)	COOLING PERFORMANCE EER / IEER	COOLING PERFORMANCE TOTAL CAPACITY (MBH)	COOLING PERFORMANCE SENSIBLE CAPACITY (MBH)	HEATING PERFORMANCE GAS INPUT (MBH)	HEATING PERFORMANCE GAS OUTPUT (MBH)	HEATING PERFORMANCE EAT/LAT DB (°F)	ELECTRICAL V / PH	ELECTRICAL MCA/MOCP (AMP.)	BASIS OF DESIGN (MANUFACTURER,MODEL#)	OVERALL DIMENSIONS (L"xW"xH")	OPERATING WEIGHT (LBS.)	NOTES
RTU-1	4,750	800	1,515	1.2"	4.6	77.9/64.0	53.3/53.1	11.5 / 18.4	147.0	122.1	200.0	162.0	40.1/138.7	208 / 3	90.8/125	DAIKIN MODEL #DPSC12B	101.6x73.4x85.9	1,909	1 - 10, 13
RTU-2	7,400	1,930	-	1.0"	5.0	79.3/65.4	53.6/53.3	11.1 / 20.0	258.52	198.30	450.0	364.5	53.6/99.0	208 / 3	122.7/175	DAIKIN MODEL #DPSC20B	202.5x76.5x72.1	3,924	1 - 8,11,12,13
RTU-3	4,150	600	1,620	1.2"	4.3	77.5/63.7	51.6/51.4	11.5 / 18.4	142.6	112.4	200.0	162.0	47.5/139.7	208 / 3	89.3/125	DAIKIN MODEL #DPSC12B	101.6x73.4x85.9	1,882	1 - 10, 13

NOTES:
1. PROVIDE 14" ROOF CURB FOR EACH ROOFTOP UNIT.
2. ALL UNITS SHALL HAVE BAROMETRIC RELIEF.
3. REFRIGERANT TYPE SHALL BE R32 OR CODE COMPLIANT EQUIVALENT.
4. PROVIDE ALL UNITS WITH MERV 8 FILTERS.
5. PROVIDE SINGLE POINT POWER CONNECTION WITH UNIT MOUNTED DISCONNECT.
6. PROVIDE UNIT WITH 7-DAY PROGRAMMABLE THERMOSTAT.
7. PROVIDE FLEXIBLE DUCT CONNECTIONS AT ALL DUCT INLETS/OUTLETS OF UNITS.
8. PROVIDE SINGLE POINT CONNECTION KIT.
9. PROVIDE UNIT WITH MODULATING GAS HEATING WITH MINIMUM 10:1 TURNDOWN.
10. HEATING IS BASED UPON THE MINIMUM AIRFLOW.
11. PROVIDE UNIT WITH MODULATING GAS HEATING WITH MINIMUM 12:1 TURNDOWN.
12. PROVIDE UNIT WITH COMBO TEMPERATURE AND HUMIDITY SENSOR.
13. RETURN AIR DUCT MOUNTED SMOKE DETECTOR.

FAN SCHEDULE

MARK	QUANTITY	AIR FLOW (CFM)	ESP IN. WG.	NOM HP	DRIVE TYPE	INTERLOCK / CONTROL	V/FREQ./PH	MCA/MOP	WEIGHT (LBS)	BASIS OF DESIGN (MANUFACTURER,MODEL#)	NOTES
EF-1	1	800	0.40	0.25	DIRECT	TIME CLOCK	115/60/1	4.8/15	67	GREENHECK, G-120-VG	1,2,3
EF-2	1	300	0.40	0.167	DIRECT	TIME CLOCK	115/60/1	3.5/15	43	GREENHECK, G-95-VG	1,2,3
EF-3	1	500	0.40	0.25	DIRECT	TIME CLOCK	115/60/1	4.8/15	39	GREENHECK, G-100-VG	1,2,3
TF-3	1	250	0.15	0.167	DIRECT	THERMOSTAT	115/60/1	3.5/15	39	GREENHECK, SQ-90-VG	1,2

NOTES:
1. MANUFACTURER TO PROVIDE GRAVITY BACKDRAFT DAMPER.
2. MANUFACTURER TO PROVIDE STARTER & INTEGRAL NON-FUSED DISCONNECT SIZED PER NEC.
3. MANUFACTURER TO PROVIDE INSULATED ROOF CURB AND ECM MOTOR WIH DIAL ON MOTOR.

ELECTRIC HEATER SCHEDULE

MARK	HEATING CAPACITY KW	HEATING CAPACITY MBH	ELECTRICAL V / PH	ELECTRICAL AMPS	BASIS OF DESIGN, MODEL #	NOTES
ECH-1	3.0	10.2	208 / 1	14.4	MARKEL, #F3483A1, CEILING RECESSED HEATER	1,2
ECH-2	2.0	6.83	208 / 1	9.6	MARKEL, #F3482A1, CEILING RECESSED HEATER	1,2
EWH-1	1.5	5.12	208 / 1	7.2	MARKEL, #HF3324TD-RP, FAN FORCED WALL HEATER	2,3,4
EWH-2	1.5	5.12	208 / 1	7.2	MARKEL, #HF3324TD-RP, FAN FORCED WALL HEATER	2,3,4

NOTES:
1. PROVIDE ELECTRIC HEATERS WITH WALL MOUNTED THERMOSTATS.
2. PROVIDE ELECTRIC HEATERS WITH INTEGRAL NON-FUSED DISCONNECT SWITCH.
3. BUILT-IN TAMPER PROOF THERMOSTAT.
4. COLOR TO BE SELECTED BY ARCHITECT.

AIR DEVICE SCHEDULE

MARK	SERVICE	MOUNTING STYLE	NECK SIZE (IN.)	FINISH	BASIS OF DESIGN	NOTES
A	SUPPLY DIFFUSER	SURFACE / LAY-IN	SEE PLAN	WHITE	PRICE, SPD - SQUARE PLAQUE DIFFUSER	ALL
B	RETURN GRILLE	LAY-IN	SEE PLAN	WHITE	PRICE, 80 - EGG CRATE GRILLE	ALL
C	EXHAUST GRILLE	SURFACE	SEE PLAN	WHITE	PRICE, RCG - REVERSIBLE CORE GRILLE	ALL
D	SUPPLY REGISTER	DUCT MOUNTED	SEE PLAN	WHITE	PRICE, 610 - LOUVERED SUPPLY GRILLE	ALL
E	RETURN GRILLE	SIDEWALL	SEE PLAN	WHITE	PRICE, 96 - HEAVY DUTY GYM RETURN GRILLE	ALL
F	FLOOR SUPPLY REGISTER	SURFACE	SEE PLAN	WHITE	PRICE LBMH CORE 16A - HEAVY DUTY MANDREL LINEAR BAR GRILLE, 15 DEG STYLE	ALL
G	SPIRAL DUCT GRILLE	DUCT MOUNTED	SEE PLAN	WHITE	PRICE SDGE - ALUMINUM SPIRAL DUCT GRILLE W/ OBD AND AIR SCOOP. DOUBLE DEFLECTION.	ALL

NOTES:
1. MAXIMUM NOISE CRITERION RATING <= 30.
2. DIFFUSER SHALL BE 4-WAY BLOW UNLESS OTHERWISE INDICATED ON PLAN.
3. COORDINATE EXACT DIFFUSER/GRILLE/REGISTER LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLAN.
4. PROVIDE VOLUME DAMPERS IN BRACH DUCT.
5. MOUNTING FRAME TYPE SHALL BE COORDINATED WITH CEILING/WALL CONSTRUCTION TYPE.

VARIABLE AIR VOLUME (VAV) BOX SCHEDULE

MARK	VAV TYPE	CASE SIZE	INLET SIZE (IN.)	PRIMARY AIR MAX. CFM	PRIMARY AIR MIN. CFM	UNIT FAN PERFORMANCE DESIGN CFM	UNIT FAN PERFORMANCE S.P. (IN H2O)	UNIT FAN PERFORMANCE FAN HP	UNIT FAN PERFORMANCE V/HZ/PH	UNIT FAN PERFORMANCE FLA	ELECTRIC REHEAT COIL EAT °F	ELECTRIC REHEAT COIL LAT °F	ELECTRIC REHEAT COIL V/HZ/PH	ELECTRIC REHEAT COIL KW	ELECTRIC REHEAT COIL MAX. STEPS	BASIS OF DESIGN (MFG, MODEL #)	NOTES
VAV-1	FAN POWERED	2	8"Ø	550	195	550	0.25	1/3	208/60/1	2.8	67.7	90.5	208/60/1	4.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-2	FAN POWERED	2	8"Ø	325	115	325	0.25	1/3	208/60/1	2.8	67.7	92.8	208/60/1	2.6	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-3	FAN POWERED	2	6"Ø	285	100	285	0.25	1/3	208/60/1	2.8	67.8	89.8	208/60/1	2.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-4	FAN POWERED	2	6"Ø	285	100	285	0.25	1/3	208/60/1	2.8	67.8	89.8	208/60/1	2.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-5	FAN POWERED	2	6"Ø	285	100	285	0.25	1/3	208/60/1	2.8	67.8	89.8	208/60/1	2.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-6	FAN POWERED	2	6"Ø	285	100	285	0.25	1/3	208/60/1	2.8	67.8	89.8	208/60/1	2.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-7	SINGLE DUCT	-	5"Ø	135	50	-	-	-	-	-	55.0	91.7	208/60/1	0.6	SCR	DAIKIN, MQTH-500	1,2,5,6
VAV-8	SINGLE DUCT	-	6"Ø	200	70	-	-	-	-	-	55.0	89.9	208/60/1	0.8	SCR	DAIKIN, MQTH-500	1,2,5,6
VAV-9	SINGLE DUCT	-	8"Ø	500	175	-	-	-	-	-	55.0	89.9	208/60/1	2.0	SCR	DAIKIN, MQTH-500	1,2,5,6
VAV-10	SINGLE DUCT	-	8"Ø	550	195	-	-	-	-	-	55.0	89.5	208/60/1	2.2	SCR	DAIKIN, MQTH-500	1,2,5,6
VAV-11	FAN POWERED	2	10"Ø	900	315	900	0.25	1/3	208/60/1	2.8	67.8	92.2	208/60/1	7.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-12	SINGLE DUCT	-	10"Ø	800	280	-	-	-	-	-	55.0	89.9	208/60/1	3.2	SCR	DAIKIN, MQTH-500	1,2,5,6
VAV-13	SINGLE DUCT	-	5"Ø	150	55	-	-	-	-	-	55.0	88.4	208/60/1	0.6	SCR	DAIKIN, MQTH-500	1,2,5,6
VAV-14	FAN POWERED	4	12"Ø	1,050	370	1,050	0.25	1/2	208/60/1	3.9	67.8	91.7	208/60/1	8.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-15	FAN POWERED	2	8"Ø	350	105	350	0.25	1/3	208/60/1	2.8	68.8	92.2	208/60/1	2.6	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-16	FAN POWERED	2	8"Ø	500	175	500	0.25	1/3	208/60/1	2.8	67.8	92.9	208/60/1	4.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-17	FAN POWERED	2	8"Ø	500	175	500	0.25	1/3	208/60/1	2.8	67.8	92.9	208/60/1	4.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-18	FAN POWERED	2	10"Ø	800	280	800	0.25	1/3	208/60/1	2.8	67.8	91.3	208/60/1	6.0	3	DAIKIN, MQFCI-600 ECM	1,2,3,4
VAV-19	FAN POWERED	2	8"Ø	450	160	450	0.25	1/3	208/60/1	2.8	67.7	92.8	208/60/1	3.6	3	DAIKIN, MQFCI-600 ECM	1,2,3,4

NOTES:
1. ELECTRIC REHEAT COIL SHALL BE LOCATED ON THE UNIT DISCHARGE.
2. ELECTRIC REHEAT COIL SHALL BE FACTORY MOUNTED AND WIRED TO VAV BOX.
3. ELECTRIC REHEAT COIL SHALL HAVE A MINIMUM OF 2 HEATING STEPS.
4. PROVIDE HIGH EFFICIENT ELECTRONICALLY COMMUTATED (ECM) FAN MOTOR.
5. ELECTRIC REHEAT COIL IS BASED UPON MINIMUM CFM PRIMARY AIR.
6. ELECTRIC REHEAT COIL SHALL HAVE SCR CONTROL.

DUCTLESS SPLIT SYSTEM AIR HANDLER UNIT SCHEDULE

MARK	COOLING PERFORMANCE TOTAL CAPACITY	COOLING PERFORMANCE SENSIBLE CAPACITY	HEATING PERFORMANCE RATED @ 47°F	HEATING PERFORMANCE RATED @ 17°F	ELECTRICAL V/HZ/PH	ELECTRICAL FAN POWER	BASIS OF DESIGN (MANUFACTURER,MODEL#)	ACCESSORIES / OPTIONS	WEIGHT (LBS.)
AH-1	24.0 MBH	17.0 MBH	24.0 MBH	15.0 MBH	208/60/1	230 WATTS	DAIKIN #FDMQ24RVJU	CONDENSATE PUMP, WIRED REMOTE TSTAT	82

NOTES:
1. MATCH WITH ASSOCIATED OUTDOOR UNIT, CU-1.
2. INDOOR UNIT SHALL BE POWERED BY THE OUTDOOR UNIT.
3. PROVIDE REFRIGERANT PIPING TO/FROM OUTDOOR HEAT PUMP UNIT SIZED AND ROUTED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
4. REFRIGERANT TYPE SHALL BE R-32 OR EQUIVALENT.

DUCTLESS SPLIT SYSTEM CONDENSING UNIT SCHEDULE

MARK	EER/SEER	COP/HSPF	COOLING CAPACITY	HEATING OUTPUT @ 47°F	V / PH	MCA/MOCP (AMP.)	WEIGHT (LBS.)
CU-1	12.5/18.6	3.8/10.0	24.0 MBH	24.0 MBH	208/1	16.9/20	108

NOTES:
1. BASIS OF DESIGN IS DAIKIN #RX24RMVJU.
2. REFRIGERANT TYPE SHALL BE R-32 OR EQUIVALENT.

STOTTSBERG ENGINEERING
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Project #23071

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MECHANICAL SCHEDULES

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Blacksburg, VA

COMMONWEALTH OF VIRGINIA
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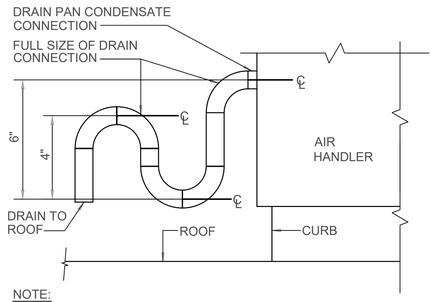
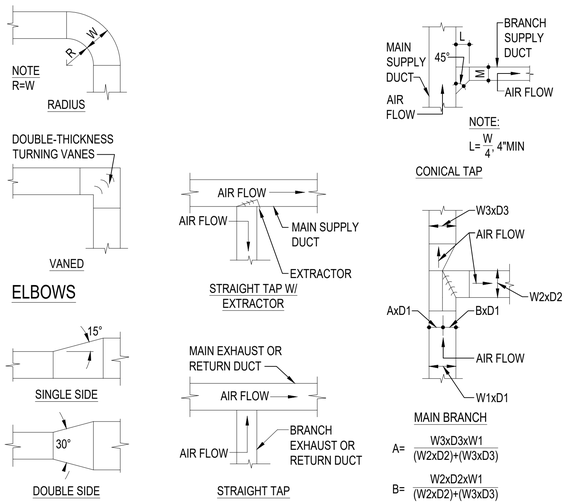
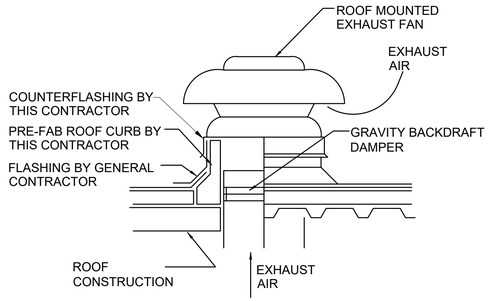


NOTE:
CONDENSATE TRAP SHALL BE CONSTRUCTED OF GALVANIZED STEEL OR PVC PIPING.

