PART 1 GENERAL

1.1 SECTION INCLUDES
A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.

B. Sequence of Operation for:
   2. Fan Coil Units / Blower Coil Units.

1.2 RELATED SECTIONS
A. Section 019101 - Commissioning: Commissioning requirements that apply to all types of work.
B. Section 230923 - Direct-Digital Control System for HVAC.
C. Section 230913 - Instrumentation and Control Devices for HVAC.
D. Section 230994 - Sequence of Operation for Heat Pump Chiller System.
E. Section 262702 - Equipment Wiring: Electrical characteristics and wiring connections.

1.3 SUBMITTALS
A. See Section 01330 - Submittal Procedures.
B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.
   1. Preface: 1 or 2 paragraph overview narrative of the system describing its purpose, components and function.
   2. State each sequence in small segments and give each segment a unique number for referencing in Functional Test procedures; provide a complete description regardless of the completeness and clarity of the sequences specified in the contract documents.
   3. Include at least the following sequences:
      a. Start-up.
      b. Warm-up mode.
      c. Normal operating mode.
      d. Unoccupied mode.
      e. Shutdown.
      f. Capacity control sequences and equipment staging.
      g. Temperature and pressure control, such as setbacks, setups, resets, etc.
      h. Detailed sequences for all control strategies, such as economizer control, optimum start/stop, staging, optimization, demand limiting, etc.
      i. Sequences for all alarms and emergency shut downs.
      j. Seasonal operational differences and recommendations.
      k. Interactions and interlocks with other systems.
   4. Include initial and recommended values for all adjustable settings, setpoints and parameters that are typically set or adjusted by operating staff; and any other control settings or fixed values, delays, etc. that will be useful during testing and operating the equipment.
   5. For packaged controlled equipment, include manufacturer's furnished sequence of operation amplified as required to describe the relationship between the packaged controls and the control system, indicating which points are adjustable control points and which points are only monitored.
C. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.
   1. Include flow diagrams for each control system, graphically depicting control logic.
   2. Include the system and component layout of all equipment that the control system monitors, enables or controls, even if the equipment is primarily controlled by packaged or integral controls.
   3. Include draft copies of graphic displays indicating mechanical system components, control system components, and controlled function status and value.
   4. Include all monitoring, control and virtual points specified in elsewhere.
   5. Include a key to all abbreviations.

D. Points List: Submit list of all control points indicating at least the following for each point.
   1. Name of controlled system.
   2. Point abbreviation.
   3. Point description; such as dry bulb temperature, airflow, etc.
   4. Display unit.
   5. Control point or setpoint (Yes / No); i.e. a point that controls equipment and can have its setpoint changed.
   6. Monitoring point (Yes / No); i.e. a point that does not control or contribute to the control of equipment but is used for operation, maintenance, or performance verification.
   7. Intermediate point (Yes / No); i.e. a point whose value is used to make a calculation which then controls equipment, such as space temperatures that are averaged to a virtual point to control reset.
   8. Calculated point (Yes / No); i.e. a “virtual” point generated from calculations of other point values.

E. Project Record Documents: Record actual locations of components and setpoints of controls, including changes to sequences made after submission of shop drawings.

1.4 WARRANTY
   A. Provide a one year parts and labor warranty

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 GENERAL:
Setpoints:
All setpoints indicated in the control specification are to be adjustable. The setpoints shall be readily available to be modified in the mechanical system software system summary (either textual or graphic based) and under the same software level as hardware points. Some less used setpoints may be provided on a lower software level, if requested by the user Agency for clarity. The setpoints indicated herein are only specified as a calculated starting point (or initial system operation). It is expected that setpoint adjustments and control loop tuning shall be required to provide optimum system operation based on requirements of the building. The control contractor shall work with the balancing contractor and the user Agency to provide the final system setpoint adjustments and control loop tuning after the system is in operation and building is in use. Any questions regarding the intended operation of the HVAC equipment and control systems shall be referred to the HVAC design engineer through the appropriate construction communication process. The following setpoints should be used as initial setpoints unless otherwise specified in the individual control sequences:

Occupied Space Terminal Unit Heating: 68°F
Occupied Space Terminal Unit Cooling: 78°F
Mechanical or Unoccupied Space Ventilation: 82°F
Mechanical or Unoccupied Space Heating: 62º F

ANTI-CYCLING:

