

<b>TO:</b>	<b>CHAIR AND MEMBERS CIVIC WORKS COMMITTEE MEETING ON OCTOBER 4, 2016</b>
<b>FROM:</b>	<b>JOHN BRAAM, P. ENG. MANAGING DIRECTOR, ENVIRONMENTAL &amp; ENGINEERING SERVICES AND CITY ENGINEER</b>
<b>SUBJECT:</b>	<b>STREET LIGHT DESIGN STANDARDS</b>

<b>RECOMMENDATION</b>
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That on the recommendation of the Managing Director, Environmental & Engineering Services and City Engineer, the Street Light Design Standards (Appendix A) **BE APPROVED.**

<b>PREVIOUS REPORTS PERTINENT TO THIS MATTER</b>
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For additional information, please refer to the following committee reports:

1. October 19<sup>th</sup>, 2009: Environment and Transportation Committee “[Alternative Street Lighting Technology Review](#)”;
2. October 18<sup>th</sup>, 2010: Environment and Transportation Committee “[Alternative Street Lighting Technology Review – Update -](#)”;
3. April 28<sup>th</sup>, 2014: Civic Works Committee “[Transportation Energy Optimization Plan \(TEOP\)](#)”;
4. December 16<sup>th</sup>, 2014: Civic Works Committee “[Transportation Energy Optimization Plan \(TEOP\) Update](#)”;
5. May 20<sup>th</sup>, 2015: Civic Works Committee “[Transportation Energy Optimization Plan \(TEOP\) Phase 1 Financing](#)”; and
6. August 24<sup>th</sup>, 2015: Civic Works Committee “[Transportation Energy Optimization Plan \(TEOP\) Phase 1 Contract Award](#)”.

<b>2015-19 STRATEGIC PLAN</b>
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The following report supports the Strategic Plan through the strategic focus areas of **Strengthening Our Community** and **Building a Sustainable City** by improving safety and promoting a healthy environment.

## BACKGROUND

Several Light Emitting Diode (LED) street light test sites were used to evaluate the performance of the street lights which demonstrated that they meet or exceed the City's requirements. Earlier this year, Phase 1 of the LED Street Light Upgrade was completed. Phase 1 involved the replacement of 9,276 High Pressure Sodium (HPS) cobra-style street lights on major roads with a 56% reduction in energy. Phase 2 of the LED Street Light Upgrade involving approximately 11,000 HPS fixtures is planned for implementation in early 2017.

LED street lights are now standard on all new capital works projects. This report addresses the adoption of LED street lights for new residential developments. (File Number 25, Lighting Emitting Diode (LED) Street Lights, CWC Deferred Matters List)

## DISCUSSION

At its April 28<sup>th</sup> 2014 meeting, the Civic Works Committee received the draft street light design criteria, which included the use of LED street lights on residential streets. This design criteria was circulated to the London Development Institute (LDI) and the London Consulting Engineers of Ontario for comment. The comments provided were mostly related to wording clarification and were addressed.

