

## SECTION 26 09 43 - NETWORK LIGHTING CONTROLS

### PART 1 - GENERAL

#### 1.1 DESIGN REQUIREMENTS

- A. Provide distributed network lighting control system. Define the lighting control zones to individual rooms, areas or individual fixtures as coordinated with the university Facilities Group.
- B. Interface lighting control zones with the Building Automation System (BAS) control zones. Provide all hardware, cabling and devices as needed for required hardwired interface.
- C. Provide minimum 25% spare capacity including equipment ratings, housing capacities, spare relays, terminals and controls.
- D. Provide a graphic user interface with a graphic display for programming lighting control zones.
- E. Complete coordination drawings for occupancy zones to interface with mechanical zones for HVAC operation
- F. Coordinate the location of the components on the shop drawings using the reflected ceiling plans. Do not mount devices over fixtures, diffusers, or sprinkler heads. Do not mount occupancy sensors in ceiling tiles with sprinkler heads.
- G. Network Backbone devices to be install on UPS system, if UPS is unavailable install on generator power.
- H. All areas with A/V equipment shall have coordination with controls to initiate shutdown sequence when area goes unoccupied.

#### 1.2 PERFORMANCE REQUIREMENTS

- A. Provide lighting control software capable of linking switch inputs to relay outputs, retrieving links, viewing relay output status, controlling relay outputs, simulating switch inputs, setting device addresses and assigning switch inputs and relay outputs modes.
- B. Provide automatic time controls with automatic adjustment of dawn to dusk switching. System shall automatically adjust for leap year and daylight savings time.
- C. System shall include daylight harvesting control capabilities.
- D. Provide system with energy usage reporting which can be downloaded to the BAS.
- E. Provide automatic notification means of reporting of problem areas
- F. The vendor shall input all of the fixture wattage information into the lighting software.
- G. All devices be identified in the software with a software label per the naming convention tables
- H. Demonstrate the operation of the emergency lighting during generator operation and signal from the fire alarm.

#### 1.3 SUBMITTALS

- A. Provide shop drawings with complete layout of all lighting control equipment including but not limited to programmable controllers, network cable, relays, switches, occupancy sensors and photocell sensors.
- B. Provide one-line diagrams showing the relative placement of all equipment and interconnections to equipment supplied by other manufactures.
- C. Provide complete wiring details showing connections to relays, switches, occupancy sensors, photocell sensors, etc.
- D. Clearly identify lighting zones which are coordinated and interface with the BAS control zones. Coordinate with Division 23.
- E. NAMING CONVENTION
  - 1. See table Naming-Encelium for Encelium Devices
  - 2. See table Naming-nLight for nLight Devices
  - 3. Submit naming convention for any devices not cover in Encelium or nLight tables

## PART 2 - PRODUCTS

### 2.1 ACCEPTABLE MANUFACTURERS

- A. Manufacturers: subject to compliance with requirements, provide programmable lighting control equipment of one of the following (for each type and rating of equipment).
  - 1. Controls: nLight, Encelium Technologies Inc., Blue Ridge, or approved equivalent.
  - 2. Sensors: Sensor Switch, Inc., nLight, Greengate. Hubbell Building Automation, Inc., PLC Multipoint Inc., The Watt Stopper, Inc., or equivalent.

### 2.2 SYSTEM REQUIREMENTS

- A. Provide windows graphic user interface for programming and status of lighting control system.
- B. Reports: Energy performance reports shall be printable in a printer friendly format and downloadable for use in spreadsheet applications, etc.
- C. Interoperability: Control module shall be configured to connect to a BACnet-compliant network, resulting in extending control to any network-compliant devices such as occupancy switches.
- D. Emergency Mode: There shall be a mode, when activated through the System, that will immediately adjust lights to full light output and retain that level until the mode is deactivated. This setting shall override all other inputs. The System shall interface with the building emergency monitoring system at a convenient point and not require multiple connections.
- E. Addressing: I/O Modules shall be centrally addressable, on a per fixture basis, through the software. To simplify installation and maintenance, the System shall not require manual recording of addresses for commissioning or reconfiguration.
- F. LAN Operations: System shall operate independently of building's existing network infrastructure and shall not rely on tenant supplied PCs for operation. Network infrastructure shall only be utilized for software. Manufacturer must provide software to facilitate communications. Manufacturer shall provide connection from the PC running energy management and lighting control software to the System communication bus.

- G. Firewall Security: System firewall technology shall maintain network security.
- H. Re-configurability: The assignment of individual fixtures to zones shall be centrally configurable by software such that physical rewiring will not be necessary when workspace reconfiguration is performed. Removal of covers, faceplates, ceiling tiles, etc. shall not be required.

