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**REVISIONS**

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**TITLE PAGE**



## HEAT PUMP REPLACEMENT DUBUQUE COUNTY COURTHOUSE 720 CENTRAL AVENUE DUBUQUE, IA 52001

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FIRST FLOOR

SCALE 3/32" = 1'

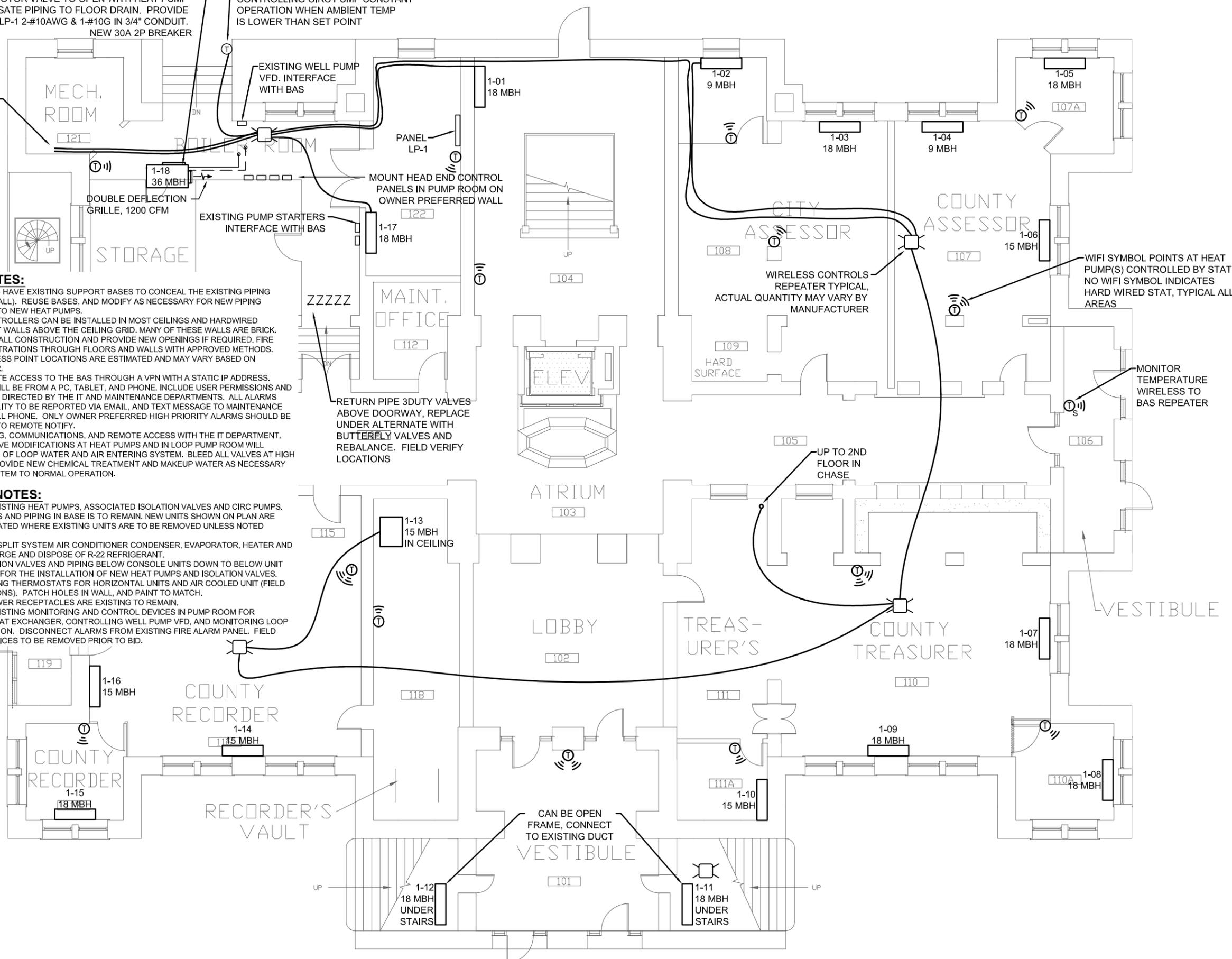
SHEET

# H1.1

SUSPEND NEW HEAT PUMP FROM CEILING. NO EXISTING UNIT CURRENTLY AT THIS LOCATION. CONNECT TO EXISTING LOOP WATER SUPPLY AND RETURN PIPING WITH 1.5" DIAMETER BRANCH PIPING. PROVIDE ISOLATION VALVES, STRAINER, AUTO FLOW AT 9 GPM, AND MOTOR VALVE TO OPEN WITH HEAT PUMP OPERATION. ROUTE PVC CONDENSATE PIPING TO FLOOR DRAIN. PROVIDE POWER WIRING TO EXISTING PANEL LP-1 2-#10AWG & 1-#10G IN 3/4" CONDUIT. NEW 30A 2P BREAKER

WATERPROOF OUTSIDE AIR TEMP SENSOR MOUNTED IN SHADE USED FOR CONTROLLING CIRC PUMP CONSTANT OPERATION WHEN AMBIENT TEMP IS LOWER THAN SET POINT

PROVIDE NEW PRESSURE SWITCHES FOR MONITORING THE DRY PIPE FIRE PROTECTION SYSTEM AIR PRESSURE AND THE WET SIDE WATER PRESSURE. MODIFY PIPING SO THAT EXISTING FIRE ALARM SWITCHES REMAIN OPERATIONAL.



