LED FIXTURES ENHANCE PARKING GARAGE: MORE UNIFORM, PLEASING LIGHT IN AUBURN, ALABAMA

By April Ruedaflores
Kim Lighting, City of Industry, CA
Plans for a new, $8 million parking garage in downtown Auburn, Alabama, demanded more than the customary solution. To meet high standards of reduced energy and maintenance cost as well as limited light trespass, the facility had to meet stringent life-cycle needs. All the while keeping the appeal of this historic university town.

The owner and design-build team selected LED lighting – 214 innovative PGL7 LED fixtures, a new, patent-pending LED system created by Kim Lighting. Kim has been the pioneer in the parking structure lighting – designed to control glare at the low mounting heights common in garages. Most important, the PGL7 LED delivers highly uniform, energy-efficient lighting with excellent demonstrated payback from energy savings.
Auburn University may have been short on parking but never short of visitors or urban attractions. From its acclaimed college football games to top-notch shopping and dining, the city is a major draw for students, residents and visitors.

For Auburn-based Design-Build developer Donald H. Allen Development, Inc., the timing was perfect for a new parking deck to meet the burgeoning demand. Lead by president Don Allen, the firm proposed an $8 million, 920-space, freestanding parking garage in brick and concrete – the only public parking facility adjacent to Auburn’s campus and the city's largest-ever privately built infrastructure project. Also unique is its solid-state lighting system featuring more than 200 Parking Garage Luminaire (PGL7 LED) fixtures and the WARP9 LED pole-mounted area lighting fixtures, both by Kim Lighting, making it one of the first parking garages ever illuminated primarily by LEDs.

While Allen has developed numerous signature mixed-use and commercial projects over the last 15 years, this was his first parking-only venture.

“We tried to make the new building fit in with the university's architecture, and we built it in five months for about $3,000 to $5,000 less per space than what a comparable university facility would cost,” says Allen. The six-story hybrid deck, built with precast and poured-in-place concrete elements, has decorative brick panels and arch shapes on its main façades giving it a classic flair. Inside are twin high-speed elevators, recharging stations for electric cars, covered bicycle parking, and an extensive digital security system.

"The PGL7 LED does a better job of putting the light where you need it."
Allen hoped for a lighting system to match the other state-of-the-art features, sustainability and efficiency of the facility. Directed by Allen, the project team looked for highly energy-efficient lighting technology but also the most uniform, glare-free illumination that parking garage luminaires could provide. “We definitely wanted to go with LED, which represents everything in our industry: everyone wants certified green buildings, including the university community, so having LED lighting was a plus,” says Allen.

The project was delivered using design-build approach, that Allen believes saves both time and money. The project team, led by development manager Greg Darden, conducted a payback analysis on the LED fixtures, which had a higher initial cost. The LED light sources carry a 5-year warranty with light source life rated to last more than 50,000 hours, as compared to only 10,000 - 24,000 hours rated for comparable high-intensity discharge (HID) luminaires such as metal halide and high-pressure sodium. As far as energy efficiency, the LED garage lighting design would reduce daytime electrical consumption by nearly to 45%. The design would cut nighttime lighting energy consumption by more than 50%, as analyzed by the engineer Alan W. Boydston, P.E., principal of Auburn’s Boydston Engineering Associates, Inc. (see payback analysis on following page).

There were other benefits, too, says Darden, who assembled the project’s financing and investment group and also serves as partner in an affiliated company, Structured Parking Solutions, Inc. “I looked extensively at low-energy consumption lighting, and carefully considered fluorescent technology, which is getting a lot of attention now,” he recalls. “The industry standard is metal halide, but for a lot of other reasons we went with LED, which offered a very promising cost-benefit curve.”

On another note, Darden learned that LED lighting performs well in cold winter weather, which degrades the performance of fluorescent systems and often reduces efficiencies and cuts average lamp life short. Working with electrical engineer Boydston, Darden studied the benefits of LED lighting for reducing energy needs, downsizing electrical distribution and backup generators, and also cutting maintenance and lamp replacement budgets.
The lighting and electrical firm Boydston Engineering Associates conducted an energy-use analysis for garage developer Don Allen, comparing metal halide lighting against Kim Lighting’s PGL7 LED luminaires. Using Illuminating Engineering Society (IESNA) recommended practice RP-20, Boydston calculated that 212 metal-halide fixtures at 150 watts each and 10 metal-halide standards at 250 watts each would consume:

- Nighttime: 38,420 watts
- Daytime: 23,870 watts

At the owner’s request, the engineer also calculated (again to IES standard RP-20) an LED scheme using 214 total 75-watt LED fixtures. Also included were 20 150-watt metal-halide fixtures at the entranceway, and 10, 150-watt standards on the top floor. This lighting design, says Alan W. Boydston, P.E., would consume:

- Nighttime: 17,175 watts - 45% savings!
- Daytime: 13,225 watts - 55% savings!

Based on this calculation and analysis of energy savings, the developer, Donald H. Allen Development, determined that the LED technology would contribute to reduced energy loads and carbon emissions – with less light trespass – ensuring a more sustainable design.

Other factors considered were light trespass, use with dimmers and photosensors, and strike/restrike times. “We looked at Kim Lighting’s PGL7 LED luminaire, a brand-new product to the market that had just released its literature and photometric data,” says Boydston. “We evaluated how many fixtures would be needed to maintain light levels, and measured cost payback and did an energy analysis.” The developer then added maintenance and other factors for a more complete life-cycle analysis. The team’s evaluation clearly pointed to a primarily LED solution. A total of 214 PGL7 LED luminaires constituted the primary light source, with 20 HID versions, called PGL5s, for use in the entry area where very bright illumination was preferred. All of the ceiling-mounted fixtures are installed with “bird shrouds”, a value-added feature unique to the Kim Lighting models that limits dirt and debris accumulation atop the luminaire. On the top deck, ten of Kim Lighting’s modern WARP9 LED luminaires were controlled by photocells. Four 18-inch Kim Lighting Wall Director luminaires with HID sources enhance the main façade, adds Allen.

