SECTION 230993 - SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 - GENERAL

1.1 SUBMITTAL REQUIREMENTS

A. Product Data

1. Provide written sequences of operation for each controlled system and piece of equipment. Sequences shall be written in Contractor's own words and shall not be a repetition of the sequences contained herein.

1.2 GENERAL CONTROL REQUIREMENTS AND SEQUENCES

A. Electrical contractor shall provide all 120 Volt power wiring as required for temperature control panels, damper actuators and valve actuators, and transformers as required to low voltage. Electrical Contractor shall connect to existing spare at electrical panel board and provide proper circuit breaker per NEC and label panel board accordingly.

B. This contractor shall be familiar with and responsible for wiring of all auxiliary equipment (control and power wiring), and controllers required under the mechanical Division 23. Equipment and controllers shall include but not be limited by the following items:

C. These additional general requirements shall also apply.

1. All fresh air intakes and relief/exhaust ducts or louvers, gravity roof ventilators, etc. shall have motor operated dampers. Dampers shall be low leak with blade and edge seals.
2. All motor operated dampers shall be furnished and installed by the mechanical contractor, unless otherwise noted. All damper actuators shall be furnished and installed by the Mechanical Contractor, (unless damper and actuator are provided by equipment manufacturer). All low voltage damper actuators shall be wired by this contractor. All line voltage damper actuators shall be wired by the Electrical Contractor. This Contractor shall provide all necessary transformers, contactors, controls and wiring for interlocking equipment to motor operated dampers. Provide end switches as necessary for proper sequencing of damper operation and energizing of fan motor. Provide motor operated dampers with end switches for, but not limited to, the following:

    a. Mechanical Room air intake dampers.
    b. Kitchen make-up air unit & Exhaust fan.

3. All Programmable Thermostats shall be programmed at startup based on a time of day schedule from the owner. The owner shall be trained on the how to change the setpoints and time of day of the programmable thermostat.

4. Carbon monoxide sensors shall be provided in all mechanical rooms containing gas-fired equipment with local alarming.
5. All control setpoints shall be adjustable through the equipment controller. Initial setpoints may be given in this section, but shall be adjusted in the field per actual field conditions or per the owner's recommendations.

1.3 BUILDING OCCUPANCY ZONES AND TIME PERIOD

A. General

1. The BAS shall incorporate a minimum of ten zones for time period scheduling. HVAC equipment can be assigned to any occupancy zone.
2. An Occupancy Zone's Occupied/Unoccupied time period shall be determined by a time-of-day, day-of-week schedule programmed by the BAS operator.

B. Optimal Start

1. An optimal start algorithm shall calculate the amount of time needed to achieve the desired space temperature prior to normal scheduled occupancy time and index time periods to pre-occupancy when time-of-day reaches the calculated time.
2. The algorithm shall utilize the Occupancy Zone's Occupied/Unoccupied time schedule, outside air temperature and average of Zone's space temperatures to determine time at which to swith the Zone's time period from Unoccupied to Proccupied.
3. During Preoccupied time period, the HVAC equipment operates to warm or cool the spaces to occupied heating or cooling setpoints.
4. Time period is switched from Preoccupied to Occupied once time-of-day reaches time schedule's occupancy time.

C. Events

1. Time-of -day, day-of-week schedule function shall allow the user to program "Events" to override normal Optimal Start algorithm occupied time period scheduling for one-time and/or reoccurring special activities.

D. Holidays

1. Holiday programming overrides normal Occupied/Unoccupied time periods and keeps Occupied/Unoccupied zones in unoccupied time period for days designated as a holiday.
2. Holiday programming does not override local unoccupied override devices.

E. Local Occupant Unoccupied Override

1. Individual unoccupied override buttons shall be incorporated into various space sensors.

2. Space sensors shall permit the occupant to index HVAC equipment serving the space to occupied, for a time period on two hours, if equipment is in its Unoccupied time period based on Occupancy Zone's time schedule.
3. BAS operator shall be capable of enabling/disabling operation of individual space sensor's local Unoccupied Override button via graphical user interface.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 REFER TO THE HVAC DRAWINGS FOR HVAC EQUIPMENT SEQUENCE OF OPERATIONS.

END OF SECTION 230993