

SECTION 25 15 10 – BAS SOFTWARE AND PROGRAMMING - RETROFIT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Although Specifications throughout the Mechanical, Electrical, Communications, Electronic Safety and Security divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them; additional Divisions also may be reciprocally applicable to this Section.

1.02 SUMMARY

- A. Section includes:
 - 1. Point Structuring.
 - 2. Alarm.
 - 3. Point Structuring.
 - 4. Graphics.
- B. Fully configure systems and furnish and install all software, programming and dynamic color graphics that completely integrate and operate from the existing system currently in operation at the institution. All access, programming, alarming, and system configuration shall be utilized from the existing system software and database without any third party programs or gateways.
- C. Refer to Section 25 00 10, Building Automation System (BAS) General - Retrofit for general requirements as well as requirements for interface with Owner's WAN.

1.03 REFERENCE STANDARDS

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials, installation and workmanship shall comply with the applicable requirements and standards addressed within all references.

PART 2 - PRODUCTS

2.01 POINT STRUCTURING AND NAMING

- A. General:

1. The intent of this Section is to require a consistent means of naming points across the Owner's WAN. Configure the systems from the perspective of the Owner's WAN, not solely the local Project.
2. The following requirement establishes a standard for naming points and addressing Buildings, Networks, Devices, Instances, and the like.
3. The convention is tailored towards the Owner's WAN and as such, the interface shall always use this naming convention.
4. Native BACnet systems shall also use this naming convention. For non-BACnet systems, the naming convention shall be implemented as much as practical, and any deviations from this naming convention shall be approved by the Owner.
5. Each controller shall have English language descriptors for all system points, variables, parameters etc. located and accessible from the controller memory. All point naming shall match between all system files and record documents.

B. Point Summary Table:

1. The BAS Provider shall coordinate with the Owner's Building Automation System department to compile and submit a proposed Point Summary Table for review prior to any object programming or project startup. The Contractor shall support and not impede direct negotiations between the BAS Provider and the Owner to allow the customizing necessary for structuring the BAS point names to meet the Owner's needs. The UNIVERSITY OF HOUSTON Manager of Building Automation will provide the format form of the Point Summary Table to be submitted to the BAS Provider upon request. Contactor shall ensure final BAS point names have the approval of the Owner's Manager of Building Automation System prior to any object programming or project startup.
2. The Point Summary Table shall be kept current throughout the duration of the Project by the Contractor as the Master List of all points for the Project. Project closeout documents shall include an up-to-date accurate Point Summary Table. The Contractor shall deliver to the Owner the final Point Summary Table prior to final acceptance of the system. The Point Summary Table shall be used as a reference and guide during the commissioning process.

C. Point Naming Convention

1. All proposed point names shall reference the existing UNIVERSITY OF HOUSTON BAS Acronym Standards which can be located and viewed on the Apogee BAS Server.

D. Device Addressing Convention:

1. BACnet network numbers and Device Object IDs shall be unique throughout the network.
2. All assignment of network numbers and Device Object IDs shall be coordinated with the Owner.
3. Coordinate with the Owner or a designated representative to ensure that no duplicate Device Object IDs occur.
4. Alternative Device ID schemes or cross project Device ID duplication if allowed shall be approved before Project commencement by the Owner.

PART 3 - EXECUTION

3.01 SYSTEM CONFIGURATION

- A. Contractor shall thoroughly and completely configure BAS system software, supplemental software, network communications, CSS, OWS, remote operator workstation, portable operators terminal, printer, and remote communications.

3.02 SITE-SPECIFIC APPLICATION PROGRAMMING

- A. Provide all database creation and Site-specific application control programming as required by these Specifications, national and local standards and for a fully functioning system. Provide all initial Site-specific application programming and thoroughly document programming. Generally meet the intent of the written sequence of operation. It is the Contractor's responsibility to request clarification on sequence issues that require such clarification.
- B. All Site-specific programming shall be fully documented and submitted for review and approval, both prior to downloading into the panel, at the completion of functional performance testing, and at the end of the Warranty Period. Programs shall utilize comment lines which will also reside in the field panel.
- C. All programming, graphics and data files must be maintained in a logical system of directories. All file names shall adhere to the naming convention format as established in the Owner's Standard Acronyms documentation. All files developed for the Project will be the property of the Owner and shall remain on the workstation(s)/server(s) at the completion of the Project.