PAYBACK ANALYSIS: WHY NORTH PARK CHOSE KIM LIGHTING’S PGL7 LED

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Also included were 20, 150-watt metal-halide fixtures at the entranceway, and 10, Warp 9 LED fixtures on poles on the top level.
“The PGL7 LED is basically a brand-new product, but on the electrical side it was pretty straightforward, including the installation, because the frame is similar to the PGL5, which Kim Lighting already makes,” says Dewayne Hutchins, president of Hutchins Electrical Service Co., Auburn, the electrical contractor for the project. “Overall, the lighting system required a lot less circuitry because it’s so much more efficient. We needed less conduit and didn’t have to pull as much wire.”

In terms of the lighting system design, Boydston explains that the primary benefit of the PGL7 LED fixtures is their uniformity of illumination. “They do a better job of putting the light where you need it,” he says. “So while averages footcandle levels might go down, the uniformity and minimum illumination levels go up.” Boydston adds that this reduces glare – an important factor for parking garage lighting – and evens out the lighting under the fixture and at the corners of the light distribution areas.

This capability of LED lighting and Kim Lighting PGL7 LED fixtures also improves task distribution, meaning that less light is wasted and more is available for effective use by vehicular traffic and pedestrians in garage facilities.

Max-to-min ratios, the disparity between brighter and darker areas, is also reduced, reducing so the light effect is more soothing and useful.

According to, Kim’s Tom Lueken, “Visual acuity is very important for parking garages and their users. If the human eye encounters a big bright spot of light, it naturally uses that as a focal point, concentrating in on it. Surrounding areas that are not so bright naturally seem much more dim, and the perceived contrast becomes even greater to the eye.” High contrast leads to poor visual acuity, says Lueken, and in some cases may cause discomfort or disability glare.

“It all comes down to contrast.”
This is a major challenge for the design and operation of HID lighting systems, says Boydston. “Metal halide fixtures put a lot of light directly underneath the fixture, while putting much less in the perimeter of the fixture’s distribution area. Instead you get a blob of light directly under the lamp, as you see with a typical cobrahead street lamp,” he explains. “Those blobs of light are wasted hot spots. These new LED fixtures are more like the even, useful light you get on a full-moon night, when there’s an even, very useful light.”

Hank Allen, a project manager with the development company, notes that the LEDs are “easier on the customer’s eyes” than other garage lighting approaches. “The lighting systems doesn’t give you that same feeling that some structures do, where the light is blinding you just to get the job done,” he says.

Another significant issue for the North Park Parking Deck was light trespass, adds Darden, which means light that spills from the parking garage onto adjacent properties, creating a nuisance. “The LED system actually turned out to be a huge benefit to controlling light trespass, which is an issue in Auburn where we have a local trespass light ordinance,” he explains.

“It’s a real big balancing act to generate enough lumens to safely light the garage when you have close-to-zero lot lines, as we do.” Darden also wanted to ensure that maintenance of the facility would be easy and inexpensive. According to Hank Allen, the LED fixtures are easier to maintain than other luminaire types. “We were surprised to see the simplicity of the maintenance involved. We can easily replace individual LED modules or the entire LED emitter deck without significant downtime.”

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“The fixture is designed to be upgradeable in this way also,” says Kim Lighting’s Product Manager, Tom Lueken. “The end-user can replace the MicroEmitter itself or the MicroEmitter deck entirely. Even though LEDs last for a very long time, when they reach end of life the PGL7 LED only needs to have the EmitterDeck replaced, not the whole fixture.” Most other companies do not provide this capability, he adds, so users have to replace the entire fixture – a much less sustainable approach. Being able to upgrade the LED light sources is also a crucial feature because LEDs are such a fast-evolving technology, with light sources becoming more efficient every day. Lueken explains that Kim Lighting’s engineering team, anticipating this rapid evolution of solid-state lighting (SSL), was careful to ensure that the fixture is fully modular from their inception.

Another benefit of the PGL7 LED for reducing operating costs and increasing fixture life is the bi-level options available. Kim Lighting offers a variety of Smart Control Solutions to cut energy use without sacrificing safety or performance. Using wireless or relay systems, the bi-level options cut illumination levels by 50% when unoccupied. In the case of the North Park deck, the team elected to use photocontrols to control illumination levels on the top deck of the garage. Taken together, the steps substantially reduced energy consumption and carbon footprint.

While aware of the increasingly widespread use of LED lighting, the development team for the North Park Parking Deck had been more familiar with its use in automotive and signage applications, Allen notes. “It’s just now making its way into the building industry for general illumination use,” he adds. In fact, the project was the first time Donald H. Allen Development had used an LED system on a parking garage, and it has been a positive experience. The owners note that the building is more energy efficient and sustainable as a result. And while there was some added time and cost on the front-end, the team acknowledges that the advantages far outweighed that initial cost. All considered, would they make the same choice next time?

“This is the first LED project for a parking garage application in Central Alabama, because of the timing, the developers were able to make the right decision to invest their resources in the right technology,” says Emery Sheffield of Lighting Partnership, a lighting and controls manufacturer representative in the architectural, commercial and industrial markets. While Sheffield’s company represents 50-plus lighting brands, he has worked with Kim Lighting for about 20 years and expects more LED garage projects in the future. “If I see a parking garage project, you can bet your life I’ll be showing people this project,” says Sheffield.