SOLANO COMMUNITY COLLEGE DISTRICT

BUILDING 1800B

LIGHTING UPGRADES

BID ALT #2

3-7-2025

TECHNICAL SPECIFICATIONS

SOLANO COMMUNITY COLLEGE

BUILDING 1800 ELECTRICAL UPGRADES

4000 SUISUN VALLEY RD

FAIRFIELD, CA 94534

CONSULTANT STAMPS

AOR

EEOR

DOCUMENT 00 01 10

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Procurement and Contracting Requirements

The remainder of Divisions 00 and 01, provided by Solano Community College.

Technical Specifications

Division 2-25 Not Used

Division 27-32 Not Used

END OF SECTION

SECTION 26 09 24
LIGHTING CONTROLS - LUTRON VIVE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single space wireless lighting control systems and associated components:

1. Wireless occupancy/vacancy sensors.
2. Wired load control modules with wireless communication inputs.
3. Wireless fixture control components factory-installed in luminaires not specified in this section.
4. Wireless control stations.
5. LED Drivers.
6. Digital dimming ballast modules.

B. Wireless hub(s) for centralized control, monitoring, and system integration.

1.2 RELATED REQUIREMENTS

A. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

B. Section 26 27 26 - Wiring Devices - Lutron:

1. Finish requirements for wall controls specified in this section.

C. Section 26 51 00 - Interior Lighting.

1.3 REFERENCE STANDARDS

A. 47 CFR 15 - Radio Frequency Devices; current edition.

B. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments; 2019.

C. CAL TITLE 24 P6 - California Code of Regulations, Title 24, Part 6 (California Energy Code); 2022, with Supplement (2024).

D. IEC 60929 - AC and/or DC-Supplied Electronic Control Gear for Tubular Fluorescent Lamps - Performance Requirements; 2011, with Amendment (2015).

E. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test; 2008.

F. ISO 9001 - Quality Management Systems — Requirements; 2015, with Amendment (2024).

G. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2023.

H. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2016.

I. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; 2023.

J. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2020).

K. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

L. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

M. UL 2043 - Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of sensors and wall controls with millwork, furniture, equipment, etc. installed under other sections or by others.

2. Coordinate the placement of wall controls with actual installed door swings.

3. Coordinate the work to provide luminaires and lamps compatible with the lighting controls to be installed.

4. Notify Engineer of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install sensors and wall controls until final surface finishes and painting are complete.

1.5 SUBMITTALS

A. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating switches, hubs, occupancy/vacancy, daylight, and other sensor locations.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1. Occupancy/Vacancy Sensors: Include detailed basic motion detection coverage range diagrams.

2. Wall Dimmers: Include derating information for ganged multiple devices.

C. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. System Performance-Verification Documentation; Lutron LSC-SPV-DOC: Include as part of the base bid additional costs for manufacturer's enhanced documentation detailing start-up performance-verification procedures and functional tests performed along with test results.

E. Title 24 Acceptance Testing Documentation: Submit Certification of Acceptance and associated documentation for lighting control acceptance testing performed in accordance with CAL TITLE 24 P6, as specified in Part 3 under "COMMISSIONING".

F. Project Record Documents: Record actual installed locations and settings for lighting control system components.

G. Operation and Maintenance Data: Include detailed information on lighting control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.

H. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications:

1. Company with not less than ten years of experience manufacturing lighting control products using wireless communication between devices.

2. Registered to ISO 9001, including in-house engineering for product design activities.

3. Provides factory direct technical support hotline available 24 hours per day, 7 days per week.

4. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.8 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1. Basis of Design System Requirements - Lutron, Unless Otherwise Indicated:

a. Ambient Temperature:

1) Lighting Control System Components: Between 32 and 104 degrees F (0 and 40 degrees C).

b. Relative Humidity: Less than 90 percent, non-condensing.

c. Protect lighting controls from dust.