3.03 ALARMS

- A. This Section supersedes and over rules all references to building automation alarms in the Contract Documents, including all sequences of operations and other sections of the BAS Specification in regards to alarms. The Contractor shall support and not impede direct negotiations between the BAS Provider and the Owner to allow the customizing necessary for customizing alarms and alarm parameters to meet the Owner's needs.
- B. The BAS Provider is required to submit a point summary to confirm building automation point names as specified herein The BAS Provider shall submit this point summary with the addition of identifying all alarms which includes detail information on the alarm parameters to the UNIVERSITY OF HOUSTON Manager of Building Automation for approval prior to the beginning of any commissioning process of the building automation system.
- C. The UNIVERSITY OF HOUSTON Manager of Building Automation will provide the format form to the BAS Provider upon request. The Owner shall grant approval of alarms to be verified through commissioning by issuing the approved alarms to the Contractor. The approved alarms issued to the Contractor shall be used for the Functional Test Procedures alarms tested. The Contractor shall initiate the start of this process immediately after building automation submittal have been approved and monitor the progress to ensure the construction schedule is not delayed.
- D. Analog Input Alarms:
 - 1. Duct Static Pressure:
 - a. Alarm @ +/- 0.3 inches from set point for 5 minutes @ Priority 3.

- b. Normal @ +/- 0.2 inches from set point for 5 minutes.
 - c. Alarm is active after fan is proven ON for the minimum time necessary to allow the sensor to be within the alarm parameter.
 - d. Alarm is deactivated after fan is proven OFF.
2. Duct Air Temperatures:
- a. Alarm @ +/- 2.0 degrees F from set point for 5 minutes @ Priority 3.
 - b. Normal @ +/- 1.0 degrees F from set point for 5 minutes.
 - c. Alarm is active after fan is proven ON for the minimum time necessary to allow the sensor to be within the alarm parameter.
 - d. Alarm is deactivated after fan is proven OFF.
3. Space or Room Temperature:
- a. Typically will not be alarmable.
 - b. Submit as not alarmable and Owner will confirm.
4. Duct or Space Humidity:
- a. Alarm @ (+) 15 percent from set point (60 percent) for 5 minutes @ Priority 3.
 - b. Alarm @ (-) 20 percent from set point (60 percent) for 5 minutes @ Priority 3.
 - c. Normal @ 5 percent from offset alarm parameters for 5 minutes.
 - d. Point is always ready to alarm.
5. Water temperature sensors which are inputs to control loops:
- a. Submit reasonable alarm parameter to prevent nuisance alarming Priority 3.
 - b. Owner will confirm alarm.
6. All other Analog Inputs:
- a. BAS Provider shall utilize their expertise and recommend not less than three (3) analog input alarms which protect the Owner's best interests.
 - b. Submit at Priority 3 with recommended alarm parameters.
 - c. Identify recommended alarms in submittal.
 - d. Owner will confirm alarm.
- E. Digital Inputs Alarms:
- 1. Proofs (current sensor, air flow switches, water differential pressure switches etc).
 - a. Digital inputs paired with BAS digital output will have the ability to alarm at all times @ Priority 3.

- b. Alarm will delay for the reason time needed when the state of the digital output changes to prevent nuisance alarms.
 - c. Point is in alarmed condition when the value of the digital input does not equal the value of the digital output after the time delay.
 - d. Point is in the Normal condition when the value of the digital input equals the value of the digital output after the time delay.
 - e. Digital input proofs without a paired digital output shall not alarm and be for monitoring purposes only.
2. Safeties (high static cutout, freeze condition, excessive vibration, high humidity cutout, VFD fault, etc.).
- a. The digital input shall be always ready to alarm without delay.
 - b. The digital input shall display "ALARM" at Priority 3 at the Alarm screen when activated.
 - c. The digital input shall display "NORMAL" at the Alarm screen when deactivated.
3. Monitoring Digital Inputs (auxiliary drain pan alarm, Liebert Unit general alarm, water detector, etc) the exception is air filter differential pressure switch.
- a. All digital inputs which "deactivated" is the normal state of planed operations shall alarm when the normal state of planed operation changes.
 - b. The digital input shall display "ALARM" at Priority 3 at the Alarm screen when activated.
 - c. The digital input shall display "NORMAL" at the Alarm screen when deactivated.
4. Air Filters:
- a. Typically will not be alarmable.
 - b. Submit as not alarmable and Owner will confirm.
 - c. The digital input shall display "DIRTY" when activated.
 - d. The digital input shall display "CLEAN" when deactivated
- F. Analog Outputs Alarms:
1. All Analog Outputs:
- a. BAS Provider shall utilize their expertise and recommend any analog output alarms which protect the Owner's best interests.
 - b. Identify recommended alarms in submittal.
 - c. Owner will confirm any alarms.
- G. Digital Outputs Alarms:
1. Refer to digital inputs paired with digital outputs as specified herein.

