

HVAC SCHEDULES

14022

ISSUED: 10-23-14

DWG BY: WBE

CKD BY: BEB

REVISIONS

SHEET NO.

M-1

1 OF 4

LEGEND - MECHANICAL

- 12" DIA. ROUND GALVANIZED STEEL DUCT
- SUPPLY DIFFUSER
- RETURN GRILLE
- WALL MOUNTED THERMOSTAT
- GRILLE TYPE
MIN. CFM
- WALL MOUNTED CARBON MONOXIDE SENSOR/MONITOR.
PROVIDE VISUAL AND AUDIBLE ALARM

GENERAL NOTES

1. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE STATE CODE AND ALL LOCAL AND OTHER APPLICABLE CODES.
2. ANY PERMITS AND INSPECTION FEES SHALL BE SECURED AND PAID FOR BY THE MECHANICAL CONTRACTOR (MC).
3. ALL WORK SHALL BE PERFORMED BY EXPERIENCED AND SKILLED CRAFTSMEN. THE MC SHALL COORDINATE ALL OF HIS WORK WITH THE GENERAL CONTRACTOR (GC) AND OTHER TRADES.
4. THE LOCATION OF ALL DUCT, PIPING AND EQUIPMENT SHALL BE ADJUSTED TO ACCOMMODATE ANTICIPATED OR ENCOUNTERED INTERFERENCES.
5. THESE PLANS ARE DIAGRAMMATIC AND MAY NOT SHOW MINOR DETAILS AND LOCATIONS. FOR DIMENSIONS REFER TO THE ARCHITECTURAL PLANS.
6. THE MC SHALL BE RESPONSIBLE FOR ALL ELECTRICAL STARTERS INTERLOCKS, CONTROL WIRING CONDUIT AND POWER WIRING FROM DISCONNECTS TO HIS EQUIPMENT, USING A LICENSED ELECTRICIAN.
7. THE MC SHALL USE FIRE DAMPERS FOR PROTECTION OF THE OPENING IN ACCORDANCE WITH STATE AND LOCAL CODES IN ALL LOCATIONS WHERE PENETRATIONS OF RATED WALLS AND FLOORS OCCUR. SEE ARCHITECTURAL PLANS FOR RATED WALL AND FLOOR LOCATIONS. PROVIDE ACCESS DOORS AT ALL DAMPER LOCATIONS. LOCATE DOORS FOR EASY ACCESS. THERE ARE NO RATED WALLS PENETRATED IN THIS PROJECT.
8. INSTALL FLEXIBLE CONNECTORS ON SUPPLY AND RETURN DUCTWORK AHEAD. ALL MECHANICAL EQUIPMENT SHALL OPERATE FREE OF OBJECTIONAL NOISE AND VIBRATION.
9. INSTALL TURNING VANES IN SUPPLY DUCTS AT ALL ELBOWS AND SPLITTER DAMPERS. PROVIDE BALANCING DAMPERS IN ALL DUCTS WHERE SHOWN OR REQUIRED FOR SYSTEM BALANCING.
10. DUCT DIMENSIONS ARE SHOWN INSIDE CLEAR.
11. THE MC SHALL KEEP THE PREMISES CLEAR OF DEBRIS FROM HIS WORK DURING CONSTRUCTION AND LEAVE THE AREA AND BUILDING CLEAN AT THE COMPLETION OF HIS WORK. HE SHALL ALSO LEAVE CLEAN ALL EXPOSED EQUIPMENT IN HIS CONTRACT.
12. PROVIDE ALL REQUIRED ROOF PENETRATIONS FOR THE INSTALLATION OF THE NEW EQUIPMENT. ALL FLASHINGS ARE BY THE MECHANICAL CONTRACTOR. ALL ROOFING WORK SHALL BE DONE BY A LICENSED ROOFING CONTRACTOR SO AS TO MAINTAIN ORIGINAL WARRANTY.
13. THE M.C. SHALL COORDINATE WITH AND PROVIDE EQUIPMENT SPEC. SHEETS TO THE GENERAL AND ELECTRICAL CONTRACTORS FOR REVIEW PRIOR TO ORDERING EQUIPMENT.
14. PROPERLY SUPPORT ALL DUCT WORK, AND EQUIP FROM STRUCTURE. PROVIDE ALL STRUCTURAL SUPPORTS FOR THE LOADS AS REQUIRED AT NO ADDITIONAL COST TO THE OWNER.

GAS PACK SCHEDULE

GPU #1 GAS HEAT ELECTRIC COOLING SINGLE PACKAGE UNIT	* CARRIER MODEL #48HCEA05A1A5-0ADA0 LP GAS HEAT ELECTRIC COOLING SINGLE PACKAGE UNIT; 13 EER; 48,500 BTUH NET COOLING; 1600 CFM; 208 VOLT, 3 PHASE; COMP 13.7 RLA; CFM 1.4 FLA; IFM 5.2 FLA; 27 MCA, 40A MOCP; 4.0 TONS. PROVIDE PROGRAMMABLE THERMOSTAT, MANUAL OUTSIDE AIR DAMPER, ACCESS PANELS, FILTER RACK, AND COIL GUARDS. 115,000 BTUH INPUT LP GAS. PROVIDE WITH MOTORIZED DAMPER TO CLOSE OUTSIDE AIR INTAKE WHEN UNIT IS NOT IN USE. PER 2012 NC ENERGY CODE.
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* OR APPROVED EQUAL

RADIANT HEATER SCHEDULE

RADIANT HEATER 45,000 BTUH (RH-1)	* REVERBERRY MODEL# DR45 LP GAS RADIANT UNIT HEATER, WITH AUTOMATIC SPARK IGNITION, 45,000 BTUH INPUT. PROVIDE MODEL NSF-2 DIRECT SPARK IGNITION. PROVIDE HEAT SHIELDS AS REQUIRED TO PROTECT ADJACENT PIPING, CONDUITS, ETC. PROVIDE GAS SHUT-OFF VALVE, UNION, DIRT LEG, AND FLEXIBLE CONNECTION. PROVIDE CHAIN MOUNTING KIT. PROVIDE ALL MANUFACTURERS RECOMMENDED CLEARANCES.
RADIANT HEATER 45,000 BTUH (RH-2)	* REVERBERRY MODEL# DR45 LP GAS RADIANT UNIT HEATER, WITH AUTOMATIC SPARK IGNITION, 45,000 BTUH INPUT. PROVIDE MODEL NSF-2 DIRECT SPARK IGNITION. PROVIDE HEAT SHIELDS AS REQUIRED TO PROTECT ADJACENT PIPING, CONDUITS, ETC. PROVIDE GAS SHUT-OFF VALVE, UNION, DIRT LEG, AND FLEXIBLE CONNECTION. PROVIDE CHAIN MOUNTING KIT. PROVIDE ALL MANUFACTURERS RECOMMENDED CLEARANCES.

