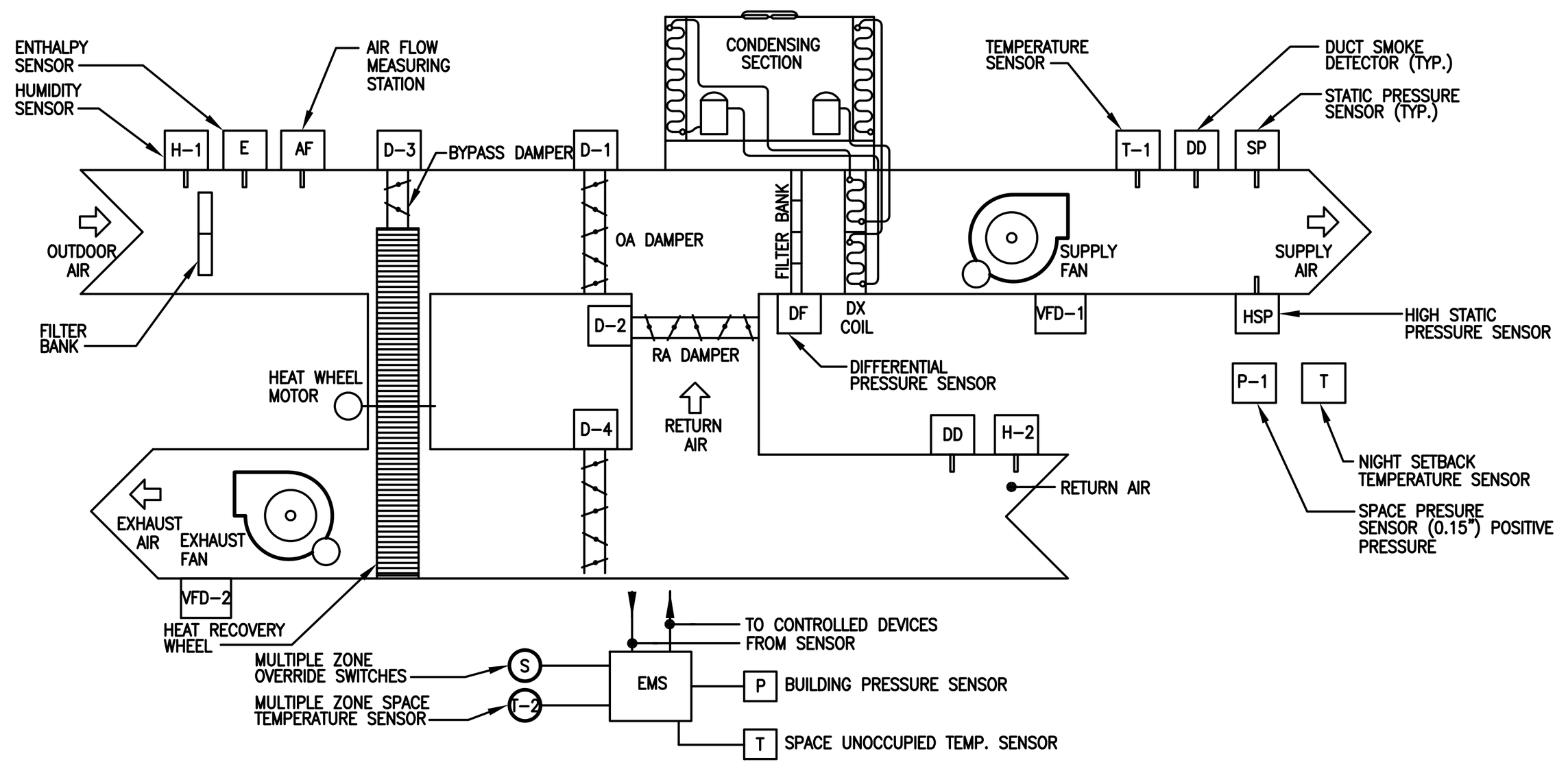
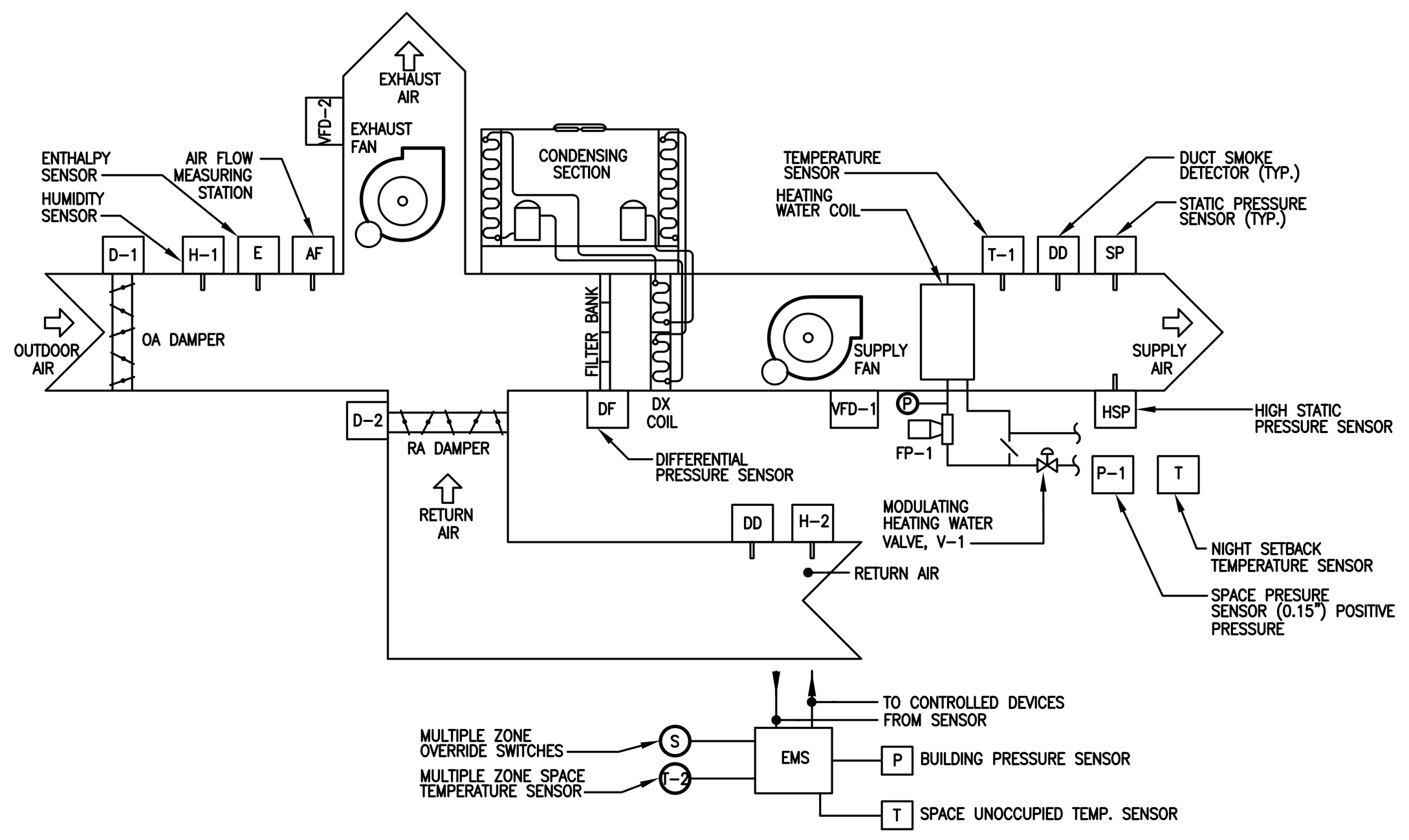
1. THE BUILDING AUTOMATION SYSTEM (BAS) SHALL INDEX THE VARIOUS HVAC UNITS TO WARM-UP, COOL DOWN, OCCUPIED AND UNOCCUPIED MODES USING THE TIME SCHEDULED START-STOP PROGRAMS.
2. BAS SHALL HAVE THE FOLLOWING FEATURES.
   A. SEPARATE PROGRAMMING FOR EACH ZONE FOR WEEKDAYS, WEEKENDS AND HOLIDAY.
   B. SEPARATE SET-POINTS FOR HEATING AND COOLING, WITH A DEAD BAND BETWEEN
   C. OPTIMUM START
   D. OPTIMUM STOP
   E. MORNING WARM-UP AND COOL DOWN CYCLE
   F. UNOCCUPIED OVERRIDE BUTTON FOR EACH ZONE TO RETURN THE ZONE TO THE OCCUPIED MODE FOR TWO HOURS.
3. BAS SHALL DISPLAY STATUS AND ALARM CONDITIONS FOR SYSTEMS AS INDICATED IN THE CONTROL SEQUENCE FOR EACH SYSTEM

