

SPECIFICATIONS & DIMENSIONS

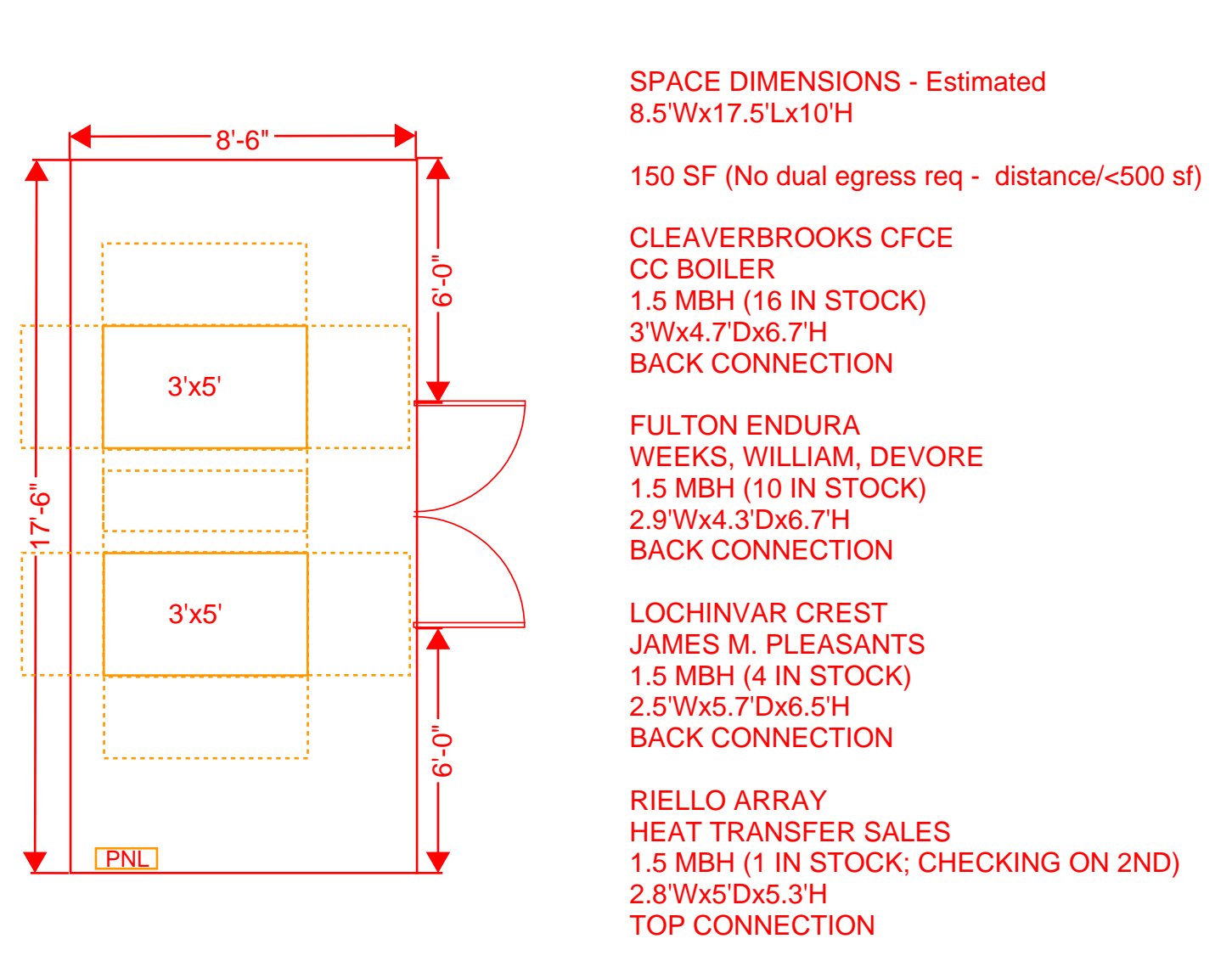
Item	Specification
Clearance	2'-0"
Clearance	2'-0"
Clearance	2'-0"

Recommended clearances for service access

Item	Clearance
Clearance	2'-0"
Clearance	2'-0"
Clearance	2'-0"

ClearFire-CE Dimensions and Rating

Item	Dimensions	Rating
Item 1	8'-6"	1-1/2
Item 2	17'-6"	1-1/2
Item 3	3'-5"	1-1/2
Item 4	3'-5"	1-1/2

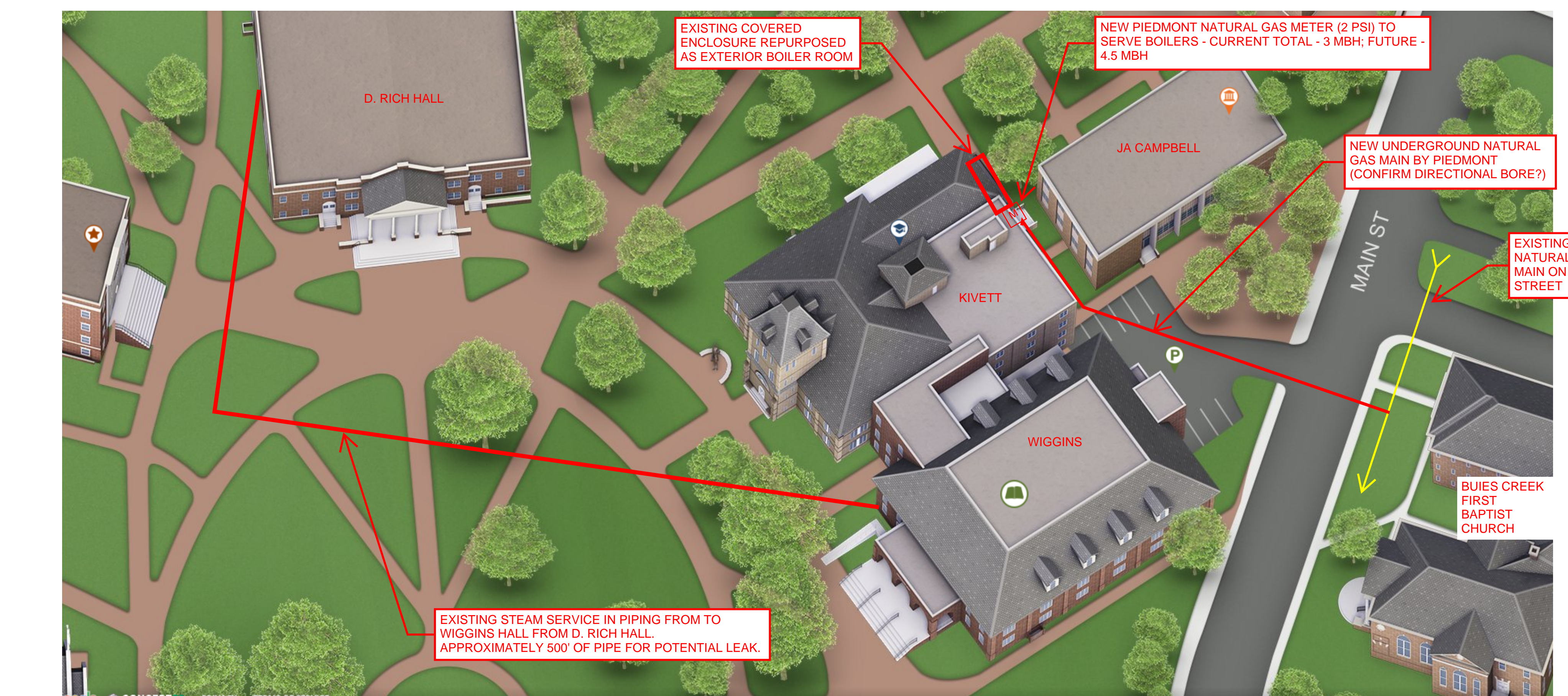
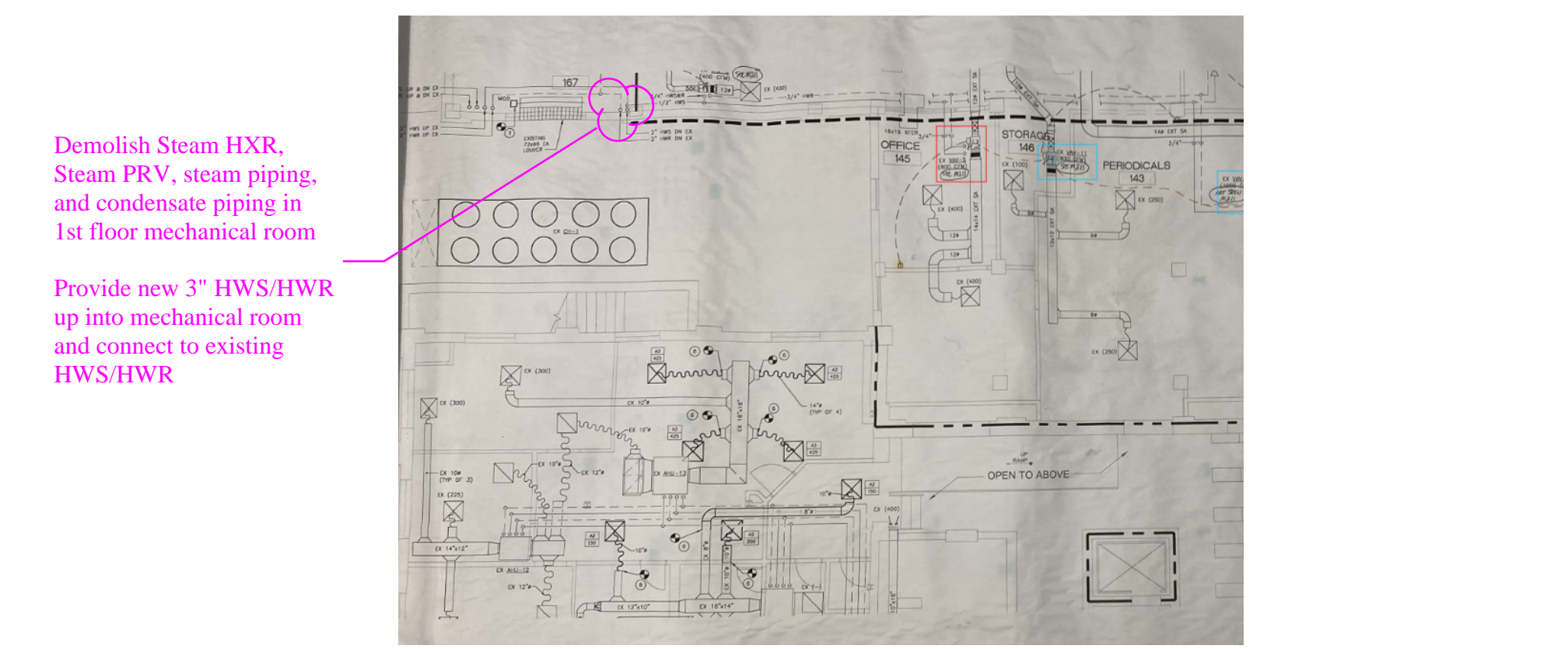


