

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

- A. Unified Lighting Control System shall consist of BACnet native lighting controllers, which reside on the BACnet network of the Building Automation System (BAS). The Unified Lighting Control System shall be an integral part of the BAS such that the operator experiences one unified system of controlling, monitoring, scheduling, trending, alarming, etc.
1. Systems that require option card, gateway or protocol translator are not acceptable.
 - a. BACnet MSTP/IP Routers are acceptable when detailed on the drawings.
 2. Systems that require separate master controller, server, or front-end computer are not acceptable.
 3. Systems that require client or server licensing are not acceptable.
 4. Systems that have an actuation time greater than 100 milliseconds are not acceptable. Actuation time is measured from an occupant signal (via low voltage field device; addressable stations, occupancy sensors, wall switches, etc.) to the first relay actuation. Succeeding relays may be delayed to minimize peak demand.
- B. Unified Lighting Control System shall also consist of controllers, relays, and low voltage field devices such as stations, occupancy sensors, wall switches, and light level sensors (as detailed on the drawings).
1. Systems utilizing pre-manufactured cables or proprietary wire to connect low voltage field devices to controllers are not acceptable.
- C. Unified Lighting Control System shall directly control the lighting as specified in this Section 3.6 – Sequence of Operations for Unified Lighting Controls.

1.2 SCOPE OF WORK

- A. The BAS Controls Contractor shall furnish all components of the Unified Lighting Control System as detailed on the drawings and specifications. These components shall consist of controllers, I/O modules, and low voltage field devices such as stations, occupancy sensors, wall switches, and light level sensors, The BAS Controls Contractor shall provide the Electrical Contractor all necessary documents, including approved submittal package, riser diagrams and termination schematics required to provide a complete and correct installation.

- B. The Electrical Contractor under Division 26 shall furnish all labor to install the Unified Lighting Control System furnished by the BAS Controls Contractor. The Electrical Contractor shall receive the Unified Lighting Control System components from the BAS Controls Contractor and store them in a secure and dry location. The Electrical Contractor shall provide all of the required materials (conduit, raceways, wire, etc.) and make all of the line and low voltage wiring terminations for the furnished equipment to ensure the Unified Lighting Control System functions properly and in accordance with the specifications and drawings. The Electrical Contractor shall provide installation as-built drawings to the BAS Controls Contractor.
- C. Reference Contractor Responsibility Matrix on plans, sheet **XX.XX** for task detail and specific responsibilities for low voltage network and device cabling.

1.3 RELATED SECTIONS

- A. The General Conditions of the Contract, Supplementary Conditions, and General Requirements are part of this specification and shall be used in conjunction with this section as part of the contract documents.
- B. The following sections constitute related work:
 - 1. Section 23 09 23 – Direct Digital Control System for HVAC
 - 2. Section 25 00 00 – Integrated Automation
 - 3. Section 26 09 23 – Wiring Devices
 - 4. Section 26 09 43 – Network Lighting Controls

1.4 QUALITY ASSURANCE

- A. BAS Controls Contractor Qualifications:
 - 1. Contractor shall be an authorized dealer for the Unified Lighting Control System.
 - 2. Contractor shall have an established office with experienced engineering and service personnel within a fifty (50) mile radius of the project site.
 - 3. Contractor shall have successfully completed the manufacturer's Technical Certification Training.
 - a. Upon request, BAS Controls Contractor shall present record of completed training including course outlines and dated certificate.
 - 4. Contractor shall have a minimum five (5) years of experience integrating lighting control systems with BACnet Building Automation Systems.
 - 5. Manufacturer shall have an established lighting control business that has been in continuous operation for more than fifteen (15) years.

6. Manufacturer shall have a minimum of five (5) years of experience designing and manufacturing BACnet native lighting controls.
7. Manufacturer shall provide, via web download, free software and firmware files during the warranty period.

1.5 CODES AND STANDARDS

- A. Work, materials, and equipment shall comply with the most restrictive of local, state, and federal authorities' codes and ordinances or these plans and specifications. As a minimum, the installation shall comply with current editions in effect 30 days prior to receipt of bids of the following codes/certifications:
1. BACnet Testing Lab (BTL)
 2. California Title 24 Energy Code
 3. ASHRAE 90.1
 4. National Electric Code (NEC)
 5. International Building Code (IBC)
 6. International Energy Conservation Code (IECC)
 7. National Electrical Manufacturer Association (NEMA)
 8. ANSI/ASHRAE 135-2010 Rev 12: Data Communication Protocol for Building Automation and Control Systems (BACNET)
 9. Underwriters Laboratory (UL) – UL916 Energy Management, UL508A Industrial Control Panels, and UL924 Emergency Lighting and Power Equipment.

