**SECTION 260995**

**HOTEL GUESTROOM CONTROLS - LUTRON MYROOM XC**

This section includes guestroom lighting, temperature, and shade/drapery controls featuring basis of design products from Lutron Electronics Company, Inc. The section also includes motorized drapery track specifically designed for hotel guestroom applications and for integration with the specified system. Motorized shades that may also be controlled by this system are specified in Section 12 2400 (12490) - Window Shades – Lutron Sivoia QS or Section 12 2400 (12490) – Window Shades – Lutron Contract Roller.

Because of the complex nature of this type of system, it is recommended that the specification and drawings be closely coordinated with consultation from the basis of design manufacturer. If systems of other manufacturers are listed or considered for substitution, the specifier should conduct a thorough evaluation to ensure that the system provides equivalent performance and that other related products will interface properly.

SECTION 26 0995 (16595) – HOTEL GUESTROOM CONTROLS – LUTRON MYROOM XC, Copyright 2023, Lutron Electronics Company, Inc.

1. GENERAL
	1. **SECTION INCLUDES**
		1. Hotel guestroom control system and associated components:
			1. Load control modules.
			2. Guestroom processors.
			3. Integration appliances.
			4. Guestroom control system software.
			5. Control stations.
			6. Room thermostats.
			7. Wired sensors.
			8. Wireless sensors.
			9. Low-voltage control interfaces.
			10. Power interfaces.
			11. Control system accessories.
		2. Motorized drapery track and associated accessories.
	2. **RELATED REQUIREMENTS**

Include the following paragraph only if specifying motorized window treatments.

* + 1. Section ***06 1000 - Rough Carpentry***: Concealed wood blocking for attachment of window treatment brackets.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Section ***09 2116 - Gypsum Board Assemblies***: Substrate for window treatments.

Include the following paragraph only if motorized shades are to be controlled by the guestroom control system.

* + 1. Section ***12 2400 - <<Window Shades – Lutron Sivoia QS; Window Shades – Lutron Roller>>***: Motorized roller window shades, for wired interface with guestroom control system.
		2. Section ***<<\_\_\_\_\_\_>>***: Building automation system, for interface with guestroom control system.
		3. Section ***26 0553 - Identification for Electrical Systems***: Identification products and requirements.
		4. Section ***26 2726 - Wiring Devices - Lutron***:
			1. Finish requirements for wall controls specified in this section.
			2. Accessory receptacles and wall plates, to match guestroom controls specified in this section.
		5. Section ***26 5133*** - ***Luminaires, Ballasts, and Drivers – Lutron***.
	1. **REFERENCE STANDARDS**
		1. 47 CFR 15 – Radio Frequency Devices***; current edition***.
		2. ANSI C82.11 - American National Standard for Lamp Ballasts - High Frequency Fluorescent Lamp Ballasts - Supplements***; 2011***.
		3. ANSI/ESD S20.20 - Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)***; 2014***.
		4. ASTM D4674 - Standard Practice for Accelerated Testing for Color Stability of Plastics Exposed to Indoor Office Environments***; 2002a (Reapproved 2010)***.
		5. ASTM E308 - Standard Practice for Computing the Colors of Objects by Using the CIE System***; 2017***.
		6. CAL TITLE 24 P6 – California Code of Regulations, Title 24, Part 6 (California Energy Code)***; 2013***.
		7. CSA C22.2 No. 223 – Power Supplies with Extra-low-voltage Class 2 Outputs***; 2015***.
		8. IEC 60669-2-1 - Switches for Household and Similar Fixed Electrical Installations - Part 2-1: Particular Requirements - Electronic Switches***; 2015***.
		9. IEC 61000-4-2 - Electromagnetic Compatibility (EMC) - Part 4-2: Testing and Measurement Techniques - Electrostatic Discharge Immunity Test***; 2008***.
		10. IEC 61000-4-5 - Electromagnetic Compatibility (EMC) - Part 4-5: Testing and Measurement Techniques - Surge Immunity Test***; 2014, with Amendments, 2017***.
		11. IEEE 1789 - Recommended Practice for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers***; 2015***.
		12. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits***; 2002 (Cor 1, 2012)***.
		13. ISO 9001 - Quality Management Systems-Requirements***; 2008***.
		14. NECA 1 - Standard for Good Workmanship in Electrical Construction***; 2015***.
		15. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association***; 2010***.
		16. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts; National Electrical Manufacturers Association***; 2015***.
		17. NEMA SSL 7A – Phase Cut Dimming for Solid State Lighting: Basic Compatibility***; 2015***.
		18. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association***; 1999 (R 2015)***.
		19. NFPA 70 - National Electrical Code; National Fire Protection Association**; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements**.
		20. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films***; 2015***.
		21. UL 94 - Tests for Flammability of Plastic Materials for Parts in Devices and Appliances**; Current Edition, Including All Revisions**.
		22. UL 924 - Emergency Lighting and Power Equipment***; Current Edition, Including All Revisions***.
		23. UL 1310 – Class 2 Power Units**; Current Edition, Including All Revisions**.
		24. UL 1598C - Light-Emitting Diode (LED) Retrofit Luminaire Conversion Kits**; Current Edition, Including All Revisions**.
		25. 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***.
		26. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products***; Current Edition, Including All Revisions***.
	2. **ADMINISTRATIVE REQUIREMENTS**
		1. 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. Where door lock system integration is indicated, coordinate the work with other trades to provide compatible products.
			5. Notify ***Architect*** of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
		2. Pre-Wire Meeting: Conduct on-site meeting with Lighting Control Manufacturer prior to commencing work as part of manufacturer's system mock-up and full-scope startup services as applicable. Manufacturer to review with installer:
			1. Low voltage wiring requirements.
			2. Separation of power and low voltage/data wiring.
			3. Wire labeling.
			4. Guestroom processor locations and installation.

Lighting Control Manufacturer Sensor Layout and Tuning service may be specified in Part 2 under "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS".

* + - 1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS", sensor locations to be reviewed 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.
			2. Control locations.
			3. Load circuit wiring.
			4. Network wiring requirements.
			5. Connections to other equipment.
			6. Installer responsibilities.
		1. Sequencing:

Include the following paragraph only if specifying motorized window treatments.

* + - 1. Do not fabricate window treatments until field dimensions for each opening have been taken.

Include the following paragraph only if specifying motorized window treatments.

* + - 1. Do not install window treatments until final surface finishes and painting are complete.
			2. Do not install sensors and wall controls until final surface finishes ***<< and painting>>*** are complete.
	1. **SUBMITTALS**
		1. See Section ***01 3000 - Administrative Requirements*** for submittal procedures.

Lighting Control Manufacturer Sensor Layout and Tuning service may be specified in Part 2 under "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS".

* + 1. Design Documents: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS", Lighting Control Manufacturer to provide plans indicating occupancy/vacancy sensor locations.
		2. Product Data:
			1. Guestroom Control System Components: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
			2. Occupancy/Vacancy Sensors: Include detailed motion detection coverage range diagrams.

Include the following paragraph only if specifying motorized window treatments.

* + - 1. Motorized Window Treatments: Include materials, finishes, fabrication details, dimensions, profiles, and mounting requirements.
		1. Shop Drawings:
			1. Provide load schedule indicating actual connected load, load type, and voltage per circuit, circuits and their respective control zones, and capacity, phase, and corresponding circuit numbers.
			2. Provide schematic system riser diagram indicating component interconnections. Include requirements for interface with other systems.

Include the following paragraph only if specifying motorized window treatments.

* + - 1. Motorized Window Treatments: Include ***<<window treatment schedule indicating size, location and keys to details; head, jamb and sill details; mounting dimension requirements for each product and condition; operation direction; and \_\_\_\_\_\_\_\_\_\_>>***.
		1. Certificates: Manufacturer's documentation that line voltage components are UL listed or UL recognized.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatment Test Reports: Indicating compliance with specified fabric properties.
		2. Samples:
			1. Wall Controls:
				1. Show available color and finish selections.
				2. Provide ***<<one; or \_\_\_\_\_>>*** sample(s) for each product ***<< proposed for substitution; or \_\_\_\_\_\_\_\_\_\_>><< upon request; or \_\_\_\_\_\_\_\_\_\_>>***.
			2. Sensors: Provide ***<<one; or \_\_\_\_\_>>*** sample(s) for each product ***<< proposed for substitution; or \_\_\_\_\_\_\_\_\_\_>><< upon request; or \_\_\_\_\_\_\_\_\_\_>>***.

Include the following paragraph only if specifying motorized window treatments.

* + - 1. Window Treatment Fabric: Showing ***<<specified colors and patterns; manufacturer's full range of available colors and patterns; or \_\_\_\_\_\_\_\_\_>>***.
		1. 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.

Use the following paragraph to specify system performance-verification documentation (at an additional cost). System Performance-Verification Documentation is often required for LEED projects, projects which involve a commissioning agent, or Title 24 (California) projects. Edit the second choice to have this additional cost included as an alternate or as part of the base bid. This documentation will be completed by a Lutron Services Company Representative during the startup of the guestroom control system. This documentation defines the functional test procedures to be used and the results of the onsite testing of the Lutron equipment. A copy of this documentation will be delivered after startup completion.

* + 1. System Performance-Verification Documentation***; Lutron LSC-SPV-DOC***: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for manufacturer's enhanced documentation detailing start-up performance-verification procedures and functional tests performed along with test results.

Include the following paragraph if lighting control acceptance testing required by California Title 24, Part 6 (California Energy Code) is specified in Part 3 under "COMMISSIONING".

* + 1. 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”.
		2. Project Record Documents: Record actual installed locations and settings for lighting control system components.
		3. Operation and Maintenance Data: Include detailed information on guestroom control system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
		4. Warranty: Submit sample of manufacturer's Warranty or Enhanced Warranty as specified in Part 1 under "WARRANTY". Submit documentation of final execution completed in Owner's name and registered with manufacturer.

Include the following paragraph only if post-occupancy maintenance is to be included in this contract. See article "MAINTENANCE" under Part 3.

* + 1. Maintenance contracts.
	1. **QUALITY ASSURANCE**
		1. Conform to requirements of NFPA 70.
		2. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
		3. Manufacturer Qualifications:
			1. Company with not less than ten years of experience manufacturing lighting control systems of similar complexity to specified system.
			2. Registered to ISO 9001, including in-house engineering for product design activities.
			3. Qualified to supply specified products and to honor claims against product presented in accordance with warranty.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatment Installer Qualifications: Qualified to install and commission specified products by prior factory training, experience, demonstrated performance, and acceptance of any requirement of the manufacturer, subsidiary of the manufacturer, or licensed agent.

Include the following paragraph if lighting control acceptance testing required by California Title 24, Part 6 (California Energy Code) is specified in Part 3 under "COMMISSIONING".

* + 1. Title 24 Acceptance Testing Technician Qualifications: Certified by a California approved Acceptance Test Technician Certification Provider as an Acceptance Test Technician (ATT) in accordance with CAL TITLE 24 P6.

Include the following paragraph only if post-occupancy maintenance is to be included in this contract, or if proposals for maintenance under another contract are being solicited in these contract documents. See article "MAINTENANCE" under Part 3.

* + 1. Maintenance Contractor Qualifications: Manufacturer's authorized service representative.
	1. **MOCK-UP**

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatment Mock-Up: Provide***<< full size; minimum 2 ft wide by 3 ft high ( minimum 0.60 m wide by 0.94 m high); minimum \_\_ ft wide by \_\_ ft high ( minimum \_\_ m wide by \_\_ m high);or \_\_\_\_\_\_>>*** mock-up of window treatment complete with selected materials.