EXISTING STEAM & CONDENSATE

ISSUE: LEAK IN EXISTING STEAM & CONDENSATE CASING FEEDING WIGGINS THEN KIVETT FROM D.RICH.

OPTIONS

- REPLACE EXISTING STEAM AND CONDENSATE LINE UNDERGROUND - UNCERTAINTY ON LOCATION OF LEAK - ASSUME APPROXIMATELY 510' UNDERGROUND THROUGH ACADEMIC CIRCLE - @ \$3400 PER LF = \$1.8 MILLION ROM TO REPLACE IN PLACE. IMPACTS TO ACADEMIC CIRCLE. HIGHEST FIRST COST.
- LOCAL NG HHW PLANT
BOILERS IN STOCK; NEW NATURAL GAS SERVICE COST ASSUMED BY PIEDMONT AND IS NEARBY; HIGHEST FUEL EFFICIENCY AND LOWEST OPERATING COST. 2ND IN LOWEST FIRST COST.
ESTIMATED: 450k (50k per boiler; piping?)
RECOMMENDATION
- LOCAL NG STEAM PLANT
NEW STEAM BOILER NOT IN STOCK; REQUIRES MORE INFRASTRUCTURE FOR WATER MAKEUP, TREATMENT, AND BLOWDOWN; MORE SAFETY REQUIREMENTS; NOT FEASIBLE BASED ON SPACIAL RESTRAINTS (CLEARANCE HEIGHT REQUIREMENT); LOWEST EFFICIENCY AND HIGHEST OPERATING COST. 3RD IN LOWEST FIRST COST.
DO NOT RECOMMEND.
- LOCAL ELECTRIC RESISTIVE HHW PLANT
LIMITED BOILERS IN STOCK; NEW 480V ELECTRICAL SERVICE COST ASSUMED BY DUKE ENERGY AND IS NEARBY; HIGHEST EFFICIENCY AND HIGHEST OPERATING COST (X3 MONTHLY PAYMENT); LOWEST FIRST COST. NO FUEL GAS, VENTING, OR COMBUSTION AIR REQUIREMENTS.
DO NOT RECOMMEND.
- LOCAL HYBRID ELECTRIC RESISTIVE / HEAT PUMP HHW PLANT
BOILERS NOT IN STOCK; NEW 480 V ELECTRICAL SERVICE COST ASSUMED BY DUKE ENERGY AND IS NEARBY; HIGH EFFICIENCY AND ISSUES ON LOW OA TEMPERATURE WITH CAPACITY AND OPERATING COST. NO FUEL GAS, VENTING, OR COMBUSTION AIR REQUIREMENTS. 2ND HIGHEST FIRST COST. ATYPICAL FOR FACILITY MAINTENANCE.
DO NOT RECOMMEND.



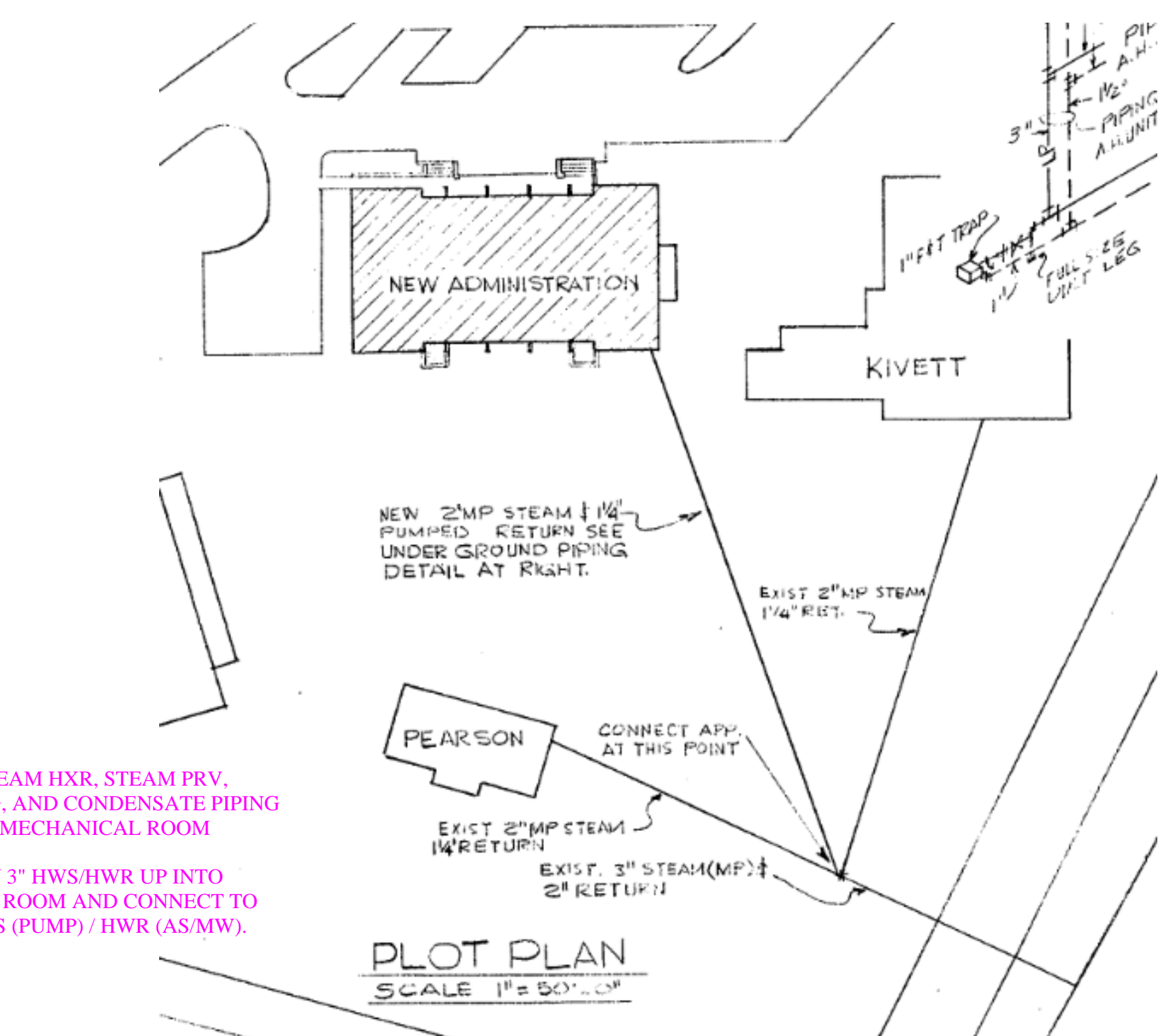
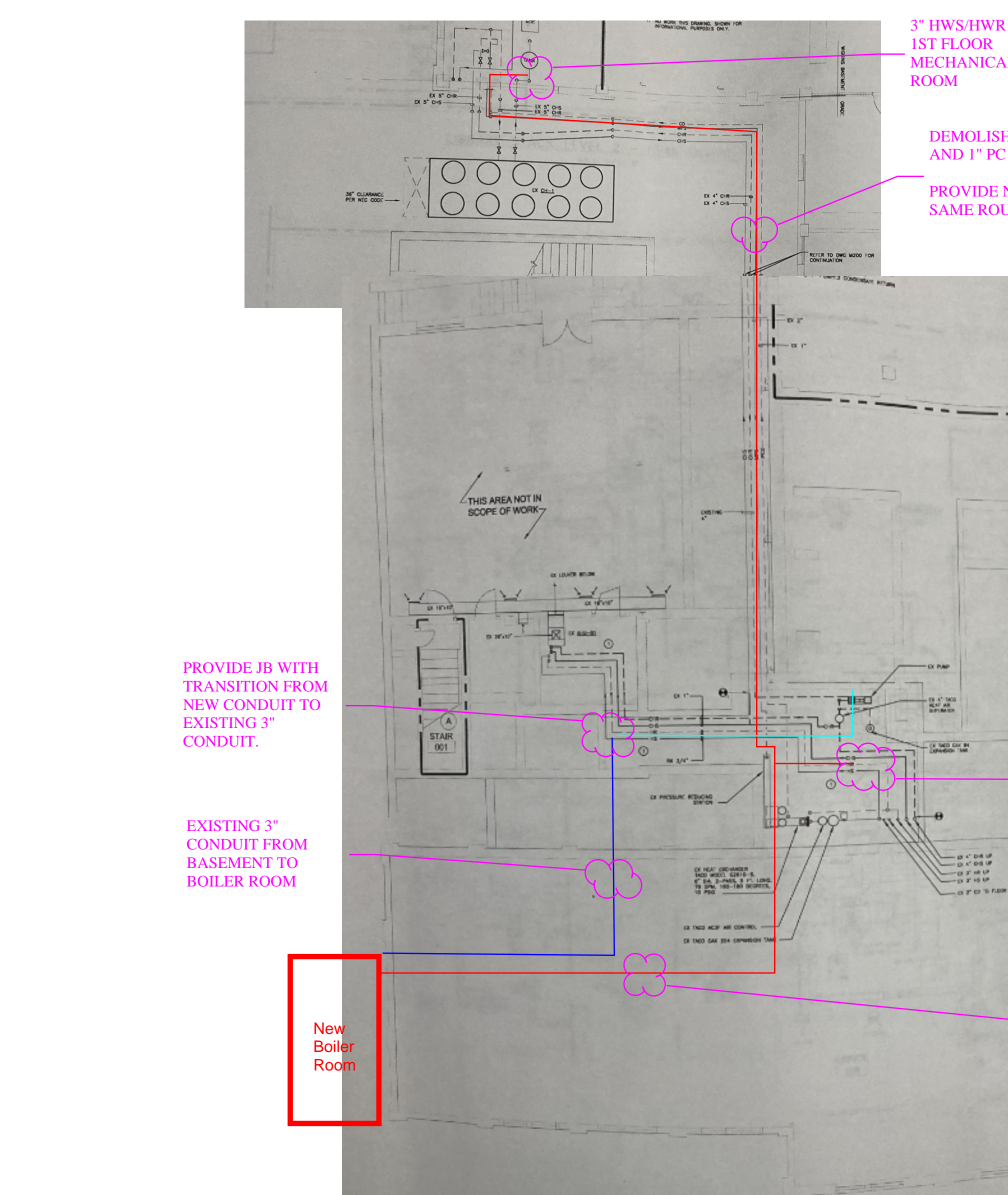
LOAD ESTIMATE