* OR APPROVED EQUAL

WASTE OIL HEATER SCHEDULE

UNIT HEATER 175,000 BTUH (WOH-1)	* CLEAN BURN MODE# CB-1750 WAST OIL FIRED HEATER. 175,000 BUTH INPUT, 1700 CFM, 8" FLUE, 3/4 HP, 120 VOLT, 24 MCA, 30 AMP MOCP. PROVIDE 8" DIA TYPE "B" EXHAUST VENT THROUGH THE ROOF. PROVIDE ALL FLASHING AS REQUIRED. HEATER SHALL HAVE DISCHARGE LOUVERS ON BOTH SIDES. ENTIRE HEATER INSTALLATION SHALL BE PER MANUFACTURER'S INSTRUCTIONS.
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AIR DISTRIBUTION SCHEDULE

MARK	* MANUFACTURER	MODEL NO.	FACE SIZE	MATERIAL	SERVICE	NOTES
A	CARNES	SPAB224	24" X 24"	STEEL	SUPPLY	LAY-IN CEILING, WHITE 4-WAY BLOW
B	RUSKIN	CDS-18	47-5/8" X 21-1/2" (2) 18" DIA. DUCT COLLARS	STEEL	SUPPLY/ RETURN	DUCT MOUNTED CONCENTRIC DIFFUSER, 4-WAY BLOW
RA	GRAINGER	4MJTB	24" X 24"	STEEL	RETURN	LAY-IN CEILING, WHITE, FILTER GRILLE

COORDINATE BORDER TYPE WITH THE CEILING TYPE. SEE ARCH SHEETS. INSULATE THE TOPS OF ALL DIFFUSERS. PROVIDE CUT SHEETS TO OWNER/ARCH. PRIOR TO ORDERING.

* OR APPROVED EQUAL

FAN EQUIPMENT SCHEDULE

EF-1		
EXHAUST FAN #1 (EF-1)	* CARNES MODEL# VCDD010C EXHAUST FAN, 93 CFM @ 1/4" SP, 640 RPM, 1.1 AMPS, 120V. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE SWITCH AND WIRE THE UNIT. THE HVAC CONTRACTOR SHALL PROVIDE UNIT, 6" RIGID DUCT TO EXTERIOR WALL CAP. LOCATE EXHAUST TERMINATION A MINIMUM OF 10'-0" FROM ANY INTAKES. FAN SHALL HAVE BACKDRAFT DAMPER TO COMPLY WITH 2012 NC ENERGY CODE, SECTION 503.2.4.4.	
EF-2		
EXHAUST FAN #2 (EF-2)	* CARNES MODEL# VCDD010C EXHAUST FAN, 93 CFM @ 1/4" SP, 640 RPM, 1.1 AMPS, 120V. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE SWITCH AND WIRE THE UNIT. THE HVAC CONTRACTOR SHALL PROVIDE UNIT, 6" RIGID DUCT TO EXTERIOR WALL CAP. LOCATE EXHAUST TERMINATION A MINIMUM OF 10'-0" FROM ANY INTAKES. FAN SHALL HAVE BACKDRAFT DAMPER TO COMPLY WITH 2012 NC ENERGY CODE, SECTION 503.2.4.4.	
EF-3		
EXHAUST FAN #3 (EF-3)	* CARNES MODEL# VCDD010C EXHAUST FAN, 93 CFM @ 1/4" SP, 640 RPM, 1.1 AMPS, 120V. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE SWITCH AND WIRE THE UNIT. THE HVAC CONTRACTOR SHALL PROVIDE UNIT, 6" RIGID DUCT TO EXTERIOR WALL CAP. LOCATE EXHAUST TERMINATION A MINIMUM OF 10'-0" FROM ANY INTAKES. FAN SHALL HAVE BACKDRAFT DAMPER TO COMPLY WITH 2012 NC ENERGY CODE, SECTION 503.2.4.4.	
EF-4		
EXHAUST FAN #4 (EF-4)	* CARNES MODEL# LWBK-24R1 SIDEWALL PROPELLER EXHAUST FAN, 3/4 HP, 855 RPM, 4525 CFM AT 0.25" SP. PROVIDE WALL BOX WITH MOTOR SIDE GUARD. PROVIDE MOTORIZED BACKDRAFT DAMPER ON EXTERIOR SIDE OF FAN. PROVIDE INTERLOCK WITH WALL INTAKE DAMPER ON OPPOSITE END OF FACILITY. BELT DRIVE MOTOR, 208 VOLT, SINGLE PHASE. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE SWITCH AND WIRE THE UNIT. FAN SHALL ALSO BE ENERGIZED BY CARBON MONOXIDE SENSOR MOUNTED IN SPACE SERVED.	
EF-5		
EXHAUST FAN #5 (EF-5)	* CARNES MODEL# VEDK18-M4 ROOF MOUNTED EXHAUST FAN, 2300 CFM @ 1/4" SP, 700 RPM, 1/3 HP, 120V. THE ELECTRICAL CONTRACTOR SHALL PROVIDE THE SWITCH AND WIRE THE UNIT. THE HVAC CONTRACTOR SHALL PROVIDE UNIT. PROVIDE FACTORY ROOF CURB, DISCONNECT SWITCH IN FAN HOUSING, AND FACTORY WALL MOUNTED SPEED CONTROLLER. LOCATE EXHAUST TERMINATION A MINIMUM OF 10'-0" FROM ANY INTAKES. SPEED CONTROLLER IS FOR BALANCING ONLY. PROVIDE WALL MOUNTED THERMOSTAT TO CONTROL FAN. FAN SHALL ALSO BE ENERGIZED BY CARBON MONOXIDE SENSOR MOUNTED IN SPACE SERVED.	