### GENERAL NOTES:

1. CONSOLE UNITS HAVE EXISTING SUPPORT BASES TO CONCEAL THE EXISTING PIPING (TYPICALLY 6" TALL). REUSE BASES, AND MODIFY AS NECESSARY FOR NEW PIPING CONNECTIONS TO NEW HEAT PUMPS.
2. WIRELESS CONTROLLERS CAN BE INSTALLED IN MOST CEILINGS AND HARDWIRED THROUGH MOST WALLS ABOVE THE CEILING GRID. MANY OF THESE WALLS ARE BRICK. FIELD VERIFY WALL CONSTRUCTION AND PROVIDE NEW OPENINGS IF REQUIRED. FIRE STOP ALL PENETRATIONS THROUGH FLOORS AND WALLS WITH APPROVED METHODS.
3. WIRELESS ACCESS POINT LOCATIONS ARE ESTIMATED AND MAY VARY BASED ON MANUFACTURER.
4. PROVIDE REMOTE ACCESS TO THE BAS THROUGH A VPN WITH A STATIC IP ADDRESS. CONNECTION WILL BE FROM A PC, TABLET, AND PHONE. INCLUDE USER PERMISSIONS AND PASSWORDS AS DIRECTED BY THE IT AND MAINTENANCE DEPARTMENTS. ALL ALARMS MUST HAVE ABILITY TO BE REPORTED VIA EMAIL, AND TEXT MESSAGE TO MAINTENANCE PERSONNEL CELL PHONE. ONLY OWNER PREFERRED HIGH PRIORITY ALARMS SHOULD BE PROGRAMMED TO REMOTE NOTIFY.
5. CONFIRM WIRING, COMMUNICATIONS, AND REMOTE ACCESS WITH THE IT DEPARTMENT.
6. PIPING AND VALVE MODIFICATIONS AT HEAT PUMPS AND IN LOOP PUMP ROOM WILL RESULT IN LOSS OF LOOP WATER AND AIR ENTERING SYSTEM. BLEED ALL VALVES AT HIGH POINTS, AND PROVIDE NEW CHEMICAL TREATMENT AND MAKEUP WATER AS NECESSARY TO RETURN SYSTEM TO NORMAL OPERATION.

### DEMOLITION NOTES:

1. REMOVE ALL EXISTING HEAT PUMPS, ASSOCIATED ISOLATION VALVES AND CIRC PUMPS. SUPPORT BASES AND PIPING IN BASE IS TO REMAIN. NEW UNITS SHOWN ON PLAN ARE TYPICALLY LOCATED WHERE EXISTING UNITS ARE TO BE REMOVED UNLESS NOTED OTHERWISE.
2. REMOVE ATTIC SPLIT SYSTEM AIR CONDITIONER CONDENSER, EVAPORATOR, HEATER AND PIPING. DISCHARGE AND DISPOSE OF R-22 REFRIGERANT.
3. REMOVE ISOLATION VALVES AND PIPING BELOW CONSOLE UNITS DOWN TO BELOW UNIT AS NECESSARY FOR THE INSTALLATION OF NEW HEAT PUMPS AND ISOLATION VALVES.
4. REMOVE EXISTING THERMOSTATS FOR HORIZONTAL UNITS AND AIR COOLED UNIT (FIELD VERIFY LOCATIONS). PATCH HOLES IN WALL, AND PAINT TO MATCH.
5. HEAT PUMP POWER RECEPTACLES ARE EXISTING TO REMAIN.
6. REMOVE ALL EXISTING MONITORING AND CONTROL DEVICES IN PUMP ROOM FOR MONITORING HEAT EXCHANGER, CONTROLLING WELL PUMP VFD, AND MONITORING LOOP PUMPS OPERATION. DISCONNECT ALARMS FROM EXISTING FIRE ALARM PANEL. FIELD VERIFY ALL DEVICES TO BE REMOVED PRIOR TO BID.

NEW 30A 2P BREAKER

EXISTING WELL PUMP VFD. INTERFACE WITH BAS

PANEL LP-1

DOUBLE DEFLECTION GRILLE, 1200 CFM

EXISTING PUMP STARTERS INTERFACE WITH BAS

MOUNT HEAD END CONTROL PANELS IN PUMP ROOM ON OWNER PREFERRED WALL

ZZZZZ

RETURN PIPE 3DUTY VALVES ABOVE DOORWAY, REPLACE UNDER ALTERNATE WITH BUTTERFLY VALVES AND REBALANCE. FIELD VERIFY LOCATIONS

WIRELESS CONTROLS REPEATER TYPICAL, ACTUAL QUANTITY MAY VARY BY MANUFACTURER

WIFI SYMBOL POINTS AT HEAT PUMP(S) CONTROLLED BY STAT, NO WIFI SYMBOL INDICATES HARD WIRED STAT, TYPICAL ALL AREAS

MONITOR TEMPERATURE WIRELESS TO BAS REPEATER

UP TO 2ND FLOOR IN CHASE

CAN BE OPEN FRAME, CONNECT TO EXISTING DUCT

MECH. ROOM

STORAGE

BOILER ROOM

MAINT. OFFICE

ELEV.