1.6 CONTRACTOR PROVIDED SUBMITTALS

- A. The BAS Controls Contractor shall provide submittal drawings including the following:
1. Bill of Material (BOM) list with item references
 2. Product data sheet for each item listed on the Bill of Material
 3. Communications riser diagram shall indicate the MAC address and BACnet Device ID for each BACnet native lighting controller that is part of the Unified Lighting Control System. The riser diagram shall also include the location and part number of each BACnet native lighting controller, and each BAS BACnet router.
 4. Panel and controller schedules shall indicate the circuit number, area description, and control sequence designation for each output.
 5. Written Sequence of Operation and BACnet Points List for each required Sequence of Operation
 6. Point-to-point wiring details for all inputs and outputs shall indicate the wiring and terminations.

7. Addressable CANbus network diagram for each lighting controller. The network diagram shall indicate the devices physical address, part number and location designation. The location designation shall include the lighting controllers BACnet Device ID, room number, switch box designation, and gang position.
 8. Dimensional drawings of all items listed on the Bill of Material.
 9. Specification compliance statement.
- B. The BAS Controls Contractor shall provide as-built drawings including:
1. Updated submittal drawings reflecting the actual installation of the system.
 2. Installation guides and user guides for each item listed on the Bill of Material.
 3. Operation and maintenance data.

1.7

WARRANTY

- A. BAS Controls Contractor shall provide twenty four (24) month labor and material warranty on the complete Unified Lighting Control System. Warranty shall include all controllers, relays, and low voltage field devices such as stations, occupancy sensors, wall switches, and light level sensors. If within twenty four (24) months from the date of acceptance of the Unified Lighting Control System, upon written notice from the owner, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the BAS Controls Contractor.
- B. Manufacturer shall provide a ten (10) year parts only warranty on all relays and relay modules, and a five (5) year parts only warranty on all other components provided. The warranty period shall commence after written owner acceptance and full payment is received by the Manufacturer. If within the time periods listed above from the date of acceptance of the Unified Lighting Control System, upon written notice from the BAS Controls Contractor, it is found to be defective in operation, workmanship or materials, it shall be replaced, repaired or adjusted at the option of the Manufacturer.

PART 2 PRODUCTS

2.1 APPROVED PRODUCTS AND SUPPLIERS

- A. Basis of design is Unified Lighting Control System by Blue Ridge Technologies, Marietta GA (800-241-9173) furnished by the BAS Controls Contractor listed below:
- B. Approved Manufacturer and BAS Controls Contractor:

Manufacturer	BAS Controls Contractor
Blue Ridge Technologies	<BAS Controls Contractor>
Blue Ridge Technologies	<BAS Controls Contractor>
Blue Ridge Technologies	<BAS Controls Contractor>

- C. All proposed substitutions must be submitted in writing for approval by the design professional a minimum of ten (10) working days prior to the bid date. Submitted substitutions must be accompanied by a review of the specification noting compliance on a line-by-line basis.
- D. BAS Controls Contractor utilizing substitutions accept full responsibility for any associated costs directly related to substitution including but not limited to; required modifications to circuitry, devices, and wiring.

2.2 MATERIALS

- A. Manufacturer shall offer spare or equivalent parts for at least five years after completion of this contract. Spare parts include:
 1. Relays.
 2. Electronics.
 3. Transformers.
 4. Low Voltage Field Devices such as addressable stations, occupancy sensors, wall switches, and light level sensors.
- B. Manufacturer shall offer replacement parts for at least five years after shipment.

2.3 OPERATOR INTERFACE

- A. Refer to Division 25 – Integrated Automation for details.
- B. The Operator Interface furnished under Division 25 shall be the primary operator interface for the Unified Lighting Control System.

1. All necessary operator functions, including scheduling, reporting, monitoring, overriding, etc., shall be provided through the Building Automation System operator workstations.
2. Lighting floor plan graphics for switched lighting zones shall utilize the color grey to represent Off, and the color white to represent On.
 - a. Dimmed lighting zones shall also utilize a numerical value (percentage) to represent the lighting intensity.

