

**HVAC SPECIFICATIONS**

- FURNISH ALL LABOR, MATERIALS AND EQUIPMENT REQUIRED TO INSTALL A COMPLETE HEATING AND COOLING SYSTEM AS INDICATED AND SPECIFIED ON THE DRAWINGS.
- WORK SHALL COMPLY WITH IMC, NFPA, ALL APPLICABLE LAWS, ORDINANCES & CODES OF THE STATE OF TENNESSEE, LOCAL AUTHORITIES HAVING JURISDICTION AND WITH APPLICABLE RULES & REGULATIONS.
- OBTAIN ALL PERMITS & INSPECTIONS REQUIRED FOR THE COMPLETION OF THE WORK & PAY ALL FEES & COSTS IN CONNECTION THEREWITH.
- THE MECHANICAL DRAWINGS ARE GENERALLY DIAGRAMMATIC AND UNLESS SPECIFICALLY DIMENSIONED, THE LOCATIONS OF DUCTWORK AND EQUIPMENT AND THE ROUTING OF DUCTWORK IS APPROXIMATE ONLY AND SHALL NOT BE SCALED FROM THE MECHANICAL DRAWINGS.
- INSTALL ALL EQUIPMENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- SUBMIT TO THE ARCHITECT FOR APPROVAL, 10 DAYS AFTER RECEIPT OF NOTICE TO PROCEED WITH THE WORK, A COMPLETE LIST OF MATERIALS, EQUIPMENT AND ACCESSORIES PROPOSED FOR USE, INCLUDING COMPLETE DESCRIPTIONS AND SPECIFICATIONS OF ANY PROPOSED SUBSTITUTIONS, MANUFACTURER'S SHOP DRAWINGS, ROUGHING-IN DRAWINGS, AND ANY OTHER INFORMATION REQUIRED FOR THE PROPER INSTALLATION OF THE WORK. SUBMITTALS SHALL BE IN PDF FORMAT (NO PAPER COPIES).
- ALL SUPPLY, RETURN, & EXHAUST DUCTWORK FOR ROOMS 101, 102, 103, & 104 SHALL BE STAINLESS STEEL FABRICATED ACCORDING TO SMACNA DETAILS. DUCTS SHALL BE SIZE INDICATED ON DRAWINGS (NET INSIDE DIMENSIONS), RIGIDLY BRACED, ADEQUATELY SUPPORTED & SECURELY FASTENED IN PLACE.
- FLEXIBLE DUCT FOR INSULATED SYSTEMS (NOT FOR ROOMS 101, 102, 103, OR 104) SHALL BE THERMAFLEX M-KF, OR EQUAL, PRE-INSULATED DUCT WITH A MINIMUM R-VALUE OF 6.0. FLEXIBLE DUCT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. DUCT RUNS SHALL BE AS STRAIGHT AS POSSIBLE AND LIMITED TO MAXIMUM OF 5 FEET IN LENGTH.
- INSTALL SINGLE WALL TURNING VANES AT RIGHT ANGLES AND SMALL RADIUS TURNS IN DUCTS. MAKE REDUCTIONS IN DUCT SIZE WITH TAPERED TRANSITION PIECES. TRANSITIONS FOR CONNECTIONS TO EQUIPMENT SHALL BE DESIGNED TO SUIT CONDITIONS AND SO THAT AIR FLOW IS NOT RESTRICTED.
- IN ALL CASES, AIR VOLUMES SHALL BE ADJUSTED BY MEANS OF MANUAL DAMPERS IN THE DUCTWORK, NOT BY INTEGRAL DAMPERS IN THE TERMINAL OUTLETS OR INLETS. DUCT DAMPER POSITIONS SHALL BE MARKED WITH PERMANENT INK MARKERS OR BLACK SPRAY PAINT AFTER THE FINAL SETTING HAS BEEN MADE.
- INSULATE ALL SHEET METAL SUPPLY AIR AND OUTSIDE AIR DUCTWORK WITH 2.2" THICK OWENS-CORNING ASW DUCTWRAP, THOROUGHLY TAPE ALL JOINTS AND SEAMS.
- ELECTRIC DUCT HEATERS SHALL BE THE OPEN COIL TYPE, U.L. LISTED, FURNISHED WITH MAGNETIC CONTRACTORS, BRANCH CIRCUIT FUSING, CONTROL TRANSFORMER, DOOR INTERLOCK DISCONNECT, THERMAL PROTECTION DEVICES, AIR FLOW SWITCH AND OVER TEMPERATURE CONTROL. THE HEATERS SHALL BE THE INSERT TYPE WITH A HINGED, BARS SHALL BE OF ALUMINIZED STEEL, ELEMENT WIRE OF 80% NICKEL AND 20% CHROMIUM SHALL BE STRUNG ON HEATER WITH A STRETCH RATIO OF NOT LESS THAN 2:1.
- EXHAUST FANS SHALL BE GREENHECK, LOREN COOK, PENNBARRY OR APPROVED SUBSTITUTE, AND BE AS SCHEDULED ON THE DRAWINGS AND HAVE THE ACCESSORIES AS NOTED ON THE DRAWINGS. FAN MOTORS SHALL HAVE BUILT-IN THERMAL OVERLOAD PROTECTION. THE UNITS SHALL BE FURNISHED WITH UNIT MOUNTED SAFETY DISCONNECT. THE UNITS SHALL BE UL LISTED AND BEAR THE AMCA CERTIFIED RATINGS SEAL FOR SOUND AND AIR PERFORMANCE. VERIFY VOLTAGE BEFORE ORDERING EQUIPMENT.
- ANY CUTS OR PENETRATIONS THROUGH THE EXISTING ROOF SHALL BE REPAIRED AND MADE WATERTIGHT IN A MANNER TO MAINTAIN THE EXISTING ROOF WARRANTY.
- WHEN THE INSTALLATION IS COMPLETE, IT SHALL BE RUN & ADJUSTED BY THE CONTRACTOR. ANY EXCESSIVE NOISE OR VIBRATION SHALL BE CORRECTED.
- SUBMIT WRITTEN AIR BALANCE REPORT TO THE ARCHITECT A MINIMUM OF 10 DAYS PRIOR TO THE FINAL INSPECTION. THE AIR BALANCE CONTRACTOR SHALL BE AABC OR NEBB CERTIFIED.
- THE CONTRACTOR SHALL INSTRUCT THE OWNER IN THE OPERATION OF EQUIPMENT & PROVIDE THE OWNER WITH A COMPLETE SET OF OPERATING INSTRUCTIONS FOR EQUIPMENT INSTALLED UNDER HIS CONTRACT.
- THE WORK SHALL BE GUARANTEED AGAINST ALL DEFECTIVE MATERIALS & EQUIPMENT FOR A PERIOD OF ONE YEAR AFTER ACCEPTANCE. THE CONTRACTOR SHALL MAKE ALL NECESSARY CORRECTIONS WITHOUT COST TO THE OWNER.