ATRIUM

LOBBY

TREASURER'S

COUNTY TREASURER

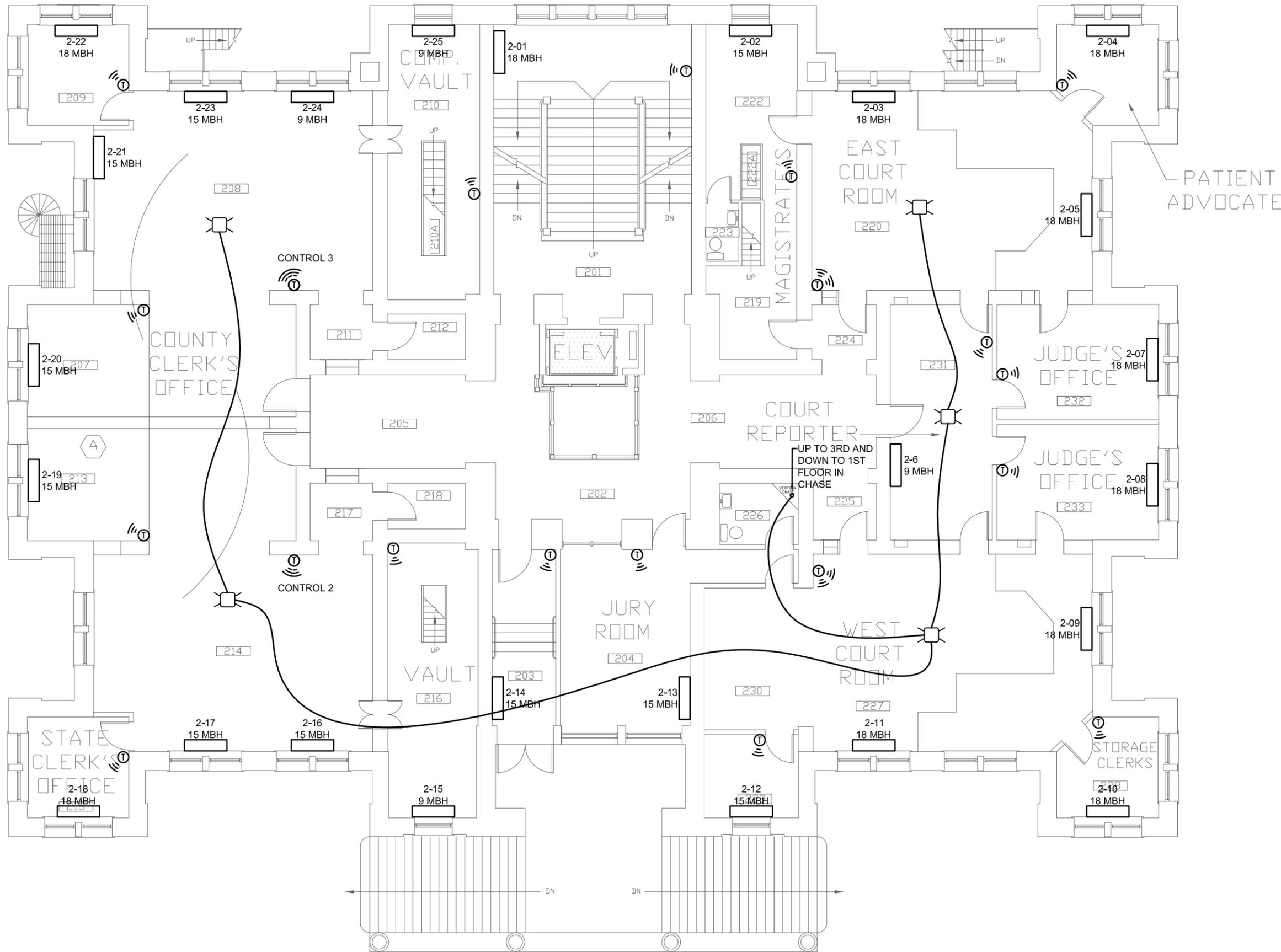
VESTIBULE

COUNTY RECORDER

COUNTY RECORDER

RECORDER'S VAULT

VESTIBULE



**HEAT PUMP REPLACEMENT  
DUBUQUE COUNTY COURTHOUSE**  
720 CENTRAL AVENUE  
DUBUQUE, IA 52001

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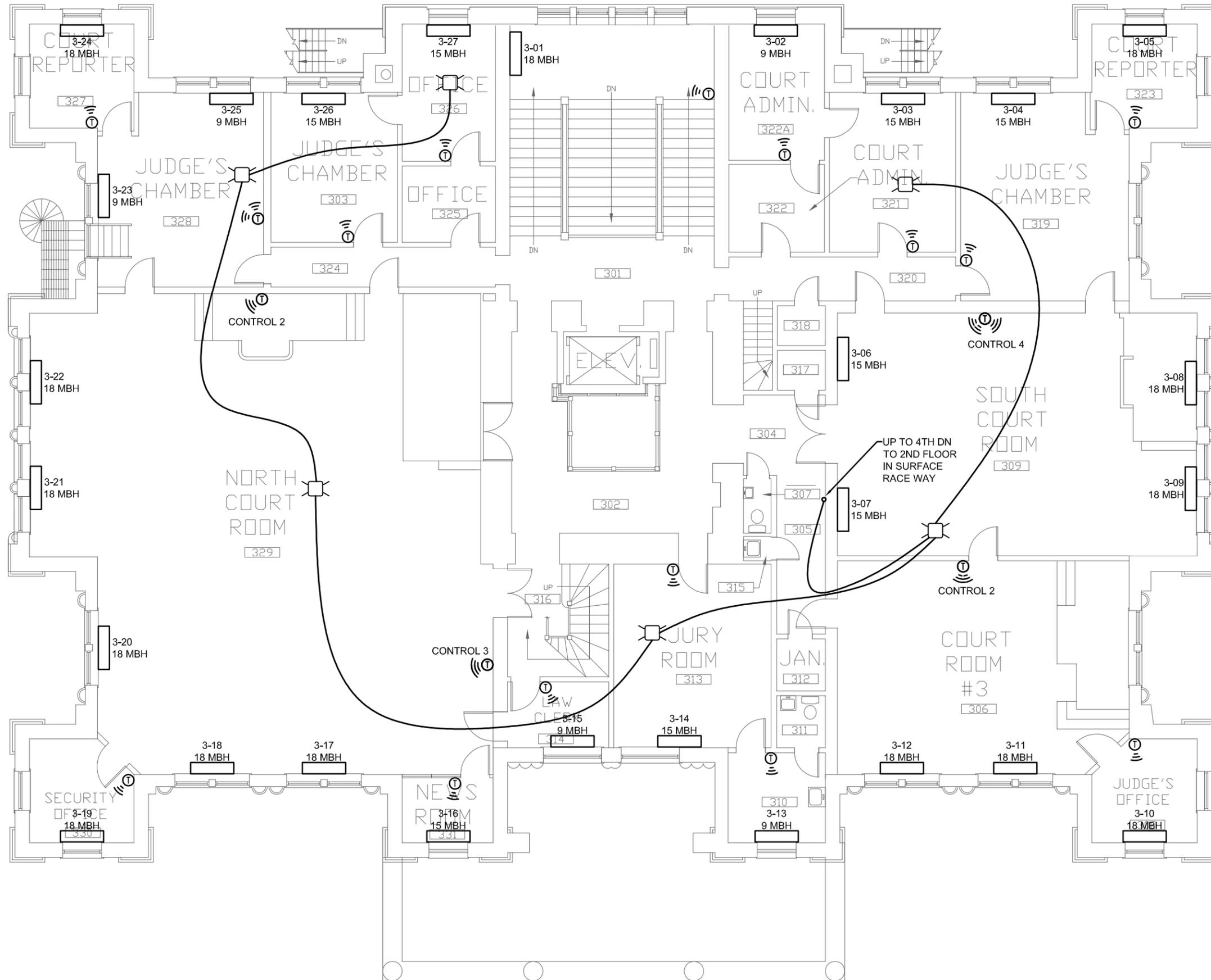
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SECOND FLOOR

SCALE 3/32" = 1'

SHEET  
**H1.2**



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THIRD FLOOR

SCALE 3/32" = 1'