Definitions of light and privacy characteristics of fabrics are not precise. If critical, view the actual fabric under the light conditions expected. A mock-up would be useful for this purpose but it would probably be better to do this evaluation before taking bids.

* + - 1. Obtain ***Architect's*** approval of light and privacy characteristics of fabric prior to fabrication.

--CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

* + - 1. Full-sized mock-up may become part of the final installation.
			2. Full-sized mock-up will become the property of the ***Owner*** to be used for spare parts.
		1. Manufacturer's System Mockup Services:
			1. Manufacturer's authorized Service Representative to conduct minimum of two site visits to ensure proper system mockup installation and operation.
			2. Conduct Pre-Wire visit to review requirements with installer as specified in Part 1 under "Administrative Requirements".
			3. Conduct second site visit upon completion of system mockup installation to perform system startup and verify proper operation as required for mockup approval.
	1. Train Owner's representative on system capabilities, operation, and **DELIVERY, STORAGE, AND HANDLING**

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatments: Deliver components in manufacturer's unopened packaging, labeled to identify each window treatment for each opening.
		2. Store products in a clean, dry space in accordance with manufacturer's written instructions until ready for installation.
	1. **FIELD CONDITIONS**
		1. Maintain field conditions within manufacturer's required service conditions during and after installation.
			1. Basis of Design System Requirements:
				1. Ambient Temperature: Between 32 and 104 degrees F (0 and 40 degrees C).
				2. Relative Humidity: Less than 90 percent, non-condensing.

During the installation phase, considerable dust (drywall, concrete, etc) may be deposited on electrical components and impair performance. General accepted housekeeping protection of the electrical equipment must be maintained.

* + - * 1. Protect against accumulation or infiltration of dust.
	1. **WARRANTY**
		1. See Section ***01 7800 - Closeout Submittals***, for additional warranty requirements.

Lutron Standard 2-Year Warranty coverage includes:

-100 percent parts and labor coverage for first two years for guestroom control system components, except ballasts/drivers.

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

-Telephone technical support; 24 hours per day, 7 days per week, excluding manufacturer holidays.

Consider including an optional Enhanced Warranty below.

* + 1. Guestroom Control System Manufacturer's Standard Warranty, With Manufacturer Start-Up:
			1. Manufacturer Guestroom Control System Components, Except Ballasts/Drivers:
				1. First Two Years:

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

First-available on-site or remote response time.

Remote diagnostics for applicable systems.

* + - * 1. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.
			1. Ballasts/Drivers: Five years 100 percent parts coverage, no manufacturer labor coverage.

Use one of the three following paragraphs to specify an optional Enhanced Warranty. Edit the choice to have this additional value included as an alternate or as part of the base bid.

Lutron Silver Enhanced Warranty includes standard 2-year warranty coverage **plus**:

-Upgrade to 8-year limited parts warranty coverage for guestroom control system components, excluding ballasts/drivers.

Lutron Gold Enhanced Warranty includes standard 2-year warranty coverage **plus**:

-Upgrade to 8-year limited parts warranty coverage for guestroom control system components, excluding ballasts/drivers.

**-Upgrade to 72-hour on-site or remote response time.**

**-Annual scheduled Preventative Maintenance Visit.**

Lutron Platinum Enhanced Warranty includes standard 2-year warranty coverage **plus**:

-Upgrade to 8-year limited parts warranty coverage for guestroom control system components, excluding ballasts/drivers.

**-Upgrade to 24-hour on-site or remote response time.**

**-Annual scheduled Preventative Maintenance Visit.**

--CHOOSE ONLY ONE OF THE THREE OPTIONAL CONTROL SYSTEM ENHANCED WARRANTIES BELOW--

* + 1. Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for manufacturer's Guestroom Control System Enhanced Warranty with manufacturer Start-up;coverage to include items listed under manufacturer's standard warranty with manufacturer start-up above, **plus** the following upgrades:
			1. Manufacturer Guestroom Control System Components, Except Ballasts/Drivers and Ballast Modules:
				1. First Two Years:

As-available Field Service response; no committed response time.

* + - * 1. Additional Coverage for Years 3-5: 50 percent replacement parts coverage, no manufacturer labor coverage.
				2. Additional Coverage for Years 6-8: 25 percent replacement parts coverage, no manufacturer labor coverage.
		1. Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for manufacturer's Guestroom Control System Enhanced Warranty with manufacturer Start-up; coverage to include items listed under manufacturer's standard warranty with manufacturer start-up above, **plus** the following upgrades:
			1. Manufacturer Guestroom Control System Components, Except Ballasts/Drivers and Ballast Modules:
				1. First Two Years:

Upgrade from as-available Field Service response to **72-hour on-site or remote response time**.

Plus annual scheduled Preventive Maintenance Visit.

* + - * 1. Additional Coverage for Years 3-5: 50 percent replacement parts coverage, no manufacturer labor coverage.
				2. Additional Coverage for Years 6-8: 25 percent replacement parts coverage, no manufacturer labor coverage.
		1. Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for manufacturer's Guestroom Control System Enhanced Warranty with manufacturer Start-up; coverage to include items listed under manufacturer's standard warranty with manufacturer start-up above, **plus** the following upgrades:
			1. Manufacturer Guestroom Control System Components, Except Ballasts/Drivers and Ballast Modules:
				1. First Two Years:

Upgrade from as-available Field Service response to **24-hour on-site or remote response time**.

Plus annual scheduled Preventive Maintenance Visit.

* + - * 1. Additional Coverage for Years 3-5: 50 percent replacement parts coverage, no manufacturer labor coverage.
				2. Additional Coverage for Years 6-8: 25 percent replacement parts coverage, no manufacturer labor coverage.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Motorized Window Treatment Manufacturer's Warranty:
			1. Window Treatment Components (including electronic drive units, fabric, and hardware):
				1. Years 1-5: 100 percent replacement parts coverage, no manufacturer labor coverage.
				2. Years 6-8: 50 percent replacement parts coverage, no manufacturer labor coverage.
				3. Telephone Technical Support: Available 24 hours per day, 7 days per week, excluding manufacturer holidays.
1. PRODUCTS
	1. **MANUFACTURERS**
		1. Basis of Design Manufacturer: **Lutron Electronics Company, Inc; *<<myRoom XC; or \_\_\_\_\_\_\_\_\_>>*; www.lutron.com**.
		2. Other Acceptable Manufacturers:
			1. ***<<\_\_\_\_\_\_>>***.
			2. Products by listed manufacturers are subject to compliance with specified requirements***<< and prior approval of Architect; or \_\_\_\_\_\_\_\_\_>>***.
		3. Substitutions: ***<<See Section 01 6000 - Product Requirements; Not permitted; or \_\_\_\_\_\_\_\_\_\_>>***.

Delete the following three subparagraphs if substitutions are not permitted.

* + - 1. All proposed substitutions (clearly delineated as such) must be submitted in writing for approval by ***Architect*** a minimum of ***<<10; or \_\_\_\_\_>>*** 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 ***Architect*** at ***Contractor's*** expense ***<< at a rate of $200 per hour; at a rate of \_\_\_\_\_\_\_\_\_; or \_\_\_\_\_\_\_\_\_\_>>***.
			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 ***Architect*** prior to rough-in.
		1. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
	1. **GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS**

--CHOOSE ONLY ONE OF THE TWO SENSOR LAYOUT AND TUNING PARAGRAPHS BELOW--

Use the following paragraph to specify optional manufacturer Sensor Layout and Tuning service or use the paragraph below if Lighting Control Manufacturer Sensor Layout and Tuning service will not be provided. Edit the choice to have this additional value included as an alternate or as part of the base bid.

* + 1. Sensor Layout and Tuning: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for Lighting Control Manufacturer's Sensor Layout and Tuning service:
			1. Lighting Control Manufacturer to take full responsibility for wired or wireless 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 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.

Use the following paragraph if Lighting Control Manufacturer Sensor Layout and Tuning service will not be provided, or use the paragraph above to specify optional manufacturer Sensor Layout and Tuning service.

* + 1. Sensor Layout and Tuning: No Lighting Control Manufacturer Sensor Layout and Tuning service to be provided.
			1. ***Contractor*** to utilize Lighting Control Manufacturer Installation Instructions to place/install sensors.
			2. At Pre-wire and Startup, Lighting Control Manufacturer to provide a rough sensor calibration only. Sensor fine-tuning to be the responsibility of ***Contractor***.
		2. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) as suitable for the purpose indicated.
		3. Unless specifically indicated to be excluded, provide all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the control intent indicated.
		4. Guestroom Control Requirements:
			1. Capable of initiating defined sequence of operations based on:
				1. Occupied/Unoccupied status.
				2. Guestroom sold/unsold status (with Property Management System integration).
				3. Guest manual control.
			2. Guest Presence Detection Algorithm:
				1. Determine presence of guest(s) in the room using algorithm that considers status of both occupancy/vacancy sensor(s) and door input.
				2. If output of algorithm indicates that guest(s) have left the room, transition room to unoccupied status and take appropriate programmed actions.
				3. If output of algorithm indicates that guest(s) have occupied the room, transition the room to occupied status and take appropriate programmed actions.
				4. Capable of assigning additional timeout through system programming.
			3. Welcome Scenes:
				1. Capable of assigning a default welcome scene.
				2. Capable of assigning multiple welcome scenes (e.g. guest first entry, guest subsequent entry, staff entry) that respond to programmed doorlock integration using compatible products.
			4. Turndown Service Scene:
				1. Capable of assigning a scene that sets lighting, shades, and temperature with a single button to pre-programmed levels ready for the guest after the turndown service of the room has occurred.
			5. Privacy/Service: Capable of control/indication of make-up-room and do-not-disturb requests.
			6. Capable of integration (using specified software) with:
				1. Property Management System.
				2. Building Management System (via BACnet IP).
				3. Door Lock System.

Include the following paragraph only if specifying motorized window treatments with wired digital communications link.

* + - 1. Window Treatments With Wired Digital Communications Link:
				1. Capable of operating window treatments and recalling presets via keypad***<<, guestroom control system software, or other guestroom control system interface>>***.
				2. Capable of operating any individual, group, or subgroup of window treatment electronic drive units within system without requiring separate group controllers.
				3. Capable of assigning and reassigning individual, groups, and subgroups of window treatments to any control within system without requiring additional wiring or hardware changes.
				4. Capable of controlling window treatment speed for tracking within plus or minus 0.125 inch (3.17 mm)throughout entire travel.
				5. Provide 10 yearpower failure memory for preset stops, open and close limits, window treatment grouping and sub grouping and system configuration.
				6. Capable of synchronizing multiple window treatment electronic drive units to start, stop, and move in unison.
				7. Capable of stopping window treatments within accuracy of 0.125 inch (3.17 mm)at any point between open and close limits.
				8. Capable of storing up to 250programmable stop points, including open, close, and any other position.
				9. Capable of controlling lights and window treatments from single wall control button.
				10. Open and close limits programmable from electronic drive unit or keypad.

Include the following paragraph only if specifying motorized window treatments without digital communications link.

* + - 1. Window Treatments Without Digital Communications Link:
				1. Guestroom Control System Integration: Capable of operating window treatments via contact closure input from contact closure interface.
				2. Standalone Operation: Capable of operating window treatments via contact closure input from standalone keypad.

