

# Technical Specifications for Implementation of Lighting Retrofits at Moorpark USD

**A108SLT1**

Prepared For:

Moorpark Unified School District  
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## A Project Supported by SoCalREN

Southern California Regional Energy Network (SoCalREN) Public Agency Program, administered by Los Angeles County, was authorized by the California Public Utilities Commission to help eligible public agencies in Southern California harness their collective action, save energy, reduce operating costs and protect precious resources. To expand public agency participation in utility energy efficiency programs, SoCalREN is offering a range of free energy efficiency services to assist public agencies with accelerating energy retrofits.

The Lighting Retrofit projects at three of Moorpark Unified School District's school sites are being supported by SoCalREN. The three schools considered are:

- **Mountain Meadows Elementary School**
- **Chaparral Middle School**
- **Moorpark High School**

The services provided as Construction Management Support are defined on a separate document titled *Roles and Responsibilities for Construction Management Support*. Please refer to this document to better understand the relationship and role of SoCalREN Project Manager and assigned Energy Consultant.

Participation of SoCalREN is entirely at the discretion of Moorpark USD and SoCalREN may modify or terminate its services based on funding availability.

## Disclaimer

Estimates of potential Investor-Owned Utility (IOU) incentives and On-Bill Financing funding values are based on the most up-to-date information available from the corresponding utility. Utilities reserve the right to change and/or terminate funding for Energy Efficiency projects based on evolving priorities as determined by California Public Utilities Commission directives. These changes can happen without notice. Furthermore, errors in submitted documentation, delays in project implementation, and lack of adherence to utility program requirements can all impact the final IOU Incentive and On-Bill Financing values and approvals.

## 1. Description of Scope

### 1.1. Summary of Scope

#### 1.1.1. Interior Lighting Replacement

Based on the best available information from the District, it has been concluded that there has not been a major lighting renovation project at any of the scoped sites in the recent past. During the audits conducted at the school sites it was observed that interior lighting consisted of CFL lamps, different configurations of linear fluorescent fixtures, and some HID high bay fixtures. It's assumed that all or most of the interior lighting fixtures at the school have exceeded their Effective Useful Life (EUL) and are excellent candidates for replacement. It is recommended that these fixtures are replaced with light-emitting diode (LED) fixtures. For all interior lighting retrofits, the retrofit can consist of full fixture replacements, installation of LED retrofit kits, and/or lamp replacements. LED technology is more energy efficient, provides better light quality, requires less maintenance, and has a longer EUL.

It is important that the newly installed fixtures meet or surpass the lighting power density and control requirements set forth by the California Building Standards Code Title 24.

#### 1.1.2. Interior Lighting Controls Upgrade

It is assumed that all interior lighting systems are controlled via manual on/off switches, but this will need to be verified during initial site inspections. All interior spaces shall be conditioned so that interior lights have occupancy sensing and multi-level lighting controls installed to meet the requirements set forth by the California Building Standards Code Title 24.

#### 1.1.3. Exterior Lighting Replacement

As with interior lighting, there has not been any major exterior lighting renovations in the recent past. Exterior lights consist of a variety of different fixture types with mostly metal halide and high pressure sodium lamps of different wattages that have been replaced over time as needed. It is recommended that all exterior fixtures are replaced with LED fixtures. Typically for exterior lights, it is recommended that the full fixture be replaced to address heat dissipation and ensure proper photometric distribution. However, there are a few instances that could consider lamp replacement or installing fixture retrofit kits instead of a full fixture replacement for financial reasons.

It is important that the proposed fixtures meet or surpass the lighting power density and control requirements set forth by the California Building Standards Code Title 24.

#### 1.1.4. Exterior Lighting Controls Upgrade

The exterior lights at the three sites are controlled by mechanical time clocks. This technology allows for limited customization and requires frequent maintenance to ensure efficient operation. In parallel with the exterior lighting replacement initiative, all controllers shall be replaced with newer technologies that allow for a more customizable controls strategy. This may include controlling the fixtures utilizing photocells, an astronomical timeclock, and/or networked lighting control system. The new lighting control system along with the Title 24 required controls, such as motion sensors, can be paired to deliver significant energy savings.