## 2.3 I/O MODULE

- A. General:
  - 1. Addressing: All I/O modules shall be individually addressable via software.
  - 2. Memory: Retains all system settings in non-volatile memory.
  - 3. Coordinate installation of I/O modules on mechanical equipment with control contractor for zone occupancy status. Relays to be mounted on enclosure of mechanical equipment. Dry contacts wired by control contractor to mechanical equipment. Relay to be provided by electrical contractor.

## 2.4 WALL CONTROLLERS

- A. General
  - 1. Addressing: All wall modules shall be individually addressable via software.
  - 2. Memory: Retains all system settings in non-volatile memory.
  - 3. Ratings: Shall be low voltage input.

## 2.5 PHOTO SENSOR

- A. General
  - 1. Addressing: All photo sensors modules shall be individually addressable via software.
  - 2. Memory: Retains all system settings in non-volatile memory.
  - 3. A sensor that measures ambient light in a finite area shall be available.
  - 4. Mounting: The sensor shall be flush mounted on or recessed inside ceiling tile

## 2.6 OCCUPANCY SENSORS

- A. General:
  - 1. Addressing: All I/O modules shall be individually addressable via software.
  - 2. Memory: Retains all system settings in non-volatile memory.
  - 3. Technology: Provide dual technology sensors where the sensitivity adjustment for each technology is configured through the System software
  - 4. Provide sensor with minimum timeout of 30 seconds..
  - 5. Sensor timeouts shall be configurable by System software. Above the minimum sensor timeout setting.
  - 6. Mounting: Sensors for mounting on ceilings and walls, including corners, must be available.
  - 7. Self-learning sensors will not be allowed.

## 2.7 LIGHTING CONTROL PANELS

- A. General
  - 1. Addressing: All relays shall be individually addressable via software.
  - 2. Memory: Retains all system settings in non-volatile memory.
  - 3. Wiring: Relay control panels shall be interconnected with any other devices on the same wiring loop.
  - 4. Provide phenolic labeling on the ceiling grid for any network communication devices, such as routers, bridges, or gateways

## 2.8 EMERGENCY SHUNT DEVICES:

A. General

1. Operation: Normally-closed electrically-held relay to be wired in parallel with control switch/relay. Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below.
2. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
3. LED Indicator Light: Indicates status of normal and emergency power.
4. All emergency lighting shall be 'on' upon activation of the fire alarm system.
5. Emergency lighting shall be controlled with a shunt to keep off based upon occupancy and emergency operation.
6. Relays will indicate off, on, and shunt status in the system software

PART 3 - EXECUTION

3.1 ENCLOSED OFFICES

- A. Provide occupancy sensor control in all offices with manual override controls. Configure office with manual on and auto off controls. Provide manual dimming controls.
- B. Provide daylight harvesting controls for all perimeter offices by dim to minimum 10% before switching off fixture(s) when adequate daylight is detected by photocell.
- C. Provide hardwired I/O module interface with BAS controls

3.2 OPEN OFFICE

- A. Provide occupancy sensor control in all open office areas. Configure open office with auto on/off. Provide manual dimming controls.
- B. Provide daylight harvesting controls for all fixtures adjacent to exterior windows or skylights. Dim to minimum 10% before switching ~~Switch~~ off fixtures when adequate daylight is detected by photocell.
- C. Provide hardwired I/O module interface with BAS controls.

3.3 CONFERENCE ROOMS

- A. Provide multi zone controls for all conference rooms. Coordinate zones with audio/visual systems to allow for video and projection presentations, video conferencing, etc. Light fixtures closest to the projections screen or monitor shall be on a separate lighting zone from the rest of the room. Coordinate with Educational Services.
- B. Provide occupancy sensor controls configured with manual on and auto off and dimming controls. Provide dimming to minimum 1%
- C. Provide hardwired I/O module interface with BAS controls.
- D. Provide low voltage controls to all motorized shades and projection screens.

3.4 LOBBIES AND CORRIDORS

- A. Provide occupancy sensors configured for automatic on/off. Provide daylight harvesting dimming to minimum 10% before turning off fixtures where possible.

- B. Coordinate occupancy time delay with university project manager.
- C. Egress lighting may be controlled under certain conditions. Coordinate with the University Project Manager.
- D. Provide hardwired I/O module interface with BAS controls.

### 3.5 SPECIALTY AREAS

- A. Coordinate lighting control requirements with the university project manager for all specialty areas such as but not limited to laboratories, conference centers, animal facilities and clinical facilities.
- B. Provide hardwired I/O module interface with BAS controls.

### 3.6 EXTERIOR

- A. Provide control of all parking poles, pedestrian poles, building fixtures and emergency ring down light fixtures.
- B. Provide astronomical clock on/off control
- C. Exterior lighting shall be zoned separately for architectural and egress areas.

