SECTION 26
NX DISTRIBUTED INTELLIGENCE™ LIGHTING CONTROL SYSTEM
HUBBELL CONTROL SOLUTIONS

PART - 1 GENERAL

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 bear 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 that 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.

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

E. 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.

F. 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.

G. 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 IN-FIXTURE MODULES

A. As indicated in the specifications and where shown on the plans, install Hubbell Control Solutions NXFM series Fixture Control Module enabled fixture(s)

B. NX In-Fixture Modules shall be design to install inside the fixture they control.

C. NX In-Fixture modules shall consist of a completely distributed intelligent lighting controller capable of functioning completely independently including time based and astronomical scheduling of On/Off and preset events without the need of any coordinator, gateway of master controller. Sensors and switches as well as other NX In-Fixture enabled fixtures shall be capable of being connected directly to the NX In-Fixture Module to create a fully functional lighting control system.

D. NX In-Fixture Modules shall be designed to self-configure, automatically to meet energy code requirements as NX sensors and other NX devices are connected.

E. NX In-Fixture Module shall be design such that self-configuration takes place automatically without user intervention or commissioning of any kind.
F. NX In-Fixture Module shall be provided with one SPST relay. Relay shall be supplied with “Zero Cross Switching” control to limit the effects of inrush upon the relays contacts.

G. NX In-Fixture Module shall be compatible with incandescent, magnetic and electronic lighting loads including LED drivers. NX In-Fixture Module shall include zero arc point switching circuitry and have the following max load ratings:

H. NX In-Fixture Modules shall have the following minimum electrical ratings:
   
a. Line Voltage Versions:
   
i. Input: Universal 120-347VAC, 50-60Hz
   
   ii. Output:
        1. 10A, 120VAC only Incandescent
        2. 10A, 120-347VAC, Magnetic Ballast
        3. 5A, 120-277VAC, Electronic Ballast
        4. 3A, 347VAC, Electronic Ballast Surge Withstand: 2000V
   
   iii. Peak Inrush: 160A for 2 ms Max

b. Low Voltage Versions:

   i. Input: 12-24 VDC

I. NX In-Fixture Modules shall be rated and tested for an operating temperature range of -40° to 185° [-40° to 85°].

J. NX In-Fixture Modules shall be provided with two 0-10VDC control interfaces for full range dimming control of dimming ballasts and LED drivers. Interface shall be designed to continuously sink 30mA of current.

K. NX In-Fixture Module 0-10VDC control interfaces shall be configurable for 0-10vdc dimming, dim to off or color temperature control.

L. NX In-Fixture Module shall be equipped with a Real Time Clock and integral backup for schedule information. Each module shall support up to 99 schedules. Schedules shall be loaded to the module via the network or locally using the NX Device Setup App. Once loaded, schedules shall run autonomously without the need of any coordinator, gateway or master controller.

M. NX In-Fixture Module shall be capable of having its device firmware updated wirelessly over the air when connected to a NX sensor of via the NX SmartPORT.
N. NX In-Fixture Modules shall be supplied with one momentary pushbutton with LED for manual control and testing. Through the use of this switch it shall be possible to test the On/Off and dimming functionality of the NX In-Fixture module or completely reset the NX In-Fixture Module to factory defaults without the need to connect any other device or testing equipment.

O. NX In-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

P. NX In-Fixture Module shall UL Listed to UL916 and Certified to CAN/CSA C22.2 NO 205-M1983.

Q. NX In-Fixture Module shall be FCC certified.

2.4 ON-FIXTURE MODULES - Wireless

A. As indicated in the specifications and where shown on the plans, install Hubbell Control Solutions NXOFM series wireless Fixture Control Module(s)

B. NX On-Fixture modules shall consist of a completely self-contained distributed intelligent wireless lighting controller capable of functioning completely independently including time based and astronomical scheduling of On/Off and preset events without the need of any coordinator, gateway master controller.