* OR APPROVED EQUAL
NOTE: ALL EXHAUST FANS SHALL HAVE BACKDRAFT DAMPERS AS REQUIRED BY THE 2012 NC ENERGY CODE.

OUTDOOR AIR CALCULATIONS

OUTDOOR VENTILATION AIR PROVIDED PER TABLE 403.3 NC88C MECHANICAL CODE.
(SERVICE BAY ADDITION ONLY)

APPLICATION	CFM/SQ.FT.
SERVICE BAY AREA	0.75 CFM/SQ.FT.
2885 SQ. FT. X 0.75 CFM/SQ.FT. = 1999 CFM	
TOTAL EXHAUST REQUIRED = 1999 CFM	
VENTILATION PROVIDED BY (1) SIDEWALL PROPELLER EXHAUST FANS FOR TOTAL OF 4525 CFM. FAN WILL RUN WHEN CO SENSOR DETECTS CO LEVELS ABOVE 25 PPM.	

OUTDOOR AIR CALCULATIONS

OUTDOOR VENTILATION AIR PROVIDED PER TABLE 403.3 NC88C MECHANICAL CODE.
(SERVICE DRIVE ONLY)

APPLICATION	CFM/SQ.FT.
SERVICE DRIVE AREA	0.75 CFM/SQ.FT.
1420 SQ. FT. X 0.75 CFM/SQ.FT. = 1065 CFM	
TOTAL EXHAUST REQUIRED = 1065 CFM	
VENTILATION PROVIDED BY (1) ROOF MOUNTED EXHAUST FAN FOR TOTAL OF 2300 CFM. FAN WILL RUN WHEN CO SENSOR DETECTS CO LEVELS ABOVE 25 PPM.	

MECHANICAL SYSTEMS AND EQUIPMENT

SERVICE DRIVE ONLY
METHOD OF COMPLIANCE:

Prescriptive Energy Cost Budget

Thermal Zone 3A

Exterior Design Conditions

winter dry bulb 23 F
summer dry bulb 94 F

Interior Design Conditions

winter dry bulb 72 F
summer dry bulb 75 F
relative humidity 50%

Building Heating Load 40,300 BTU/hr

Building Cooling Load 599,500 BTU/hr

Mechanical Spacing Conditioning System

Unitary - The building is served by the following system:
(1) One 4 ton roof-top single package unit with hp gas heat and dx cooling
(2) Two 45 mbh LP gas fired infrared heaters.

Boiler - Not applicable to this project.

Chiller - Not applicable to this project.

Equipment efficiencies

Efficiencies and outputs are listed on equipment schedules - See drawings.

Equipment schedules with motors.

Motors used on this project are included in the efficiency rating of the unit. See drawings for efficiencies.

DESIGNER STATEMENT:

To the best of my knowledge and belief, the design of this building complies with the mechanical system and equipment requirements of the 2012 North Carolina State Building Code: Energy Conservation Code.

MECHANICAL SYSTEMS AND EQUIPMENT

SERVICE BAY ADDITION ONLY
METHOD OF COMPLIANCE:

Prescriptive Energy Cost Budget

Thermal Zone 3A

Exterior Design Conditions

winter dry bulb 23 F
summer dry bulb 94 F

Interior Design Conditions

winter dry bulb 72 F
summer dry bulb 75 F
relative humidity 50%

Building Heating Load 141,200 BTU/hr

Building Cooling Load NA - No cooling in this area

Mechanical Spacing Conditioning System

Unitary - The building is served by the following system:
(1) One 175 mbh waste oil unit heaters.

Boiler - Not applicable to this project.

Chiller - Not applicable to this project.