WIGGINS HALL - 48,368 SF
ROT - 25-35 BTU/SF - 1209 to 1692 MBH
PLANS - AHU SCHEDULE - COIL GPM = 80 GPM @ 20F = 800 MBH; COIL HEATING = 1598 MBH (THESE SHOULD BE THE SAME)

KIVETT HALL - 30,060 SF
ROT - 25-35 BTU/SF - 752 to 1052 MBH
PLANS - FLOORPLAN - EX HXR - 79 GPM @ 20F - 790 MBH
AHU SCHEDULE - 1142 MBH @ 101 GPM

ADMINISTRATIVE BLDG. - 15670 SF
ROT - 25-35 BTU/SF - 392 to 550 MBH
PLANS - 2' MPS - @ 80 PSI - ROUGHLY 1,100 PPH / 1100 MBH - TOO SMALL TO TIE IN KIVETT AND WIGGINS

TOTAL RECOMMENDED LOAD -
ROT - 2352 to 3294 MBH
2x1.5 MBH HHW Boilers



DATE: 11/1/2024

PROVIDE PROPOSAL FOR TURNKEY INSTALLATION SERVICES FOR OF 2 NEW BOILERS IN EXISTING COVERED AND ENCLOSED EXTERIOR SPACE AT KIVETT HALL. PROJECT INTENT IS TO INSTALL 180F HEATING HOT WATER BOILERS WITH PRIMARY / SECONDARY PUMPING SYSTEM TO SERVE KIVETT AND WIGGINS HALL IN RESPONSE TO RECENT STEAM MAIN FAILURE. BOILERS MUST BE IN STOCK AND READY FOR SHIP FOR CONSTRUCTION TO BEGIN AS SOON AS POSSIBLE.

CONTRACTOR RESPONSIBLE FOR COMPLIANCE WITH ALL APPLICABLE BUILDING CODES, MANUFACTURER INSTALLATION INSTRUCTIONS, AND LOCAL AUTHORITY HAVING JURISDICTION PERMITTING AND INSPECTIONS. INSTALLATION TO SATISFY NC DEPARTMENT OF LABOR AND LOCAL HARNETT COUNTY INSPECTIONS REQUIREMENTS.

DEMOLITION

DEMOLISH STEAM TO HOT WATER SHELL & TUBE HEAT EXCHANGER AND STEAM PIPING TO ISOLATION VALVE UPSTREAM OF PRV IN KIVETT HALL BASEMENT. PREPARE HEATING HOT WATER PIPING FOR CONNECTION TO NEW HEATING HOT WATER PIPING FROM BOILER. CLOSE STEAM ISOLATION VALVE AND INSTALL CAP. DEMOLISH STEAM CONDENSATE FROM HEAT EXCHANGER TO CONDENSATE PUMP.

DEMOLISH STEAM TO HOT WATER SHELL & TUBE HEAT EXCHANGER AND STEAM PIPING TO ISOLATION VALVE UPSTREAM OF PRV IN WIGGINS HALL FIRST FLOOR. PREPARE HEATING HOT WATER PIPING FOR CONNECTION TO NEW HEATING HOT WATER PIPING FROM BOILER.

DEMOLISH 2" STEAM PIPING AND 1" CONDENSATE FROM WIGGINS HALL TO KIVETT HALL. (APPROXIMATELY 130 LF EACH)

EXISTING BUILDING HEATING HOT WATER PUMPS TO REMAIN AS SECONDARY PUMPS ALONG WITH AIR SEPARATORS, EXPANSION TANKS, AND MAKEUP WATER TO REMAIN AT DEMOLISHED HEAT EXCHANGERS.

NEW WORK

PROVIDE TWO 1.5 MILLION BTU/HR (MBH) FIRE TUBE CONDENSING BOILERS WITH INTEGRAL CASCADING BOILER CONTROLS, CONDENSATE NEUTRALIZER, FUEL GAS REGULATOR, AND BACNET COMMUNICATION CARD FOR FUTURE INTEGRATION. INSTALL VIA MANUFACTURER'S INSTRUCTIONS AND APPLICABLE LOCAL CODES. PROVIDE MINIMUM 2" ELEVATED PAD. INSTALL IN EXISTING SPACE WITH MANUFACTURER SERVICE AND COMBUSTIBLE MATERIAL CLEARANCE REQUIREMENTS. ROOM IS APPROXIMATELY 17.5Lx8.5Wx10H. BOILER SHALL BE ASME CERTIFIED, AT LEAST 80% EFFICIENCY, MINIMUM 101 TURNDOWN, INCLUDE O2 TRIM, AND MEET SPECIFICATION PROVIDED. (SIMILAR TO CLEAVERBROOKS CFCE, FULTON ENDURA, RAYPAK XVERS KOR, LOCHINVAR CREST, OR RIELLO ARRAY)

PROVIDE INLINE PRIMARY PUMP IN BOILER RETURN FOR EACH BOILER WITH STRAINER AND TRIPLE DUTY VALVE. (QTY:2) (150 GPM @ 30 FT HEAD, 208V/3PH/1750RPM TEFC MOTOR WITH COMBINATION MOTOR STARTER/DISCONNECT SIMILAR TO TACO 1841 or BSG 6-62). PROVIDE TESTING, ADJUSTING, AND BALANCING FOR CIRCUIT SETTER TO BOILER FLOW REQUIREMENTS.

PROVIDE 1-1/2" NATURAL GAS STEEL PIPING FROM 2 PSI METER PROVIDED BY PIEDMONT NATURAL GAS (LOCATED EXTERIOR ADJACENT TO THE T) TO BOILER REGULATOR. PROVIDE MINIMUM 10' OF 1-1/2" NATURAL GAS STEEL PIPING FROM REGULATOR TO BOILER CONNECTION. CONFIRM AND SIZE PIPING TO BE IN COMPLIANCE WITH NC FUEL GAS CODE AND MANUFACTURER'S INSTALLATION INSTRUCTIONS. PROVIDE ELECTRICAL GROUNDING. PAINT GAS PIPING YELLOW AND LABEL WITH PSI. PROVIDE TRAP AND ISOLATION VALVES FOR EACH REGULATOR AND EQUIPMENT CONNECTION.

PROVIDE COPPER BOILER TEMPERATURE & PRESSURE RELIEF AND BOILER DRAIN PIPING TO NEAREST EXISTING FLOOR DRAIN. SIZE TO MATCH MANUFACTURER'S CONNECTION SIZE.

PROVIDE PVC BOILER FLUE CONDENSATE DRAIN WITH NEUTRALIZER KIT PIPING TO NEAREST FLOOR DRAIN. FURNISH SPARE BAG OF MEDIA.