1.9 WARRANTY

A. Manufacturer's Standard Warranty, With Manufacturer Full-Scope Start-Up; Lutron Standard 2-Year Warranty; Lutron LSC-B2:

1. Manufacturer Lighting Control System Components, Except Lighting Management System Computer, Drivers and Load Control Modules:

a. First Two Years:

1) 100 percent replacement parts coverage, 100 percent manufacturer labor coverage to troubleshoot and diagnose a lighting issue.

2) First-available on-site or remote response time.

3) Remote diagnostics for applicable systems.

b. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.

2. Lighting Management System Computer: One year 100 percent parts coverage, one year 100 percent manufacturer labor coverage.

3. Drivers and Load Control Modules:

a. With On-Site Full-Scope Start-Up: Five years 100 percent parts coverage, no manufacturer labor coverage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: Lutron Electronics Company, Inc; Vive; www.lutron.com/#sle.

B. Other Acceptable Manufacturers:

1. Lithonia nLight Air.

2. _____.

3. Products by listed manufacturers are subject to compliance with specified requirements and prior approval of Architect.

C. Substitutions: See Section 01 60 00 - Product Requirements.

1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by Engineer a minimum of 10 working days prior to the bid date and must be made available to all bidders. Proposed substitutes must be accompanied by a review of the specification noting compliance on a line-by-line basis.

2. Any proposed substitutions to be reviewed by Engineer at Contractor's expense.

3. By using pre-approved substitutions, Contractor accepts responsibility and associated costs for all required modifications to related equipment and wiring. Provide complete engineered shop drawings (including power wiring) with deviations from the original design highlighted in an alternate color for review and approval by Engineer prior to rough-in.

2.2 LIGHTING CONTROLS - GENERAL REQUIREMENTS

A. Sensor Layout and Tuning: Include as part of the base bid additional costs for Lighting Control Manufacturer's Sensor Layout and Tuning service; Lutron LSC-SENS-LT:

1. Lighting Control Manufacturer to take full responsibility for wired or wireless occupancy/vacancy and daylight sensor layout and performance for sensors provided by Lighting Control Manufacturer.

2. Lighting Control Manufacturer to analyze the reflected ceiling plans, via supplied electronic AutoCAD format, and design a detailed sensor layout that provides adequate occupancy sensor coverage and ensures occupancy and daylight sensor performance per agreed upon sequence of operations. Contractor to utilize the layouts for sensor placement.

3. During startup, Lighting Control Manufacturer to direct Contractor regarding sensor relocation, as required, should conditions require a deviation from locations specified in the drawings.

4. Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits, within one calendar year from Date of Substantial Completion to fine-tune sensor calibration per the agreed upon sequence of operations.

B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.

C. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, programming, etc. as necessary for a complete operating system that provides the control intent indicated.

D. Design lighting control equipment for 10 year operational life while operating continually at any temperature in an ambient temperature range of 32 degrees F (0 degrees C) to 104 degrees F (40 degrees C) and 90 percent non-condensing relative humidity.

E. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

F. Power Failure Recovery: When power is interrupted for periods up to 10 years and subsequently restored, lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.

G. Wireless Devices:

1. Wireless device family includes area or fixture level sensors, area or fixture level load controls for dimming or switching, and load controls that can be mounted in a wallbox, on a junction box, or at the fixture.

2. Wireless devices including sensors, load controls, and wireless remotes or wall stations, can be set up using simple button press programming without needing any other equipment (e.g. central hub, processor, computer, or other smart device).

3. Wireless hub adds the ability to set up the system using any smart device with a web browser (e.g. smartphone, tablet, PC, or laptop).

4. System does not require a factory technician to set up or program the system.

5. Capable of diagnosing system communications.

6. Capable of having addresses automatically assigned to them.

7. Receives signals from other wireless devices and provides feedback to user.

8. Capable of determining which devices have been addressed.

9. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B application.

H. Device Finishes:

1. Wall Controls: Match finishes for Wiring Devices in Section 26 27 26 - Wiring Devices - Lutron, unless otherwise indicated.

