

## LED APPLICATION: Parking Structure, Pathway and Roadway Lighting – New Construction



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*Doug Kind  
Campus Energy Manager  
Cal State Fullerton*

## LED PRODUCTS



151 Parking luminaires with Type V optics and 60 LEDs with two-level operation and integrated occupancy sensor

236 Parking luminaires with Type V optics and 60 LEDs

27 Parking luminaires with Type V optics and 100 LEDs with two-level operation



33 LEDway streetlights with Type III optics and 80 LEDs

## BENEFITS

- Anticipated 80 percent energy savings
- Parking structure lighting power density is 80 percent below California Title 24 Energy Code Requirements
- Nearly \$120,000 in energy incentives from Southern California Edison®

### Lighting design brings astounding energy savings and utility rebate



California State University at Fullerton (CSUF) is working toward a goal to become an all-LED campus with the long term objective to be a net zero energy consumer; meaning it will use only as much energy as it generates. The process is taking shape with energy efficient lighting solutions that include BetaLED exterior site lighting controlled with an integrated wireless outdoor dimming system.

The massive project began with a phase one installation that includes lighting for a new six-level eastside parking structure, adjoining roadway, and pedestrian walkway that leads from the structure to campus buildings. Through in-depth evaluations, BetaLED was selected as the lighting supplier of choice for the majority of the project.

#### Parking structure lighting

THE EDGE parking luminaires had previously been through an evaluation and selection process at sister campus CSU at Long Beach, one of 23 CSU campus locations, making them a natural choice for the CSUF team to install in the new parking structure. The project included 151 parking structure luminaires with two-level operation providing a high level LED drive current at 350mA while achieving a lighting power density well below California Title 24 Energy Code requirements. An additional 50 percent power reduction was realized in low level operation with the LED drive current at 175mA while illumination performance is reduced by only an approximate 30 percent.

The new parking structure lighting system operates 24/7 to accommodate commuting students and campus housing residents. BetaLED luminaires include integrated two-level occupancy sensors to provide the flexibility of reducing energy consumption when the lot is unoccupied during night time hours and raising the illumination

levels when occupants are present. The two-level feature is used on all fixtures that are not on an emergency circuit.

Twenty-seven luminaires feature integrated two-level operation without a sensor making them equipped to be used with external controls that can select from various drive currents for high and low operation. The structure includes an additional 236 parking luminaires and the rooftop is illuminated with 20 BetaLED LEDway fixtures.

CSUF's manager of commissioning and energy, Doug Kind, compared actual metered energy savings on the structure to an identical facility on campus that is currently lit with fluorescent fixtures. The size, shape, number of elevators, and number of floors, are all identical to the LED-illuminated structure. The results are 80 percent less energy use than the fluorescent-lit structure.

"I expect more than an 80 percent energy savings from the BetaLED luminaires over traditional fluorescent parking structure lighting," said Kind. "Fifty percent of the savings comes from just switching the technology to LED with an additional 30 percent savings coming from the bi-level operation."

The \$24 million parking structure was below California's Title 24 Energy Code Requirements by an astounding 80 percent resulting in nearly \$120,000 in energy incentives from local utility company Southern California Edison®. Title 24 refers to California's Energy Efficiency Standards for Residential and Nonresidential Buildings, established in response to a legislative mandate to reduce the state's energy consumption. If the requirements are exceeded, construction is not permitted. The CSUF engineering team developed and submitted the lighting plan that uses only 20 percent of what is permitted for a normal parking structure of this size – an admirable achievement due in large part to the 414 energy-saving BetaLED luminaires.

According to CSUF's office of Design and Construction, the new environmentally-friendly structure includes several sustainable and state-of-the-art features. Solar panels will be added to the roof of the structure with electricity generated from the solar panels feeding into the campus' power grid. The landscaping around the structure consists of low water, drought resistant, local plants. The structure is also equipped with a bioswale, designed to direct excess water into plants for more efficient storm drainage, which will reduce the need for irrigation.

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### Site lighting

The university conducted extensive real-world research to select the best LED luminaires for roadway and pathway areas surrounding the parking structure. Narrowing the selection down to four manufacturers, the CSUF engineering team installed two fixtures from each company at a campus parking lot. A judging committee was formed with representatives from campus parking, safety, physical plant, and the chancellor's office to evaluate the products using a strict set of criteria and a weighted scoring procedure developed by Kind.

"BetaLED's LEDway luminaire was selected as the overall best fixture and was awarded to the new campus standard LED fixture for all roadways," Kind said. It performed very solidly on most every category and in the end it won the day. Its strengths included efficacy of the LED, photometric performance, cost, ability to upgrade the LED light engines without having to change out the housing, automatically being able to increase the light output of the adjacent LEDs if another nearby LED goes out, etc."

Thirteen LEDway luminaires illuminate a portion of the roadway and pedestrian path surrounding the parking structure.

### Phase two plans

CSUF phase two installation plans include retrofitting metal halide fixtures with 1,000 LED luminaires with wireless remote control access to campus security. The 18-month project will replace street, roadway, parking lot and pedestrian fixtures primarily with BetaLED's LEDway luminaires supplied with dimming drivers. Campus security officials will have an interface allowing the main office or mobile security vehicles to control lighting if the need arises. For example, lighting in specific areas of the campus can be increased to full power to increase visibility for spectators attending evening events.