PROVIDE 4" LUGGED BUTTERFLY ISOLATION VALVES FOR EACH BOILER PIPING CONNECTION, 1 FUTURE BOILER, AND 3" EACH SECONDARY BRANCH TAKEOFF. (300 GPM) (est. 90 LF each; 180 LF total)

PROVIDE 3" HWS & HWR SCHEDULE 40 STEEL PIPING WITH 1-1/2" FIBERGLASS INSULATION IN ALL SERVICE JACKETS (ASJ) FROM BOILER PRIMARY HEADER TO KIVETT HOT WATER HEAT EXCHANGER. ROUTE THROUGH BASEMENT CRAWLSPACE. PROVIDE HANGERS AND SUPPORTS. (est. 10 LF each; 20 LF total)

PROVIDE 3" HWS & HWR SCHEDULE 40 STEEL PIPING WITH 1-1/2" FIBERGLASS INSULATION IN ASJ FROM BOILER PRIMARY HEADER TO WIGGINS LIBRARY HOT WATER HEAT EXCHANGER. PROVIDE ALUMINUM SERVICE JACKET WHEN EXTERIOR TO THE BUILDING. ROUTE THROUGH KIVETT HALL BASEMENT CRAWLSPACE THEN FOLLOW EXISTING PATHWAY OF STEAM & CONDENSATE PIPING TO WIGGINS HALL. PROVIDE HANGERS AND SUPPORTS. (est. 130 LF each with 45 LF exterior; 260 LF total with 90 LF in aluminum jacket)

PROVIDE 6" or 8" TYPE B DOUBLE WALL / AL29-4C STAINLESS STEEL VENT THROUGH ROOF DECK WITH SEALED METAL ROOF PENETRATION AND AP FOR EACH BOILER. DO NOT MANIFOLD. MAINTAIN MINIMUM CODE DISTANCES FROM BUILDING OPENINGS (OPERABLE WINDOWS/DOORS), ROOF OVERHANGS, ROOF SURFACE, AND WALKWAYS. TERMINATE FLUE VENT VIA MANUFACTURER'S INSTRUCTIONS. (ESTIMATE 18' LENGTH; INSTALL VIA MANUFACTURER SIZING AND MINIMUM LENGTH REQUIREMENTS)

PROVIDE 8" PVC, CPVC, OR STAINLESS STEEL COMBUSTION AIR AIR INTAKE THROUGH SIDE WALL FOR EACH BOILER. DO NOT MANIFOLD. TERMINATE FLUE VENT VIA MANUFACTURER'S INSTRUCTIONS WITH BIRD SCREEN. (ESTIMATE 12' LENGTH; INSTALL VIA MANUFACTURER SIZING AND MINIMUM LENGTH REQUIREMENTS)

PROVIDE 3/4" AIR VENT AND DRAIN BALL VALVE WITH HOSE END AND CAP FOR HOT WATER PRIMARY LOOP.

PROVIDE TEMPORARY FILL CONNECTION. EXISTING HOT WATER AIR SEPARATOR, MAKEUP WATER, AND CHEM POTS TO REMAIN IN SECONDARY LOOP.

PROVIDE NEW ELECTRICAL SUB PANEL IN BOILER ROOM TO FEED EQUIPMENT. PANEL TO BE FED FROM MDP IN KIVETT ELECTRICAL ROOM APPROXIMATELY 120 FT. SIZE PANEL, WIRING, AND BREAKERS TO CODE. ROUTE FROM ELECTRICAL ROOM DOWN TO BASEMENT TO JUNCTION BOX AT EXISTING 3" CONDUIT. UTILIZE EXISTING 3" CONDUIT AS RACEWAY FROM BASEMENT TO NEW BOILER LOCATION. VERIFY MDP LOAD DEMAND VIA ELECTRICAL DATA LOGGER.

PROVIDE 120V/1PH/25A CIRCUIT TO EACH BOILER WITH LOCAL DISCONNECT. ELECTRICAL TO CONFORM WITH CURRENT NATIONAL ELECTRICAL CODE REQUIREMENTS.

PROVIDE 208V/3PH/20A CIRCUIT TO EACH 3PH PRIMARY PUMP. PROVIDE COMBINATION STARTER/DISCONNECT WITH EACH PUMP.

PROVIDE BOILERS WITH INTEGRAL CASCADING CONTROL TO MAINTAIN 180F. PROVIDE HOT WATER SENSOR IN PRIMARY LOOP FOR STAGING CONTROL. PROVIDE WIRING FOR BOILER TO START/STOP THE PUMP.

PROVIDE 120V SERVICE RECEPTACLE.

PROVIDE NEW 12"x12" FLOOR SINK DRAIN WITH 6" SUMP AND P-TRAP FOR BOILER RELIEF, BOILER DRAIN, AND CONDENSATE DRAIN. PROVIDE 4" WASTE PIPING TO THE INTO EXISTING SANITARY. (est. 40 LF)

PROVIDE FIRESTOPPING OF ALL PENETRATIONS FROM BOILER MECHANICAL ROOM INTO EXISTING BUILDING. SEAL ALL EXTERIOR PENETRATIONS FOR PIPING.

PROVIDE EMERGENCY POWER OFF SWITCH AT ENTRANCE TO NEW BOILER ROOM. HARDWIRE WITH RELAY TO "FAIL-SAFE" AND SHUT OFF POWER TO BOILER UPON ACTIVATION OR CUT IN WIRE.

INSTALL TO MEET TYPICAL INSTALLATION DETAILS.

BY OWNER

PROVIDE COMBINATION SMOKE AND CARBON MONOXIDE ALARM. INTEGRATE INTO EXISTING SIMPLEX FIRE ALARM SYSTEM.

SPRINKLER COVERAGE - EXISTING BUILDING NOT SPRINKLERED.

EXISTING AIR HANDLING UNIT SCHEDULE

DESCRIPTION	FAN SECTION			COOLING SECTION			HEATING SECTION			ELECTRICAL (VA/PH)	REMARKS
	CFM	MINIMUM CFM	MAXIMUM CFM	TOTAL TON	TON	BTU	TOTAL TON	TON	BTU		
AHU-1	1500	2500	2500	78	78	10500	88	88	2087/60	1, 2, 3	
AHU-2	1500	2500	2500	78	78	10500	88	88	2087/60	1, 2, 3	
AHU-3	1500	2500	2500	78	78	10500	88	88	2087/60	1, 2, 3	



EXISTING AIR HANDLING UNIT SCHEDULE

DESCRIPTION	FAN SECTION			COOLING SECTION			HEATING SECTION			ELECTRICAL (VA/PH)	REMARKS
	CFM	MINIMUM CFM	MAXIMUM CFM	TOTAL TON	TON	BTU	TOTAL TON	TON	BTU		
AHU-1	1500	2500	2500	78	78	10500	88	88	2087/60	1, 2, 3	
AHU-2	1500	2500	2500	78	78	10500	88	88	2087/60	1, 2, 3	
AHU-3	1500	2500	2500	78	78	10500	88	88	2087/60	1, 2, 3	

1004 Boiler rooms and enclosures.

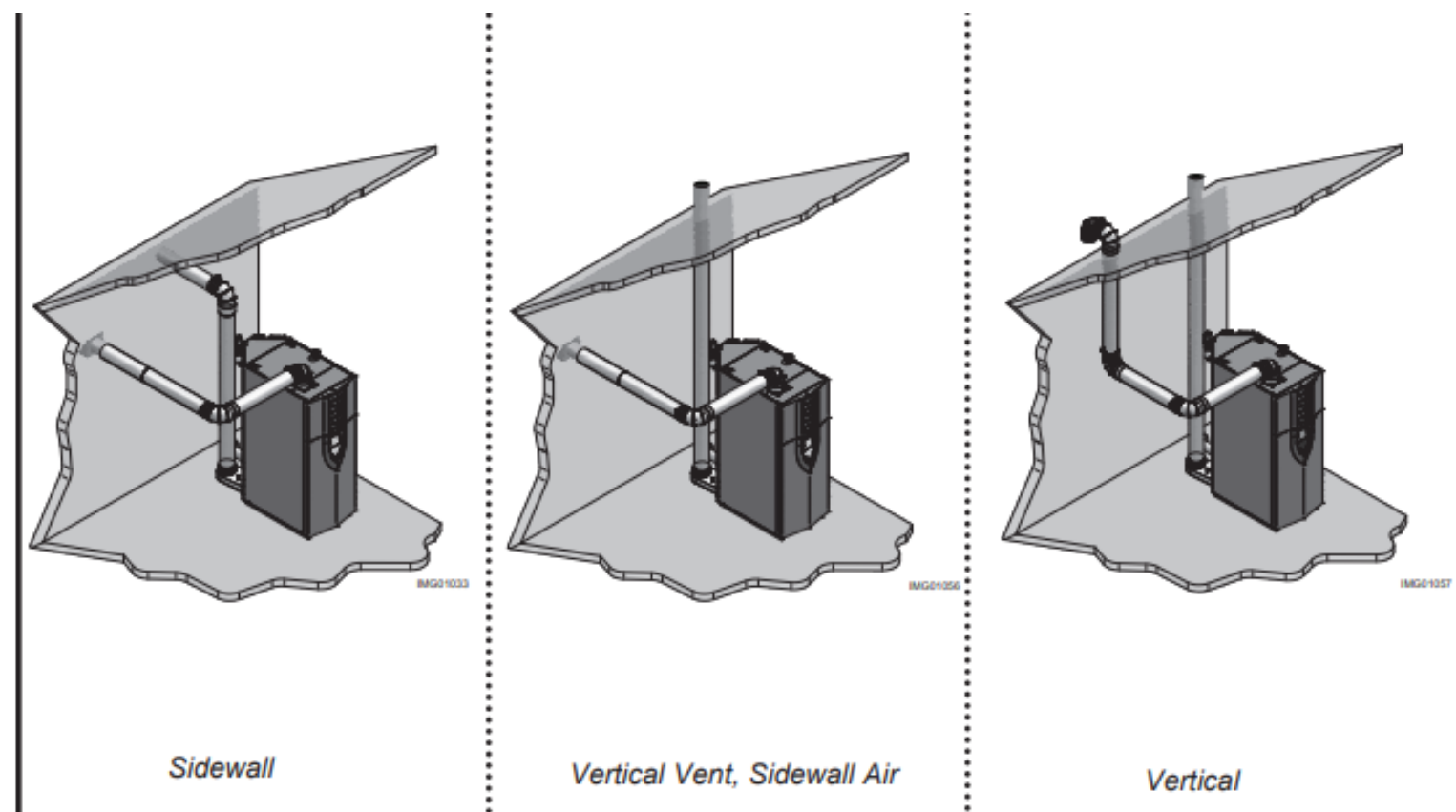
7.12 Mechanical Equipment Rooms, Boiler Rooms, and Furnace Rooms.