2.4 CONTROL PANELS AND ZONE CONTROLLERS

- A. BAS Controls Contractor shall provide Control Panels (CP) and or Zone Controllers (ZC) as detailed on drawings.
 1. The Electrical Contractor under Division 26 shall install as detailed on the drawings and in accordance with the manufacturer's recommendation.
- B. CP and ZC shall include the BACnet native lighting controller, I/O modules, relays, power supplies, voltage barriers, and other panel components.
- C. CP and ZC shall be certified to meet the 2012 seismic testing requirements of the International Code Council Evaluation Services (ICC-ES) Acceptance Criteria 156 (AC156), Importance Factor 1.5.
- D. Enclosure shall be manufactured with a minimum of 18 gauge cold rolled steel (C.R.S.) that is treated to prevent corrosion and is powder coated. Plastic enclosures are not acceptable.
- E. Interior shall be manufactured with a minimum of 18 gauge cold rolled steel (C.R.S.) that is treated to prevent corrosion and is powder coated.
- F. Interior shall be removable to aid in the installation process.
- G. CP and ZC shall be provided with a power supply; 120VAC or 277VAC, minimum of 200mA, 50/60 Hz.
- H. CP relays shall be available in increments of four.
- I. CP and ZC must provide separate low voltage and line voltage compartments that will allow field installation of optional dead front covers.
 1. Dead-front covers and line voltage compartments shall be properly marked.
 2. Dead-front covers will be provided in panels where indicated on plans.
- J. CP and ZC shall support optional relay voltage barriers to separate normal and emergency powered relays or to comply with other code requirements.
 1. Voltage barriers shall not reduce the relay capacity of the panel.

2. Panels equipped for UL924 shall include voltage barriers and the UL924 section shall be properly marked.
- K. Relay shall be SPST, dual-coil, latching relay with temporary override lever that indicates relay status.
 1. Electrically held or electrically latched relays are not acceptable.
 2. HOA switch on relays are not acceptable.
- L. Relay shall be rated for the following load ratings:
 1. Maximum of 20 amp Magnetic Ballast @ 277VAC
 2. Maximum of 16 amp Electronic Ballast @ 277VAC
 3. Maximum of 20 amp Tungsten @ 277VAC
 4. Maximum of 20 amp Resistive @ 277VAC
 5. 1.5 Horse Power @ 120VAC
- M. Relay shall be rated for a minimum of 300,000 on and off cycles at full load. Systems with published ratings less than 300,000 cycles at full load shall provide spare equipment and labor equal to the difference in their published life span cycles.
- N. Load Status shall be provided for each relay, status will be determined by the measurement of voltage or current at the load side of the relay.
 1. Auxiliary contact-based status is not acceptable.

2.5 BACNET NATIVE LIGHTING CONTROLLERS (BNLC)

- A. BACnet Native Lighting Controllers (BNLC) must be actively certified by the BACnet Testing Lab (BTL).
- B. BNLC shall be BACnet Application Specific Controller (B-ASC) in accordance with BACnet Standardized Device Profile (Annex L), and shall comply with BACnet Protocol Revision 135-2010 Rev 13 or greater.
- C. BNLC shall be provided with BACnet MS/TP network communications.
- D. BNLC shall be provided with a micro-USB port for temporary connection to a laptop computer for product configuration.
 1. Connection shall support memory downloads, firmware upgrades and troubleshooting operations.
 2. Controllers that require proprietary cables are not acceptable.
- E. BNLC shall have the capability to read and write values to other BACnet controllers on the Building Automation System (BAS) BACnet MS/TP network.
 1. Control variables used to integrate control strategies across multiple BACnet controllers shall be readable by each BACnet controller on the network.