2. Standard Colors: Comply with NEMA WD 1 where applicable.

3. Color Variation in Same Product Family: Maximum delta E of 1, CIE L*a*b color units.

4. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

I. Interface with building automation system _____; Lutron System and Network Integration Consultation; LSC-INT-VISIT.

2.3 WIRELESS SENSORS

A. General Requirements:

1. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.

2. Does not require external power packs, power wiring, or communication wiring.

3. Capable of being placed in test mode to verify correct operation from the face of the unit.

B. Wireless Occupancy/Vacancy Sensors:

1. General Requirements:

a. Provides a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices.

b. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

c. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions; Lutron XCT Technology. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.

d. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity.

e. Turns off lighting after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Provide adjustable timeout settings of 1, 5, 15, and 30 minutes.

f. Capable of turning dimmer's lighting load on to an optional locked preset level selectable by the user. Locked preset range to be selectable on the dimmer from 1 percent to 100 percent.

g. Color: White.

h. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.

i. Provide temporary mounting means for drop ceilings to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method to be design for easy, damage-free removal.

j. Sensor lens to illuminate during test mode when motion is detected to allow installer to place sensor in ideal location and to verify coverage prior to permanent mounting.

2.4 LOAD CONTROL MODULES

A. Provide wireless load control modules as indicated or as required to control the loads as indicated.

B. Junction Box-Mounted Modules:

1. Plenum rated.

2. 0-10 V Dimming Modules:

a. Product(s):

1) 8 A dimming module with 0-10V control, without emergency mode; Lutron PowPak Dimming Module Model RMJS-8T-DV-B.

2) 8 A dimming module with 0-10V control, with emergency mode; Lutron PowPak Dimming Module Model RMJS-8T-DV-B-EM.

b. Communicates via radio frequency with up to ten compatible occupancy/vacancy sensors, ten wireless control stations, and one daylight sensor.

c. Single low voltage dimming module with Class 1 or Class 2 isolated 0-10V output signal conforming to IEC 60929 Annex E.2; source or sink automatically configures.

d. Selectable minimum light level.

e. Configurable high- and low-end trim.

f. Relay: Rated for 0-10 V ballasts, LED drivers, or fixtures that conform with NEMA 410.

g. Dimming Modules with Emergency Mode:

1) Operation With Lutron Vive Wireless Hub: Upon loss of power, dimming module enters and remains in emergency mode as long as wireless hub is de-energized; upon restoration of power to wireless hub, dimming module returns to normal mode and lights automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.

2) Operation Without Lutron Vive Wireless Hub: Upon loss of power, dimming module enters and remains in emergency mode for 90 minutes, during which time local unit buttons and wireless controls are disabled.

3) Used with Lutron Model LUT-ELI-3PH emergency lighting interface to achieve total system UL 924 listing.

C. Fixture Control Modules/Sensors:

1. Fixture Control Modules:

a. Communicates via radio frequency with compatible occupancy/vacancy sensors,control stations, and one daylight sensor.

b. Communicates via wired input with one combination occupancy/daylight or vacancy/daylight fixture sensor.

c. Coordination between Wired and Wireless Sensors:

1) Occupancy/Vacancy Sensing: Wired and wireless sensors work in conjunction (occupancy detected by either sensor turns lights on and vacancy detected by both sensors turns lights off).

2) Daylight Sensing: Wireless sensor takes precedence over wired sensor.

d. Selectable minimum light level setting.

e. Configurable high- and low-end trim.

f. Plenum rated.

g. Mounts to fixture or junction box through 1/2 inch (16 mm) trade size knockout.

2.5 LUMINAIRE COMPONENTS (FACTORY-INSTALLED)

A. Wireless fixture control components to be factory-installed in luminaires as specified in luminaire schedule26 51 33.

2.6 WIRELESS CONTROL STATIONS

A. General Requirements:

1. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.