\*An example controls strategy is presented as follows (\*District to indicate whether a specific strategy is desired):

- At sunset, a photocell or an astronomical timeclock activates the exterior lights.
- From sunset to 7pm the lights are fully operational and are at 100% light output.
- From 7pm to 11pm the lights utilize the motion sensors to dim the fixtures to 50% output when a space is not occupied. When the space becomes occupied the light output is increased to 100% until the space is no longer occupied.
- From 11pm to 6am the lights utilize the motion sensors to dim the fixtures to 0% output when a space is not occupied. When the space becomes occupied the light output is increased to 100% until the space is no longer occupied.
- From 6am to sunrise the lights utilize the motion sensors to dim the fixtures to 50% output when a space is not occupied. When the space becomes occupied the light output is increased to 100% until the space is no longer occupied.
- At sunrise, a photocell or an astronomical timeclock deactivates the exterior lights.

### 1.3. Site Overview

#### 1.3.1. Mountain Meadows Elementary School

**ADD LAYOUT FOR MOUNTAIN MEADOWS ES**

**Figure 1 – Mountain Meadows Elementary School Map**

Address	4200 Mountain Meadow Dr, Moorpark, CA 93021
Sq. ft.	
Year built	1987

#### 1.3.2. Chaparral Middle School

**ADD LAYOUT FOR MOUNTAIN MEADOWS ES**

**Figure 2 – Chaparral Middle School**

Address	280 Poindexter Ave, Moorpark, CA 93021
Sq. ft.	89,552
Year built	1961

1.3.3 Moorpark High School

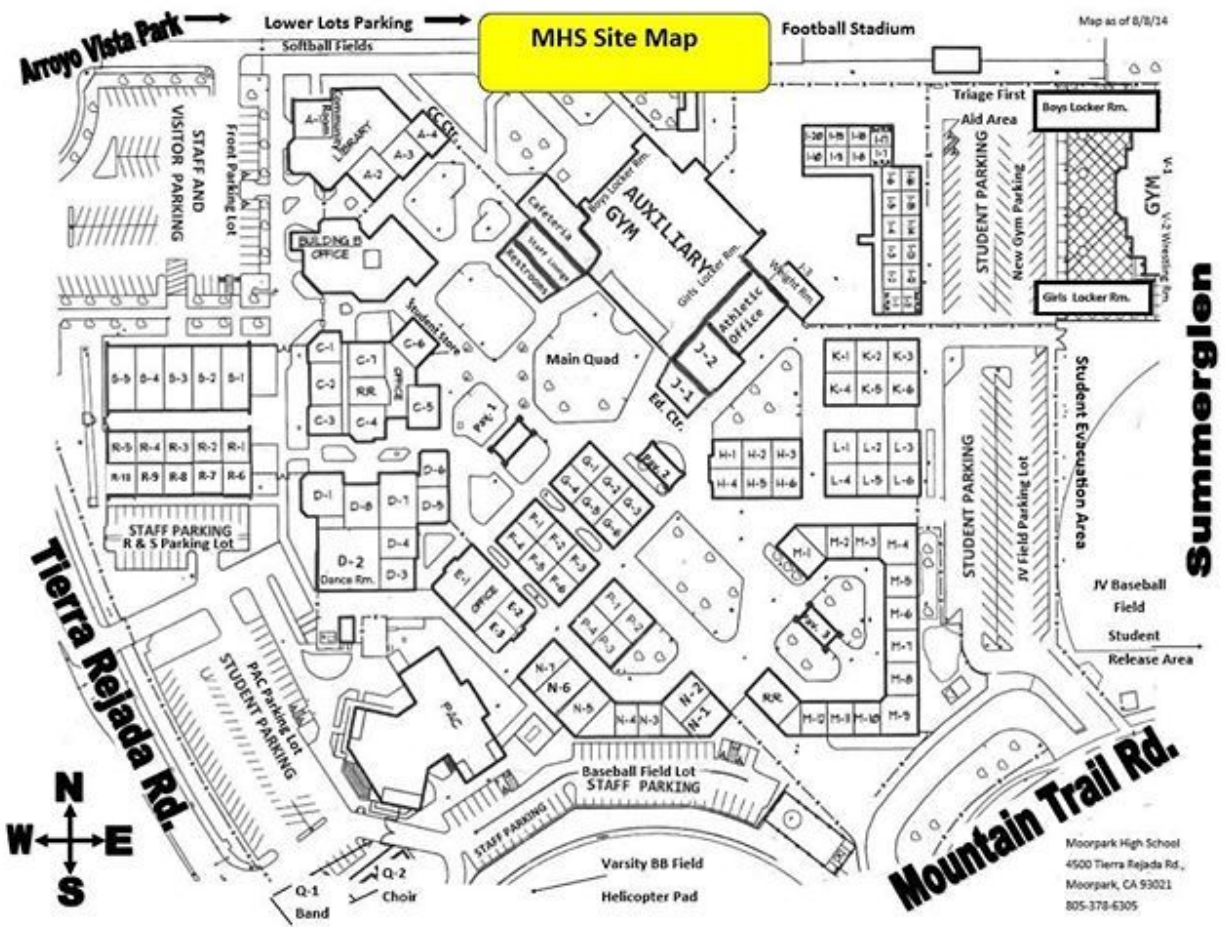


Figure 3 – Moorpark High School Map

Address	Tierra Rajada Road, Moorpark, CA 93021
Sq. ft.	244,633
Year built	1920

Scope of work consists of replacing all interior and exterior lighting fixtures with more efficient LED fixtures and installing new lighting controls as required by Title 24 throughout the three school sites listed above.



## 1.4. Survey of Existing Conditions

Bid documents require a preliminary design solution for all lighting listed in the documents for the interior and exterior areas. Potential bidders are required to attend a mandatory site walk to become familiar with the areas addressed in the preliminary survey documents. Bidders are responsible for verifying and revise accordingly the audit information to accurately represent actual conditions and fixture types and quantities for each scoped area.

The proposed design shall include assessments of all existing survey documents to understand their condition and their implications for system design, construction and operation.

The selected Contractor shall utilize AutoCAD electronic files whenever they are available to represent the layout of the building and/or the construction of the existing lighting systems. Where AutoCAD drawings of the existing lighting system are not available, the Contractor shall use scanned drawings. Where building plans are not available, the Contractor shall use site plans to display the layout of the existing lighting.