2. All Digital Outputs:
 - a. BAS Provider shall utilize their expertise and recommend any digital output alarms which protect the Owner's best interests.
 - b. Identify recommended alarms in submittal.
 - c. Owner will confirm any alarms.
- H. All alarms shall be enhanced to alarm and display the alarm Priority level at the alarm screen table of the specific Owner approved BAS workstations
- I. Priority 2 Critical Alarms: All incubator temperature alarms, ultra low temperature alarms, and any other alarm that the Owner deems critical shall report to the Owner specified destinations as a Priority 2 alarm. The Contractor, with Owner approved time delays and triggered points, shall enhance the alarm to prevent nuisance alarming.
- J. Priority 3 Mechanical Critical Alarms: All mechanical equipment alarms, which has been identified by the Owner and is achievable with the I/O point available in the Project, shall report to the Owner specified destinations as a Priority 3 alarm. The Contractor, with Owner approved time delays and triggered points, shall enhance the alarm to prevent nuisance alarming.
- K. Priority 4 Mechanical Alarms: Dirty air filters alarms and non critical alarms, which has been identified by the Owner and is achievable with the I/O point available in the Project, shall report to the Owner specified destinations as a Priority 4 alarm. The Contractor, with Owner approved time delays and triggered points, shall enhance the alarm to prevent nuisance alarming.
- L. Nuisance Alarms: All alarms which have been identified by the Owner as a nuisance alarm due to numerous times in and out of alarm shall be addressed and corrected by the Contractor in a manner that the Owner has approved.
- M. Contractor shall review Owner's current and typical BAS existing alarms. The Contractor shall use this data as a guideline in identifying all alarmable points for this Project. The Contractor shall submit all virtual and physical points involved in the Project with all alarmable points identified for the Owner to review. Contractor is responsible for complying with all alarming requests by the Owner that is achievable with the I/O point available in the Project, with existing BAS database, and with the creation of any necessary virtual points.

3.04 GRAPHIC SCREENS

[ENGINEER MUST PROVIDE ELECTRONIC CONTROL DESIGN FLOOR PLANS TO THE CONTRACTOR.]

- A. Background resolution shall be 1280 x 1024 for all graphics.
- B. Floor Plan Screens: The Contract Document Drawings will be made available to the Contractor in AutoCAD LT 2002 format upon request. These Drawings may be used only for developing backgrounds for specified graphic screens; however the Owner does not guarantee the suitability of these Drawings for the Contractor's purpose. Graphic Screens shall be submitted for approval.
 1. Provide graphic floor plan screens for each floor [wing] [tower] [other] of each building.
 - a. Indicate the location of all equipment that is not located on the equipment room screens.

- b. Indicate the location of temperature sensors associated with each temperature-controlled zone (i.e., VAV terminals, fan-coils, single-zone AHUs, etc.) on the floor plan screens.
 - c. Display the space temperature point adjacent to each temperature sensor symbol. Use a distinct line symbol to demarcate each terminal unit zone boundary. Use distinct colors to demarcate each air handling unit zone.
 - d. Mechanical floor plan Drawings will be made available to the Contractor upon request for the purpose of determining zone boundaries. Indicate room numbers as provided by the Owner.
 - e. Provide a drawing link from each space temperature sensor symbol and equipment symbol shown on the graphic floor plan screens to each corresponding equipment schematic graphic screen.
 - f. The Owner may approve the substitution of tabular graphics in lieu of floor plan graphics as circumstances apply. Contractor shall verify with Owner whether to create tabular or floor plan graphics.
2. If multiple floor plans are necessary to show all areas, provide a graphic building key plan. Use elevation views and/or plan views as necessary to graphically indicate the location of all of the larger scale floor plans. Link graphic building key plan to larger scale partial floor plans. Provide links from each larger scale graphic floor plan screen to the building key plan and to each of the other graphic floor plan screens.
3. Provide a graphic for each system of the Project. Contact Owner to identify all systems requiring a graphic. An example of the AHU system is:
 - a. Provide graphic screens for each air handling system to include but not limited to describe area served and any information the Owner has identified as pertinent.
 - b. Link screens for air handlers to the heating system and cooling system graphics.
 - c. Link screens for supply and exhaust systems if they are not combined onto one screen.
4. Provide a graphic for each system of the Project. Contact Owner to identify all systems requiring a graphic. An example of the CHW system is:
 - a. Provide a cooling system graphic screen showing all points associated with the chillers, cooling towers and pumps.
 - b. Indicate outside air dry-bulb temperature and calculated wet-bulb temperature.
 - c. Link screens for chilled water and condenser water systems if they cannot fit onto one cooling plant graphic screen.
5. Link graphic screens to all pertinent graphics and/or pertinent data/ information the Owner has requested.
 - a. Link the appropriate sequence of operations to graphics. (.rtf format).
 - b. Link approved schematic control Record Drawing to graphic. (.pdf format)
6. Submit all graphics per Section 25 00 10 for Owner approval.

END OF SECTION 25 15 10