Typical dimming equipment is rated for 40 degrees C (104 degrees F). This is the maximum ambient temperature that can exist while the dimming equipment is operating at full load conditions. Include the following paragraph to ensure that the operating equipment is designed to operate at worst case environmental conditions without affecting product life.

* + 1. 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.
		2. Electrostatic Discharge Tolerance: Design and test equipment to withstand electrostatic discharges without impairment when tested according to IEC 61000-4-2.

Power dropouts occur frequently. When power is restored, the lighting system should recover quickly and automatically return to the last lighting levels. A momentary interruption (1 or 2 seconds) of power should not cause extended periods (20 seconds or more) without lighting while the system reboots and all other electrical equipment is back on.

* + 1. Power Failure Recovery: When power is interrupted and subsequently restored, within 3 seconds lights to automatically return to same levels (dimmed setting, full on, or full off) as prior to power interruption.
		2. Device Finishes:
			1. Wall Controls: ***<<Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated; As indicated on the drawings; To be selected by Architect; or \_\_\_\_\_\_\_\_\_\_>>***.
			2. Standard Colors: Comply with NEMA WD1 where applicable.
			3. Color Variation in Same Product Family: Maximum delta E of 1, CIE L\*a\*b color units per ASTM E308.

Daylight or fluorescent lighting generate ultraviolet light which can cause parts that do not meet ASTM D4674 to discolor/yellow over time.

* + - 1. Visible Parts: Exhibit ultraviolet color stability when tested with multiple actinic light sources as defined in ASTM D4674. Provide proof of testing upon request.

Use the following paragraph if interface with building automation system will be required. Any specific requirements can be added as subparagraphs below.

* + 1. Interface with building automation system***<< as specified in Section \_\_\_\_\_>>***.
		2. Interface with Existing Work: ***<<\_\_\_\_\_\_>>***.
	1. **LOAD CONTROL MODULES**
		1. DIN Rail Power Modules:
			1. General Requirements:
				1. Surge Tolerance: Designed and tested to withstand surges of 6,000 V, 3,000 amps according to IEEE C62.41.2 and IEC 61000-4-5 without impairment to performance.
				2. Power: 120-240 VAC, 50/60 Hz; provide connection as indicated or as required.
				3. Communications: Utilize RS485 wiring for low-voltage communications link.
				4. Passively cooled via free-convection, unaided by fans or other means.
			2. Switching Power Modules:
				1. Products:

***<<Type \_\_\_\_\_ - >>***4-zone low-capacity switching module; each zone rated at 1 A for lighting loads***.***

Contact Closure Input:

Provides interface for integration with magnetic door switch ***<<or keycard device>>***.

Accepts both momentary and maintained contact closures (maintained contact closure required to function correctly from door input).

***<<Type \_\_\_\_\_ - >>***3-zone low-capacity switching module; each zone rated at 1 A for lighting loads***.***

Contact Closure Input:

Provides interface for integration with magnetic door switch ***<<or keycard device>>***.

Accepts both momentary and maintained contact closures (maintained contact closure required to function correctly from door input).

***<<Type \_\_\_\_\_ - >>***2-zone low-capacity switching module; each zone rated at 1 A for lighting loads.

Contact Closure Input:

Provides interface for integration with magnetic door switch ***<<or keycard device>>***.

Accepts both momentary and maintained contact closures (maintained contact closure required to function correctly from door input).

***<<Type \_\_\_\_\_ - >>***4-zone switching module; each zone rated at 8A for lighting loads or 1/3 HP motor load; maximum of 16 A per module.

Emergency Contact Closure Input:

Provides activation of emergency mode; turns all loads on and disables control from other devices.

UL 924 certified for use with emergency lighting interface.

* + - * 1. Output Zones: Rated for resistive, inductive, or capacitive lighting loads as defined by IEC 60669-2-1 and NEMA 410.
				2. Manual Mode Operation: Provide button for each zone to turn loads on/off.
				3. Provide LED indicators for displaying diagnostic information.
				4. Contact Closure Output:

Provides interface for integration with room thermostat (setback control) or to control receptacles (via contactor).

Can be configured for maintained or pulsed output.

Inductive Loads: Provide flyback diode wired per manufacturer’s instructions to control unclamped inductive loads such as relays, solenoids, and motors.

* + - 1. Phase Adaptive Power Modules:
				1. Products:

***<<Type \_\_\_\_\_ - >>***4-zone low-capacity phase adaptive module.

Each zone rated for incandescent/halogen (120 W, 120 V), electronic low voltage (120 W, 120 V), magnetic low voltage (120 VA/90 W, 120 V), or neon/cold cathode (120 VA/90 W, 120 V); one load type per zone; minimum 5 W incandescent load requirement.

Provides leading-edge or trailing-edge dimming; automatic or manual configuration.

***<<Type \_\_\_\_\_ - >>***3-zone low-capacity phase adaptive module.

Each zone rated for incandescent/halogen (120 W, 120 V), electronic low voltage (120 W, 120 V), magnetic low voltage (120 VA/90 W, 120 V), or neon/cold cathode (120 VA/90 W, 120 V); one load type per zone; minimum 5 W incandescent load requirement.

Provides leading-edge or trailing-edge dimming; automatic or manual configuration.

***<<Type \_\_\_\_\_ - >>***2-zone low-capacity phase adaptive module.

Each zone rated for incandescent/halogen (120 W, 120 V), electronic low voltage (120 W, 120 V), magnetic low voltage (120 VA/90 W, 120 V), or neon/cold cathode (120 VA/90 W, 120 V); one load type per zone; minimum 5 W incandescent load requirement.

Provides leading-edge or trailing-edge dimming; automatic or manual configuration.

***<<Type \_\_\_\_\_ - >>***4-zone adaptive module.

Zone 1: Rated for incandescent/halogen (800 W, 120/277 V), electronic low voltage (800 W, 120/277 V), magnetic low voltage (800 VA/525 W, 120/277 V), or neon/cold cathode (800 VA/525 W, 120/277 V), LED Driver (maximum of 20 drivers), NEMA SSL 7A forward phase LED (400 W, 120 V), reverse phase LED (6.6 A, 120 V; 2.9 A, 277 V).

Zones 2 through 4: Each zone rated for incandescent/halogen (500 W, 120/277 V), electronic low voltage (500 W, 120/277 V), magnetic low voltage (500 VA/375 W, 120/277 V), or neon/cold cathode (500 VA/375 W, 120/277 V), LED Driver (maximum of 13 drivers), NEMA SSL 7A forward phase LED (200 W, 120 V), reverse phase LED (4.2 A, 120 V; 1.8 A, 277 V).

Provides forward phase or reverse phase dimming; automatic or manual configuration. Support auto-detect mode to detect and configure forward-phase or reverse-phase dimming for incandescent/halogen, electronic/magnetic low voltage, and neon/cold cathode light sources.

Emergency Contact Closure Input:

Provides activation of emergency mode; turns all loads on and disables control from other devices.

UL 924 certified for use with emergency lighting interface.

* + - * 1. Output Zones: One load type per zone.
				2. Manual Mode Operation: Provide button for each zone to turn loads on/off or dim loads up/down.
				3. Provide LED indicators for displaying diagnostic information.
				4. Provide cycle-by-cycle compensation for incoming line voltage variations, including changes in voltage, frequency shifts, harmonics, and line noise; accommodate up to plus/minus two percent change in frequency per second.
				5. Systems not providing cycle-by-cycle compensation to include external power conditioning equipment as part of dimming system.
				6. Comply with NEMA SSL 7A.

The following is based on Lutron Model QSN-4T5-120-D.

* + - 1. 0-10 V Power Modules:
				1. Product: 4-zone module.
				2. Output Zones:

Each zone provides 50 mA of 0-10 V dimming control conforming to IEC 60929 Annex E.2; source or sink automatically configures.

Relay: Each zone rated for 5 A for switching of incandescent, electronic low voltage, magnetic low voltage, and LED lighting loads.

* + - * 1. Manual Mode Operation: Provide buttons to turn loads on/off or dim loads up/down for each zone.
				2. Emergency Contact Closure Input:

Provides activation of emergency mode; turns all loads on and disables control from other devices.

UL 924 certified for use with a LUT-ELI emergency lighting interface.

* + - 1. DALI Fixture Control Modules:
				1. Products:

Provide bus power and control for two DALI busses.

Provide bus power and control for one DALI bus.

* + - * 1. Provide DALI-2 certified single master application controller.
				2. Provide testing capability using manual override buttons.
				3. Each DALI bus supports:

Control of up to 64 DALI-2 certified addressable loads, including any combination of static white/tunable white and device type 6/device type 8 drivers, grouped up to 64 zones.

Up to 250 mA bus power.

* 1. **GUESTROOM Processors**
		1. Edge Processors:
			1. Products:
				1. ***<<Type \_\_\_\_\_ - >>***2-link processor; supports up to 99 devices per link (198 devices total).
				2. ***<<Type \_\_\_\_\_ - >>***1-link processor; supports up to 50 devices.
			2. Power: Class 2 (low voltage).
			3. Supports connection to QS wired devices via QS links; supports connection to edge processors and integration appliance via system Ethernet link.
			4. Supports outbound cloud connection when connected to Internet. Processors that do not support cloud connectivity or that require inbound connection from cloud server are not acceptable. Manufacturers requiring on-site servers requiring annual maintenance are not acceptable. System requiring third-party servers to be pre-approved by IT department before acceptance with written approval.
				1. App connectivity to system for control and monitoring from iOS and Android mobile devices, including creating/editing timeclock events and editing scenes.
				2. Automated firmware updates via outbound HTTPS requests.
				3. Remote access, diagnostics, and service.
				4. Data insights software for energy and occupancy monitoring and reporting from web browser.
			5. Signed processor firmware ensures firmware update is authentically from manufacturer. Origin of unsigned processor firmware cannot be authenticated and is not acceptable.
			6. Supports two-way digital shade control. Processors that do not allow two-way digital shade communication are not acceptable.
			7. Supports time-dependent conditional programming that allows different sensor and keypad actions at different times of day. Processors that do not allow for time dependent conditional programming are not acceptable.
			8. Connects to controls via RS485.
			9. Integrates control station devices, shades, and external inputs into single customizable guestroom control system with:
				1. Multiple Failsafe Mechanisms:

Power failure detection via emergency lighting interface.

Protection: Lights go to full on if ballast wires are shorted.

Distributed architecture provides fault containment. Single hub failure or loss of power does not compromise lights and shades connected to other processors.