**GRILLES AND CEILING OUTLET SPECIFICATIONS**

GRILLES AND CEILING OUTLETS SHALL BE PRICE, OR EQUAL, STAINLESS STEEL CONSTRUCTION WITH ELECTRO-DEPOSITION PAINTED FINISH, SIZE SHOWN ON THE DRAWINGS AND SCHEDULED AS FOLLOWS.

LFDC LAMINAR FLOW DIFFUSER WITH HEPA FILTER, PRICE MODEL LFDC ALL STAINLESS STEEL CONSTRUCTION LAMINAR FLOW DIFFUSER WITH ROOM-SIDE REPLACABLE HEPA FILTER AND ROOM-SIDE ADJUSTABLE DAMPER. UNIT SIZES FOR LAY-IN CEILING INSTALLATION.

LWRG LOW WALL RETURN GRILLE, PRICE MODEL 730-D, SURFACE MOUNT, STAINLESS STEEL, 45° DEFLECTION, 3/4" BLADE SPACING, ALL FRONT BARS HORIZONTAL, WITH OPPOSED BLADE DAMPER.

LWEG LOW WALL EXHAUST GRILLE, PRICE MODEL 730-D, SURFACE MOUNT, STAINLESS STEEL, 45° DEFLECTION, 3/4" BLADE SPACING, ALL FRONT BARS HORIZONTAL, WITH OPPOSED BLADE DAMPER.