## 1.5. Retrofit/Replacement Requirements

Bidders shall propose design solutions to improve the lighting and control system for each lighting retrofit. The Bidders may propose either retrofit, such as installation of new lamps and ballast in existing housing, or full fixture replacement, for each entry listed on the 'Existing Fixture Survey'. The 'Existing Fixture Surveys' may note additional guidelines that dictate which type of fixtures, controls or retrofits can be proposed in specific applications. It is recommended to replace lighting in the existing location to utilize the existing circuits. Provide universal voltage for initial design, fixtures are to be field verified by the selected Contractor for circuiting and voltage once contract is awarded.

Retrofit and/or replacement fixtures shall meet Moorpark USD's desired aesthetic for each location. Uniformity in luminaire's appearance, performance, and control capability shall be considered by the Bidder and approved by Moorpark USD during the design review process.

Bidders shall describe their proposed modifications for each lighting solution proposed. This includes an identification of the proposed ballasts, lamps, fixtures, retrofit kits and controls. If the project includes a change in the total number of fixtures, schematic drawings showing each proposed new and removed fixture shall be included for District's review.

For LED-based fixtures, Bidders shall provide the power draw for each fixture as stated in the DesignLights Consortium Appendix E Pre-Qualified LED Fixture List. For non-LED-based fixtures, power draw for each fixture in the proposed case shall be provided from the PG&E 2018 Statewide Customized Offering Procedures Manual for Business, Appendix B Table of Standard

Fixture Wattages. For fixtures with two lighting levels provide the power and light level information for both levels. For fixtures with dimming capability, provide the power and light level information at 100%, 50% and minimum light levels. State the specific minimum light levels achieved by the luminaire.

During the design process, the selected Contractor shall provide a count of each of the proposed luminaires, the total power draw for the luminaires in each zone, and the proposed installed lighting power density (W/square foot) in each lighting zone.

Bidders shall summarize proposed fixtures and energy usage using the provided template in the “Summary of Proposed Fixtures and Wattages” workbook and submit a qualitative description of their controls system/approach. The information will be used by Moorpark USD to run energy calculations and compare bids.

For each of the scoped buildings, provide the following information:

- Proposed fixture description
- Proposed fixture quantity
- Proposed Lamps/fixtures
- Proposed Nominal Fixture Wattage (W)
- Proposed Actual Fixture Wattage (kW)

The selected Contractor shall ultimately be responsible for proper disposal of removed or replaced lighting components and shall include the decommissioning, removal and proper disposal of existing lighting control panels and associated equipment in their proposal.