* + - * 1. Manual overrides.
				2. Automatic control.
			1. Supports internet connection for automated firmware updates and remote access, diagnostics, and service.
			2. Furnished with astronomical time clock.
			3. Maintains backup of programming in no-volatile memory capable of lasting more than ten years without power.
			4. Terminal block inputs to be over-voltage and miswire-protected against reversals and shorts.
			5. Provide LED indicators for displaying diagnostic information.
	1. **INTEGRATION APPLIANCES**
		1. Product: Lutron myRoom XC Integration Appliance; Model PM-INT.
		2. Hotel Property Management System Integration:
			1. Interpret and convert information from hotel property management system for use by guestroom control system:
				1. Guest check-in.
				2. Guest check-out.
			2. Support advanced sequence of operations including, but not limited to:
				1. Occupancy.
				2. Lighting scenes.
				3. Zones.
				4. HVAC controls.
				5. Shades.
		3. Hotel Property Management System Integration:
			1. Interpret and convert information from hotel property management system for use by guestroom control system:
				1. Guest check-in.
				2. Guest check-out.
				3. Room move.
				4. Room restriction.
			2. Support advanced sequence of operations including, but not limited to:
				1. Occupancy.
				2. Lighting scenes.
				3. Zones.
				4. HVAC controls.
				5. Shades.
		4. Hotel Property Management System Interface Software License:
			1. Interpret and convert information from hotel property management system for use by guestroom control system:
				1. Guest check-in.
				2. Guest check-out.
				3. Guest do-not-disturb on/off.
			2. Support advanced sequence of operations including, but not limited to:
				1. Occupancy.
				2. Lighting scenes.
				3. Zones.
				4. HVAC controls.
				5. Shades.
		5. Hotel Property Management System Interface Software License:
			1. Interpret and convert information from hotel property management system for use by guestroom control system:
				1. Guest check-in.
				2. Guest check-out.
				3. Guest message pending on/off.
				4. Room HVAC operating mode.
				5. Guest do-not-disturb on/off.
				6. Guest make-up-room on/off.
			2. Support advanced sequence of operations including, but not limited to:
				1. Occupancy.
				2. Lighting scenes.
				3. Zones.
				4. HVAC controls.
				5. Shades.
		6. Central Electronic Locking Systems (CELS) Integration:
			1. Enable compatible online door lock system to communicate door event messages over a user-supplied Ethernet network for use by guestroom control system.
			2. Features:
				1. Guest presence detection.
				2. Occupant differentiation.
				3. Energy saving.
				4. Thermostat programming.
		7. Hotel Service Management System Integration:
			1. Enable guestroom control system to communicate service messages over user-supplied Ethernet network for use by compatible ***Alice*** hotel service management system.
			2. Support the following service commands:
				1. Make up room (open/close).
		8. Hotel Service Management System Integration:
			1. Enable guestroom control system to communicate service messages over user-supplied Ethernet network for use by compatible ***HotSOS/REX*** hotel service management system.
			2. Support the following service commands:
				1. Make up room (true/false).
				2. Do not disturb (true/false).
				3. Guest in room (true/false).
				4. Valet box on/off.
				5. Butler call on/off.
				6. Butler visit on/off.
				7. Make up room (open/close).
		9. API Integration:
			1. Enable guestroom control system to communicate service messages over user-supplied Ethernet network for use by compatible third party hotel service management systems.
			2. Support the following service commands:
				1. Make up room (true/false).
				2. Do not disturb (true/false).
				3. Guest in room (true/false).
				4. Various service ticket codes.
	2. **GUESTROOM CONTROL SYSTEM SOFTWARE**

The following is based on Lutron Dashboard.

* + 1. Data Insights Software:
			1. General Requirements:
				1. No on-site hosting server (neither physical nor virtual). Manufacturers requiring on-site servers requiring annual maintenance are not acceptable. System requiring third-party servers to be pre-approved by IT department before acceptance with written approval.
				2. Web-based; runs on updated browsers including Edge, Chrome, and Safari.
				3. Constant internet connection to edge processors and gateways.
				4. Support multiple platforms and devices; runs from tablet, desktop, laptop.
				5. User interface supports multi-touch gestures such as pinch to zoom, drag to pan, etc.
				6. Utilizes HTTPS (industry-standard certificate-based encryption and authentication for security).
				7. Provide functionality listed below via single application.
			2. Software Updates:
				1. Provide software feature updates, enhancements, and security patches automatically with no disruption to system or space.
			3. Reporting: Provide reporting capability that allows building manager to gather real-time and historical information about system.
				1. Energy Reports: Show comparison of cumulative energy used over period of time for one or more areas.

Capable of displaying historic energy savings in kWh saved.

Capable of displaying historical views in time periods (days, weeks, months).

* + - * 1. Power Reports: Show power usage trend over period of time for one or more areas.
			1. Guestroom Data Summary:
				1. Provide tabular view of guestrooms showing current status of the following:

Lighting and HVAC energy.

Occupancy status.

Make-Up Room/Do-Not-Disturb room status.

Device alert status.

HVAC status.

* + - 1. Alerts: Real-time device alerts to allow building operator to understand system status.
				1. Include the following:

Wired and wireless device not responding.

Low battery warning.

Processor offline.

* + - 1. Notification:
				1. Visibly display alerts in application interface.
				2. Users with access receive daily emails of unresolved alerts.
			2. Support and Training:
				1. Training available accessible from application covering system overview and new feature additions.
			3. Administration:
				1. Share user access across entire system.
		1. API Integration:
			1. Support communication, without requiring interface, between guestroom control system and third-party systems via RESTful API.
			2. API Integration Capabilities:
				1. Discovery:

Areas: Area and scene names.

Zones: Zone names, minimum and maximum light levels.

The following paragraph would only be included if motorized shades are to be controlled by the lighting control system.

Shade Groups: Shade group and preset names.

HVAC Zones: Zone names, set point ranges, operating modes, fan modes, and schedules.

* + - * 1. Monitoring:

Area Information:

Occupancy status.

Occupancy enabled.

Lighting zone status.

Active scene.

Instantaneous and maximum lighting power.

Zone Information:

Light intensity.

Switch level.

Contact closure output status.

Correlated color temperature, where controllable.

Shade group level.

HVAC zone setpoint, current temperature, and HVAC fan speed status.

* + - * 1. Control:

Lighting Control:

Activate scene.

Set lighting zone level and correlated color temperature, where controllable.

The following paragraph would only be included if motorized shades are to be controlled by the lighting control system.

Shade Group Control:

Set shade group level.

Activate shade group preset.

HVAC Control:

Change temperature setpoint.

Change operating mode.

Change HVAC fan speed.

The following is based on Lutron Model LMRXC-BAC-PR.

* + 1. BACnet Software License:
			1. Enables guestroom control system to communicate by means of native BACnet IP communication (does not require interface) system through a user-supplied Ethernet network.
			2. Enables third-party hospitality building management system to control and monitor lighting, temperature, and room occupancy/vacancy status.
			3. Available information includes, but is not limited to:
				1. Any lights on.
				2. All lights off.
				3. Room temperature.
				4. Room humidity.
				5. Temperature setpoints.
				6. Lighting and HVAC power data.
	1. **CONTROL STATIONS**
		1. Provide control stations with configuration as indicated or as required to control the loads as indicated.

The following is based on Lutron Model QSWP-DM.

* + 1. Privacy Controls:
			1. Button press enables guest to initiate or cancel make-up-room and do-not-disturb requests.
			2. Power: Class 2 (low voltage).
			3. Communications: Utilize RS485 wiring for low-voltage communications link.
			4. Mounting: Wallbox; provide wall plates with concealed mounting hardware.
			5. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Black; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.

The following is based on Lutron Model QSWP-CP.

* + 1. Corridor Controls:
			1. Indicates status of guest make-up-room and do-not-disturb-requests.
			2. Button press provides doorbell functionality.
			3. Power: Class 2 (low voltage).
			4. Communications: Utilize RS485 wiring for low-voltage communications link.
			5. Mounting: Wallbox; provide wall plates with concealed mounting hardware.
			6. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Black; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.
		2. Keypads:
			1. General Requirements:
				1. Allows control of any devices part of the guestroom control system.

Controls can be programmed with different functionality through system software without any hardware changes.

* + - * 1. Allows for easy reprogramming without replacing unit.
				2. Buttons/Engraving:

To help occupants understand how to use the guestroom control system, engraving requirements should be included for all controls. Engraving details should include text size and style.

Engrave keypads with button, zone, and scene descriptions ***<<as indicated on the drawings; to be selected by Architect; or \_\_\_\_\_\_\_\_\_>>***.

Engravings to be ***<<icon-based; text-based; or \_\_\_\_\_\_\_\_\_>>***.

Engraving must be durable when exposed to cleaning and normal wear.

Borders, logos, and graduations to use laser engraving or silk-screened graphic process that chemically bonds graphics to faceplate, resistant to removal by scratching and cleaning.

Unlike traditional scene control wall stations, centralized low voltage controls can be programmed so that the buttons can have a variety of functions.

* + - * 1. Software Configuration:

Customizable keypad button functionality:

Buttons can be programmed to perform single defined action.

Buttons can be programmed to perform defined action on press and defined action on release.

Buttons can be programmed to perform automatic sequence of defined actions.

Capable of deactivating select keypads to prevent accidental changes to light levels.

Buttons can be programmed for raise/lower of defined loads.

Buttons can be programmed to toggle defined set of loads on/off.

* + - * 1. Status LEDs:

Time delays inherent in large systems can cause short delays between button press and system confirmation. To avoid any confusion and prevent multiple button presses, keypads should immediately show that the button has been pressed for visual confirmation.

Upon button press, LEDs to immediately illuminate.

There are two types of keypads; those that only send signals and those that send and receive signals. Having the latter type allows feedback to the user to verify that the request has been received and processed. If the lighting control system fails to process the button press request, the LED will turn off to indicate the true system status.

LEDs to reflect the true system status. LEDs to remain illuminated if the button press was properly processed or LEDs to turn off if the button press was not processed.

Support logic that defines when LED is illuminated:

Scene logic (logic is true when all zones are at defined levels).

Room logic (logic is true when at least one zone is on).

Pathway logic (logic is true when at least one zone is on).

* + - 1. Wired Keypads:

US style wallstations are rectangular, single column. Square style wallstations are square, single or double column.

* + - * 1. Style: ***<<US Style; Square Style>>.***
				2. Power: Class 2 (low voltage).
				3. Communications: Utilize RS485 wiring for low-voltage communications link.
				4. Mounting: Wallbox; provide wall plates with concealed mounting hardware.

To provide a clean, minimalist appearance, Palladiom wallstations feature buttons that are flush with the faceplate with minimal gaps and buttons/faceplates with matching material/finishes.

* + - * 1. Buttons and Faceplate:

Buttons to be greater than 0.65 inch (16.5 mm) in height to provide large target area for ease of use and actuation.

Front of buttons to be flush with faceplate.

Buttons and faceplate to be of the same material and finish (e.g. plastic/plastic, glass/glass, metal/metal).

Buttons to depress and provide tactile feedback of a successful button push. Controls utilizing capacitive or resistive touch technology are not acceptable.

Gaps to be less than 0.007 inch (0.18 mm) between buttons and less than 0.15 inch (3.8 mm) between buttons and faceplate.

Include the following paragraph to specify optional button/engraving backlighting.

* + - * 1. Button/Engraving Backlighting:

Backlighting to be visible through engraving to provide clear readability in a variety of lighting conditions.

Indicate active scene or room status through the intensity of the backlighting (brighter backlit text indicates the active state).

Backlight intensity adjustable via programming software; capable of dynamic adjustment during usage based on conditional logic (time of day, button press, etc.).

* + - * 1. Design keypads to allow field-customization of button color and engraving using field-changeable replacement kits.
				2. Terminal block inputs to be over-voltage and miswire-protected against wire reversals and shorts.
				3. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Custom colors to be selected by Architect; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.

SeeTouch QS Keypads:

• Available in several button configurations and finishes

• Receive up to two contact closure inputs

• LEDs on each button are used during programming and provide feedback when the buttons are pressed

• Large, rounded, backlit buttons with optional engraving

* + - 1. Wired Keypads:

Architectural series keypads use Lutron Nova T\* wall plates and are available in insert and non-insert styles. The insert style allows decorator-style controls to be easily ganged.

