SECTION 260425

DIGITAL LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

Applicable provisions of the Conditions of the Contract and Division 1 General Requirements govern work in this section. Submit shop drawings for checking and approval.

1.1 SYSTEM DESCRIPTION

A. The distributed lighting control system as specified herein shall be comprised of stand-alone and networked control devices as indicated.

B. Control devices shall include but not be limited to lighting control panels, room controllers, wall switch stations, occupancy/vacancy sensors, daylight sensors, user interfaces, network interfaces, and related input/output devices.

C. The contractor shall provide all related conduit, wire, boxes, and mounting hardware to provide a complete and functional installation.

1.2 QUALITY ASSURANCE

A. Factory Assembly: All system components shall arrive at the job site completely pre-wired and ready for installation, requiring only the connection of lighting circuits and network terminations. All connections shall be made to clearly and permanently labeled termination points. Systems that require field assembly shall not be acceptable.

B. Component Testing: All system components and assemblies shall be individually tested prior to assembly. Once assembled, all finished products shall be tested for proper operation of all control functions per specifications prior to shipment.

C. NEC Compliance: All system components shall comply with all applicable sections of the National Electrical Code (NEC) as required.

D. NEMA Compliance: All system components shall comply with all applicable portions of NEMA standards pertaining to types of electrical equipment and enclosures.

E. UL Approval: All applicable equipment shall be tested to and listed under UL standard 508 and shall bare labels to indicate compliance. Lighting control relays shall be tested to UL standard 508 for both safety and endurance. System listed other ETL, or other UL sections shall provide documentation proving compliance with UL standard 508.

F. FCC Emissions: All applicable equipment shall comply with FCC emissions standards specified in Part 15, sub-part j for commercial and residential applications and shall bear labels indicating compliance testing. Equipment the does not meet these standards shall not be acceptable.

G. Title 24: All applicable system components and the system as a whole shall be certified as complying with Title 24 requirements.

1.3 SUBMITTALS

A. Submit a line-by-line comparison that describes the differences between each specifications requirement and the equipment / systems being proposed. Comparison shall include a complete listing of how the proposed equipment / systems differ from that specified with regard to size, quantity, quality, method of control, features and functions, control software functions and installation requirements.

B. Prior to fabrication and shipment of lighting control components, the manufacturer shall provide submittal documentation for approval under the general provisions of these specifications.

C. The submittal documentation shall include Class 2 control wire type and routing requirements necessary to match the proposed lighting control components.

D. Submittal documentation shall include a list of components to be supplied, panel schedules, wiring diagrams, detail drawings, and catalog submittal sheets demonstrating compliance with the specified requirements.

E. Provide as part of the submittal package a system riser drawing of sufficient detail to indicate relative placement of major system components and the required connections between each.

F. It shall be the responsibility of the contractor to verify all control wire requirements with the lighting controls manufacturer prior to rough in.

1.4 PROJECT CONDITIONS

A. The contractor shall not install lighting control system components in spaces where the ambient temperature cannot be maintained between 0 degrees to 40 degrees C (32 degrees to 104 degrees F) with a maximum humidity of 90%, non-condensing.

B. All stored and installed lighting control components shall be adequately protected from dust and dirt.

1.5 WARRANTY

A. The lighting control manufacturer shall warrant the system to be free from manufacturing defects for a period of 5 years from shipment.

B. The warranty shall include replacement parts deemed necessary to restore the system to normal operation.

C. The manufacturer shall provide telephone technical support and remote diagnostics where applicable during normal business hours excluding manufacturer holidays.

D. Upon request, the manufacturer shall make available for purchase service contract option(s) which include on-site technician visits for service and repair.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. The basis for design is the NX Distributed Lighting Control System from Hubbell Control Solutions.

B. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval a minimum of 10 working days prior to the bid date and must be made available to all bidders.

C. By using pre-approved substitutions, the contractor accepts responsibility and associated costs for all required modifications to circuitry, devices, and wiring.

D. Provide complete shop drawings with deviations to the engineer for review and approval prior to rough-in.

2.2 GENERAL

A. Provide lighting control system hardware that is designed, tested, manufactured, and warranted by a single manufacturer.

B. System components shall be UL listed under the UL916 Energy Management Equipment standard.

2.3 SMART SENSOR MODULE

A. As indicated in the specifications and where shown on the plans, install Hubbell Control Solutions NXSMP series sensor module enabled fixture(s).

B. NXSMP Series Sensor Module shall be designed to install directly into or on the fixture housing or lens.

C. NXSMP Series Sensor Module shall consist of a completely self-contained distributed intelligent device containing the following sensing and control elements:

D. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall provide automatic or vacancy switching of lighting load(s) within an area/zone based on the presence of human activity.

E. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall be microprocessor controlled and utilize IntelliDAPT™ technology to optimize sensor behavior to adapt to space conditions and occupant usage patterns and adjust sensitivity and time delay to maximize energy savings and minimize false On and Off events.

F. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall not require any adjustments of any kind at the time of installation or during operation.

G. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall be powered by Smart Pack SmartPORT™ using plenum rated SmartPORT plug and play cables.

H. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall have a timer that can be adjusted manually from 1 second to 20 minutes.

I. NXSMP Series Sensor Module Occupancy/Vacancy sensor sensitivity shall be adjustable from 1 to 10.

J. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall include non-volatile memory for retaining device settings during power outages.

K. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall have RED real time motion indicator LED visible from the front of the unit.

L. NXSMP Series Sensor Module Occupancy/Vacancy sensor may be programmed for active and inactive times.

M. NXSMP Series Sensor Module Occupancy/Vacancy sensor shall be available with the following 360° coverage patterns:
   1. 1:1 (mounting height to radius) up to 16 feet
   2. 1:1.5 (mounting height to radius) up to 12 feet
   3. 1:3 (mounting height to radius) up to 14 feet
   4. 1:1.4 (mounting height to radius) up to 45 feet indoors 32 feet outdoors

N. NXSMP Series Sensor Module daylight sensor shall continually measure the amount of visible light under the lighting fixture to provide continuous On/Off and full range dimming control of fixture or group under its control.

O. NXSMP Series Sensor Module daylight sensor shall utilize a closed loop daylight harvesting algorithm to maintain the required light level in response to changes in daylight.

P. NXSMP Series Sensor Module daylight sensor shall have independently programmable ramp up and ramp down times to allow the sensor to respond quickly to decrease in daylight and respond more slowly to increase in daylight to minimize the effect of sudden changes in daylight.

Q. NXSMP Series Sensor Module daylight sensor shall be capable of being programmed for active and inactive times.

R. NXSMP Series Sensor Module daylight sensor shall include non-volatile memory for retaining device settings during power outages.

2.6 DIGITAL ROOM CONTROLLER

A. As indicated and where shown on the plans, install Hubbell Control Solutions NXRC series Room Controller(s) to control the quantity of lighting and plug loads required.

B. Where indicated, the room controller shall provide 0 - 10 volt dimming capability for the required number of dimmable lighting loads.

C. The Room Controller shall integrate the functionality of connected control components including wall switch stations, occupancy sensors and daylight sensors to provide the required sequence of operation for the space.

D. Room Controllers and associated room control components shall operate in a totally standalone mode and not require the use of a network, software, computer or server for local control functions.

E. Room Controllers equipped with the optional NXBTC Real Time Clock, shall be capable of storing and running up to 99 local schedules. Setup shall be via Bluetooth using the NX Device Setup App. Schedules shall run autonomously without the need of any coordinator, gateway or master controller.

F. Mechanical:

1. The room controller housing shall measure 5.75" X 3.85" X 1.3" and be constructed of GSM UL rated 94 HB plastic approved for use in a return air plenum.

2. The housing and shall include an integral 1/2" chase nipple for external mounting to standard junction box knockout.

3. Four RJ45 SmartPORT connectors shall be accessible on the side of the enclosure for connection of room control devices.

4. Two recessed push buttons and associated LED indicators shall be accessible on the top of the enclosure to provide override, status, set-up and testing functions.

G. Electrical:

1. The room controller shall have a single power feed and shall be capable of operation at voltages between 120 and 347 volts AC, 50/60 Hz.

2. One or two output relays (model specific) shall provide a total combined power switching capacity of 20 amps per unit.

3. Where indicated provide one or two independent 0 - 10 volt dimming channels (model specific) for full range dimming control of fixtures equipped with compatible dimmable ballast or driver.

4. Each dimming output shall have a current sinking capacity of at least 30 mA.

5. The room controller shall be capable of supplying 250 mA of Class 2 auxiliary DC power for use by wall switch stations, occupancy sensors, and daylight sensors connected to the room controller's four RJ45 SmartPORT connectors.

6. Where indicated, room controllers shall be equipped with power monitoring circuitry capable of measuring and reporting the total connected load for each room controller.

H. Functional:

1. Provide an integral pushbutton and LED indicator for each load for status and to allow operation of the relays and dimmers for testing and verification without requiring other control devices to be connected.

2. The room controller shall have a default operation providing an automatic logical sequence of operation for each load as the room control devices are plugged into the SmartPORT connectors.

3. Default operation for occupancy sensors shall be automatic on, automatic off for all loads.

4. Upon connection of a switch, the operation shall automatically change to manual on, automatic off (vacancy) mode for all loads.