SHEET

**H1.3**



**HEAT PUMP REPLACEMENT  
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720 CENTRAL AVENUE  
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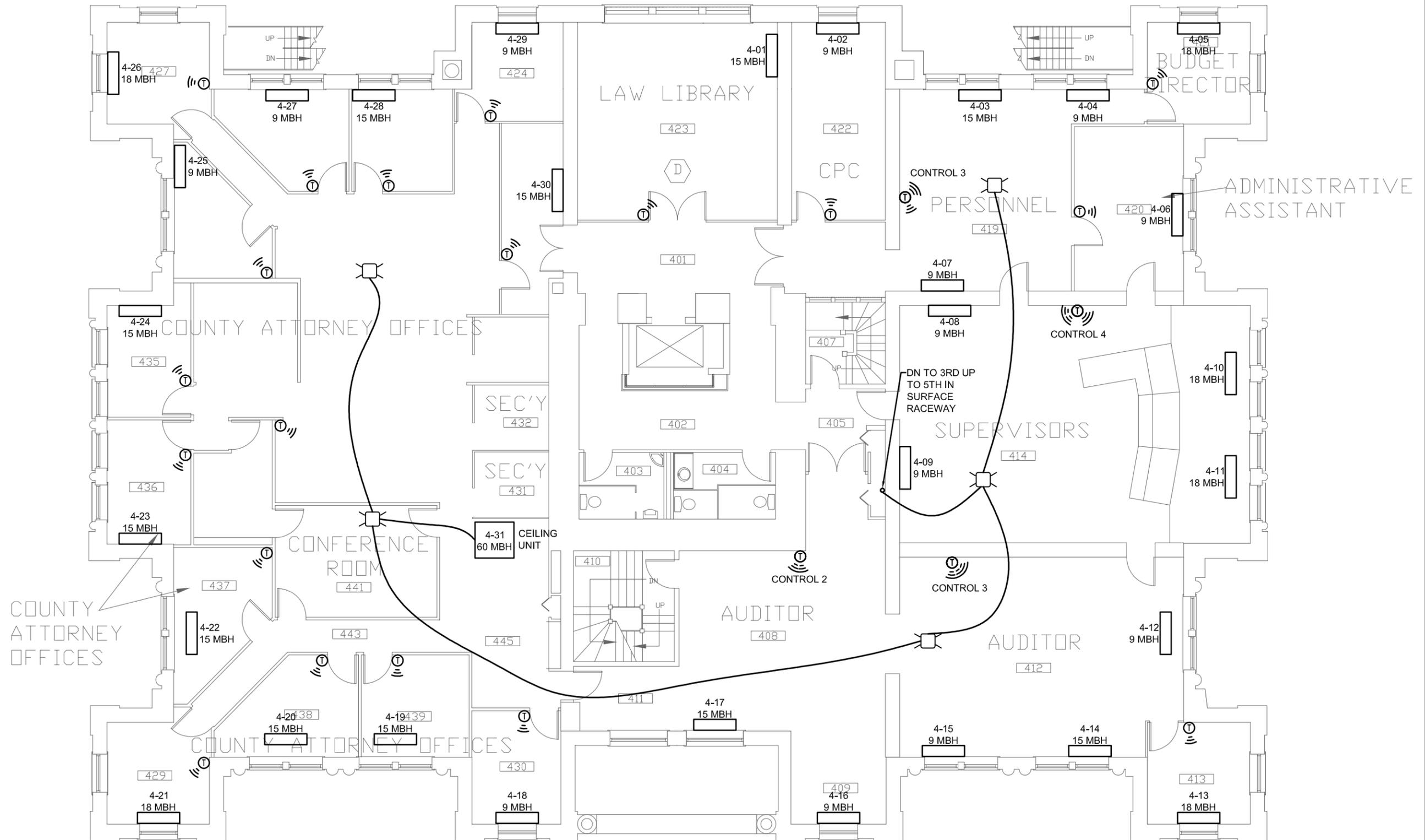
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FOURTH FLOOR

SCALE 3/32" = 1'