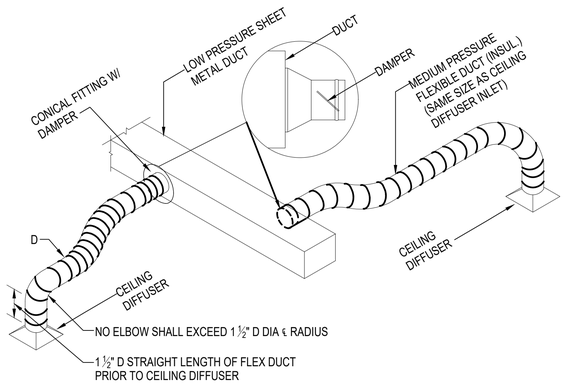
CONDENSATE DRAIN DETAIL



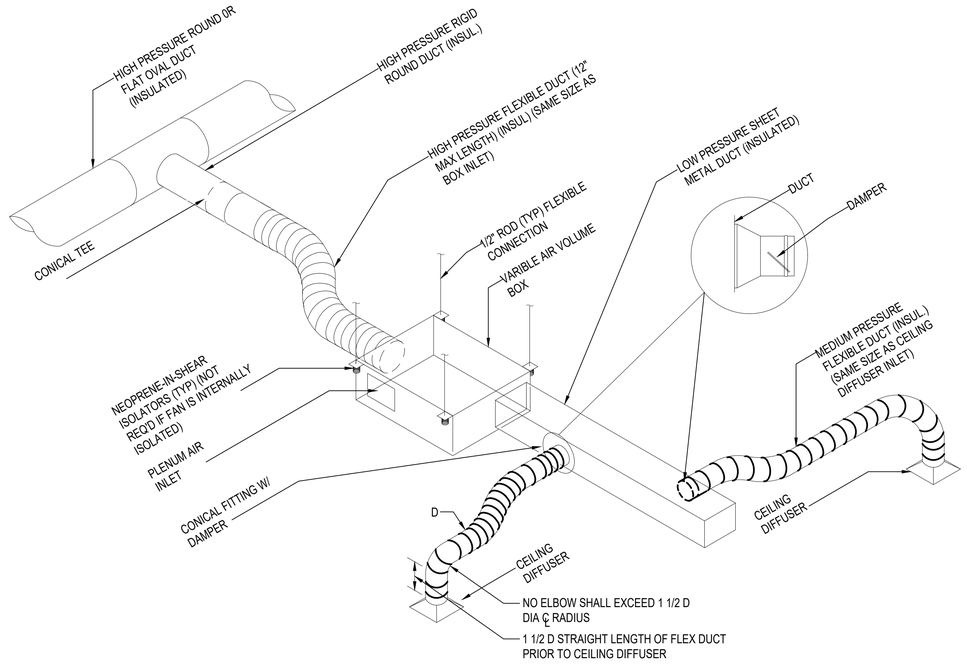
DUCT DETAILS



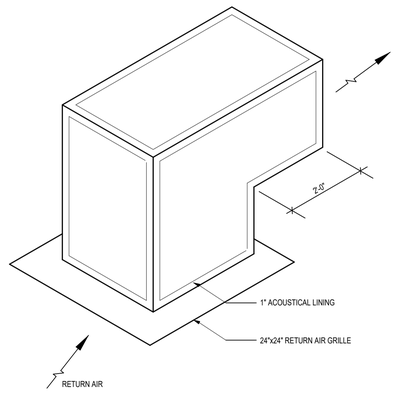
ROOFTOP EXHAUST (DOWNBLAST) DETAIL



DIFFUSER CONNECTION DETAIL



FAN POWERED VAV BOX DETAIL



PLENUM RETURN DETAIL

DATE:	10/28/2024
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MECHANICAL DETAILS 1 OF 2

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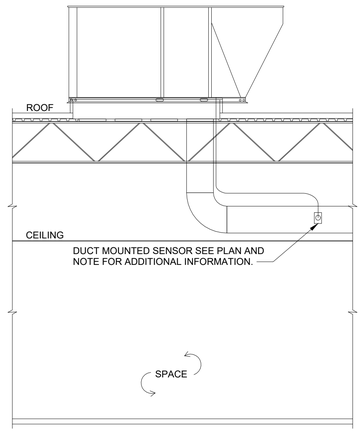
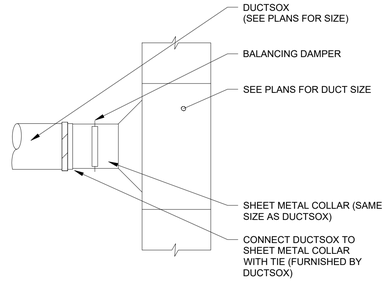
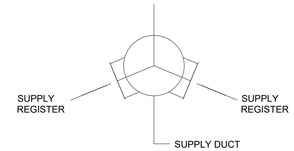


PRESSURE SENSOR:
MECHANICAL CONTRACTOR TO PROVIDE DUCT STATIC PRESSURE PROBE (MODEL BAPI ZPS-ACC08) AND SILICONE RUBBER TUBING 1/8" ID AND 1/4" OD (MODEL ZPS-SIL-250-125-50). TUBING TO CONNECT TO THE PRESSURE TRANSDUCER IN THE RTU. PENETRATION OF SUPPLY DUCT TO BE DONE WITH A FITTING TO AVOID KINKING THE TUBE. PROBE TO BE INSTALLED IN SUPPLY DUCT, APPROXIMATELY 2/3 DOWN SUPPLY MAIN, BUT NOT PAST FINAL VAV TAKE-OFF.

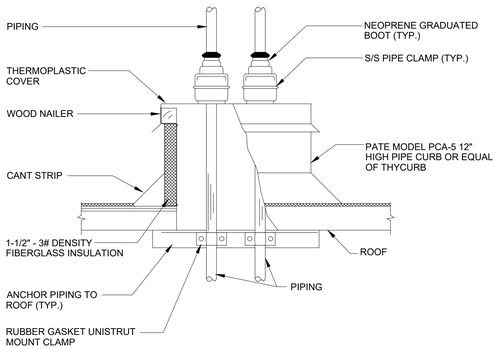
DUCT MOUNTED SENSOR DETAIL
SCALE: NTS



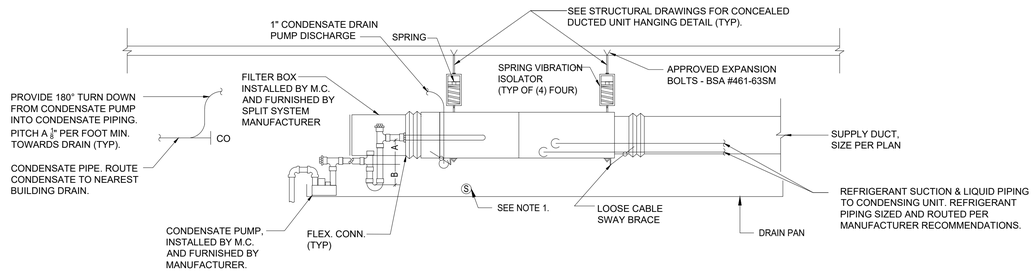
SHEETMETAL TO DUCTSOX CONNECTION DETAIL
SCALE: NTS



SUPPLY AIR REGISTER DETAIL
SCALE: NTS



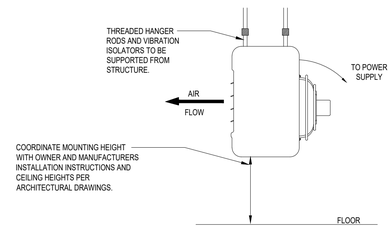
PIPE ROOF PENETRATION DETAIL
SCALE: NTS



NOTES:

1. ALL UNITS SHALL BE SUPPLIED WITH FACTORY INSTALLED CONDENSATE WATER LEVEL DETECTION TO SHUT OFF UNIT OPERATION IN THE EVENT THE DRAIN IS BLOCKED.
2. ALL UNITS SHALL BE SUPPLIED WITH CONDENSATE DRAIN PUMP. CONDENSATE DRAIN TO BE TYPE L COPPER.

CONCEALED DUCTED SPLIT SYSTEM AH DETAIL
SCALE: NTS



ELECTRIC UNIT HEATER DETAIL

STOTTSBERG ENGINEERING
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MECHANICAL DETAILS 2 OF 2

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M301

SHEET 100 OF 122

GENERAL MECHANICAL SPECIFICATIONS

1. SCOPE:
PROVIDE ALL MATERIALS, LABOR, TOOLS AND INCIDENTALS NECESSARY TO INSTALL AND MAKE READY FOR OWNER'S USE COMPLETE SYSTEMS OF HEATING, VENTILATION, AIR CONDITIONING (HVAC), PLUMBING, FOR THE PROPOSED WORK AND BUILDING RENOVATIONS AS SHOWN ON THE DRAWINGS AND CALLED FOR IN THESE SPECIFICATIONS. THE CONTRACTOR IS RESPONSIBLE FOR THE COORDINATION WITH OTHER DIVISIONS OF WORK FOR THE FULL EXTENT OF THE SCOPE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FIELD VERIFY ALL ASPECTS, COMPONENTS, SYSTEMS, ETC. AND ACCOMMODATE THE PERFORMANCE INTENT OF THE CONSTRUCTION DOCUMENTS THROUGHOUT THE PROJECT SCOPE.

2. BIDDERS RESPONSIBILITY:
EXAMINE THE DRAWINGS AND SPECIFICATIONS AND VISIT THE WORK SITE. BECOME FAMILIAR WITH THE CHARACTER OF THE WORK, THE COORDINATION WITH OTHER TRADES REQUIRED, AND ANY OTHER CONDITIONS THAT AFFECT THE COMPLETION OF THIS WORK. GENERAL CONTRACTOR SHALL BE REQUIRED TO COORDINATE WORK WITH TENANT FINISH CONTRACTOR IN A SIDE BY SIDE SCENARIO.

3. PERMITS, CODES AND LAWS:
APPLY FOR ALL PERMITS AND PAY ALL FEES.
ALL WORK SHALL BE IN ACCORDANCE WITH LATEST EDITIONS OF THE FOLLOWING RULES AND REGULATIONS, HEREIN REFERRED TO AS "CODES":
THE LATEST OR ADOPTED EDITION OF THE APPLICABLE LOCAL, STATE, AND FEDERAL BUILDING, MECHANICAL, SANITATION, PLUMBING, ETC. CODES.
UNDERWRITER'S LABORATORIES, INC. (U.L) NATIONAL FIRE PROTECTION ASSOCIATION (N.F.P.A.) OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (O.S.H.A)
WHERE ANY OF THESE CODES ARE AT VARIANCE WITH THE DRAWINGS AND SPECIFICATIONS, THEIR REQUIREMENTS SHALL TAKE PRECEDENCE, UNLESS THE DRAWINGS AND SPECIFICATIONS REQUIREMENTS EXCEED THESE CODES. INCLUDE ANY COST NECESSARY TO MEET THESE CODES IN THE BID PRICE.

4. MECHANICAL PLANS:
THE MECHANICAL PLANS ARE DIAGRAMMATIC AND BASED ON ONE MANUFACTURER'S EQUIPMENT. THEY ARE NOT INTENDED TO SHOW EVERY ITEM IN ITS EXACT LOCATION, THE EXACT DIMENSIONS, OR ALL THE DETAILS OF THE EQUIPMENT. VERIFY THE ACTUAL DIMENSIONS OF THE EQUIPMENT PROPOSED TO BE USED. INSTALLATION SHALL BE WITHIN THE LIMITATIONS IMPOSED BY THE ARCHITECTURAL, STRUCTURAL, HVAC, ELECTRICAL, AND PLUMBING REQUIREMENTS WITH ADEQUATE SPACE FOR MAINTENANCE.

5. QUESTIONS AND CLARIFICATIONS OF BID DOCUMENTS:
BIDDERS SHALL NOT RELY ON ANY ORAL CLARIFICATION OF THE DRAWINGS OR SPECIFICATIONS. ANY QUESTIONS OR CLARIFICATIONS SHALL BE REFERRED IN WRITING TO THE ARCHITECT.

6. GUARANTEES:
ALL EQUIPMENT, MATERIALS, AND WORKMANSHIP SHALL BE GUARANTEED IN WRITING FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE. WARRANTIES SHALL BE IN WRITING AND SHALL INCLUDE FACTORY WARRANTIES FOR EACH PIECE OF EQUIPMENT. PROVIDE A CERTIFICATE FOR EACH PIECE OF EQUIPMENT. CLEARLY INDICATE ON EACH WARRANTY CERTIFICATE THE MODEL NO., SERIAL NO., LOCATION, AND OWNER'S NAME.

7. COMPLETE SYSTEM:
ALL PRODUCTS, MATERIALS AND ACCESSORIES SHALL BE FURNISHED AND INSTALLED AS REQUIRED FOR A COMPLETE SYSTEM READY FOR OWNER'S BENEFICIAL USE.

8. WORKMANSHIP:
ALL WORK SHALL BE PERFORMED BY COMPETENT MECHANICS USING PROPER TOOLS AND EQUIPMENT TO PRODUCE FIRST QUALITY WORK. ALL WORK SHALL BE NEATLY INSTALLED, ACCESSIBLE FOR MAINTENANCE, AND COMPLETE WITH ALL ACCESSORIES REQUIRED.

9. ACCESSIBILITY:
INSTALL ALL EQUIPMENT AND THEIR APPURTENANCES SUCH AS, BUT NOT LIMITED TO, VALVES, COILS, DRAIN PANS, DRAINS, DAMPERS, CONTROLS, MOTORS, CONTROLLERS, ETC., SO THAT THEY CAN BE SERVICED, RESET, REPLACED OR RECALIBRATED, ETC. INSTALL ALL NECESSARY ACCESS PANELS AND BUILDING ACCESS DOORS, AS BELOW, WHERE REQUIRED TO ACCOMPLISH THIS. IF ANY EQUIPMENT OR COMPONENTS DO NOT FIT WHERE INTENDED, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING, REQUESTING FURTHER GUIDANCE.
PROVIDE BUILDING ACCESS DOORS FOR ALL MECHANICAL EQUIPMENT REQUIRING SERVICE, INCLUDING BUT NOT LIMITED TO, AHU'S, FANS, DAMPERS, DUCT ACCESS PANELS, CONTROLS, PIPING, VALVES, REGULATORS, TRAPS, ETC., INSTALLED ABOVE HARD CEILINGS, BEHIND WALLS, AND BELOW FLOORS, FOR INSTALLATION BY OTHER DIVISIONS OF THE WORK. BUILDING ACCESS DOORS ARE NOT REQUIRED WHERE THE MECHANICAL EQUIPMENT IS INSTALLED ABOVE LAY-IN AND ACCESSIBLE SPLINE CEILINGS. OTHER TYPES OF SPLINE CEILINGS REQUIRE BUILDING ACCESS DOORS. SIZE THE BUILDING ACCESS DOORS FOR THE USE INTENDED, BUT NOT LESS THAN 12 INCHES BY 12 INCHES. WHERE HUMAN ACCESS IS REQUIRED, PROVIDE 24 INCHES BY 24 INCHES, OR LARGER. WHERE BUILDING ACCESS DOORS CANNOT BE INSTALLED FOR STRUCTURAL OR ARCHITECTURAL REASONS, NOTIFY THE ARCHITECT. PRIME COAT BUILDING ACCESS DOORS IN PAINTED AREAS WITH FINISH PAINTING AS SPECIFIED IN OTHER DIVISIONS. IN WET AREAS, TOILET ROOMS, OR AREAS WITH CERAMIC TILE FLOORS OR WALLS, PROVIDE STAINLESS STEEL BUILDING ACCESS DOORS. PROVIDE BUILDING ACCESS DOORS WITH A CONCEALED KEY OPERATED LOCK AND CONCEALED HINGES. ALL LOCKS SHALL BE KEYED ALIKE. PROVIDE BUILDING ACCESS DOORS AS SPECIFIED IN OTHER DIVISIONS OF THE WORK OR PROVIDE MILCOR DOORS, OR EQUIVALENT, SUITABLE FOR THE INSTALLATION INTENDED. PROVIDE FIRE RATED DOORS FOR ALL FIRE RATED WALLS, PARTITIONS, AND CEILINGS.

10. WORK BY OTHER TRADES:
FURNISH ALL SLEEVE FRAMES, BUILDING ACCESS DOORS, PREFABRICATED EQUIPMENT CURBS, ROOF CURBS, ETC. FOR INSTALLATION BY OTHER TRADES.
INSTALL ALL MOTORS AND FURNISH THE STARTING EQUIPMENT AND DISCONNECTS TO THE DIVISION 26000 SUBCONTRACTOR FOR INSTALLATION. CONTROL WIRING, INCLUDING SWITCHES, THERMOSTATS, INTERLOCKS, ETC. SHALL BE FURNISHED BY DIVISION 23000. ENSURE THAT THE ELECTRICAL EQUIPMENT MOUNTED NEAR THE MECHANICAL EQUIPMENT DOES NOT BLOCK ACCESS TO SERVICE AREAS OF THE MECHANICAL EQUIPMENT. DO NOT ALLOW ANY EQUIPMENT TO BE INSTALLED ON THE HVAC EQUIPMENT ENCLOSURES.

11. FIRE STOPPING:
ALL PENETRATIONS OF FLOORS AND OTHER FIRE-RATED ASSEMBLIES SHALL BE FIRE AND SMOKE-STOPPED IN STRICT ACCORDANCE WITH THE APPLICABLE CODES.

12. FOUNDATIONS AND SPECIAL SUPPORTS:
FURNISH AND INSTALL ALL SPECIAL FOUNDATIONS AND SUPPORTS REQUIRED FOR EQUIPMENT INSTALLED UNDER THIS SECTION, UNLESS THEY ARE A PART OF THE BUILDING STRUCTURE AND ARE SHOWN IN OTHER SECTIONS.

13. CLEANING AND PAINTING:
THOROUGHLY CLEAN ALL EQUIPMENT AND REMOVE ALL TRASH, CARTONS, ETC. MAKE ANY NECESSARY CORRECTIONS OR REPAIR/REPLACE ANY DAMAGED MATERIALS OR EQUIPMENT. LEAVE THE ENTIRE SYSTEM IN A THOROUGHLY CLEAN AND ORDERLY MANNER.
ANY FINISHED SURFACES THAT HAVE BEEN SCRATCHED OR DISCOLORED SHALL BE TOUCHED-UP OR REPAINTED BREAK TO BREAK WITH PAINT TO MATCH THE ORIGINAL COLOR. TOUCH UP PAINTED SURFACES OR REPAINT THE ENTIRE PAINTED SURFACE IF TOUCH UP IS UNACCEPTABLE. SEE ARCHITECTURAL PAINTING SPECIFICATIONS.
ALL METAL ITEMS SUBJECT TO RUSTING, INSIDE OR EXPOSED TO WEATHER SHALL BE GIVEN ONE COAT OF PROPER TYPE RUST PREVENTATIVE PRIMER AS SOON AS INSTALLED. APPLY TWO FINISH COATS WITH COLOR TO BE SELECTED BY THE ARCHITECT. FOR ALL INTERIOR OR EXTERIOR STRUCTURAL GALVANIZED STEEL, COLD GALVANIZE ALL EXPOSED METAL CUT ENDS, HOLES, WELDS, SCRATCHES, ETC., OR HOT DIP GALVANIZE THE ENTIRE STRUCTURE OR FRAME AFTER FABRICATION AND MOUNTING HOLES ARE CUT. UPON COMPLETION OF THE INSTALLATION, BUT NOT BEFORE, AND BEFORE ACCEPTANCE, THOROUGHLY CLEAN ALL EXPOSED EQUIPMENT, PIPING, DUCTWORK, INSULATION JACKETS, ETC., REMOVING ALL STICKERS, LABELS, MARKING, WRITING, FABRICATION MARKINGS, IDENTIFICATION, ADHESIVE, SEALER, GLUE, RUST, CORROSION, ETC., FROM THEIR EXTERIOR SURFACES.
THE CLEANLINESS AND PAINTING ACCEPTABILITY IS AT THE SOLE DISCRETION OF THE ARCHITECT AND MAY REQUIRE ADDITIONAL CLEANING AND COATS OF PAINT BEFORE ANY SURFACE IS ACCEPTED.