**DEDICATED OUTSIDE AIR SYSTEM (DOAS) SCHEDULE - R454B REFRIGERANT**

MARK	SUPPLY FAN			COIL COOLING CAPACITY				NG HEATING CAPACITY				V/PH	MCA	MOCP	WEIGHT (LBS)	VALENT MODEL
	OA CFM	MIN FAN HP	EXT STATIC (INCHES W.G.)	SENSIBLE (MBH)	TOTAL (MBH)	COIL EAT (DB/WB)	COIL LAT (DB/WB)	MBH INPUT	MBH OUTPUT	COIL EAT (DB)	COIL LAT (DB)					
①	1910	1	1.25	88.7	181.4	95.0/78.0	47.8/47.3	200.0	162.0	0.0	78.5	208/3	84.9	125	2750	VX-112-15K-G-E2

**NOTES:**

- VERIFY VOLTAGE BEFORE ORDERING EQUIPMENT
- SHALL BE FURNISHED WITH GAS FURNACE WITH 16:1 TURNDOWN, MIN. PRESSURE OF 6 IN. W.C., MODULATING CONTROL, & 409 SS HEAT EXCHANGER
- SHALL BE FURNISHED WITH INVERTER SCROLL COMPRESSOR, SS DRAIN PAN, 2" FOAM-INJECTED DOUBLE-WALL PANELS, & ROOF CURB WITH TWO LAYERS OF 5/8" CEMENT BOARD WITH JOINTS OVERLAPPING AND 2" RIGID THERMAFIBER ACOUSTIC INSULATION
- SUPPLY FAN SHALL BE FURNISHED WITH VFD MOTOR AND DIRECT DRIVE PLENUM FAN; PROVIDE CONSTANT VOLUME SUPPLY FAN CONTROL
- PROVIDE NEOPRENE VIBRATION ISOLATOR FOR COMPRESSORS
- PROVIDE MOTORIZED RETURN AIR DAMPER; BALANCE TO 875 CFM OF OUTSIDE AIR AND 1035 CFM OF RETURN AIR DURING "UNOCCUPIED HOURS"
- PROVIDE DISCHARGE AIR TEMPERATURE SENSOR; MAINTAIN 50°F DISCHARGE AIR TEMPERATURE

**EXHAUST FAN (EF) SCHEDULE**

MARK	CFM	EXT. STATIC (INCHES W.G.)	HP	RPM	MAX SONES	WEIGHT (LBS)	VOLTS/ PHASE	TYPE	GREENHECK MODEL
①	800	0.55	1/4	1089	7.3	60	115/1	ROOF	G-120-VG