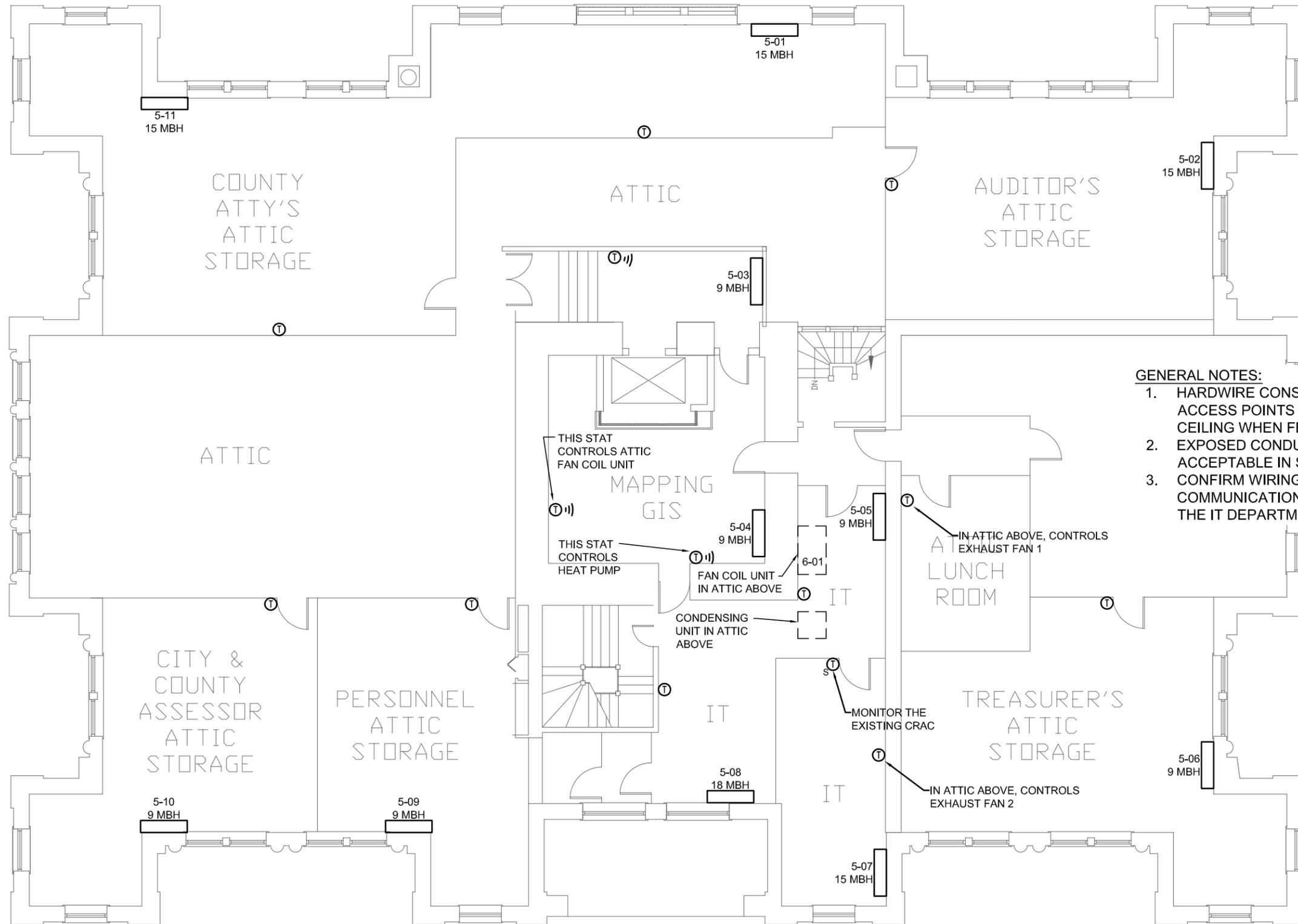
SHEET

**H1.4**





**HEAT PUMP REPLACEMENT  
DUBUQUE COUNTY COURTHOUSE  
720 CENTRAL AVENUE  
DUBUQUE, IA 52001**



- GENERAL NOTES:**
1. HARDWIRE CONSOLE UNITS TO ACCESS POINTS IN 4TH FLOOR CEILING WHEN FEASIBLE.
  2. EXPOSED CONDUITS ARE ACCEPTABLE IN STORAGE SPACES.
  3. CONFIRM WIRING AND COMMUNICATION METHODS WITH THE IT DEPARTMENT IN THEIR AREA.

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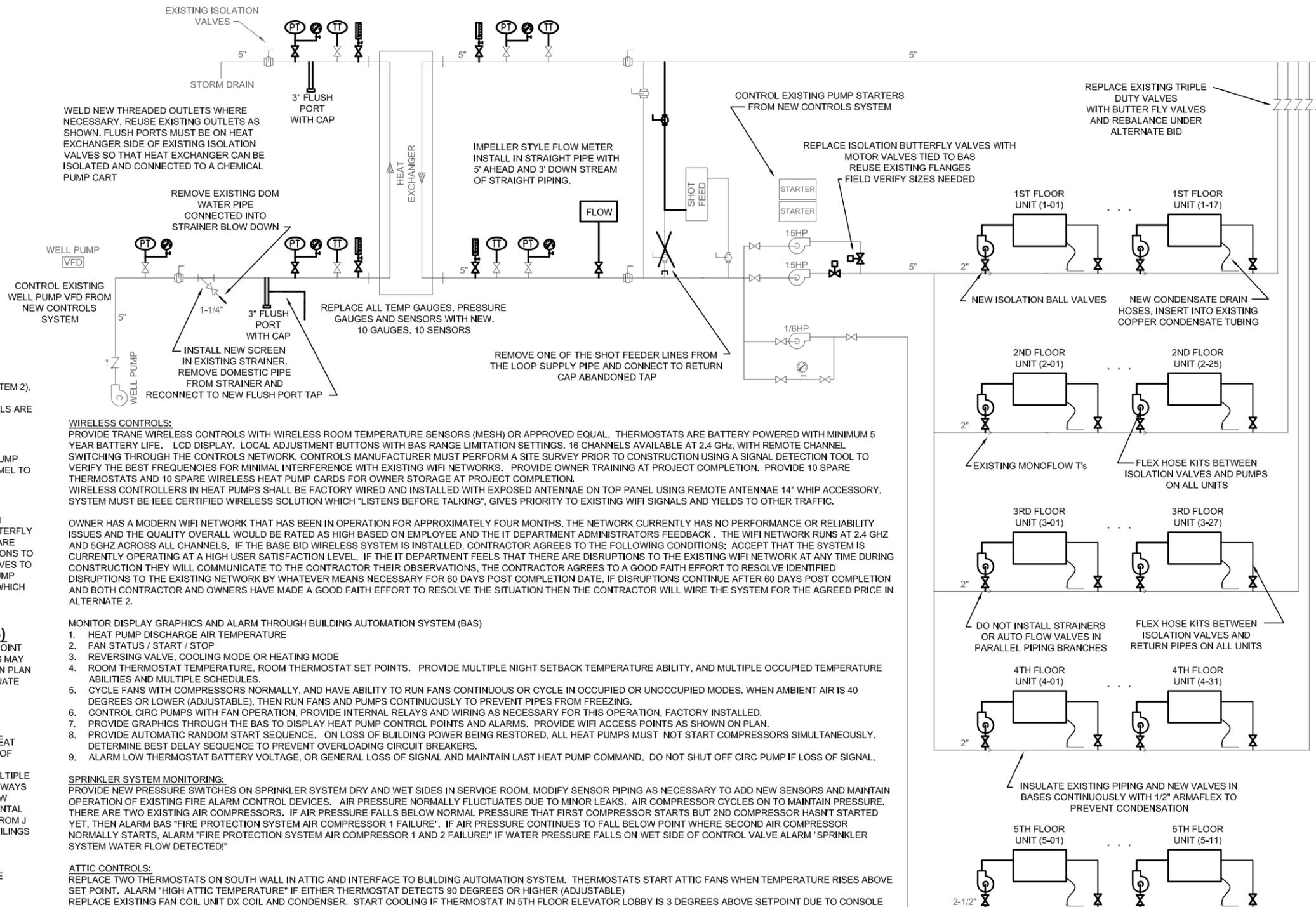
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FIFTH FLOOR

SCALE 3/32" = 1'

SHEET

**H1.5**



**BID REQUIREMENTS:**

REFER TO FRONT END SPECIFICATIONS FOR FULL DETAILS. PROVIDE **SEPARATE COSTS** FOR EQUIPMENT INSTALLATION (LINE ITEM 2), AND FOR WIRELESS CONTROLS (LINE ITEM 3). UNDER THE BASE BID ALL THERMOSTATS AND HEAT PUMP CONTROLS ARE WIRELESS UNLESS OTHERWISE NOTED ON PLANS.

**LINE ITEM 4: (PAINT BASES)**

SAND SMOOTH, CLEAN AND PREP ALL EXISTING TO REMAIN HEAT PUMP SUPPORT BASES FOR PAINTING. PAINT WITH TWO COATS OF ENAMEL TO MATCH NEW HEAT PUMP COLOR.