### 3.7 PARKING GARAGE

- A. Provide photocell control of perimeter fixtures for daylight harvesting controls. Switch fixtures off when adequate daylight is present.
- B. Control light fixtures at drive entry locations such that higher light levels are provided during daytime hours and lower light levels at night.

### 3.8 ANIMAL CARE FACILITIES

- A. Provide a separate lighting control system from the building control with graphic screens. Provide full manual override capabilities from the lighting control computer.
- B. Provide automatic controls with a 12-hour On/Off cycle at the half light level of 30 foot-candle in each holding room. Review with the University Project Manager.
- C. Provide manual "Full On" switch inside each holding room with a 15-minute time delay. Provide "Full On" capabilities during an "On" cycle only. Disable "On" function switch during the "Off" cycle. Disable the "Off" function during the "On" cycle.
- D. Provide red filter over a single lamp, verify spectrum with the university. Provide manual "On" switch inside each holding room with a 15-minute delay.
- E. Provide all holding rooms with positive verification back to lighting control computer.

### 3.9 LECTURE HALL/AUDITORIUM

- A. Provide dedicated dimming control system with multi-zone capabilities. Provide dimming to minimum 1%.

- B. Coordinate zones with audio/video system to allow for video and projection presentations, video conferencing, etc. Provide light fixtures closest to the projection screen or monitor on a separate lighting zone from the rest of the room.
- C. Provide low voltage control to all motorized shades and project screens.
- D. Provide interface with A/V control panel.

## PART 4 - PROJECT DOCUMENTATION

### 4.1 PROJECT RECORD DOCUMENTATION

- A. At least 3 working days before final acceptance demonstration, the contractor shall submit project record drawings of the network lighting for approval by the university. If more than three errors or omissions are found during the university review or during the acceptance procedure the acceptance procedure will be cancelled and rescheduled when accurate and complete drawings are received.
- B. Project Record Documents shall include all the information in the submittal drawings plus:
  - 1. All communication wiring shall have the exact route shown on a floor plan.
  - 2. Include the working construction drawings set from the installation sub-contractor.
  - 3. Exact locations of all devices including panels, communication devices, IO devices, etc. shall be shown. Any room numbers changes during construction will be incorporated into the record documentation
  - 4. All changes made during installation shall be shown, update the devices to where they are actually installed.
  - 5. The electrical circuits used by the network lighting should be clearly indicated as panel and circuit number.
  - 6. Unit communication address identifiers shall be shown.
  - 7. Conductor and network identifier numbers shall be shown.
  - 8. Update the bill of material to show the installed device quantities.
  - 9. The electric circuiting layer needs to be turned on for the drawing.
  - 10. Update drawings and remove any notes, clouds, x's and removed devices.
  - 11. Include the X-ref(s) to the AutoCAD drawings.
  - 12. Update the Title Block on the drawings.
- C. After receiving final approval, supply six (or as specified on Division 1) complete project record drawing sets together with an electronic copy, PDF and AutoCAD, to the university. The project is not considered complete until record documents have been received and certified complete and accurate by the university
- D. O&M manuals shall be provided that detail any maintenance required for any device in the system.

## PART 5 – WARRANTY

- A. The lighting controls shall be warranted to be free from defects in both material and workmanship for a period of one (1) year of normal use and service. This warranty shall become effective the date the university accepts the system. The warranty shall include 24 hour per day, 7 day per week emergency problem response and all standard service contract preventative maintenance items (i.e. I/O calibration, sensor adjustment, etc.). An emergency service number shall be provided to the university. Response shall be within twenty-four (24) hours to the phone call. Provide a phone number for the factory service for 24 hour response to the owner.
- B. Provide factory trained technicians familiar with the installation for emergency warranty service. An electrician will be available to support the activities of the technician, as needed.

- C. Upgrades: Include all controller firmware and software updates for the installed system version at no additional cost to the system the owner during the warranty period. The controller firmware and software will be installed by a factory trained technician.
- D. Tuning: Include 4 site visits by a factory trained technician for lighting system analysis for efficiency and effectiveness of energy savings. Provide operation and seasonal fine-tuning of parameters to provide an optimized control system to the university by a factory trained technicians. The visits will be to be completed at the 3rd, 6th, 9th, and 11th months of the warranty period.
- E. Provide a professional service report for any of the warranty work, system analysis, and changes to parameters

#### Part 6 QUALITY ASSURANCE

##### A. Installation

1. All installers will have the required training from the controls manufacture on installation of the network lighting before installation of the system. If certification is available from the vendor, the installer shall complete the certification. Provide a list of trained installers to the general contractor for record keeping.

**END OF SECTION 26 09 43**