BUILDING AUTOMATION SYSTEM



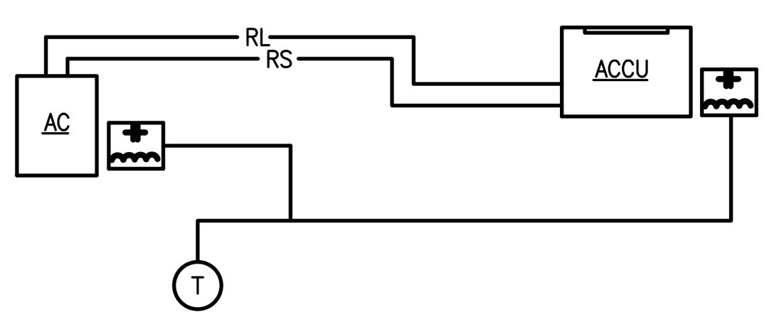
1. THE BUILDING AUTOMATION SYSTEM (BAS) SHALL DETERMINE IF THE SYSTEM IS IN THE OCCUPIED, UNOCCUPIED, WARM-UP AND COOL DOWN MODES.
2. OCCUPIED MODE
   A. VENTILATION
      1) THE SUPPLY AIR FAN SHALL RUN CONTINUOUSLY AND THE OUTDOOR AIR (OA) DAMPER, D-1, SHALL OPEN TO MAINTAIN MINIMUM OUTSIDE AIR (UNLESS IN ECONOMIZER CYCLE) AND THE RETURN AIR DAMPER (D-2) SHALL MODULATE PROPORTIONATELY TO MAINTAIN TOTAL DESIGN AIR FLOW RATE.
      2) AT ALL SUPPLY AIR FLOW RATES, D-1 AND D-2 SHALL MODULATE TO MAINTAIN THE REQUIRED OUTDOOR AIR FLOW RATE, AS SENSED BY AIR FLOW MEASURING STATION, AF.
   B. SUPPLY FAN SPEED
      1) VARIABLE FREQUENCY DRIVE, VFD-1, SHALL MODULATE THE SUPPLY FAN SPEED TO MAINTAIN STATIC PRESSURE, AS SENSED BY STATIC PRESSURE SENSOR, SP, MOUNTED IN THE ROOFTOP UNIT. STATIC PRESSURE SET-POINT SHALL BE SET BY THE BAS SO THE VARIABLE AIR VOLUME (VAV) BOX DAMPER WITH THE GREATEST COOLING DEMAND WILL BE 90 PERCENT OPEN.
   C. DISCHARGE TEMPERATURE SET-POINT
      1) THE DISCHARGE TEMPERATURE SET-POINT SHALL BE ADJUSTED BY THE BAS TO MAINTAIN 55 DEGREES F (ADJUSTABLE). THE SET-POINT SHALL BE MET BY EITHER THE ECONOMIZER CYCLE, THE ERV OR MECHANICAL COOLING.
   D. DEHUMIDIFICATION
      1) ON A RISE IN SPACE RELATIVE HUMIDITY ABOVE SET-POINT (55 PERCENT, ADJUSTABLE), AS SENSED BY THE RELATIVE HUMIDITY SENSOR, THE COOLING COIL SHALL BE ENERGIZED AND MODULATE TO PROVIDE DEHUMIDIFICATION. HUMIDITY CONTROL SHALL BE AVAILABLE WHEN HEATING AND COOLING DEMANDS ARE SATISFIED.
   E. COOLING
      1) WHEN THE UNIT DISCHARGE TEMPERATURE IS ABOVE SET-POINT, AS SENSED BY T-1, THE COOLING CYCLE SHALL BE ENERGIZED. UNIT SHALL PROVIDE FULL MODULATION (0% TO 100%) BY STAGING THE COMPRESSORS AND UTILIZING AT LEAST ONE FULLY MODULATING COMPRESSOR WHEN OUTDOOR CONDITIONS ALLOW.
   F. ENERGY RECOVERY WHEEL
      1) RAC WHEN ECONOMIZER DE-ENERGIZED.
         1. D-1 AND D-2 SHALL BE IN THE MINIMUM OUTDOOR AIR MODE.
         2. ENERGY RECOVERY WHEEL OUTDOOR AIR BYPASS DAMPER, D-3, SHALL BE CLOSED.
         3. ENERGY RECOVERY WHEEL EXHAUST BYPASS DAMPER, D-4, SHALL BE CLOSED.
         4. ENERGY RECOVERY WHEEL SHALL ROTATE. IF THE RECOVERED ENERGY RESULTS IN A ROOFTOP UNIT DISCHARGE TEMPERATURE GREATER THAN THE VAV UNIT DISCHARGE TEMPERATURE SET-POINT, THE WHEEL SPEED SHALL BE CONTROLLED TO MAINTAIN THE UNIT DISCHARGE TEMPERATURE SET-POINT.
         5. THE EXHAUST FAN SHALL OPERATE AND BE CONTROLLED BY THE VARIABLE SPEED DRIVE, VFD-2, AT A SPEED TO MATCH THE OUTDOOR AIR RATE.
      2) RAC IN THE ECONOMIZER MODE
         1. D-3 SHALL OPEN
         2. D-4 SHALL OPEN
         3. ENERGY RECOVERY WHEEL SHALL STOP
         4. THE EXHAUST FAN SHALL OPERATE AND BE CONTROLLED BY VFD-2 AT A SPEED TO MATCH THE ECONOMIZER OUTDOOR AIR RATE SUBJECT TO BUILDING PRESSURIZATION. EXHAUST FAN SHALL OVERRIDE THIS FIXED DIFFERENTIAL TO SATISFY THE BUILDING PRESSURIZATION SET-POINT.
   G. ECONOMIZER
      1) WHEN THE OUTDOOR ENTHALPY IS LOWER THAN THE RETURN AIR ENTHALPY AND COOLING IS REQUIRED, OUTDOOR AIR DAMPER SHALL MODULATE OPEN AS REQUIRED TO MAINTAIN MIXED AIR TEMPERATURE OF 55 DEG. F. (ADJUSTABLE). THE R.A. DAMPER SHALL MODULATE CLOSED PROPORTIONATELY. THE EXHAUST FAN SHALL BE ENERGIZED DURING ECONOMIZER OPERATIONS TO SATISFY SPACE PRESSURE SENSOR. WHEN THE OA ENTHALPY IS HIGHER THAN THE R.A. ENTHALPY, ECONOMIZER SHALL NOT OPERATE.
3. UNOCCUPIED MODE
