REDMOND LED STREETLIGHTS

Redmond Traffic Safety Committee

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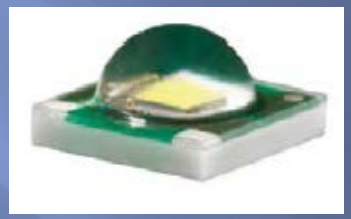
Purpose of Streetlights

Increase Safety and Security

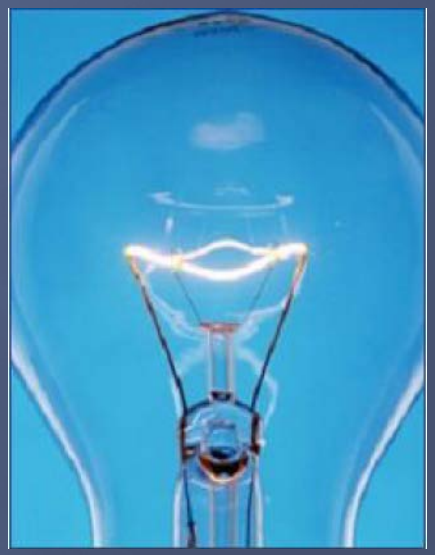
What is an LED

Light Emitting Diode (LED) - Semiconductor device that emits light by releasing energy in the form of photons



Why LED?

1. Light source efficiency
2. Life Expectancy
3. Durability
4. Instant ON and OFF operations
5. Light pattern options



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Light Source Efficacy

Typical Lamp Source	Typical Efficacy
Incandescent (INC)	15 LPW
Metal Halide (MH)	70 LPW
High Pressure Sodium 55v (HPS)	95 LPW
Light Emitting Diode (LED)	130 LPW

