Highway Luminaires
&
INDOT’s Research

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High Pressure Sodium - HPS

In use since 1964
- High efficacy - Lm/W 38-150
- Low cost, due to product age
- High availability & broad application

- High Wattage - more electricity consumed
- Poor Color Rendering Index (CRI) 20-30; yellow color - CCT < 3000K
- Uses a ballast to ignite the arc tube
- Lamp life - 24,000 hours

Non-HPS  HPS

http://www.yearhime.blogspot.com
Light Emitting Diode-LED (cont)

LED arrays or panels direct light source to the surface (Powered by an electronic driver)

- Long service life – typically 50,000-70,000 hrs
- High efficacy: Lm/W
- Good CRI 70-80; CCT-3000K to 6000K
- Less energy consumption
- Better uniformity—each diode acts as a reflector
- Warranty period, typically 5-10 years
- High reliability
- Cost of units are reducing due to widespread popularity of the LED
- Environmentally friendly
Light Emitting Diode - LED

- High initial cost
- Expensive replacement
- Thermal management
- Biological safety concern
- Light pollution
- Glare
Light Emitting Plasma - LEP

Electrode less lamp, uses RF waves to excite plasma within the tiny bulb

- Long service life
- Less energy consumption
- High efficacy: 115
- High CRI 95; CCT 5200K Sun-like quality spectrum; True to life colors
- Superior Light Distribution
- High night time visibility

- High initial cost
- Expensive replacement
- Failure/lumen depreciation
Electrode less lamp similar to fluorescent tubes, uses HF current

- Long service life: 60,000-70,000 hours
- Efficacy: 85
- Good CRI 70-80; CCT 270K-6500K
- No flickering
- Instant start

- High initial cost
- High ballast failure
- Bulky design, not a compact light source
- Under development
- Radio Frequency Interference
Metal Halide (with electronic ballast)

A lamp that produces light by an electric arc through a gaseous mixture of mercury vapor and metal halides

- High efficacy – lumens per watt-110-125
- High CRI 90; CCT 4000K-6000k
- Service life - 50,000 hours

- Longer starting time
- Variation in color from lamp to lamp & color shift over time
Research Study

- **JTRP: SPR 3613 (2012-2013)**
  
  http://dx.doi.org/10.5703/1288284315221

  Focused on properties, benefits, cost analysis, and effectiveness

- **Field Evaluation of Alternative Luminaires (2013-14)** - Greenfield, I-70 EB Rest Area, Hancock County

- **JTRP: SPR-3833 (2014-2016)**
  
  1. evaluate the effects of lighting on traffic safety in Indiana
  2. assess in-service performance of new light sources
  3. develop a tool to assist INDOT Traffic Safety in comparing candidates and identify the most cost-effective lighting solution
Work Plan (Cont)

Work accomplished

- Test sites selected
- Demo luminaires selected
- HPS luminaires installed at new lighting locations
- Non-HPS luminaires installation in progress
- Night time crash data collected
Work Plan

Work to be done

- Complete Installation of luminaires
- Complete gathering info on existing luminaires
- Light levels/current draw- Pre & Post installation
- Perform post installation crash data - develop CMF
- AIG 32 simulation
- Life cycle cost analysis
- Recommend lighting design level
- Recommend for IN Test Method for luminaires
- Community survey
Coliseum Blvd/ Cold Water Rd - LED
SR 43 & I -65 Metal Halide

SR 43 & I-65 (North Bound Ramp)
US 136 @ Connector Rd
Brownsburg
Field work

- Acquire demo luminaires
- Measure photometrics & current draw of existing luminaires
- Install demo Luminaires
- Measure photometrics and current draw of demo luminaires
- Observe installation/maintenance issues

Konica Minolta
Illuminance Meter T-10A
Field work

I-74/US 231 High Mast (T2) Illuminance Measurement
(October 16, 2014)

I-74/US 231 High Mast (T1 and T3) Illuminance Measurement
(November 21, 2014)
Amerlight AF250*

250W

6023K, CRI 79, PF 0.95

Average life (per catalog cut) = 70,000 hours

Electro-Matic

240W

4745-5311K, CRI 75, PF 0.96

Average life (per catalog cut) = 50,000 hours
Demo Luminaires LED

Global Tech
GTL-RW-5498
190W
4000-5000K, CRI 76, PF>0.90
System rating L70 - 100,000 hours
5yrs. warranty on driver & fixture

Leotek
GC2-100F-MV-NW-GY-700
244W
4000K, 100 Lm/w, 10yrs. limited warranty
Demos - Plasma & Metal Halide

Plasma: Lightefficient
Conventional-R Series 280W
CCT 5200K, CRI -75
Average life (per brochure) = 50,000 hours

Metal Halide: Cerametek
210W
CCT 4200K; CRI 92
Rated life hrs. 50,000+
Mean lumens per Watt 125
Demo Luminaires- HMT (cont)

**Carolina - Condor**
LED- 415W
4000-5000K, 70CRI, PF 0.95
Driver life (per catalog cut) = 100,000+ hours
Warranty 5 yrs. Limited

**Lightefficient**
Plasma- 500W
5200K, 75CRI, PF ≥ 0.92
Life hours (L70) 50,000
Demo Luminaires HMT

Electro-Matic - LED

240W
CCT 4745-5311K, CRI >75, PF 0.96
LED life time-50,000 Hrs
Qwarranty-5 yrs.

Cerametek - Metal Halide

375W
CCT 4100K; CRI 80
Rated life hrs. 50,000+
Mean lumens per Watt 125
Greenfield Test Site (SPR-3613)

INDOT TEST PROJECT 1-70
AERIAL VIEW ON OCTOBER 9TH, 2013

1000 Watt HPS
6 Luminaires Per Pole

Hoophane LED
280W per Luminaire
3 Luminaires

Holophane LED
550 Watts per Luminaire
6 Luminaires

Bright Lights BLP1000
540 Watts per Luminaire
6 Luminaires

Lightefficient Plasma
280W per Luminaire
3 Luminaires
Greenfield Test Site (SPR-3613) (Completed)
Contact Info

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