- F. BNLC shall have a real-time clock and shall support both BACnet Time Synchronization service and Universal Time Synchronization service (configurable).
- G. BNLC shall support all of the following BACnet Interoperability Building Blocks (BIBBs):
 - 1. Data Sharing – Read Property-B (DS-RP-B)
 - 2. Data Sharing – Read Property Multiple-A (DS-RPM-B)
 - 3. Data Sharing – Write Property-B (DS-WP-B)
 - 4. Data Management – Dynamic Device Binding (DM-DDB-B)
 - 5. Data Management – Dynamic Object Binding (DM-DOB-B)
 - 6. Data Management – Device Communication Control (DM-DCC-B)
 - 7. Data Management – Time Synchronization (DM-TS-B)
 - 8. Data Management – UTC Time Synchronization (DM-UTC-B)
- H. BNLC shall support all of the following BACnet Objects as a minimum, to be visible and adjustable through BAS frontend.
 - 1. Controller Object, read and write
 - 2. Schedule Object, read and write
 - 3. Channel or relay state, read and write
 - 4. Channel level, read and write
 - 5. Occupancy State read only.
 - 6. Occupancy Timer, read and write
 - 7. Day Light Harvesting Setpoint, read and write
- I. BNLC shall provide a means to field select any one of the following BACnet baud rates; 9.6k, 19.2k, 38.4k, 76.8k or 115.2K.
- J. BNLC shall provide a means to field select the MAC address and shall have a range from 1 to 99.
- K. BNLC shall auto generate a BACnet Device ID that is based upon the selected MAC address and the manufacturer's BACnet Vendor ID.
 - 1. BNLC shall also be capable of being assigned a custom BACnet Device ID. The custom BACnet Device ID is assignable by the Building Automation System within the limits of the BACnet standard with a maximum value of 4,194,303.
- L. BNLC shall be provided with a subnet port for optional Expanders and stations.
 - 1. Systems requiring option cards are not acceptable.

2.6 LOW VOLTAGE INPUTS AND OUTPUTS

- A. Controllers shall support all of the following:
 - 1. UI for direct connection to low voltage field devices such as dry contact switches, occupancy sensors, and light level sensors.
 - 2. UI shall be configurable as either a digital input or an analog input.

- a. Digital input shall be compatible with dry contact switches, occupancy sensors, or BAS/security system contact.
- b. Analog input shall be compatible with 0-5VDC, 0-10VDC, and 4-20mA.
3. Analog Outputs (AO) shall be compatible with 0-10VDC dimming ballasts and drivers.
4. Each AO shall be capable of sinking up to 100mA.
5. AO shall be compatible with 0-10VDC dimming ballasts that comply with IEC 60929 Annex E, Section E.2.
6. Digital output (DO) shall be capable driving 1 amp load 24 AC or DC.

2.7 LOW VOLTAGE STATIONS

- A. BAS Controls Contractor shall provide stations as detailed on drawings.
 1. Electrical Contractor under Division 26 shall install all stations as detailed on the drawings and in accordance with the manufacturer's recommendation.
 - a. See Contractor Responsibility Matrix on plans, Sheet **XX.XX** for addressing responsibilities.
 2. BAS Controls Contractor shall provide addressing and ganging information for all stations.
 3. Electrical Contractor under Division 26 shall furnish and install all face plates with labeling or engraving as required. The BAS Controls Contractor shall provide the text for labeling or engraving of all face plates.
- B. Stations shall be gang-able with other low voltage, decorator style devices under a common face plate.
- C. Stations shall reside on a four (4) wire daisy chain network (CL3P 22/4); two (2) for digital communication and two (2) for 24VDC power.
- D. Stations shall be available in the following configurations:
 1. Channel On/Off - one (1), two (2), three (3), four (4), or six (6) button
 2. Channel Raise/Lower - one (1), or two (2) channels
 3. Preset – three (3) preset with raise/lower, or six (6) preset
- E. Stations shall be provided with LED indicator for status. LED On = Active or ON, LED Off = Inactive or OFF. LED shall also serve as a locator light by operating at a low level that is visible in a dark room. LED shall also be capable of blinking to warn occupants of channel transition to inactive or off.
- F. Stations shall utilize capacitive touch technology.
 1. Stations with mechanical switches or moving parts are not acceptable.

- G. Stations shall be available in white, black, grey, or light almond colors.
- H. Stations utilizing pre-manufactured cables or proprietary wiring to connect to controllers are not acceptable.
- I. Provide blink warning for wiring issues.