   A. VENTILATION AND ENERGY RECOVERY WHEEL
      1) THE SUPPLY FAN SHALL BE DE-ENERGIZED, THE EXHAUST FAN SHALL BE DE-ENERGIZED, D-1 SHALL BE CLOSED, D-2 SHALL OPEN, D-3 SHALL CLOSE AND D-4 SHALL CLOSE. THE ENERGY RECOVERY WHEEL SHALL STOP.
   B. COOLING
      1) WHEN THE SPACE TEMPERATURE RISES ABOVE THE NIGHT SET BACK SPACE TEMPERATURE SENSOR UNOCCUPIED SET-POINT, THE SUPPLY FAN AND THE COOLING CYCLE SHALL BE ENERGIZED TO MAINTAIN THE DISCHARGE TEMPERATURE SET-POINT (55° F). DAMPER D-2 SHALL OPEN. D-1, D-3 AND D-4 SHALL CLOSE. WHEN OUTDOOR AIR CONDITIONS ALLOW, ENTHALPY CONTROLLED ECONOMIZER SHALL OPERATE THE SAME AS WHEN THE UNIT IS IN THE OCCUPIED MODE.
   C. OVERRIDE SWITCH
      1) PRESSING ANY OF THE VAV ZONE OVERRIDE SWITCHES WILL RETURN THE VAV ZONE PRESSED AND THE ROOFTOP UNIT TO THE OCCUPIED MODE.
4. MORNING WARM-UP AND COOL DOWN MODES
   A. SUPPLY PANS SHALL ENERGIZE AND THE EXHAUST FAN SHALL BE OFF. DAMPERS D-1, D-3 AND D-4 SHALL CLOSE. D-2 SHALL OPEN. HEAT WHEEL SHALL BE OFF.
   B. COOL DOWN CYCLE SHALL BE SIMILAR TO WARM-UP CYCLE.
   C. DURATION: THE DURATION OF THE CYCLE SHALL BE DETERMINED BY THE BAS AND SHALL BE DYNAMICALLY UPDATED TO END 15 MINUTES PRIOR TO OCCUPANCY TIME. SUPPLY FAN SHALL MODULATE BY VARIABLE FREQUENCY DRIVE (VFD-1) TO MAINTAIN STATIC PRESSURE SENSOR SET-POINT.
5. SAFETY CONTROLS
   A. SMOKE DETECTORS
      1) UPON SENSING PRODUCTS OF COMBUSTION BY DUCT SMOKE DETECTORS, DD, LOCATED IN THE SUPPLY AND RETURN AIR DUCTS, THE SUPPLY FAN AND EXHAUST FAN SHALL STOP AND ALL DAMPERS SHALL CLOSE. AN ALARM SHALL REGISTER ON THE BAS.
      2) IN THE EVENT OF A SUPPLY OR EXHAUST FAN FAILURE THE UNIT SHALL BE DE-ENERGIZED. AN ALARM SHALL REGISTER ON THE BAS.
   B. DUCT PRESSURE
      1) IF THE DUCT PRESSURE EXCEEDS THE HIGH STATIC PRESSURE SETTING, THE SUPPLY AND EXHAUST FAN SHALL STOP AND AN ALARM SHALL REGISTER ON THE BAS.
6. THE FOLLOWING POINTS SHALL BE MONITORED BY THE BAS.
   A. DIRTY FILTER SENSORS FOR THE ENERGY RECOVERY WHEEL FILTERS. AN ALARM SHALL REGISTER ON THE BAS.
   B. DIRTY FILTER SENSORS FOR THE MAIN FILTERS. AN ALARM SHALL REGISTER ON THE BAS.
   C. SUPPLY FAN STATUS. AN ALARM SHALL REGISTER ON THE BAS.
   D. SUPPLY FAN SPEED.
   E. EXHAUST FAN STATUS. AN ALARM SHALL REGISTER ON THE BAS.
   F. EXHAUST FAN SPEED.
   G. OUTDOOR AIR QUANTITY AT THE OUTDOOR AIRFLOW MONITOR.
   H. STATIC PRESSURE SET-POINT.
   I. SPACE PRESSURE.
   J. OUTDOOR AIR TEMPERATURE.
   K. OUTDOOR AIR RELATIVE HUMIDITY.
   L. DISCHARGE TEMPERATURE.
   M. SPACE NIGHT-SET BACK TEMPERATURE SENSOR.
   N. RETURN AIR HUMIDITY.
   O. POSITION OF OUTDOOR, RETURN AIR AND RELIEF DAMPERS.
   P. ENTHALPY (O.A. AND R.A.)
7. GENERAL
   A. SEE PLANS FOR LOCATION OF SPACE THERMOSTATS, PANELS, DAMPERS, VALVES AND EQUIPMENT. WHEN SUCH DEVICES ARE NOT INDICATED, HOWEVER REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED FOR SYSTEM OPERATION.
   B. CONTRACTOR SHALL COORDINATE FACTORY UNIT CONTROL WITH FIELD CONTROLS TO PROVIDE A COMPLETE AND OPERABLE SYSTEM AS REQUIRED BY THE SEQUENCES OF OPERATION.
   C. DIVISION 16 SHALL PROVIDE ALL DETECTION DEVICES (HEAT/SMOKE) AS REQUIRED BY NFPA STANDARD 96 AND 90 AND IBC. THE INSTALLATION OF ALL DETECTION DEVICES AND ALL CONTROL TUBING AND CONTROL/POWER WIRING FOR DETECTION DEVICES AND SMOKE DAMPERS SHALL BE PROVIDED UNDER THIS SECTION. DETECTION DEVICES SHALL PROVIDE AUTOMATIC SHUTDOWN OF HVAC UNITS IN ACCORDANCE WITH NFPA 90A

