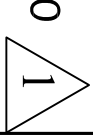
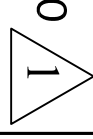


SPLIT-SYSTEM HEAT PUMP SCHEDULE

UNIT NO.	SERVICE	SUPPLY FAN		COOLING CAPACITY		HEATING CAPACITY		AUXILIARY ELECTRIC HEATER (KW)	ELEC. (VOLT/PH)	MFR MODEL NO. OR EQ.	REMARKS
		CFM	EXT. S.P. (IH, W/G)	NOM. CAP (MBH)	SEER	NOM. CAP (MBH)	COP				
AHU-1/HP-1	BASEMENT, FIRST FLOOR	800	0.40	24	15.0 	24	3.0	7.6	HP - 240V, 1Ø AHU - 240V, 1Ø	TRANE 4TWTB2442A/ TRANE 4TEC324B	(3)
AHU-2/HP-2	2ND FLOOR, 3RD FLOOR	1400	0.40	42	15.0 	42	3.0	15.3	HP - 240V, 1Ø AHU - 240V, 3Ø	TRANE 4TWTB4242A/ TRANE 4TEC342B	(4) (5)

① COOLING CAPACITY BASED ON 95° F AMBIENT TEMP., 80° F DB / 67° F WB COIL ENTERING AIR.

② HEATING CAPACITY BASED ON 47° F AMBIENT TEMP., 70° F DB COIL ENTERING AIR.

③ PROVIDE 1" A/C CONDENSATE DRAIN, WITH DISCHARGE TO OUTDOORS; PROVIDE A/C CONDENSATE PUMP

④ PROVIDE 1 1/4" CONDENSATE DRAIN, WITH DISCHARGE TO OUTDOORS

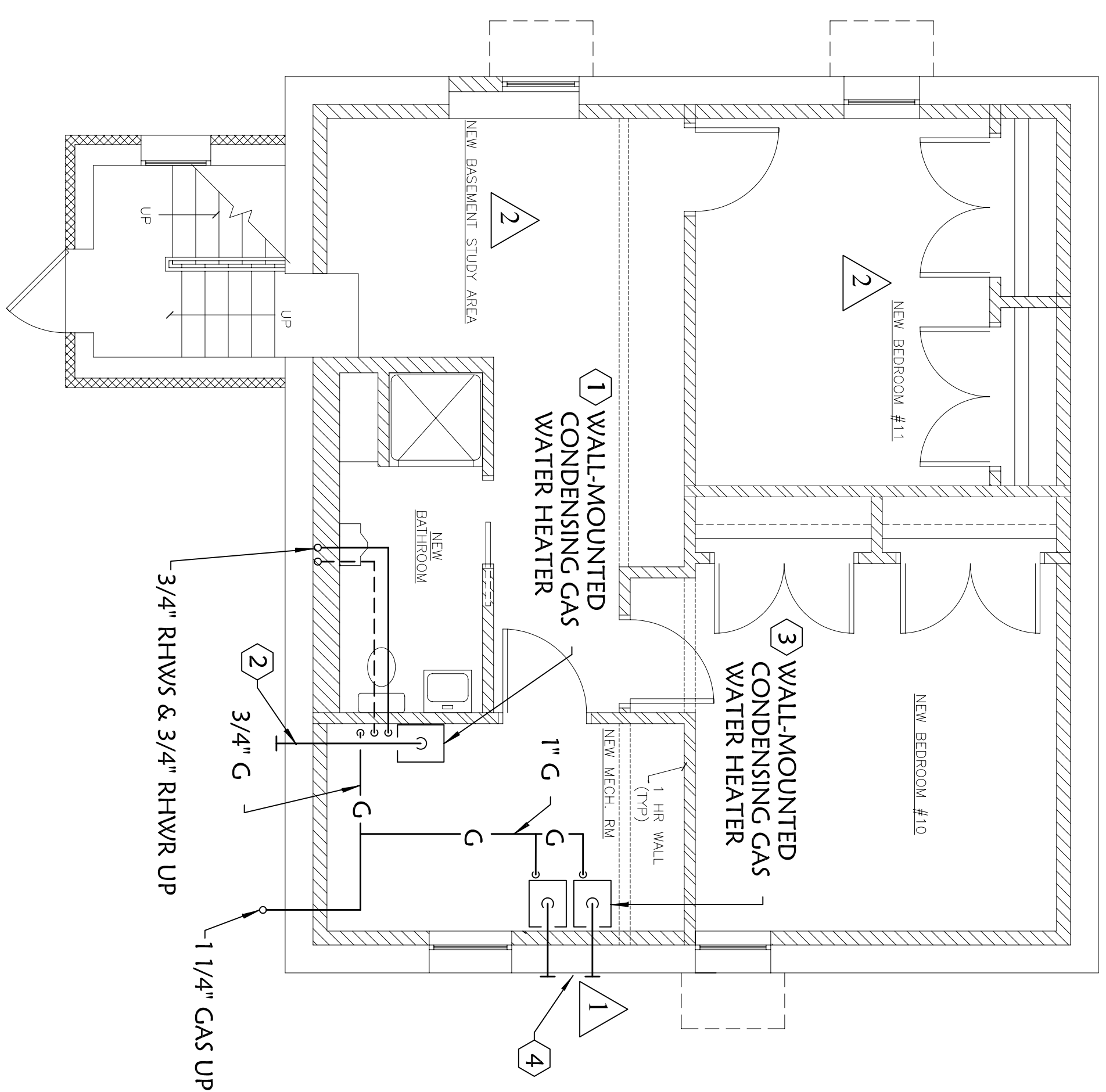
⑤ PROVIDE 24 GAUGE, 1-1/2" DEEP, AUXILIARY ALUMINUM DRAIN PAN UNDER AIR HANDLING UNIT, WITH SEPARATE 1" DRAIN PIPED TO OUTDOORS; PAN SHALL BE MINIMUM 3" LARGER IN WIDTH AND LENGTH THAN AHU