* + - * 1. Style: ***<<Architectural Non-Insert Style; Architectural Insert Style>>.***
				2. Power: Class 2 (low voltage).
				3. Communications: Utilize RS485 wiring for low-voltage communications link.
				4. Mounting: Wallbox or low-voltage mounting bracket; provide wall plates with concealed mounting hardware.
				5. Button/Engraving Backlighting:

Utilize backlighting for buttons and associated engraving to provide readability under all light conditions.

Backlight intensity adjustable via programming software.

* + - * 1. Design keypads to allow field-customization of button color, configuration, and engraving using field-changeable replacement kits.
				2. Contact Closure Interface: Provide two contact closure inputs on back of unit which provide independent functions from front buttons; accepts both momentary and maintained contact closures.
				3. Terminal block inputs to be over-voltage and miswire-protected against wire reversals and shorts.
				4. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Custom colors to be selected by Architect; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.

Architrave Keypads:

• Available in several button configurations and finishes

• Receives up to two contact closure inputs

• LEDs next to each button are used during programming and provide feedback when the buttons are pressed

• Available with green status and backlight LEDs

* + - 1. Wired Keypads:
				1. Power: Class 2 (low voltage).
				2. Communications: Utilize RS485 wiring for low-voltage communications link.
				3. Mounting: Wallbox; provide wall plates with concealed mounting hardware.
				4. Design keypads to allow field-customization of button color, configuration, and engraving using field-changeable replacement kits.
				5. Contact Closure Interface: Provide two contact closure inputs on back of unit which provide independent functions from front buttons; accepts both momentary and maintained contact closures.
				6. Terminal block inputs to be over-voltage and miswire-protected against wire reversals and shorts.
				7. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Custom colors to be selected by Architect; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.

Signature Series Keypads:

• Available in several button configurations and finishes

• Receive up to two contact closure inputs

• LEDs on each button are used during programming and provide feedback when the buttons are pressed

• Large, rounded, backlit buttons with option engraving

• Available with either Green or Blue status and backlight LEDs

* + - 1. Wired Keypads:
				1. Power: Class 2 (low voltage).
				2. Communications: Utilize RS485 wiring for low-voltage communications link.
				3. Mounting: Wallbox; provide wall plates with concealed mounting hardware.
				4. Button/Engraving Backlighting:

Utilize backlighting for buttons and associated engraving to provide readability under all light conditions.

Backlight intensity adjustable via programming software.

* + - * 1. Design keypads to allow field-customization of button color, configuration, and engraving using field-changeable replacement kits.
				2. Contact Closure Interface: Provide two contact closure inputs on back of unit which provide independent functions from front buttons; accepts both momentary and maintained contact closures.
				3. Terminal block inputs to be over-voltage and miswire-protected against wire reversals and shorts.
				4. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Custom colors to be selected by Architect; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.

The Pico Wireless Control is a flexible and easy to use device that allows the user to control dimmers and switches. The Pico wireless control can function as a tabletop control on a pedestal, a lightweight handheld remote, or it can be wall-mounted with or without a Lutron Claro faceplate, to mimic a traditional keypad. The battery-operated control requires no external power or communication wiring. Models are available with integral night light.

* + 1. Wireless (Radio Frequency) Controls:
			1. Products:
				1. ***<<Type \_\_\_\_\_ - >>***2-Button Control.

Button Marking: ***<<Light (icons); As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>.***

* + - * 1. ***<<Type \_\_\_\_\_ - >>***2-Button Control with Night Light.
				2. ***<<Type \_\_\_\_\_ - >>***2-Button with Raise/Lower Control.

Button Marking: ***<<Light (icons); Shade (icons); As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>.***

* + - * 1. ***<<Type \_\_\_\_\_ - >>***3-Button Control.

Button Marking: ***<<Light (icons); As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>.***

* + - * 1. ***<<Type \_\_\_\_\_ - >>***3-Button with Raise/Lower Control.

Button Marking: ***<<Light (icons); Shade (text); Shade (icons); Blackout (text); Sheer (text); Drapery (text); As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>.***

* + - * 1. ***<<Type \_\_\_\_\_ - >>***3-Button with Raise/Lower Control and Night Light.
				2. ***<<Type \_\_\_\_\_ - >>***4-Button.

Button Marking: ***<<Zone controls (light); Zone controls (shade); Scene keypads (light); Scene keypads (shade); 2-group controllers (lights); 2-group controllers (shades); 2-group controllers (light and shade); 4-group toggle; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>.***

* + - * 1. Single Pedestal.
				2. Double Pedestal.
				3. Triple Pedestal.
				4. Screw Mounting Kit.
				5. Wallbox Adapter.
			1. Quantity: ***<<As indicated on the drawings; To be determined; provide allowance for \_\_\_\_\_ control(s); or \_\_\_\_\_\_\_\_\_>>***.
			2. Communicates via radio frequency to compatible devices.
			3. Does not require external power packs, power or communication wiring.

Controls can be programmed with different functionality through system software without any hardware changes.

* + - 1. Allows for easy reprogramming without replacing unit.
			2. Button Programming:
				1. Single action.
				2. Toggle action
				3. Buttons can be programmed for raise/lower of defined loads.
			3. Includes LED to indicate button press or programming mode status.
			4. Mounting:
				1. Capable of being mounted with a table stand or directly to a wall under a faceplate.
				2. Faceplates: Provide concealed mounting hardware.
			5. Finish: ***<<As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White; Black; Ivory; Light Almond; White/Grey; As indicated on drawings; To be selected by Architect; or \_\_\_\_\_\_\_\_\_\_>>***.
	1. **ROOM THERMOSTATS**

--CHOOSE ONLY ONE OF THE TWO PARAGRAPHS BELOW--

* + 1. Thermostats to be 120 V, ***<<As specified under other sections; furnished by others; or \_\_\_\_\_\_\_\_\_\_>>***; provided with a contact closure input capable of setting back thermostat based on output from guestroom control system.

The following is based on Lutron QS Wired Palladiom Room Thermostat.

* + 1. Thermostats to be low-voltage, provided by Lighting Control Manufacturer for guestroom control system interface.
			1. Power: Class 2 (low voltage).
			2. Communications: Utilize RS485 wiring for low-voltage communications link.
			3. Mounting: Wallbox***; Lutron Model EBB-1-SQ***.
			4. Button/Display Backlighting: Turns on when any button is pressed and turns off after 10 seconds of inactivity.
			5. Temperature Setpoint/Display:
				1. Temperature Setpoint: Adjustable in 1 degree F (0.5 degree C) increments.
				2. Temperature Display: Displays in 1 degree F (0.5 degree C) increments.
				3. Can be toggled between Fahrenheit and Celsius units.
			6. Room Temperature Sensor:
				1. Measuring Range: 32 to 120 degrees F (0 to 50 degrees C).
				2. Accuracy: Plus/minus 1 degree F at 70 degrees F (0.5 degrees C at 25 degrees C).
				3. Temperature Calibration Range: Plus/minus 5 degrees F (3 degrees C).
			7. Provide integral room humidity sensor.
			8. Integral Passive Infrared Occupancy Sensor:
				1. Passive Infrared Sensing: Passive infrared coupled with technology for sensing fine motions. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor’s sensitivity threshold.
				2. Coverage: 900 square feet (81 sq m) with mounting height of 4 feet (1.2 m); 180 degree field of view.
				3. Adjustable sensitivity (high, low presets).

Palladiom devices feature matching buttons and faceplates (e.g. plastic/plastic, glass/glass, metal/metal).

* + - 1. Provide matching material/finish for buttons and wall plates.
			2. Finish: ***<< As specified for wall controls in "Device Finishes" under GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS article above; White, unless otherwise indicated; Custom colors to be selected by Architect; As indicated on drawings; or \_\_\_\_\_\_\_\_\_\_>>***.
			3. Provide interface as required to control HVAC system.

--CHOOSE ONE OF THE FIVE PARAGRAPHS BELOW--

* + - * 1. Interface by guestroom control system manufacturer for 3-speed fan and on/off heat and cool valve controlled fan coil units (FCU)***.***
				2. Interface by guestroom control system manufacturer for 3-speed fan or 0-10V fan and on/off heat and cool valve controlled or 0-10V heat and cool valve controlled fan coil units (FCU)**.**
				3. BACnet interface and BACnet client by HVAC system manufacturer (not furnished or configured by guestroom control system manufacturer).
				4. Modbus interface by HVAC system manufacturer (not furnished or configured by guestroom control system manufacturer).
				5. Modbus interface by third party interface manufacturer (not furnished or configured by guestroom control system manufacturer)***.***

Use of wired sensors requires a sensor module (see Low-Voltage Control Interfaces below)

* 1. **WIRED SENSORS**
		1. Wired Occupancy Sensors:
			1. General Requirements:
				1. Comply with UL 94.

The self-adaptive internal microprocessor analyzes the signals to eliminate time-consuming adjustments and callbacks found in non-intelligent sensors.

* + - * 1. Self-Adaptive: Continually adjusts sensitivity and timing to ensure optimal lighting control for any use of the space.
				2. Furnished with field-adjustable controls for time delay and sensitivity to override any adaptive features.

Power dropouts occur frequently. When power is restored, the lighting system should recover quickly and automatically return to the last lighting levels. A momentary interruption (1 or 2 seconds) of power should not cause extended periods (20 seconds or more) without lighting while the system reboots and all other electrical equipment is back on.

* + - * 1. Power Failure Memory: Settings and learned parameters to be saved in non-volatile memory and not lost should power be interrupted and subsequently restored.
				2. Furnished with all necessary mounting hardware and instructions.
				3. Class 2 devices.
				4. Ceiling-Mounted Sensors: Indicate viewing directions on mounting bracket.
				5. Wall-Mounted Sensors: Provide swivel-mount base.
				6. Color: White.

Ceiling- and wall-mounted sensors using passive infrared (PIR) technology sense occupancy by detecting the difference between heat emitted from the human body in motion and background space. PIR sensors are good at detecting major motion and require an unobstructed line-of-sight for accurate detection. Ceiling-mounted sensors are recommended for larger open spaces with ceilings less than 12 feet high. Wall-mounted sensors are recommended for spaces with pendant fixtures, ceiling fans, or ceilings more than 12 feet high.

* + - 1. Wired Passive Infrared Sensors:

Include the following paragraph to ensure that the line-of-sight is not obstructed due to dust and other contaminants.

* + - * 1. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.
				2. Ceiling-Mounted Sensors: Provide customizable mask to block off unwanted viewing areas.

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - * 1. Products:

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Passive Infrared Sensor, 450 square feet (42 sq m): Coverage of 450 square feet (42 sq m)with ceiling height of 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Passive Infrared Sensor, 1500 square feet (140 sq m): Coverage of 1500 square feet (140 sq m)with ceiling height of 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

***<<Type \_\_\_\_\_ - >>***Wall-Mounted Passive Infrared Sensor: Coverage of 1600 square feet (149 sq m)with ceiling height of 8 to 12 feet (2.4 to 3.7 m); 110 degree field of view.

Ceiling-mounted sensors using ultrasonic technology sense occupancy by bouncing ultrasonic sound waves (32kHz-45kHz) off objects in a space and detecting a frequency shift between emitted and reflected sound waves. Ultrasonic sensors are good at detecting minor motion and do not require an unobstructed line-of-sight. Ceiling-mounted sensors are recommended for larger open spaces with ceilings less than 12 feet high.

* + - 1. Wired Ultrasonic Sensors:

The intent of the following paragraph is to eliminate sensor cross talk and assure reliable performance.

* + - * 1. Utilize an operating frequency of 32kHz or 40kHz, crystal-controlled to operate within plus/minus 0.005 percent tolerance.