Equipment efficiencies

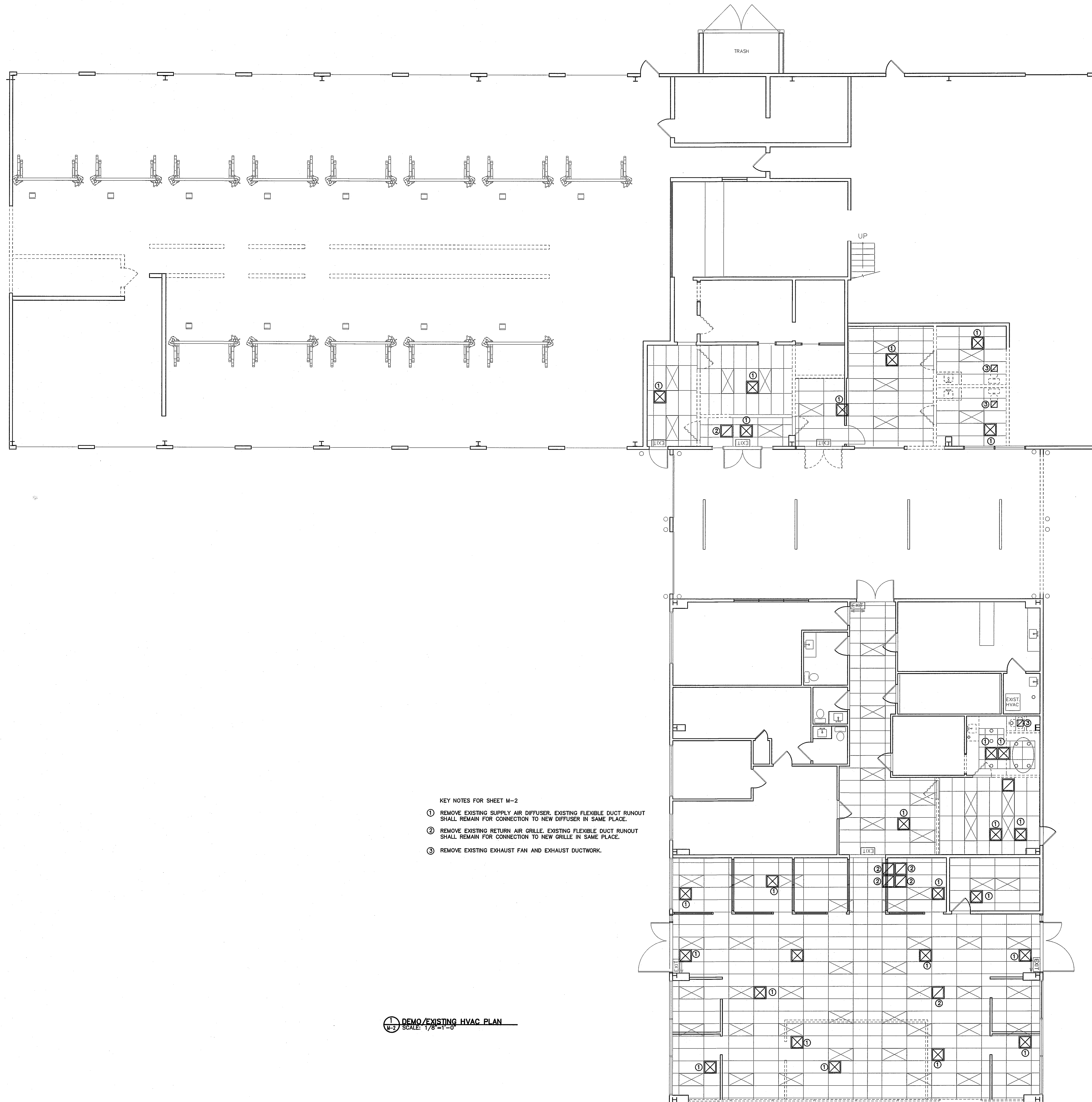
Efficiencies and outputs are listed on equipment schedules - See drawings.

Equipment schedules with motors.

Motors used on this project are included in the efficiency rating of the unit. See drawings for efficiencies.

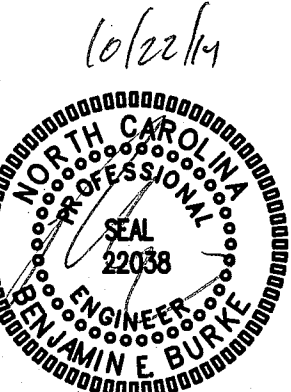
DESIGNER STATEMENT:

To the best of my knowledge and belief, the design of this building complies with the mechanical system and equipment requirements of the 2012 North Carolina State Building Code: Energy Conservation Code.



- KEY NOTES FOR SHEET M-2
- ① REMOVE EXISTING SUPPLY AIR DIFFUSER. EXISTING FLEXIBLE DUCT RUNOUT SHALL REMAIN FOR CONNECTION TO NEW DIFFUSER IN SAME PLACE.
 - ② REMOVE EXISTING RETURN AIR GRILLE. EXISTING FLEXIBLE DUCT RUNOUT SHALL REMAIN FOR CONNECTION TO NEW GRILLE IN SAME PLACE.
 - ③ REMOVE EXISTING EXHAUST FAN AND EXHAUST DUCTWORK.

DEM/EXISTING HVAC PLAN
SCALE: 1/8"=1'-0"