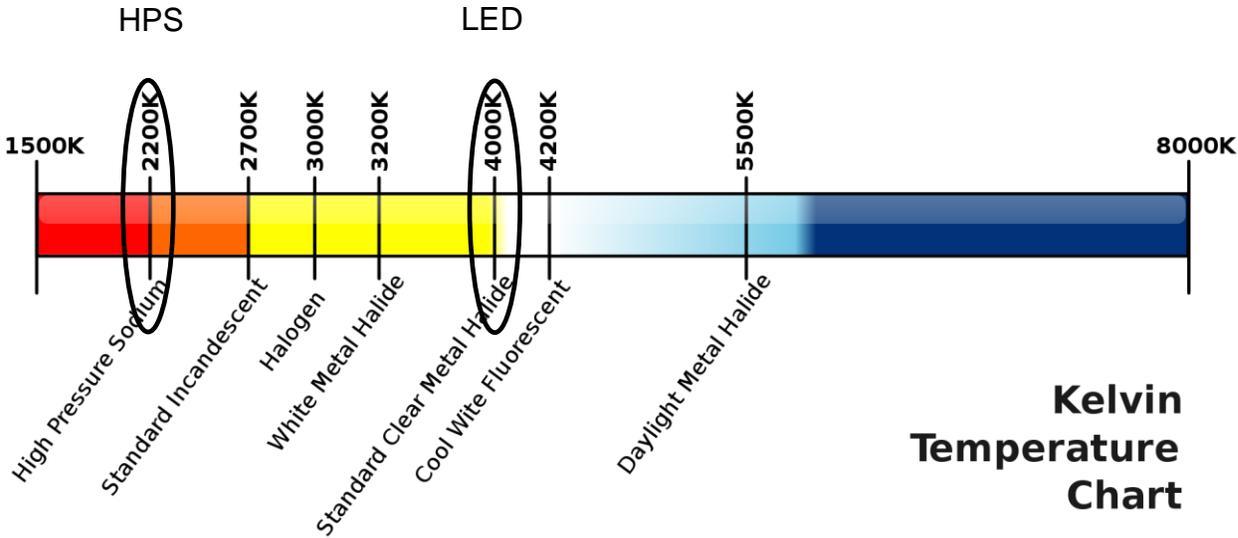


The figure on the left shows a typical HPS residential post-top street light.



The figure on the right is a LED residential post-top street light.

The revised street light design standards are included in Appendix A and will form part of the City's Design Manual. The use of full-cut-off LED fixtures will mitigate light pollution concerns and LED lights allow for better colour rendition which improves visibility. The following chart shows the difference in the light output from HPS at 2200K and LED which is 4000K.



In the past, photometric designs were only required for all major roads or for minor roads if a new fixture was being used. The updated design standards require the submission of photometric designs for all street light installations to ensure the appropriate lighting levels are achieved. It should be noted that this design requirement is consistent with the design standards of other similar municipalities.

The LDI commented that the increased cost of the LED fixture compared to the HPS fixture would “be passed onto new home buyers in a subdivision and will have an effect on housing affordability when combined with other municipally imposed costs”. The additional cost of a residential LED street light is approximately \$1,000 compared to the HPS fixture; however, smaller power supply wires can be used which will save approximately \$200 per street light. Typically one street light services four houses; therefore the net additional cost to the home buyer is \$200 which is minimal compared to the cost of a new home. It should be noted that it is anticipated that the cost of residential LED street lights will decrease as their use increases. Lower energy consumption of the LED street lights will benefit all present and future Londoners.

<b>CONCLUSION</b>
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The new street light design standards (Appendix A) take into consideration newer energy efficient technologies and the standards will ensure the appropriate lighting levels are achieved. Improved lighting levels improve mobility and offer an improved sense of safety.

**ACKNOWLEDGEMENTS:**

This report was prepared by Doug Bolton and Shane Maguire of the Roadway Lighting & Traffic Control Division.

<b>PREPARED BY:</b>	<b>REVIEWED &amp; CONCURRED BY:</b>
<b>SHANE MAGUIRE, P. ENG. DIVISION MANAGER ROADWAY LIGHTING &amp; TRAFFIC CONTROL</b>	<b>EDWARD SOLDI, P.ENG. DIRECTOR, ROADS AND TRANSPORTATION</b>
<b>RECOMMENDED BY:</b>	
<b>JOHN BRAAM, P.ENG. MANAGING DIRECTOR, ENVIRONMENTAL &amp; ENGINEERING SERVICES AND CITY ENGINEER</b>	

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September 26, 2016/SM

Attach: Appendix A: Street Light Design Standards

## APPENDIX A

### Street Light Design Criteria

#### 2.5 STREET LIGHTING

##### 2.5.1 Warrants

Street lighting shall be considered warranted on all roads in urban areas. At isolated rural intersections with non-continuous lighting on the intersecting roads, street lighting shall be considered warranted if the roadway meets or exceeds the requirements of the warrant provided in the Transportation Association of Canada Illumination of Isolated Rural Intersections guide.

Reconstruction of a substandard, isolated rural intersection should be considered before illumination. Street lighting may also be installed at isolated rural intersections at the direction of the Roadway Lighting & Traffic Control Division. Situations when this is warranted may include but are not limited to the occurrence of rare but severe collisions, an inability to maintain adequate hazard markings for raised channelizing islands, or the presence of an unusual number of long combination vehicles with reduced accelerating and braking abilities.