14. SUBMITTAL AND SHOP DRAWINGS:
SUBMIT MANUFACTURER'S CERTIFIED DATA RELATIVE TO ALL EQUIPMENT, PIPING, CONTROLS, ETC. REQUIRED FOR THE INSTALLATION OF THE HVAC, PLUMBING AND FIRE PROTECTION SYSTEMS. SUBMIT FOR REVIEW ALL NECESSARY ENGINEERING, PRODUCT AND INSTALLATION DATA, SHOP DRAWINGS, SAMPLES ETC. FOR ALL EQUIPMENT, MATERIAL, AND SYSTEMS TO ASCERTAIN COMPLIANCE WITH THE TECHNICAL REQUIREMENTS OF THE CONTRACT DOCUMENTS.
SUBMIT SIX (6) COPIES OF ALL NECESSARY DATA, CUTS, MANUFACTURER'S SELECTIONS, CATALOGS, BULLETINS, INSTALLATION INSTRUCTIONS, DRAWINGS, DIAGRAMS, CURVES, ETC. CLEARLY INDICATE ON THE SUBMITTED DATA, THE MANUFACTURER'S NAME, PRODUCT NUMBER(S), OPTIONS, EQUIPMENT CAPACITY, DIMENSIONAL DATA, WEIGHTS, AND OTHER APPLICABLE TECHNICAL DATA FOR THE PROJECT. TRADE NAMES, MANUFACTURERS, AND CATALOGUE NUMBERS ARE MENTIONED HEREIN AND ON THE DRAWINGS SOLELY IN ORDER TO ESTABLISH A STANDARD FOR THE TYPE, GENERAL DESIGN, AND QUALITY OF PRODUCT REQUIRED. OTHER PRODUCTS SIMILAR IN DESIGN OF EQUIVALENT QUALITY CAPABLE OF FITTING WITHIN THE SPACES ALLOCATED AND COMPLYING WITH THE DRAWINGS AND SPECIFICATIONS WILL BE CONSIDERED AFTER THE CONTRACT IS LET UNLESS "PRIOR APPROVAL" REQUIREMENTS ARE SET FORTH IN THESE DOCUMENTS. WHERE TWO OR MORE MANUFACTURERS OR MATERIALS ARE NAMED, THE CONTRACTOR MAY SUBMIT ANY OF THOSE NAMES, PROVIDED THEY CONFORM TO THE SPECIFICATIONS AND DESIGN INTENT. CONTRACTOR SHALL INCLUDE WITH THE SUBMITTAL A LIST OF ALL COMPARATIVE FEATURES INDICATING COMPLIANCE WITH THE SPECIFICATIONS.
THE ARCHITECT AND/OR ENGINEER MAY REQUIRE THE SUBMISSION OF SAMPLES, PARTICULARLY WHEREVER EQUIPMENT OR APPLIANCES ARE VISIBLE IN FINISHED AREAS, SUCH AS CEILINGS, INTERIOR AND EXTERIOR WALLS. THE CONTRACTOR AND SUPPLIER SHALL ARRANGE FOR DEMONSTRATIONS OF THE INSTALLATION OF ANY OF THESE PRODUCTS AND THEIR ABILITY TO PERFORM AS SPECIFIED, IF REQUIRED. REVIEW OF SUBMITTALS AND SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY FOR FITTING THE EQUIPMENT IN THE SPACE ALLOTTED WITH SPACE FOR ALL CONNECTIONS AND SERVICING AND FOR THE COORDINATION OF THE WORK WITH WORK OF OTHER TRADES.
THE CONTRACTOR SHALL REVIEW ALL SUBMITTALS AND SHOP DRAWINGS AND INDICATE BY STAMP OR LETTER THAT HE HAS REVIEWED THEM, BEFORE FORWARDING THEM TO THE ARCHITECT AND/OR ENGINEER. SUBMITTALS AND DRAWINGS WILL BE RETURNED AFTER REVIEW INDICATING WHETHER EXCEPTIONS ARE TAKEN, THE SUBMITTAL RETURNED WITH CORRECTIONS, OR IS COMPLETELY REJECTED. RESUBMISSION OF REVISED SUBMITTALS AND SHOP DRAWINGS, IF REQUIRED, SHALL BE DONE BEFORE INSTALLATION AND CONSTRUCTION IS BEGUN.
CORRECTIONS OR COMMENTS MADE ON THE SUBMITTALS AND DRAWINGS DURING THIS REVIEW DOES NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. THIS REVIEW IS FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, FABRICATION PROCESSES, TECHNIQUES OF CONSTRUCTION, COORDINATING THE WORK WITH THAT OF ALL OTHER TRADES, AND PERFORMING WORK IN A SAFE AND SATISFACTORY MANNER. REVIEW OF THE SUBMITTALS SHALL NOT PERMIT ANY DEVIATION FROM PLANS AND SPECIFICATIONS.
SUBMITTALS FOR A SPECIFIC CLASS OF PRODUCTS, SYSTEMS, INSTALLATION PROCEDURES, SHOP DRAWINGS, ETC. WILL BE REVIEWED BY THE ENGINEER ONE TIME AND ITS RESUBMITTAL ONE TIME, IF NECESSARY, AS ABOVE, AT NO COST TO THE CONTRACTOR. THE CONTRACTOR WILL BEAR THE FULL COST FOR ALL SUBSEQUENT RESUBMITTAL REVIEWS AT THE ENGINEER'S STANDARD HOURLY RATES. PAYMENT WILL BE REQUIRED AT COMPLETION OF RESPECTIVE REVIEW.
REQUIRED SHOP DRAWINGS:
SUBMIT THE FOLLOWING SHOP DRAWINGS BEFORE ANY MECHANICAL DUCTWORK, PIPING, EQUIPMENT, ETC. IS FABRICATED AND INSTALLED. SUBMIT THESE SHOP DRAWINGS IN ¼ INCH PER FOOT MINIMUM SCALE WITH NECESSARY PLANS, ELEVATIONS, SECTIONS, DETAILS, AND ISOMETRICS. SUBMIT SIX (6) PAPER COPIES AND ONE (1) CD-ROM WITH ALL THESE DRAWINGS IN AUTOCAD DRAWING DWG FILES, LATEST AUTOCAD FORMAT.
SOON AFTER AWARD OF THE CONTRACT, DETERMINE WHERE THERE MAY BE INSTALLATION, SPACE CONCERNS, AND/OR WHERE OTHER CONFLICTS MAY OCCUR. SUBMIT COORDINATION DRAWINGS, RELATING TO THESE CONFLICTS WITH THE MECHANICAL EQUIPMENT, DUCT, PIPING, ELECTRICAL, STRUCTURAL AND ARCHITECTURAL SYSTEMS ETC., SHOWING CLEARANCES AND RELATIONSHIP TO STRUCTURAL MEMBERS, PIPING, LIGHTS, CONDUITS, ELECTRICAL EQUIPMENT, AND BUILDING COMPONENTS. IN PREPARING THESE SHOP DRAWINGS, ESTABLISH LINES AND LEVELS FOR ALL DIVISIONS OF THE WORK IN THE AFFECTED AREA. IMMEDIATELY CALL TO THE ATTENTION OF THE ARCHITECT ANY INTERFERENCE OR CONFLICT FOR CLARIFICATION IN WRITING.
SUBMIT SHOP DRAWINGS FOR ALL DUCTWORK. SUBMIT LAYOUT DRAWINGS OF EACH MECHANICAL SYSTEM SHOWING THE LOCATION, ARRANGEMENT, ETC. OF ALL EQUIPMENT, ALL TRADES, ETC. TO BE INSTALLED RELATED TO THE RESPECTIVE SYSTEM.

15. AS-BUILT DRAWINGS:
MAINTAIN DAILY UPDATED DRAWINGS SHOWING DEVIATIONS FROM CONSTRUCTION DOCUMENTS. AT THE END OF THE PROJECT, PROFESSIONALLY PREPARE AS-BUILT DRAWINGS AND SUBMIT THREE COPIES, ONE REPRODUCIBLE.

16. OPERATION AND MAINTENANCE MANUALS:
UPON COMPLETION OF THE PROJECT, SUBMIT THREE COPIES OF ALL OPERATION AND MAINTENANCE MANUALS, WARRANTIES, SPARE PARTS LIST, AS-BUILT DRAWINGS, TEST AND BALANCE REPORTS, AND LETTER OF GUARANTEE ALL BOUND IN THREE RING BINDERS, CLEARLY SHOWING WHICH EQUIPMENT WAS SUPPLIED TO THE JOB.

17. PROJECT COMPLETION:
BEFORE STARTING AND TESTING ANY SYSTEM, HVAC, OR PLUMBING, TO PREVENT INADVERTENT OPERATION OF THE MECHANICAL EQUIPMENT BEFORE THE MANUFACTURER'S INSPECTION AND TESTING, THE CONTRACTOR SHALL:
VERIFY THAT ALL ELECTRICAL POWER IS OFF TO ALL MECHANICAL EQUIPMENT, INCLUDING THE AHU'S, ACCU'S, BOOSTER PUMPS, FIRE PUMPS, ETC.
LOCK OUT EACH SYSTEM USING SETON MODEL NUMBER 70329; "DO NOT OPERATE" LOCK ON LOCKOUT TAGS, OR EQUIVALENT. INSTALL LOCKOUT TAGS AT EACH PIECE OF EQUIPMENT, ELECTRICAL DISCONNECTS, STARTERS, SWITCHES, ETC.
REMOVE THESE TAGS ONLY WHEN THE MANUFACTURER APPROVES OF THE EQUIPMENT INSTALLATION IN WRITING. EACH MANUFACTURER OR THEIR REPRESENTATIVE SHALL INSPECT THEIR EQUIPMENT FOR COMPLIANCE TO THEIR INSTALLATION REQUIREMENTS AND RECOMMENDATIONS. IN ADDITION, THE COMPRESSOR MANUFACTURER SHALL INSPECT EACH REFRIGERANT PIPING INSTALLATION FOR ADHERENCE TO THE APPROVED REFRIGERANT PIPING DIAGRAMS, ROUTING. EACH MANUFACTURER SHALL PREPARE A PUNCH LIST OF ALL DEFICIENCIES, IN WRITING WITH COPIES TO THE ARCHITECT AND CONTRACTOR.
EACH MANUFACTURER SHALL REINSPECT THE EQUIPMENT AFTER THE CONTRACTOR HAS CORRECTED ALL DEFICIENCIES. WHEN THE MANUFACTURER HAS GIVEN THEIR WRITTEN APPROVAL WITH COPIES TO THE ARCHITECT AND CONTRACTOR, THE CONTRACTOR MAY REMOVE THE LOCKOUT TAGS, SAFELY START, AND TEST THE EQUIPMENT, AS REQUIRED HEREIN.
CONTRACTOR SHALL PROVIDE FOR ALL NECESSARY DRILLING OF WALL STUDS, CEILING JOISTS, PLATES, FINISHES, ETC. TO ACCOMMODATE ROUTING AND INSTALLATION OF ALL PIPING, DUCT, ETC.

HVAC EQUIPMENT, METHODS AND MATERIALS

18. DUCTWORK GENERAL:
DUCT SIZES SHOWN ON THE DRAWINGS ARE INSIDE DIMENSIONS AND DO NOT TAKE INTO ACCOUNT LINING THICKNESS. DUCTWORK SHALL BE GALVANIZED SHEET METAL WITH GAUGES, CONSTRUCTION DETAILS AND INSTALLATION ACCORDING TO N.F.P.A. STANDARD 90A, ASHRAE, AND SMACNA DUCT CONSTRUCTION MANUALS AND REQUIREMENTS. PROVIDE FLEXIBLE CONNECTIONS AT AIR HANDLING UNITS AND FANS. PROVIDE SINGLE THICKNESS TURNING VANES IN ELBOWS. PAINT DUCTS, SLEEVES, PLENUMS, ETC., INTERIORS VISIBLE THROUGH AIR DEVICES WITH A MINIMUM OF ONE COAT OF PROPER TYPE RUST PREVENTATIVE PRIMER, SUITABLE FOR GALVANIZED STEEL, AND TWO FINISH COATS OF FLAT BLACK PAINT.
LOW PRESSURE DUCTWORK: STATIC PRESSURE RATING LESS THAN 2" W.G. AND VELOCITIES LESS THAN 2000 FPM. ALL SUPPLY DUCTWORK DOWNSTREAM OF VAV BOXES.
MEDIUM PRESSURE DUCTWORK: STATIC PRESSURE RATING LESS THAN 6" W.G. AND VELOCITIES GREATER THAN 2000 FPM AND ALL SUPPLY DUCTWORK UPSTREAM OF VAV BOXES.

19. DUCT CONSTRUCTION MATERIALS:
ALL SUPPLY DUCTWORK WHICH IS CONCEALED ABOVE CEILINGS AND/OR LOCATED WITHIN MECHANICAL ROOMS SHALL BE EXTERNALLY INSULATED UNLESS SPECIFICALLY CALLED OUT ON THE DRAWINGS AS INTERNALLY LINED.
ALL EXPOSED SUPPLY DUCTWORK LOCATED IN THE MULTIPURPOSE ROOM, SHALL BE DOUBLE-WALLED INTERNALLY INSULATED DUCT WITH PERFORATED INTERNAL LINER, 1" ACOUSTIC INSULATION AND GALVANIZED SHEET METAL EXPOSED ON EXTERIOR. ALL EXPOSED RETURN, TRANSFER, AND EXHAUST DUCTWORK LOCATED IN THE MULTIPURPOSE ROOM SHALL BE SPIRAL SHEET METAL DUCTWORK, PAINTED ON EXTERIOR.

20. FABRICATION, ERECTION, AND SUPPORT:
ALL DUCTWORK SHALL BE FABRICATED, ERECTED, BRACED, AND SUPPORTED IN STRICT ACCORDANCE WITH THE LATEST EDITIONS OF SMACNA AND ASHRAE REQUIREMENTS.

21. ACOUSTIC LINED DUCTWORK:
ACOUSTICALLY AND THERMALLY LINE RETURN, AND EXHAUST DUCT (WITHIN 10FT OF FANS), TRANSFER DUCTS, AND PLENUMS WITH 1" THICK, 1 1/2 PCF FIBERGLASS DUCT LINER, APPLIED PER THE MANUFACTURER'S AND NAIMA REQUIREMENTS. DUCT LINER SHALL MEET AND/OR EXCEED ASHRAE'S I.A.Q. STANDARD 62. USE WELDED STICK CLIPS, IN LIEU OF ADHESIVE TYPE FASTENERS AND FULL COVERAGE ADHESIVE. PROVIDE EDGE NOSINGS WHERE REQUIRED. COAT ALL EXPOSED FIBERGLASS WITH HARDCAST "LAG-GRIP 671".

22. JOINT SEALING:
SEAL ALL DUCT JOINTS AND SEAMS (LONGITUDINAL AND TRANSVERSE) WITH HIGH PRESSURE DUCT SEALER, HARDCAST "IRON-GRIP 601" OR APPROVED EQUIVALENT. REINFORCED FOIL BACKED TAPES, CLOTH OR PLASTIC BACKED TAPES (DUCT TAPE) ARE NOT ACCEPTABLE.

23. FLEXIBLE AIR DUCT:
DUCT SHALL BE UL LISTED UL-181, CLASS I AIR DUCT MATERIAL AND SHALL COMPLY WITH N.F.P.A 90A AND 90B AND ALL LOCAL REQUIREMENTS. DUCT SHALL HAVE AN OPERATING AIR PRESSURE OF 6 INCHES WG POSITIVE AND 4 INCHES WG NEGATIVE, ACOUSTICAL DOUBLE LAMINATED INNER FABRIC BONDED TO A STEEL HELIX WIRE. OUTER JACKET FIRE RETARDANT REINFORCED ALUMINUM MYLAR WITH FIBERGLASS INSULATION. FLEXMASTER TYPE "8M" ACOUSTICAL INSULATED OR EQUIVALENT. MAKE ALL FLEXIBLE DUCT CONNECTIONS TO HARD DUCT USING STAINLESS STEEL SCREW CLAMPING BANDS AND SEALED AIR TIGHT WITH HIGH PRESSURE DUCT SEALER. PLASTIC BANDS ARE NOT ACCEPTABLE. SEAL FLEXIBLE DUCT VAPOR BARRIER TO HARD DUCT AND/OR ADJACENT INSULATION. NO EXPOSED FIBERGLASS SHALL BE VISIBLE. NO FLEXIBLE DUCT RUNS LONGER THAN 5 FEET.

24. AIR DISTRIBUTION DEVICES:
COORDINATE THE EXACT LOCATIONS OF ALL AIR DEVICE NEEDS WITH THE ARCHITECTURAL DRAWINGS PRIOR TO INSTALLATION. COORDINATE THE EXACT LOCATION OF EACH OUTLET WITH THE ARCHITECT WITH REGARD TO CEILING AND WALL SPACING, CENTERING ALONG SOFFITS, WALLS, ETC. FURNISH AND INSTALL WHERE SHOWN ON THE DRAWINGS ALL DIFFUSERS, GRILLES, AND REGISTERS OF THE SIZE, TYPE, AND CAPACITY AS INDICATED IN THE AIR DEVICE SCHEDULE.
ELBOWS:

25. TURNING VANES AND SMOOTH RADIUS ELBOW (WITHOUT VANES):
AT ALL DUCT TURNS OF 45 DEGREES OR MORE, PROVIDE SINGLE THICKNESS TURNING VANES PER SMACNA REQUIREMENTS. ALTERNATIVELY, USE SMOOTH RADIUS ELBOW (R/W = 1.5).