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - * 1. Products:

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Ultrasonic Sensor, 500 square feet (46 sq m): Coverage of 500 square feet (46 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 180 degree field of view.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Ultrasonic Sensor, 1000 square feet (93 sq m): Coverage of 1,000 square feet (93 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 180 degree field of view.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Ultrasonic Sensor, 2000 square feet (186 sq m): Coverage of 2000 square feet (186 sq m)with ceiling height of 8to 12 feet (2.6 to 3.7 m); 360 degree field of view.

Ceiling-and wall-mounted dual technology sensors use both passive infrared and ultrasonic technologies for sensing occupancy providing maximum reliability. Ceiling-mounted sensors are recommended for larger open spaces with ceilings less than 12 feet height. Wall-mounted sensors are recommended for spaces with pendant fixtures, ceiling fans, or ceilings more than 12 feet high.

* + - 1. Wired Dual Technology Sensors:

Include the following paragraph to ensure that the line-of-sight is not obstructed due to dust and other contaminants.

* + - * 1. Passive Infrared: Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

Include the following paragraph to eliminate sensor cross talk and assure reliable performance.

* + - * 1. Ultrasonic: Utilize an operating frequency of 32kHz or 40kHz, crystal-controlled to operate within plus/minus 0.005 percent tolerance.
				2. Ceiling-Mounted Sensors: Provide customizable mask to block off unwanted viewing areas.

Omit the optional choice in the following paragraph if only models with isolated relay will be used.

Contact Rating (R Models only)

SPDT 500mA rated at 24V isolated relay.

* + - * 1. Isolated Relay: Provide an internal additional isolated relay with Normally Open, Normally Closed, and Common outputs for use with HVAC control, Data Logging and other control options***<< where indicated>>***.

Omit the optional choice in the following paragraph if only models with integral photocell will be used.

PhotoCell (R Models only)

-Prevents light from turning on when there is sufficient natural light

-Sensitivity: 0-1,000 LUX adjustable

* + - * 1. Integral Photocell: Provide an integral photocell with adjustable sensitivity to prevent lights from turning on when there is sufficient natural light***<< where indicated>>***.

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - * 1. Products, Without Isolated Relay and Integral Photocell:

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Dual Technology Sensor, 500 square feet (46 sq m): Coverage of 500 square feet (46 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 180 degree field of view.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Dual Technology Sensor, 1000 square feet (93 sq m): Coverage of 1000 square feet (93 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 180 degree field of view.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Dual Technology Sensor, 2000 square feet (186 sq m): Coverage of 2000 square feet (186 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 360 degree field of view.

***<<Type \_\_\_\_\_ - >>***Wall-Mounted Dual Technology Sensor: Coverage of 1600 square feet (149 sq m)with ceiling height of 8 to 12 feet (2.4 to 3.7 m); 110 degree field of view.

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - * 1. Products, With Isolated Relay and Integral Photocell:

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Dual Technology Sensor, 500 square feet (46 sq m): Coverage of 500 square feet (46 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 180 degree field of view; with isolated relay and integral photocell.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Dual Technology Sensor, 1000 square feet (93 sq m): Coverage of 1000 square feet (93 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 180 degree field of view; with isolated relay and integral photocell.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Dual Technology Sensor, 2000 square feet (186 sq m): Coverage of 2000 square feet (186 sq m)with ceiling height of 8 to 12 feet (2.6 to 3.7 m); 360 degree field of view; with isolated relay and integral photocell.

***<<Type \_\_\_\_\_ - >>***Wall-Mounted Dual Technology Sensor: Coverage of 1600 square feet (149 sq m)with ceiling height of 8 to 12 feet (2.4 to 3.7 m); 110 degree field of view; with isolated relay and integral photocell.

* + 1. Sensor Power Packs:

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - 1. Products:
				1. ***<<Type \_\_\_\_\_ - >>***120-277 VAC power input/24 VDC, 150 mA power output; 16 A lighting (120-177 V), 1 HP motor (120-277 V) relay contact rating.
				2. ***<<Type \_\_\_\_\_ - >>***120-277 VAC power input (manual)/24 VDC, 150 mA power output; 16 A lighting (120-177 V), 1 HP motor (120-277 V) relay contact rating.
				3. ***<<Type \_\_\_\_\_ - >>***Control relay only (no power input/output); requires another power pack for power and counts as one of three sensors connected to a power pack; 16 A lighting (120-277 V), 1 HP motor (120-277 V), 15 A ballast (347 V) relay contact rating.
			2. Provide sensor power packs where required for power connection to sensors.
			3. For ease of mounting, installation and future service, power pack(s) to be able to mount through a 1/2 inch (16 mm) trade size knockout in a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Transformer to provide power to a minimum of three sensors.
			4. Plenum-rated.
			5. Control Wiring Between Sensors and Processors: Class 2, 18-24 AWG, stranded UL Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.
	1. **WIRELESS SENSORS**
		1. General Requirements:
			1. Operational life of 10 years without the need to replace batteries when installed per manufacturer's instructions.
			2. Communicates directly to compatible RF receiving devices through use of a radio frequency communications link.
			3. Does not require external power packs, power wiring, or communication wiring.
			4. Capable of being placed in test mode to verify correct operation from the face of the unit.
			5. RF Range: 30 feet (9 m)between sensor and compatible RF receiving device(s).

The FCC sets limits on EMI/RFI for both non-consumer (commercial and industrial) and consumer (residential) applications. The class B, consumer limits are more stringent than the class A, non-consumer limits.

* + - 1. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of CFR, Title 47, Part 15, for Class B application.

Lutron's occupancy/vacancy sensors are wireless, battery-powered passive infrared (PIR) sensors that automatically control lights via RF communication to compatible dimming and switching devices. These sensors detect the heat from people moving within an area to determine when the space is occupied. The sensors then wirelessly transmit the appropriate commands to the associated dimming and switching devices to turn the lights on or off automatically. They combine both convenience and exceptional energy savings along with ease of installation.

* + 1. Wireless Occupancy/Vacancy Sensors:
			1. General Requirements:
				1. 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.

Include the following paragraph to ensure that the line-of-sight is not obstructed due to dust and other contaminants.

* + - * 1. Utilize multiple segmented lens, with internal grooves to eliminate dust and residue build-up.

Lutron's XCT signal processing technology greatly enhances the performance of PIR sensors, enabling them to "see" fine motions that other sensors couldn't previously detect. Plus, the user-replaceable batteries are designed to last up to 10 years.

* + - * 1. Sensing Mechanism: Passive infrared coupled with technology for sensing fine motions. Signal processing technology detects fine-motion passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
				2. Provide optional, readily accessible, user-adjustable controls for timeout, automatic/manual-on, and sensitivity; adjustable timeout settings of 1, 5, 15 and 30 minutes.
				3. Color: White.
				4. Provide all necessary mounting hardware and instructions for both temporary and permanent mounting.
				5. Provide temporary mounting means 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.
				6. Sensor lens to illuminate during test mode when motion is detected to allow installer to verify coverage prior to permanent mounting.
				7. Ceiling-Mounted Sensors:

Provide surface mounting bracket compatible with drywall, plaster, wood, concrete, and compressed fiber ceilings.

Provide recessed mounting bracket compatible with drywall and compressed fiber ceilings.

Provide customizable mask to block off unwanted viewing areas.

* + - * 1. Wall-Mounted Sensors: Provide wall or corner mounting brackets compatible with drywall and plaster walls.
			1. Wireless Combination Occupancy/Vacancy Sensors:

-Wireless occupancy sensor has three settings available: Auto-On/Auto-Off, Auto-On Low-Light/Auto-Off, and Manual-On/Auto-Off

-Auto-On Low-Light feature will only turn lights on automatically if there is less than approximately 1 fc (10 lux) of ambient light

-Simple and intuitive adjustments available for Timeout, Auto-On, and Activity settings

-Supports advanced occupancy features, such as dependent occupancy groups and customizable occupied/unoccupied presets in some systems

-Refer to product specification submittal of receiving device to determine system limits

* + - * 1. Ceiling-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), an occupancy sensor with low light feature (automatic-on when less than one footcandle of ambient light available and automatic-off), or a vacancy sensor (manual-on and automatic-off).

-Wireless occupancy sensor has two settings available: Auto-On/Auto-Off, and Manual-On/Auto-Off

-Simple and intuitive adjustments available for Timeout, Activity, and Auto-On settings

-Supports advanced occupancy features, such as dependent occupancy groups and customizable occupied/unoccupied presets in some systems

-Refer to product specification submittal of receiving device to determine system limits

* + - * 1. Wall-Mounted Sensors: Programmable to operate as an occupancy sensor (automatic-on and automatic-off), or a vacancy sensor (manual-on and automatic-off).

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - * 1. Products:

Wireless ceiling-mounted occupancy/vacancy sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology for sensing fine motion. Sensor can be auto-on/auto-off, auto-on low light/auto-off, or manual on/auto-off. Ceiling-mounted sensors are recommended for spaces with ceilings less than 12 feet high.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Occupancy/Vacancy Sensor: Coverage from 324 square feet (30.2 sq m)to 676 square feet (62.4 sq m)depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

Wireless 180 degree coverage wall-mount occupancy/vacancy sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology. Sensor can be auto-on/auto-off or manual on/auto-off.

***<<Type \_\_\_\_\_ - >>***Wall-Mounted Occupancy/Vacancy Sensor: Minor motion coverage of 1500 square feet (139.4 sq m)and major motion coverage of 3000 square feet (278.7 sq m)with mounting height of 6 to 8 feet (1.6 to 2.4 m); 180 degree field of view.

Wireless 90 degree coverage corner-mount occupancy/vacancy sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology. Sensor can be auto-on/auto-off or manual on/auto-off.

***<<Type \_\_\_\_\_ - >>***Corner-Mounted Occupancy/Vacancy Sensor: Minor motion coverage of 1225 square feet (113.8 sq m)and major motion coverage of 2500 square feet (232.3 sq m)with mounting height of 6 to 8 feet (1.6 to 2.4 m); 90 degree field of view.

Wireless hallway occupancy/vacancy sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology. Sensor can be auto-on/auto-off or manual on/auto-off.

***<<Type \_\_\_\_\_ - >>***Hallway Occupancy/Vacancy Sensor: Major motion coverage of up to 150 feet (45.7 m)with mounting height of 6 to 8 feet (1.6 to 2.4 m); narrow field of view.

* + - 1. Wireless Vacancy-Only Sensors:

Visit [www.lutron.com](http://www.lutron.com/Education-Training/EnergyCodes/StateEnergyCodes/California/Pages/Overview.aspx) for more information on California Title 24 requirements.

* + - * 1. Operates only as a vacancy sensor (manual-on and automatic-off) )***<< in accordance with California Title 24 requirements>>***.

If more than one model is required, the optional choice can be used to assign type designations. Make sure that designations indicated on the drawings are consistent with those specified here.

* + - * 1. Products:

Wireless ceiling-mounted vacancy sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology for sensing fine motion. Sensor is manual on/auto-off (meets California Title 24 requirements). Ceiling-mounted sensors are recommended for spaces with ceilings less than 12 feet high.

***<<Type \_\_\_\_\_ - >>***Ceiling-Mounted Vacancy-Only Sensor: Coverage from 324 square feet (30.2 sq m)to 676 square feet (62.4 sq m) depending on ceiling height from 8 to 12 feet (2.4 to 3.7 m); 360 degree field of view.