**LINE ITEM 5: (FLOW BALANCE DEVICES)**

REMOVE ALL EXISTING TRIPLE DUTY FLOW CONTROL VALVES FROM RETURN PIPES IN PUMP ROOM ABOVE STAIRS. REPLACE WITH BUTTERFLY VALVES WITH LOCKING HANDLES. EXISTING TRIPLE DUTY VALVES ARE LONGER THAN NEW BUTTERFLY VALVES, ADD FLANGED PIPE SECTIONS TO EXTEND TO NEW VALVES AS NECESSARY. ADJUST BUTTERFLY VALVES TO BALANCE FLOW IN EACH BRANCH TO SUM OF SCHEDULED HEAT PUMP FLOWS ON EACH FLOOR. FIELD VERIFY WHICH BRANCHES SERVE WHICH ZONES. MARK HANDLE FINAL POSITIONS AFTER BALANCING. ASBESTOS ABATEMENT WILL BE PERFORMED BY OWNER.

**LINE ITEM 6: (EXTRA WIFI ACCESS POINTS)**

PROVIDE UNIT COST TO ADD ONE ADDITIONAL WIRELESS ACCESS POINT CONNECTED TO BUILDING AUTOMATION SYSTEM. MASONRY WALLS MAY INTERFERE WITH WIRELESS COMMUNICATIONS. ACCESS POINTS ON PLAN ARE AN ESTIMATION OF QUANTITY NECESSARY TO PROVIDE ADEQUATE COMMUNICATION, ADDITIONAL POINTS MAY BE REQUIRED IF COMMUNICATION ISSUES ARE FOUND DURING INSTALLATION.

**ALTERNATE 1: (HARD WIRED CONTROLS):**

PROVIDE ALL ITEMS IN THE BASE BID, EXCEPT WITH HARD WIRED HEAT PUMP CONTROLS AND HARD WIRED THERMOSTATS (AT THE START OF CONSTRUCTION). PULL CONTROL WIRES UP FLOOR TO FLOOR AND CONCEAL IN NEW VERTICAL SURFACE MOUNTED RACEWAYS AT MULTIPLE LOCATIONS. NO HORIZONTAL RACEWAYS PERMITTED. PAINT RACEWAYS TO MATCH EXISTING WALLS. DRILL NEW HOLES IN FLOORS FOR NEW WIRES AND FIRE STOP AFTER WIRING AS NECESSARY. ALL HORIZONTAL WIRING MUST BE ABOVE ACCESSIBLE CEILINGS AND SUPPORTED FROM J HOOKS, PROVIDE NEW PENETRATIONS THROUGH WALLS ABOVE CEILINGS AS NECESSARY OR REUSE EXISTING HOLES. FIRE STOP ALL USED HORIZONTAL PENETRATIONS. LOCATE THERMOSTATS AT SAME LOCATIONS AS BASE BID SHOWN ON PLANS. ALL MONITORING AND THERMOSTAT FEATURES IN BASE BID ARE REQUIRED IN ALTERNATE

**ALTERNATE 2: (HARD WIRED CONTROLS, CHANGE DURING CONSTRUCTION):**

IF WIRELESS COMMUNICATION CONTROLS ISSUES ARE ENCOUNTERED DURING CONSTRUCTION AND ARE NOT ABLE TO BE RESOLVED PER THE BASE BID REQUIREMENTS AND DEFINITIONS, THEN PROVIDE A WIRED SYSTEM AS DESCRIBED IN ALTERNATE 1. REMOVE ALL WIRELESS DEVICES AND RETURN TO THE CONTROLS CONTRACTOR.

**ALTERNATE 3: (CONTROLS SERVICE CONTRACT):**

PROVIDE A 5 YEAR CONTROLS SERVICE CONTRACT THAT INCLUDES 200 HOURS ON SITE, AND 100 HOURS OF REMOTE SERVICE ASSISTANCE. 300 HOURS TOTAL. INCLUDE ALL REPLACEMENT MATERIALS FOR CONTROLS COMPONENTS FOR 5 YEARS. CONTRACT START DATE SHALL BE THE SUBSTANTIAL COMPLETION DATE.

**WIRELESS CONTROLS:**  
 PROVIDE TRANE WIRELESS CONTROLS WITH WIRELESS ROOM TEMPERATURE SENSORS (MESH) OR APPROVED EQUAL. THERMOSTATS ARE BATTERY POWERED WITH MINIMUM 5 YEAR BATTERY LIFE. LCD DISPLAY. LOCAL ADJUSTMENT BUTTONS WITH BAS RANGE LIMITATION SETTINGS. 16 CHANNELS AVAILABLE AT 2.4 GHZ. WITH REMOTE CHANNEL SWITCHING THROUGH THE CONTROLS NETWORK. CONTROLS MANUFACTURER MUST PERFORM A SITE SURVEY PRIOR TO CONSTRUCTION USING A SIGNAL DETECTION TOOL TO VERIFY THE BEST FREQUENCIES FOR MINIMAL INTERFERENCE WITH EXISTING WIFI NETWORKS. PROVIDE OWNER TRAINING AT PROJECT COMPLETION. PROVIDE 10 SPARE THERMOSTATS AND 10 SPARE WIRELESS HEAT PUMP CARDS FOR OWNER STORAGE AT PROJECT COMPLETION. WIRELESS CONTROLLERS IN HEAT PUMPS SHALL BE FACTORY WIRED AND INSTALLED WITH EXPOSED ANTENNAE ON TOP PANEL USING REMOTE ANTENNAE 14" WHIP ACCESSORY. SYSTEM MUST BE IEEE CERTIFIED WIRELESS SOLUTION WHICH "LISTENS BEFORE TALKING", GIVES PRIORITY TO EXISTING WIFI SIGNALS AND YIELDS TO OTHER TRAFFIC.

OWNER HAS A MODERN WIFI NETWORK THAT HAS BEEN IN OPERATION FOR APPROXIMATELY FOUR MONTHS. THE NETWORK CURRENTLY HAS NO PERFORMANCE OR RELIABILITY ISSUES AND THE QUALITY OVERALL WOULD BE RATED AS HIGH BASED ON EMPLOYEE AND THE IT DEPARTMENT ADMINISTRATORS FEEDBACK. THE WIFI NETWORK RUNS AT 2.4 GHZ AND 5GHZ ACROSS ALL CHANNELS. IF THE BASE BID WIRELESS SYSTEM IS INSTALLED, CONTRACTOR AGREES TO THE FOLLOWING CONDITIONS: ACCEPT THAT THE SYSTEM IS CURRENTLY OPERATING AT A HIGH USER SATISFACTION LEVEL. IF THE IT DEPARTMENT FEELS THAT THERE ARE DISRUPTIONS TO THE EXISTING WIFI NETWORK AT ANY TIME DURING CONSTRUCTION THEY WILL COMMUNICATE TO THE CONTRACTOR THEIR OBSERVATIONS. THE CONTRACTOR AGREES TO A GOOD FAITH EFFORT TO RESOLVE IDENTIFIED DISRUPTIONS TO THE EXISTING NETWORK BY WHATEVER MEANS NECESSARY FOR 60 DAYS POST COMPLETION DATE, IF DISRUPTIONS CONTINUE AFTER 60 DAYS POST COMPLETION AND BOTH CONTRACTOR AND OWNERS HAVE MADE A GOOD FAITH EFFORT TO RESOLVE THE SITUATION THEN THE CONTRACTOR WILL WIRE THE SYSTEM FOR THE AGREED PRICE IN ALTERNATE 2.