DIFFUSER / REGISTER / GRILLE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER MODEL NO. OR EQUAL	NOTES
CDA	ROUND VANED CEILING DIFFUSER, 4-WAY PATTERN, BUTTERFLY DAMPER	HART & COOLEY MODEL 18 W/ 12 BUTTERFLY DAMPER	BAKED WHITE ENAMEL FINISH
SRA	SIDEWALL SUPPLY REGISTER, 1/3" SPACED FINIS, MULTI-SHUTTER VALVE	HART & COOLEY MODEL 661	BAKED WHITE ENAMEL FINISH
KSR	KICK-SPACE SUPPLY GRILLE	HART & COOLEY MODEL 420	BAKED GOLDEN SAND ENAMEL FINISH
FDA	FLOOR DIFFUSER, FOOT-OPERATED DIAL CONTROL	HART & COOLEY MODEL 411	BAKED GOLDEN SAND ENAMEL FINISH
FGA	FLOOR RETURN GRILLE	HART & COOLEY MODEL 265	BAKED GOLDEN SAND ENAMEL FINISH
RGA	WALL RETURN GRILLE	HART & COOLEY MODEL 672	BAKED WHITE ENAMEL FINISH

FAN SCHEDULE

UNIT NO.	SERVICE	TYPE	CFM	S.P. (IH, W/G)	ELECTRICAL CHARACTERISTICS	MANUFACTURER'S MODEL NO. OR EQUAL	REMARKS
EF-1	TOILET EXHAUST	CEILING EXHAUST FAN	75	0.125	1/12 HP, 120V, 1Ø	BROAN MODEL NO. QTXE080	PROVIDE UNIT W/ WALL TERMINATION KIT, BACKDRAFT DAMEPR
EF-2	TOILET EXHAUST	CEILING EXHAUST FAN	75	0.125	1/12 HP, 120V, 1Ø	BROAN MODEL NO. QTXE080	PROVIDE UNIT W/ WALL TERMINATION KIT, BACKDRAFT DAMEPR