2.8 LOW VOLTAGE OCCUPANCY SENSORS

- A. BAS Controls Contractor shall provide Low Voltage Occupancy Sensors as detailed on drawings.
 - 1. Electrical Contractor under Division 26 shall install all Occupancy Sensors as detailed on the drawings and in accordance with the manufacturer's recommendation.
 - 2. Electrical Contractor under Division 26 shall set all timers to the minimum setting and document settings on the as-built documents provided to the BAS Controls Contractor.
 - 3. Low voltage occupancy sensors that are not part of the Unified Lighting Control System shall be furnished and installed by the Electrical Contractor, under Division 26.
- B. Occupancy Sensors shall sense the presence of human activity within the space and provide a signal to the controller. The controller shall determine the on, off or dimming signals required to perform the sequences of operation in this Section 3.6 – Sequence of Operations for Unified Lighting Controls.
- C. Occupancy Sensors shall utilize passive infrared (PIR) technology to detect occupant motion.
- D. For applications where a second method of sensing is necessary to adequately detect or maintain occupancy (such as in rooms with obstructions), a sensor with an additional “dual” technology shall be used.
- E. Acceptable dual technology includes;
 - 1. PIR/HFD (also known as High Frequency Doppler)
 - 2. PIR/Ultrasonic
- F. All sensing technologies provided shall not interfere with other electronic devices within the space (such as electronic white board readers or hearing aids). Microwave based sensing technologies are not acceptable for use within the building envelope.
- G. Occupancy Sensors shall be 24VDC with three (3) wire (common, power, and signal), or four (4) wire (common, power, signal common, and signal) connections and shall be available for the following applications:
 - 1. Ceiling Mount Passive Infrared – BOS-515 or equal
 - 2. Ceiling Mount Passive Dual Tech – BDS-600 or equal
 - 3. Wall Mount Passive Infrared – OS-551 or equal
 - 4. Wall Mount Passive Dual Tech – OS-551DT or equal
 - 5. Hallway Passive Infrared – OS-551 or equal

- 6. Wall Switch Passive Infrared – BBS-700 or equal
- 7. Wall Switch Passive Dual Tech – BDS-700 or equal
- H. Occupancy Sensors with automatic time delay adjustments are not acceptable. The controller shall determine the occupancy sensor time delay, minimum on time or other timing parameters.
- I. Occupancy sensors shall have a minimum timer value of 30 seconds or less.
- J. Occupancy sensor timers shall be writeable from BACnet. Occupancy sensor timers that are configured at each device location are not acceptable.
- K. Occupancy Sensor shall be factory calibrated for optimum performance for its installed PIR lens, and shall not require initial or subsequent field adjustment of detection sensitivity.
- L. Occupancy Sensors with integral light sensor are not acceptable.
- M. Occupancy Sensors utilizing pre-manufactured cables or proprietary wiring to connect to controller are not acceptable.

2.9 LOW VOLTAGE WALL SWITCHES

- A. BAS Controls Contractor shall provide Wall Switches as detailed on drawings.
 - 1. Electrical Contractor under Division 26 shall install all Wall Switches as detailed on the drawings and in accordance with the manufacturer's recommendation.
 - 2. Electrical Contractor under Division 26 shall furnish and install all face plates with labeling or engraving as required. The BAS Controls Contractor shall provide the text for labeling or engraving of all face plates.
 - 3. Low voltage wall switches that are not part of the Unified Lighting Control System shall be furnished and installed by the Electrical Contractor, under Division 26.
- B. Wall Switches shall be gang-able with other low voltage, decorator style devices under a common face plate.
- C. Wall Switches utilizing pre-manufactured cables or proprietary wiring to connect to controllers are not acceptable.

2.10 LOW VOLTAGE LIGHT LEVEL SENSORS

- A. BAS Controls Contractor shall provide low voltage Light Level Sensors as detailed on drawings.
 - 1. Electrical Contractor under Division 26 shall install all Light Level Sensors as detailed on the drawings and in accordance with the manufacturer's recommendation.
- B. Light Level Sensors shall be a 3 wire (common, power and signal) analog, linear photo diode and shall be available for the following applications:

1. Indoor Closed Loop – BPD-500 or equal.
 2. Indoor Closed Loop – LS24OL or equal.
 3. Outdoor, Open Loop, - BPD-500, LS24 or equal.
- C. Light Levels Sensors that require an interface box, manual set points, or external power source are not acceptable.
- D. Light Level Sensors utilizing pre-manufactured cables or proprietary wiring to connect to controllers are not acceptable.

2.11 LINE VOLTAGE OCCUPANCY

- A. BAS Controls Contractor shall provide line voltage occupancy sensors that are directly connected to the Unified Lighting Control System.
1. Electrical Contractor under Division 26 shall install all line voltage occupancy sensors as detailed on the drawings and in accordance with the manufacturer's recommendation.
- B. Line voltage occupancy sensors that are not part of the Unified Lighting Control System shall be furnished and installed by the Electrical Contractor, under Division 26.