- MONITOR DISPLAY GRAPHICS AND ALARM THROUGH BUILDING AUTOMATION SYSTEM (BAS)
- HEAT PUMP DISCHARGE AIR TEMPERATURE
  - FAN STATUS / START / STOP
  - REVERSING VALVE, COOLING MODE OR HEATING MODE
  - ROOM THERMOSTAT TEMPERATURE, ROOM THERMOSTAT SET POINTS. PROVIDE MULTIPLE NIGHT SETBACK TEMPERATURE ABILITY, AND MULTIPLE OCCUPIED TEMPERATURE ABILITIES AND MULTIPLE SCHEDULES.
  - CYCLE FANS WITH COMPRESSORS NORMALLY, AND HAVE ABILITY TO RUN FANS CONTINUOUS OR CYCLE IN OCCUPIED OR UNOCCUPIED MODES. WHEN AMBIENT AIR IS 40 DEGREES OR LOWER (ADJUSTABLE), THEN RUN FANS AND PUMPS CONTINUOUSLY TO PREVENT PIPES FROM FREEZING.
  - CONTROL CIRC PUMPS WITH FAN OPERATION, PROVIDE INTERNAL RELAYS AND WIRING AS NECESSARY FOR THIS OPERATION, FACTORY INSTALLED.
  - PROVIDE GRAPHICS THROUGH THE BAS TO DISPLAY HEAT PUMP CONTROL POINTS AND ALARMS. PROVIDE WIFI ACCESS POINTS AS SHOWN ON PLAN.
  - PROVIDE AUTOMATIC RANDOM START SEQUENCE. ON LOSS OF BUILDING POWER BEING RESTORED, ALL HEAT PUMPS MUST NOT START COMPRESSORS SIMULTANEOUSLY. DETERMINE BEST DELAY SEQUENCE TO PREVENT OVERLOADING CIRCUIT BREAKERS.
  - ALARM LOW THERMOSTAT BATTERY VOLTAGE, OR GENERAL LOSS OF SIGNAL AND MAINTAIN LAST HEAT PUMP COMMAND. DO NOT SHUT OFF CIRC PUMP IF LOSS OF SIGNAL.

**SPRINKLER SYSTEM MONITORING:**  
 PROVIDE NEW PRESSURE SWITCHES ON SPRINKLER SYSTEM DRY AND WET SIDES IN SERVICE ROOM. MODIFY SENSOR PIPING AS NECESSARY TO ADD NEW SENSORS AND MAINTAIN OPERATION OF EXISTING FIRE ALARM CONTROL DEVICES. AIR PRESSURE NORMALLY FLUCTUATES DUE TO MINOR LEAKS. AIR COMPRESSOR CYCLES ON TO MAINTAIN PRESSURE. THERE ARE TWO EXISTING AIR COMPRESSORS. IF AIR PRESSURE FALLS BELOW NORMAL PRESSURE THAT FIRST COMPRESSOR STARTS BUT 2ND COMPRESSOR HASNT STARTED YET, THEN ALARM BAS "FIRE PROTECTION SYSTEM AIR COMPRESSOR 1 FAILURE". IF AIR PRESSURE CONTINUES TO FALL BELOW POINT WHERE SECOND AIR COMPRESSOR NORMALLY STARTS, ALARM "FIRE PROTECTION SYSTEM AIR COMPRESSOR 1 AND 2 FAILURE" IF WATER PRESSURE FALLS ON WET SIDE OF CONTROL VALVE ALARM "SPRINKLER SYSTEM WATER FLOW DETECTED"

**ATTIC CONTROLS:**  
 REPLACE TWO THERMOSTATS ON SOUTH WALL IN ATTIC AND INTERFACE TO BUILDING AUTOMATION SYSTEM. THERMOSTATS START ATTIC FANS WHEN TEMPERATURE RISES ABOVE SET POINT. ALARM "HIGH ATTIC TEMPERATURE" IF EITHER THERMOSTAT DETECTS 90 DEGREES OR HIGHER (ADJUSTABLE)  
 REPLACE EXISTING FAN COIL UNIT DX COIL AND CONDENSER. START COOLING IF THERMOSTAT IN 5TH FLOOR ELEVATOR LOBBY IS 3 DEGREES ABOVE SETPOINT DUE TO CONSOLE UNIT NOT ABLE TO MAINTAIN SETPOINT.

**PUMP ROOM CONTROLS & VALVES:**  
 INSTALL PRESSURE AND TEMPERATURE TRANSDUCERS AND GAUGES ON ALL FOUR (4) HEAT EXCHANGER CONNECTIONS AND AHEAD OF STRAINER. SEE FLOW DIAGRAM ON THIS SHEET. ADD BUILDING FLOW METER. INSTALL MOTOR VALVES AT LOOP PUMP DISCHARGE, REMOVE ISOLATION VALVES TYPICAL OF 2. EXISTING PUMPS REQUIRE MANUAL ISOLATION TO ALTERNATE, NEW CONTROLS MUST AUTOMATICALLY ISOLATE AND ALTERNATE PUMPS.