When HVAC equipment or a sequence is specified to be started and stopped by a temperature, humidity, pressure setpoint or any other controlled variable, there shall be an adjustable differential setpoint that shall be set to prevent short cycling of the systems and equipment due to minor changes in the controlled variable. Temperature differential setpoints shall be set at 2º F and non-temperature setpoints shall be set at 10% of the controlled range unless otherwise specified. Setpoints shall indicate at when the process should be turned on. Cooling differentials shall be set for below setpoint and heating differentials shall be set above setpoint and will be used to turn the process off. For example, an economizer sequence called to switch at 68º F, would turn on at 68º F and off at 70º F since it is a cooling function. A heating lockout setpoint of 50º F would turn on heating control at 50º F and off at 52º F. Non-temperature differentials shall be set above setpoint if the setpoint is indicating a minimum value or below setpoint if the setpoint is indicating a maximum value. Provide minimum runtime timers for loads that are cycled to prevent over-cycling. Timers shall be set as specified or as needed to prevent damage or excessive wear to the equipment. Unless otherwise specified in the individual control sequences, fans and pumps shall have a minimum runtime on timers of 15 minutes (adj.) and off timers of 5 minutes (adj.). Safeties shall override runtime timers.

DEADBANDS:

Provide deadbands for all DDC control loops to prevent constant hunting of output signals to controlled devices. Deadbands shall be set to provide adequate control around setpoint as follows unless otherwise specified in the individual control sequences:

Temperature Control: ±0.5º F

Humidity Control: ±1% RH

Airflow Control: ±2% of total flow

AHU Static Pressure Control: ±0.01 in. w.c.

ALARMS:

Provide all alarmed points with adjustable time delays to prevent nuisance tripping under normal operation and on equipment start-up. Provide alarms on all points as indicated on point charts. For existing campus automations systems, add/delete what is called on the point charts for after consultation with user Agency to provide consistent alarming throughout the automation system.

EQUIPMENT START/STOP FAILURE STATES:

All start/stop points for equipment shall utilize normally open contacts unless called out specifically in the individual control sequences.

LEAD/LAG SEQUENCING:

For sequences that call for lead/lag of equipment connected to building automation systems, the lead device shall be able to be chosen through a selectable day of the week and time of day through the building automation system. Coordinate with the user Agency for scheduling switchover and frequency. Unless otherwise directed, switchover shall occur at 10AM Tuesday and shall rotate the lead device on a weekly cycle rotating through all devices sequentially. For standalone lead/lag sequence controllers (non-DDC), the lead device shall be selected by a switch on the panel face.

VARIABLE FREQUENCY DRIVE (VFD) MOTOR RUN STATUS:

Use the VFD programmable relay dry contact output specified to be provided with the VFD to prove motor run status and detect belt loss or coupling break. If a bypass contactor is provided with the VFD, provide an adjustable current switch and wire it in parallel with the VFD output for proving motor status.

VFD BYPASS & SAFETY INTERLOCKS:
VFD’s equipped with bypass starters shall be interlocked so that the start/stop and safety circuits that are called out for VFD operation shall be functional when the VFD is indexed to the bypass starter mode. Unless otherwise specified in the sequence below, the switch from inverter to bypass starter modes shall be through a manual switch provided on the VFD/bypass starter package.

VFD MINIMUM SPEED:

The VFD start-up technician shall work with the Temperature Control Contractor determine the minimum speed required for the motor controlled by the VFD to provide cooling of the motor as installed to prevent heat related problems. This minimum speed shall be set in the VFD controller.

CURRENT SWITCH SETUP:

When current switches are used for proving fan or pump status, they shall be set up so that they will detect belt or coupling loss by the reduction in current draw on loss of coupled load. The current switch set up shall be redone by the 15973B contractor after the balancer is complete.

DAMPER INTERLOCKS FOR FANS WITH STARTERS:

For fan systems with magnetic starters and shutoff dampers specified with end switches, the damper interlock shall be hardwired in such a way that the damper shall open if the fan starter hand / off / auto switch is in the hand or in the auto position and being called to start. After the damper end switch has proven the damper open, a hardware interlock from the end switch to the starter holding coil for the fan shall cause the fan to start. For fan systems that are ducted in parallel, see specific sequence for fan system on interlock requirements.

