Residential roads and walkways throughout a military base use a combination of decorative LED lanterns and luminaires to enhance driver and pedestrian safety. PHOTOS COURTESY ACUITY BRANDS LIGHTING

Illuminating Military Installations

Installing LED lighting systems across military installations can reduce energy consumption while significantly increasing both safety and security.

By Monik Mehra, LC, M.SAME

Military bases must implement high security measures to ensure the safety of personnel and visitors. Lighting is a critical aspect of a base-wide security plan. Installations require high-quality, reliable lighting and real-time reporting and diagnostics so energy and security personnel know when and where luminaires are down and why, allowing them to re-establish the security perimeter more quickly. Modern installations are also concerned with conserving energy and reducing maintenance in order to decrease overall operating costs. An energy-efficient lighting system helps minimize the military's energy footprint and decrease greenhouse gas emissions.

There are, however, challenges associated with these efforts. Most bases sprawl across thousands of acres and include a range of applications that require a broad portfolio of luminaires—from roadways and intersections to security checkpoints, substations, motor pools, and office, housing, and medical buildings. They also include a mix of personnel who reside and work on base. Some military personnel and civilians arrive in the morning and leave at night. Others, including soldiers manning security checkpoints, require illumination for tasks performed after dark.

In addition, many installations are located near residential areas or wildlife refuges where sky glow and light pollution must be avoided.

MEETING BASE NEEDS

Military bases are beginning to convert aged HID and fluorescent lighting systems to solid-state, LED lighting to achieve higher

Fort Benning upgraded its outdoor lighting to an LED lighting system to reduce energy and maintenance while also enhancing safety and security.

levels of efficiency and more reliable long-term performance. LED lighting offers advantages for the many applications typical of military installations, most notably energy efficiency and reduced maintenance.

LED lighting uses far less energy than traditional technology and typically reduces energy consumption by 40 to 65 percent. The long service life of fixtures (rated up to 100,000 hours in most cases) eliminates the need to change lamps and replace ballasts. LED systems are highly flexible and include luminaire styles and technology to replace HID cobra-head luminaires, floodlights, and high mast units. Architectural styles are also available to illuminate a variety of roadway applications, walkways, office facilities, and base housing. Indoor LED fixtures can offer 30 percent or more in energy consumption savings over standard fluorescent or other conventional lighting sources. With many options and configurations, LED fixtures match up well with multiple applications and can be embedded with wired or wireless controls to further optimize savings and easily scale with a space.

The addition of lighting control systems offers the ability to dim and control individual luminaires or groups of luminaires from a single user interface device. This helps reduce energy consumption and extend service life. Available technology can transform LED luminaires into sensor-equipped smart devices capable of capturing data in near-real time and providing unprecedented insight for a broad range of applications and services, such as alerting maintenance crews when lighting is not operating, or determining parking lot occupancy or roadway traffic flow.

It was determined that Fort Benning, through the implementation of a comprehensive outdoor LED lighting conversion, had the potential to reduce energy consumption by 60 percent annually over traditional high-pressure sodium fixtures.

FORT BENNING UPGRADES

Luminaire outages represented the most common complaints when an area utility company purchased the outdoor power system at Fort Benning, Ga., a military training base and home to the U.S. Army Maneuver Center of Excellence. Fort Benning, located near the City of Columbus, Ga., and spread across 182,000-acres, supports more than 120,000 active duty military, family members, reserve component soldiers, retirees, and civilian employees on a daily basis.

The local utility had made the decision to convert to LED luminaires based on projected energy and maintenance savings and Department of Defense energy reduction mandates. It also worked with the U.S. Army Corps of Engineers, which emphasizes energy efficiency to minimize the Army's energy footprint. Installing LED lighting helped gain LEED certification for various new projects on the base.

Several LED lighting tests were implemented, starting with a parking lot. Based on the results, a total outdoor lighting solutions

package was determined. Work was completed in phases beginning with roadways and parking areas.

It was determined that Fort Benning, through the implementation of a comprehensive outdoor LED lighting conversion, had the potential to reduce energy consumption by 60 percent annually over traditional high-pressure sodium fixtures. Further, the reduced energy consumption brings a corresponding decrease in greenhouse gases, and better directed illumination reduces light pollution during normal operation and when luminaires are dimmed.

As far as maintenance, the base uses crews to install LED luminaires or respond to outages caused by storms rather than investing time to change HID luminaire lamps. Fort Benning has an energy manager on post.

Light provided by an LED system is more uniform, with fewer dark spots and bright areas. The color of the light more closely resembles daylight and makes vehicle colors easier to distinguish.

ADDITIONAL CONSIDERATIONS

Outdoor LED lighting options for military bases span a broad range of product types and applications, from roadway and area lighting to perimeter security and residential lighting. And for hangars and barracks, offices, maintenance, and sports facilities, utilizing indoor LED lighting and controls solutions help reduce electricity costs while providing a responsive (dimming, occupancy, and daylight sensing) environment. These solutions can help enhance security and safety by improving visibility and occupant comfort.

- Base housing lighting options include decorative options to enhance the community living spaces while providing visually comfortable lighting.
- Gymnasiums benefit from vandal-resistant type or rough service LED high bays, which are built to withstand the rigors of an active gymnasium while providing the energy efficiency, low maintenance, and high-lumen, quality illumination desired by personnel.
- Parking lots and garages need reliable energy-efficient lighting if they are on all evening; LED lighting can improve illumination to help enhance safety for drivers and pedestrians traveling back and forth from their vehicles.
- Motor pools and maintenance areas can benefit from LED lighting by enhancing safety and security through increased visibility and reduced lighting-operating costs.
- Roadways on base require a high degree of illumination at night to enhance visibility without added glare, as well as the ability to dim or turn off to save energy during stretches of times when an area is unused or unoccupied.
- Hangars use LED high bay lighting to provide high lumens; high color rendering index LED lighting can withstand high ambient temperatures, contributing to optimal working conditions.
- Ports and shipyards where fixtures with tall mounting heights and wide pole spacing require the ability to illuminate large areas with large-scale dock and warehouse traffic.

A SMARTER APPROACH

The potential exists now to employ a single integrated solution that will transform energy-efficient LED lighting into a smart platform for data-driven applications such as public safety, security, and location analytics.

A smart lighting network will have the ability to transform LED luminaires into sensor-equipped, smart devices capable of capturing data in near-real time, which will enable a broad array of applications and services.

Military bases can reap the benefits of efficient, reliable illumination provided by intelligent lighting systems. Integrated solutions are a greener choice. They offer advanced monitoring and control capabilities for longevity; they reduce related operational costs; and most importantly, they provide a safer and more secure environment.

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Monik Mehra, LC, M.SAME, is Director, International Specifications of Lighting and Controls, Acuity Brands Lighting; monik.mehra@acuitybrands.com.