##### 2.5.2 Materials

All street and walkway light fixtures shall be LED, full cut-off, 120V, integrated dimming control capability utilizing an external 0-10VDC control signal and must have a correlated colour temperature (CCT) of 4,000 +/- 500 K, except for walkway lights. The above applies to walkway lights except for the CCT which must be 3,000 +/- 500 K and the fixture should be a "shoebox" style. Materials used for street lights shall be in conformance with the City of London's Traffic Signal and Street Light Specifications. Contact the Roadway Lighting and Traffic Control Division for an updated list of approved LED street light fixtures.

##### 2.5.3 Street Light Designs

The design of street lights on Primary Collector/Main Street and higher classification roads must be designed, signed and sealed by a pre-qualified Professional Electrical Engineering Consulting Companies.

The design of street lights for Local Streets/Neighbourhood Streets & Secondary Collector/Neighbourhood Connectors roads must be designed, signed and sealed by a Professional Engineer.

The design of street illumination shall conform to the requirements set out by American National Standard Practice for Roadway Lighting (ANSI/IESNA RP-8-14)

1. Detailed photometric designs shall be submitted for all roads, intersections, sidewalks and walkways regardless of their classification demonstrating how the RP-8-14 standards have been satisfied. In addition to the photometric isolux drawings, the results of the photometric design must be displayed in a table similar to the following:

	$L_{avg}$	$L_{avg}/L_{min}$	$L_{max}/L_{min}$	$L_{max}/L_{avg}$
Collector Road with Medium Pedestrian Conflict	0.6	3.5	6.0	0.4
<b>Luminaire name</b>				
	RESULTS	RESULTS	RESULTS	RESULTS
	$E_H$ (lux/ft)	$E_{Vmin}$ (lux/ft)	$E_{avg}/E_{min}$	
Sidewalk with Medium Pedestrian Conflict	5.0/0.5	2.0/0.2	4.0	
<b>Luminaire name (near side)</b>				
	RESULTS	RESULTS	RESULTS	
<b>Luminaire name (far side)</b>				
	RESULTS	RESULTS	RESULTS	

2. Street light fixtures shall be located such that current and future tree canopies do not interfere with the distribution of the light.
3. The use of street light fixtures mounted over the travelled portion of the road is encouraged to avoid trees and to achieve improved street light spacing.
4. The drawings shall show the location of the street lights (indicated by an open circle), street light conductors, the location of transformers and the location of power disconnects. The drawings shall specify the type of pole, fixture, conduit, fixture wattage, and conductor being used.
5. Street lights should be placed wholly on one lot at the property line whenever possible.
6. The maximum number of lights that can be attached to a single circuit is 10 unless voltage drop calculations are provided that demonstrate the circuit can accommodate the load.
7. Existing street lights shall be shown as solid black circles.
8. The street light cable should be indicated by a black line with an SL imposed on the line.
9. All street light wire road crossings shall be placed in a 50 mm RPVC duct with handholds at either end of the road crossing.
10. Designers should be aware of driveway locations and living room windows when determining the location of lights.
11. The design is to be drawn at a 1:500 scale.
12. Final designs must be accepted by the City of London's, Roadway Lighting & Traffic Control Division.

#### 2.5.4 Walkway Lighting Design

Walkway lighting designs shall be comprised of the following:

1. 4.6m pole base mounted (black powder coated galvanized square tapered steel or aluminium).
2. Walkway lights are to intersect street circuits at a junction box located at one end of the walkway.
3. Street light wire shall be placed in a 50mm RPVC duct.
4. The light is to be placed within 1m of the fence line in the walkway.

5. Bollards located at either end of a lit walkway must be removable for maintenance purposes.

#### 2.5.5 Residential Street Light Installation & Inspection Guidelines

1. The same light standard must be used from one end of a street to the other regardless of how many phases of construction are involved.
2. Poles and luminaries take a minimum of 8 weeks to be delivered. The City does not stock any residential street lights for new construction.
3. A power disconnect must be installed at the first street light from the transformer. All installations must be inspected by the Electrical Safety Association (ESA) prior to London Hydro doing the power connection. The Contractor is responsible for arranging inspection with ESA.