2. Allows for easy reprogramming without replacing unit.

3. Button Programming:

a. Single action.

b. Toggle action.

4. Includes LED to indicate button press or programming mode status.

5. Faceplates: Provide concealed mounting hardware.

6. Finish: As specified for wall controls in "Device Finishes" under LIGHTING CONTROLS - GENERAL REQUIREMENTS article above.

B. Battery-Powered Wireless Control Stations:

1. Quantity: As indicated on the drawings.

2. Does not require external power packs, power or communication wiring.

3. Power: Battery-operated with minimum ten-year battery life (3-year battery life for night light models).

4. Mounting:

a. Capable of being mounted with a table stand or directly to a wall under a faceplate.

5. Product(s):

2.7 WIRELESS HUBS

A. Product(s):

1. Wireless hub with BACnet; Lutron Vive Premium Hub.

a. Surface-mount wireless hub; Model HJS-2-SM; supports up to 700 total paired devices.

B. Integrated multicolor LED provides feedback on what mode the hub is in for simple identification and diagnosis.

C. Integrated processor and web server allows hub to set up and operate the system without any external connections to outside processors, servers, or the internet.

D. Utilizes Ethernet connection for:

1. Networking up to 64 hubs together to create a larger system.

2. Integration with Building Management System (BMS) via native BACnet; does not require interface (Lutron Vive Premium wireless hub with BACnet only).

3. Remote connectivity capabilities, including maintaining system date/time and receiving periodic firmware updates (requires internet connection).

E. A single hub or network of hubs can operate on either a dedicated lighting control only network or can be integrated with an existing building network as a VLAN.

F. Communicates directly to compatible Lutron Vive RF devices through use of Lutron Clear Connect radio frequency communications link; does not require communication wiring; RF range of 71 feet (23 m) through walls to cover an area of 15836 square feet (1471 sq m) (device and hub must be on the same floor).

G. Communicates directly to mobile device (smartphone or tablet) or computer using built-in Wi-Fi. 2.4 GHz 802.11b/g; wireless range of 71 feet (23 m) through walls (device and hub must be on the same floor).

1. Does not require Wi-Fi router for connecting to the hub.

H. Allows for system setup, control, and monitoring from mobile device or computer using Vive web-based software:

1. Supports paired devices up to maximum number indicated including compatible wireless sensors, wireless control stations, and wireless load devices.

2. Allows for timeclock scheduling of events, both time of day and astronomic (sunrise and sunset).

a. Timeclock is integrated into the unit and does not require a constant internet connection.

b. Retains time and programming information after a power loss.

c. 365-day schedulable timeclock allows for:

1) Scheduling of events years in advance.

2) Setting of recurring events with exceptions on holidays.

d. Timeclock events can be scheduled to:

1) Send lights to a desired level and select the fade rate desired to reach that level.

2) Adjust level lights go to when occupied.

3) Adjust level lights go to when unoccupied.

4) Enable/disable occupancy.

5) Adjust timeout of sensors (requires Lutron Model FC-SENSOR wired fixture sensor or Lutron Model DFCSJ-OEM-OCC wireless fixture control dongle with integral sensing capabilities).

3. Daylighting:

   a. Daylighting can be enabled/disabled. Can be used to override the control currently taking place in the space.

   b. Daylight set point can be adjusted with the software to increase or decrease the electric light level in the room based on the same amount of natural light.

4. Allows for control, monitoring, and adjustment from anywhere in the world (Lutron Vive wireless hub internet connection required).

5. Uses RF signal strength detection to find nearby devices for quick association and programming without having to climb ladders.

   a. Association and setup does not require a factory technician to perform.

6. System using Lutron Vive wireless hub(s) can operate with or without connection to the internet.

7. Supports energy reporting.

   a. Reports measured energy data for PowPak fixture control modules at accuracy of plus/minus 2 percent or 0.5 W (whichever is higher).

   b. Reports calculated energy data for PowPak junction box mounted modules at accuracy of 10 percent.