## 2. Design and Design Review

### 2.1. General

Upon Moorpark USD’s written Notice to Proceed, the selected Contractor shall review their Design Proposal with the Moorpark USD Representative and make changes to the documents as directed that are typical of final revisions to Schematic Design and do not materially change the scope of the work. Upon Moorpark USD’s written approval of the revised Design Proposal, the Contractor shall prepare Design Development documents for approval by Moorpark USD’s Representative. These documents shall consist of such drawings, audit Sheets and narratives as needed to establish and describe the size and character of the entire Project and allow Moorpark USD to initiate Scope Compliance Review(s). The Contractor shall incorporate into the Design Development documents electrical (power and lighting) systems, materials, and such

other elements and other systems as required for the work and as described in the Contract Documents.

The Contractor shall submit documentation supporting the design criteria for the electrical and lighting systems, and other specialized building systems affected by this project.

The work of this phase is subject to independent reviews, both internal and external, and value engineering.

Prior to finalizing the design drawings, the Contractor will compare the design against the SCE Incentive program and the Prop 39 program requirements. Contractor shall verify the current SCE incentive program offerings and ensure that the proposed equipment meets the program requirements to the extent of the project scope eligibility. If there are any issues that they foresee, the Contractor will alert Moorpark USD and/or their representative. It is the Contractor's responsibility to ensure compliance with the requirements of both programs.

## **2.2. Electrical Requirements**

The power layouts shall be shown on one set of drawings, and the lighting layouts shall be shown on a different set of drawings. Use standard symbol conventions.

### **2.2.1. Floor Plans**

- a. Scale: Not less than 1/8 inch = 1 foot 0 inches
- b. Indicate the location of each load center unit substation, distribution switchboard, panel board for power and lighting.
- c. Indicate the types and locations of lighting fixtures and controls and use a schedule for detail.

### **2.2.2. Large-Scale Drawings**

- a. Scale: Not less than ¼ inch = 1 foot 0 inches.
- b. Provide a layout of all equipment rooms and closets to ensure the proposed equipment with proper clearances will fit in the allotted space.

### **2.2.3. Schedules**

- a. Provide schedules for light fixtures, lamp types, ballasts, watts, controls and retrofit kits.
- b. Provide panel schedules.

### 2.3. Design Submittals

The Contractor shall prepare a comprehensive submittal package for each phase of the Work that will be reviewed and approved by Moorpark USD. Each submittal package shall include, at a minimum, the required elements that convey in sufficient detail for each phase of the design, the necessary documentation as follows:

- Site Layout Drawings
- Illuminance Calculations
- Energy Savings Calculations
- Construction Specifications (trenching, mounting, etc.)
- Equipment Layout Drawings
- Detailed Drawings
- Single-Line Diagrams
- IT Network Connection Diagrams
- Control System Architecture
- Structural Drawings
- Manufacturer's Cut Sheets
- Equipment Specifications
- Installation Details and/or Directions
- Graphical representation of grouping/zoning of fixtures

Contractor shall include adequate time for Moorpark USD review and approval of submittals, as well as re-submittals and re-reviews. Minimum Moorpark USD review time shall be **ten (10) days** from the date of receipt of each submittal package during each phase of the Design Review.

### 2.4. Division of the State Architect (DSA) Review

Construction Documents must be reviewed and approved where applicable by the Division of the State Architect (DSA). Contractor shall be responsible for obtaining all DSA approvals and shall account for DSA requirements in their system designs, project pricing, and schedule. Moorpark USD will not grant Contractor relief based on the Contractor's incomplete or incorrect understanding of DSA requirements.

## 3. Construction

### 3.1. General

The Contractor shall provide all materials, equipment, labor, and services required by the Contract Documents to construct the entirety of the Work for the Contract Sum and within the Contract Time during the Construction Phase.

### 3.2. Testing and Inspection

Testing and inspection shall follow the approved Quality Control Plan and the Specifications.

The Contractor shall:

- a. Participate in punch list inspections for beneficial occupancy, substantial completion and completion. Punch lists shall be prepared by the Contractor on the project to confirm code and design compliance.
- b. Assist Moorpark USD's Representative in reviewing test and inspection results.
- c. Not authorize deviations from the Contract Documents.
- d. Assure the Construction Work complies the Quality Control Plan and Specifications.

### 3.3. Record Documents

Any revisions or changes that have been made during the construction phase shall be incorporated in the Record Documents. During construction, the Moorpark USD's Representative shall have reviewed all revisions and changes and shall have approved the set of drawings and specifications maintained by the Contractor prior to their preparation of the final Record Documents. The Contractor shall provide reproducible Record Documents to the District in all the following formats: (1) hardcopy and (1) electronic copy in pdf, Excel & Word (for Specifications) and AutoCAD formats.