7.12.1 Mechanical equipment rooms, boiler rooms, furnace rooms, and similar spaces shall be arranged to limit common path of travel to a distance not exceeding 50 ft (15 m), unless otherwise permitted by the following:

- A common path of travel not exceeding 100 ft (30 m) shall be permitted in the following locations:
 - In buildings protected throughout by an approved, supervised automatic sprinkler system installed in accordance with Section 9.7.
 - In mechanical equipment rooms with no fuel-fired equipment.
 - In existing buildings.
- In an existing building, a common path of travel not exceeding 150 ft (46 m) shall be permitted, provided that all of the following criteria are met:
 - The building is protected throughout by an approved, supervised automatic sprinkler system in accordance with Section 9.7.
 - No fuel-fired equipment is within the space.
 - The egress path is readily identifiable.
- The requirement of 7.12.1 shall not apply to rooms or spaces in existing health care occupancies complying with the arrangement of means of egress provisions of 19.2.5 and the travel distance limits of 19.2.6.

7.12.2 Spaces used exclusively for mechanical equipment, furnaces, or boilers shall be permitted to have a single means of egress where the travel distance to an exit on that story is not in excess of the common path of travel limitations of 7.12.1.

New Boiler Room



Model	FB751	FB1001	FB1251	FB1501	FB1751	FB2001	FB2501	FB3001	FB3501	FB4001	FB5001	FB6001
Height (in. / mm)	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219	48 / 1219
Width (in. / mm)	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457	18 / 457
Weight (lb. / kg)	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8	15 / 6.8