**NOTES:**

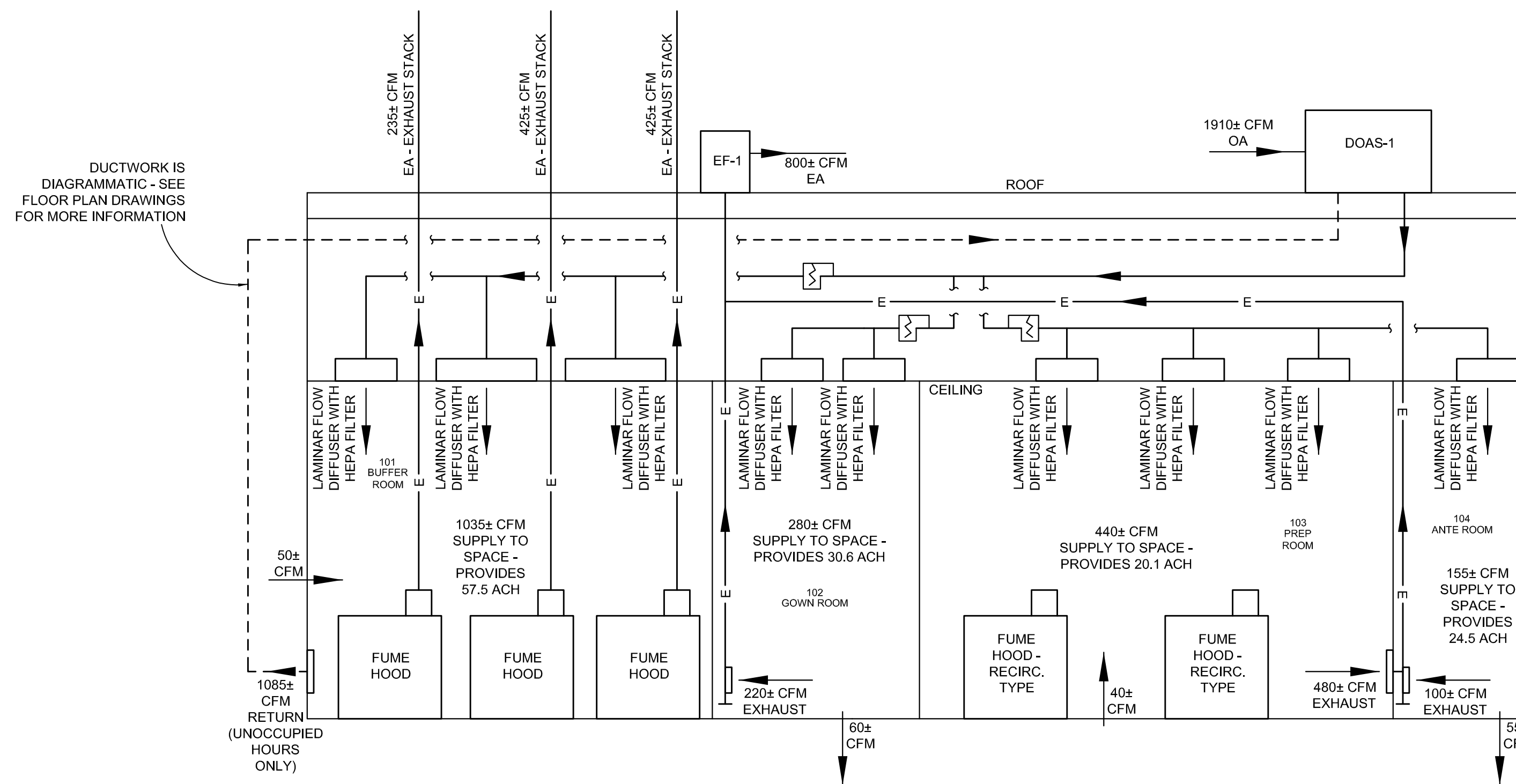
- VERIFY VOLTAGE BEFORE ORDERING EQUIPMENT
- FURNISH EXHAUST FAN WITH BACKDRAFT DAMPER, ROOF CURB, DISCONNECT, AND SPEED CONTROLLER
- EF-1 SHALL OPERATE CONTINUOUSLY

**DUCT HEATER (DH) SCHEDULE**

MARK	CFM	DUCT SIZE (WIDTH x HEIGHT)	WATTS	STEPS	VOLTS/ PHASE	MANUF. & MODEL
①	1035	16x12	6500	SCR	208/3	MARKEL SERIES HF
②	280	8x8	2000	SCR	208/1	MARKEL SERIES HF
③	595	12x10	4000	SCR	208/1	MARKEL SERIES HF

**NOTES:**

- VERIFY VOLTAGE BEFORE ORDERING EQUIPMENT
- PROVIDE WALL-MOUNTED 7-DAY PROGRAMMABLE THERMOSTAT WITH HUMIDITY SENSOR; SET TO 68°F AND 60% RH
- PROVIDE SCR MODULATING CONTROLS.



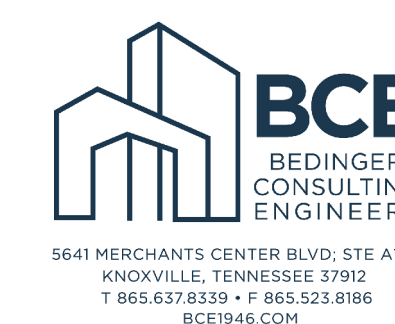
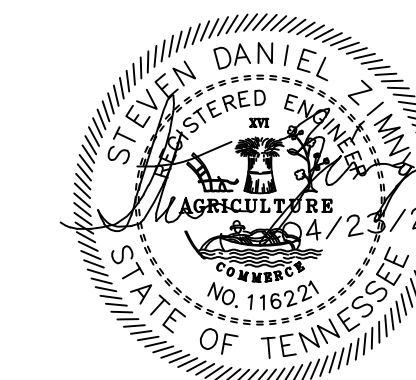
**CLEAN ROOM PRESSURE RELATIONSHIPS**