DEM/EXISTING
HVAC PLAN

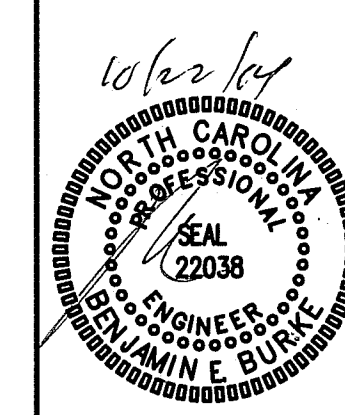
14022

ISSUED: 10-23-14
DWG BY: WBE
CKD BY: BEB

REVISIONS

SHEET NO.
M-2
2 OF 4

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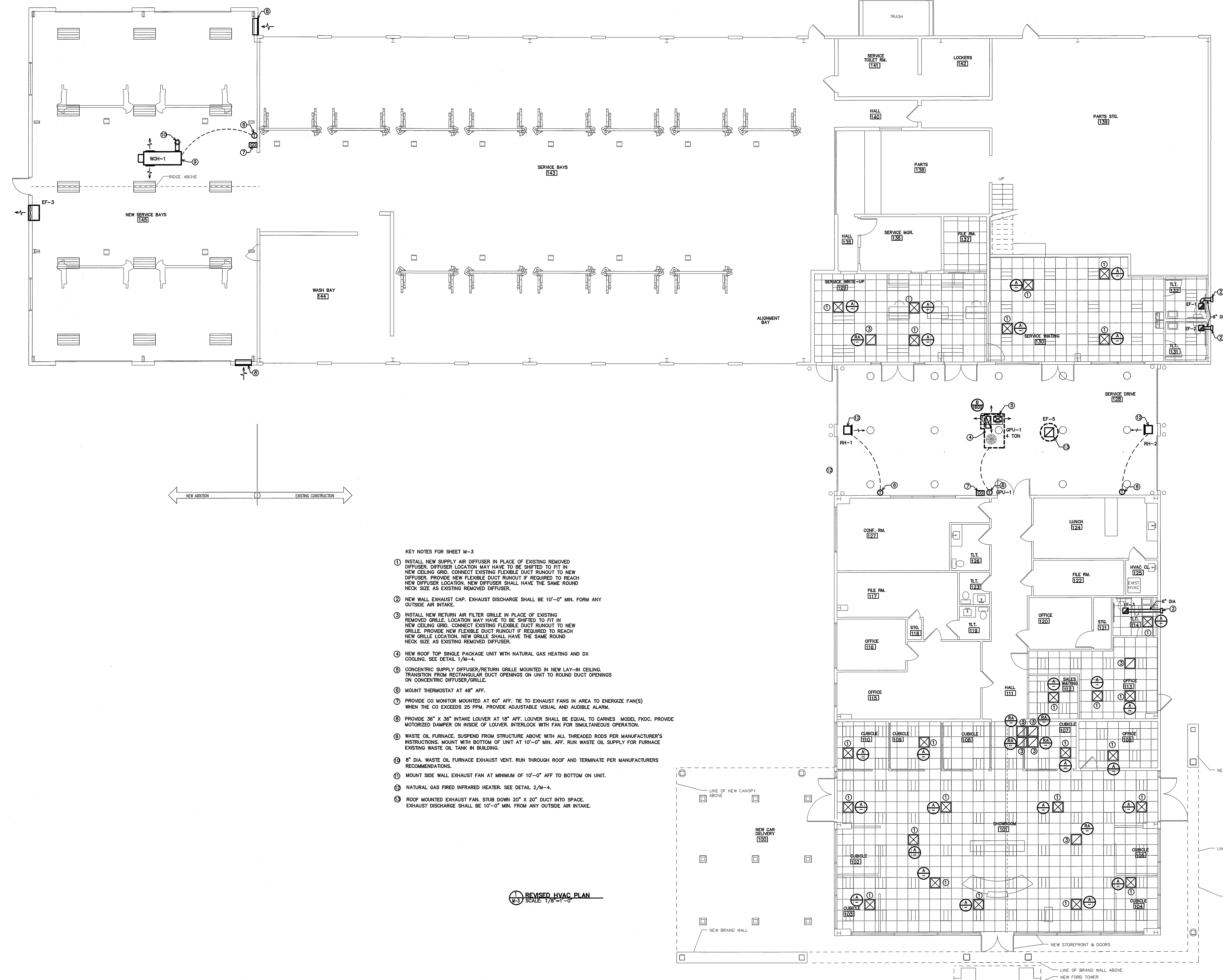
REVISED
HVAC PLAN

14022

ISSUED: 10-23-14
DWG BY: WBE
CKD BY: BEB

NO.	REVISIONS

SHEET NO.
M-3
3 OF 4



- KEY NOTES FOR SHEET M-3
- INSTALL NEW SUPPLY AIR DIFFUSER IN PLACE OF EXISTING REMOVED DIFFUSER. DIFFUSER LOCATION MAY HAVE TO BE SHIFTED TO FIT IN NEW CEILING GRID. CONNECT EXISTING FLEXIBLE DUCT RUNOUT TO NEW DIFFUSER. PROVIDE NEW FLEXIBLE DUCT RUNOUT IF REQUIRED TO REACH NEW DIFFUSER LOCATION. NEW DIFFUSER SHALL HAVE THE SAME ROUND NECK SIZE AS EXISTING REMOVED DIFFUSER.
 - NEW WALL EXHAUST CAP. EXHAUST DISCHARGE SHALL BE 10'-0" MIN. FORM ANY OUTSIDE AIR INTAKE.
 - INSTALL NEW RETURN AIR FILTER GRILLE IN PLACE OF EXISTING REMOVED GRILLE. LOCATION MAY HAVE TO BE SHIFTED TO FIT IN NEW CEILING GRID. CONNECT EXISTING FLEXIBLE DUCT RUNOUT TO NEW GRILLE. PROVIDE NEW FLEXIBLE DUCT RUNOUT IF REQUIRED TO REACH NEW GRILLE LOCATION. NEW GRILLE SHALL HAVE THE SAME ROUND NECK SIZE AS EXISTING REMOVED DIFFUSER.
 - NEW ROOF TOP SINGLE PACKAGE UNIT WITH NATURAL GAS HEATING AND DX COOLING. SEE DETAIL 1/M-4.
 - CONCENTRIC SUPPLY DIFFUSER/RETURN GRILLE MOUNTED IN NEW LAY-IN CEILING. TRANSITION FROM RECTANGULAR DUCT OPENINGS ON UNIT TO ROUND DUCT OPENINGS ON CONCENTRIC DIFFUSER/GRILLE.
 - MOUNT THERMOSTAT AT 48" AFF.
 - PROVIDE CO MONITOR MOUNTED AT 60" AFF. TIE TO EXHAUST FANS IN AREA TO ENERGIZE FAN(S) WHEN THE CO EXCEEDS 25 PPM. PROVIDE ADJUSTABLE VISUAL AND AUDIBLE ALARM.
 - PROVIDE 36" X 36" INTAKE LOUVER AT 18" AFF. LOUVER SHALL BE EQUAL TO CARNES MODEL FKDC. PROVIDE MOTORIZED DAMPER ON INSIDE OF LOUVER. INTERLOCK WITH FAN FOR SIMULTANEOUS OPERATION.
 - WASTE OIL FURNACE. SUSPEND FROM STRUCTURE ABOVE WITH ALL THREADED RODS PER MANUFACTURER'S INSTRUCTIONS. MOUNT WITH BOTTOM OF UNIT AT 10'-0" MIN. AFF. RUN WASTE OIL SUPPLY FOR FURNACE EXISTING WASTE OIL TANK IN BUILDING.
 - 8" DIA. WASTE OIL FURNACE EXHAUST VENT. RUN THROUGH ROOF AND TERMINATE PER MANUFACTURERS RECOMMENDATIONS.
 - MOUNT SIDE WALL EXHAUST FAN AT MINIMUM OF 10'-0" AFF TO BOTTOM ON UNIT.
 - NATURAL GAS FIRED INFRARED HEATER. SEE DETAIL 2/M-4.
 - ROOF MOUNTED EXHAUST FAN. STUB DOWN 20" X 20" DUCT INTO SPACE. EXHAUST DISCHARGE SHALL BE 10'-0" MIN. FROM ANY OUTSIDE AIR INTAKE.