Electrical drawings shall include the following items:

- a. The final control sequence for each lighting system, if modified.
- b. Revisions of each schedule in the original Contract Documents reflecting the actual equipment installed (by manufacturer's name and model number)
- c. Components technical specifications and warranties demonstrating compliance with the project technical specifications and full manufacturer and labor warranty agreements with terms and conditions.

### 3.4. Quality Insurance and Quality Control

The Contractor shall implement a Quality Assurance / Quality Control (QA/QC) plan for construction activities on Moorpark USD sites. At least 30 days prior to the planned commencement of construction, the Contractor shall submit a copy of the QA/QC Plan for review and approval by the Moorpark USD.

To ensure the highest quality of the installation, the Contractor shall:

- a. Implement policies and procedures to ensure proper oversight of construction work, verification of adherence to construction documents and contractual requirements, and rapid identification and mitigation of issues and risks.
- b. Utilize best practice methods for communicating progress, performing work according to the approved Project schedule, and completing the Project on-time.
- c. Maintain constant communication with the site staff to avoid any disruptions to the day-to-day activities at the school.
- d. Keep the Site clean and orderly throughout the duration of construction. All trash and rubbish shall be disposed of off-site by licensed waste disposal companies and in accordance with applicable Law.
- e. Provide equipment marking, as well as labeling and signage for the Project that shall be removed after Project completion.
- f. Fully comply with all applicable notification, safety and Work rules (including Moorpark USD safety standards) when working on or near Moorpark USD facilities.
- g. Route all electrical collection system wiring and conduits in a neat and orderly fashion and in accordance with all applicable code requirements. All cable terminations, excluding module-to-module and module-to-cable harness connections, shall be permanently labeled.
- h. Provide all temporary road and warning signs, flagmen or equipment as required to safely execute the Work. Street sweeping services shall also be provided as required to keep any dirt, soil, mud, etc. off roads if applicable.

## 4. Training

The Contractor shall conduct at least \*twelve (12) hours per site of on-site training for Moorpark USD personnel in all aspects of operation, routine maintenance, and safety of the lighting systems (\*Note: District to confirm desired amount of personnel training). At a minimum, training topics shall include the following:

- a. System safety, including shut-down procedures.
- b. Fixture maintenance, repair and troubleshooting.
- c. Fixture mounting elements maintenance and repair guidelines.
- d. Calibration and adjustment procedures for the fixture and mounting systems (if any).
- e. Fixture/lamp replacement.
- f. Control system hardware, software and any associated interface.
- g. How to identify and troubleshoot wireless and wired network issues.
- h. Warranty coverages and limitations.

The Contractor shall submit a proposed Training Plan during the design process for approval and provide all training materials and manuals to support on-site training in advance of scheduled training sessions (see schedule of submittals in Section 2.2.3, "Submittals"). The on-site portion of the training program shall be scheduled to take place at the jobsite at a time agreeable to both Moorpark USD and the Contractor.

## 5. Technical Requirements

### 5.1. Applicable Codes, Rules, Regulations, Regulatory Agency Approvals, & Independent Review(s)

It is the Contractor's responsibility to design the Project in compliance with applicable requirements of federal and state laws, codes, rules, regulations, ordinances, and standards, including, but not limited to, those outlined below. The Contractor shall have copies available of applicable codes and regulations for ready reference.

a. California Building Standards Code, Title 24 2016, California Code of Regulations (CCR):

- Part 1, Building Standards Administrative Code
- Part 2, California Building Code
- Part 3, California Electrical Code
- Part 4, California Mechanical Code
- Part 5, California Plumbing Code
- Part 6, California Energy Code
- Part 7, California Elevator Safety Construction Code
- Part 8, California Historical Building Code
- Part 9, California Fire Code
- Part 12, California Reference Standards Code

b. General: Reference standards and guidelines include but are not limited to the latest adopted editions from:

- i. 1. ADA Americans with Disabilities Act
- ii. ANSI American National Standards Institute
- iii. APWA American Public Works Association
- iv. ASCE American Society of Civil Engineers
- v. ASHRAE Guideline, the Commissioning Process
- vi. IEEE Institute of Electrical and Electronics Engineers
- vii. IESNA Illuminating Engineering Society of North America
- viii. ISO International Organization for Standardization
- ix. NEC National Electric Code
- x. NEMA National Electrical Manufacturers Association
- xi. NFPA National Fire Protection Association
- xii. OSHA Occupational Safety and Health Administration
- xiii. UL Underwriters Laboratories Inc.