SEQUENCE OF CONTROL V.A.V. ROOFTOP UNITS RAC-1 & 3



1. THE BUILDING AUTOMATION SYSTEM (BAS) SHALL DETERMINE IF THE SYSTEM IS IN THE OCCUPIED, UNOCCUPIED, WARM-UP AND COOL DOWN MODES.
2. OCCUPIED MODE
   A. VENTILATION
      1) THE SUPPLY AIR FAN SHALL RUN CONTINUOUSLY AND THE OUTDOOR AIR (OA) DAMPER, D-1, SHALL OPEN TO MAINTAIN MINIMUM OUTSIDE AIR (UNLESS IN ECONOMIZER CYCLE) AND THE RETURN AIR DAMPER (D-2) SHALL MODULATE PROPORTIONATELY TO MAINTAIN TOTAL DESIGN AIR FLOW RATE.
      2) AT ALL SUPPLY AIR FLOW RATES, D-1 AND D-2 SHALL MODULATE TO MAINTAIN THE REQUIRED OUTDOOR AIR FLOW RATE, AS SENSED BY AIR FLOW MEASURING STATION, AF.
   B. SUPPLY FAN SPEED
      1) VARIABLE FREQUENCY DRIVE, VFD-1, SHALL MODULATE THE SUPPLY FAN SPEED TO MAINTAIN STATIC PRESSURE, AS SENSED BY STATIC PRESSURE SENSOR, SP, MOUNTED IN THE ROOFTOP UNIT. STATIC PRESSURE SET-POINT SHALL BE SET BY THE BAS SO THE VARIABLE AIR VOLUME (VAV) BOX DAMPER WITH THE GREATEST COOLING DEMAND WILL BE 90 PERCENT OPEN.
   C. DISCHARGE TEMPERATURE SET-POINT
      1) THE DISCHARGE TEMPERATURE SET-POINT SHALL BE ADJUSTED BY THE BAS TO MAINTAIN 55 DEGREES F (ADJUSTABLE). THE SET-POINT SHALL BE MET BY EITHER THE ECONOMIZER CYCLE, MECHANICAL COOLING OR HEATING.
   D. DEHUMIDIFICATION
      1) ON A RISE IN SPACE RELATIVE HUMIDITY ABOVE SET-POINT (55 PERCENT, ADJUSTABLE), AS SENSED BY THE RELATIVE HUMIDITY SENSOR, THE COOLING COIL SHALL BE ENERGIZED AND MODULATE TO PROVIDE DEHUMIDIFICATION. HUMIDITY CONTROL SHALL BE AVAILABLE WHEN HEATING AND COOLING DEMANDS ARE SATISFIED.
   E. HEATING
      1) WHEN THE ROOFTOP UNIT DISCHARGE TEMPERATURE IS BELOW SET-POINT, AS SENSED BY TEMPERATURE SENSOR, T1, THE HEATING WATER VALVE V-1 SHALL MODULATE OPEN TO MAINTAIN DISCHARGE TEMPERATURE SET-POINT.
   F. COOLING
      1) WHEN THE UNIT DISCHARGE TEMPERATURE IS ABOVE SET-POINT, AS SENSED BY T-1, THE COOLING CYCLE SHALL BE ENERGIZED. UNIT SHALL PROVIDE FULL MODULATION (0% TO 100%) BY STAGING THE COMPRESSORS AND UTILIZING AT LEAST ONE FULLY MODULATING COMPRESSOR WHEN OUTDOOR CONDITIONS ALLOW.
   G. ECONOMIZER
      1) WHEN THE OUTDOOR ENTHALPY IS LOWER THAN THE RETURN AIR ENTHALPY AND COOLING IS REQUIRED, OUTDOOR AIR DAMPER SHALL MODULATE OPEN AS REQUIRED TO MAINTAIN MIXED AIR TEMPERATURE OF 55 DEG. F. (ADJUSTABLE). THE R.A. DAMPER SHALL MODULATE CLOSED PROPORTIONATELY. THE EXHAUST FAN SHALL BE ENERGIZED DURING ECONOMIZER OPERATIONS TO SATISFY SPACE PRESSURE SENSOR. WHEN THE OA ENTHALPY IS HIGHER THAN THE R.A. ENTHALPY, ECONOMIZER SHALL NOT OPERATE.
3. UNOCCUPIED MODE
   A. VENTILATION
      1) THE SUPPLY FAN SHALL BE DE-ENERGIZED, THE EXHAUST FAN SHALL BE DE-ENERGIZED, D-1 SHALL BE CLOSED, D-2 SHALL OPEN.
   B. HEATING
      1) THE SUPPLY FAN SHALL CYCLE ITS SUPPLY AIR FAN AND ENERGIZE HEATING WATER VALVE V-1 TO MAINTAIN 60 DEG. F. (ADJUSTABLE) AT THE NIGHT SET BACK SPACE TEMPERATURE SENSOR (60° F). DAMPER D-2 SHALL OPEN. D-1 SHALL CLOSE.
   C. COOLING
      1) WHEN THE SPACE TEMPERATURE RISES ABOVE THE NIGHT SET BACK SPACE TEMPERATURE SENSOR UNOCCUPIED SET-POINT, THE SUPPLY FAN AND THE COOLING CYCLE SHALL BE ENERGIZED TO MAINTAIN THE DISCHARGE TEMPERATURE SET-POINT (55° F). DAMPER D-2 SHALL OPEN. D-1 SHALL CLOSE. WHEN OUTDOOR AIR CONDITIONS ALLOW, ENTHALPY CONTROLLED ECONOMIZER SHALL OPERATE THE SAME AS WHEN THE UNIT IS IN THE OCCUPIED MODE.
   D. OVERRIDE SWITCH
      1) PRESSING ANY OF THE VAV ZONE OVERRIDE SWITCHES WILL RETURN THE VAV ZONE PRESSED AND THE ROOFTOP UNIT TO THE OCCUPIED MODE.
   E. HEATING WATER COIL FREEZE PROTECTION PUMP CONTROL
      1) WHEN OUTSIDE TEMPERATURE AS DETERMINED BY T1 DROPS BELOW 35°F, AND HWP-1 OR HWP-2 ARE NOT ENERGIZED, 2-WAY VALVE V-1 SHALL CLOSE AND FP-1 SHALL OPERATE TO CIRCULATE WATER THROUGH THE HEATING COIL. FLOW SHALL BE VERIFIED BY PRESSURE SENSOR, P; IF NO FLOW IS DETECTED, THE BAS SHALL REPORT A TROUBLE CONDITION.
4. MORNING WARM-UP AND COOL DOWN MODES
   A. SUPPLY FAN SHALL ENERGIZE AND THE EXHAUST FAN SHALL BE OFF. DAMPER D-1 SHALL CLOSE. D-2 SHALL OPEN.
   B. WARM-UP CYCLE: THE HEATING WATER VALVE SHALL MODULATE OPEN TO SATISFY THE NIGHT SET BACK SENSOR OCCUPIED SET-POINT (70° F).
   C. COOL DOWN CYCLE SHALL BE SIMILAR TO WARM-UP CYCLE.
   D. DURATION: THE DURATION OF THE CYCLE SHALL BE DETERMINED BY THE BAS AND SHALL BE DYNAMICALLY UPDATED TO END 15 MINUTES PRIOR TO OCCUPANCY TIME. SUPPLY FAN SHALL MODULATE BY VARIABLE FREQUENCY DRIVE (VFD-1) TO MAINTAIN STATIC PRESSURE SENSOR SET-POINT.
5. SAFETY CONTROLS
   A. SMOKE DETECTORS
      1) UPON SENSING PRODUCTS OF COMBUSTION BY DUCT SMOKE DETECTORS, DD, LOCATED IN THE SUPPLY AND RETURN AIR DUCTS, THE SUPPLY FAN AND EXHAUST FAN SHALL STOP AND ALL DAMPERS SHALL CLOSE. AN ALARM SHALL REGISTER ON THE BAS.
      2) IN THE EVENT OF A SUPPLY OR EXHAUST FAN FAILURE THE UNIT SHALL BE DE-ENERGIZED. AN ALARM SHALL REGISTER ON THE BAS.
   B. DUCT PRESSURE
      1) IF THE DUCT PRESSURE EXCEEDS THE HIGH STATIC PRESSURE SETTING, THE SUPPLY AND EXHAUST FAN SHALL STOP AND AN ALARM SHALL REGISTER ON THE BAS.
6. THE FOLLOWING POINTS SHALL BE MONITORED BY THE BAS.
   A. DIRTY FILTER SENSORS FOR THE MAIN FILTERS. AN ALARM SHALL REGISTER ON THE BAS.
   B. SUPPLY FAN STATUS. AN ALARM SHALL REGISTER ON THE BAS.
   C. SUPPLY FAN SPEED.
   D. EXHAUST FAN STATUS. AN ALARM SHALL REGISTER ON THE BAS.
   E. EXHAUST FAN SPEED.
   F. OUTDOOR AIR QUANTITY AT THE OUTDOOR AIRFLOW MONITOR.
   G. STATIC PRESSURE SET-POINT.
   H. SPACE PRESSURE.
   I. OUTDOOR AIR TEMPERATURE.
   J. OUTDOOR AIR RELATIVE HUMIDITY.
   K. DISCHARGE TEMPERATURE (HEATING/COOLING).
   L. SPACE NIGHT-SET BACK TEMPERATURE SENSOR.
   M. RETURN AIR HUMIDITY.
   N. POSITION OF OUTDOOR, RETURN AIR AND RELIEF DAMPERS.
   O. ENTHALPY (O.A. AND R.A.)
7. GENERAL
   A. SEE PLANS FOR LOCATION OF SPACE THERMOSTATS, PANELS, DAMPERS, VALVES AND EQUIPMENT. WHEN SUCH DEVICES ARE NOT INDICATED, HOWEVER REQUIRED BY THE SEQUENCES, THEY SHALL BE PROVIDED FOR SYSTEM OPERATION.
   B. CONTRACTOR SHALL COORDINATE FACTORY UNIT CONTROL WITH FIELD CONTROLS TO PROVIDE A COMPLETE AND OPERABLE SYSTEM AS REQUIRED BY THE SEQUENCES OF OPERATION.
   C. DIVISION 16 SHALL PROVIDE ALL DETECTION DEVICES (HEAT/SMOKE) AS REQUIRED BY NFPA STANDARD 96 AND 90 AND IBC. THE INSTALLATION OF ALL DETECTION DEVICES AND ALL CONTROL TUBING AND CONTROL/POWER WIRING FOR DETECTION DEVICES AND SMOKE DAMPERS SHALL BE PROVIDED UNDER THIS SECTION. DETECTION DEVICES SHALL PROVIDE AUTOMATIC SHUTDOWN OF HVAC UNITS IN ACCORDANCE WITH NFPA 90A