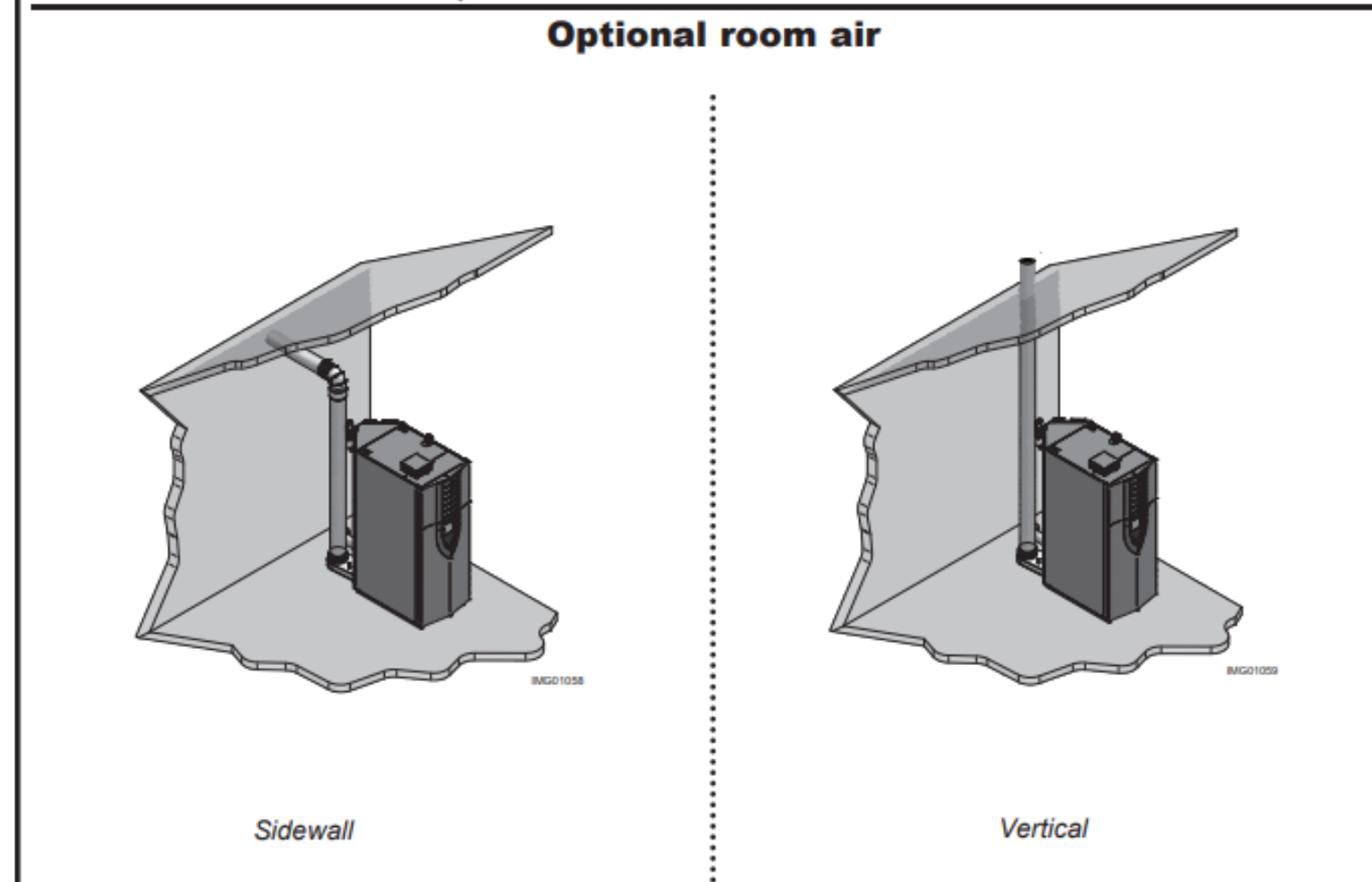
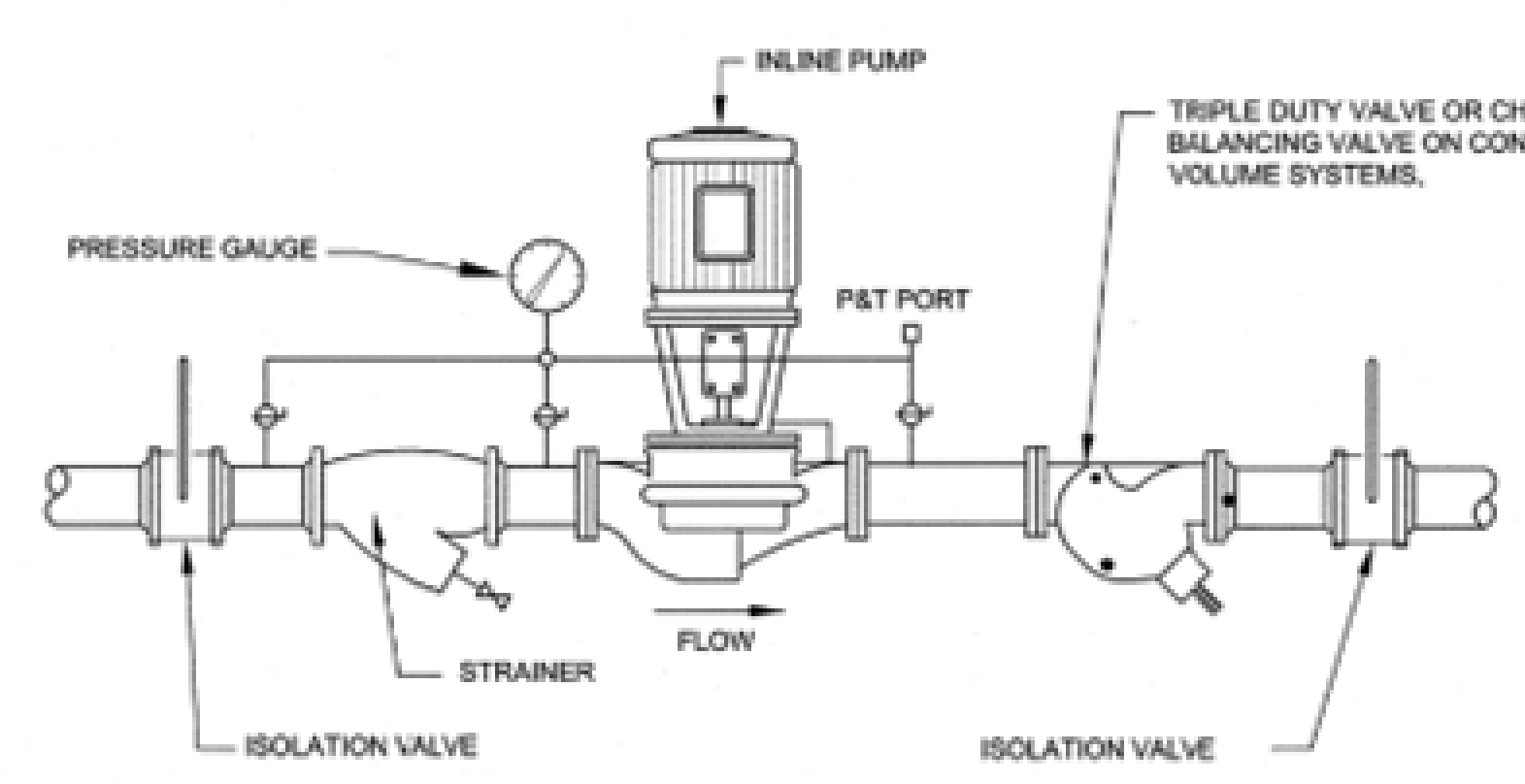
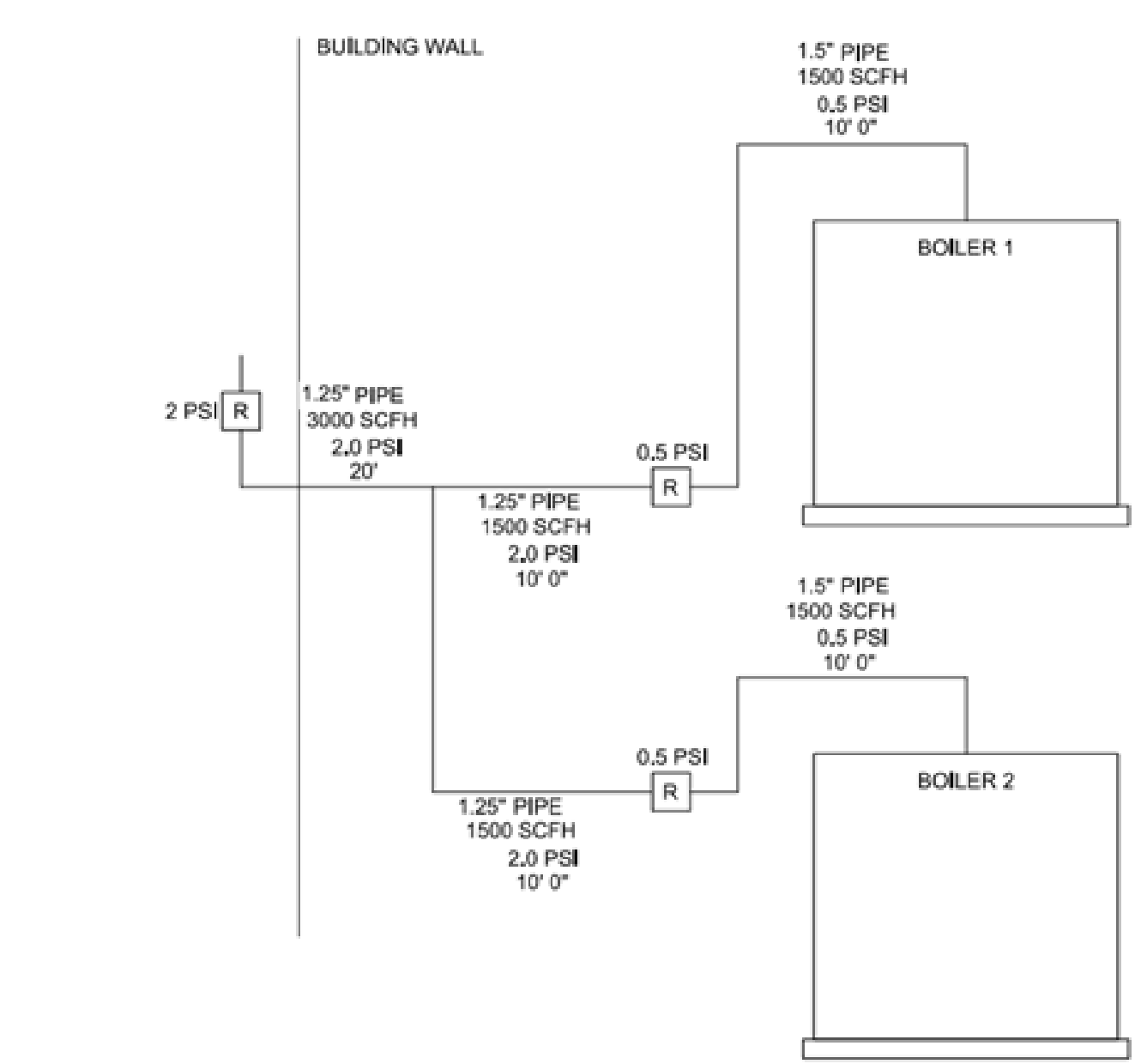
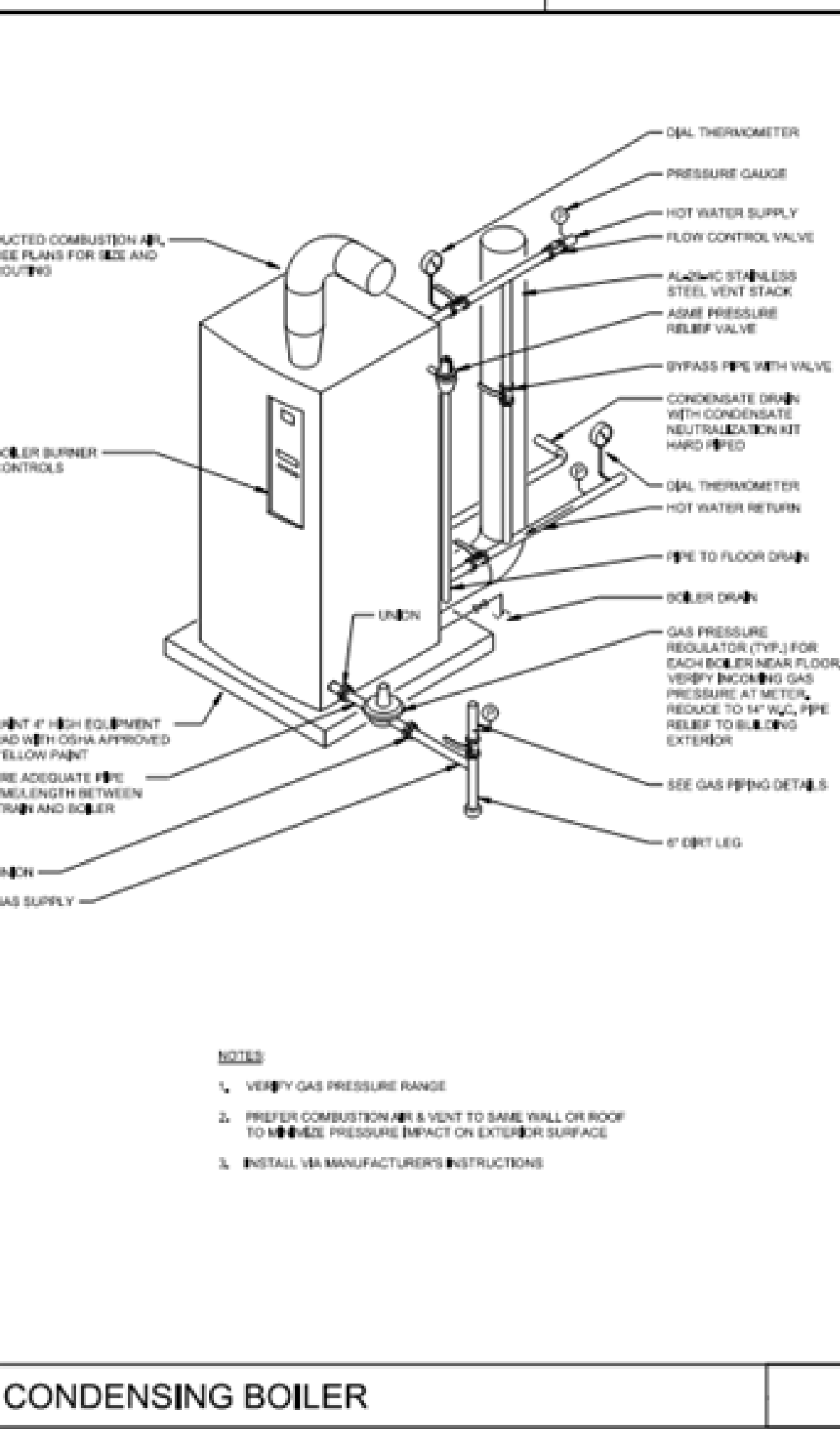
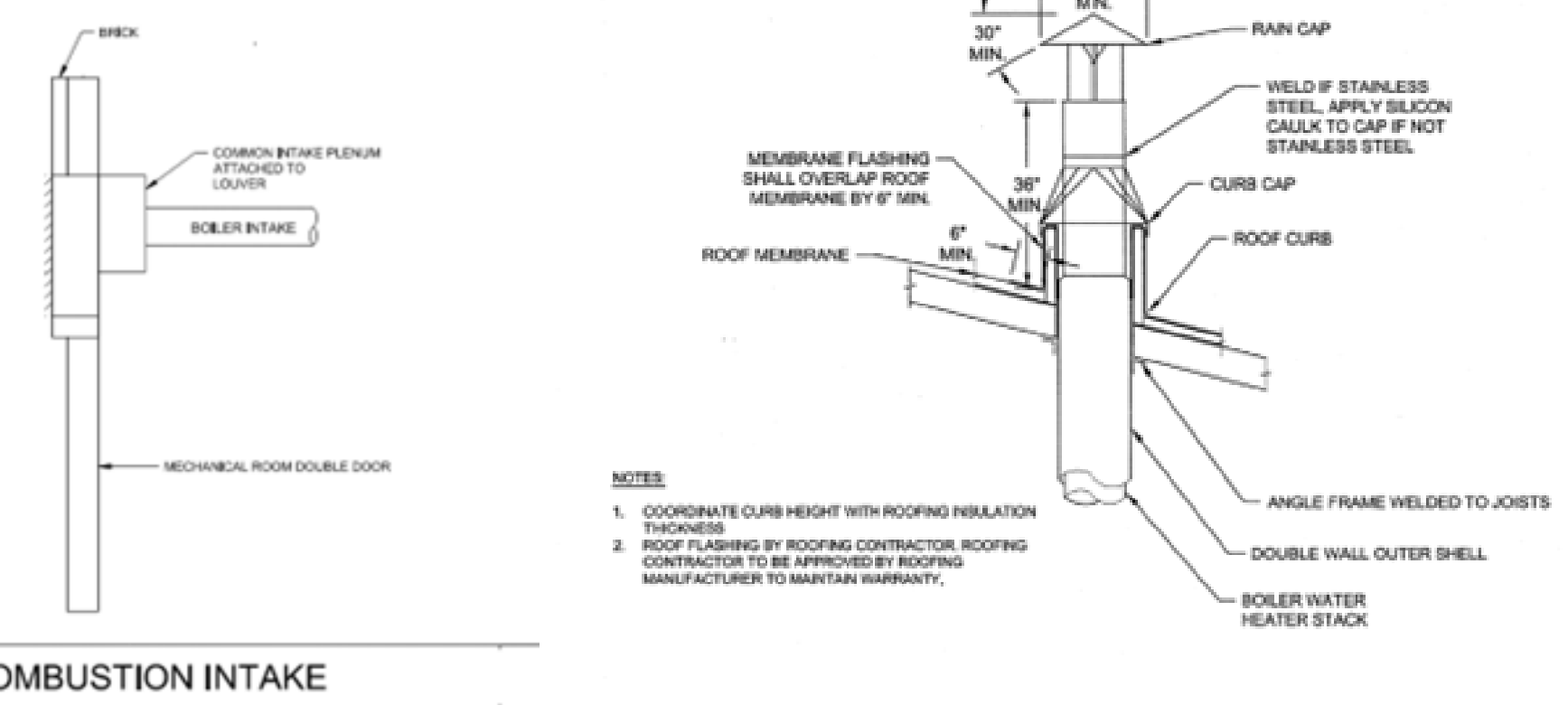
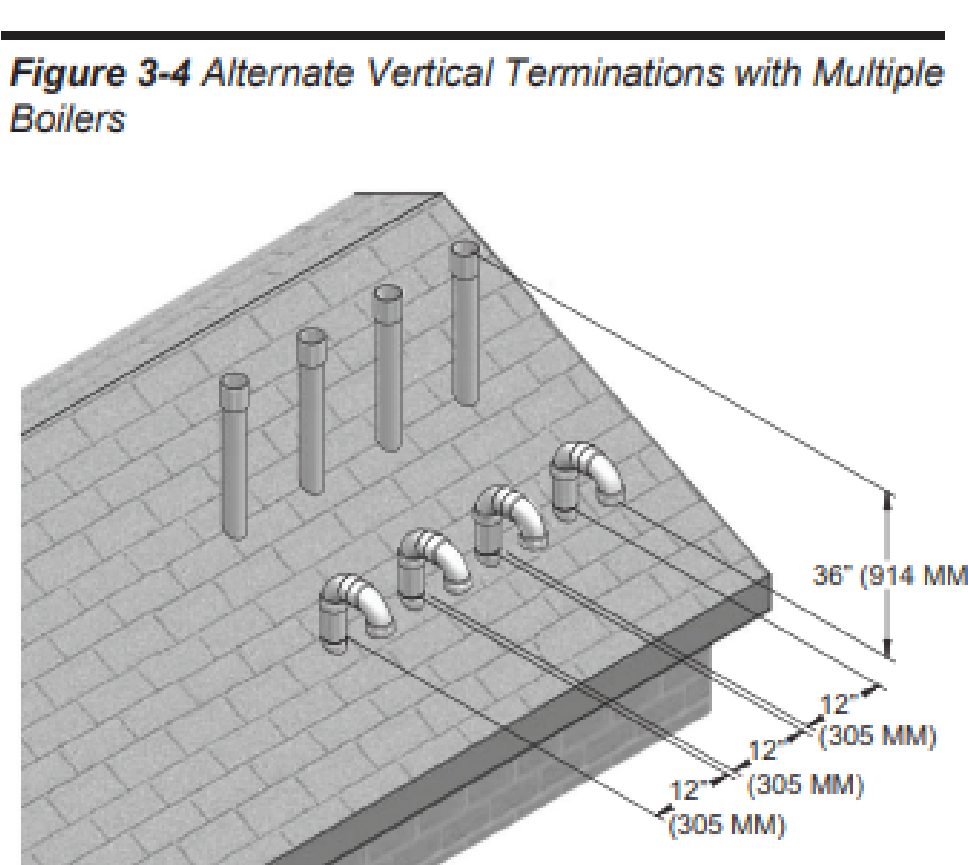
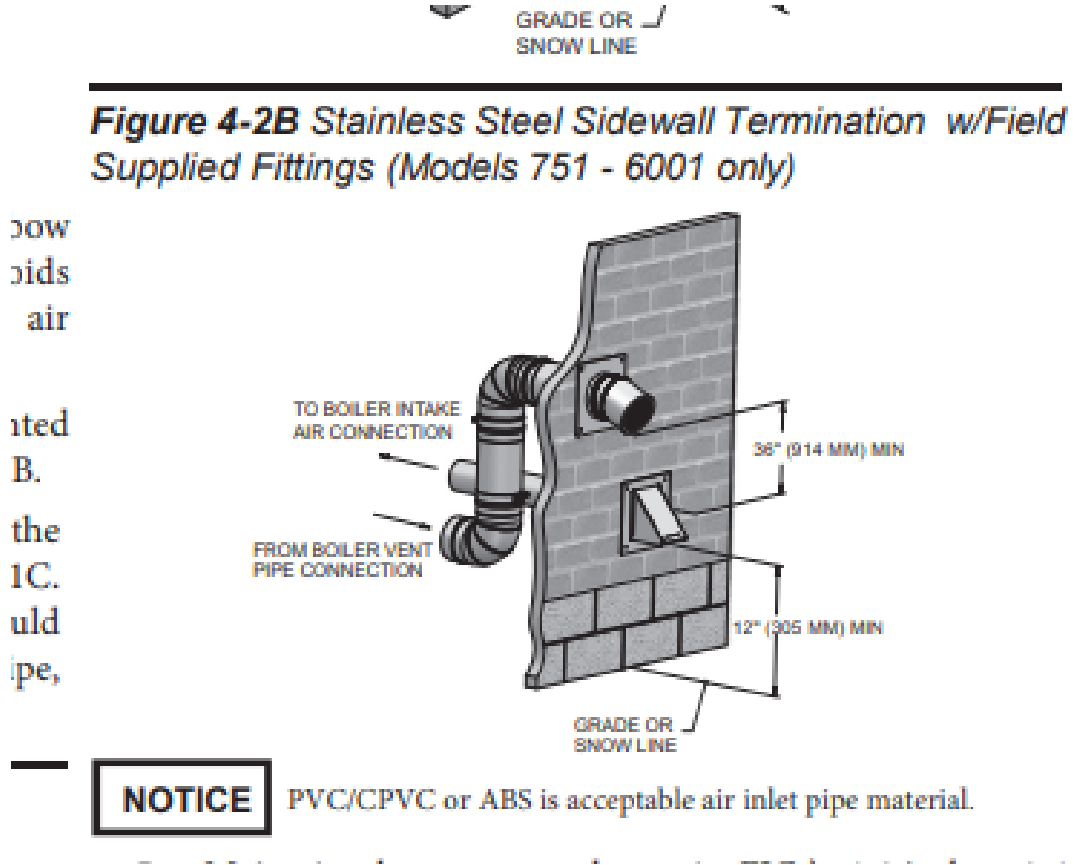