NO SCALE

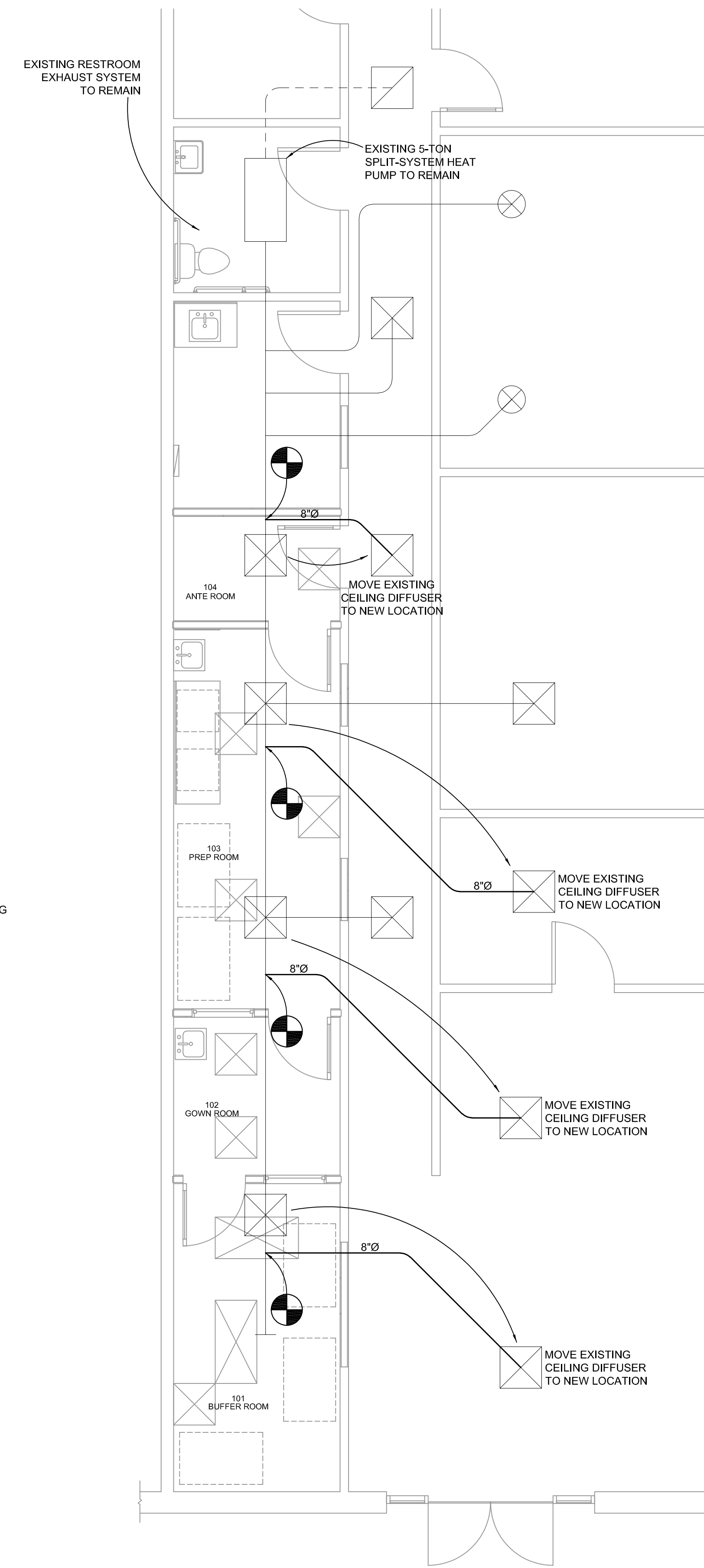
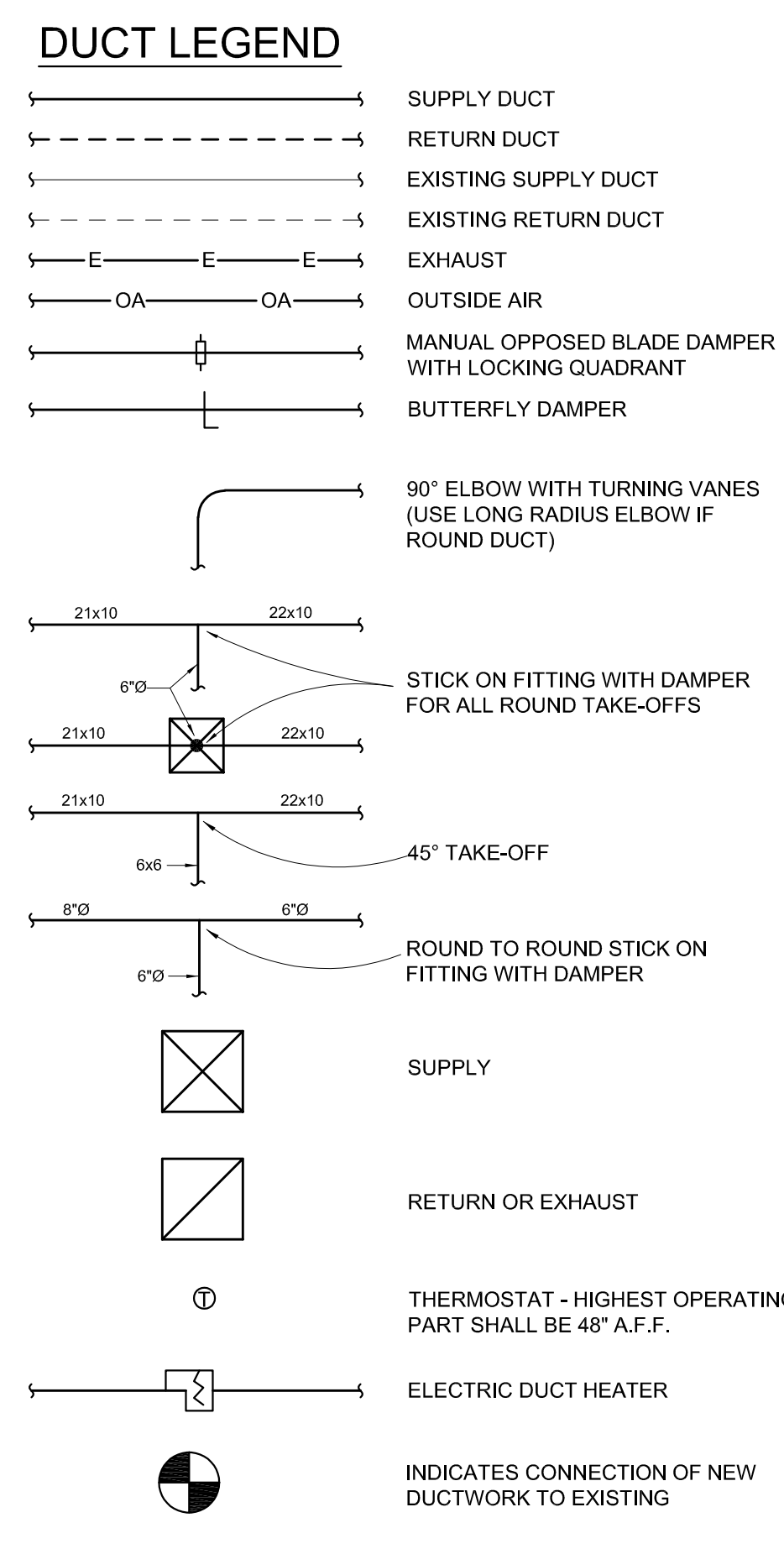
**HEARTLAND APOTHECARY CLEAN ROOM**  
9947 KINGSTON PIKE,  
KNOXVILLE, TN 37922

