SECTION 15900 – BUILDING AUTOMATION SYSTEM

PART 1 - GENERAL

0.1 WORK INCLUDED

A. This Section governs the materials and installation of a complete Building Automation System consisting of a direct-digital temperature control and monitoring system with all I/O operator devices, web page data server, controllers, sensors, valves, dampers, damper motors, relays, control cabinet, etc. to perform the functions as specified in the sequence of control.

B. Related Sections

1. Energy Monitoring
2. Lighting Control
3. Security Control

C. All control wiring required for the temperature control system shall be included in this Section of the specifications. Wiring shall be in accordance with the National Electrical Code and DIVISION 16 - ELECTRICAL of these specifications.

0.2 EQUIPMENT SUBSTITUTION

A. Most items in this DIVISION are eligible for substitution in accordance with the General Conditions and Supplements thereto. Where a proprietary specification is written for a particular item, then only that item may be used. All items eligible for substitution require submission of request for substitution 10 days prior to bid date. This submittal shall include specific models and capacities of equipment and not just manufacturer's literature. Only those manufacturers listed and those receiving written prior approval communicated via addendum shall be considered for review. Verbal approvals will not be given.

0.3 TESTING & APPROVING AGENCIES

A. Where items of equipment are required to be provided with compliance to U.L., ETL, CSA, FCC Part 15, Class A or other testing and approving agencies, the contractor may submit a written certification from any nationally recognized testing agency, adequately equipped and competent to perform such services, that the item of equipment has been tested and conforms to the same method of test as the listed agency would conduct.

0.4 SUBMITTAL DATA

A. See Section 15000 for general submittal requirements.

B. Submittals for all automation, control and monitoring systems shall include complete schematic/flow drawings, logic diagrams, wiring diagrams, manufacturer's literature/submittal

sheets for all components, control points list, bill of materials and a bound booklet of all instruments and devices to be installed.

C. Mechanical contractor shall red-line one set of submittal drawings, showing any and all deviations of installed system from that shown in the submittal drawings for this use in developing record drawings.

PART 2 - PRODUCTS

0.5 ACCEPTABLE SYSTEMS

A. System shall Taco iWorx or approved equal.

1. Mechanical contractor shall be responsible for furnishing work and material as described on contract drawings and herein after under paragraph 'WORK INCLUDED."

2. Coordinate all work associated with control installer.

0.6 MAN/MACHINE LOCAL CONTROL INTERFACE (LCI)

A. General

1. The LCI shall be a color touchscreen user interface and system configuration tool that communicates with device controllers over a LonWorks network. Its functions shall include a local touchscreen user interface, internet or dial-up connectivity for remote access, network configuration tools, database generation tool, automatic web page generation and global time of day scheduling. The LCI will provide supervisory HVAC control, lighting control, and access control integration.

B. Communications

1. The LCI2 shall incorporate Echelon Corporation LonWorks communications, utilizing Free Topology Transceivers (FTT-10) for communication to networked controllers.

C. Touch Screen

1. The LCI shall have a minimum useable touch screen area of 16.4 square inches with ¼ VGA 320x240 pixel resolution. The LCI2 display shall consists of an analog resistance-based touchscreen over an LCD display with Cold-Cathode Fluorescent (CCFL) back lighting. The touch screen shall include contrast adjustment.

D. Automatic Configuration and Network Addressing

1. The LCI shall automatically self configure for network addressing and communication for HVAC, access and lighting controllers upon initiation of the service pin push-button of a device controller added to the network. Systems that require PC based configuration software or portable system configuration hardware tools shall not be acceptable.

E. Programming

1. The LCI shall be preprogrammed and not require field programming of control proportional bands, control deadbands, reverse or direct acting control actions, control algorithms or any other programmable parameters.

2. Field programming shall only require input of setpoints, schedules and passwords.

F. Automatic WEB Page Creation

1. As the LCI automatically creates the database for HVAC, access and lighting controllers by the initiation of the service pin push-button, it shall create the database so that it is accessible from web-browsers. The LCI shall automatically generate web pages without administrator interaction, connection to a personal computer, or HTML programming shall not be required.

G. Web Content

1. All data that is accessible from the local touchscreen shall be accessible remotely except for the ability to calibrate the touchscreen, change user names and enable and disable the keyclick.

H. E-mail Alarms

1. In the event of an alarm condition, the LCI shall generate an e-mail message to up to three predefined e-mail accounts. The e-mail alarm message will provide the site name, device, alarm description, and the date and time the alarm event occurred.

I. Electrical Specifications

1. Power requirements 28-36 VAC or 24 VAC (requires external power supply).

2. Power consumption 24 VA.

J. Battery and Real Time Clock

1. The LCI2 shall include a Real Time Clock. A lithium battery shall maintain nonvolatile database memory.

0.7 APPLICATION SPECIFIC CONTROLLERS (ASC)

A. Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independent of other controllers in the network. Each ASC shall be a micro-processor based controller, multi-tasking real-time digital control processor and shall have sufficient memory to support its own operating system and data bases including:

1. Controls processor
2. Monitoring functions

3. Energy management functions
4. I/O interface and conversions

B. Communications

1. ASC's shall incorporate Echelon Corporation LonWorks communications, utilizing Free Topology Transceivers (FTT-10) for communication to the LCI and the Web Data Server.

C. Automatic Configuration

1. The ASC's and LCI shall use a self-configuring control network management scheme requiring no external computers, tools, binding, or LonWorks knowledge. The LCI shall recognize and configure networked controllers when the controller's service pin is pressed. Once the service pin has been pressed, no further action shall be required by the installer, the controller will be fully accessible to the LCI.

