

Case Study

Best Practice in Energy Cost Savings: Lighting Audit and Redesign in a Parking Ramp

Location: St. Louis County, Minnesota

Contact: Brian Wagstrom, Director of Public Works

11522 Minnetonka Blvd. Minnetonka, MN 55305; Phone: (952) 988-8400

E-mail: bwagstrom@eminnetonka.com

Website: http://www.eminnetonka.com/public_works.cfm

Background

This St. Louis County parking ramp is located adjacent to the courthouse in downtown Duluth. The 5-level, 257 space ramp is built into the hill side and connected to the courthouse by a skywalk structure. The ramp was constructed in 1985 using pre-stressed concrete plank mounted on poured concrete columns and supports. The original, high-pressure sodium light fixtures were flush mounted (buried) on the ceiling surface between the concrete “T” bars limiting their light coverage area. A few years ago, the County began to consider retrofitting the existing lighting fixtures due to the inefficiency of the existing fixtures and security concerns due to inadequate lighting. In addition to these issues, the sodium lights had to be left on 24 hours a day, seven days per week, because these applications are not compatible with occupancy sensors. Prompted by these concerns, St. Louis County officials conducted a lighting study in the parking ramp and proceeded with a comprehensive lighting retrofit of the facility in 2006.



Parking Ramp Retrofit

Primary steps to the lighting retrofit

1. The County worked with a local electrical contracting company on a lighting audit to determine how to reduce overall energy use.
2. The staff pressure washed and painted the stair wells, ceilings, and walls a gloss white to reflect and spread the light within the parking ramp.
3. They lowered the overhead “buried” sodium high-pressure lights and replaced them with metal halide fixtures with round “acorn” diffusers to increase fixture coverage. This reduced the wattage load by two-thirds and the fixture count by one-half.
4. They installed LED Exit lights to replace the florescent fixtures.
5. Daylight sensors were added to turn off fixtures in areas that received ample ambient daylight.
6. Timers and occupancy sensors were installed to shut off fixtures during non-use times.

In addition to these improvements, the County installed a solar panel on the roof of the parking ramp. The 5.1 kW photovoltaic application, financed using a grant from the Minnesota Department of Commerce, will provide increased energy efficiency for the parking ramp. The expected payback for the solar panel installation is 20 years at 2006 electrical energy rates.

Cost-Benefit Analysis

The lighting audit performed by St. Louis County staff and the local electrical contractor was an important step in achieving greater energy efficiency and reduced energy costs in the parking ramp. The lighting audit and redesign resulted in a considerable reduction in the light fixture count and overall energy use in the parking ramp. Before the retrofit the parking ramp had 101 fixtures at 16,400 watts, while after retrofit this was down to 63 fixtures at 3,945 watts.

The total cost for replacing the light fixtures in the St. Louis County parking ramp was \$10,500. The County spent an additional \$2,600 for the paint to make the interior walls in the parking ramp lighter and more reflective. The expected payback for the lighting retrofit of the St. Louis County parking ramp was calculated to be 18 months at 2006 electricity rates. In addition to reduced energy costs, St. Louis County officials state that more effective lighting has had the added benefit of improved security.

“The former monthly electrical bills varied between \$950 and \$1000. Our goal was to reduce it by one-half. We actually did much better, as our lowest monthly bill to date has now been \$198....Improved lighting has the added benefit of improved security – this is good for staff and customers. Maintenance and life cycle costs are always left out of payback calculations, but this is a mistake, as these are significant”

-Tony Mancuso,
St. Louis County Property
Management

Lessons Learned

“Do your homework and analysis. Never use high-pressure sodium lighting for anything other than street lights, as the human eye does poorly with yellow hues and does much better in the white spectrum. Use daylight sensors and timers, as they are very cost effective. Lower the overhead lights and get them out of the shadow producing areas for better coverage, as this really cuts the fixture count. Clean and paint the interior surfaces – this is “free” light, as it lowers wattage and fixture counts.”

-Tony Mancuso, St. Louis County Property Management