C. NX On-Fixture Module shall be configurable remotely over the air utilizing built in Bluetooth radio an iOS or Android handheld device with the NX Configuration App installed or via NX Wireless HubbNET network.

D. NX On-Fixture Module shall be capable of having its device firmware updated wirelessly over utilizing it’s built in Bluetooth radio and iOS or Android handheld device with the NX Configuration App installed or via NX Wireless HubbNET.

E. On-Fixture Module shall respond to scheduled events, occupancy/vacancy sensor events and manual switch station events.

F. On-Fixture Module shall monitor and measure energy consumption.

G. On-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

H. On-Fixture Module shall include an integrated daylight sensor with a foot candle range as shown below:

1. On level: 1FC to 5FC (Default: 5FC)
2. Off level: 4FC to 15FC (Default: 8FC) 0.5fc – 50fc.
I. NX On-Fixture Modules shall be design to install on to the fixture they control utilizing a NEMA C136-41 receptacle with 5 or 7 prong twist lock connector interface.

J. NX On-Fixture Modules shall be rated and tested for an operating temperature range of -40° to 185° [-40° to 85°]

K. NX On-Fixture Module shall support universal input voltage (120-480VAC, 50/60Hz).

L. NX On-Fixture Module shall include one SPST relay for On/Off control.

M. NX On-Fixture Modules relay shall be supplied with “Zero Cross Switching” control to limit the effects of inrush upon the relays contacts.

N. NX On-Fixture Module shall be compatible with incandescent, magnetic and electronic lighting loads including LED drivers. NX On-Fixture Module shall have the following max load ratings:

1. Input: 120-480VAC, 50-60Hz
2. Output:
   a. 5A@120-347VAC,
   b. 3A@480V
4. Peak Inrush: 160A for 2 ms Max
5. Standby Power (W):
   a. 120VAC: 1.2
   b. 277VAC: 1.5
   c. 347VAC: 1.5
   d. 480VAC:1.3

O. NX On-Fixture Module shall conform to UL916 and CAN/CSA C22.2 No. 61010-1-04.

P. NX On-Fixture Modules shall communicate with other NX enabled fixtures and devices via HubbNET wireless mesh network with the following characteristics:

1. Robust & reliable IEEE 802.15.4 2.4GHz wireless self-organizing and self-healing mesh network
2. Radio Range:
   a. Indoor: ~300 ft. (~100m) Note: Actual range is dependent upon building construction and radio location
   b. Outdoor: ~1000 ft. (~300m) Note: Range based on clear line of site.
3. Security:
   a. AES-128 (Advanced Encryption Standard)
Q. NX On-Fixture Module shall be FCC Certified and IC Certified.

R. Hubbell Control Solutions product number(s):
   1. NXOFM-1R1D-UNV – NX On-Fixture Module, (1 Relay 1 Dimmer, Universal Voltage (120V-480V) SPST Output)

S. NX On-Fixture Module shall include non-volatile memory for retaining device settings during power outages.

T. NX On-Fixture Module shall UL Listed to UL916 and Certified to CAN/CSA C22.2 NO 205-M1983.

U. NX On-Fixture Module shall be FCC certified.

2.5 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 design 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:
   a. 1:1 (mounting height to radius) up to 16 feet
   b. 1:1.5 (mounting height to radius) up to 12 feet
   c. 1:3 (mounting height to radius) up to 14 feet
   d. 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

9. The optional NXBTR Bluetooth® radio module and smart phone app shall allow wireless setup and configuration of the room controller and connected devices through a user-supplied IOS or Android smart phone or tablet. The application shall provide as a minimum:

   a. Configure wall switch button types. At a minimum, button types shall include toggle on/off with pilot, preset, on only and off only
b. Configure up to six zones of daylight harvesting per room with independent set points and time delays

c. Include or exclude loads from occupancy sensor control

d. Configure up to 16 load groups per room

e. Configure up to 16 preset scenes per room with independent fade times

f. Set independent power up conditions for relays and dimmers

g. Set independent occupied and unoccupied conditions for each relay and dimmer

h. Adjust dimmer high and low trim points

i. Manually control loads allowing use of the phone or tablet as a personal control for the room