D. ASC's may include a local iView LCD man/machine interface. The iView shall include, but not be limited, to the following:

1. Display operating conditions.
2. Display status.
3. Display setpoints.
4. Display control parameters
5. Override outputs
6. Change setpoints and operating parameters

E. Programming

1. The ASC's shall not require any special knowledge of programming. The ASC's shall be preprogrammed for control proportional bands, control deadbands, reverse or direct acting control actions, control algorithms or any other programmable parameters.

2. Field programming shall be limited to input of setpoints, schedules and passwords.

F. All system setpoints, proportional bands, control deadbands, reverse or direct acting control actions, control algorithms and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate the reprogramming of the controller.

G. ASCs shall be provided for control of HVAC fan coils, heat pumps, VAV units, air handling units, AC units, boilers, chillers, cooling towers, pumps, and energy (BTU) metering.

H. ASCs shall be provided for lighting and access control.

0.8 SENSORS

A. Sensor shall be RTD type, nickel silicon, platinum, or thermistor type to best meet the application. Complete with all necessary mounting hardware.

1. Room Sensors: Plastic or metallic casing with occupant readjustment feature as required by description in sequence of control. When required by sequence description, an occupied/unoccupied override switch will be resident with the sensor to allow occupant override of system mode. Each sensor shall have provisions for set point adjustment.

2. Duct Sensors: Sensor completely cased in metallic case with handi-box for electrical wiring connections.

3. Fluid Sensors: Mount in separable well or equivalent strap-on. Sensor cased in metal casing with handi-box for electric wire connections.

4. Low limit sensor or thermostat. Unit with 20 ft. averaging element and manual or automatic reset as indicated on the sequence description. (Low limit sensors which provide system freeze-up protection will be manual reset type.).

5. Differential static pressure sensors (duct and building): Transmitter measures differential status of pressure with a stainless steel displayer that converts the differential static pressure to a 0-10 VDC or a 4 to 20 MA proportional output. Range as required by applications.

0.9 CONTROL VALVES

A. Brass body with stainless steel stem and modulated plug. Replaceable seats and stem. Replaceable packing with adjustable packing unit.

B. Two-way or three-way mixing application as indicated.

C. Valves less than 2" to be screwed connection, over 2" to be flanged.

0.10 PUMPS

A. Wet rotor pumps shall be repairable in-line without removal of the circulator from the piping using a stainless steel replaceable cartridge. Pump shall be provided with a 3 year warranty.

1. Circulator shall bear UL label.

2. An integral variable speed drive (VSD) shall accept a 0-10 Vdc or 4-20 mA modulating control signal to control the speed of the circulator motor.

0.11 DAMPERS

A. Dampers

1. Airfoil, low leakage rated. Size as indicated on the drawings.

2. Control dampers will be opposed blade type. Mixing dampers shall be parallel blade with blade attitude for converging air streams.

B. Actuators

1. Electric/Electronic Actuators: Provide with all necessary mounting hardware and linkage to meet application. Size to provide control sequence as indicated for application.

2. Magnetic or synchronous motors for full modulation with appropriate linkage to provide linear actuation.

3. Control of system components which require action after power failure (such as freeze protection) require spring return devices.

0.12 SMOKE DETECTORS

A. Self-contained, stand along, ionized type duct detector with sampling tubes to sample full width of the duct.

PART 3 - EXECUTION

0.13 INSTALLATION

A. Network all controllers together for communication with LCI.

B. Installed by trained mechanics and with first-class workmanship throughout.

C. Refer to other parts of these specifications for general methods of running pipe, hangers, sleeves, coordination with other trades, etc. Specifications governing other trades shall also govern these installers.

D. Conduit and Wire

1. All cable and wiring for the BAS system shall be concealed except in mechanical areas where it shall be protected by metallic raceways.

2. Concealed cable in accessible ceiling, stud walls, crawl space, etc., may be plenum rated, low voltage cable. Cable in ceiling spaces shall not interfere with the removal of ceiling tiles or light fixtures and shall be run in a workmanlike manner firmly secured regularly to building structures. It shall not drape across the ceiling or be suspended from other system components such as ductwork, pipe or electrical conduit runs.

3. Parallel cable systems shall be bundled and identified.

4. LonWorks communication cable shall be Echelon approved Level 4 twisted pair.

5. Sensor wiring shall be minimum 18 gauge twisted shielded stranded pair.

0.14 SEQUENCE OF OPERATION

A. Operating sequences shall be as described on contract drawings.

B. Samples for all points shall be stored for the past 24 hours to allow the operator or service person to immediately analyze equipment performance and all problem-related events for the past day.

0.15 TESTING, INSTRUCTING, CHECKOUT AND BALANCING

A. Commissioning and Setup

1. BAS installer to furnish personnel to check out and demonstrate workability of system before final job acceptance. Provide minimum of two commissioning and setup visits, one at the start of the heating season and one at the start of the cooling season. Times to be as coordinated with the owner.

2. BAS installer shall fully cooperate with the mechanical contractor in providing qualified personnel to assist in the testing and checkout of the HVAC systems.

B. Instruction

1. At the completion of the job and the second seasonal commissioning visit provide competent personnel to adequately instruct the Owner's personnel in the operation of the complete control system.

a. Personnel shall sign off that they have received satisfactory instruction and understand the system.

b. Sign-off sheet shall be forwarded to the Owner and the A/E for matter of record.

2. Provide one additional visit to the job at the one-year anniversary to review operating sequences, operating history with the users and make any adjustment, corrections and repairs to systems which may have been evidenced during the one-year operating history

END OF SECTION 15900