8. Supports automatic demand response for load shedding via:

   a. Local contact closure without need for separate interface.

   b. OpenADR® 2.0b compliant utility command.

   c. BACnet (Lutron Vive Premium wireless hub with BACnet only).

9. Support automatic generation of alerts in Lutron Vive web-based application for designated events/triggers, including:

   a. Low-battery condition in battery-operated sensors and controls; alert cleared when battery is replaced.

   b. Missing device (e.g., control or sensor); alert cleared when device is detected.

10. Wireless hub can be firmware upgraded to provide new software features and system updates.

    a. Firmware update can be done either locally using a wired Ethernet connection or Wi-Fi connection, or remotely if the wireless hub is connected to the internet.

I. Lutron Vive Web-Based Application:

1. Accessibility and Platform Support:

    a. Web-based; runs on most HTML5 compatible browsers (including Safari and Chrome).

    b. Supports multiple platforms and devices; runs from a tablet, desktop, laptop, or smartphone.

    c. User interface supports multi-touch gestures such as pinch to zoom, drag to pan, etc.

    d. Utilizes HTTPS (industry-standard certificate-based encryption and authentication for security).

    e. Multi-level Password Protected Access: Individual password protection on both the integrated Wi-Fi network and web-based software.

    f. WPA2 security for Wi-Fi communication with wireless hub.

2. System Navigation and Status Reporting:

    a. Area Tree View: Easy navigation by area name to view status and make programming adjustments through the software.

    b. Area and device names can be changed in real time.

3. Setup app available for iOS and Android that allows for:

    a. Job registration to extend product warranty.

    b. Management of setup for multiple projects in different locations.

    c. Creation of handoff documents that are sent directly to a facility manager via email once setup is complete.

    d. Backup of Vive wireless hub database to Lutron cloud for hub replacement.

    e. Access to native help and instructions to assist user with Vive system setup.

J. BACnet Integration (Lutron Vive Premium wireless hub with BACnet only):

1. Provide ability to communicate by means of native BACnet IP communication (does not require interface) to lighting control system from a user-supplied 10BASE-T or 100BASE-T Ethernet network.

2. Requires only one network connection per hub.

3. BACnet Integrator Capabilities:

    a. The BACnet integrator can command:

        1) Area light output.

        2) Area load shed level.

        3) Area load shed enable/disable.

        4) Enable/Disable:

            a) Area occupancy sensors.

            b) Area daylighting.

        5) Daylighting level.

        6) Area occupied and unoccupied level

        7) Occupancy sensor timeouts (for fixture sensors).

    b. The BACnet integrator can monitor:

        1) Area on/off status.

        2) Area occupancy status.

        3) Area load shed status.

        4) Area instantaneous energy usage and maximum potential power usage.

        5) Enable/Disable:

            a) Area occupancy sensors.

            b) Daylighting.

            c) Timeclocks.

        6) Daylighting level.

        7) Light levels from photo sensors.

        8) Area occupied and unoccupied level.

9) Occupancy sensor timeouts.

K. API Integration:

1. Support communication, without requiring interface, between lighting control system and third-party system via RESTful API.

2. Requires one network connection per wireless hub.

3. API Integration Capabilities:

a. Control all zones or subset of zones.

1) Set zones in designated area to specific level.

2) Raise/lower dimmable lights in designated area.

b. Control individual zones.

c. Subscribe to and Monitor:

1) Area status changes (e.g, occupancy, light level, and instantaneous power).

2) Individual zone changes in light level.

3) Alerts (e.g., missing device and low battery).

L. Scenes:

1. Support programmable scenes to control individual devices, areas, or groups of areas on demand.

2. Scenes may be activated via:

a. Contact closure input.

b. API integration.

c. Manual activation in app.

M. Emergency Mode:

1. Support emergency mode to, when triggered, send lights to defined levels and lock out controls for PowPak load control modules equipped with emergency mode.

