LED Street Light Program

Technical lighting and Installation overview

September 10th, 2020
Agenda

- Introduction
- LED street light & specifications
- Customer lighting design considerations
- Installation overview
- Wrap-up
Drivers for LED street light program

Proactive replacement of HPS fixtures to LEDs

- Compliance with Federal Environmental PCB Regulations
- Energy conservation
- Better quality lighting with fewer failures, resulting in improved public safety
- Meet customers’ expectations for converting street lights to LEDs
- More efficient than replacing fixtures as HPS lights failed
- Improved coordination with customers
LED Streetlights

- HPS v LED streetlights
- LED options
- Colour temperature
- Customer lighting design considerations
HPS v LED street lights

LEDs improve light quality, use less energy, and require less maintenance

*HPS v LED street photo of Los Angeles from CNN.com
# LED street light specifications

Manufacturer: LED Roadway Lighting

<table>
<thead>
<tr>
<th>Model</th>
<th>LED Wattage</th>
<th>Equivalent Wattage HPS</th>
<th>Colour Temperature (CCT)</th>
<th>Light Distribution</th>
<th>Lumen Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lite-S</td>
<td>39W</td>
<td>100W Flat</td>
<td>3000K 4000K</td>
<td>Type II Max Throw</td>
<td>5,150 5,250</td>
</tr>
<tr>
<td></td>
<td>75W</td>
<td>100W Drop</td>
<td>3000K 4000K</td>
<td>Type II Max Throw</td>
<td>7,700 8,500</td>
</tr>
<tr>
<td>Lite-M</td>
<td>114W</td>
<td>150W</td>
<td>3000K 4000K</td>
<td>Type II Max Throw</td>
<td>12,700 14,050</td>
</tr>
<tr>
<td></td>
<td>162W</td>
<td>200W</td>
<td>3000K 4000K</td>
<td>Type II Max Throw</td>
<td>16,900 18,650</td>
</tr>
</tbody>
</table>

- .ies files are available for each light option
Light distribution

How did BC Hydro select the light distributions?

1. Modelled the HPS luminaires to determine limits for:
   - Longest pole spacing
   - Width of roadway
   - Back light and front light for sidewalks
   - Intersections

2. Aligned these scenarios with the recommended lighting levels in IES RP-8.

3. Evaluated LED luminaires against existing HPS street lights.
What is colour temperature?

<table>
<thead>
<tr>
<th></th>
<th>HPS 2300K</th>
<th>LED 3000K Warm</th>
<th>LED 4000K Cool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Image</td>
<td><img src="image1" alt="HPS 2300K" /></td>
<td><img src="image2" alt="LED 3000K Warm" /></td>
<td><img src="image3" alt="LED 4000K Cool" /></td>
</tr>
</tbody>
</table>

- HPS: High Pressure Sodium (2300K)
- LED: Light Emitting Diode
- 3000K: Warm
- 4000K: Cool
Customer lighting design considerations

Customers are responsible for their lighting design

- Street light levels and uniformity requirements differ from municipality to municipality
- BC Hydro offers street light service to customers only on existing poles that make up a part of our distribution system backbone
- Pole spacing may vary and may not be optimal for street lighting as such achieving light levels and uniformities may not be possible with street lights on BC Hydro poles alone
Lighting design considerations

What factors should be considered for the lighting design?

• Luminaire specification (lumen output, light distribution type)
• Constraints
• Light loss factors
• Installation parameters
• Industry recommended practice
Lighting design considerations

Light Loss Factors

• Lamp lumen depreciation (LLD):
  - BC Hydro requires a minimum depreciation factor of 0.8 at the end of life.
  - Actual LLD is between 0.88 – 0.95.

• Luminaire dirt depreciation (LDD):
  - Cleaning cycle
  - Location factors (pollution and air quality)
  - Luminaire design
  - IES RES-1-16 Measure and Report Luminaire Dirt Depreciation (LDD) in LED Luminaires for Street and Roadway Lighting Applications recommends depreciation of 3% per year for luminaires with individually molded acrylic optics. This results in a LDD factor of 0.70 (assume 10 year cleaning cycle).
Lighting design considerations

Installation Parameters

- Pole spacing
- Mounting height
- Roadway overhang
  - Mounting bracket
  - Pole setback

BC Hydro installation standards will be available on [www.bchydro.com](http://www.bchydro.com) in Fall 2020.
Lighting design considerations

Installation Parameters

• Pole spacing
• Mounting height
• Roadway overhang
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Lighting design consideration

Industry Recommended Practice

The Illuminating Engineering Society (IES) publishes ANSI/IES RP-8 *Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting*.