REVISED HVAC PLAN
SCALE: 1/8" = 1'-0"

ENGINEER
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DIVISION 15 B - HEATING, VENTILATING AND AIR CONDITIONING

1.1 DESCRIPTION OF THE WORK

- A. Work under this section includes, but is not necessarily limited to, furnishing and installing the following:
 1. Heating, ventilation, and air conditioning equipment.
 2. Ductwork.
 3. Grilles and diffusers.
 4. Controls and control wiring.
 5. Condensate piping.

- B. All work under this contract shall be installed in compliance with the latest edition of the following codes and standards insofar as they apply:
 1. ASHRAE Guide
 2. National Electric Code.
 3. 2012 NC State Building Code: Mech Code.
 4. The Electrical Specifications for this project.
 5. SMACNA HVAC Duct Construction Standards.
 6. All local codes and ordinances.
 7. ARI ratings.
 8. 2012 NC State Building Code: Energy Conservation Code.

- C. These codes are minimum standards. If codes require a more stringent method of construction than the specifications require, the codes shall govern.

- D. The HVAC Contractor shall be licensed in North Carolina and have all local licenses required for the work.

- E. Obtain all permits, licenses, inspections, etc., required for the work and pay for the same.

1.2 INTENT

- A. The intent of these specifications and the accompanying drawing is to convey as reasonably as possible the requirements for a complete job ready for the building to operate. The HVAC Contractor shall take this into consideration and include in his bid allowance for contingencies as will allow him to provide minor pieces of equipment and labor not specifically indicated but required for the job to operate properly, at no additional cost to the Owner.

1.3 COORDINATION

- A. Coordinate work with other contractors. Notify Owner of apparent conflicts early to expedite construction. If structural damage appears imminent, stop work and notify Owner for a decision before resuming operations.

- B. Locations shown are approximate. The HVAC Contractor shall verify with owner, the placement of equipment, fixtures, outlets, etc. The drawings do not give exact details as to elevations and locations of various pipes, fittings, ducts, conduit, etc., and do not show all offsets and other installation details which may be required.

- C. Changes in duct or piping design caused by obstructions shall be submitted to Engineer in sketch form for study and comment prior to execution. Additional cost will not be allowed for this type of work.

1.4 SHOP DRAWINGS

- A. Shop drawings shall be submitted for all major items of equipment. These may consist of the manufacturer's standard catalog or tear sheets and shall have the exact items being offered clearly identified. Shop drawings shall include but are not limited to the following:
 1. All equipment and accessories.
 2. Grilles and diffusers.
 3. Unit sizes and requirements.

PART 2 - PRODUCTS

2.1 EQUIPMENT

- A. All air handling devices must have the manufacturer's recommended filter rack, for 1" thick filters.

2.2 PIPING

- A. Condensate drain piping shall be PVC pipe. Provide tee and plug at changes in direction. Route pipe to proper termination point. All condensate piping shall be insulated with flexible elastomeric insulation. Provide copper piping in plenum areas.

2.3 DUCTWORK

- A. Ductwork shall be built in accordance with SMACNA HVAC Duct construction standards. Furnish and install all supply, return, and ventilation ductwork shown, together with splitters, deflectors, dampers, etc. This work shall be constructed of new galvanized prime grade steel sheets. The gauges of metal to be used and the construction and bracing of joints shall be in accordance with the SMACNA recommendations.

- B. Seal all sheet metal joints with fiber impregnated mastic.
- C. Support from building structure on strap hangers not over 8 feet apart.

- D. Use manufactured turning vanes in each elbow where required or where indicated on drawings.

- E. Flexible connectors shall be 3 inches wide, of fireproof material and used to isolate noise between equipment and ductwork on supply and return side of all units.

- F. Round runouts, where used, shall be built in accordance with the above standards, and each runout shall also have manufactured side take off, adjustable quadrant damper at all accessible locations and shall be of Owens Corning INL-25 flexible duct with UL label. Flex duct lengths allowed up to 14 feet. Duct must be supported with sufficient hangers in order to prevent sags. Serpentine routing will not be permitted. Quadrant damper to be 22 gauge easily adjustable manually with exterior handle (similar to H&C Kwik-set) and is not to be mounted in side take-off.

2.4 DUCT INSULATION (LOW PRESSURE)

- A. All insulation, linings, coverings and adhesives shall have a flame spread classification of 25 or less and a smoke developed rating of not more than 50, exposed exterior piping.
- B. All duct insulation shall comply with Section 604, of the N. C. Building Code: Mechanical Code

- C. All supply and return ductwork shall be completely insulated, either internally or externally.

- D. Rectangular ductwork shall be lined with two-inch thick, 1.5 lb. per cubic foot density, duct liner, Armstrong, CSG Ultraliner, Johns Manville or approved equal.

- E. As an alternative to duct liner rectangular duct may be wrapped with Class I - 2, 3/4 lb. density (R-6.5) thick reinforced foil back fiberglass insulation, Owens-Corning Series ED or equal. Tape shall be Kraft reinforced foil tape or equal.

- F. Exhaust air duct does not require insulation, unless otherwise noted on the plans.

- G. Insulation shall be held in place with adhesive and welding pins 18" on center.

- H. Duct dimensions shown on the drawings are Net Inside Dimensions

2.5 THERMOSTATS

- A. Provide programmable electronic thermostats.
- B. Submit proposed thermostats for approval.

2.6 ROOF PENETRATIONS

- A. Provide pre-manufactured roof flashings compatible with equipment served.
- B. Coordinate roof work with roof system used. Provide proper flashing as required.
- C. Provide 1 year warranty on all roof work performed.

2.7 DUCT SMOKE DETECTORS

- A. Duct detectors are not required since units air flows ARE 2000 cfm or less per NCSCB: Mechanical Code, Section 606.2.

PART 3 - EXECUTION

3.1 PIPING

- A. The HVAC Contractor shall coordinate such routing with others, to line his work true to adjacent spaces and in a workmanlike manner and to use only short radius 90 degree elbows. Where required, piping to be sturdily supported and separated in a manner satisfactory to the Engineer.

