Municipal Solid-State STREET LIGHTING CONSORTIUM

U.S. Department of Energy

LED Street Lighting: Experiences from Boston, Las Vegas, and Seattle

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LightFair International, 2014
Las Vegas

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Three Municipal Streetlight Programs

	Boston	Las Vegas	Seattle
Number of LED Replacements to Date (4/2014)	34,000	44,000	42,800
Total Inventory of Streetlights	64,000	54,000	85,000
Most Recent Date of Install	Ongoing	Ongoing (some intersections and decorative remain)	Ongoing (arterial streets; residential completed)
Incumbents Replaced	MV/HPS Cobra heads, post tops. shoebox	HPS Cobra heads	HPS Cobra heads
Average Energy Savings	69.5% across all applications (>85% in shoebox)	56%	49-67% (all recent installs at upper end of range)

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Failure/Defect Rates - Boston

Installs	Dates	Number Returned to Mfr	Failure/Defect Percentage
Phase I – 3000 Residential Units	November 2010 to March 2011	97 Units	3.2%
Phase 2 – 20,000 Lights, Residential, Commercial and Collector	April 2011 to November 2012	156 Units	0.8%
Phase 3 – 3000 MV Post tops	November 2012 to April 2013	88 Units	2.9%
Phase 4 – 10,000 Shoebox (6000 so far)	April 2013 to the present	30 Units (so far)	0.5%
Overall (34,000 to date)		**371 Units**	**1.1%**

Failure/Defects/Abuse

- Overall rates for Las Vegas – 0.5%, Seattle – 0.8%
- Causes include
  - Power supply
  - Broken/disconnected/pinched wiring
  - Broken hinges or other structural component
  - Bullet wound (2)

- Once installed and operating, callbacks for faulty operation are very low; most are “out of the box” type failures.
- Occasional infrastructure issues, need for other upgrades become evident.
  - Older conductors may cause issues.
  - Photocontrols should be upgraded to high quality, long-life to match the LEDs.
  - Electronics are more sensitive to poor power quality than iron transformers.

O&M Impacts

- In all cases, outages and complaint rates dropped significantly:
  - Las Vegas – 80% reduction
  - Seattle – at one point 5000 trouble tickets in queue caused up to 4 month delay in response time; current outages average less than 200.
  - Boston – annually responded to >9000 complaints (of all types) prior to conversion; in FY14 expect this to drop to ~6500 and continue improving as the transition continues
- Some previous “problem areas” eliminated? E.g., bridge vibration in Seattle causing rapid failure of HPS lamps.
- Reduced requirement to spend time relamping is allowing crews to catch up on deferred maintenance and provide better service elsewhere; in most cases reduced work load is being absorbed by attrition and retraining.
- Reduced inventory and associated storage area requirements – 30% reductions reported by both Las Vegas and Boston.

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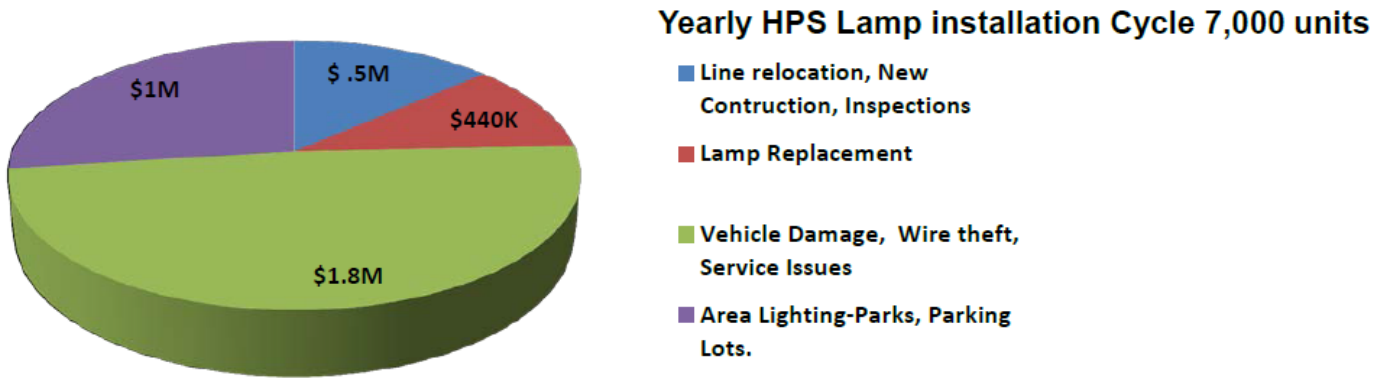
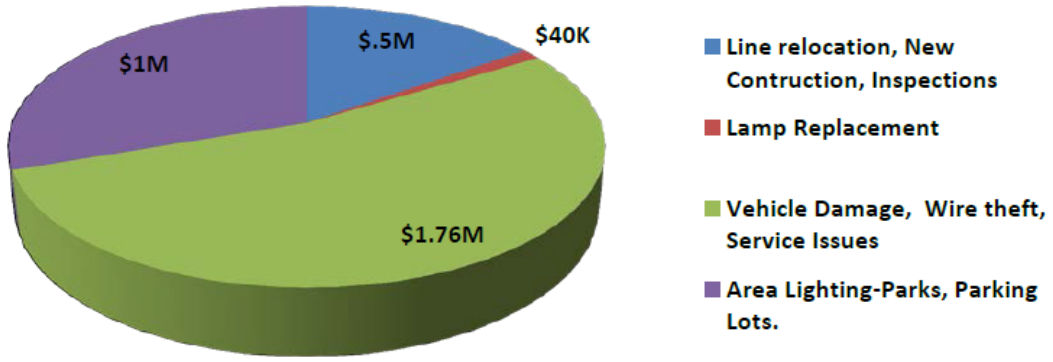
O&M Cost Impacts