SEQUENCE OF CONTROL V.A.V. ROOFTOP UNITS RAC-2, 4, 5 & 6



1. GENERAL

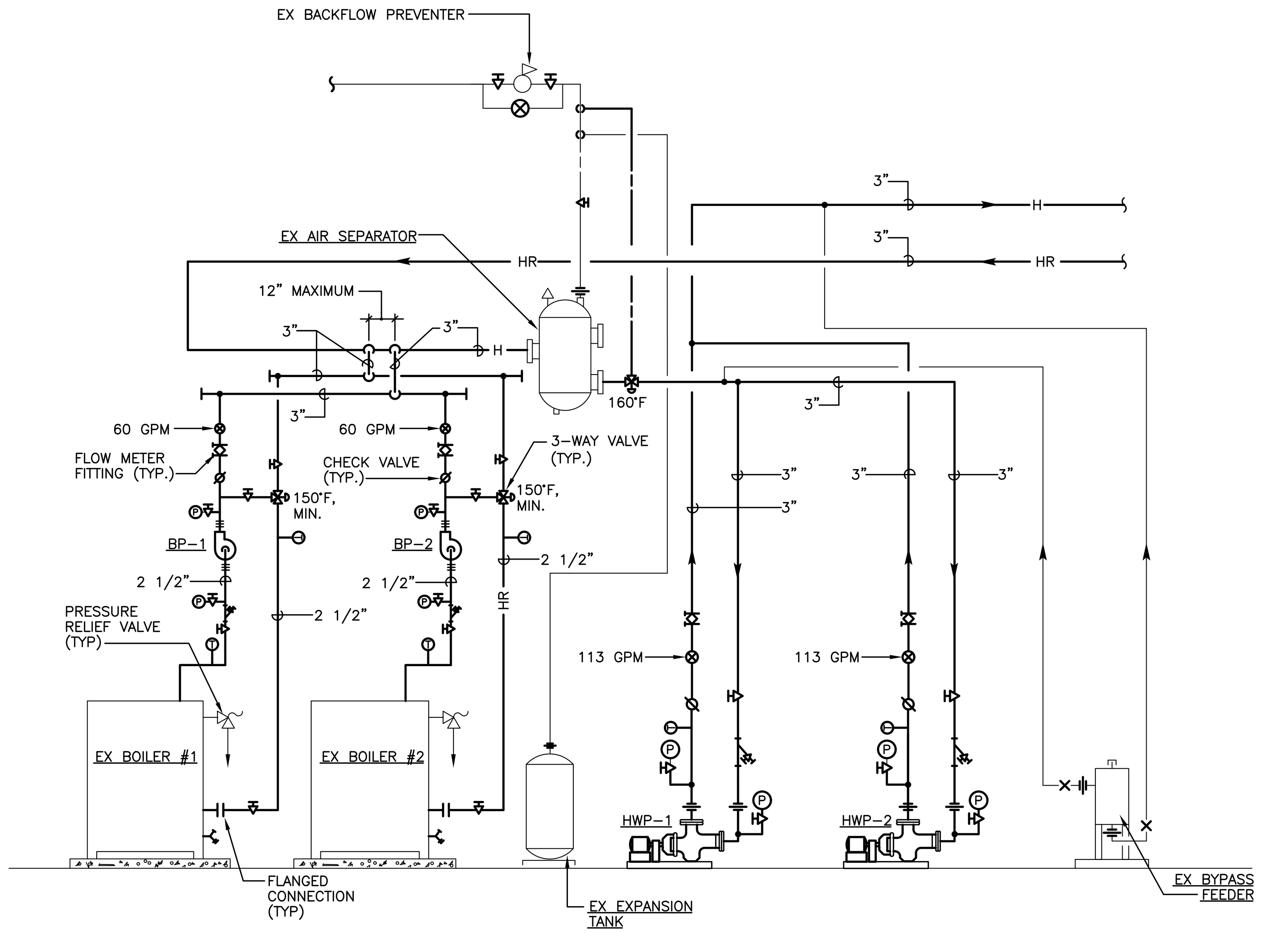
   SPLIT SYSTEM AIR CONDITIONER UNIT SHALL BE ENERGIZED FROM THE CIRCUIT BREAKER IN THE ELECTRIC PANEL.