5. Provide capability to convert each load independently to automatic on or vacancy mode using only the integral push buttons and LED indicators on the room controller.

6. When in vacancy mode, provide a 30 second grace period after an off during which automatic on shall be temporarily enabled.

7. It shall be possible to connect up to eight (8) room controllers together using Cat5 patch cables to provide configurations up to 16 switched and dimmed loads operating as a single zone.

8. Provide the following set up and configuration functions without the need for additional devices or software:

a. Assign/reassign relays for control by wall switch station buttons
b. Configure relays for occupancy or vacancy operation
c. Assign/reassign dimmers to raise/lower switches
d. Assign dimming channels for response to daylight sensor control
e. Auto calibrate default daylight sensor sequence of operation
f. Save preset scenes

2.7 LOW VOLTAGE SWITCH STATIONS

A. Low voltage digital wall switch stations shall be of the programmable type using standard Cat5 cabling for connection to system SmartPORT™.

B. Stations shall have one to six buttons and provide lighting control functions as called out and shown on the plans.

C. All switches shall be single gang and be of the generic decorator style allowing easy ganging and use of a wide array of standard wall switch plate options.

D. Provide two RJ-45 ports per switch to allow for daisy chain connection of up to eight switches to each SmartPORT.

E. Switch station color shall be white, ivory, light almond, grey, or black as indicated.

2.8 OCCUPANCY SENSORS

A. Occupancy sensors shall be ceiling or wall mounted and use dual technology (ultrasonic and passive infrared), ultrasonic and/or passive infrared (model specific) sensing technology as indicated.

B. Sensors shall be Class 2 and connect to any room controller SmartPORT using a wiring adaptor and standard Cat5 patch cable.

C. Occupancy sensors shall be self-adaptive and not require manual calibration after installation. Digital circuitry and logic shall automatically make adjustments to the sensitivity and time delay based on learned occupancy patterns and the environment in which the sensor is installed.

D. Sensors using both ultrasonic and passive infrared (dual technology) shall operate such that detection by both technologies is required to initiate occupancy and continued detection by either technology will maintain occupancy.

E. Up to four occupancy sensors may be connected to one room controller.

2.9 DAYLIGHT SENSORS

A. The NX daylight sensor shall provide ambient light level information to the room controller allowing daylight responsive lighting control.

B. The system shall operate in an open loop sequence of operation reducing the amount of electric light as the quantity of daylight entering the room increases.

C. It shall be possible to configure up to six daylight zones in a room. Each zone shall be programmable to proportionally respond to the light level provided by the daylight sensor.

D. The daylight sensor shall be mounted and positioned to provide an unobstructed view of the windows per the manufacturer's directions.

2.10 EMERGENCY LIGHTING INTERFACE

A. Where emergency lighting is to be controlled by the lighting control system, provide UL924 listed load control relays as necessary to insure that emergency lights are automatically turned full on upon loss of normal power to the area.

PART – 3 EXECUTION

3.1 INSTALLATION

A. Install all equipment in accordance with manufacturer’s installation instructions.

B. The lighting controls shall be installed in accordance with specific guidelines and submittal documents provided by the lighting control manufacturer.

C. Where variations from the general specifications or drawings exist, the contractor shall request a clarification prior to rough in or installation.

D. The contractor shall verify all wire type and routing requirements with the lighting controls manufacturer prior to installation. Not part of this section are requirements for work including, but not limited to, raceways, electrical boxes, junction boxes, circuit protection, wiring, and fittings required for installation of the lighting control equipment.

3.2 STARTUP AND PROGRAMMING

A. The system manufacturer shall provide a factory authorized field engineer to the project site after installation has been completed and prior to system energization for the purpose of testing and adjustment of the system. Factory field engineer shall test and verify all system functions and ensure proper operation of the system components in accordance with the specifications and on-site conditions. The installing contractor shall notify the system manufacturer in writing that the system is completely wired and ready to be energized and tested 2 weeks prior to scheduling a field engineer for start-up of the system. Should the field engineer arrive on the job site and find the installation incomplete, the installing contractor shall pay the cost of any future visits by the field engineer required to complete the system start-up.

B. During the start-up procedure, the factory field engineer shall provide programming assistance and guidance to the building operating personnel in order to program the systems for initial operation.

C. Allow for up to 4 hours of on-site training on the use and maintenance of the lighting control system to be scheduled at the completion of startup and programming of the system.

3.3 TECHINICAL SUPPORT

A. The lighting controls manufacturer shall provide reasonable access to factory direct telephone technical support during normal business hours.

END OF SECTION 260425