26. BRANCH TAKEOFF FITTINGS:
AT ALL MAIN TO BRANCH DUCT TAPS, TAKEOFFS, OR RUN-OUTS, PROVIDE 45 DEGREE ENTRANCE TAPS, AS DETAILED BY SMACNA STANDARDS.

27. GREASE DUCTS:
ALL KITCHEN EXHAUST DUCTS CARRYING GREASE LADEN AIR (AND ALL SUPPLY DUCTS LOCATED WITHIN 18" OF A TYPE I EXHAUST HOOD) SHALL BE FACTORY FABRICATED, DOUBLE WALL, INSULATED GREASE DUCT AS MANUFACTURED BY METAL-FAB, METALBESTOS, OR HART & COOLEY. DUCT SHALL BE SUITABLE FOR 0" CLEARANCE TO COMBUSTIBLES. DUCT SHALL CONSIST OF MINIMUM 0.035" THICK STAINLESS STEEL INNER WALL, MINIMUM 0.024" ALUMINIZED STEEL OUTER WALL, AND HIGH TEMPERATURE CERAMIC INSULATION. DUCT SHALL BE CLASSIFIED UNDER UL 1978 AND UL 2221 AND SHALL COMPLY WITH NFPA-96. DUCT SYSTEM SHALL BE RATED AS REQUIRED BY VUSBC. GREASE DUCT SYSTEM SHALL INCLUDE ALL SUPPORTS, FITTINGS, ROOF PENETRATIONS, EXPANSION JOINTS, ETC. AS NECESSARY FOR A FULL AND PROPER INSTALLATION. GREASE DUCT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. SHOP DRAWING SHALL INCLUDE A SKETCH SHOWING THE ASSEMBLY OF ALL SECTIONS. PROVIDE GREASE CLEANOUTS AND SLOPE DUCTS AS REQUIRED BY VUSBC.

28. DUCT MOUNTED ACCESS PANELS:
INSTALL ACCESS PANELS AS FOLLOWS:
AT INLET OF EACH DUCT MOUNTED FIRE AND MOTORIZED DAMPER.
FOR DUCT MOUNTED CONTROLS.
AS REQUIRED AND DIRECTED BY THE TEST AND BALANCE CONTRACTOR.
WHERE REQUIRED FOR DUCT INSPECTION, MAINTENANCE, AND CLEANING.
ACCESS PANELS SHALL BE 18 INCHES X 18 INCHES OR LARGEST DUCT WILL ALLOW. NORMALLY CENTER THE ACCESS PANEL IN THE BOTTOM OF THE DUCT AS CLOSE AS POSSIBLE TO THE DUCT MOUNTED DEVICE. ACCESS PANELS MAY BE INSTALLED ON THE SIDE OF THE DUCT, WHERE NECESSARY.
ACCESS PANELS SHALL BE DOUBLE WALL INSULATED HINGED WITH NEOPRENE GASKETS AND CAM LOCKS ON EACH UNHINGED SIDE. WHERE REQUIRED BECAUSE OF PANEL OPENING CLEARANCE, SUBSTITUTE UNHINGED ACCESS PANELS WITH CAM LOCKS ON EACH SIDE AND CAPTIVE CHAIN. ACCESS PANELS SHALL BE FLEXMASTER "TBSM-TAB DOOR" GREENHECK MODEL "HAD-10", OR EQUIVALENT. PROVIDE FOR ALL EQUIPMENT ACCESS CONCEALED ABOVE HARD CEILINGS.

29. REFRIGERANT PIPING:
REFRIGERANT PIPING SHALL CONFORM TO THE REQUIREMENTS OF THE SAFETY CODES FOR MECHANICAL REFRIGERATION AND REFRIGERANT PIPING AND THE MANUFACTURER REQUIREMENTS.
RUN ALL PIPING SQUARE TO BUILDING LINES WHEREVER POSSIBLE. FIELD ROUTE PIPING IN ORDER TO PROVIDE FOR EASE OF ACCESS TO VALVES AND OTHER APPURTENANCES.
SUPPORT INTERIOR PIPING FROM THE BUILDING STRUCTURE USING COPPER OR PVC COATED HANGERS. SUPPORT REFRIGERANT PIPING 4 FOOT ON CENTER AND AT EACH CHANGE OF DIRECTION. PROVIDE 4" WIDE INSULATION SADDLES.
SUBMIT REFRIGERANT PIPING LAYOUT SHOP DRAWINGS FOR EACH UNIQUE SYSTEM, REVIEWED AND APPROVED BY THE MANUFACTURER, IN WRITING. SHOW ALL FILTERS, DRIERS, SIGHT-GLASSES, VALVES, ETC. AS REQUIRED BY THE MANUFACTURER.
USE REFRIGERANT GRADE, TYPE "K" HARD DRAWN COPPER PIPE WITH LONG RADIUS ELBOWS. NO CAST FITTINGS ARE ACCEPTABLE. INSTALL FILTER DRIER EQUIVALENT TO SPORLAN CATCH-ALL. INSTALL SIGHT GLASSES WITH MOISTURE INDICATORS COVERED BY A PROTECTIVE CAP. LOCATE THE SIGHT GLASSES INSIDE THE BUILDINGS, CLOSE TO THE FAN COIL IN THEIR RESPECTIVE MECHANICAL CLOSETS. PROVIDE EXTERNAL FRONT SEATED BRASS SERVICE VALVES WITH SWEAT CONNECTIONS, WITH SERVICE PORTS FOR CHECKING OPERATING REFRIGERANT PRESSURES. COPPER SHALL BE CLEANED AND SHINED BEFORE BRAZING. BRAZE USING J.W. HARRIS "DYNAFLOW" 6% SILVER BRAZING ALLOY.
PIPING SHALL BE PURGED WITH DRY NITROGEN WHILE BRAZING TO PREVENT OXIDATION. UPON COMPLETION OF A WELD, THE WELD SHALL BE WIPED WITH A DAMP RAG TO REMOVE FLUX WHILE STILL HOT. ALL PIPING SHALL BE TESTED FOR 24 HOURS IN ACCORDANCE WITH THE FOLLOWING SCHEDULE AND PROVEN TIGHT:
DISCHARGE AND LIQUID REFRIGERANT PIPING--300 PSIG, NITROGEN.
SUCTION REFRIGERANT PIPING--150 PSIG NITROGEN.
REFRIGERANT PIPING, AFTER PROVEN TIGHT, SHALL BE EVACUATED BY MEANS OF AN APPROVED VACUUM PUMP TO A VACUUM OF 2.5 MM HG ABSOLUTE. SYSTEMS SHALL STAND UNDER VACUUM WITH VACUUM PUMP OFF FOR A MINIMUM OF 12 HOURS. SYSTEMS MAY BE CHARGED WITH PROPER REFRIGERANT AFTER ARCHITECT'S APPROVAL OF VACUUM TEST. A DEHYDRATOR SHALL BE USED IN CHARGING HOSE DURING CHARGING OF SYSTEMS WITH REFRIGERANT.

30. GENERAL
THIS SECTION APPLIES TO ALL MECHANICAL WORK.
ALL INSULATION SHALL BE IN STRICT ACCORDANCE WITH ASHRAE STANDARDS AND ALL LOCAL AND STATE ENERGY CODES.
THE INSULATION WORK SHALL BE PERFORMED BY A FIRM REGULARLY ENGAGED IN THIS TYPE WORK USING MECHANICS SKILLED IN THE TRADE.
INSTALL ALL MATERIALS AS RECOMMENDED BY THE MANUFACTURER FOR THE SERVICE INTENDED. ALL INSULATION MATERIAL, INCLUDING SEALER MATERIAL, ADHESIVES, COVERING MATERIAL, FINISH, ETC. SHALL HAVE A U.L. LISTED FLAME SPREAD RATING NOT OVER 24 WITHOUT EVIDENCE OF CONTINUED PROGRESSIVE COMBUSTION AND WITH A SMOKE DEVELOPED RATING NOT HIGHER THAN 50. ALL COATINGS AND COVERINGS FOR HOT SERVICE SHALL BE BREATHER TYPE AND VAPOR BARRIER TYPE FOR COLD SERVICE.
HVAC PIPING:
INSULATE REFRIGERANT SUCTION LINES AND ALL CONDENSATE DRAIN LINES WITH 1" THICK CLOSE CELLED ELASTOMERIC INSULATION INSTALLED PER THE MANUFACTURERS REQUIREMENTS. PAINT EXTERIOR INSULATION WITH TWO COATS OF PAINT AS REQUIRED BY THE INSULATION MANUFACTURER.
EXTERNALLY INSULATED DUCTS:
EXTERNALLY INSULATE ALL ROUND SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK WITH 1 1/2" THICK (3/4 LBS/CU. FT. DENSITY) DUCT WRAP WITH ALUMINUM ALL SERVICE JACKET, VAPOR BARRIER, EXCEPT PRE-INSULATED FLEXIBLE DUCT.

31. EQUIPMENT:
CAPACITY, PERFORMANCE AND CHARACTERISTICS OF EQUIPMENT SHALL BE AS INDICATED ON THE DRAWINGS AND AS SPECIFIED OR IMPLIED HEREIN. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY INCREASED COST TO HIMSELF OR OTHERS FOR EQUIPMENT WHICH DEVIATES FROM THAT SCHEDULED OR IMPLIED HEREIN. REGARDLESS OF COST AFFECT, THE ARCHITECT MUST APPROVE ANY DEVIATION FROM THE DRAWINGS AND THE SPECIFICATION.

32. MOTORS AND STARTERS:
ALL ELECTRIC MOTORS SHALL BE HIGH EFFICIENCY TYPE WITH MAXIMUM OF 1750 RPM WITH OPEN DRIP PROOF OR TEFC ENCLOSURES, UNLESS OTHERWISE NOTED. MOTORS LOCATED ON AIR HANDLING UNITS SHALL BE MOUNTED IN RUBBER SUPPORTS OR THE FAN SHALL BE INDEPENDENTLY SUPPORTED ON SPRING ISOLATORS. MOTORS LOCATED IN THE CONDITIONED SPACE SHALL BE SELECTED FOR QUIET OPERATION AND SHALL NOT PRODUCE AN OBJECTIONABLE "MOTOR NOISE" IN THE SPACE.
ELECTRICAL CHARACTERISTICS SHALL BE VERIFIED FROM THE ELECTRICAL DRAWINGS, PRIOR TO BIDDING, AND VERIFIED ON THE JOB WITH THE ELECTRICAL SUB-CONTRACTOR. IF A CONFLICT ARISES, THE ELECTRICAL DRAWINGS SHALL BE THE AUTHORITY.
PROVIDE MOTOR STARTERS AND PROPER HEATER ELEMENTS SIZED IN ACCORDANCE WITH NFPA 70. STARTERS SHALL BE SQUARE-D OR EQUIVALENT WITH OVERLOAD TRIP ELEMENT IN EACH PHASE. LARGER MOTORS AND THEIR STARTERS SHALL MEET THE REQUIREMENTS OF THE UTILITY COMPANY AS TO INRUSH ALLOWABLE AND THE TYPE OF STARTING PERMITTED.
SHOULD ANY MECHANICAL EQUIPMENT REQUIRE EXTRA WORK BY OTHER TRADES, FOR PROPER INSTALLATION, THIS CONTRACTOR SHALL BEAR ALL COSTS, SUCH AS INCREASED ELECTRICAL, STRUCTURAL, ROOFING, ETC.

33. SYSTEMS TEST AND BALANCE:
THE REQUIRED TEST & BALANCE OF THE HVAC SYSTEM SHALL BE PERFORMED BY AN APPROVED INDEPENDENT TESTING AGENCY AS SPECIFIED BELOW.
AGENCY QUALIFICATIONS:
TEST & BALANCE SHALL BE PERFORMED BY AN INDEPENDENT AGENCY ENGAGED SOLELY IN TEST AND BALANCE WORK. AGENCY SHALL BE A MEMBER OF THE ASSOCIATED AIR BALANCE COUNCIL (AABC) AND NATIONAL ENVIRONMENTAL BALANCING BUREAU, (NEBB). SUBMIT A WRITTEN REPORT WITHIN 30 DAYS OF COMMENCING WORK, WITH ANY RECOMMENDED CHANGES TO INSURE BALANCING CAPABILITY. SUBMIT A DETAILED TEST PLAN TO THE ARCHITECT ILLUSTRATING ALL FORMATS, DRAWINGS, AND TEST PROCEDURE TO BE USED FOR TESTING THE COMPLETED SYSTEM. THE APPROVED PLAN WILL BE USED FOR TESTING THE SYSTEMS. PROCEDURES SHALL INCLUDE REQUIREMENTS LISTED IN AABC/NEBB STANDARDS, LATEST EDITION AND ANY SPECIAL REQUIREMENTS FOR THIS PROJECT. MAKE PROJECT VISITS AS REQUIRED DURING CONSTRUCTION PERIOD INSPECTING FOR PROPER INSTALLATION OF THE SYSTEM AND RELATED BALANCING DEVICES. PROJECT VISIT REPORTS SHALL BE MADE TO THE ARCHITECT IN WRITING.
CONTRACTORS REQUIREMENTS PRIOR TO TEST & BALANCE:
THE CONTRACTOR SHALL PERFORM ALL REQUIRED PRELIMINARY TESTS AND OTHER PREPARATORY WORK, INCLUDING BUT NOT LIMITED TO:
MAKE SURE ALL FANS ARE OPERATING, CHECK ROTATION, RPM, AND AMPS. CHECK ALL DAMPERS FOR OPERATION.
PUT ALL HVAC EQUIPMENT IN FULL OPERATION INCLUDING AIR UNITS AND FANS. MAKE SURE ALL HVAC CONTROLS ARE INSTALLED AND FULLY OPERATIONAL. CLEAN/REPLACE FILTERS JUST PRIOR TO TESTING.
PROVIDE ALL BALANCING DEVICES AND DRIVE CHANGES THAT ARE DEEMED NECESSARY BY T&B AGENCY FOR BALANCE AT NO ADDITIONAL COST TO THE OWNER.
TEST & BALANCE AGENCY SHALL BALANCE ALL AIR SYSTEMS FOR OPERATION WITHIN DESIGN CRITERIA. PRIME MOVERS SHALL BE WITHIN 5% OF DESIGN AND TERMINALS WITHIN 10% OF DESIGN.
AIR SYSTEMS SHALL BE BALANCED AS DESCRIBED HEREIN.
TEST REPORT: THE FINAL TAB REPORT SHALL BE SUBMITTED IN PDF FORMAT.
REPORT SHALL BE INDEXED.
TABLE OF CONTENTS SHALL LIST ALL REPORTS.
ALL AIR OUTLETS SHALL BE LOCATED ON CODED DRAWINGS PREPARED BY THE T&B AGENCY.
AIR OUTLETS FORMS SHALL BE PREPARED AND CORRELATED TO THE CODED DRAWINGS.
TEST SUMMARY SHALL DESCRIBE FINAL TEST PROCEDURES AND SPECIAL CONDITIONS DURING TESTS (SUCH AS THERMOSTAT OUTSIDE/RETURN AIR RELATIONSHIP), AND DUCT STATIC PRESSURE.
DESCRIBE OTHER DATA THAT MAY ASSIST OPERATING PERSONNEL IN THE CONTINUING OPERATION OF THE SYSTEM.
T&B CONTRACTOR SHALL TAKE AND RECORD ALL NECESSARY READINGS AT THE FINAL BALANCE POINTS, SUCH AS BUT NOT LIMITED TO: AIR QUANTITIES, PRESSURES, SETPOINTS, ENTERING AND LEAVING COIL TEMPERATURES, SPACE INDOOR AND OUTSIDE WET AND DRY BULB TEMPERATURES, OUTDOOR WEATHER CONDITIONS, ELECTRICAL READINGS OF ALL NEW AND EXISTING MOTORS, COMPRESSORS, ETC.
TEST REPORT SHALL CONTAIN TBA CERTIFICATION OF TEST DATA AND SYSTEM CONDITIONS.
SUBMIT THE TEST REPORTS, FOR REVIEW, BEFORE SUBSTANTIAL COMPLETION.
END OF MECHANICAL SPECIFICATIONS.

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COMM No: 23-30
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STATE PROJECT No:

MECHANICAL SPECIFICATIONS

ISNRV BUILDING EXPANSION
Blacksburg, VA

COMMONWEALTH OF VIRGINIA
JOHN N. BERG, JR
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10/28/2024
PROFESSIONAL ENGINEER

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REVISIONS

No.	DESCRIPTION	DATE

M400

FOR QUESTIONS, CALL THE
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REGION 29
PHONE:
EMAIL: jt.obrien@captiveaire.com

PATENT NUMBERS

EXHAUST HOODS ND-2/BD-2/SND-2 (CANADA) - CA PATENT 2520435 C.