Table 5A Sizing Information for Temperature Rise Applications_20°F, 40°F and 60°F

Model	BOILER CONNECTION SIZE	TEMPERATURE RISE APPLICATIONS					
		20°F		40°F		60°F	
		GPM	FT/HD	GPM	FT/HD	GPM	FT/HD
FB 0751	3"	72	4.8	36	3.0	24	2.5
FB 1001	3"	96	8.3	48	6.0	32	5.5
FB 1251	3"	120	9.2	60	6.0	40	4.1
FB 1501	4"	144	12.3	72	7.3	48	5.8
FB 1751	4"	168	13.8	84	8.1	56	6.7
FB 2001	4"	192	14.5	96	8.1	64	6.6
[FB 751 - 2001 models are based on 96% AHRI Efficiency]							
FB 2501	4"	240	8.4	120	5.3	80	4.8
FB 3001	4"	288	8.0	144	4.0	96	3.3
FB 3501	4"	336	9.9	168	5.0	112	3.8
FB 4001	4"	350*	10.9	192	5.9	128	4.4
FB 5001	6"	480	13.9	240	7.6	160	5.5
FB 6001	6"	576	17.2	288	9.4	192	6.8

[Models FB 2501 - 3501 and 6001 based on 96% AHRI Efficiency and Models FB 4001 - 5001 based on 96% Efficiency]
 *Flow is based on 22°F AT.