EF-3	TOILET EXHAUST	CEILING EXHAUST FAN	75	0.125	1/12 HP, 120V, 1Ø	BROAN MODEL NO. QTXE080	PROVIDE UNIT W/ WALL TERMINATION KIT, BACKDRAFT DAMEPR
EF-4	TOILET EXHAUST	CEILING EXHAUST FAN	75	0.125	1/12 HP, 120V, 1Ø	BROAN MODEL NO. QTXE080	PROVIDE UNIT W/ WALL TERMINATION KIT, BACKDRAFT DAMEPR
EF-5	TOILET EXHAUST	CEILING EXHAUST FAN	75	0.125	1/12 HP, 120V, 1Ø	BROAN MODEL NO. QTXE080	PROVIDE UNIT W/ WALL TERMINATION KIT, BACKDRAFT DAMEPR
EF-6	TOILET EXHAUST	CEILING EXHAUST FAN	75	0.125	1/12 HP, 120V, 1Ø	BROAN MODEL NO. QTXE080	PROVIDE UNIT W/ WALL TERMINATION KIT, BACKDRAFT DAMEPR



RADIANT FLOOR HEATING PLAN

1
M-4

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

SPECIAL NOTES: (APPLY TO BASEMENT HVAC PLAN)

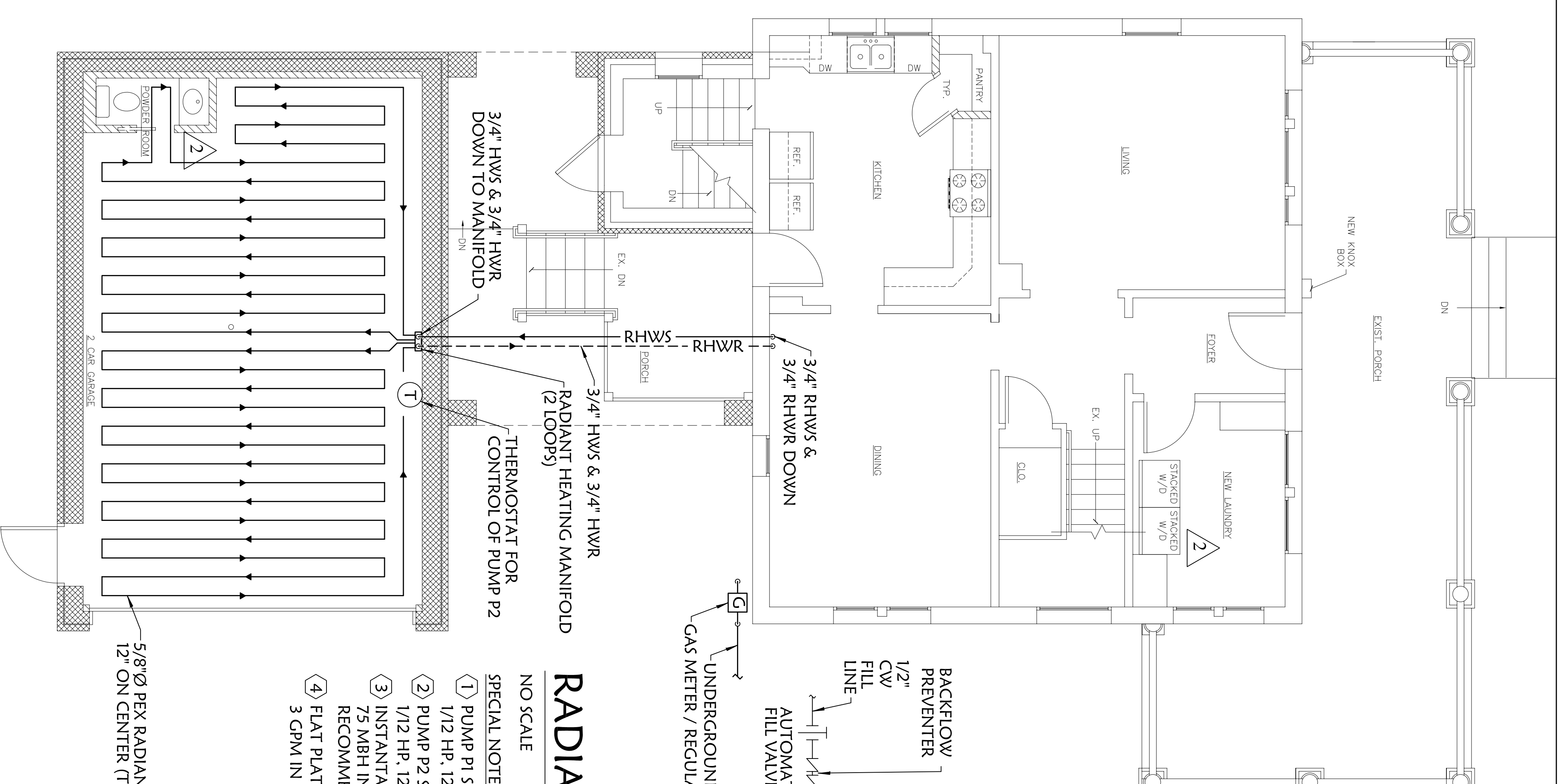
- 1 INSTANTANEOUS WALL-MOUNTED GAS WATER HEATER EQUAL TO RINNAI MODEL E75C; 75 MBH INPUT, AFUE = 96.5%; INSTALL IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS
- 2 CONCENTRIC VENT SYSTEM (VENT + COMBUSTION AIR) PER MANUFACTURER'S RECOMMENDATIONS