2.12 TECHNICIANS KIT

- A. BAS Controls Contractor shall provide Technicians Kit to owner during training. The Technicians Kit shall include;
1. Configuration software on USB flash drive
 2. USB Cable (micro-B)
 3. Bluetooth USB Dongle
 4. Bluetooth Module
- B. BAS Controls Contractors shall provide an electronic copy of all system files and firmware images for all BACnet Native Lighting Controllers (BNLC).
- C. Configuration software shall be capable of local communication with one or multiple BNLC using USB (or optional Bluetooth). Upon local connection with one BNLC the software shall be capable of communication with any other BNLC on that BACnet MSTP segment / LAN.
- D. Configuration software shall be capable of remote communication with one or multiple BNLC using IP connection through the BACnet IP / MSTP router (BACnet router must support tunneling). Upon remote connection with one BNLC the software shall be capable of communication with any other BNLC on that BACnet MSTP segment / LAN.
- E. Configuration software shall be capable of setting or changing all BNLC parameters.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation of Unified Lighting Control Systems shall be furnished by the Electrical Contractor under Division 26.

3.2 PROGRAMMING AND CONFIGURATION

- A. BAS Controls Contractor under this Section shall program and configure Unified Lighting Control System controllers to perform the functions in this Section 3.6 – Sequence of Operations for Unified Lighting Controls.
- B. BAS Controls Contractor shall configure the Unified Lighting Control System to be an integral part of the Building Automation System such that the operator experiences one unified system of controlling, monitoring, scheduling, trending, alarming, etc.
- C. BAS Controls Contractor shall provide an operator interface that includes the following graphics:
 - 1. Floor Plan Graphic: Each controlled zone shall be represented on a Floor Plan Graphic. The status shall be represented on the graphic through the use of color.
 - a. Grey shall represent Off.
 - b. White shall represent On.
 - c. Areas with dimming, multiple levels or presets shall also have an adjacent numeric value showing the current percentage or active preset.
 - 2. Zone Detail Graphic. Each zone shall have a Zone Detail Graphic displaying the following:
 - a. Status of channel(s) associated with the Zone. Status shall be represented on the graphic through the use of color.
 - b. Status of channel timer values for override switches or occupancy sensors associated with the channel. The time-out value shall be represented in minutes and seconds.
 - c. Status of channel runtime and cycle count. The runtime shall be represented in hours and minutes. The cycle count shall be represented as a numeric value.
- D. Provided that the operator has the appropriate access, each Zone shall be able to be commanded from the Floor Plan Graphic.

3.3 CONTROL SYSTEM CHECKOUT AND TESTING

- A. BAS Controls Contractor shall complete startup testing to verify control system is operational before notifying Owner of system demonstration.

1. Provide Owner with schedule for startup testing. Owner may have representative present during any or all startup testing.
2. Verify that control wiring is properly connected.
3. Verify that wiring installed by Division 26 is free of shorts and ground faults, and that terminations are tight.
4. Verify that system performs the functions in this Section 3.6 – Sequence of Operations for Unified Lighting Controls.
5. Simulate and observe each operational mode by overriding and actuating inputs and schedules.
6. Check each alarm with an appropriate signal at a value that will trip the alarm.
7. Prepare a log documenting startup testing of each input and output device, with technician's initials certifying each device has been tested and calibrated.

3.4 CONTROL SYSTEM DEMONSTRATION AND ACCEPTANCE

- A. After tests described in this specification are performed to the satisfaction of both the Engineer and Owner, Engineer will accept control system as meeting completion requirements. Engineer may exempt tests from completion requirements that cannot be performed due to circumstances beyond Contractor's control. Engineer will provide written statement of each exempted test.
- B. System shall not be accepted until completed demonstration forms and checklists are submitted and approved.

3.5 TRAINING

- A. BAS Controls Contractor shall provide two (2) four (4) hour sessions of on-site orientation by a system technician who is fully knowledgeable of the specific installation details of the project. This orientation shall, at a minimum, consist of a review of the project as-built drawings, the Unified Lighting Control System software, layout and naming conventions, and a walk through of the facility with the facility manager to identify the Unified System components.

3.6 SEQUENCE OF OPERATION FOR UNIFIED LIGHTING CONTROLS

- A. **ADD YOUR SEQUENCES HERE**

END Division 25