**SPECIFICATIONS & SCHEDULES**

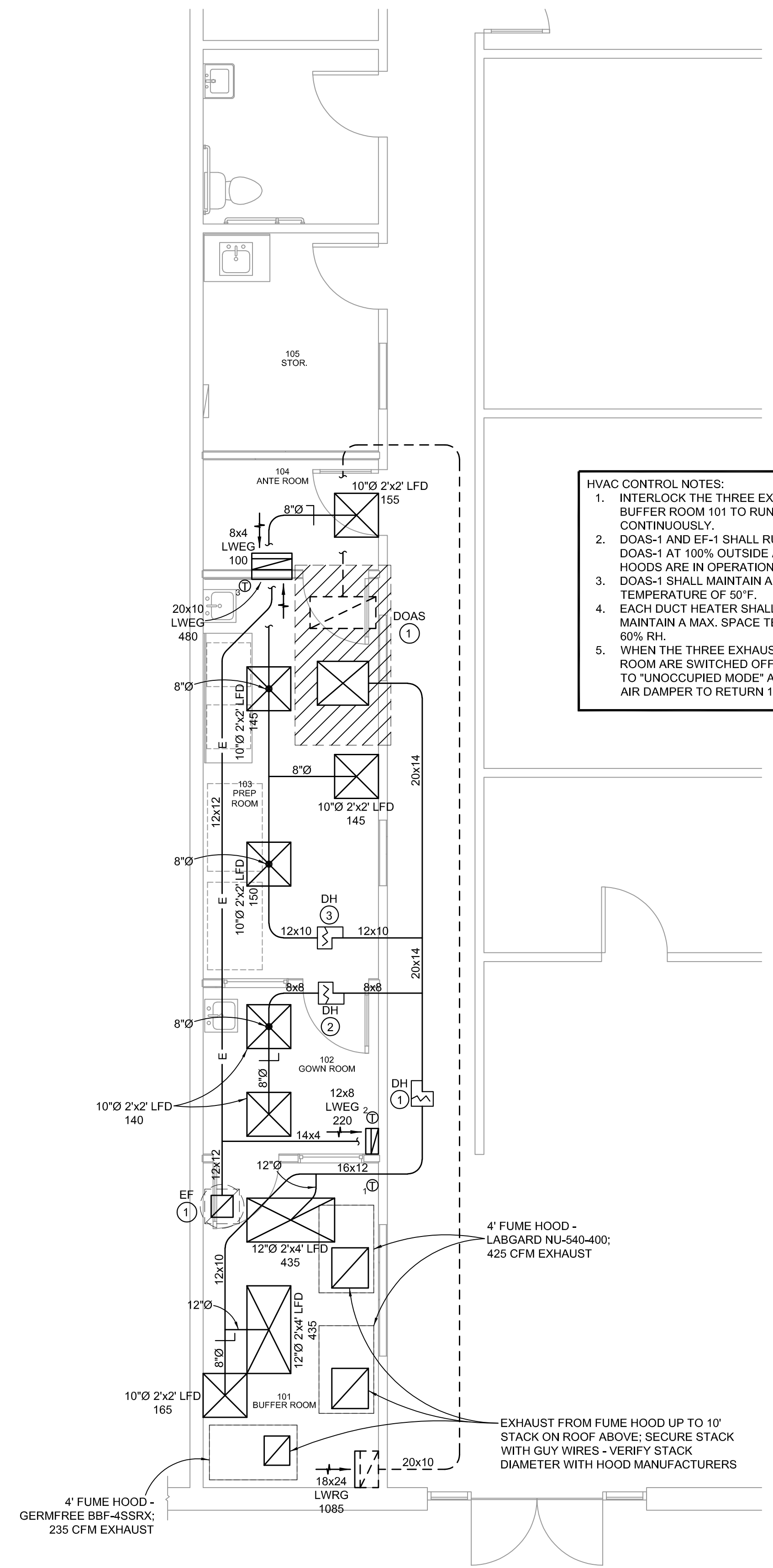
Issue	Issued by	Drawn by	Date
RELEASE FOR CONSTRUCTION	SZ	SZ	04/23/2025



**M-001**



TRUE NORTH  
1/4"=1'-0"  
**FLOOR PLAN - EXISTING HVAC**



TRUE NORTH  
1/4"=1'-0"  
**FLOOR PLAN - NEW HVAC**

**HVAC CONTROL NOTES:**

- INTERLOCK THE THREE EXHAUST HOODS IN BUFFER ROOM 101 TO RUN TOGETHER CONTINUOUSLY.
- DOAS-1 AND EF-1 SHALL RUN CONTINUOUSLY WITH DOAS-1 AT 100% OUTSIDE AIR WHILE THE EXHAUST HOODS ARE IN OPERATION.
- DOAS-1 SHALL MAINTAIN A DISCHARGE AIR TEMPERATURE OF 50°F.
- EACH DUCT HEATER SHALL MODULATE TO MAINTAIN A MAX. SPACE TEMPERATURE OF 68°F AT 60% RH.
- WHEN THE THREE EXHAUST HOODS IN BUFFER ROOM ARE SWITCHED OFF, DOAS-1 SHALL SWITCH TO "UNOCCUPIED MODE" AND OPEN ITS RETURN AIR DAMPER TO RETURN 1085 CFM OF AIRFLOW.

**HEARTLAND APOTHECARY CLEAN ROOM**  
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**FLOOR PLAN - HVAC**

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