TANKLESS WATER HEATERS

1 4
M-4

SPECIAL NOTES: (APPLY TO BASEMENT HVAC PLAN)

- 3 (2) INSTANTANEOUS WALL-MOUNTED GAS WATER HEATER EQUAL TO RINNAI MODEL E180C; 180 MBH INPUT, AFUE = 96.5%; INSTALL IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS
- 4 CONCENTRIC VENT SYSTEM (VENT + COMBUSTION AIR) PER MANUFACTURER'S RECOMMENDATIONS

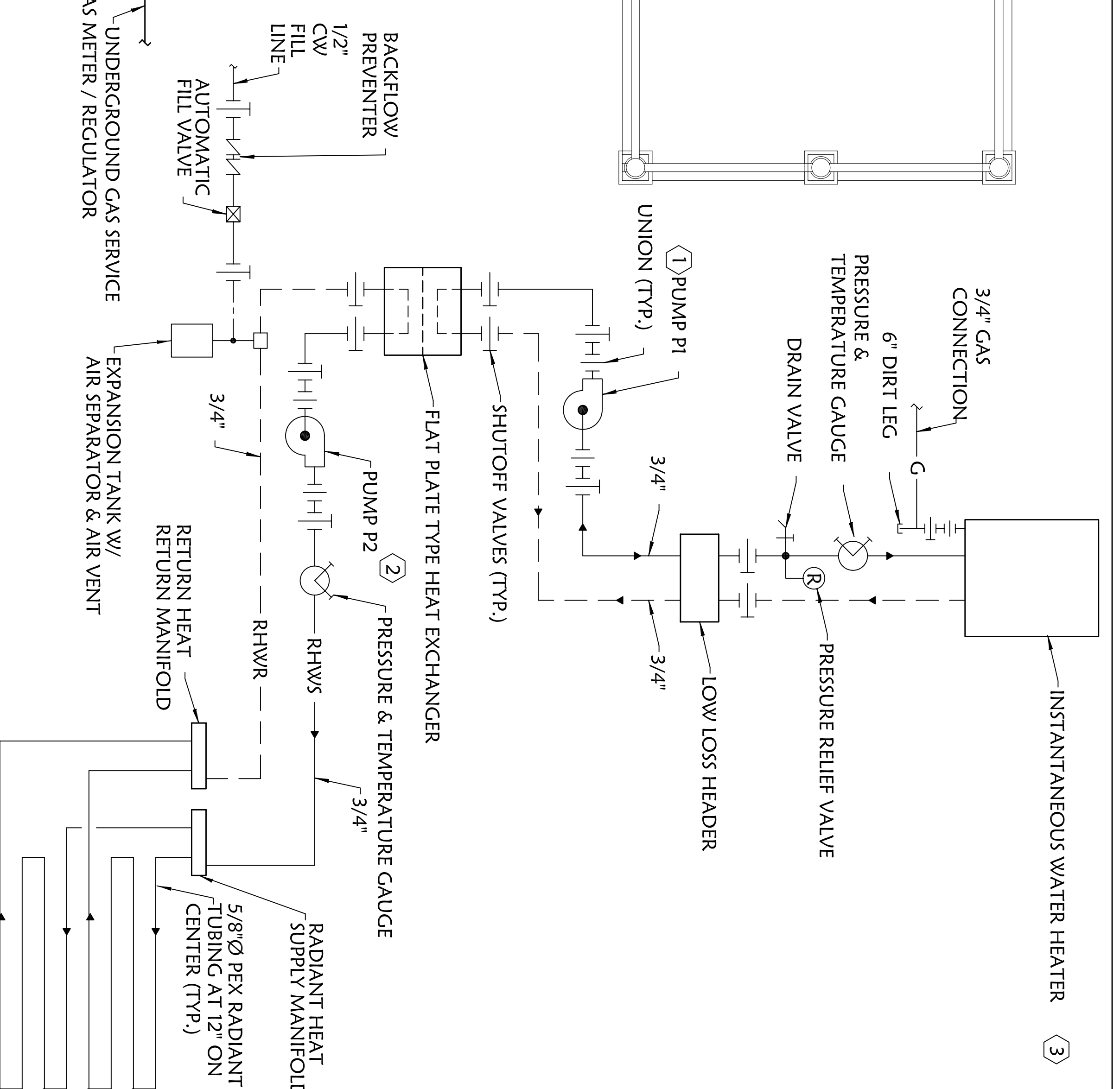


FIRST FLOOR RADIANT HEATING PLAN

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

SPECIAL NOTES: (APPLY TO FIRST FLOOR HVAC PLAN)

- 1 10 X 6 RETURN AIR GRILLE, BOTH SIDES OF PARTITION



RADIANT HEATING PIPING SCHEMATIC

3
M-4

NO SCALE

SPECIAL NOTES: (APPLY TO RADIANT HEATING PIPING SCHEMATIC ONLY)

- 1 PUMP P1 SHALL BE EQUAL TO GRUNDFOFOS MODEL 15-55F; 33.0 GPM @ 8 TDH; 1/12 HP, 120V, 1-Ø
- 2 PUMP P2 SHALL BE EQUAL TO GRUNDFOFOS MODEL 15-55F; 3.0 GPM @12 TDH; 1/12 HP, 120V, 1-Ø
- 3 INSTANTANEOUS WALL-MOUNTED GAS WATER HEATER EQUAL TO RINNAI MODEL E75C; 75 MBH INPUT, AFUE = 96.5%; INSTALL IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS
- 4 FLAT PLATE HEAT EXCHANGER: BOILER SIDE - 3 GPM IN AT 160°F; RADIANT SIDE - 3 GPM IN AT 100°F; OUT AT 120°F

2
M-4

1
REVISION REFLECTS CHANGES TO FLOOR PLAN LAYOUT.

Division 15 - Mechanical Specifications, HVAC

Part I - General

- 1.1 The scope of mechanical work shall include the furnishing and installation of all labor, material, equipment and services and in performing all operations necessary for and reasonably incidental to the installation of all mechanical systems as indicated on the drawings and specified herein.
- 1.2 The drawings are diagrammatic and specified herein. Plans are intended to show size, capacity and approximate location, direction and general relationship of one work phase to another, but not necessarily exact detail or arrangement.
- 1.3 The contractor shall verify all dimensions and conditions at the site. The contractor shall verify the connection requirements and configurations of mechanical equipment before installation.
- 1.4 All work shall be done in strict accordance with the latest edition of the International Mechanical Code (IMC) and the International Plumbing Code (IPC) and all applicable state and local codes and regulations.