DAMPER INTERLOCKS FOR FANS WITH VFD’S:

For fan systems with VFD’s and shutoff dampers specified with end switches, the damper end switches shall be hardware interlocked to the safety circuit(s) of the VFD to prevent the fan from starting until the damper is proven open. This interlock shall prevent the fan from running in either the VFD or bypass (if provided) mode. For fan systems that are ducted in parallel, see specific sequence for fan system on interlock requirements.

FAN INTERLOCKING:

Provide interlocks between supply and return or exhaust fan systems as scheduled on the plans or called out in individual control sequences. If DDC controlled, interlocks shall be done through DDC start/stop points unless otherwise specified in individual control sequences. If not DDC controlled, interlocks shall be accomplished via hardwire interlocks between fan starters or VFD’s.

THERMOSTATS AND SENSORS: AE CYA

All devices and equipment including terminal units, specified to be controlled in a control sequence by a thermostat or sensor, shall be provided with a thermostat or sensor, whether or not the device is indicated on the plans. Consult the HVAC design engineer for the thermostat or sensor location.

ORIGINAL EQUIPMENT MANUFACTURER (OEM) CONTROLLER DDC INTEGRATION:

Provide DDC programming to define all equipment integral input/output points, setpoints, data points, calculations, etc. that are available through the manufacturers communication interface. Consult with the Agency DDC operations personnel to determine if some of the points should be omitted (for clarity or lack of value). The following equipment shall be integrated into the DDC system:

- Chillers
- Chilled Water BTU Meters
- Variable Frequency Drives
- Laboratory Fume Hood Control
- Computer Room Air Conditioners
- Lighting Control (furnished by Div 16)
- Power Quality Meters (furnished by Div 16)
WEEKLY SCHEDULING

Provide scheduling of DDC terminal units in groups based on occupancy. Work with the user Agency to determine how many groups are required and which zones should be included. Individual terminal units shall be able to receive temporary schedules that will override the group schedules. Temporary override buttons at the zone sensor (where specified on point charts) shall override the scheduling to occupied. When groups that consist of more than 20% of terminal units are indexed to occupied, the associated air handling unit shall start if not already running.

3.2 CENTRAL REFRIGERATION SYSTEMS

A. Refer to Section 230994 - Sequence of Operations for Chiller Plant for additional information including but not limited to BAS energy monitoring, calculations and display information.

B. Chillers (By Others) are provided with communication interface modules which provide chiller specific information to the BAS.
   1. Chiller communication interface module shall be configured from the factory as Media - Ethernet CAT-5 Protocol - Modbus TCP/IP.

C. All communication interface wiring and hardware which is required external to the chiller control panel shall be provided by this contractor. This contractor shall coordinate interface requirements with Owner furnished equipment vendors and manufacturers. This contractor shall be responsible for any hardware, software, firmware necessary to properly interface the chiller control panel generated information into the BAS including but not limited to read only, read / write and any other data point that is available from the Owner furnished equipment.
   1. This contractor shall coordinate and verify all information available from the Owner’s equipment supplier and take the necessary steps including providing additional hardware, software, firmware or anything else required to provide and display third party data and graphics at the BAS.

3.3 CENTRAL FAN SYSTEMS (ATU-1) PUMP ROOM (COOLING ONLY)

A. Building Automation System Interface:
   1. The Building Automation System (BAS) will send the controller Occupied, Unoccupied, Optimal Start, Cool, and Timed Override commands. The BAS may also send a Cool mode, return temperature and/or return temperature setpoint. If a BAS is not present, or communication is lost with the BAS, the controller will operate using its local schedule and setpoints.
      a. Occupied mode shall be active when pump room equipment is operating.

B. Cool Mode:
   1. When the return temperature rises one degree above the Occupied Cooling setpoint the mode will transition to cooling. When the return temperature falls one degree below the Occupied setpoint the mode will transition out of cooling. When the return temperature is between one degree above the Occupied Cooling setpoint and one degree below the Occupied Cooling setpoint the mode will remain in its last state. If the return temperature sensor fails the mode will remain in its last state and an alarm will be annunciated. If the local (and communicated) setpoint(s) fail the controller will use its default setpoints and an alarm will be annunciated.
C. Occupied (Temperature Control):
   1. During occupied periods, the first stage supply fan will run continuously, announce an alarm if supply fan not operating. The first stage 2-way control valves shall open to maintain return air temperature setpoint, if the return air temperature setpoint is not met within 15 minutes, the second stage fan will run (announce an alarm if supply fan not operating) and second stage 2-way control valve shall open to maintain the return air temperature setpoint, when return air temperature setpoint has been satisfied for a 30 minute period, deactivate second stage and return to first stage. The return air temperature setpoint will be dynamically reset based on the deviation of actual space temperature from the active space temperature setpoint. If the return air temperature sensor fails all valves will modulate to maintain the active space temperature setpoint and an alarm will be annunciated. If the return air temperature sensor and the return temperature sensor fail all associated valves will close and an alarm will be annunciated.