HOOD INFORMATION – JOB#7062008

HOOD NO	TAG	MODEL	MANUFACTURER	LENGTH	MAX COOKING TEMP	TYPE	APPLIANCE DUTY	DESIGN CFM/FT	TOTAL EXH CFM	EXHAUST PLENUM RISER(S)							HOOD CONSTRUCTION	HOOD CONFIG	
										WIDTH	LENG	HEIGHT	DIA	CFM	VEL	SP		END TO END	ROW
1		5424 ND-2	CAPTIVEAIRE	6' 8"	600 DEG	I	HEAVY	190	1265			4"	12"	1265	1611	-0.746"	430 SS WHERE EXPOSED	ALONE	ALONE

HOOD INFORMATION

HOOD NO	TAG	FILTER(S)					LIGHT(S)			UTILITY CABINET(S)					FIRE SYSTEM PIPING	HOOD HANGING WEIGHT
											FIRE SYSTEM		ELECTRICAL	SWITCHES		
		TYPE	QTY	HEIGHT	LENGTH	EFFICIENCY @ 7 MICRONS	QTY	TYPE	WIRE GUARD	LOCATION	SIZE	TYPE	SIZE	MODEL #	QUANTITY	
1		CAPTRATE SOLO FILTER	4	16"	16"	85% SEE FILTER SPEC	2	RECESSED ROUND	NO	RIGHT	12"x54"x24"	TANK FS	4.0/4.0	SC-311110MA	1 LIGHT 1 FAN	YES	703 LBS

HOOD OPTIONS

HOOD NO	TAG	OPTION
1		FIELD WRAPPER 18.00" HIGH FRONT, RIGHT.
		BACKSPLASH 80.00" HIGH X 93.00" LONG 430 SS VERTICAL.
		LEFT SIDESPLASH 80.00" HIGH X 54.00" LONG 430 SS VERTICAL.
		LEFT END STANDOFF (FINISHED) 1" WIDE 54" LONG INSULATED.
		RISER SENSOR INSTALL 6IN PLEN.
		RIGHT VERTICAL END PANEL 27" TOP WIDTH, 21" BOTTOM WIDTH, 80" HIGH INSULATED 430 SS.
		LEFT WALL AS END PANEL.

§

GREASE DUCT & CHIMNEY SPECIFICATIONS:
PROVIDE GREASE DUCT EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW" ROUND 20 GAUGE 430 STAINLESS STEEL DUCTWORK. MODEL "DW" IS LISTED TO UL-1978 AND IS INSTALLED USING "V" CLAMP LOCKING CONNECTIONS SEALED WITH 3M FIRE BARRIER 2000 PLUS. MODEL "DW" DOES NOT REQUIRE WELDING PROVIDING IT HAS BEEN INSTALLED PER THE MANUFACTURES INSTALLATION GUIDE.
PROVIDE RATED ACCESS DOORS AT EVERY CHANGE IN DIRECTION AND EVERY 12' ON CENTER. PER MANUFACTURES LISTING MODEL "DW" HORIZONTAL RUNS LESS THAN 75 FT. CAN BE SLOPED 1/16" PER 12", HORIZONTAL RUNS MORE THAN 75 FT. CAN BE SLOPED 3/16" PER 12".
DUCT SHOULD BE SLOPED AS MUCH AS POSSIBLE TO REDUCE THE CHANCE OF GREASE ACCUMULATION IN HORIZONTAL RUNS.

IF THE DUCT OR CHIMNEY IS WITHIN 18 INCHES OF COMBUSTIBLE MATERIAL, PROVIDE UL-2221 OR UL-103 HT LISTED DOUBLE WALL GREASE DUCT OR DOUBLE WALL CHIMNEY EQUAL TO CAPTIVEAIRE SYSTEMS MODEL "DW- 2R, 2R TYPE HT, 3R, OR 3Z" ROUND 20 GAUGE 430 STAINLESS INNER DUCT INSULATED WITH A 24 GAUGE 430 STAINLESS OUTER SHELL.

CAPTIVEAIRE SYSTEMS RECOMMENDS THE USE OF LISTED, PRE-FABRICATED ROUND GREASE EXHAUST DUCT TO REDUCE STATIC PRESSURE IN THE SYSTEM, MINIMIZE INSTALLATION AND INSPECTION TIMES, AND ENSURE DUCT IS LIQUID TIGHT

HVAC DISTRIBUTION NOTE

HIGH VELOCITY DIFFUSERS OR HVAC RETURNS SHOULD NOT BE PLACED WITHIN TEN (10) FEET OF THE EXHAUST HOOD. PERFORATED DIFFUSERS ARE RECOMMENDED.

VERIFY CEILING HEIGHT

___' - ___"

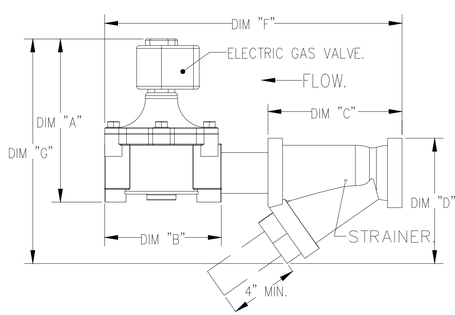
HEIGHT REQUIRED TO VERIFY THAT HOOD FITS SPACE AND TO SIZE THE ENCLOSURE PANELS

CUSTOMER APPROVAL TO MANUFACTURE:

APPROVED AS NOTED ☐
APPROVED WITH NO EXCEPTION TAKEN ☐
REVISE AND RESUBMIT ☐
SIGNATURE _____
YOUR TITLE _____ DATE _____

GAS VALVES AND STRAINERS

	GAS VALVE SIZING						GAS VALVE DIMENSIONS						INSTALLATION	PART NUMBERS			
	TYPE	SIZE	VOLTAGE	MIN. INLET PRESSURE	MAX. INLET PRESSURE	FLOW AT 1 IN.W.C. DROP NATURAL GAS	FLOW AT 1 IN.W.C. DROP PROPANE	DIM "A"	DIM "B"	DIM "C"	DIM "D"	DIM "F"	DIM "G"	MOUNTING ORIENTATION	GAS VALVE PART NUMBER	STRAINER PART NUMBER	GAS VALVE/STRAINER KIT
GAS VALVE FOR FS#1 →	ELECTRICAL	1"	120 VAC	0 PSI (0 IN.W.C.)	5 PSI (138 IN.W.C.)	1,132,300 BTU/HR	734,733 BTU/HR	6-15/16"	5-15/16"	4-7/8"	5-3/16"	12-13/16"	10-11/16"	HORIZONTAL	8214250	4417K65	(SC)EGVA1



CALCULATIONS

TO CALCULATE GAS FLOW FOR OTHER THAN 1 IN.W.C. PRESSURE DROP
NEW BTU/HR = (BTU/HR AT 1 IN.W.C. PRESSURE DROP) X NEW PRESSURE DROP$^{0.5}$
TO CALCULATE GAS FLOW FOR OTHER THAN 0.64 SPECIFIC GRAVITY
NEW BTU/HR = (BTU/HR AT 0.64) X (0.64 / NEW SPECIFIC GRAVITY)$^{0.5}$.

ALL GAS VALVES/STRAINERS

PROPER CLEARANCE MUST BE PROVIDED IN ORDER TO SERVICE THE STRAINERS A MINIMUM OF 4" CLEARANCE DISTANCE MUST BE PROVIDED AT THE BASE OF THE STRAINER CUSTOMER MUST VERIFY BTU CONSUMPTION AS WELL AS PRESSURE RATING SPECIFIC GRAVITY OF NATURAL GAS = 0.64, SPECIFIC GRAVITY OF LP = 1.52.

ELECTRIC GAS VALVES ONLY:

3/4"–2" 120VAC GAS VALVES CAN BE MOUNTED WITH THE SOLENOID IN ANY POSITION ABOVE HORIZONTAL.
2 1/2"–3" 120VAC GAS VALVES MUST BE MOUNTED WITH THE SOLENOID VERTICAL AND UPRIGHT.
24VDC GAS VALVES MUST BE MOUNTED WITH THE SOLENOID VERTICAL AND UPRIGHT.

SPECIFICATION: CAPTRATE GREASE-STOP SOLO FILTER

THE CAPTRATE GREASE-STOP SOLO FILTER IS A SINGLE-STAGE FILTER FEATURING A UNIQUE S-BAFFLE DESIGN IN CONJUNCTION WITH A SLOTTED REAR BAFFLE DESIGN, TO DELIVER EXCEPTIONAL FILTRATION EFFICIENCY.

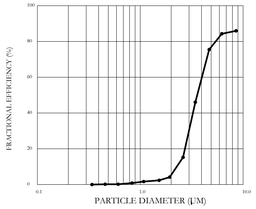
FILTER IS STAINLESS STEEL CONSTRUCTION, AND SIZED TO FIT INTO STANDARD 2-INCH DEEP HOOD CHANNEL(S).

UNITS SHALL INCLUDE STAINLESS STEEL HANDLES AND A FASTENING DEVICE TO SECURE THE TWO COMPONENTS WHEN ASSEMBLED.

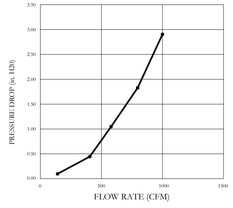
GREASE EXTRACTION EFFICIENCY PERFORMANCE SHALL REMOVE AT LEAST 75% OF GREASE PARTICLES FIVE MICRONS IN SIZE, AND 85% GREASE PARTICLES SEVEN MICRONS IN SIZE AND LARGER, WITH A CORRESPONDING PRESSURE DROP NOT TO EXCEED 1.0 INCHES OF WATER GAUGE.

THE CAPTRATE GREASE-STOP SOLO WAS TESTED TO ASTM STANDARD ASTM F2519-05. MANUFACTURER APPROVED FOR USE IN SOLID FUEL APPLICATIONS AS A SPARK ARRESTER.

EFFICIENCY VS. PARTICLE DIAMETER

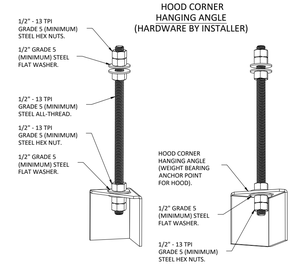


PRESSURE DROP VS. FLOW RATE



CAPTRATE FILTERS ARE BUILT IN COMPLIANCE WITH:.
NFPA #96.
NSF STANDARD #2.
UL STANDARD #1046.
INT. MECH. CODE (IMC).
ULC-S649.

HOOD CORNER HANGING ANGLE (HARDWARE BY INSTALLER)



ASSEMBLY INSTRUCTIONS

HANGING ANGLE MUST BE SUPPORTED WITH 1/2" - 13 TPI GRADE 5 (MINIMUM) ALL-THREAD. SANDWICH HANGING ANGLES AND CEILING ANCHOR POINTS WITH 1/2" GRADE 5 (MINIMUM) STEEL FLAT WASHERS AND 1/2" - 13 TPI GRADE 5 (MINIMUM) HEX NUTS AS SHOWN. MUST USE DOUBLED HEX NUT CONFIGURATION BENEATH HOOD HANGING ANGLES AND ABOVE CEILING ANCHORS. MAINTAIN 1/4" OF EXPOSED THREADS BENEATH BOTTOM HEX NUT. TORQUE ALL HEX NUTS TO 57 FT-LBS.

SYSTEM DESIGN VERIFICATION (SDV)

IF ORDERED, CAS SERVICE WILL PERFORM A SYSTEM DESIGN VERIFICATION (SDV) ONCE ALL EQUIPMENT HAS HAD A COMPLETE START UP PER THE OPERATION AND INSTALLATION MANUAL. TYPICALLY, THE SDV WILL BE PERFORMED AFTER ALL INSPECTIONS ARE COMPLETE.

ANY FIELD RELATED DISCREPANCIES THAT ARE DISCOVERED DURING THE SDV WILL BE BROUGHT TO THE ATTENTION OF THE GENERAL CONTRACTOR AND CORRESPONDING TRADES ON SITE. THESE ISSUES WILL BE DOCUMENTED AND FORWARDED TO THE APPROPRIATE SALES OFFICE. IF CAS SERVICE HAS TO RESOLVE A DISCREPANCY THAT IS A FIELD ISSUE, THE GENERAL CONTRACTOR WILL BE NOTIFIED AND BILLED FOR THE WORK. SHOULD A RETURN TRIP BE REQUIRED DUE TO ANY FIELD RELATED DISCREPANCY THAT CANNOT BE RESOLVED DURING THE SDV, THERE WILL BE ADDITIONAL TRIP CHARGES.

DURING THE SDV, CAS SERVICE WILL ADDRESS ANY DISCREPANCY THAT IS THE FAULT OF THE MANUFACTURER. SHOULD A RETURN TRIP BE REQUIRED, THE GENERAL CONTRACTOR AND APPROPRIATE SALES OFFICE WILL BE NOTIFIED. THERE WILL BE NO ADDITIONAL CHARGES FOR MANUFACTURER DISCREPANCIES.

FIRE SYSTEM INFORMATION – JOB#7062008

FIRE SYSTEM NO	TAG	TYPE	SIZE	MAX FP	DESIGN FP	INSTALLATION	
						SYSTEM	LOCATION ON HOOD
1		TANK FS	4.0/4.0	40	23	FIRE CABINET RIGHT	RIGHT, HOOD 1

GAS VALVE(S)

FIRE SYSTEM NO	TAG	TYPE	SIZE	SUPPLIED BY
1		SC ELECTRICAL	1.000	CAPTIVEAIRE SYSTEMS

FIRE SYSTEM PARTS LIST KEY

FIRE SYSTEM NO	TAG	KEY NUMBER - PART DESCRIPTION	QTY BY FACTORY	QTY BY DIST
1		0 - 0 - TANK FIRE SUPPRESSION POST-DISCHARGE PROCEDURE UTILITY CABINET LABEL SHEET.	1	0
		0 - 0 - TANK FIRE SUPPRESSION MAINTENANCE GUIDE UTILITY CABINET LABEL SHEET.	1	0
		0 - 0 - 12-F28021-32144-OT-360 DUCT FIRE THERMOSTAT WITH 12 FOOT WIRE LEADS. NO, CLOSE ON TEMP RISE AT 360°F. (A0034310).	1	0
		0 - 0 - 4429K153 1/2" MALE NPT TO 1/2" FEMALE NPT ELBOW, BRASS.	2	0
		0 - 0 - 4429K422 1/2" X 1/4" BRASS REDUCING BUSHING.	1	0
		0 - 0 - 79525 1/2" 90 PRO-PRESS ELBOW WITH 1/2" NPT FEMALE CONNECTION, VIEGA.	1	0
		0 - 0 - 79580 1/2" X 1/2" PRO-PRESS TEE X 1/2" NPT FEMALE CONNECTION, VIEGA.	2	0
		0 - 0 - 87-120042-001 SECONDARY ACTUATOR VALVE (SVA) - SINGLE ACTUATOR, REQUIRES PRIMARY RELEASE ACTUATOR, TANK FIRE SUPPRESSION.	1	0
		0 - 0 - 87-120045-001 HOSE, SECONDARY ACTUATOR HOSE, 7.5" BRAIDED STAINLESS STEEL, TANK FIRE SUPPRESSION.	1	0
		0 - 0 - 87-300001-001 TANK - PRESSURIZED TANK USED FOR TANK FIRE SUPPRESSION.	2	0
		0 - 0 - 87-300030-001 PRIMARY ACTUATOR KIT (PAK) - ACTUATOR AND RELEASE SOLENOID ASSEMBLY, ONE NEEDED PER FIRE SYSTEM, SUPERVISED, TANK FIRE SUPPRESSION.	1	0
		0 - 0 - 87-300030-001 PRIMARY ACTUATOR KIT (PAK) - ACTUATOR AND RELEASE SOLENOID ASSEMBLY, ONE NEEDED PER FIRE SYSTEM, SUPERVISED, TANK FIRE SUPPRESSION.	1	0
		0 - 0 - 87-300152-001 HARDWARE, SVA BOLTS, TANK FIRE SUPPRESSION.	8	0
		0 - 0 - 98694A115 HARDWARE, DATANKLOCK LOCKING BRACKET SQUARE NUTS 5/16" ZINC, TANK FIRE SUPPRESSION.	4	0
		0 - 0 - A0034332 JUNCTION BOX FOR MANUAL PULL STATION. 1.5" DEEP BACK BOX, RED COLOR.	1	0
		0 - 0 - A31484 1/4" NPT SCHRADER VALVE AND CAP, JB INDUSTRIES. 1/4" FLARE X 1/4" MPT HALF UNION. USED ON TANK SERVICE PORT.	1	0
		0 - 0 - DATANKLOCK DISCHARGE ADAPTER TANK LOCKING PLATE FOR FIRE SYSTEM TANK INSTALLATION IN UTILITY CABINETS, TANK FIRE SUPPRESSION.	2	0
		0 - 0 - TANK STRAP TANK STRAP - USED FOR TANK FIRE SUPPRESSION.	6	0
		0 - 0 - TFS-UCTANKBRACKET TANK BRACKET FOR FIRE SYSTEM TANK INSTALLATION IN UTILITY CABINETS, TANK FIRE SUPPRESSION.	2	0
		0 - 0 - WK-283952-000 DISCHARGE ADAPTER, TANK FIRE SUPPRESSION.	2	0
		34 - 34 - A0034331 24VDC SINGLE ACTION MANUAL ACTUATION DEVICE (PUSH/PULL STATION) WITH PROTECTIVE COVER, ONE (1) NORMALLY OPEN CONTACT. RED COLOR.	1	0

ELECTRICAL PACKAGE – JOB#7062008

NO	TAG	PACKAGE #	LOCATION	SWITCHES		OPTION	FANS CONTROLLED				
				LOCATION	QUANTITY		TYPE	Φ	HP	VOLT	FLA
1		SC-311110MA	UTILITY CABINET RIGHT	UTILITY CABINET RIGHT	1 LIGHT	SMART CONTROLS THERMOSTATIC CONTROL W/ RELAY ON/OFF WITH SUPPLY	EXHAUST	1	0.750	230	5.0
				HOOD # 1	1 FAN		SUPPLY	3	1.000	208	3.1