Part II - Products

- 2.1 Split System Heat Pumps (AHU-1/HP-1 and AHU-2/HP-2)
 - a) Unit shall be completely factory assembled and tested. Air handling unit shall be variable speed type, designed for horizontal mounting and discharge as indicated on drawings, equal to Trane 2/4TEC3F Series. Heat pumps shall be two-stage cooling type equal to Trane 4TWPB30 Series.
 - b) Nominal capacity of split system heat pumps shall be as scheduled on drawings.
 - c) For each split system heat pump, provide a complete system of refrigerant piping and air conditioning, installed in strict accordance with unit manufacturer's recommendations. For each air handling unit, provide 1" air conditioning condensate drain with deep seal trap, extending from air handling unit with discharge to outdoors. Provide air conditioning condensate pump as required if gravity flow to outdoors is not possible.
 - d) For each horizontal air handling unit mounted above a ceiling, provide a 1-1/2" deep aluminum drain pan, extending minimum 3" beyond footprint of air handling unit, as protection against condensate pan overflow. Provide 1" drain connection from aluminum pan to outdoors.
 - e) Provide vibration isolation for indoor air handling units. For ceiling suspended units, provide steel spring and 0.3" deflection neoprene element equal to Mason Industries Type 30N, with 0.75" minimum deflection.
- 2.2 Ductwork
 - a) Unless otherwise indicated construct all concealed supply, return and exhaust air ductwork of galvanized steel, with gages and reinforcing conforming to SMACNA low pressure duct construction standards. Seal all duct joints with duct sealer equal to Foster 30-02. Construct all square elbows with turning vanes, shop fabricated per SMACNA standards. Provide for adequate support of all ductwork per SMACNA standards.
 - b) Provide balancing dampers at locations as indicated on drawings.
 - c) For branch takeoffs to round branch ducts, provide bellmouth takeoffs equal to Buckley Model BMD.
 - d) Insulated flexible ductwork shall consist of vapor barrier foil scrim material, factory installed 1 inch nominal glass fiber insulation, liner of continuous airtight aluminum core, and helix of zinc coated steel, equal to Genflex Type SFR-25A. Insulated flexible ductwork shall be limited to maximum lengths of 14 feet. Make all connections for insulated flexible duct with screw down clamps
 - e) Make all supply and return duct connections to air handling units with neoprene flexible connections equal to Duro Dyne Flexible Duct Connectors.
 - f) Provide for adequate support of all ductwork per SMACNA Standards.
- 2.3 Diffusers/Register/Grilles
 - a) Provide diffusers, registers and grilles as scheduled on drawings.
- 2.4 Gas-Fired Water Heater (for radiant floor heating system)
 - a) Furnish and install a wall-mounted gas-fired water heater, equal to Rinnai Model E75C. Water heater shall be suitable for space (radiant) heating application. Water heater shall be installed in strict accordance with manufacturer's recommendations. Water heater shall be complete with stainless steel primary heat exchanger, internal expansion tank, concentric venting system, electronic ignition system.
 - c) Provide a concentric venting system as indicated on drawings and installed in strict accordance with manufacturer's recommendations.
 - d) Provide a 3/4" condensate drain for water heater with discharge to outdoors via condensate pump.
 - e) Capacity of water heater shall be as follows:
- 2.5 Piping
 - a) Air conditioning condensate piping - Schedule 40 PVC, solvent welded fittings.
 - b) Refrigerant piping - Type L (ACR) hard or soft drawn copper tubing, wrought copper solder fittings.
 - c) Provide adequate support of all piping. Support PVC piping at 4'-0" maximum on center. Support copper piping at 6'-0" maximum on center.