   UNIT SHALL MAINTAIN SPACE TEMPERATURE VIA PROGRAMMABLE WALL THERMOSTAT, T,

2. COOLING

   UPON A RISE IN SPACE TEMPERATURE ABOVE THE COOLING SETPOINT (72°F, ADJ.) AS SENSED BY SPACE THERMOSTAT, THE COOLING CYCLE SHALL BE ENERGIZED VIA THE AIR CONDITIONING UNIT THROUGH ITS INTERNAL CONTROLS TO MAINTAIN SPACE TEMPERATURE. ONCE SPACE TEMPERATRE IS SATISFIED, THE UNITS SHALL DE-ENERGIZE.

SPLIT SYSTEM AIR CONDITIONING UNIT CONTROL (AC-1 & 2)



BOILER PIPING DIAGRAM

1. THE EXISTING BOILERS SHALL BE ENABLED/DISABLED VIA THE BUILDING AUTOMATION SYSTEM. ON A FALL IN OUTSIDE AIR TEMPERATURE BELOW SETPOINT (65°F; ADJUSTABLE) THE BOILERS SHALL BE ENABLED. PRIOR TO BEING ENERGIZED THE FOLLOWING SHALL OCCUR:
   A. THE LEAD BOILER'S PRIMARY HEATING WATER PUMP (BP-1 OR BP-2) SHALL BE ENERGIZED AND FLOW PROVEN.
   B. THE SECONDARY HEATING WATER PUMP (HWP-1 OR HWP-2) SHALL BE ENERGIZED AND FLOW PROVEN.
   C. IF FLOW FAILURE SENSED BAS SHALL REPORT AN ALARM.

2. ON A FALL IN THE SECONDARY HEATING WATER TEMPERATURE BELOW SETPOINT (160°F; ADJUSTABLE), THE LAG BOILER SHALL BE ENABLED VIA THE BAS, PRIOR TO BEING ENERGIZED, THE LAG BOILER'S PRIMARY HEATING WATER PUMP SHALL BE ENERGIZED AND FLOW PROVEN.

3. ATC CONTRACTOR SHALL PROVIDE A 3-WAY CONTROL VALVE FOR EACH BOILER. ON A DROP IN HOT WATER RETURN TEMPERATURE BELOW 150°F (ADJUSTABLE) THE 3-WAY CONTROL VALVE SHALL MODULATE OPEN TO THE BOILER'S INLET TO MAINTAIN THE MINIMUM RETURN WATER TEMPERATURE AT SETPOINT TO PREVENT THERMAL SHOCK. IF HOT WATER TEMPERATURE FALLS BELOW 125°F (ADJUSTABLE) THEN BOILER SHALL BE DE-ENERGIZED AND AN ALARM REPORTED BY THE BAS.

4. ATC CONTRACTOR SHALL PROVIDE A 3-WAY CONTROL VALVE IN THE HEATING WATER SUPPLY, THIS VALVE SHALL MODULATE OPEN TO A CW SUPPLY IN ORDER TO MODULATE THE HEATING WATER SUPPLY TO A TEMPERATURE OF 160°F (ADJUSTABLE).

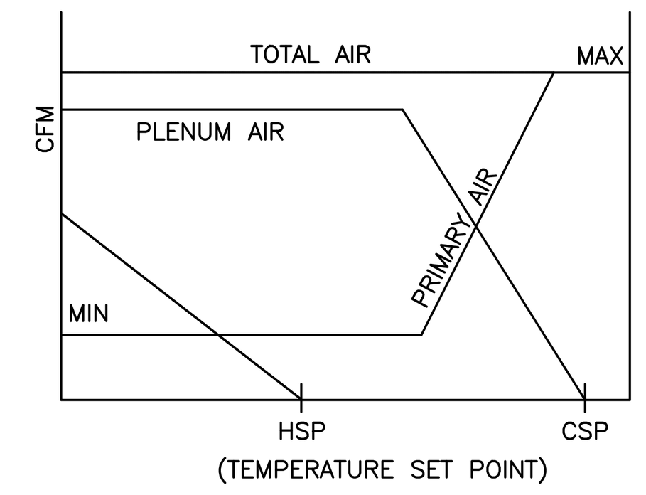
5. ATC CONTRACTOR SHALL PROVIDE READOUT OF THE FOLLOWING AT THE BAS OPERATOR'S TERMINAL:
   A. OPERATION STATUS OF EACH BOILER.
   B. PRIMARY SUPPLY AND RETURN WATER TEMPERATURE OF EACH BOILER.
   C. SECONDARY SUPPLY AND RETURN WATER TEMPERATURE.
   D. HEATING WATER PUMP STATUS (PRIMARY AND SECONDARY).
   E. COMBUSTION AIR STATUS.
   F. HIGH/LOW TEMPERATURE ALARM FOR PRIMARY AND SECONDARY HEATING SYSTEMS.
   G. BOILERS AND PUMPS RUN TIME TOTALS.

EXISTING HOT WATER BOILERS AND PRIMARY HOT WATER PUMPS (BP-1 & BP-2)

1. HOT WATER PUMP (HWP-1 OR HWP-2) SHALL BE STARTED AND STOPPED FROM THE BAS DEPENDENT OF OUTSIDE AIR TEMPERATURE. ONE PUMP SHALL BE ENERGIZED CONTINUOUSLY WHEN THE OUTSIDE AIR TEMPERATURE DROPS BELOW 65°F (ADJUSTABLE).