10. The optional NXBTC Bluetooth® radio module shall have the functionality of the NXBTR plus the following additional features:

   a. An integral Real Time clock with backup shall support local scheduling of Room Controllers without the need for any coordinator, gateway or master controller.

   b. Integral storage of a security PIN that shall effectively prevent connection of a non-authorized Bluetooth Smart Device.

   c. The NXBTC shall be UL listed for installation in a return air plenum and can be permanently installed into a SmartPORT™ directly on a Room Controller.

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2.7 NETWORK BRIDGE MODULE

A. The NXHNB network bridge module allows multiple room controller zones to be networked with other NX system devices for whole building administration of lighting control functions.

B. The network bridge 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.

C. The bridge shall connect to and be powered from a room controller SmartPORT via a standard Cat5 cable.

D. Two additional RJ-45 ports on the bridge shall provide an in and out connection point for an Ethernet based network.

E. The network bridge module shall provide a communication link between the room control devices and the NX system Area Controller via an Ethernet based network. At a minimum, the network link shall provide the following functionality through a web browser user interface:

   1. Report the current occupancy status for each lighting control zone

   2. Indicate the status of each relay and dimming channel

   3. Allow reconfiguration of system device input and output parameters

   4. Report the real time power consumption for each Room Controller
5. Set up daylight harvesting for zones equipped with photocells
6. Configure and download schedules to panels and Room Controllers

2.8 LIGHTING CONTROL PANELS

A. As indicated and where shown on the plans, install Hubbell Control Solutions NX series Ethernet based network lighting control panels.

B. Panels shall be configured with the quantity of relays and 0 - 10 volt dimming channels as indicated.

C. Mechanical:

1. Lighting control panels shall be wall mounted with NEMA1 rated enclosure.

2. Screw on cover assembly shall have hinged locking door to expose only the low voltage wiring section of the panel.

3. Covers shall be sized for either surface or recess mounting of the panel.

4. The enclosure shall be of welded construction primed and painted with a powder coat finish. Unpainted or galvanized enclosures are not acceptable.

5. Provide capacity for 8, 16, 24, 32, or 48 relays in each panel as indicated.

6. Relay positions shall support single pole or double pole relays. Capacity of the panel shall not be reduced by use of double pole relays.

7. Relays shall be of the plug-in type and be individually field replaceable.

8. Panels shall be factory assembled and tested. No field assembly shall be required.

9. Standard knockout patterns shall be supplied on enclosure side, upper and lower panels. Field drilling and cutting for pipe and wire shall not be required.

10. A mechanical metal barrier shall separate all high-voltage components and wiring from all low-voltage (Class2) components and wiring.

D. Electrical:

1. Panels shall be supplied with a multi-voltage power supply suitable for use on 120 or 277 volt input power.

2. All wire connections shall be made to labeled terminal blocks.

3. Terminals for low voltage Class2 wiring shall be of the removable type.
4. Relays shall be mechanical latched, single pole rated 30A normally open or double pole electrically held, rated 20A normally open or normally closed.

5. Minimum UL listed Short Circuit Current Rating (SCCR) shall be 14,000A.

E. Functional:

1. The lighting control panels shall be of the distributed intelligence type and shall not be dependent a network connection to execute schedules or perform programmed functions.

2. Relays, dimmers, and low voltage inputs shall be assignable to control zones as required via the web browser user interface.

3. Each panel shall have low voltage input terminals for connection of Class 2 devices.

4. Inputs shall be programmable to support momentary or maintained contact types and shall provide for alternate action on/off, on only, off only, raise, lower, timed on or preset recall operation.