D. Unoccupied (Pump Room Equipment not Operating):
   1. When the return temperature is below the Unoccupied setpoint (60°F adj) the supply fan will start, the outside air damper will remain closed and the space unit heaters will operate based upon their own thermostatic controls. When the return temperature rises above the Unoccupied heating setpoint (60°F adj) plus the Unoccupied differential (4°F adj) the supply fan will stop.

E. Cooling Coils:
   1. Single return temperature sensor set at 80 degrees F (adjustable) maintains constant space temperature by modulating two-way control cooling valve.

F. Economizer:
   1. When Outside Air Temperature (OAT) is at least 5 degrees lower than space temperature setpoint and the space is calling for cooling the following shall occur:
      a. The Cooling Coil control valve shall be disabled (normally closed).
      b. The Outside Air Damper shall modulate open as required to satisfy the return temperature setpoint.
      c. The Return Air Damper shall modulate closed in an inverse-proportional relationship with the Outside Air Damper.
   2. Space unit heaters will operate based upon their own thermostatic controls to heat the space.
   3. When Outside Air Temperature (OAT) is lower than space temperature setpoint and the space is calling for cooling the following shall occur:
      a. The Cooling Coil control valve shall be closed.
      b. The Outside Air Damper shall modulate closed to the minimum open position.
      c. The Return Air Damper shall modulate closed in an inverse-proportional relationship with the Outside Air Damper.

G. Safety Devices:
   1. Freeze Protection: Stop fans and close outside air dampers if temperature before supply fan is below 37 degrees F; signal alarm.

H. Filter Status:
   1. A differential pressure switch will monitor the differential pressure across the filter when the fan is running. If the switch closes during normal operation a dirty filter alarm will be annunciated.

I. Coil Protection Mode: (Pumped Cooling Coil):
   1. If the OAT is < 40 degrees F, and the fan is running, the coil protection pump shall operate to provide constant water flow through the coils.
2. If the OAT is < 40 degrees F, the fan is not operating, and the OA duct temperature sensor detects 40 degrees F or less, the coil protection pump shall operate to provide constant water flow through the coils.

3.4 CENTRAL FAN SYSTEMS (AHU-1) CHILLER ROOM (VENTILATION OPERATIONS)

A. Ventilation Operation:
1. Supply Fan VFD shall operate at ventilation speed setting to deliver the air quantity as scheduled.

B. Building Automation System Interface:
1. The Building Automation System (BAS) will send the controller Occupied, Unoccupied, Optimal Start, Night Heat / Cool, and Timed Override commands. The BAS may also send a Heat / Cool mode, return temperature and/or return temperature setpoint. If a BAS is not present, or communication is lost with the BAS, the controller will operate using its local schedule and setpoints.

C. Heat / Cool Mode:
1. When the return air temperature rises one degree above the Occupied Cooling setpoint the mode will transition to cooling. When the return air temperature falls one degree below the Occupied Heating setpoint the mode will transition to heating. When the return air temperature is between one degree above the Occupied Cooling setpoint and one degree below the Occupied Heating setpoint the mode will remain in its last state. If the return air temperature sensor fails the mode will remain in its last state and an alarm will be annunciated. If the local (and communicated) setpoint(s) fail the controller will use its default setpoints and an alarm will be annunciated.

D. Occupied (Temperature Control):
1. During occupied periods, the supply fan will run continuously, annunciate an alarm if supply fan not operating. All valves will modulate to maintain the return air temperature setpoint. The return air temperature setpoint will be dynamically reset based on the deviation of actual space temperature from the active space temperature setpoint. If the return air temperature sensor fails all valves will modulate to maintain the active space temperature setpoint and an alarm will be annunciated. If the return air temperature sensor and the space temperature sensor fail all associated valves will close and an alarm will be annunciated.