- B. The HVAC Contractor shall paint all exterior refrigerant piping with UV resistant paint as recommended by the closed cell insulation manufacturer.

- C. Insulate all condensate lines for their entire length with 1/2" closed cell insulation. Install insulation per the manufacturers recommendations.

3.2 ELECTRICAL WORK

- A. The electrical contractor shall provide all switches, starters, wire conduit for the air conditioning, heating and ventilation equipment. Control wiring shall be by the heating and air conditioning contractor.

- B. HVAC Contractor is responsible for verifying that power terminals have been properly grounded prior to operating equipment and must find connections to all equipment including control wiring.

- C. All materials and workmanship shall be in accordance with the electrical specifications for the project. All wiring shall be color coded, and as-built wiring diagram prepared showing all connections and colors of wiring and delivered to the Owner.

- D. Furnish certification for acceptance of control wiring from local electrical inspector prior to acceptance.

3.3 CLEAN UP

- A. During construction, keep the site clean of debris. Upon completion, and before final inspection, clean up the premises to remove all evidence of work. In addition upon completion of construction leave equipment clean.

- B. Furnish one box of clean filters, for each size required, at the time of final inspection to the owner.

3.4 OPERATOR'S MANUAL AND DIAGRAM

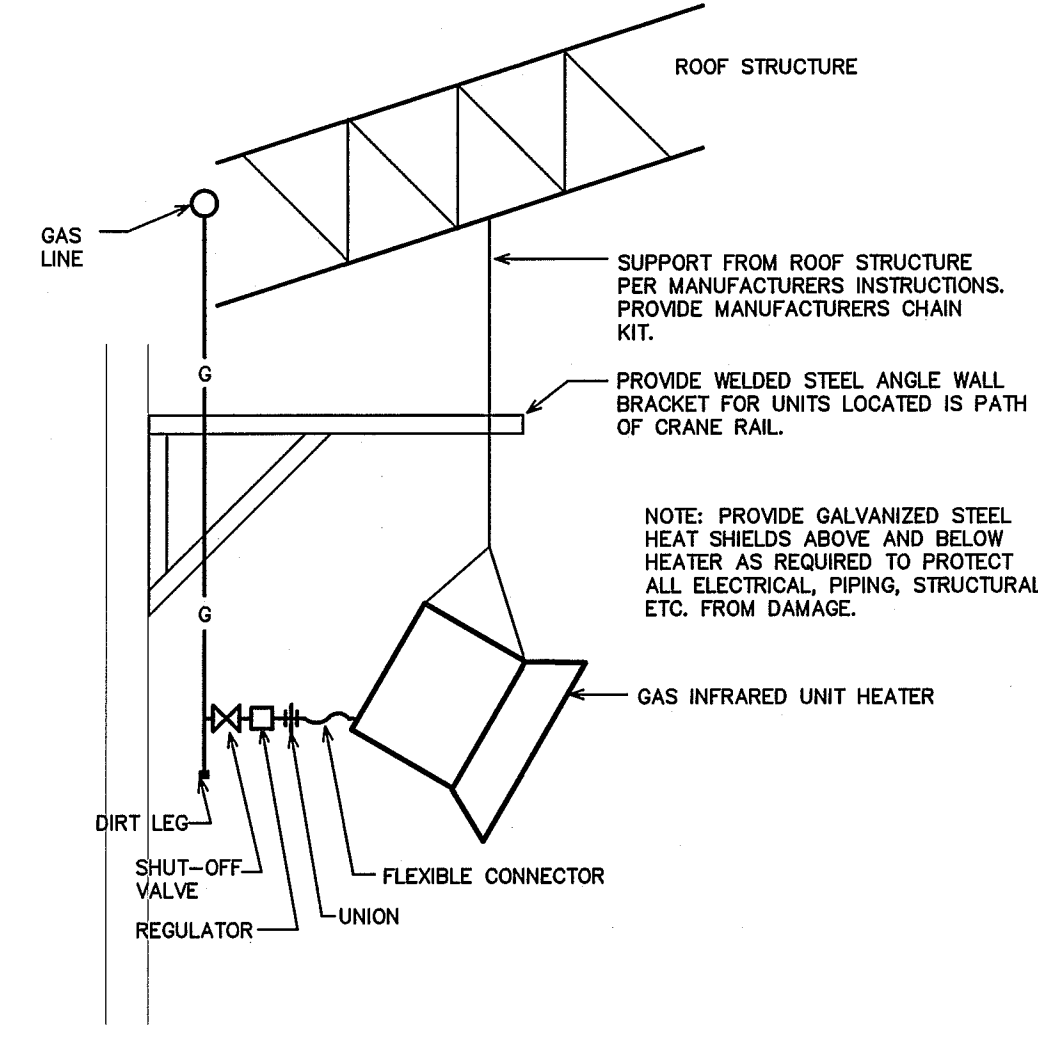
- A. The HVAC Contractor shall prepare in one copy a manual describing the proper maintenance and operation of the systems. This manual shall not consist of standard factory instructions (although these may be included) but shall be prepared to describe this particular job.
- B. The manual shall be bound, indexed, dated and signed by the HVAC Contractor.

- C. Qualified representative of the HVAC contractor shall meet with the designated representatives of the Owner and the Owner's representative shall be instructed in the proper operation and maintenance of the control system and other systems.