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HOOD SYSTEM DETAILS 1 OF 3

ISNRV BUILDING EXPANSION
Blacksburg, VA

COMMONWEALTH OF VIRGINIA
JOHN N. BERG, JR
Lic. No. 051165
10/28/2024
PROFESSIONAL ENGINEER

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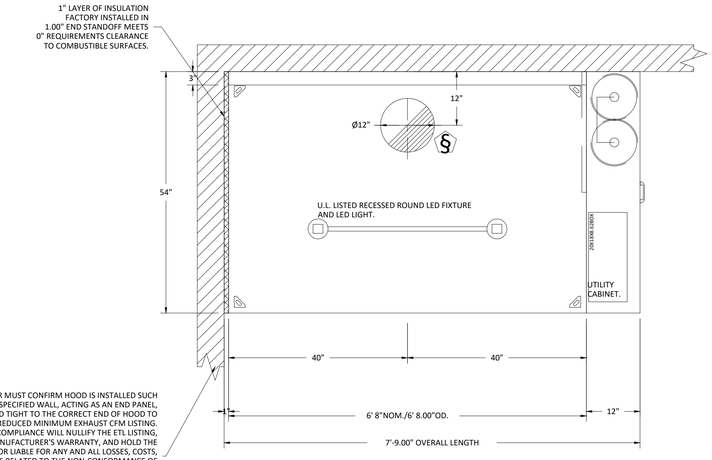
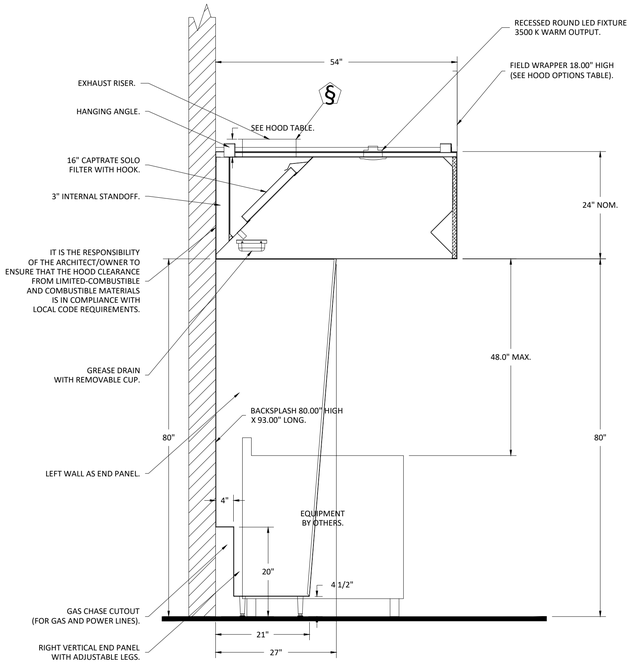
SHEET 102 OF 122



PLAN VIEW – HOOD #1
6' 8.00" LONG 5424ND–2



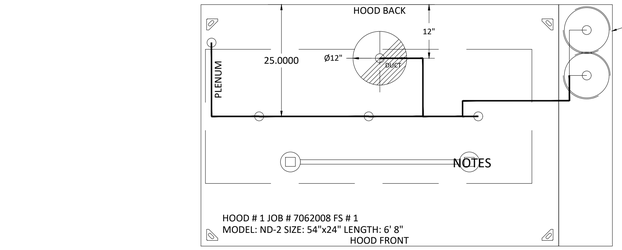
SECTION VIEW – MODEL 5424ND–2
HOOD – #1

CLEARANCE TO COMBUSTIBLES

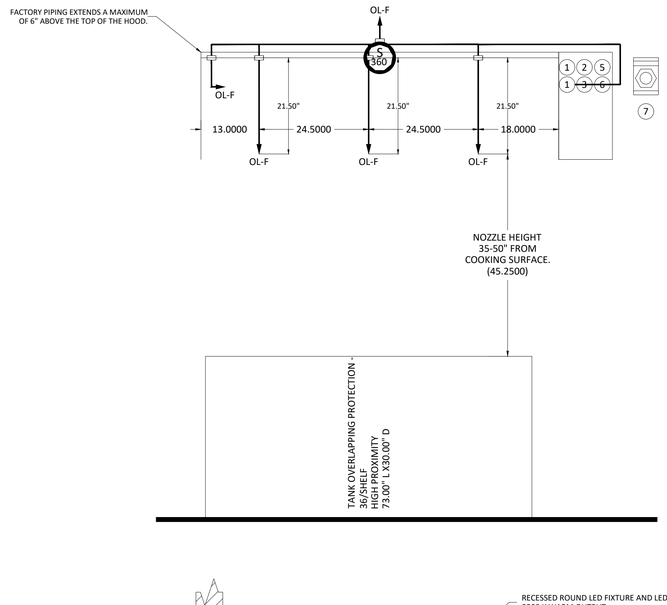
HOODS #	SURFACE	*CLEARANCE
1	TOP	18"
	FRONT	0"
	BACK	18"
	LEFT	0"
	RIGHT	0"

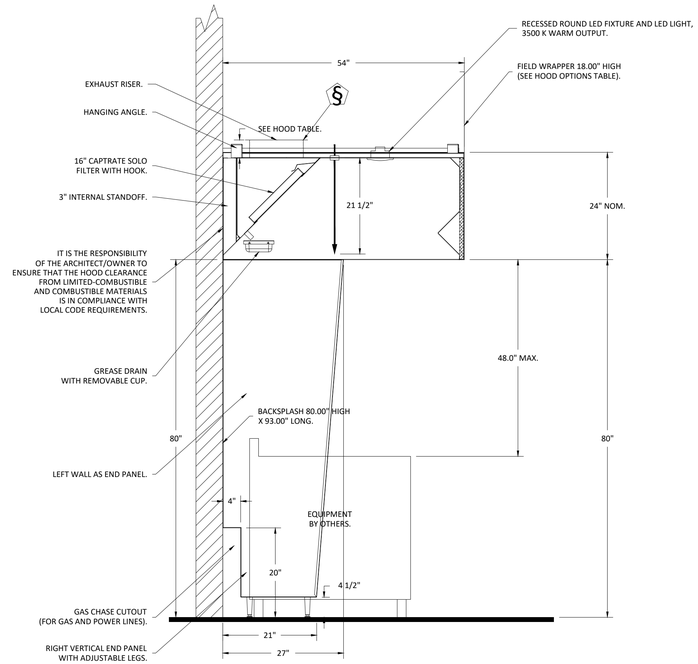
- *0" CLEARANCE TO COMBUSTIBLES CONFORMS TO UL710 STANDARD.

- HOOD MOUNTED UTILITY CABINETS REQUIRE 36" SERVICE CLEARANCE.



SYSTEM REQUIRES A MINIMUM OF 7 FT OF EQUIVALENT PIPE LENGTH BETWEEN TANK AND NEAREST APPLIANCE NOZZLE FOR MOST APPLIANCES. EACH 90 DEGREE ELBOW ADDS 1.3 FT OF EQUIVALENT LENGTH. SEE MANUAL FOR DETAILS





SECTION VIEW – MODEL 5424ND–2
HOOD – #1

- FIELD PIPE DROPS AS SHOWN
  PIPING, ELBOWS, TEES, AND NOZZLES SUPPLIED BY CAS.
- FIELD INSTALLED DROP: FACTORY WILL PROVIDE QTY 2 60IN LONG PIECES OF CHROME PLATED PIPING SHIPPED LOOSE TO BE FIELD-INSTALLED.
- SHIP LOOSE DROP: FACTORY WILL PROVIDE THE EXACT CHROME PIPE LENGTH NEEDED SHIPPED LOOSE TO BE FIELD-INSTALLED.
- RELOCATE NOZZLES IF FLOW PATTERN IS BLOCKED BY SHELVING, SALAMANDERS, ETC.
- OVERLAPPING COVERAGE SHALL NOT BE USED ON ANY APPLIANCE WITH AN OBSTRUCTION.
- IF APPLICABLE, EXTENDED PRE-PIPED DROPS ARE SHIPPED LOOSE.
- FACTORY PIPING EXTENDS A MAXIMUM OF 6" ABOVE THE TOP OF THE HOOD.

- APPLIANCE DIMENSIONS LISTED REPRESENT THE COOKING SURFACE SIZE, NOT THE OVERALL APPLIANCE SIZE.

- THIS FIRE SYSTEM COMPLIES WITH U.L. 300 REQUIREMENTS.

- OL-F NOZZLE PART NUMBER REPLACES 3070-3/8H-10-SS

JOB #: 7062008.
JOB NAME: ISNRV.

SYSTEM SIZE: TANK-SP-2 DESIGN FP: 23. MAXIMUM FP: 40.
HOOD # 1 6' 8.00" LONG x 54" WIDE x 24" HIGH.
RISER # 1 SIZE: 12" DIA.
HOOD # 1 METAL BLOW-OFF CAPS INCLUDED.

- HEAVY-DUTY APPLIANCES (RATED 600°F) WILL REQUIRE AN ADDITIONAL DOWNSTREAM FIRESTAT IN THE EVENT THAT THE DUCTWORK CONTAINS ANY HORIZONTAL RUNS OVER 25 FT IN LENGTH.
- MEDIUM TO LIGHT-DUTY APPLIANCES (RATED 450°F) WILL NOT REQUIRE ANY ADDITIONAL DOWNSTREAM DETECTION.

AGENT DISTRIBUTION PIPING LIMITATIONS	
PIPE SECTION	MAX PIPE LENGTH (FT)
MAX SUPPLY LINE TO FIRST OVERLAPPING NOZZLE	42
OVERLAPPING NOZZLE APPLIANCE BRANCH	10
DEDICATED NOZZLE APPLIANCE BRANCH	10

LEGEND – FIRE CABINET TANK SYSTEM

1 4 GALLON TANK.
2 PRIMARY ACTUATOR RELEASE.
3 SECONDARY ACTUATOR RELEASE.
4 PRESSURE SUPERVISION SWITCH.
5 PRIMARY HOSE ASSEMBLY.
6 SECONDARY HOSE ASSEMBLY.
7 REMOTE MANUAL ACTUATION DEVICE.

INCLUDES: FIELD INSTALLATION AND HOOKUP DURING NORMAL BUSINESS HOURS BY CERTIFIED INSTALLERS ONLY IN THE LOCATION NOTED ABOVE, TWO SITE VISITS ONLY (ONE VISIT TO SET PULL STATION & SYSTEM HOOKUP AND ONE VISIT FOR ONE TEST; ADDITIONAL VISITS WILL RESULT IN ADDITIONAL CHARGES), ONE MECHANICAL OR ELECTRICAL GAS VALVE PER SYSTEM AT A MAXIMUM SIZE OF 2", PERMIT, AND SYSTEM TEST.
EXCLUDES: UNION LABOR & PREVAILING WAGE (LABOR & WAGES WILL BE ADDED IF APPLICABLE), GAS VALVE INSTALLATION, ELECTRICAL HOOKUP AND CONNECTIONS, HANGING OF FIRE CABINET, SHUNT TRIP, HANDHELD EXTINGUISHER(S), ON-SITE RE-PIPING DUE TO EQUIPMENT LAYOUT CHANGES.

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HOOD SYSTEM DETAILS 2 OF 3

ISNRV BUILDING EXPANSION
Blacksburg, VA

COMMONWEALTH OF VIRGINIA
JOHN N. BERG, JR
Lic. No. 051165
10/28/2024
PROFESSIONAL ENGINEER

FIVE DESIGN ARCHITECTURE

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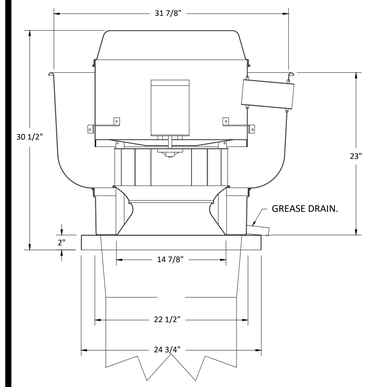
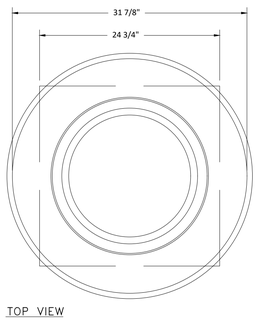
EXHAUST FAN INFORMATION – JOB#7062008

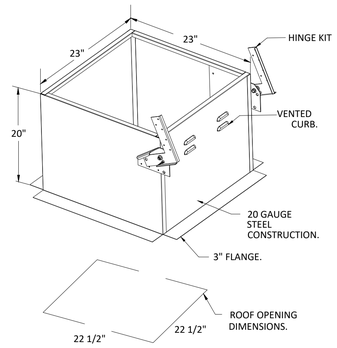
FAN UNIT NO	TAG	QTY	FAN UNIT MODEL #	MANUFACTURER	CFM	ESP	RPM	MOTOR ENCL	HP	BHP	PHASE	VOLT	FLA	DISCHARGE VELOCITY	WEIGHT (LBS)	SONES
1		1	DU85HFA	CAPTIVEAIRE	1265	1.000	1244	TEAO-ECM	0.750	0.3230	1	230	5.0	400 FPM	90	9.6

FAN #1 DU85HFA - EXHAUST FAN





TOP VIEW



FEATURES:

- DIRECT DRIVE CONSTRUCTION (NO BELTS/PULLEYS).
- ROOF MOUNTED FANS.
- RESTAURANT MODEL.
- UL705 AND UL762 AND ULC-S645
- VARIABLE SPEED CONTROL.
- INTERNAL WIRING.
- THERMAL OVERLOAD PROTECTION (SINGLE PHASE).
- HIGH HEAT OPERATION 300°F (149°C).
- GREASE CLASSIFICATION TESTING.
- NEMA 3R SAFETY DISCONNECT SWITCH.

NORMAL TEMPERATURE TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING AIR AT 300°F (149°C) UNTIL ALL FAN PARTS HAVE REACHED THERMAL EQUILIBRIUM, AND WITHOUT ANY DETERIORATING EFFECTS TO THE FAN WHICH WOULD CAUSE UNSAFE OPERATION.

ABNORMAL FLARE-UP TEST
EXHAUST FAN MUST OPERATE CONTINUOUSLY WHILE EXHAUSTING BURNING GREASE VAPORS AT 600°F (316°C) FOR A PERIOD OF 15 MINUTES WITHOUT THE FAN BECOMING DAMAGED TO ANY EXTENT THAT COULD CAUSE AN UNSAFE CONDITION.

OPTIONS

- GREASE BOX.
- FAN BASE CERAMIC SEAL - DU/DR85HFA - INSTALLED AT PLANT - FOR GREASE DUCTS.
- ECM WIRING PACKAGE - PWM SIGNAL FROM ECPMO3 PREWIRE (TELCO MOTOR), CCW ROTATION.
- 2 YEAR PARTS WARRANTY.

DOAS/RTU FAN SCHEDULE – JOB#7062008

FAN INFORMATION										ELECTRICAL INFORMATION					COOLING INFORMATION										REHEAT INFORMATION					GAS HEAT INFORMATION					NOTES
FAN UNIT NO	TAG	QTY	DOAS/RTU MODEL #	MANUFACTURER	BLOWER	RETURN AIR CFM	MAX OUTSIDE AIR CFM	TOTAL CFM	WEIGHT (LBS)	ESP	HP	PHASE	VOLT	MCA	MOCP	OUTSIDE AIR		MIXED AIR		LEAVING AIR			CAPACITY		IEER	ISMRE	DISCHARGE		CAPACITY		MOISTURE REMOVAL RATE	GAS TYPE	INPUT BTUs	OUTPUT BTUs	TEMP RISE	REQUIRED INPUT GAS PRESSURE	
																DB	WB	DB	WB	DB	WB	DP	TOTAL	SENS.			DB	WB	DESIRED	MAX						
2		1	CAS-HVAC1-I.125-13-6T	CAPTIVEAIRE	13P-1	0	1100	1100	1314	0.500	1.00	3	208	30.7A	35A	80.4°F	74.0°F	80.4°F	74.0°F	51.4°F	51.4°F	51.5°F	84.0 MBH	34.7 MBH	19.5	9.2	70.0°F	58.6°F	21.4 MBH	56 MBH	41.1 LBS/HR	NATURAL	113291	91766	75°F	7 IN. W.C. - 14 IN. W.C.	1,2,3,4,5,6,7,8,9,10,11,12,13,14

NOTES:
1. INVERTER SCROLL COMPRESSOR WITH INTEGRATED OIL SENSOR. DIGITAL OR STAGED SCROLL NOT AN APPROVED EQUAL
2. DIRECT DRIVE PLENUM BLOWER. BELT DRIVEN BLOWERS ARE NOT ACCEPTABLE
3. INTEGRATED MONITORING VIA CELLULAR CONNECTION BY MANUFACTURER
4. REFRIGERATION PRESSURE MONITORING ON HIGH AND LOW PRESSURE SIDE OF SYSTEM INCLUDED THROUGH DIGITAL INTERFACE
5. EC MOTOR CONDENSING FANS
6. ELECTRONIC EXPANSION VALVE. TXV NOT ACCEPTABLE
7. SUCTION LINE ACCUMULATOR
8. FACTORY COMMISSIONING WITH 5 YEAR PARTS WARRANTY, 25 YEAR WARRANTY ON STAINLESS STEEL HEAT EXCHANGER
9. AVERAGING INTAKE, EVAP AND DISCHARGE TEMPERATURE SENSORS (DISCHARGE SENSOR TO BE FACTORY MOUNTED WITHIN UNIT)
10. 81% EFFICIENT FURNACE, WITH MODULATING INDUCER TO MAINTAIN CONSTANT COMBUSTION EFFICIENCY ACROSS FIRING RANGE. 6:1 TURNDOWN WITH NG AND 5:1 TURNDOWN WITH LP
11. SUPPLY CFM MONITORING INTEGRAL TO UNIT WITH CFM MEASUREMENT INCLUDED THROUGH DIGITAL INTERFACE
12. FULLY MODULATING HOT GAS REHEAT
13. 1" EXTERIOR DUAL-WALL CONSTRUCTION W/ R-4.3 INSULATION-MINIMUM 24GA EXTERIOR W/ 18GA BASE
14. DOWN DISCHARGE/DOWN RETURN