E. Unoccupied (Night Setback):
1. When the space temperature is below the Unoccupied heating setpoint (60°F adj) the supply fan will start, the outside air damper will remain closed and the hot water valve will open. When the space temperature rises above the Unoccupied heating setpoint (60°F adj) plus the Unoccupied differential (4°F adj) the supply fan will stop and the hot water valve will close.

F. Morning Warm-up:
1. During optimal start, if the space temperature is below the Occupied heating setpoint, a morning warm-up sequence will be activated. The supply fan will start, the hot water valve will open and the outside air damper will remain closed. Mode will terminate when the space temperature reaches the Occupied heating setpoint or the occupied time period has started.

G. Morning Cool-down:
1. During Optimal Start, if the space temperature is above the Occupied cooling setpoint, a morning cool down sequence will be activated. The supply fan will start, the chilled water valve will open and the outside air damper will remain closed. Mode will terminate when the space temperature reaches the Occupied cooling setpoint or the occupied time period has started.
H. Heating Coils:
   1. Two-way heating control valve will modulate to prevent space temperature from dropping below 60º F (adjustable). Heating valve shall be Normally Open.

I. Cooling Coils:
   1. Two-way cooling control valve will modulate to prevent space temperature from rising above 80º F (adjustable). Cooling valve shall be Normally Closed.

J. Economizer:
   1. When Outside Air Temperature (OAT) is at least 5 degrees lower than space temperature setpoint and the space is calling for cooling the following shall occur:
      a. The Cooling Coil control valve shall be disabled (normally closed).
      b. The Heating Coil control valve shall be closed.
      c. The Relief Air Damper at the Relief Louver shall open.
      d. When the Relief Air Damper has proved open, the Outside Air Damper shall modulate open as required to satisfy the space temperature setpoint.
      e. The Return Air Damper shall modulate closed in an inverse-proportional relationship with the Outside Air Damper.
   2. When Outside Air Temperature (OAT) is at or above the space temperature setpoint and the space is calling for cooling the following shall occur:
      a. The Cooling Coil control valve shall be enabled. The cooling coil valve shall modulate as required to satisfy the space temperature setpoint.
      b. The Heating Coil control valve shall be closed.
      c. The Outside Air Damper shall modulate closed.
      d. The Return Air Damper shall modulate open in an inverse-proportional relationship with the Outside Air Damper.
      e. The Relief Air Damper shall modulate closed.
   3. When Outside Air Temperature (OAT) is lower than space temperature setpoint and the space is calling for heating the following shall occur:
      a. The Heating Coil control valve shall be enabled. The heating coil valve shall modulate as required to satisfy the space temperature setpoint.
      b. The Cooling Coil control valve shall be closed.
      c. The Outside Air Damper shall modulate closed.
      d. The Return Air Damper shall modulate open in an inverse-proportional relationship with the Outside Air Damper.

K. Safety Devices:
   1. Freeze Protection: Stop fans and close outside air dampers if temperature before supply fan is below 37 degrees F; signal alarm.
   2. High Temperature Protection: Stop fans and close outside dampers if temperature in return air is above 180 degrees F; signal alarm.
   3. Smoke Detector: Stop fans, close outside dampers, if smoke is detected; signal alarm.

L. Filter Status:
   1. A differential pressure switch will monitor the differential pressure across the filter when the fan is running. If the switch closes during normal operation a dirty filter alarm will be annunciated.

M. Coil Protection Mode: (Pumped Heating Coil):
   1. When the fan is running, if the OAT is < 40 degrees F, the coil protection pump shall operate to provide constant water flow through the coils.
   2. If the OAT is < 40 degrees F, and the fan is running, the coil protection pump shall operate to provide constant water flow through the coils.
3. If the OAT is < 40 degrees F, the fan is not operating, and the OA duct temperature sensor detects 40 degrees F or less, the coil protection pump shall operate to provide constant water flow through the coils. The heating coil control valve shall also modulate to maintain 70 degrees F at the discharge air temperature sensor. The intent is to keep the air handling unit cabinet warm to prevent cold stratified air from freezing the cooling coil which is downstream from the heating coil.

3.5 ROOM STATIC PRESSURE CONTROL

A. Ventilation Operation:
   1. Interlock with L-2- when AHU-1 is enabled or ATU-1 is in economizer mode.
   2. Louver/Damper L-2 shall modulate as required to maintain 0.05 "WG (adjustable) space static pressure setpoint in chiller room, when pump room is in economizer the relief air will be pushed up to chiller room and relieved thru louver.
   3. Relief louver will be enabled continuously during occupied time periods; annunciate an alarm if Relief louver is not operating.
   4. During unoccupied time periods Relief louver shall remain closed.