Division 15 - Mechanical Specifications, HVAC - cont'd

- 2.6 Pumps
 - a) Heating water pumps: Cartridge in-line, single stage, wet rotor type, with motor mounted directly to pump chamber equal to Grundfos Alpha Series. Pump chamber shall be constructed to cast iron, and rated at 145 psig working pressure. The impeller, impeller inlet cone, rotor can and rotor cladding shall be constructed of stainless steel. Motor shaft shall be constructed of aluminum oxide ceramic. Pump shall have no coupling or mechanical seal.
 - b) Capacity of pumps shall be as indicated on drawings.
- 2.7 Piping Specialties
 - a) Strainers, heating water - Cast iron or semi steel construction "Y" type strainer, 125 pound construction, Sarco Type AF125 or equal.
 - b) Balancing devices, heating water - Ball & Gossett Thermoflo Balancer/Thermoflo Indicator or equal.
 - c) For each closed loop heating water system, provide diaphragm type expansion tank with air purger and automatic air vent equal to Amtrol Extrol combination package 1500 with 2.0 gallon tank with 0.9 gallons acceptance.
- 2.8 Hot Water Radiant Floor System
 - a) Furnish and install complete and fully operational radiant floor heating system as indicated on drawings and specified herein. System components shall be as manufactured by Wirsbo or approved equal.
 - b) Radiant floor tubing shall be cross-linked polyethylene. All radiant floor tubing shall be 1/2" inside diameter. Contractor shall keep accurate record of total length and location of radiant tubing as installed for each loop.
 - c) Provide 3-way reactive tempering valve, one for each radiant heating water zone, as manufactured by Wirsbo. Provide thermometer downstream of each 3-way reactive tempering valve to accurately measure heating water supply temperature to each radiant heating zone.
 - d) Radiant heating system manifolds shall be constructed of dezincification resistant brass, with number of loops as scheduled on drawings.
 - e) Install radiant floor tubing and manifold in strict accordance with manufacturer's recommendations. Perform pressure test of system before covering system.
- 2.9 Insulation
 - a) Provide duct insulation for all concealed supply air ductwork and return air ductwork located in unheated space. Ductwork insulation shall be fiberglass blanket type, 0.75 pound density, 1-1/2" thick (R-5 minimum), jacketed laminated aluminum foil, glass reinforcing and kraft paper, installed in strict accordance with manufacturer's recommendations. Omit external duct insulation from those ducts with duct liner.
 - b) Provide all refrigerant piping with closed cell elastomeric type pipe insulation, 3/8" thick, equal to Armaflex II. For all insulation located outdoors, apply two coats of weatherproof WB Armaflex finish. Apply insulation per manufacturer's recommendations.
- 2.10 Balancing
 - a) All testing and balancing shall be performed by a qualified representative of the mechanical contractor.
 - b) Balance all supply, return and exhaust devices to volumetric airflow rates as indicated on drawings.
- 2.11 Controls
 - a) Split system heat pumps AHU-1/HP-1 and AHU-2/HP-2 - Provide 7-day, 24-hour electronic programmable thermostat.
 - b) Radiant heat, garage - Wall-mounted electronic timeclock heating thermostat in garage shall cycle pump P2 on and off to maintain setting.
- 2.12 Dryer Vent:
 - a) Dryer vent shall terminate at the wall.
 - b) Dryer vent duct shall be equipped with a backdraft damper.
 - c) Dryer duct shall be 4" min., 0.016", rigid metal duct, smooth interior surface with joints running in the direction of air flow. ducts shall not be connected with sheet-metal screws or fastening means which extend into the duct. flexible transition ducts used to connect the dryer to the exhaust duct system shall be limited to single lengths, not exceeding 8', and shall be listed and labeled in accordance with ul 2158a. transition ducts shall no be connected within construction.
 - d) Length shall not exceed 25' from the dryer location to the wall termination, and shall use required 45° & 90° bends. the max. length shall be reduced 2.5' for each 45° bend and 5' for each 90° bend. the max. length of the exhaust duct does not include the transition duct.
 - e) Wall termination shall be of non-corrosive materials, weather protected, and prevent insects or animals from penetration.
- 2.13 Bathroom Exhaust Fans:
 - a) Exhaust fans shall terminate at the roof or wall.
 - b) Exhaust fans shall have the capacity of 75 cfm.
 - c) Exhaust fans shall be equipped with a backdraft damper.
 - d) Exhaust duct shall be 4", min., 0.016", rigid metal duct, smooth interior surface.
 - e) Roof or wall termination shall be of non-corrosive materials, weather protected, and prevent insects or animals from penetration.