5. Each panel shall provide capability to control external devices through integral form-C low voltage contacts.

6. Dimming outputs shall be industry standard 0 - 10 volt current sinking type and provide continuous dimming for compatible dimming ballasts and LED drivers.

7. Dimming channels shall be assignable to control zones as required via the web browser user interface.

8. Dimming channels shall be configurable to respond to manual raise/lower wall switch control stations, preset scenes, or daylight harvesting photocells.

9. When used with the optional NXR-3LEM relay, the panel shall support UL924 listed control of emergency lighting circuits. Upon loss of normal power to the panel, all NXR-3LEM relays installed in the panel shall automatically be forced to the on position.

2.9 SmartPORT™ MODULE

A. Where indicated, provide the NXSP SmartPORT Module.

B. Each SmartPORT module shall have four RJ-45 SmartPORTs for connection of digital wall switch stations, occupancy sensors, and photocells to the networked system.

C. Devices connected to the SmartPORT module shall be network visible and configurable to operate with panels and room controllers via the web browser user interface.
2.10 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.

2.11 NX SIMPLETOUCH™ GRAPHIC WALL STATION

A. Station shall employ a 3.5” resistive LCD-TFT, full-color touch screen with 320x480 screen resolution in portrait orientation.

B. Mounting shall be to a standard single gang switch box.

C. Station shall utilize standard Cat5 cabling for connection to system SmartPORT. Provide two RJ45 ports to allow daisy chain connection with other NX Smart Switches.

D. The touch station shall operate seamlessly with other NX Smart Switches.

E. A supplied 4GB microSD card shall provide for storing user preferences that include the quantity of controls per screen, function names, screen navigation, home screen selection, and custom screen saver graphic image.

F. Screens can be configured to meet project requirements for control of up to 16 groups, each with provision for On/Off and dimming, up to 16 preset scenes, or CCT color control.

G. Station shall be capable of local control within a single space or configured for master control across spaces or building wide.

H. Optional password access control shall require a secure PIN to access the station.

I. The station shall have adjustable screensaver timeout and backlight brightness.

J. Stations shall be supplied with a white bezel. Optional color change kit shall allow for Ivory, Grey, Light Almond, or Black.
2.12 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.

2.13 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.

2.14 AREA CONTROLLER

A. Web browser based system programming, monitoring and administration shall be provided by the Hubbell Control Solutions NXAC Area Controller.

B. The Area Controller shall have the ability to communicate by means of TCP/IP over Ethernet allowing enterprise connectivity between the NX Distributed Lighting Control System and external LAN or WAN networks.

C. Provide integral capability to communicate with the Building Automation System via BACnet IP protocol.
D. Mechanical:

1. The Area Controller electronics shall be housed in a NEMA 1 industrial grade enclosure suitable for surface wall mounting in an electrical/mechanical room.

2. The enclosure shall measure 13.5" H x 14.5" W x 4" D and include a screw on cover with a hinged locking door.

3. Provide standard knock outs eliminating the need for field drilling or cutting of the enclosure which could damage the electronics.

E. Electrical:

1. The Area Controller shall have a 120VAC, 60Hz hard wired supply connection. Servers or controllers using plug-in type power sources shall not be acceptable.

F. Functional:

1. The Area Controller shall function as a web server allowing the user interface to be accessible through a standard web browser.

2. The installation of software shall not be required. At a minimum, the user interface shall provide the following functions:
   
   a. Automatic discovery of NX system devices
   b. Commissioning of devices into logical Areas and Zones, provide a minimum of 128 areas each with 128 zones
   c. Display the entire system in a logical navigation tree view
   d. Allow the user to name Zones, Groups, Presets, Schedules and individual loads
   e. Set up control functions for system inputs and outputs
   f. Monitor status and override individual relays and dimmers
   g. Set up and download schedules to panels and room controllers
   h. Monitor real-time power use at each room controller

2.15 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 TECHNICAL SUPPORT

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