3.6 EXHAUST FAN (EF-1) TOILET / CONTROL ROOM

A. Interlock with FC-1. Exhaust / Relief fan EF-1 shall be enabled when FC-1 is enabled.
B. Exhaust fan shall run continuously during occupied time periods; annunciate an alarm if exhaust fan is not operating.
C. During unoccupied time periods Exhaust fan shall remain Off.

3.7 EXHAUST / RELIEF FAN (EF-2) CHEMICAL STORAGE ROOM

A. Interlock with FC-2. Exhaust / Relief fan EF-2 shall be enabled when FC-2 is enabled.
B. Relief fan shall run continuously during occupied time periods; annunciate an alarm if exhaust fan is not operating.
C. During unoccupied time periods Exhaust / Relief fan shall remain Off.

3.8 FAN COIL UNITS (FC-1 AND FC-2)

A. Building Automation System Interface:
   1. The BAS will send Occupied, Unoccupied, Optimal Start, Night Heat / Cool and Timed Override commands. If communication is lost with the BAS, or a BAS is not present, Morning Warm-up and Morning Cool-down will be disabled.
      a. FC-1 shall be interlocked with Exhaust / Relief Fan (EF-1).
      b. FC-2 shall be interlocked with Exhaust / Relief Fan (EF-2).
   B. Unoccupied (Night Setback):
      1. When the space temperature is below the unoccupied heating setpoint (60°F adj) the supply fan will start and the hot water valve will open. When the space temperature rises above the unoccupied heating setpoint (60°F adj) plus the unoccupied differential (2°F adj) the supply fan will stop and the hot water valve will close.
      2. When the space temperature is above the unoccupied cooling setpoint (80°F adj) the supply fan will start and the chilled water valve will open. When the space temperature falls below the unoccupied cooling setpoint (80°F adj) minus the unoccupied differential (2°F adj) the supply fan will stop and the chilled water valve will close.
   C. Occupied:
      1. During occupied periods the supply fan will run continuously. All valves will modulate to maintain the active space temperature setpoint.
D. Space Temperature Control:
   1. The space temperature will be maintained between the occupied cooling setpoint (74°F adj) and the occupied heating setpoint (71°F adj). The unit will transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint (74°F adj). The unit will transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint (71°F adj).

E. Morning Warm-up:
   1. During optimal start, if the space temperature is 3°F or more below the occupied heating setpoint, a morning warm-up sequence will be activated. The supply fan will start and the hot water valve will open to raise the space temperature to the occupied heating setpoint. Mode will terminate when the space temperature reaches the occupied heating setpoint.

F. Morning Cool-down:
   1. During optimal start, if the space temperature is 3°F above the occupied cooling setpoint, a morning cool-down sequence will be activated. The supply fan will start and the chilled water valve will open to lower the space temperature to the occupied cooling setpoint. Mode will terminate when the space temperature reaches the occupied cooling setpoint.

G. Supply Fan Operation:
   1. The fan will be off in the unoccupied mode. When the controller is in the occupied mode, the supply fan will operate at high speed for 3 seconds before changing to any other speed.

3.9 BLOWER COIL UNITS (BC-1) ELECTRICAL SERVICE ROOM

A. Building Automation System Interface:
   1. The BAS will maintain an Occupied mode of operations 24 / 7.

B. Occupied:
   1. During occupied periods the supply fan will run continuously. Cooling coil valve will modulate to maintain the active space temperature setpoint.

C. Space Temperature Control:
   1. The space temperature will be maintained between the cooling setpoint (80°F adj) and the heating setpoint (60°F adj). The unit will transition to the cooling mode when the space temperature rises one degree above the occupied cooling setpoint (80°F adj). The unit will transition to the heating mode when the space temperature drops one degree below the occupied heating setpoint (60°F adj).

D. Supply Fan Operation:
   1. When there is a call for heating or cooling, the supply fan shall operate.
   2. When there is no call for heating or cooling, the supply fan shall remain off.

E. High Temperature Alarm:
   1. When the space air temperature exceeds 90°F (adj) generate a high temperature alarm at the BAS.

END OF SECTION