

### Overview

One of the nation's largest schools serving over 60,000 students, the University of Minnesota (U of M) is upgrading the lighting at all 18 parking ramps and garages on its Minneapolis campus. In the Northrop Auditorium Garage, a small 24,000 square foot facility with 75 parking spots, U of M replaced low-wattage high-pressure sodium fixtures with high efficiency, lower-wattage LED fixtures with lighting controls. This Lighting Energy Efficiency in Parking (LEEP) Campaign Award winning project achieved 90% energy savings by upgrading to LEDs with lighting controls.

### Keys to Success

U of M's parking lighting projects grew out of an earlier effort in its Energy Management (EM) department to upgrade all building stairway lighting on campus to LED lighting fixtures with occupancy controls. The EM staff then approached Parking and Transportation Services to look at upgrades to the parking garage lighting. Most of the parking garages were still lighted with the original high-pressure sodium lighting fixtures that were installed in the early 1970s. The parking garages were excellent candidates for an efficiency project, as the light quality was poor and energy was being wasted.

According to Puneet Vedi, the project manager in Parking and Transportation Services, improved lighting quality was the most important project driver. Secondary but also important considerations included the potential energy savings and maintenance cost savings. U of M had been tracking LED performance for parking applications for some time but had delayed launching the project until first cost came down. Recent reductions in lighting technology costs made the project feasible. U of M also took advantage of Xcel Energy (their local utility) incentives to lower costs.



Northrop Garage, image courtesy University of Minnesota

Results	
<b>Energy Savings</b>	76,000 kWh, a savings of 90%
<b>Lighting Power Density (W/sq. ft.)</b>	0.12, a reduction of 70%
<b>Return on Investment (ROI)</b>	29%
<b>Installation and Maintenance</b>	Extreme winter climate became a complicating factor in installation. Lighting at an above-ground garage experienced early performance issues when temperatures approached -20 degrees. By switching to the longer life LED system, the University was able to significantly reduce maintenance costs.
<b>Overall Performance</b>	The LEDs have great color rendering, and U of M is exceeding its goals for energy use reduction in the parking garages.

The U of M project features Kenall TekDek luminaires and LimeLight PC-based lighting controllers, and was completed with the assistance of Walker Parking Consultants.

The results have more than met expectations, and U of M is exceeding its goals for energy use reduction in the parking garages.

**“The LEDs have great color rendering,”**  
*Puneet Vedi, the project manager in Parking and Transportation Services, U of M*

Before factoring in the Xcel energy incentives, the return of investment (ROI) of just the fixtures at the Northrop Auditorium Garage came to 17%. With controls added to the lighting system, the ROI increased to 29%. These figures do not include other benefits: by switching to the longer life LED system, the University was able to significantly reduce maintenance costs.

### Project Challenge

As the team worked to switch over parking facilities around campus to LEDs, the extreme winter climate became a complicating factor. Although implementation at the underground Northrop Garage was straight-forward, lighting at an above-ground garage experienced early performance issues when temperatures approached -20 degrees Fahrenheit. Facility managers worked to optimize the lighting system (LED fixture and controls) for operation in extreme cold temperature conditions.

Another general retrofit issue that emerged during the lighting projects concerned dedicating information technology space in older garages not designed to accommodate these systems. To establish an Ethernet connection, alterations to the original plan became part of the job scope.

### Lessons Learned

- ▶ Test as many candidate fixtures as possible in your facility. U of M tested 10 different LED, induction and fluorescent fixtures prior to selecting their final system.
- ▶ In a multi-site project spanning a range of parking facilities, relight a few parking ramps before establishing the gateway (network structure and protocols) for the lighting controls. This way the kinks are worked out before committing to a dedicated network structure.

### 2014 LEEP Award: Highest Percentage Energy Savings in a Retrofit at a Single Parking Structure

<b>Location:</b>	Northrop Auditorium Garage Minneapolis, MS
<b>Parking Area:</b>	24,000 sq. ft. (75 spaces and 51 fixtures)
<b>Solution:</b>	Replaced HPS with LED and lighting controls

### Next Steps

U of M completed phase two of the project, to relight five more parking garages at just over 1 million square feet. Commissioning of the lighting controls should be complete in early 2015.

### Learn More

Through the [Better Buildings Alliance](#), members across different market sectors work with the U.S. Department of Energy's (DOE) exceptional network of research and technical experts to develop and deploy innovative, cost-effective, energy-saving solutions that lead to better technologies, more profitable businesses, and better buildings in which we work, shop, eat, stay, and learn.

Learn more about how to join the Better Building Alliance's Lighting Energy Efficiency in Parking Campaign, at [www.leepcampaign.org/](http://www.leepcampaign.org/). LEEP Participants are collectively saving over 120 million kilowatt-hours and over \$10 million annually across 430 million square feet of lots and garages by upgrading to high efficiency parking lighting.

Find more resources and guidance on lighting in the [Better Buildings Solution Center](#).