2. ONE OF THE SECONDARY HEATING WATER PUMPS IS A STANDBY PUMP AND SHALL BE ENERGIZED IF THE OPERATING PUMP FAILS, UPON SENSED FAILURE AN ALARM SHALL BE REPORTED BY THE BAS. ALTERNATE THE PUMPS' OPERATION BI-WEEKLY.

SECONDARY HOT WATER PUMPS (HWP-1 & HWP-2)



COOLING OCCUPIED:
UNIT DELIVERS MAXIMUM CONSTANT AIR FLOW WITH PRIMARY AIR VALVE SET AT MAXIMUM CFM TO SATISFY COOLING SETPOINT (CSP). WHEN CSP IS SATISFIED, PRIMARY VALVE MODULATES TO MINIMUM POSTION.

HEATING OCCUPIED:
UPON DROP IN SPACE TEMPERATURE BELOW HSP (ADJUSTABLE), PRIMARY AIR VALVE REACHES MINIMUM AND PLENUM AIR MIX REACHES MAX FAN CFM TO SPACE. AS TEMPERATURE CONTINUES TO DROP HOT WATER HEATING VALVE OPENS TO SATISFY HSP.

UNOCCUPIED:

EMS SHALL ENERGIZE UNIT FAN AND OPEN HEATING VALVE WHEN SPACE TEMPERATURE DROPS BELOW NIGHT SETPOINT OF 55°F (ADJUSTABLE).

UNITS PROVIDED WITH OCCUPANCY SENSOR

UNIT SHALL NORMALLY BE IN UNOCCUPIED MODE. UPON OCCUPANCY SENSOR BEING ENERGIZED, UNIT SHALL ENERGIZE AND OPERATE IN EITHER COOLING OR HEATING OCCUPIED MODE AS DIRECTED BY THE BAS.

MORNING WARM UP:

VAV UNIT FAN SHALL BE ENERGIZED, HEATING VALVE SHALL BE OPEN, AND PRIMARY AIR VALVE SHALL BE AT CLOSED SETTING WHEN SYSTEM IS IN MORNING WARM UP.

VAV SERIES FAN POWERED REHEAT CONTROL

GEN. MECH./PLUMB. DEMO NOTES (APPLIES TO ALL MECH. DEMO WORK BEING PERFORMED)

1. NOTIFY THE OWNER, IN WRITING, AT LEAST FOURTEEN (14) DAYS IN ADVANCE OF ALL REQUIRED SHUTDOWNS OF WATER, SEWER, FIRE PROTECTION, GAS, ELECTRICAL SERVICE, OR OTHER UTILITIES. UPON WRITTEN RECEIPT OF APPROVAL FROM OWNER, SHUTDOWNS SHALL BE PERFORMED BETWEEN THE HOURS OF SIX (6) P.M. AND SIX (6) A.M. OR AS DIRECTED OTHERWISE BY THE OWNER AT NO ADDITIONAL CONTRACT COST. AT THE END OF EACH WORK DAY SHUT DOWN ALL SERVICE SHALL BE RESTORED SO THAT NORMAL USE OF UTILITIES CAN CONTINUE.
2. WHEN WORKING IN AND AROUND THE EXISTING BUILDING, CARE SHALL BE EXERCISED WITH REGARD TO PROTECTION OF EXISTING STRUCTURE AND MECHANICAL AND ELECTRICAL SERVICES WHICH SHALL REMAIN.
3. REPAIR, REPLACE, OR RESTORE TO THE SATISFACTION OF THE ARCHITECT ALL EXISTING WORK DAMAGED IN THE PERFORMANCE OF DEMOLITION AND/OR NEW WORK.
4. THE EXISTING CONDITIONS (DUCTWORK, PIPING, EQUIPMENT, AND MATERIALS) SHOWN ON THE CONTRACT DOCUMENTS, ARE BASED ON INFORMATION OBTAINED FROM THE AVAILABLE RECORD DRAWINGS AND FIELD SURVEYS AND SHALL BE CONSIDERED DIAGRAMMATIC. THE CONTRACTOR SHALL FIELD VERIFY EXACT SIZES AND LOCATIONS OF ALL DUCTWORK, PIPING, EQUIPMENT, AND MATERIALS PRIOR TO COMMENCING WITH NEW AND DEMOLITION WORK.
5. EXISTING MECHANICAL AND ELECTRICAL WORK INDICATED TO BE REMOVED: (PIPES, VALVES, DUCTS, ETC.) SHALL BE REMOVED TO A POINT BELOW THE FINISHED FLOORS OR BEHIND FINISHED WALLS AND CAPPED. TERMINATION POINTS SHALL BE FAR ENOUGH BEHIND FINISHED SURFACES TO ALLOW FOR THE INSTALLATION OF THE NORMAL THICKNESS OF FINISHED MATERIAL.
6. EXISTING PIPING NO LONGER REQUIRED TO REMAIN IN SERVICE SHALL BE DISCONNECTED AND REMOVED BACK TO EXISTING ASSOCIATED SERVICE MAIN UNLESS OTHERWISE INDICATED OR NOTED ON THE CONTRACT DRAWINGS. REMOVE EXISTING PIPE HANGERS, SUPPORTS, VALVES, ETC. EXISTING PIPING INDICATED OR REQUIRED TO REMAIN IN SERVICE OR IN PLACE SHALL BE CAPPED, PLUGGED OR OTHERWISE SEALED. NO EXISTING PIPING SHALL BE LEFT OPEN ENDED.
7. EXISTING DUCTWORK INDICATED TO BE DISCONNECTED AND REMOVED SHALL INCLUDE RELOCATED AIR DEVICES, HANGERS, SUPPORTS, ETC. DUCTWORK SHALL BE CAPPED WITH SIMILAR GAGE SHEET METAL. SECURE CAP(S) WITH SHEET METAL SCREWS AND SEAL WITH DUCT SEALER. NO EXISTING DUCTWORK SHALL BE LEFT UNCAPPED.
8. PATCH TO MATCH EXISTING ALL NEW AND EXISTING OPENINGS IN WALLS, CEILINGS AND FLOOR SURFACES DAMAGED OR CREATED BY DEMOLITION WORK. PATCHING SHALL MATCH EXISTING ADJACENT SURFACES AS TO THICKNESS, TEXTURES, MATERIALS AND COLOR. ALL PATCHING SHALL BE PERFORMED TO THE SATISFACTION OF THE ARCHITECT AND AT NO ADDITIONAL CONTRACT COST.
9. ALL DEMOLISHED EQUIPMENT SHALL BE OFFERED TO TRI-COUNTY COUNCIL PRIOR TO DISPOSAL. EQUIPMENT RETAINED BY THE OWNER SHALL BE STORED WHERE DIRECTED BY THE OWNER. ANY EQUIPMENT THE OWNER DOES NOT WISH TO RETAIN SHALL BE DISPOSED OF, OFF SITE, BY THE CONTRACTOR.