2. Emergency mode may be activated via:

a. Contact closure input.

b. API integration.

c. Manual activation in app.

N. Contact Closure Interface: Provide two contact closure inputs; accepts both momentary and maintained contact closures that can be used for automatic demand response.

O. Rated for use in air-handling spaces as defined in UL 2043.

P. Meets CAL TITLE 24 P6 requirements.

Q. Provide Ethernet switch(es) as required for inter-hub network wiring per manufacturer's instructions; do not exceed manufacturer's required maximum wiring segment lengths.

2.8 ACCESSORIES

A. Emergency Lighting Interface:

1. Product: Lutron Model LUT-ELI-3PH.

2. Provides total system listing to UL 924 when used with lighting control system.

3. Senses all three phases of building power.

4. If power on any phase fails provides output to send lights to defined levels. Lights to return to their previous intensities when normal power is restored.

5. Accepts contact closure input from fire alarm control panel.

PART 3 EXECUTION

3.1 PREPARATION

A. System and Network Integration Consultation; Lutron LSC-INT-VISIT: Include as part of the base bid additional costs for Lighting Control Manufacturer to conduct meeting with facility representative and other related equipment manufacturers to discuss equipment and integration procedures.

1. Coordinate scheduling of visit with Lighting Control Manufacturer. Manufacturer recommends that this visit be scheduled early in construction phase, after system purchase but prior to system installation.

3.2 INSTALLATION

A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, except for mounting heights specified in those standards.

B. Install products in accordance with manufacturer's instructions.

C. Sensor Locations:

1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", locate sensors in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, locate sensors in accordance with Drawings.

D. Lamp Burn-In: Operate lamps at full output for prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

E. Identify system components in accordance with Section 26 05 53.

3.3 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Manufacturer's Full-Scope Start-Up Service is required.

C. Manufacturer's Full-Scope Start-Up Service: Provide manufacturer's On-Site Full-Scope Start-Up Service.

1. On-Site Full-Scope Start-Up Service; Lutron LSC-OS-SU-VIVE: Manufacturer's authorized Service Representative to conduct site visit upon completion of lighting control system installation to perform system start-up and verify proper operation:

a. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS", authorized Service Representative to verify sensor locations, in accordance with layout provided by Lighting Control Manufacturer. Lighting Control Manufacturer may direct Contractor regarding sensor relocation should conditions require a deviation from locations indicated.

b. Verify connection of power wiring and load circuits.

c. Verify connection and location of controls.

d. Energize wireless hubs.

e. Associate occupancy/vacancy sensors, daylight sensors, wireless remotes, and wall stations to load control devices.

f. Provide initial rough calibration of sensors; fine-tuning of sensors is responsibility of Contractor unless provided by Lighting Control Manufacturer as part of Sensor Layout and Tuning service where specified in Part 2 under "LIGHTING CONTROLS - GENERAL REQUIREMENTS".

g. Program timeclock schedules per approved sequence of operations.

h. Configure load shed parameters per approved sequence of operations.

i. Verify system operation control by control.

j. Obtain sign-off on system functions.

k. Train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".

D. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.4 COMMISSIONING

A. See Section 01 91 13 - General Commissioning Requirements for commissioning requirements.

B. Title 24 Acceptance Testing Service; Lutron LSC-SPV-DOC-T24: Include as part of the base bid additional costs for Lighting Control Manufacturer to perform lighting control acceptance testing in accordance with CAL TITLE 24 P6. Submit required documentation.

3.5 CLOSEOUT ACTIVITIES

A. Training:

1. Include services of manufacturer's certified service representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of on-site system start-up services.

END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Interior luminaires.

B. Ballasts and drivers.

C. Emergency power supply units.

D. LED replacement lamps.

E. LED retrofit luminaire conversion kits.

1.2 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.

1.3 REFERENCE STANDARDS

A. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products; 2024.

B. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources; 2021.