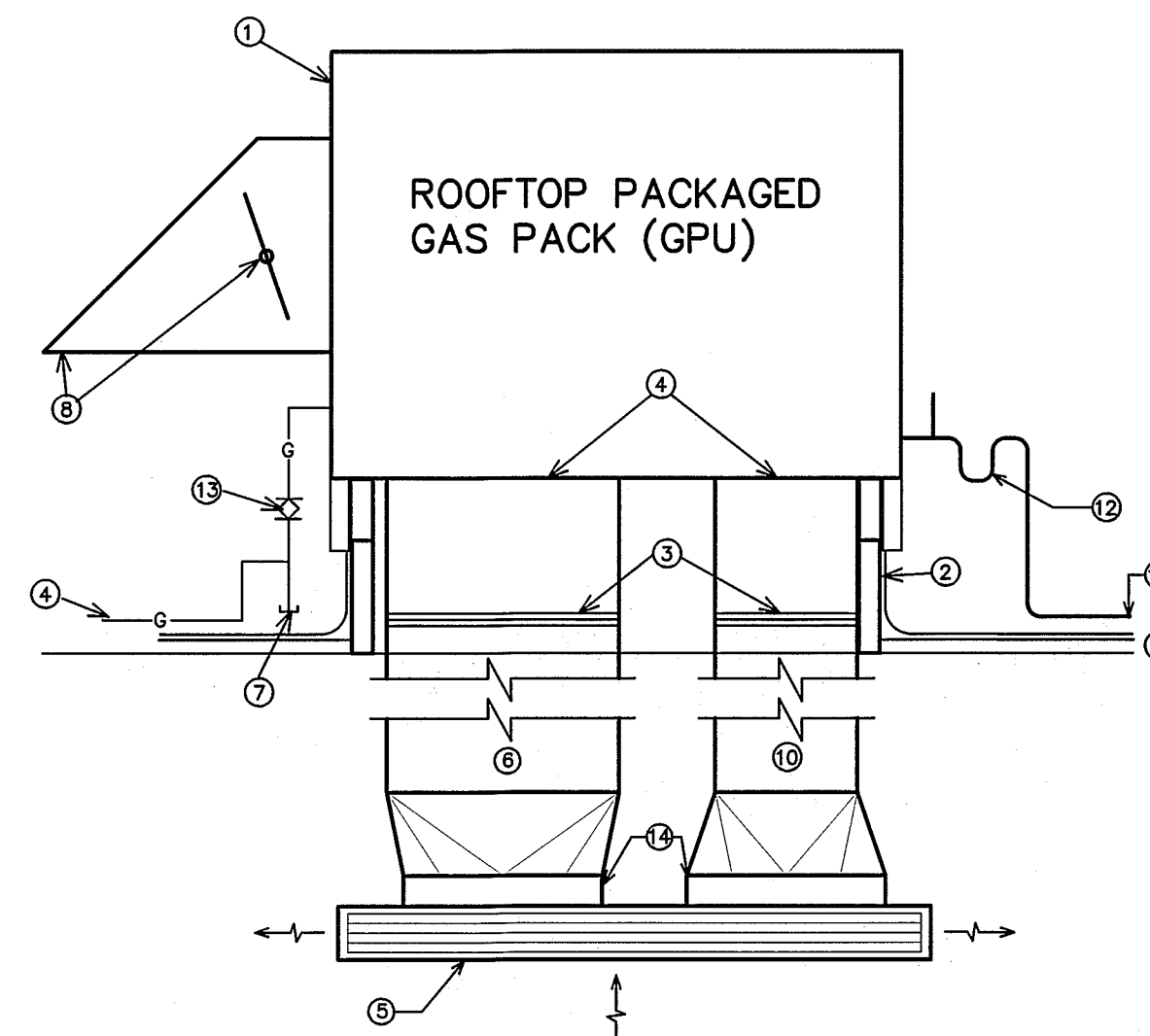
3.5 GUARANTEE

- A. Guarantee all materials and labor included in the HVAC work for a period of one year from date of final acceptance by the owner. In addition, motor compressors shall be a nonprorated five year warranty. Any part or parts of the work or equipment which prove to be defective during the guarantee period shall be replaced at no additional cost to the owner.

- B. The HVAC Contractor shall conduct a complete test and balance of the entire system. This includes airflow checks at all inlets and outlets, at all duct branch lines, and a duct transverse at the return and supply of each unit. Adjust all airflows to within 10% of design airflows. Provide a bound test and balance report for the Architect and Engineers review. After 90 days of occupied use the contractor shall return and balance system per individual comfort needs of the tenants. Balance airflows and shift locations of thermostats if required for tenant comfort.



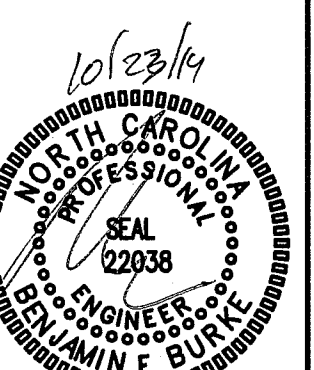
2 INFRARED HEATER DETAIL
SCALE: NOT TO SCALE



1 ROOF TOP GAS PACKAGE UNIT DETAIL
SCALE: NOT TO SCALE

KEY NOTES FOR 1/M-4

- 1 ROOF TOP GAS PACKAGE UNIT BY MECHANICAL CONTRACTOR.
- 2 ROOF CURB BY MECHANICAL CONTRACTOR.
- 3 FLEXIBLE CONNECTIONS
- 4 GAS LINE TO UNIT PROVIDED BY PLUMBING CONTRACTOR. FINAL CONNECTION AND START UP BY MECH. CONTRACTOR.
- 5 CONCENTRIC SUPPLY DIFFUSER/RETURN GRILLE IN LAY-IN CEILING.
- 6 RETURN DUCT.
- 7 6" DIRT LEG.
- 8 ADJUSTABLE OUTDOOR DAMPER AND HOOD. SET TO MINIMUM SETTING AND MARK.
- 9 ROOF SYSTEM. COORDINATE TYPE WITH GENERAL CONTRACTOR.
- 10 SUPPLY DUCT.
- 11 CONDENSATE DRAIN. RUN TO ROOF DRAIN.
- 12 PROVIDE CONDENSATE DRAIN TRAP. SIZE PER MANUFACTURERS RECOMMENDATIONS.
- 13 GAS SHUT-OFF VALVE, UNION AND FLEXIBLE HOSE.
- 14 TRANSITION TO ROUND DUCT CONNECTIONS ON CONCENTRIC DIFFUSER.



HVAC SPECIFICATIONS
AND DETAILS

14022

ISSUED: 10-23-14

DWG BY: WBE

CKD BY: BEB

REVISIONS

SHEET NO.

M-4

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