



City of Richmond

Report to Committee

To: Public Works and Transportation Committee **Date:** May 1, 2014
From: John Irving, P.Eng. MPA **File:** 10-6000-01/2014-Vol
 Director, Engineering 01
Re: Light Emitting Diode (LED) Street Light Standards

Staff Recommendation

That the staff report dated May 1, 2014, titled "Light Emitting Diode (LED) Street Light Standards" from the Director, Engineering be received for information.

John Irving, P.Eng. MPA
 Director, Engineering
 (604-276-4140)

REPORT CONCURRENCE		
ROUTED TO: Roads & Construction	CONCURRENCE <input checked="" type="checkbox"/>	CONCURRENCE OF GENERAL MANAGER
REVIEWED BY STAFF REPORT / AGENDA REVIEW SUBCOMMITTEE	INITIALS: 	APPROVED BY CAO

Staff Report

Origin

LED street lighting technology continues to rapidly progress in terms of affordability, applicability, and energy savings. As the technology matures, more vendors have been approaching the City seeking approval of their products. The increasing number of vendors and products available has necessitated the development of standards to clearly identify minimum performance criteria and Illuminating Engineering Society of North America (IESNA) industry standard lighting requirements.

Staff have evaluated a number of fixtures from various suppliers in the past few years, and the Engineering Design Standards (see Attachment 1) are being updated to clarify the evaluation process for prospective vendors.

Analysis

Benefits of LED Street Lighting

The main benefit of an LED street light over a traditional street light is increased energy efficiency and the corresponding energy cost savings and reduction in greenhouse gas emissions. An LED fixture uses approximately 40% less energy than other light sources while maintaining the same light output. LED street lights are also more directional, which helps reduce the amount of light pollution from the street lighting system.

LED street light systems also have the potential to reduce maintenance costs. The current system requires re-lamping on a two to four year cycle. LED fixtures do not require re-lamping but have other power supply components that may need to be changed during the service life depending on the specific fixture used.

LED Street Light Implementation

The main barrier to implementing LED street lighting is the initial cost of the LED fixtures. These costs have reduced significantly over time, and now are at the point where the overall life cycle cost of LED lighting is approaching that of the existing metal halide (MH) and high pressure sodium (HPS) technologies. Staff are now specifying the use of LED street lights where new road lighting systems are required on capital road projects and development projects.

The directional nature of LED lights also poses challenges when LED fixtures are retrofitted onto existing poles. The IESNA standards require certain light levels and uniformity of light for roadways, walkways and bikeways. Since LED lighting has different light distribution characteristics compared to the existing HPS or MH lights, many different LED fixtures may need to be evaluated before a suitable one is found. This challenge is reduced where entirely new lighting systems are installed, as the pole spacing can be adjusted somewhat to suit a specific LED fixture.

LED Street Lights in Richmond

There are approximately 100 LED street lights currently installed throughout the City. The most recent installation was completed as part of the No. 6 Road Widening project between Westminster Highway and Commerce Parkway. There are approximately 10,000 street lights in Richmond today.

Staff are also working with BC Hydro to implement LED street lighting improvements along some secondary roads in need of upgrades. Subject to final approval, the proposed locations include No.3 Road between Steveston Highway and Dyke Road, and Westminster Highway between No. 6 Road and Nelson Road. These sites include the installation of new street lights on BC Hydro poles. Since the City is required to pay for some of the operating costs associated with these new installations, staff pressed for the installation of high efficient LED lighting. After multiple discussions with BC Hydro and partially due to the work that City continues to undertake in regards to energy efficiency, BC Hydro has proposed that these lighting upgrades proceed as a pilot project with BC Hydro covering all the capital costs, which provides the City with significant savings. In consultation with the City, suitable LED fixtures will be chosen and installed by BC Hydro for each roadway and performance of the lighting will be jointly assessed. These projects will provide multiple benefits for the City on the roadways selected, including increased safety, improved lighting levels, and increased staff knowledge and hands on experience of LED fixture performance.

While the City is regularly approached by vendors, replacing existing street lights that are not at the end of their service life with new LED street lights is not cost effective at this time. With further advances in LED technology or significant increases to energy costs, this may change in the future.

Financial Impact

None at this time.

Based on current LED street light fixture pricing, the life cycle cost of a new LED street light is comparable to a new HPS or MH fixture.

Conclusion

LED street lighting provides an opportunity for the City to reduce its greenhouse gas emissions and assist in meeting its energy reduction goals while maintaining the required lighting levels and associated public safety. As this technology continues to mature, staff will continue to evaluate locations suitable for the use of LED street lights as well as update our design standards and construction specifications.



Milton Chan, P.Eng
Manager, Engineering Design & Construction
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Design Standards and LED Fixture Testing

The current Engineering Design Standards are based on the use of HPS or MH lamps, and do not specifically address the use of LED street lighting. These standards are being updated to include LED street lighting for new development. The City's Supplementary Specifications and Detail Drawings used during the construction stage are also being updated to reflect the use of LED street lights. The main update to the standards is as follows:

6.15 NEW LED ROADWAY LIGHTING LUMINAIRE PRESENTATION

The City of Richmond (COR) invites suppliers and manufacturers to submit and present to the City their LED roadway lighting luminaires. The luminaires must meet or exceed the current IESNA RP-8 Standard (American National Standard Practice for Roadway Lighting), COR Engineering Design Specifications, COR Engineering Department Supplementary Specifications and Detail Drawings and the Master Municipal Construction Documents.

For LED luminaire presentations the COR will require the following:

- Completed "COR Supplier Specifications and Details of Light Emitting Diode (LED) Roadway Lighting Luminaires" form (document is available on Richmond web site)
- IES photometric file for the submitted luminaire
- Lighting calculations using the recommended luminaire IES file (design criteria to be determined by COR at time of luminaire presentation)
- Sample luminaire (to be commercially available, no prototype unit)
- Upon COR request, supply 2 luminaires at no charge for testing purposes (luminaires will not be returned)

Suppliers seeking approval of their goods will be required to provide detailed information on each of their fixtures for staff to review. Once the initial submission is approved, lighting calculations are requested from the supplier and sample fixtures are requested for field testing.

Some of the key items that staff review are durability, rated lifespan, heat management, ease of installation, and performance characteristics.