GENERAL PROJECT NOTES

1. UNLESS OTHERWISE INDICATED, PIPING SHALL BE SUPPORTED FROM THE STRUCTURE ABOVE. INTERMEDIATE STRUCTURAL SUPPORTS SHALL BE PROVIDED IN AN APPROVED MANNER AS REQUIRED TO MEET MINIMUM SUPPORT SPACING REQUIRED BY THE SPECIFICATIONS.
2. COORDINATE THE INSTALLATION OF LIGHTING FIXTURES WITH PIPING, DUCTWORK, AIR DEVICES, SPRINKLERS AND EQUIPMENT BEING INSTALLED IN THE FACILITY SUCH THAT PIPING, DUCTWORK, AIR DEVICES, AND EQUIPMENT DO NOT BLOCK OR IMPEDE LIGHTING.
3. PROVIDE HANGERS, ANCHORS, ETC... ON PIPING PER SUPPORT MANUFACTURER'S RECOMMENDATIONS.
4. INSTALL PIPING SO THAT VALVING IS ACCESSIBLE. PROVIDE ACCESS PANELS PER SPECIFICATIONS.
5. INSTALL DUCTWORK SO THAT VOLUME DAMPERS, HEATING COILS, ETC... CONTROLS ARE ACCESSIBLE. PROVIDE ACCESS PANELS PER SPECIFICATIONS.
6. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING CONSTRUCTION TYPES AND DETAILS. FIELD VERIFY EXISTING BEAMS AND STEEL JOIST SIZES AND LOCATIONS.
7. COORDINATE THE INSTALLATION OF SUPPLY AND RETURN AIR DEVICES, AND DUCTWORK WITH EXISTING: HEATING SYSTEM, DOMESTIC WATER, AND SANITARY. IF THE INSTALLATION DEVIATES FROM THE CONTRACT DRAWINGS, SERVICEABILITY & MAINTENANCE MUST BE MAINTAINED TO VALVING, EQUIPMENT, ETC...
8. INSTALL EQUIPMENT, IE: VAV'S, IN SUCH A MANNER AS TO PROVIDE ADEQUATE SPACE FOR MAINTENANCE AND EQUIPMENT ACCESS.
9. MOUNTING HEIGHT OF THERMOSTATS SHALL BE 48" A.F.F. AND/OR AS DIRECTED BY THE ARCHITECT.
10. REPLACE FILTERS SERVING HVAC EQUIPMENT PRIOR TO FINAL BALANCING OF AIR DISTRIBUTION SYSTEMS.
11. THE SPRINKLER SYSTEM MODIFICATIONS SHALL BE DESIGNED & COORDINATED WITH DUCTWORK, PIPING, LIGHTING, EQUIPMENT AND ARCHITECTURAL REFLECTED CEILING PLANS. NO CHANGE ORDERS SHALL BE ACCEPTED.
12. FIRE STOP ALL PIPING AND DUCT PENETRATIONS THRU FIRE WALLS, IN ADDITION PROVIDE FIRE/SMOKE DAMPERS IN ALL DUCTS THAT PASS THROUGH FIRE WALLS AND CEILINGS. REFER TO ARCHITECTURAL DWG'S FOR FIRE WALL LOCATIONS.
13. EXISTING: PIPING, VALVING, DUCTWORK & ELECTRIC CONDUITS, ETC... DO EXIST WITHIN THE CEILING SPACES OTHER THAN THAT WHICH IS SHOWN ON THE CONTRACT DRAWINGS.
14. COORDINATE NEW & DEMOLITION WORK WITH EXISTING WORK TO REMAIN SO AS NOT TO DAMAGE EXISTING WORK. ANY DAMAGE TO EXISTING WORK TO REMAIN SHALL BE REPLACED/REPAIRED AT NO COST TO THE OWNER.
15. PATCH EXISTING WALLS AND FLOORS TO MATCH EXISTING WHERE NEW MECHANICAL UTILITIES SUCH AS PIPING ATC WIRING AND TUBING, DUCTS, ETC. PENETRATES EXISTING WALLS AND FLOORS. CONTRACTOR SHALL ALSO PATCH WALLS AND FLOORS TO MATCH EXISTING WHERE EXISTING PIPING, WIRING, TUBING, DUCTS, ETC. ARE BEING REMOVED AND PENETRATES EXISTING WALLS.
16. SUPPLY AND RETURN AIR DUCT OPENINGS NOT BEING REUSED SHALL BE PATCHED AND REPAIRED AIR TIGHT IN ACCORDANCE WITH SMACNA STANDARDS.
17. FIELD CHECK PREMISES PRIOR TO SUBMITTING BID TO BECOME ACQUAINTED WITH EXISTING CONDITIONS AND TO DETERMINE BEST MANNER FOR INSTALLATION. DETAILS OF PROPOSED DEPARTURES DUE TO ACTUAL FIELD CONDITIONS OR OTHER CAUSES SHALL BE SUBMITTED TO THE ARCHITECT FOR APPROVAL PRIOR TO FINAL INSTALLATION. NO EXTRAS SHALLL BE PAID IN INSTANCES WHERE DISCREPANCIES ARISE AND THE INSTALLER HAS FAILED TO VERIFY JOB SITE CONDITIONS.
18. COORDINATE MOTORS AND OTHER ELECTRICAL EQUIPMENT FURNISHED UNDER DIV. 23 WITH DIV. 26.

FIRE PROTECTION NOTES:

1. EXISTING SPRINKLER HEAD LAYOUT SHALL BE MODIFIED TO ACCOMMODATE THE NEW TENANT LAYOUT.
2. SPRINKLER MODIFICATIONS SHALL BE DESIGNED & INSTALLED TO COMPLY WITH NFPA 13. SPRINKLER
3. SYSTEM LAYOUT DRAWINGS SHALL BE PREPARED BY THE FIRE PROTECTION CONTRACTOR. DRAWINGS SHALL BE REVIEWED BY ARCHITECT/ENGINEER & APPROVED BY THE REGULATING AGENCIES INCLUDING THE OWNER'S INSURANCE CARRIER, IF REQUIRED, PRIOR TO THE START OF WORK.
4. SPRINKLER HEADS SHALL BE LOCATED IN CENTERS OF CEILING TILES.

REVISIONS		
NO.	DATE	REMARKS
NO.	DATE	REMARKS

"Professional Certification. I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 16961, Expiration Date: 2012-06-14."

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TRI - COUNTY COUNCIL
REGIONAL CENTER
ROUTE 50, EAST
SALISBURY, MARYLAND

ATC, NOTES, BOILER PIPING DIAGRAM

PRINT DATE: 11/01/10
SPA PROJ. NO.: 2009.0264
DESIGN BY: MW/TC
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SCALE: AS NOTED
STAGE: ISSUED FOR BIDS
DWG. FILE: 09264M002

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SHEET: 2 OF 28
ISSUED DATE: 11/01/10

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