FAN OPTIONS

FAN UNIT NO	TAG	QTY	DESCRIPTION
1		1	GREASE BOX
		1	FAN BASE CERAMIC SEAL - DU/DR85HFA - INSTALLED AT PLANT - FOR GREASE DUCTS
		1	ECM WIRING PACKAGE - PWM SIGNAL FROM ECPMO3 PREWIRE (TELCO MOTOR), CCW ROTATION
		1	2 YEAR PARTS WARRANTY
2		1	INLET PRESSURE GAUGE, 0-35"
		1	MANIFOLD PRESSURE GAUGE, 0 TO 10" WC, 1 FURNACE
		1	TOTAL CFM MONITORING
		1	INTAKE FIRESTAT SET TO 135°F
		1	FREEZESTAT
		1	DISCHARGE FIRESTAT SET TO 240°F
		1	SHIP LOOSE GAS STRAINER 3/4"
		1	SINGLE POINT ELECTRICAL CONNECTION FOR RTU. 750VA TRANSFORMER USED. IF A NON-DCV PREWIRE CONTROLS THIS UNIT, THE #28, #47, "MA", OR "E2" PREWIRE OPTION MUST BE SELECTED. DOES NOT PROVIDE SUPPLY STARTER IN PREWIRE
		1	CASLINK BUILDING MONITORING SYSTEM - INTERNET OR CELLULAR CONNECTION REQUIRED
		1	2" MERV 13 FILTERS FOR RTU1 (QTY. 4)
		1	2" MERV 8 FILTERS FOR RTU1 (QTY. 4)
		1	OVERHEAT STAT
		1	SPECIAL ORIFICES FOR IF HEATERS ABOVE 2,000'
		1	RTU1 DOWN DISCHARGE
		1	OCCUPIED SCHEDULING
		1	RTU1 CURB DUCT HANGER
		1	6 TON MODULATING COOLING OPTION, 208/230V. R410A REFRIGERANT, VARIABLE SPEED COMPRESSOR, ECM CONDENSING FANS
		1	6 TON MODULATING REHEAT OPTION - SPACE DEWPOINT CONTROL - R410A
		1	RTU SIZE 1 INTAKE HOOD, SHIPPED LOOSE
		1	RTU INTAKE/RETURN DAMPER - MANUAL CONTROL VIA HMI
		1	RTU1 DOWN RETURN
		1	RTU RETURN MOUNTED SMOKE DETECTOR AND SAMPLING TUBE - FACTORY INSTALLED
		1	24VAC FIRE INPUT
		1	UNIT MOUNTED VFD CONFIGURED FOR DCV
		1	5 YEAR ENTIRE UNIT PARTS WARRANTY, 10 YEAR ENTIRE UNIT PARTS WARRANTY WITH REMOTE MONITORING AND CAPTIVEAIRE SERVICE CONTRACT, 25 YEAR STAINLESS STEEL FURNACE PARTS WARRANTY (SEE ADDITIONAL DETAILS)
		1	EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET

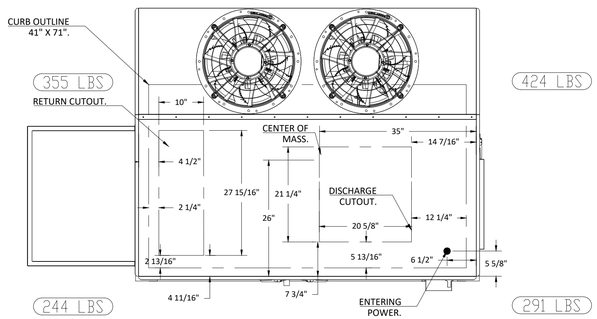
FAN ACCESSORIES

FAN UNIT NO	TAG	EXHAUST			SUPPLY			
		GREASE CUP	GRAVITY DAMPER	WALL MOUNT	SIDE DISCHARGE	GRAVITY DAMPER	MOTORIZED DAMPER	WALL MOUNT
1		YES						

CURB ASSEMBLIES

NO	ON FAN	WEIGHT	ITEM	SIZE
1	# 1	36 LBS	CURB	23.000"W X 23.000"L X 20.000"H VENTED HINGED.
2	# 2	89 LBS	CURB	41.000"W X 71.000"L X 16.000"H INSULATED.

HMI SCHEDULE				
UNIT NUMBER	HMI #	HMI LOCATION	TEMP AVERAGING	MODBUS ADDRESS
FAN #2	HMI #1 - UNIT	IN UNIT	NOT AVERAGED	55
FAN #2	HMI #2 - SPACE		AVERAGED	56



FAN #2 CAS-HVAC1-I.125-13-6T - HEATER

NOTES:
1. DO NOT OBSTRUCT OUTSIDE AIR INLET, OUTSIDE AIR COIL OR OUTSIDE AIR FAN.
2. DENOTES CORNER WEIGHT.
3. ROOF OPENING MUST BE 2" SMALLER THAN CURB DIMENSIONS IN BOTH DIRECTIONS.
4. CONNECTION FROM BREAKER TO UNITS SAFETY DISCONNECT SWITCH TO BE COPPER WIRE ONLY.
5. EXTERIOR GAS CONNECTION PROVIDED BY FACTORY WITH QUICK SEAL AND ANTI-ROTATION BRACKET.

*NOTE: SUPPLY DUCT MUST BE INSTALLED TO MEET SMACNA STANDARDS. A MINIMUM STRAIGHT DUCT LENGTH MUST BE MAINTAINED DOWNSTREAM OF UNIT DISCHARGE AS OUTLINED IN AMCA PUBLICATION 201. WHEN USING RECTANGULAR DUCTWORK, ELBOWS MUST BE RADIUS THROAT, RADIUS BACK WITH TURNING VANES. FLEXIBLE DUCTWORK AND SQUARE THROAT/SQUARE BACK ELBOWS SHOULD NOT BE USED. ANY TRANSITION AND/OR TURNS IN THE DUCTWORK WILL CAUSE SYSTEM EFFECT. SYSTEM EFFECT WILL DRASTICALLY INCREASE STATIC PRESSURE AND REDUCE AIRFLOW. DO NOT RELY ON UNIT TO SUPPORT DUCT IN ANY WAY. FAILURE TO PROPERLY SIZE DUCTWORK MAY CAUSE SYSTEM EFFECTS AND REDUCE PERFORMANCE OF THE EQUIPMENT.
SUGGESTED STRAIGHT DUCT SIZE IS 20.75" x 21.5".

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HOOD SYSTEM DETAILS 3 OF 3

ISNRV BUILDING EXPANSION
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REVISIONS

No.	DESCRIPTION	DATE

M502

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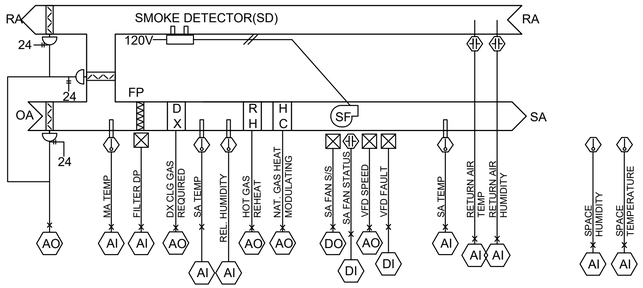
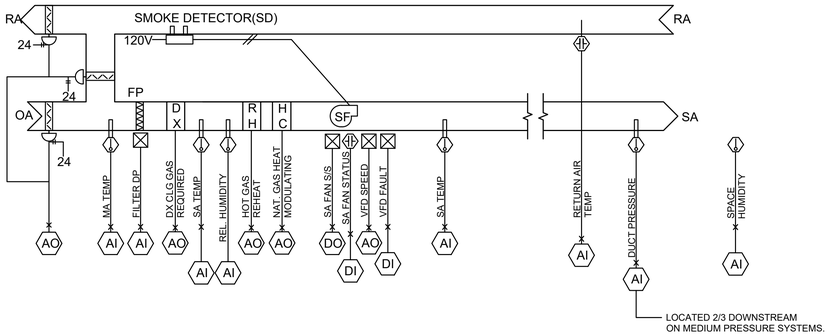
SEQUENCE OF OPERATIONS:

SINGLE ZONE ROOFTOP UNIT (RTU-1 & 3):

1. TEMPERATURE CONTROL: ON A RISE IN THE SPACE TEMPERATURE SETPOINT 75F (ADJUSTABLE) AS SENSED BY THE SPACE TEMPERATURE SENSOR, THE CONTROLS SYSTEM SHALL MODULATE DX COOLING ON AS REQUIRED. ON A FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE THE UNIT SHALL MODULATE THE GAS FIRED BURNERS ON AS REQUIRED TO MAINTAIN THE HEATING SPACE TEMPERATURE SET POINT OF 75F (ADJUSTABLE) .
2. ECONOMIZER CONTROL: PROVIDE WITH COMPARATIVE ENTHALPY ECONOMIZER CONTROLS. WHENEVER THE OUTDOOR AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL BE FULLY OPEN AND THE RETURN AIR DAMPER SHALL BE CLOSED. WHEN NOT IN ECONOMIZER MODE, THE RETURN AIR DAMPER SHALL BE OPEN AND THE OUTSIDE AIR DAMPER SHALL BE OPEN TO ITS MINIMUM POSITION.
3. HUMIDITY CONTROL: WHEN THE RETURN AIR HUMIDITY LEVEL RISES ABOVE 60% RH (ADJUSTABLE), THE UNITS HOT GAS REHEAT SHALL BE ENABLED. THE UNIT SHALL CONTROL THE EVAPORATING LEAVING AIR TEMPERATURE TO REMOVE MOISTURE AS REQUIRED AND THEN REHEAT WITH THE HGRH COIL TO PREVENT OVER COOLING.
4. SUPPLY FAN CONTROL: THE SUPPLY FAN SHALL RUN CONTINUOUSLY WHILE OCCUPIED AND SHALL CYCLE ON AND OFF DURING UNOCCUPIED TIMES TO MAINTAIN THE SPACE SET BACK TEMPERATURE SET POINT.
5. DUCT SMOKE DETECTORS: WHEN PRODUCTS OF COMBUSTION ARE SENSED BY A DUCT SMOKE DETECTORS AS INDICATED ON THE DRAWINGS, THE UNIT FAN SHALL BE DEENERGIZED.



SINGLE ZONE ROOFTOP AIR HANDLING UNIT CONTROL (RTU-2)



VAV DX ROOFTOP AIR HANDLING UNIT CONTROL

SEQUENCE OF OPERATIONS:

VAV ROOFTOP UNITS (RTU-1 & 3):
EACH OF THESE UNITS SHALL BE PROVIDED WITH SITELINE CONTROLS PACKAGE INSTALLED BY THE FACTORY. THE SITELINE CONTROLS SHALL CONTROL THE ROOFTOP UNIT AND ASSOCIATED VAV BOXES. PROVIDE ALL REQUIRED VAV UNIT AND ROOFTOP UNIT CONTROLLERS, WIRING, AND ACCESSORIES AS REQUIRED.

1. TEMPERATURE CONTROL: ON A RISE IN UNIT DISCHARGE AIR TEMPERATURE ABOVE 55F (ADJUSTABLE) AS SENSED BY THE SUPPLY AIR TEMPERATURE SENSOR, THE CONTROLS SYSTEM SHALL MODULATE DX COOLING ON AS REQUIRED. ON A FALL IN DISCHARGE AIR TEMPERATURE, THE REVERSE SHALL OCCUR. ON A FURTHER FALL IN DISCHARGE AIR TEMPERATURE THE UNIT SHALL MODULATE THE GAS FIRED BURNERS ON AS REQUIRED.
2. ECONOMIZER CONTROL: PROVIDE WITH COMPARATIVE ENTHALPY ECONOMIZER CONTROLS. WHENEVER THE OUTDOOR AIR ENTHALPY IS LESS THAN THE RETURN AIR ENTHALPY, THE OUTSIDE AIR DAMPER SHALL BE FULLY OPEN AND THE RETURN AIR DAMPER SHALL BE CLOSED. WHEN NOT IN ECONOMIZER MODE, THE RETURN AIR DAMPER SHALL BE OPEN AND THE OUTSIDE AIR DAMPER SHALL BE OPEN TO ITS MINIMUM POSITION.
3. HUMIDITY CONTROL: WHEN THE RETURN AIR HUMIDITY LEVEL RISES ABOVE 60% RH (ADJUSTABLE), THE UNITS HOT GAS REHEAT SHALL BE ENABLED. THE UNIT SHALL CONTROL THE EVAPORATING LEAVING AIR TEMPERATURE TO REMOVE MOISTURE AS REQUIRED AND THEN REHEAT WITH THE HGRH COIL TO PREVENT OVER COOLING.
4. SUPPLY FAN CONTROL: WHEN UNIT SUPPLY FAN IS STARTED, THE CONTROLS SYSTEM SHALL SLOWLY RAMP UP THE SPEED OF THE SUPPLY FAN THROUGH ITS VFD AND CONTROL TO MAINTAIN A CONSTANT STATIC PRESSURE AS SENSED BY THE STATIC PRESSURE TRANSMITTER LOCATED 2/3 DOWNSTREAM OF SUPPLY TRUNK DUCT. THE DUCT PRESSURE SENSOR LOCATED AT FAN DISCHARGE SHALL PROVIDE HIGH LIMIT STATIC PRESSURE OVERRIDE. THE SUPPLY FAN SHALL RUN CONTINUOUSLY WHILE OCCUPIED AND SHALL CYCLE ON AND OFF DURING UNOCCUPIED TIMES TO MAINTAIN THE SPACE SET BACK TEMPERATURE SET POINT.
5. DUCT SMOKE DETECTORS: WHEN PRODUCTS OF COMBUSTION ARE SENSED BY A DUCT SMOKE DETECTORS AS INDICATED ON THE DRAWINGS, THE UNIT FAN SHALL BE DEENERGIZED.
8. SYSTEM MONITORING: IN ADDITION TO ALL POINTS LISTED ABOVE, THE CONTROLS SYSTEM SHALL MONITOR RETURN AIR TEMPERATURE; MIXED AIR TEMPERATURE; RETURN AIR HUMIDITY THROUGH; AND VFD ALARMS.
9. FAN POWERED VARIABLE VOLUME HEATING BOX: THE FAN SHALL BE ENERGIZED DURING OCCUPIED PERIODS. ON A FALL IN SPACE TEMPERATURE AS SENSED BY THE SPACE TEMPERATURE SENSOR, THE BOX DAMPER SHALL MODULATE CLOSED TO ITS MINIMUM POSITION. ON A FURTHER FALL IN SPACE TEMPERATURE, THE ELECTRIC REHEAT SHALL MODULATE ON AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SET POINT. ON A RISE IN TEMPERATURE THE REVERSE SHALL OCCUR. DURING NIGHT OPERATION, THE FAN SHALL BE CYCLED AND THE SPACE TEMPERATURE SENSOR SHALL BE INDEXED TO MAINTAIN A REDUCED NIGHT TEMPERATURE.
10. VARIABLE VOLUME HEATING BOX: ON A FALL IN SPACE TEMPERATURE, THE BOX DAMPER SHALL MODULATE CLOSED TO ITS MINIMUM POSITION. ON A FURTHER FALL IN SPACE TEMPERATURE, THE ELECTRIC REHEAT SHALL MODULATE ON AS REQUIRED TO MAINTAIN SPACE TEMPERATURE SET POINT. DURING NIGHT OPERATION THE SPACE TEMPERATURE SENSOR SHALL MAINTAIN A REDUCED NIGHT SETTING.
11. EXHAUST FAN CONTROL: DURING OCCUPIED HOURS, THE CONTROLS SYSTEM SHALL ACTIVATE ALL EXHAUST FANS AND OPEN THEIR ASSOCIATED MOTORIZED CONTROL DAMPER. DURRING UN OCCUPIED HOURS, THE CONTROLS SYSTEM SHALL DEACTIVATE ALL EXHAUST FANS AND CLOSE THE ASSOCIATED DAMPERS.

CONTROLS LEGEND

H	HUMIDISTAT	T	AQUASTAT
S	WALL SWITCH		
⊘	TIMER	M	MOTORIZED DAMPER (ELECTRIC ACTUATOR)
S	SENSOR		PUMP
H	HUMIDISTAT	MD	MANUAL DAMPER
C	CO2 SENSOR		
T	THERMOSTAT		BACKDRAFT DAMPER
S	SWITCH		MOTORIZED VALVE (ELECTRIC ACTUATOR) (TWO POSITION, TWO WAY)
	CONTACTOR		
CT	CURRENT TRANSFORMER		MOTORIZED VALVE (ELECTRIC ACTUATOR) (TWO POSITION, THREE WAY)
CR	CIRCUIT RELAY		
DI	DIGITAL IN	C1	CARBON MONOXIDE SENSOR
DO	DIGITAL OUT		
AI	ANALOG IN		
AO	ANALOG OUT		
AOP	ANALOG OUT PNEUMATIC		
EA	EXHAUST AIR		
SA	SUPPLY AIR		
RA	RETURN AIR		
SF	SUPPLY FAN		
EF	EXHAUST FAN		
CC	COOLING COIL		
HC	HEATING COIL		
FS	FLOW SWITCH		
MA	MIXED AIR		
FP	FREEZE PROTECTION		

CONTROLS SYSTEM (BAS):

THE CONTROLS SYSTEM SHALL BE SITELINE, PRE-PROGRAMMED BAS BY DAIKIN APPLIED OR EQUIVALENT.

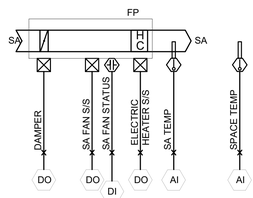
SITELINE™ PRE-PROGRAMMED BAS GIVES BUILDING OWNERS ACCESS TO MANAGE THEIR BUILDING'S HVAC SYSTEM. THROUGH THE LOCAL INTERFACE AN OPERATOR CAN MAKE SCHEDULE CHANGES, ADJUST SETPOINTS, TREND DATA, AND MANAGE ALARMS. CUSTOM CONTROL SEQUENCES AND ALARMS CAN BE CREATED FOR BUILDING SPECIFIC CONTROLS REQUIREMENTS THROUGH THE LOCAL INTERFACE. OWNERS AND MAINTENANCE PERSONNEL CAN ENSURE THE COMFORT OF THE OCCUPANTS THROUGH THE LOCAL TOUCH SCREEN INTERFACE OR THROUGH THE CLOUD INTERFACE WITH A REMOTE COMPUTER USING A STANDARD WEB BROWSER WHEN THE PANEL IS CONNECTED TO THE BUILDINGS LOCAL NETWORK OR THE INTERNAL CELL CONNECTION.