City of Las Vegas Maintenance Costs 2010 $3.74M Budget



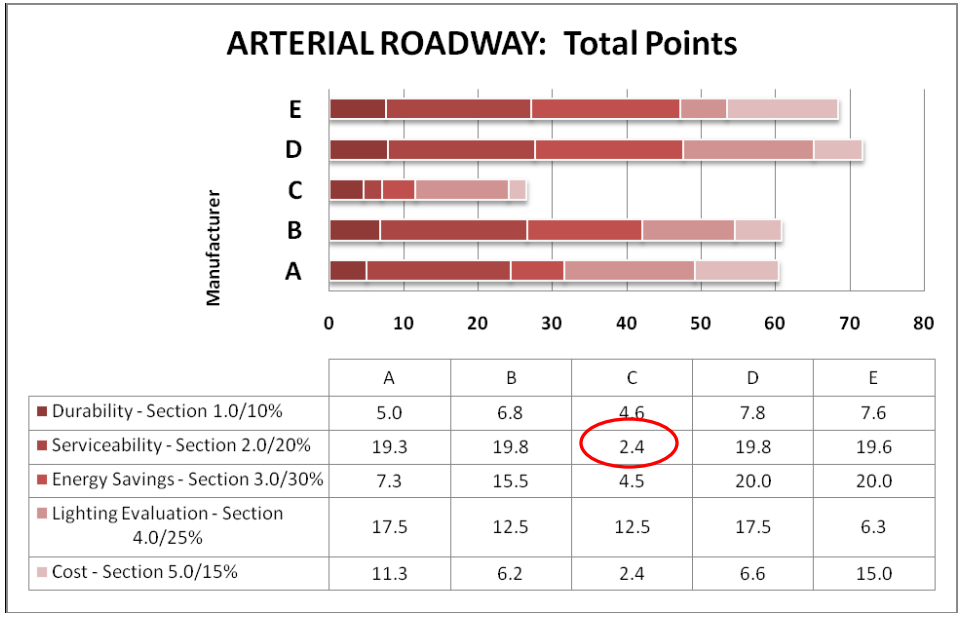
City of Las Vegas Maintenance Costs 2013 $3.3M Budget



Source: Patrick Batte, City of Las Vegas

Lessons Learned and Recommendations

- Specifications are critical to ensure that the products used are of the highest quality available.
- Review by maintenance staff of submitted samples extremely helpful in identifying potential issues going forward – handling, serviceability, etc.



	A	B	C	D	E
Durability - Section 1.0/10%	5.0	6.8	4.6	7.8	7.6
Serviceability - Section 2.0/20%	19.3	19.8	2.4	19.8	19.6
Energy Savings - Section 3.0/30%	7.3	15.5	4.5	20.0	20.0
Lighting Evaluation - Section 4.0/25%	17.5	12.5	12.5	17.5	6.3
Cost - Section 5.0/15%	11.3	6.2	2.4	6.6	15.0

Lessons Learned and Recommendations

- LEDs not a panacea for all lighting issues
  - Vegetative growth can still cause problems
  - Better defined lumen distribution means less “slop,” and hence more attention needed to ensure specific product is appropriately matched to specific application.
  - Light trespass or lack of it can still cause callbacks – typically(?) it’s the change in illumination that is noticed.

- Recommended that locations settle on a specific CCT, but also recognize the tolerances present in ratings, particularly between different products.
- Prior to conversion, existing infrastructure should be investigated and replaced when necessary as part of the conversion.
- Look into bar coding of future street lighting equipment to keep an up to date inventory system.
- Plan for public outreach and be ready to respond to questions about the change.

Thank You!

Questions?

www.ssl.energy.gov/consortium.html

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