## 5.2. Site Lighting System Performance

### 5.2.1. Energy Conservation

Lighting within parking lots (excluding dedicated emergency lighting) shall not exceed a maximum of 0.18 W/ft. Assume 4,100 operating hours per year. Both parking lot and other area system performance should aim to produce the highest energy savings within the given requirements.

### 5.2.2. Lighting Requirements

Lighting levels shall follow and comply with the recommended levels indicated within the current IESNA lighting handbook and RP-20.

Below are the recommended lighting levels values for the relevant areas of the school site.

Recommended Maintained Illuminance levels for exterior areas				
Application Area	Horizontal Illuminance (fc)	Uniformity ratio (maximum to minimum)	Vertical Illuminance (fc) *	Luminance (cd/m <sup>2</sup> )
Parking Lot Basic	0.2 Minimum	20:1	0.1 minimum	
Parking Lot Enhanced Security	0.5 minimum	15:1	0.25 minimum	
Roadways	0.4	6	N/A	0.4 on grade
Pathways	0.5 average	N/A	0.5 average	

\* Measured at height of observer 1.5m, 5 feet

### 5.2.3. Color Rendering and Color Temperature

Selected fixtures shall have a color rendering of greater than 80 CRI and a color temperature between \*3500-4500K (\*Note: The District will review and confirm the proposed color temperature). The voltage of the new luminaires shall be verified on site with the existing circuits available before ordering. All selected fixtures shall be approved and accepted by Moorpark USD and be eligible for the IOU incentives where incentives are available.

### 5.3. Lighting Controls

It is estimated that an additional 40% savings can be had by adding lighting controls to the exterior fixtures. At a minimum, the exterior fixtures should be controlled by photocells or astronomical clocks.

The new control system implemented as part of this project should adhere at a minimum to the following controls capabilities outlines below:

- a. All luminaires shall be functionally controlled with manual ON and OFF lighting controls. Each area enclosed by ceiling-height partitions shall be independently controlled.
- b. The general lighting of any enclosed area 100 square feet or larger, with a connected lighting load that exceeds 0.5 watts per square foot shall provide multi-level lighting control that meets the following requirements:
  - Lighting shall have the required number of control steps and meet the uniformity requirements in accordance with Table 130.1-A from Title 24.
  - Multi-level lighting controls shall not override the functionality of other lighting controls required.
  - Dimmable luminaires shall be controlled by a dimmer control that is capable of controlling lighting through all required lighting control steps and that allows manual ON and OFF functionality.
  - Classrooms with a connected general lighting load of 0.7 watts per square feet or less and public restrooms shall have at least one control step between 30-70 percent of full rated power.
- c. All installed indoor lighting shall be equipped with an occupant sensing control, automatic time-switch control, or other control capable of automatically shutting off all the lighting when the space is unoccupied.
- d. All outdoor lighting installed below 24 feet must have an integral motion sensor as per Title 24 2016 code requirements, exceptions are pole mounted luminaires  $\leq 75W$ , non-pole mounted luminaires  $< 30W$  and linear lighting  $< 4W$  per foot. The motion sensor must reduce the light level during unoccupied periods between 40-80%. This can be achieved by means of dimming or other power reduction methods. Lighting shall be zoned per use and no more than 1,500 watts of lighting shall be controlled together.

More specific provisions for each lighting space shall be evaluated based on the standards set forth in Section 130 of the 2016 Building Energy Efficiency Standards (Title 24). It is the Contractor's responsibility to adhere and comply with these standards.

### 5.4. Equipment Warranties

All supplies, equipment, and services shall include manufacturer's minimum standard warranties and labor warranties unless otherwise agreed to in writing.

- a. Provide a comprehensive written warranty for including luminaire finish, onsite replacement of material, and workmanship. On-site replacement includes transportation, removal, and installation of new products. Finish warranty shall include warranty against failure or substantial deterioration such as blistering, cracking, peeling, chalking, or fading.
- b. Provide a written replacement material warranty for defective or non-starting LED source assemblies.
- c. Provide a written replacement material warranty on all equipment.
- d. Provide a written 5-year replacement warranty for non-maintained illuminance levels on all light sources (for example, LED package, LED array, or LED module).

END OF DOCUMENT