- DISPLAY GRAPHICS OF HEAT EXCHANGER AS SHOWN ON THIS FLOW DIAGRAM AND SHOW ALL TEMPERATURE AND PRESSURES AS MEASURED FROM SENSORS.
- ALARM "CLOGGED HEAT EXCHANGER" IF PRESSURE DIFFERENCE ACROSS WELL SIDE IS 2PSI LARGER THAN CLEAN HEAT EXCHANGER AT WELL PUMP FULL OPERATING FLOW (ADJUSTABLE). REFER TO HEAT EXCHANGER PUBLISHED PRESSURE DATA.
- ALARM "CLOGGED WELL WATER STRAINER" IF PRESSURE DIFFERENCE ACROSS STRAINER IS 2PSI LARGER THAN CLEAN STRAINER AT WELL PUMP FULL OPERATING FLOW (ADJUSTABLE). REFER TO STRAINER PUBLISHED PRESSURE DATA.
- ADD CONTROLS TO EXISTING LOOP PUMP STARTERS TO AUTOMATICALLY START AND ALTERNATE LEAD PUMP ONCE PER WEEK. START LAG PUMP IF LEAD PUMP FAILS TO GENERATE FLOW AT BUILDING FLOW METER DUE TO FAILED PUMP OR MOTOR VALVE, AND ALARM "LOOP PUMP 1 FAILURE, PUMP 2 STARTED" OR "LOOP PUMP 2 FAILURE, PUMP 1 STARTED". CLOSE MOTOR VALVE DOWN STREAM OF PUMP THAT IS OFF AND OPEN VALVE DOWN STREAM OF PUMP THAT IS ON. DISPLAY WHICH PUMP ON OR OFF, AND VALVE OPEN OR CLOSED.
- MONITOR BUILDING FLOW FROM NEW FLOW METER. DISPLAY BUILDING GPM, ALARM "LOSS OF BUILDING FLOW" IF FLOW DROPS BELOW 50% OF MAX GPM FOR OVER 10 MINUTES (ADJUSTABLE).
- MONITOR BUILDING ENERGY TRANSFER. DISPLAY INSTANTANEOUS ENERGY "MBH". RECORD "PAST 7 DAY PEAK ENERGY" AND STORE 3 YEARS OF DATA (156 WEEKS). CALCULATE INSTANTANEOUS ENERGY AS  $GPM \times 0.5 \times (LOOP\ SUPPLY\ TEMP - LOOP\ RETURN\ TEMP)$ . POSITIVE BTU/HR INDICATES HEAT INTRODUCED TO BUILDING, NEGATIVE VALUES INDICATE HEAT REJECTED FROM BUILDING.
- DISPLAY TOTAL ENERGY TRANSFERRED "MBTUs PAST 30 DAYS". EACH HOUR RECORD MBTU/HR AND SUM FOR PAST 720 HOURS. RECORD EACH MONTH TOTAL ON THE LAST DAY OF EACH MONTH AND STORE FOR 36 MONTHS.
- DISPLAY WELL PUMP FLOW "WELL PUMP GPM". CALCULATE USING KNOWN BUILDING ENERGY AND WELL SIDE HEAT EXCHANGER TEMPERATURES.  $WELL\ PUMP\ GPM = BUILDING\ MBTU/HR / 0.5 / SQUARE\ ROOT\ OF((HEAT\ EXCHANGER\ WELL\ LEAVING\ TEMP - HEAT\ EXCHANGER\ WELL\ ENTERING\ TEMP)^2)$ . SQUARE ROOT OF SQUARED FUNCTION WILL ELIMINATE NEGATIVE GPM CALCULATIONS. RECORD PEAK WELL PUMP GPM AND MINIMUM GPM. RECORD TIME STAMPS OF PEAK AND MINIMUM. STORE PAST 30 DAY PEAK AND MINIMUM AT END OF EACH MONTH. STORE 36 MONTHS OF DATA.



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**FLOW DIAGRAM**

SCALE: NTS

SHEET

**H2.0**

**WATER SOURCE HEAT PUMPS**

BASIS OF DESIGN: CLIMATEMASTER

TAG NUMBER	HEAT PUMP MODEL NUMBER	NOMINAL CAPACITY TONS	COOLING CAPACITY TOTAL MBH	HEATING CAPACITY MBH	FAN SUPPLY CFM	LOOP WATER GPM	AHRI ISO EER	ELECTRICAL V/PH/Hz	ELECTRIC FLA	ELECTRIC MCA	ELECTRIC MAX FUSE
1-01	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-02	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
1-03	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-04	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
1-05	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-06	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
1-07	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-08	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-09	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-10	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
1-11	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-12	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-13	TRH-015	1 1/4	15.0	13.0	395	3.7	25.0	208/60/1	8.7	10.2	15
1-14	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
1-15	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-16	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
1-17	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
1-18	TRH-036	3	39.0	35.8	1200	9.0	20.9	208/60/1	21.9	26.1	40
2-01	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-02	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-03	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-04	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-05	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-06	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
2-07	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-08	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-09	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-10	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-11	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-12	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-13	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-14	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-15	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
2-16	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-17	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-18	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-19	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-20	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-21	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-22	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
2-23	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
2-24	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
2-25	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
3-01	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-02	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
3-03	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
3-04	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
3-05	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-06	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
3-07	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
3-08	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-09	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-10	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-11	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-12	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-13	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
3-14	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
3-15	TRC-09	3/4	9.4	8.5	350	2.2	14.9	208/60/1	4.9	6.0	15
3-16	TRC-15	1 1/4	15.7	14.6	520	3.7	19.4	208/60/1	6.4	7.8	15
3-17	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-18	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15
3-19	TRC-18	1 1/2	17.2	16.5	620	4.5	17.9	208/60/1	7.5	9.2	15

\*NO PUMP

\*NO PUMP

**WATER SOURCE HEAT PUMPS**

BASIS OF DESIGN: CLIMATEMASTER

TAG NUMBER	HEAT PUMP MODEL NUMBER	NOMINAL CAPACITY TONS	COOLING CAPACITY TOTAL MBH	HEATING CAPACITY MBH	FAN SUPPLY CFM	OA CFM	Return CFM	LOOP WATER GPM	PRESSURE DROP FEET	AHRI ISO EER	ELECTRICAL V/PH/Hz	FAN TYPE	ELECTRIC FLA	ELECTRIC MCA	ELECTRIC MAX FUSE
3-20	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
3-21	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
3-22	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
3-23	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
3-24	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
3-25	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
3-26	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
3-27	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-01	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-02	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-03	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-04	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-05	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
4-06	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-07	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-08	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-09	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-10	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
4-11	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
4-12	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-13	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
4-14	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-15	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-16	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-17	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-18	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15
4-19	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-20	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-21	TRC-18	1 1/2	17.2	16.5	620	0.0	0.0	4.5	0.0	17.9	208/60/1	0.0	7.5	9.2	15
4-22	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-23	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-24	TRC-15	1 1/4	15.7	14.6	520	0.0	0.0	3.7	0.0	19.4	208/60/1	0.0	6.4	7.8	15
4-25	TRC-09	3/4	9.4	8.5	350	0.0	0.0	2.2	0.0	14.9	208/60/1	0.0	4.9	6.0	15