COMMUNICATIONS: 1. ALL UNIT AND SYSTEM LEVEL CONTROLS SHALL BE PROVIDED WITH BACNET MSTP COMMUNICATION PROTOCOL. SYSTEMS AND EQUIPMENT USING A PROPRIETARY COMMUNICATOINS PROTOCOL SHALL BE EXCLUDED FROM THIS BID. SITELINE™ PRE-PROGRAMMED BAS SHALL BE EQUIPPED WITH IP PORT TO PROVIDE BROWSER BASED ACCESS TO SYSTEM.

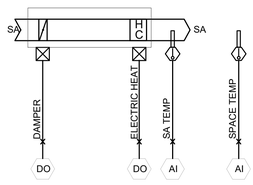
SYSTEM SHALL INCLUDE A PRE-PROGRAMMED BAS COMPUTER. A PC WITH LINUX OS AND INTEGRAL BACNET COMMUNICATIONS CARD SHALL BE PROVIDED.

USERS SHALL HAVE THE ABILITY TO MANAGE, ADD, AND DELETE INDIVIDUAL AND GROUP SCHEDULES, ADD EXCEPTION SCHEDULES, ALLOW MORE THAN ONE OCCUPANCY PERIOD PER DAY, AND REASIGN DEVICES TO EXISTING GROUPS OR NEW GROUPS. USERS SHALL HAVE THE ABILITY TO VIEW ACKNOWLEDGE, OR CLEAR ALARMS AND SET UP ALARM NOTIFICATIONS VIA EMAIL OR TEXT. USERS WILL HAVE THE ABILITY TO MODIFY TEMPERATURE SETPOINTS.

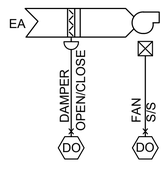
THE SITELINE™ PRE-PROGRAMMED BAS PC SHALL BE PRE-PROGRAMMED WITH TAGGING AND ADDRESSING OF ALL SYSTEM COMPONENTS, SUCH AS ROOFTOP AIR HANDLERS, VAVS, FANS, ETC. ALL SYSTEM RELATIONSHIPS SHALL BE PRE-ESTABLISHED FROM THE FACTORY.



VAV BOX CONTROLS (FP)



SHUT-OFF VAV BOX CONTROLS (VV)



ROOFTOP EXHAUST FAN CONTROL

STOTTSBERG ENGINEERING
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CONTROLS AND SEQUENCE OF OPERATIONS

ISNRV BUILDING EXPANSION

Blacksburg, VA

COMMONWEALTH OF VIRGINIA
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REVISIONS

No.	DESCRIPTION	DATE

M600

SHEET 105 OF 122

COMcheck Software Version COMcheckWeb

Mechanical Compliance Certificate

Project Information

Energy Code:	2021 IECC
Project Title:	ISNRV - BLACKSBURG
Location:	Blacksburg (Montgomery), Virginia
Climate Zone:	4a
Project Type:	Addition

Construction Site:
1284 N Main St
Blacksburg, Virginia 24060

Owner/Agent:

Designer/Contractor:
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540-216-0331
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Mechanical Systems List

Quantity	System Type & Description
1	RTU-1 (Multiple-Zone): Heating: 1 each - Central Furnace, Gas, Capacity = 200 kBtu/h Proposed Efficiency = 81.00% Et, Required Efficiency: 80.00 % Et or 80% AFUE Cooling: 1 each - Single Package DX Unit, Capacity = 147 kBtu/h, Air Cooled Condenser, Air Economizer Proposed Efficiency = 11.50 EER, Required Efficiency = 10.80 EER Proposed Part Load Efficiency = 18.40 IEER, Required Part Load Efficiency = 14.00 IEER Fan System: FAN SYSTEM 1 | FIRST FLOOR -- Compliance (Motor nameplate HP and fan efficiency method) : Passes Fans: FAN 1 Supply, Multi-Zone VAV, 4750 CFM, 4.6 motor nameplate hp, 1.00 fan energy index
1	RTU-2 (Single Zone): Heating: 1 each - Central Furnace, Gas, Capacity = 450 kBtu/h Proposed Efficiency = 81.00% Et, Required Efficiency: 81.00 % Et Cooling: 1 each - Single Package DX Unit, Capacity = 259 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 11.10 EER, Required Efficiency = 9.80 EER Proposed Part Load Efficiency = 20.00 IEER, Required Part Load Efficiency = 13.00 IEER Fan System: FAN SYSTEM 2 | MULTI-PURPOSE -- Compliance (Motor nameplate HP and fan efficiency method) : Passes Fans: FAN 2 Supply, Single-Zone VAV, 7400 CFM, 5.0 motor nameplate hp, 1.00 fan energy index
1	RTU-3 (Multiple-Zone): Heating: 1 each - Central Furnace, Gas, Capacity = 200 kBtu/h Proposed Efficiency = 81.00% Et, Required Efficiency: 80.00 % Et or 80% AFUE Cooling: 1 each - Single Package DX Unit, Capacity = 143 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 11.50 EER, Required Efficiency = 10.80 EER Proposed Part Load Efficiency = 18.40 IEER, Required Part Load Efficiency = 14.00 IEER Fan System: FAN SYSTEM 3 | SECOND FLOOR -- Compliance (Motor nameplate HP and fan efficiency method) : Passes Fans: FAN 3 Supply, Multi-Zone VAV, 4150 CFM, 4.3 motor nameplate hp, 1.00 fan energy index
1	DOAS-1 (Single Zone): Heating: 1 each - Central Furnace, Gas, Capacity = 114 kBtu/h Proposed Efficiency = 81.00% Et, Required Efficiency: 80.00 % Et or 80% AFUE Cooling: 1 each - DX DOAS (Dehumidification), Capacity = 84 kBtu/h, Air-Cooled Condenser, Air Economizer Proposed Efficiency = 9.20 ISMRE, Required Efficiency = 4.00 ISMRE Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: FAN SYSTEM 4 | KITCHEN -- Compliance (Motor nameplate HP and fan efficiency method) : Passes

Quantity	System Type & Description
	Fans: FAN 4 Supply, Constant Volume, 1100 CFM, 1.0 motor nameplate hp, 1.00 fan energy index
1	AH-1/CU-1 (Single Zone): Split System Heat Pump Heating Mode: Capacity = 24 kBtu/h, Proposed Efficiency = 10.00 HSPF2, Required Efficiency = 7.50 HSPF2 Cooling Mode: Capacity = 24 kBtu/h, Proposed Efficiency = 18.60 SEER2, Required Efficiency = 14.30 SEER2 Proposed Part Load Efficiency = 0.00 , Required Part Load Efficiency = 0.00 Fan System: FAN SYSTEM 5 | STAIRS -- Compliance (Motor nameplate HP and fan efficiency method) : Passes
	Fans: FAN 5 Supply, Constant Volume, 800 CFM, 0.3 motor nameplate hp, 95.00 fan energy index

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 2021 IECC requirements in COM*check* Version COMcheckWeb and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Name - Title Signature Date

COMcheck Software Version COMcheckWeb

Inspection Checklist

Energy Code: 2021 IECC

Requirements: 100.0% were addressed directly in the COM*check* software

Text in the "Comments/Assumptions" column is provided by the user in the COMcheck Requirements screen. For each requirement, the user certifies that a code requirement will be met and how that is documented, or that an exception is being claimed. Where compliance is itemized in a separate table, a reference to that table is provided.

Section # & Req.ID	Plan Review	Complies?	Comments/Assumptions
C103.2 [PR2][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical and service water heating systems and document where exceptions to the standard are claimed. Load calculations per acceptable engineering standards and handbooks. Hot water system sized per manufacturer's sizing guide.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C406 [PR9][1]	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Footing / Foundation Inspection	Complies?	Comments/Assumptions
C403.13.2	Snow/ice melting system and freeze protection systems have sensors and controls configured to limit service for pavement temperature above 50F and outdoor temperature above 40F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.13.3 [FO9][1]			

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Plumbing Rough-In Inspection	Complies?	Comments/Assumptions
C404.5, C404.5.1, C404.5.2 [PL6][1]	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C402.2.6 [ME41][1]	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.8.4 [ME142][1]	Motors for fans that are not less than 1/12 hp and less than 1 hp are electronically commutated motors or have a minimum motor efficiency of 70 percent. These motors have the means to adjust motor speed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.8.6 [ME143][1]	Each DX cooling system > 65 kBtu and chiller water/evaporative cooling system with fans > 1/4 hp are designed to vary the indoor fan airflow as a function of load and comply with detailed requirements of this section.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.9 [ME144][1]	Large diameter fans where installed shall be tested and labeled in accordance with AMCA 230.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.3 [ME55][1]	HVAC equipment efficiency verified.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	*See the Mechanical Systems list for values.*
C403.2.1 [ME112][1]	Zone isolation devices and controls installed where applicable.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.5.5 [ME113][1]	Fault detection and diagnostics installed with air-cooled unitary DX units or VRF units having economizers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.2.2 [ME59][1]	Natural or mechanical ventilation is provided in accordance with International Mechanical Code Chapter 4. Mechanical ventilation has capability to reduce outdoor air supply to minimum per IMC Chapter 4.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.7.1 [ME59][1]	Demand control ventilation provided for spaces >500 ft2 and >15 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.7.2 [ME115][1]	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.7.3 [ME140][1]	Units that provide ventilation air to multiple zones and operate in combination with zone heating and cooling systems do not use heating or heat recovery to warm supply air to a temperature greater than 60°F when representative building loads or outdoor air temperatures indicate that the majority of zones require cooling.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.7.6 [ME141][1]	HVAC systems serving guestrooms in Group R-1 buildings with > 50 guestrooms: Each guestroom is provided with controls that automatically manage temperature setpoint and ventilation (see sections C403.7.6.1 and C403.7.6.2).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.7.4 [ME57][1]	Exhaust air energy recovery on systems meeting Table C403.7.4(1) and C403.7.4(2).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.7.5 [ME116][1]	Kitchen exhaust systems comply with replacement air and conditioned supply air limitations, and satisfy hood rating requirements and maximum exhaust rate criteria.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.5, C403.5.1, C403.5.2 [ME62][1]	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.5.3, 3 [ME124][1]	Air economizers automatically reduce outdoor air intake to the design minimum outdoor air quantity when outdoor air intake will not reduce cooling energy usage. See Table C403.5.3.3 for applicable device types and climate zones.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.5.3, 4 [ME125][1]	System capable of relieving excess outdoor air during air economizer operation to prevent over pressurizing the building. The relief air outlet located to avoid recirculation into the building.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.5.3, 5 [ME126][1]	Return, exhaust/relief and outdoor air dampers used in economizers have motorized dampers that automatically shut when not in use and meet maximum leakage rates. Reference section C403.7.7 for details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.1 [ME75][1]	Hydronic and multizone HVAC system controls are VAV fans driven by mechanical or electrical variable speed drive per Table C403.4.1.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.9 [ME67][1]	VAV fans have static pressure sensors located so controller setpoint <=1.2 w.c..	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.3 [ME24][1]	Reset static pressure setpoint for DDC controlled VAV boxes reporting to central controller based on the zones requiring the most pressure.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.4.3.3.2 [ME121][1]	Closed-circuit cooling tower within heat pump loop have either automatic bypass valve or lower leakage positive closure dampers. Open-circuit tower within heat pump loop have automatic valve to bypass all heat pump water flow around the tower. Open- or closed-circuit cooling towers used in conjunction with a separate heat exchanger have heat loss by shutting down the circulation pump on the cooling tower loop. Open- or closed circuit cooling towers have a separate heat exchanger to isolate the cooling tower from the heat pump loop, and heat loss is controlled by shutting down the circulation pump on the cooling tower loop.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.6.1 [ME130][1]	Supply air systems serving multiple zones have VAV systems with controls configured to reduce the volume of air that is reheated, recoiled or mixed in each zone. See section for details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.2 [ME131][1]	Single-duct VAV systems use terminal devices configured to reduce the supply of primary supply air before reheating or recooling takes place.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.3 [ME132][1]	Systems that have 1 warm air duct and 1 cool air duct use terminal devices configured to reduce the flow from one duct to a minimum before mixing of air from the other duct takes place.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.6.4 [ME133][1]	Individual dual-duct or mixing heating and cooling systems with a single fan and with total capacities > 90,000 Btu/h not equipped with air economizers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C403.6.5 [ME134][1]	Multiple zone HVAC systems have supply air temperature reset controls based on building loads or outside temperatures.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.7 [ME136][1]	Parallel-flow fan-powered VAV air terminals have automatic controls configured to 1) turn off the terminal fan except when space heating is required or where required for ventilation, 2) turn on the terminal fan as the first stage of heating before the heating coil is activated, and 3) during heating for warmup or setback temperature control, either operate the terminal fan and heating coil without primary air or, reverse the terminal damper logic and provide heating from the central air handler by primary air.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

DATE: 10/28/2024
COMM No: 23-30
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ENERGY COMPLIANCE SHEET 1 OF 2

ISNRV BUILDING EXPANSION

Blacksburg, VA

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SHEET 106 OF 122

STOTTSBERG ENGINEERING

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Project #23071

Section # & Req.ID	Mechanical Rough-In Inspection	Complies?	Comments/Assumptions
C403.6.8 [ME137][1]	Systems with DDC of individual zones reporting to the central control panel configured to reset the static pressure setpoint based on zone requiring the most pressure. The DDC is capable of monitoring zone damper positions or have an alternative method of indicating the need for static pressure. See section for details.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.9 [ME138][1]	Static pressure sensors used to control VAV fans located such that the controller setpoint is <= 1.2 inches w.c.. Where this results in one or more sensors being located downstream of major duct splits, not less than one sensor located on each major branch.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.4 [ME63][2]	Heating for vestibules and air curtains with integral heating include automatic controls that shut off the heating system when outdoor air temperatures > 45F. Vestibule heating and cooling systems controlled by a thermostat in the vestibule with heating setpoint <= 60F and cooling setpoint >= 80F.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.6.6 [ME135][3]	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met. *See the Mechanical Systems list for values.*
C403.3.3 [ME35][1]	Hot gas bypass limited to: <=240 kBtu/h - 50% >240 kBtu/h - 25%	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.2.1 [ME53][3]	Air outlets and zone terminal devices have means for air balancing.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.11.3.1, C403.11.3.1.1, C403.11.3.2 [ME123][3]	Refrigerated display cases, walk-in coolers or walk-in freezers served by remote compressors and remote condensers not located in a condensing unit, have fan-powered condensers that comply with Sections C403.11.3.1 and refrigeration compressor systems that comply with C403.11.3.2.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Rough-In Electrical Inspection	Complies?	Comments/Assumptions
C405.7 [EL26][2]	Low-voltage dry-type distribution electric transformers meet the minimum efficiency requirements of Table C405.6.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.8 [EL27][2]	Electric motors meet the minimum efficiency requirements of Tables C405.7(1) through C405.7(4). Efficiency verified through certification under an approved certification program or the equipment efficiency ratings shall be provided by motor manufacturer (where certification programs do not exist).	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.9.1, C405.9.2 [EL28][2]	Escalators and moving walks comply with ASME A17.1/CSA B44 and have automatic controls configured to reduce speed to the minimum permitted speed in accordance with ASME A17.1/CSA B44 or applicable local code when not conveying passengers.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.10 [EL29][2]	Total voltage drop across the combination of feeders and branch circuits <= 5%.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C405.1.1 [EL30][2]	At least 90% of dwelling unit permanently installed lighting shall have lamp efficacy >= 65 lm/W or luminaires with efficacy >= 45 lm/W or comply with C405.2.4 or C405.3.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	**Exception:** Requirement does not apply.
C405.11, C405.11.1 [EL31][2]	50% of 15/20 amp receptacles installed in enclosed offices, conference rooms, copy rooms, break rooms, classrooms and workstations and > 25% of branch circuit feeders for modular furniture will have automatic receptacle control in accordance with C405.11.1.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C303.3, C408.2.5.3 [FI8][3]	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.3.1 [FI27][3]	HVAC systems and equipment capacity does not exceed calculated loads.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1 [FI47][3]	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.1 [FI42][3]	Heat pump controls prevent supplemental electric resistance heat from coming on when not needed.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.2 [FI38][3]	Thermostatic controls have a 5 °F deadband.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.1.3 [FI20][3]	Temperature controls have setpoint overlap restrictions.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2 [FI39][3]	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.1, C403.4.2.2 [FI40][3]	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C403.4.2.3 [FI41][3]	Systems include optimum start controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.1.1 [FI57][3]	Building operations and maintenance documents will be provided to the owner. Documents will cover manufacturers' information, specifications, programming procedures and means of illustrating to owner how building, equipment and systems are intended to be installed, maintained, and operated.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.1 [FI28][3]	Commissioning plan developed by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

Section # & Req.ID	Final Inspection	Complies?	Comments/Assumptions
C408.2.3.1 [FI31][3]	HVAC equipment, systems and system-to-system relationships have been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.3.2 [FI10][3]	HVAC and service water heating control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.3.3 [FI32][3]	Economizers have been tested to ensure proper operation.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.4 [FI29][3]	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5 [FI7][3]	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.1 [FI43][3]	An air and/or hydronic system balancing report is provided for HVAC systems.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.
C408.2.5.2 [FI30][3]	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	☐Complies ☐Does Not ☐Not Observable ☐Not Applicable	Requirement will be met.

Additional Comments/Assumptions:

1 High Impact (Tier 1) 2 Medium Impact (Tier 2) 3 Low Impact (Tier 3)

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ENERGY COMPLIANCE SHEET 2 OF 2

ISNRV BUILDING EXPANSION

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