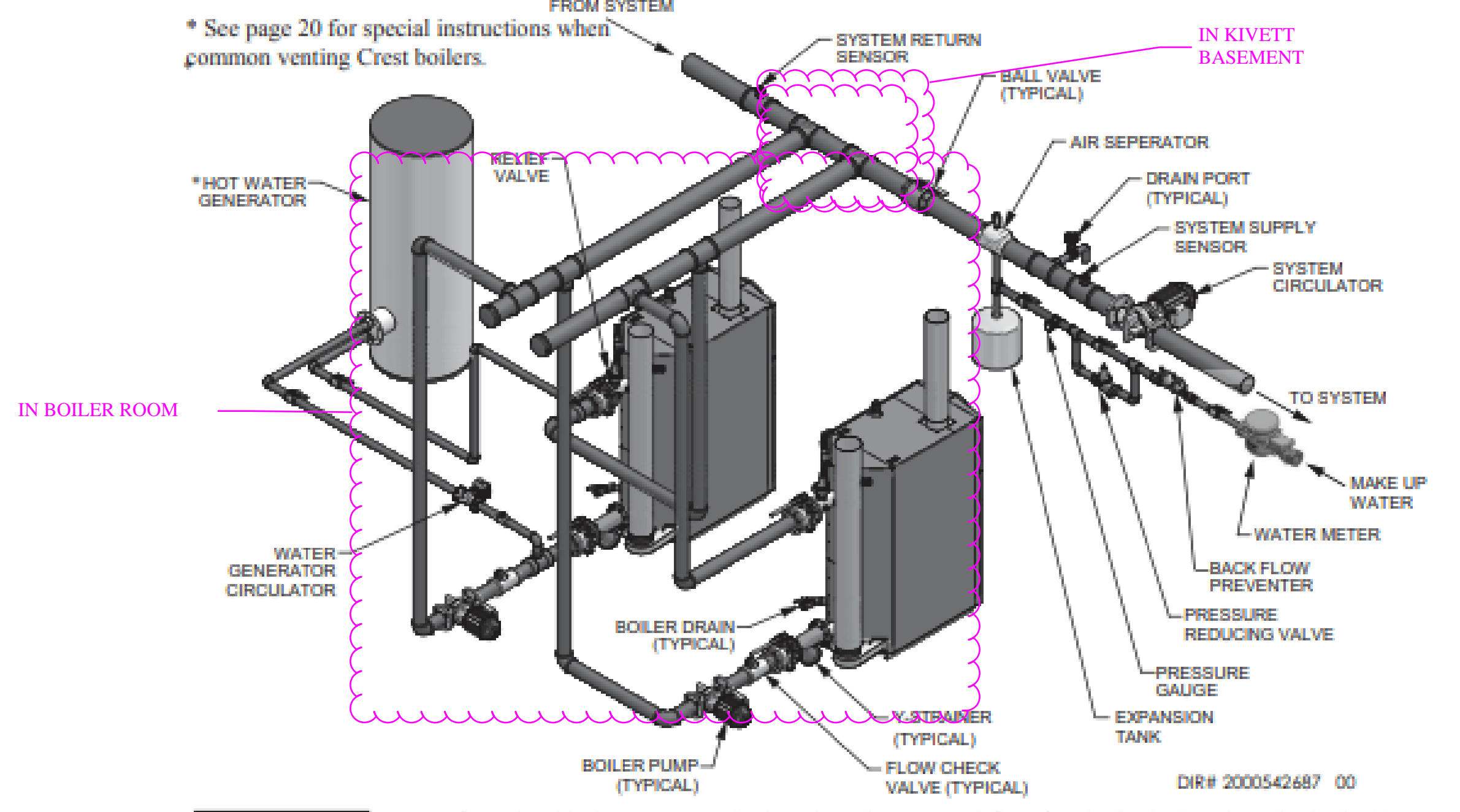
5 Hydronic piping

Table 5C Multiple Boilers - Common Header - Primary / Secondary Flow

Model	Number of Units							
	2	3	4	5	6	7	8	
Recommended Common Header Pipe Sizes in Inches								
FB 0751	4	4	5	5	6	6	7	
FB 1001	4	5	5	6	7	7	8	
FB 1251	5	5	6	7	7	8	10	
FB 1501	5	6	7	7	8	10	10	
FB 1751	5	6	7	8	10	10	10	
FB 2001	6	6	8	8	10	10	12	
FB 2501	5	5	6	7	7	8	10	
FB 3001	5	6	7	7	8	10	10	
FB 3501	5	6	7	8	10	10	10	
FB 4001	6	6	8	8	10	10	12	
FB 5001	6	8	8	10	10	12	12	
FB 6001	8	8	10	10	12	12	14	

NOTICE A system supply sensor (factory supplied) MUST BE installed for proper boiler operation.

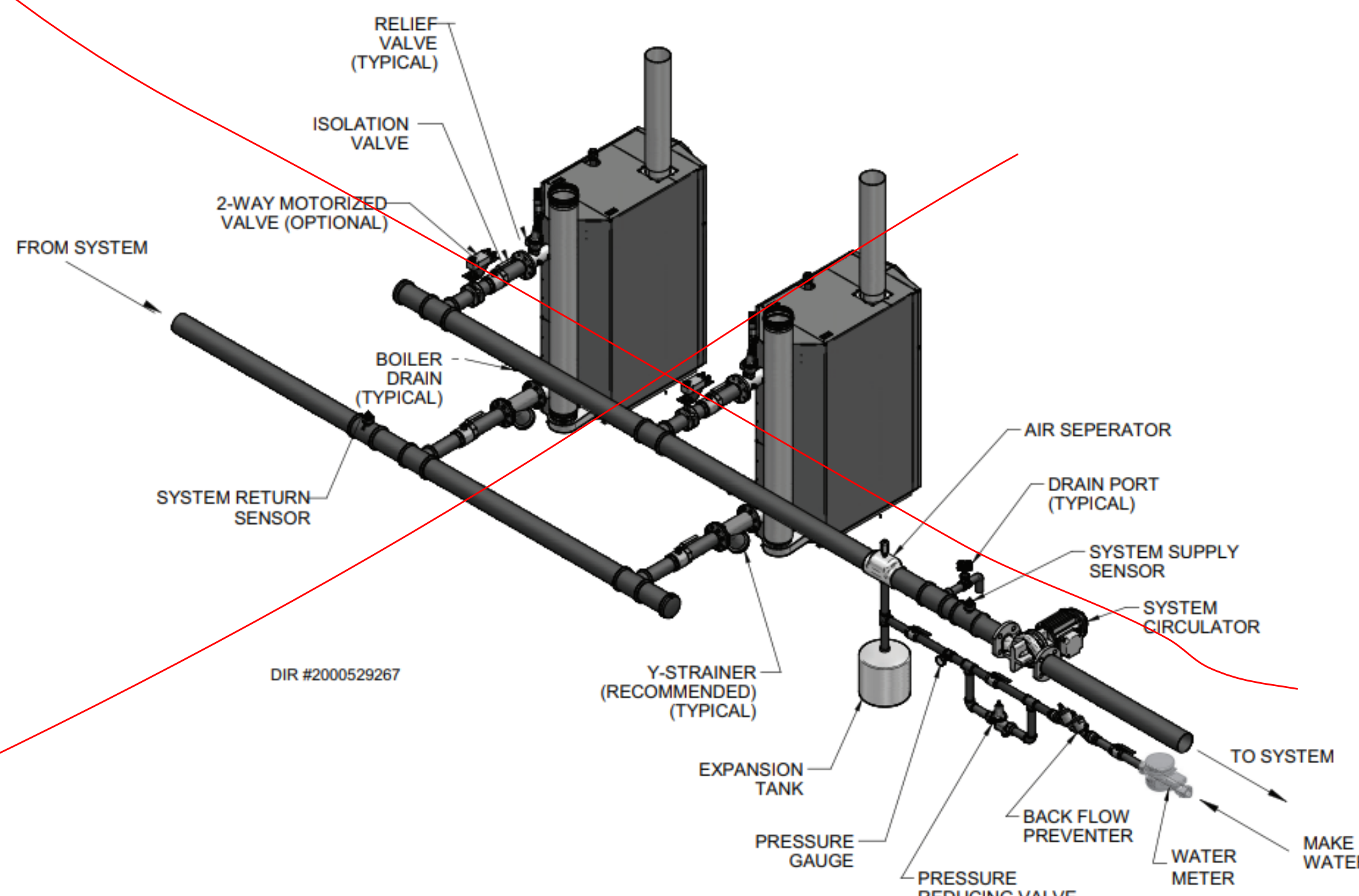
Figure 5-3 Multiple Boilers - Common Header - Recommended - Primary / Secondary Flow



NOTICE System flow should always remain higher than the required flow for the boiler(s) when the boiler(s) is in operation to prevent short cycling and high limit issues.

NOTICE Please note that these illustrations are meant to show piping concepts only, the installer is responsible for all equipment. The installer must follow all manufacturer's installation instructions for each system component. The installer is responsible for compliance with local codes.

Figure 5-5 Multiple Boilers - Alternate - Common Header - Fixed or Variable Flow Primary



NOTICE Please note that these illustrations are meant to show piping concepts only, the installer is responsible for all equipment. The installer must follow all manufacturer's installation instructions for each system component. The installer is responsible for compliance with local codes.

NOTICE When installing multiple Crest boilers in fixed or variable flow primary applications, utilize a reverse-return or other piping method to ensure balanced flow through each boiler.