C. NECA/IESNA 500 - Standard for Installing Indoor Lighting Systems; 2006.

D. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

H. UL 1598 - Luminaires; Current Edition, Including All Revisions.

I. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits; Current Edition, Including All Revisions.

J. UL 1993 - Self-Ballasted Lamps and Lamp Adapters; Current Edition, Including All Revisions.

K. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.

3. Notify Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.5 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

a. Include estimated useful life, calculated based on IES LM-80 test data.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

E. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.6 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.7 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.8 WARRANTY

A. Provide 3-year manufacturer warranty for LED luminaires, including drivers.

PART 2 PRODUCTS

2.1 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.2 LUMINAIRES

A. Manufacturers:

1. Acuity Brands, Inc: www.acuitybrands.com/#sle.

2. Cooper Lighting, a division of Cooper Industries: www.cooperindustries.com/#sle.

3. Hubbell Lighting, Inc; _____: www.hubbelllighting.com/#sle.

4. Philips Lighting North America Corporation; _____: www.lightingproducts.philips.com/#sle.

5. RAB Lighting, Inc; _____: www.rablighting.com/#sle.

6. Substitutions:See Section 01 60 00 - Product Requirements

B. Provide products that comply with requirements of NFPA 70.

C. Provide products that are listed and labeled as complying with UL 1598, where applicable.

D. Provide products listed, classified, and labeled as suitable for the purpose intended.

E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

H. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.

2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

I. Luminaires Mounted in Continuous Rows: Provide quantity of units required for length indicated, with all accessories required for joining and aligning.

2.3 EMERGENCY POWER SUPPLY UNITS

A. Description: Self-contained emergency power supply units suitable for use with indicated luminaires, complying with NFPA 101 and applicable state and local codes, and listed and labeled as complying with UL 924.

B. Compatibility:

1. Drivers: Compatible standard, energy saving, and dimming AC LED drivers, including those with end of lamp life shutdown circuits.

C. Operation: Upon interruption of normal power source, solid-state control automatically switches connected lamps to emergency power supply for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

D. Battery: Sealed maintenance-free high-temperature nickel cadmium unless otherwise indicated.

E. Diagnostics: Provide accessible and visible multi-chromatic combination test switch/indicator light to display charge, test, and diagnostic status and to manually activate emergency operation.

2.4 LED REPLACEMENT LAMPS

A. Manufacturers:

1. RAB Lighting, Inc; _____: www.rablighting.com/#sle.

2. Green Creative.

B. Description: Light-emitting diode (LED) self-ballasted lamps listed as complying with UL 1993; intended for replacement of existing lamps of other light source types, including but not limited to, incandescent, fluorescent, and high intensity discharge (HID); suitable for installation in luminaire to be retrofitted.

C. Ballast bypass only.

D. LED Estimated Useful Life:

1. Calculated based on IES LM-80 test data.

2.5 LED RETROFIT LUMINAIRE CONVERSION KITS

A. Description: Light-emitting diode (LED) retrofit luminaire conversion kits, including but not limited to LED lamps and arrays, control modules, drivers, power supplies, wiring, lampholders, brackets, wire connectors, reflectors, and diffusers, intended for replacement of existing light sources in existing luminaires; listed as complying with UL 1598C; suitable for installation in luminaire to be converted.

2.6 ACCESSORIES

A. Threaded Rods for Suspended Luminaires: Zinc-plated steel, minimum 1/4" size, field-painted as directed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Suspended Ceiling Mounted Luminaires:

1. Do not use ceiling tiles to bear weight of luminaires.

2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.

3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

4. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

G. Recessed Luminaires:

1. Install trims tight to mounting surface with no visible light leakage.

H. Suspended Luminaires:

1. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

J. Install accessories furnished with each luminaire.

K. Bond products and metal accessories to branch circuit equipment grounding conductor.

L. Install lamps in each luminaire.

3.3 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Engineer.

3.4 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Engineer. Secure locking fittings in place.

3.5 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.6 CLOSEOUT ACTIVITIES

A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.

END OF SECTION