

CITY OF CAMBRIDGE

LED CONVERSION

Case Study



SMART STREETLIGHTS FOR A SMART CITY IN CAMBRIDGE, MASSACHUSETTS

SUMMARY

To achieve the energy consumption goals of its sustainability initiative, the City of Cambridge, MA selected King Luminaire Co. Inc., a division of The StressCrete Group, to replace 2,100 high-pressure sodium (HPS) streetlights with energy-efficient light-emitting diode (LED) lights, which are compatible with their new wireless adaptive control system. The LED conversion contributed significantly to the City's ability to reduce its energy consumption, while yielding reduced maintenance costs, increased light uniformity, visibility, and color rendition. In addition, it positioned Cambridge as the first U.S. city to complete a city-wide LED streetlight retrofit using wireless adaptive controls.

PROJECT HIGHLIGHTS

Project Site: Cambridge, MA

Payback Period: 4.36 years

Electricity Savings: Over 75%

Energy Cost Savings: \$500,000/year

CO₂ Reductions: 77%

Overall Illumination Improvement:

- Greatly improved color rendition
- Increased visibility
- Glare reduction

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Longfellow bridge from Cambridge to Boston at night
(photo: The StressCrete Group)



An example of the HPS streetlight
(photo: The StressCrete Group)

THE CHALLENGE

With Cambridge being home to two of the most prestigious and technologically advanced universities in America: Harvard and MIT, the City felt as though it too must welcome change and forward thinking. The City of Cambridge committed to reducing their energy consumption by 20% over the course of five years as part of their 2010 sustainability initiative. In addition, the City also sought to improve the management and maintenance of their existing streetlight system.

THE SOLUTION

To reduce energy consumption, the City of Cambridge made a decisive move towards more energy-efficient luminaires by replacing 7,000 high-pressure sodium (HPS) streetlights with new, state-of-the-art light-emitting diode (LED) lights. The City also incorporated wireless adaptive controls into the design of their new LED system.

- Replacement of 4,900 cobra-type fixtures over 9 months, followed by the installation of over 1,000 retrofitted decorative fixtures supplied by King Luminaire Co. Inc.
- The decorative LED fixtures were custom designed to be compatible with their adaptive control system
- Wireless adaptive controls allow for real-time adjustability of light levels, enhanced energy conservation, and energy usage monitoring capabilities
- The LED luminaires only need replacement after approximately 15-20 years, versus re-lamping the old HPS lights every 4-5 years and King Luminaire backs the LED lights with a 7-year warranty

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Harvard University and the Boston Skyline along the Charles River
(photo: The StressCrete Group)

“As far as we know, we are the first major city to deploy an adaptive LED lighting system city-wide. This has been an extremely successful process that has far exceeded our expectations and we’ve seen a savings of 80 percent (energy use) so far.”

Stephen Lenkauskas, City Electrician, Cambridge, MA

THE RESULTS

Electricity and Maintenance Savings:

- The new LED system saves Cambridge over 75% in electricity every year and reduce bulb replacement frequency by 80%
- The conversion brings significant maintenance savings (estimated lifetime of LED is roughly 4-5 times longer than the old HPS lights)

Energy Cost Savings:

- The use of LED lights delivers energy cost savings of \$500,000 each year for a 20-year lifetime, or an equivalent of \$10 million
- Eversource, the utility company, contributed over \$820,000 in energy rebates toward the cost of LED conversion; the payback period for the first phase of the conversion is 4.36 years
- The LED conversion contributed significantly to Cambridge’s ability to reduce its energy consumption by 20% in 2014, as part of the City’s sustainable initiative goals

Emission Reductions:

- CO₂ emissions were reduced by 77%
- After dimming, the LED system emits 40% less light pollution than the old HPS system

Overall:

- The City of Cambridge became the first U.S. city to complete a city-wide LED streetlight retrofit, using adaptive controls that complies with Illuminating Engineering Society (IES) RP-8-14 standards for roadway illumination



John Weeks bridge from Cambridge to Boston at night
(photo: The StressCrete Group)

References

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- Street Lighting, Community Development Department, City of Cambridge, Massachusetts. Retrieved from: <http://www.cambridgema.gov/CDD/climateandenergy/municipalsustainability>
- Echelon. 2016. Cambridge, MA: Setting the Example for Adaptive Street Lighting. Retrieved from: <http://www.echelon.com/assets/bt39b6475f3f7ac71/Cambridge%20Case%20Study.pdf>



THE STRESSCRETE GROUP

With manufacturing facilities in five North American locations, The StressCrete Group produces an extensive line of high performance decorative outdoor lighting fixtures, decorative spun concrete and metal poles, plus pole arms and accessories, bollards and site amenities. We also manufacture a vast range of spun concrete poles for power distribution and transmission, sports lighting, high-mast lighting, and specialty poles for the electrical and communications industries.

We are a family business that operates by the core values of honesty, integrity, compassion and respect to better the lives of our employees, their families, our customers and the communities we represent. The StressCrete Group services multiple market segments through two divisions:

- StressCrete Ltd., established in 1953, is the longest-operating, most experienced manufacturer of spun concrete poles in North America. With plants in Alabama, Kansas and Ontario, we offer the broadest, most diverse range of spun concrete poles and bollards in the industry, with quality second to none.
- King Luminaire Co. Inc. produces a comprehensive assortment of high performance outdoor luminaires, metal poles, pole arms and accessories, plus bollards and site amenities. With an array of state-of-the-art LED Technology and HID optical systems, and plants in Ohio and Ontario, King Luminaire is a North American leader in the outdoor lighting industry.

At The StressCrete Group, we provide every customer with the highest quality innovative products and work as a team to create and maintain life-long customers through world class service.