Wireless 180 degree coverage wall-mount vacancy-only sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology. Sensor is manual-on/auto-off (meets California Title 24 requirements).

***<<Type \_\_\_\_\_ - >>***Wall-Mounted Vacancy-Only Sensor: Minor motion coverage of 1500 square feet (139.4 sq m)and major motion coverage of 3000 square feet (278.7 sq m) with mounting height of 6 to 8 feet (1.6 to 2.4 m); 180 degree field of view.

Wireless 90 degree coverage corner-mount vacancy-only sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology. Sensor is manual-on/auto-off (meets California Title 24 requirements).

***<<Type \_\_\_\_\_ - >>***Corner-Mounted Vacancy-Only Sensor: Minor motion coverage of 1225 square feet (113.8 sq m)and major motion coverage of 2500 square feet (232.3 sq m) with mounting height of 6 to 8 feet (1.6 to 2.4 m); 90 degree field of view.

Wireless hallway vacancy-only sensor using infrared technology for sensing occupancy coupled with Lutron XCT Technology. Sensor is manual-on/auto-off (meets California Title 24 requirements).

***<<Type \_\_\_\_\_ - >>***Hallway Vacancy-Only Sensor: Major motion coverage of up to 150 feet (45.7 m)with mounting height of 6 to 8 feet (1.6 to 2.4 m); narrow field of view.

These interfaces enable the lighting control system to receive or send a control signal to or from another system (Occupancy, A/V, shades). Include this article if control over the system through external inputs such as contact closure, Ethernet, RS232, etc. is required.

* 1. **LOW-VOLTAGE CONTROL INTERFACES**
		1. Provide low-voltage control interfaces as indicated or as required to control the loads as indicated.
		2. Connects to system using wired communication link.

The following is based on Lutron Model QSE IO.

* + 1. Contact Closure Interface:
			1. The contact closure input device to accept both momentary and maintained contact closures.
			2. The contact closure output device can be configured for maintained or pulsed outputs.

The QS Sensor Module (QSM) is a ceiling-mounted device that integrates Lutron wireless and wired sensors and controls through the QS communication link.

* + 1. Sensor Modules:
			1. Products:

Capabilities of the following module:

Up to 4 wired sensors per module

Maximum of 10 wireless occupancy sensors

Maximum of 10 wireless controllers

Sensor Module wireless range:

60 ft (18 m) line of sight

30 ft (9 m) through walls

* + - * 1. Sensor module with both wired and wireless inputs***.***

Capabilities of the following module:

Up to 4 wired sensors per module

* + - * 1. Sensor module with wired inputs only***.***

Capabilities of the following module:

Maximum of 10 wireless occupancy sensors

Maximum of 10 wireless controllers

Sensor Module wireless range:

60 ft (18 m) line of sight

30 ft (9 m) through walls

* + - * 1. Sensor module with wireless inputs only***.***
			1. Wired Modules:
				1. Provide wired inputs for:

Up to four occupancy sensors.

* + - 1. Wireless Modules:
				1. Provide wireless communication inputs for:

Up to 10 occupancy/vacancy sensors.

Up to 10 wireless controllers.

* + - * 1. RF Range: 30 feet (9 m)between sensor and compatible RF receiving devices.
				2. RF Frequency: 434 MHz; operates in FCC governed frequency spectrum for periodic operation; continuous transmission spectrum is not permitted.
			1. Communicate sensor information to wired low-voltage digital link for use by compatible devices.
	1. **POWER INTERFACES**
		1. Provide power interfaces as indicated or as required to control the loads as indicated.
		2. General Requirements:

Include the following paragraph to simplify field wiring for the installation contractor and prevent the failure of the interface due to phase to phase overvoltage.

* + - 1. Phase independent of control input.

Refer to NFPA 70 (NEC) 300.22, which references UL 2043 in informational note.

* + - 1. Rated for use in air-handling spaces as defined in UL 2043.

When off, the semiconductor in a dimmer circuit can allow leakage current to the load creating the possibility for an electrical shock. It is common for this leakage current to exceed 5 milliamps (the UL limit for GFCI outlets). Using an air gap eliminates leakage current by requiring a physical disconnect in the off position to prevent electric shock when servicing the load.

* + - 1. Utilize air gap off to disconnect the load from line supply.
			2. Diagnostics and Service: Replacing power interface does not require re-programming of system or processor.
		1. Products:

The following modules take phase control input and provide full circuit of forward/reverse phase control (16 amps) output. The output can be 120V or 277V. This is used for incandescent, magnetic low voltage (MLV), electronic low voltage (ELV), and neon/cold cathode.

* + - 1. Phase-Adaptive Power Module: Provides interface for phase control input to provide full 16 A circuit output of forward/reverse phase control for compatible loads.

The following modules take phase control input and provide full circuit of control (16 amps) output to Lutron Hi-lume dimming ballasts. The output can be 120V or 277V.

* + - 1. 3-Wire Fluorescent Power Module: Provides interface for phase control input to provide full 16 A circuit output for compatible line-voltage control fluorescent electronic dimming ballasts or LED drivers.

The following modules take phase control input and provide full circuit switching (16 amps) output. The output can be 120V or 277V. This is used for non-dim loads.

* + - 1. Switching Power Module: Provides interface for phase control or switched input to provide full 16 A circuit output of switching for compatible non-dim loads.

The following interfaces take phase control input and provide full circuit of switching and 0-10V low voltage output (16 amps) for electronic fluorescent ballasts/LED drivers.

* + - 1. Ten Volt Interface: Provides interface for phase control input to provide full 16 A circuit output of switching and 0-10 V low voltage control for compatible fluorescent electronic dimming ballasts or LED drivers.
	1. **CONTROL SYSTEM ACCESSORIES**
		1. Synthetic Minimum Load: Provide as indicated or as required to control loads below dimmer’s minimum rating.
		2. Power Supplies: Provide power supplies as indicated or as required to power system devices and accessories.
			1. Products:
				1. 30 Power Draw Unit (PDU) DIN rail-mounted power supply for compatible accessories and devices.
				2. Din rail-mounted power supply for guestroom processors, system devices, and interfaces with two wire harnesses pre-installed for installation inside a processor panel.
				3. Din rail-mounted power supply for guestroom processors, system devices, and interfaces with two wire harnesses pre-installed for installation inside a processor panel; TAA – Trade Agreement Act compliant.
				4. Din rail-mounted power supply for system devices, and interfaces for installation in an IP 20 rated consumer panel or breaker panel integrated DIN.
				5. Din rail-mounted power supply for system devices, and interfaces for installation in an IP 20 rated consumer panel or breaker panel integrated DIN; TAA – Trade Agreement Act compliant.
				6. Junction box-mounted power supply for shades, keypads, and accessories, and for providing additional low voltage power to communication link; with miswire and thermal protection.
				7. Plug-in power supply for shades, drapery drive units, keypads, and accessories, and for providing additional low voltage power to communication link; with miswire protection; powered from standard receptacle using cord 6 feet (1.8 m)in length; complies with DOE Level VI regulation.
				8. Ten output power supply panel for shades, drapery drive units, keypads and accessories, and for providing additional low voltage power to communication link; no replaceable fuses required for overload/miswire protection; contains DOE Level VI Compliant power supplies.
		3. Enclosures: Provide as required to house system components.

The following is based on Lutron Model LV16-120.

* + - 1. Low-Voltage Enclosures: Provide self-contained enclosed area for power feed.
				1. Product: 16 by 18 inches (40.6 by 45.7 cm), nominal; surface mounting; for mounting up to two guestroom processors or up to two system interfaces and up to four wire landing boards and two power supplies.
			2. High-Voltage Enclosure: 16 by 18 inches (40.6 by 45.7 cm), nominal; surface mounting; for mounting up to four DIN rail power modules.
		1. Wire Landing Boards: Provide as indicated or as required for terminating wiring.
	1. **Motorized DRAPERY TRACK**
		1. Products:
			1. Drapery track with wired (low voltage) digital communications link.

Alena drapery track without digital communications link is capable of either guestroom control system integration through contact closure interface or standalone operation via contact closure input from standalone keypad.

* + - 1. Drapery track without digital communications link.

The following paragraph can be used to define application information that might normally be indicated on the drawings.

If more than one type fabric, color, or mounting method is used, copy the following paragraph and edit accordingly. Use the optional choice to assign a unique designation for each (e.g. “Drapery Track Type A”, “Drapery Track for Guestroom 101”, etc.).

* + 1. Motorized Drapery Track***<< at \_\_\_\_\_\_\_\_\_\_; for \_\_\_\_\_\_\_\_\_\_; - Type \_\_\_\_\_; or \_\_\_\_\_\_\_\_\_\_>>***:

Specify manufacturer's pattern name/number and coordinate with material below. Lutron does not offer fabrics for drapery panels.

* + - 1. Drapery Panel Fabric: ***<<\_\_\_\_\_\_>>***.

There are dozens of options for fabric material. Select general characteristics or specify actual type of material.

Common types include:

Vinyl coated polyester.

Vinyl coated fiberglass.

PVC coated fiberglass.

100% Fiberglass.

Polyester-acrylic blend.

100% recycled content thermoplastic olefin.

* + - * 1. Material: ***<<\_\_\_\_\_\_>>***.
				2. Color: As selected by ***Architect*** from manufacturer’s full range of colors.
				3. Color: ***<<\_\_\_\_\_\_>>***.
			1. Draw Type: ***<<Side draw; Center draw; Split draw (only available for drapery track with digital communications link); As indicated on drawings; or \_\_\_\_\_\_\_\_\_>>***.
			2. Track Shape: ***<<Straight; Simple return (only available for drapery track with digital communications link); As indicated on drawings; or \_\_\_\_\_\_\_\_\_>>***.
			3. Track Length: ***<<As indicated on drawings; \_\_\_ feet (\_\_\_ m); or \_\_\_\_\_\_\_\_\_>>***.
			4. Mounting: ***<<Ceiling, surface; Ceiling, recessed in pocket; or \_\_\_\_\_\_\_>>***.
		1. General Requirements:
			1. Fabric: Non-flammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.

Additional fire tests may be required by some jurisdictions.

* + - * 1. Flammability: Pass NFPA 701 large and small tests.
			1. Drapery Style: ***<< Pinch pleat, with hook and loop drapery panel attachment to carrier; Ripplefold, with snap drapery panel attachment to carrier>>***.
			2. Tracks: Extruded aluminum, complete with drive belts, idler gear housings, carriers, and covers.
				1. Color/Finish: ***<<White; Bronze; Silver; As selected from manufacturer’s standard colors; Custom color to be selected; or \_\_\_\_\_\_>>***.
				2. Endcaps: Color to match track.
			3. Electronic Drive Units: 24 VDC, for connection to NFPA 70, Class 2 power source; size and configuration as recommended by manufacturer for the type, size, and arrangement of shades to be operated.

Noise rating is measured with the largest window treatment in the heaviest fabric.

* + - 1. Audible Noise: Maximum 44 dBA measured 3 feet (1 m)from the electronic drive unit; no audible clicks when motor starts and stops.
			2. Pull-to-Start Manual Operation: While at rest, pulling on drapery panel initiates motor operation for automatic movement to open/close limit.
		1. Accessories:
			1. Brackets and Mounting Hardware: Size as recommended by manufacturer for mounting configuration and span indicated.
			2. Fasteners: Non-corrosive, and as recommended by shade manufacturer.
			3. Cornice: ¾ inch (19 mm) thick fabric wrapped board with foam padding.
				1. Style: ***<<Straight; Lutron Shape A; Lutron Shape B; Lutron Shape C; Lutron Shape D; or \_\_\_\_\_>>***.
				2. Fabric: ***<<Match drapery panel; or \_\_\_\_\_>>***
		2. Fabrication:
			1. Field measure finished openings prior to ordering or fabrication.