This recommended practice includes:

- Lighting fundamentals
- Lighting design criteria
Opportunity to add, remove or modify lights

Customers are able to request changes to streetlights through:

- Anytime via SLIM
- Street Light Program via the **Customers Selection file** (*detailed selections*)

*Standard design charges will apply*
Customer support

- Lighting Design Consultants - referrals available via BC Hydro’s Alliance of Energy Professionals
  
  bchydro.com/streetlights

Program questions

- E. LightingSupport@BCHydro.com
- P. 1.833.828.2224 (toll-free) Monday to Friday from 8AM to 4PM
Customer Street Light Selection

- Default versus detailed selection
- How to complete the Customer Detailed Selection excel file
Default versus detailed selection

Default Selections

- Request already sent to all customers; requested back to BC Hydro by September 18\textsuperscript{th}
- Temporarily used for SLIM repair requests – to know what type of LED street light to use for failed HPS lights starting in November 2020

Detailed Selections

- Used for SLIM repair requests (instead of default selection)
- Used for conversion of lights to LEDs
- Capture street light data issues
- Enter requests for the addition of new lights plus the removal or modification of existing lights
LED detailed selection file

Pre-populate detailed selections via global selection table

See where the lights are on a map

Existing light info

Select LED wattage and colour temp – via global selection and/or individually

### High Pressure Sodium (HPS) to LED equivalent

<table>
<thead>
<tr>
<th>Current High Pressure Sodium Street Light Wattage</th>
<th>Your Requested LED Wattage</th>
<th>Your Requested Colour Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>75</td>
<td>Warm (3000K)</td>
</tr>
<tr>
<td>150</td>
<td>114</td>
<td>Warm (3000K)</td>
</tr>
<tr>
<td>200</td>
<td>162</td>
<td>Cool (4000K)</td>
</tr>
</tbody>
</table>
LED Deployment Selection
– File Walkthrough
Installation Overview

- Installation statistics
- What does installation look like?
- Before installation
- After installation
Installation statistics

- ~90,000 streetlights across the province

<table>
<thead>
<tr>
<th>HPS Wattage</th>
<th>100W</th>
<th>150W</th>
<th>200W</th>
</tr>
</thead>
<tbody>
<tr>
<td># of Lights</td>
<td>~51,000</td>
<td>~35,000</td>
<td>~2,500</td>
</tr>
</tbody>
</table>

- 380+ customers including ~140 First Nations
- 40% of Customers have <25 lights
- 66% of Customers have <100 lights
- 6% of Customers have >1000 lights

Streetlight - Customer Histogram

- # of Customers
- Cumulative # of Customers
Refining the installation schedule

Factors for managing an efficient and cost-effective roll-out:

- Installations starting in November 2020
- Target completion is June 2023
- Dependency on receipt of detailed selection files from all customers within a geographical area
- Multiple installation contractors (3 or more) + Internal BC Hydro crews working concurrently in multiple regions / areas
- Seasonality, specifically for the Interior locations
- Density of lights affecting the number of installations per day / week
Before installation

• Installation will start only after customer detailed LED selections are received
• Planned installation dates will be communicated in advance
• Traffic Control will be arranged
• Highway Use Permit will be obtained where required
• Field crew will be fully trained
• First Nation considerations identified
Installation process

- The crew will have 2-3 workers, including qualified electrical resources, bucket truck and supporting vehicles for materials and traffic management.
- The traffic control -- per Ministry of Transportation, Highway and local regulations -- to ensure safety of public and installation crews.

- The crews will be moving from pole to pole to convert lights to LED.
- Each light will take about 20-30 minutes to complete.
- Crew will complete ~10-20 streetlights per day.
- Installation will be coordinated around events & road closures.
- Management of installation exceptions.
After installation

- Removed material will be recycled / properly disposed of
- Customers will receive letters confirming installations are complete
Support for customers

• Media kits for communicating with general public?
• Handling and supporting general public inquiries?
• Anything missing or additional considerations?
Program support

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