



# Highway Illumination LED Pilot Projects

Oregon Department of Transportation

Scott Cramer, PE



# Highway Illumination

- Current Standard: High Pressure Sodium (HPS)
- Pilot Projects: Light Emitting Diodes (LED)
  - Pro's
    - Lower Maintenance Costs
    - Lower Power Costs
  - Con's
    - Increased Initial Cost
    - Limited Standardization
  - Unknowns
    - Actual Field Performance
    - Public Opinion





# Bridge Deck Lighting

- Alsea Bay Bridge
- Maintenance Difficulties in the Past
- Mounting Height: 30'
- Typical Pole Spacing: 190'
- 33 - 250W HPS to Philips RVM 190W LED Fixtures



Retrofit - Simple Cost Analysis	Cost
Retrofit Cost (\$1200 Installed/ Fixture)	- \$39,600.00
Electricity Savings Over 15 Year Period (Flat Rate)*	+\$14,640.00
Maintenance Savings Over 15 Year Period **	+\$8,580.00
<b>Total Retrofit Cost Over 15 Year Period</b>	<b>- \$16,380.00</b>

\* With a 2% and 5% annual electricity cost increase, additional electricity cost savings of \$2,238 and \$6,421 over a 15 year period are expected respectively

\*\* Maintenance savings estimate is based on a 3 year HPS relamping cycle and a 50% HPS fixture failure rate over a period of 15 years. LED fixtures are inspected every 5 years and replaced after 15 years at 70% of initial cost



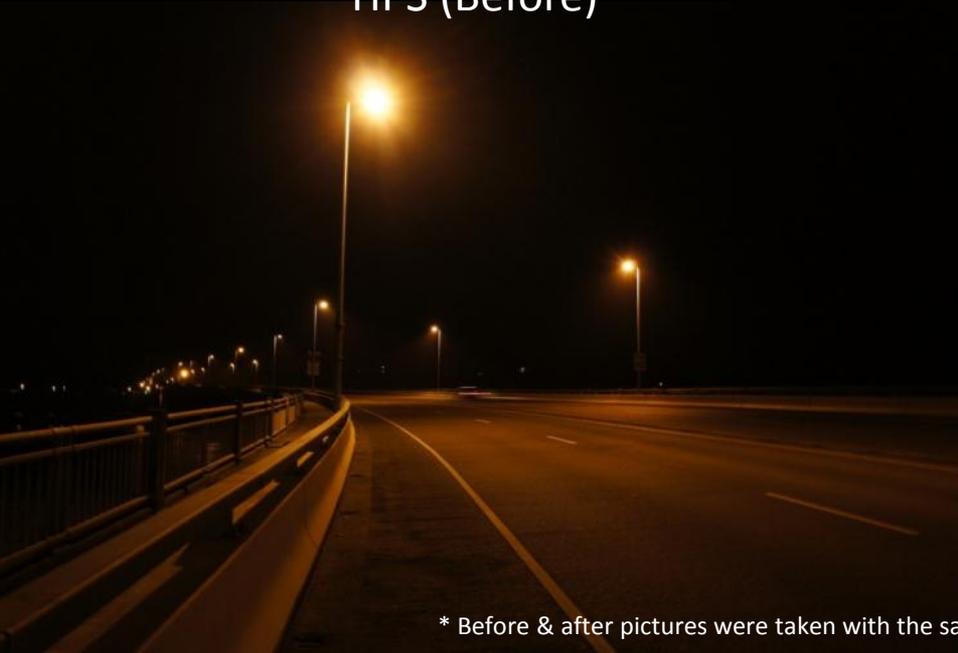
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HPS (Before)



LED (After)



\* Before & after pictures were taken with the same camera exposure, focal length & ISO settings



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# Roadway Lighting

- OR 18 - Fort Hill Road
- Mounting Height: 45'
- Typical Pole Spacing: 240' to 250'
- 19 - 400W HPS to 258W GE ERS4 LED Fixtures



<b>Retrofit - Simple Cost Analysis</b>	<b>Cost</b>
Retrofit Cost (\$1400 Installed/ Fixture)	- \$26,600.00
Electricity Savings Over 15 Year Period (Flat Rate)*	+\$27,645.00
Maintenance Savings Over 15 Year Period **	+\$2,280.00
<b>Total Retrofit Savings Over 15 Year Period</b>	<b>+\$3,325.00</b>

\* With a 2% and 5% annual electricity cost increase, additional electricity cost savings of \$4,427 and \$12,124 over a 15 year period are expected respectively

\*\* Maintenance savings estimate is based on a 3 year HPS relamping cycle and a 50% HPS fixture failure rate over a period of 15 years. LED fixtures are inspected every 5 years and replaced after 15 years at 70% of initial cost



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HPS (Before)



LED (After)





# Signal Intersection Lighting

- 99W @ Hoffman Rd. (Monmouth)
- Intersection Dimension: 125' x 110'
- Mounting Height: 35'
- Initially 4 Fixtures, Increased to 6 After Install
- 6 - 250W HPS to Cree 101W LED Fixtures



<b>Retrofit - Simple Cost Analysis (6 Fixtures)</b>	<b>Cost</b>
Retrofit Cost (\$700 Installed/ Fixture)	- \$4,200.00
Electricity Savings Over 15 Year Period (Flat Rate)*	+\$3,180.00
Maintenance Savings Over 15 Year Period **	+\$1,460.00
<b>Total Retrofit Savings Over 15 Year Period</b>	<b>+\$440.00</b>

\* With a 2% and 5% annual electricity cost increase, additional electricity cost savings of \$486 and \$1,395 over a 15 year period are expected respectively

\*\* Maintenance savings estimate is based on a 3 year HPS relamping cycle and a 50% HPS fixture failure rate over a period of 15 years. LED fixtures are inspected every 5 years and replaced after 15 years at 70% of initial cost



HPS (Before)



LED (After – 4 Lights)



\* Before & after pictures were taken with the same camera exposure, focal length & ISO settings

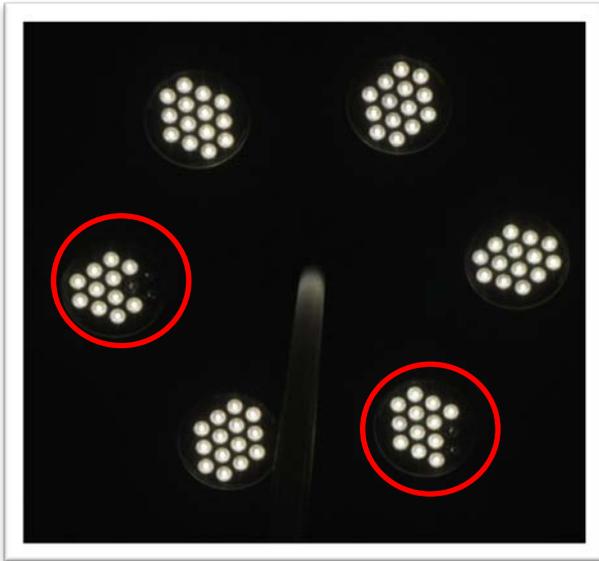


\* Note the distinctive shadows casted by the LED fixture



## High Mast Lighting

- Delta Highway (Eugene)/ I-5 Wilsonville – 1 Pole Retrofit
- Mounting Height: 105'
- 6 - 1000W MH to 560W Holophane LED Fixtures
- Issues with LED fixtures immediately and after 6 months



1 Month After Install



6 Months After Install



# Questions?

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