Include the following paragraph to refer to manufacturer for tolerances or include the paragraph below to specify tolerances.

* + - 1. Dimensional Tolerances: As recommended in writing by manufacturer.

Include the following paragraph to specify tolerances or include the paragraph above to refer to manufacturer for tolerances.

* + - 1. Dimensional Tolerances: Fabricate drapery track to fit openings within specified tolerances.
				1. Side Draw: Extend track ***<<12 inches (300 mm); or \_\_\_ inches (\_\_\_ mm)>>*** beyond jamb on draw side only and flush on other side.
				2. Center or Split Draw: Extend track ***<<12 inches (300 mm); or \_\_\_ inches (\_\_\_ mm)>>*** beyond jambs on each side.
				3. Vertical Dimensions - Provide ***<<1/2 inch (13 mm); \_\_\_ inch (\_\_\_ mm)>>*** space between bottom of drapery panel and ***<<finish floor; or \_\_\_\_\_\_\_>>***.
	1. **SOURCE QUALITY CONTROL**
		1. See Section ***01 4000 - Quality Requirements***, for additional requirements.
		2. Factory Testing:

To ensure that 100 percent of the lighting control products work at installation, the manufacturer should test 100 percent of all assemblies at full rated load in the factory. This testing will assure that every product has been tested and guaranteed to work. Sampling would only prove that the samples work and should not be acceptable.

* + - 1. Perform full-function factory testing on all completed assemblies. Statistical sampling is not acceptable.

To ensure that 100 percent of the lighting control products work at installation, the manufacturer should test 100 percent of all ballasts and LED drivers at the factory.

* + - 1. Perform full-function factory testing on 100 percent of all LED drivers.
1. EXECUTION
	1. **EXAMINATION**
		1. Verify that field measurements are as shown on the drawings.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatments:
			1. Examine finished openings for deficiencies that may preclude satisfactory installation.
			2. If substrate preparation is the responsibility of another installer, notify ***Architect*** of unsatisfactory preparation before proceeding.
			3. Start of installation shall be considered acceptance of substrates.
		2. Verify that ratings and configurations of system components are consistent with the indicated requirements.
		3. Verify that mounting surfaces are ready to receive system components.
		4. Verify that conditions are satisfactory for installation prior to starting work.
	1. **PREPARATION**

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatments:
			1. Prepare surfaces using methods recommended by manufacturer for achieving best result for substrate under the project conditions.
			2. Coordinate with window installation and placement of concealed blocking to support window treatments.
	1. **INSTALLATION**
		1. 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;, including mounting heights specified in those standards unless otherwise indicated; or \_\_\_\_\_\_\_\_\_\_>>***.
		2. Install products in accordance with manufacturer's instructions.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatment Installation:
			1. Install in accordance with approved shop drawings, using mounting devices as indicated.
			2. Installation Tolerance: ***<<1/16 inch (1.5 mm); \_\_\_ inch (\_\_\_ mm)>>*** maximum offset from level.
			3. Replace window treatments that exceed specified dimensional tolerances at no extra cost to ***Owner.***
			4. Ensure smooth window treatment operation.

In order for the system to be fully commissioned and operating to specification, a database will need to be created. It is critical that the manufacturer receive information on load and control functionality so that the database can be written and fully tested by the manufacturer.

* + 1. Define each dimmer/relay load type, assign each load to a zone, and set control functions.
		2. Sensor Locations:

Lighting Control Manufacturer Sensor Layout and Tuning service may be specified in Part 2 under "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS".

* + - 1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under "GUESTROOM CONTROL SYSTEM - 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.
			2. Sensor locations indicated are diagrammatic. Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage, in accordance with manufacturer's recommendations.

Many lamp manufacturers recommend seasoning fluorescent lamps prior to dimming in order to ensure full rated life.

* + 1. 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.

If the lamp leads exceed the specification, trouble starting the lamps may result.

* + 1. LED Light Engine/Array Lead Length: Do not exceed 100 feet (31 m).

Use the following paragraph to specify an optional visit for system and network integration consultation. Edit the second choice to have this additional value include as an alternate or as part of the base bid.

**A System and Network Integration Consultation is required for a job that will integrate with a third party BMS system.**

* + 1. System and Network Integration Consultation: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** 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.
		2. Identify system components ***<< in accordance with Section 26 0553>>***.
	1. **FIELD QUALITY CONTROL**
		1. See Section ***01 4000 - Quality Requirements***, for additional requirements.

Lutron's full-scope startup services include multiple site visits to ensure proper operation. The first site visit ensures that the contractor is trained to install the system correctly. The second visit starts up the system and ensures that the system is operating as specified. The third visit trains the owner on system operation and functionality.

* + 1. Manufacturer's Full-Scope Startup Services:
			1. Manufacturer's authorized Service Representative to conduct minimum of three site visits to ensure proper system installation and operation.
			2. Conduct Pre-Wire visit to review requirements with installer as specified in Part 1 under "Administrative Requirements".
			3. Conduct second site visit upon completion of guestroom control system to perform system startup and verify proper operation:

Lighting Control Manufacturer Sensor Layout and Tuning service may be specified in Part 2 under "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS".

* + - * 1. Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under “GUESTROOM CONTROL SYSTEM – 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.
				2. Verify connection of power wiring and load circuits.
				3. Verify connection and location of controls.
				4. Energize guestroom processors and download system data program.
				5. Address devices.
				6. Verify system operation control by control.
				7. Verify proper operation of manufacturer's interfacing equipment.
				8. Configure initial groupings of loads for wall controls and occupancy sensors.
				9. 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 "GUESTROOM CONTROL SYSTEM - GENERAL REQUIREMENTS".
				10. Obtain sign-off on system functions.

Include the following paragraph if start-up of lighting control system outside of normal business hours is required. Edit the choice to have this additional cost included as an alternate or as part of the base bid.

* + - * 1. After Hours Startup: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs to perform manufacturer's startup procedures outside normal working hours (Monday through Friday, 7am to 5pm).
			1. Conduct third visit to train Owner's representative on system capabilities, operation, and maintenance, as specified in Part 3 under "Closeout Activities".
		1. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.
	1. **ADJUSTING**

Use the following paragraph to specify an optional on-site meeting with the Lighting Control Manufacturer to make adjustments to the lighting control system, after all equipment and room furnishings have been installed. Edit the first choice to have this additional value included as an alternate or as part of the base bid.

This meeting may be desired in order to meet the lighting designer's original design intent. These adjustments may include light level, fade time and delay in lighting scenes.

* + 1. On-Site Scene and Level Tuning: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_>>*** additional costs for Lighting Control Manufacturer to visit site to conduct meeting with ***<<Engineer; Owner's representative; Lighting Designer; or \_\_\_\_\_\_\_\_\_\_>>*** to make required lighting adjustments to the system for conformance with original design intent.

Lighting Control Manufacturer Sensor Layout and Tuning service may be specified in Part 2 under "LIGHTING CONTROL SYSTEM - GENERAL REQUIREMENTS".

* + 1. Sensor Fine-Tuning: Where Lighting Control Manufacturer Sensor Layout and Tuning service is specified in Part 2 under “LIGHTING CONTROL SYSTEM – GENERAL REQUIREMENTS”, Lighting Control Manufacturer to provide up to two additional post-startup on-site service visits for fine-tuning of sensor calibration. Where Lighting Control Manufacturer Sensor Layout and Tuning service is not specified, ***Contractor*** to provide fine-tuning of sensor calibration.
	1. **CLEANING**
		1. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

Include the following paragraph only if specifying motorized window treatments.

* + 1. Window Treatments:
			1. Clean soiled window treatments and exposed components as recommended by manufacturer.
			2. Replace window treatments that cannot be cleaned to "like new" condition.
	1. **COMMISSIONING**
		1. See Section ***01 9113 – General Commissioning Requirements*** for commissioning requirements.

Use the following paragraph to specify that lighting control acceptance testing required by California Title 24, Part 6 (California Energy Code) be performed by Lighting Control Manufacturer. Edit the second choice to have this additional cost included as an alternate or as part of the base bid.

Required documentation associated with this service is also specified in Part 1 under “SUBMITTALS”.

* + 1. Title 24 Acceptance Testing Service: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for Lighting Control Manufacturer to perform lighting control acceptance testing in accordance with CAL TITLE 24 P6. Submit required documentation.
	1. **CLOSEOUT ACTIVITIES**
		1. See Section ***01 7800 - Closeout Submittals***, for closeout submittals.
		2. See Section ***01 7900 - Demonstration and Training***, for additional requirements.
		3. Demonstration:

Use the following paragraph to specify an optional on-site walkthrough to demonstrate system functionality (at an additional cost). Edit the first choice to have this additional cost included as an alternate or as part of the base bid.

**An on-site walkthrough to demonstrate system functionality to a commissioning agent is often required for LEED projects, other projects which involve a commissioning agent, or Title 24 (California) projects.** During this visit, the manufacturer's authorized Service Representative will perform tasks, at the request of the facility representative or commissioning agent, such as to demonstrate wall control functions, explain timeclock schedules or describe occupancy or daylight sensor functionality.

* + - 1. On-Site Performance-Verification Walkthrough: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_\_>>*** additional costs for Lighting Control Manufacturer to provide on-site demonstration of system functionality to ***<<commissioning agent; facility representative; or \_\_\_\_\_\_\_\_\_\_>>***.
		1. Training:

Lutron's full-scope startup procedure includes training of customer representatives. Include the paragraph below to specify additional training visits.

* + - 1. Include services of manufacturer's authorized Service Representative to perform on-site training of Owner's personnel on operation, adjustment, and maintenance of lighting control system as part of manufacturer’s full-scope startup services.

Lutron's standard start-up procedure includes one day of training for customer representatives. Use the following paragraph to specify additional training visits. Edit the first choice to have this additional value included as an alternate or as part of the base bid. Edit the number of training days required according to project requirements.

* + - 1. Customer-Site Solution Training Visit: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_>>*** additional costs for Lighting Control Manufacturer to provide ***<<one; or \_\_\_\_\_>>*** day(s) of additional on-site system training.
	1. **PROTECTION**
		1. Protect installed products from subsequent construction operations.
		2. Touch-up, repair or replace damaged products before Substantial Completion.
	2. **MAINTENANCE**
		1. See Section ***01 7000 - Execution and Closeout Requirements***, for additional requirements relating to maintenance service.

Use the following paragraph to specify an on-site meeting between the Lighting Control System Manufacturer and a facility representative to evaluate the system usage after the building has been in operation for a predetermined period of time (at an additional cost). Edit the first choice to have this additional cost included as an alternate or as part of the base bid. This evaluation can include sensor calibration, timeclock programming, light level analysis, sensor layout support, and training. Edit the time period according to project requirements.

* + 1. System Optimization Visit: Include ***<<as part of the base bid; as an alternate to the base bid; or \_\_\_\_\_\_\_\_\_>>*** additional costs for Lighting Control System Manufacturer to visit site ***<<six months; or \_\_\_\_\_\_\_\_\_\_>>*** after system start-up to evaluate system usage and discuss opportunities to make efficiency improvements that will fit with the current use of the facility.

END OF SECTION