Lumen = Measure of Light
LPW = Lumens per Watt

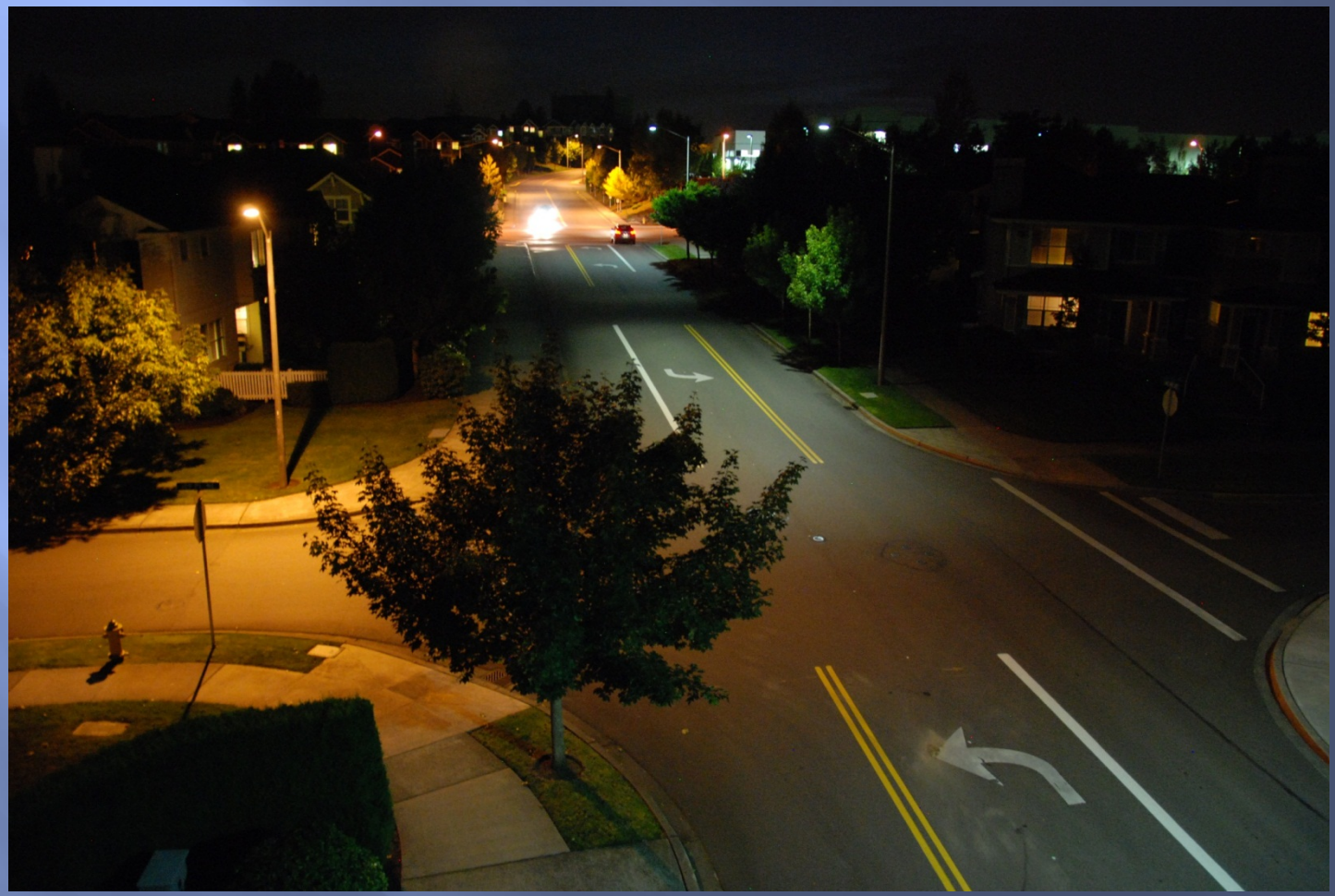
Color

CCT – Correlated Color Temperature

CRI – Color Rendering Index (your ability to see color)

Typical		
CCT	**Lamp Source**	**CRI**
5500k - 6500k	Daylight	100
4000k - 6000k	LED	70
5500k	Cool Flourescent	64
3000k - 4000k	Metal Halide	65
3000k - 5000k	Induction	80
3000k	Incandescent	100
2000k	HPS	25

Color



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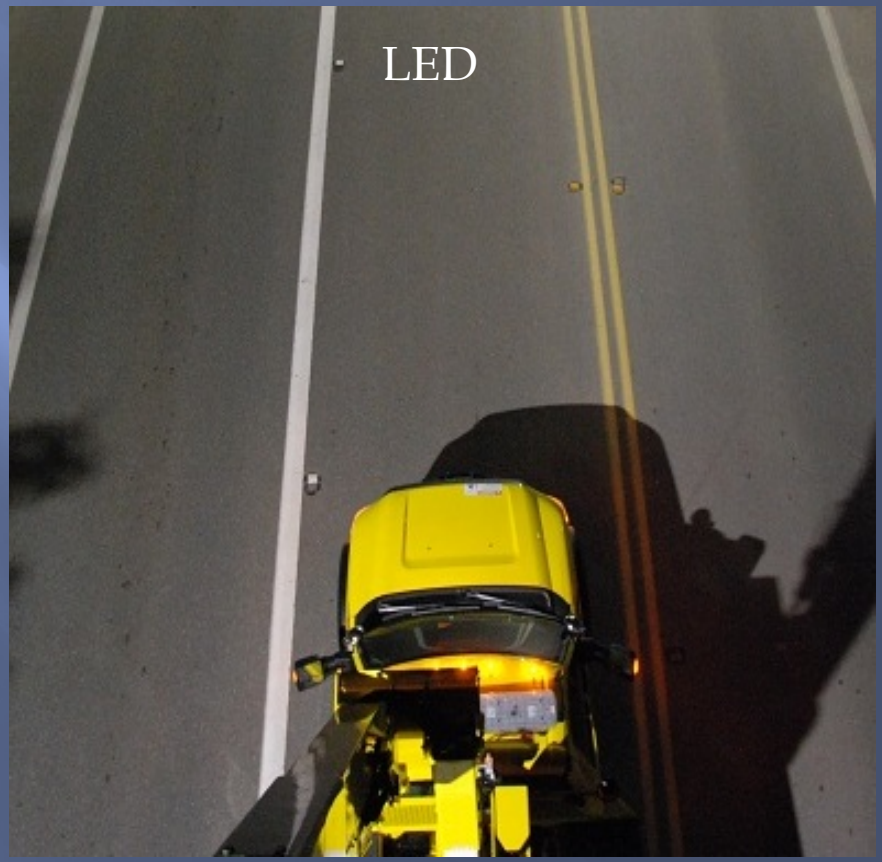
Color



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LED Streetlight Evaluation Goals

1. Evaluated Lighting Performance
2. Evaluated Energy Consumption/Savings
3. Evaluated Maintenance Experience
4. Recommended LED Streetlights for Redmond

Tested Fixtures

6 Manufacturers (5-LED and 1-Induction)

1. American Induction Technologies – (Induction)
2. American Electrical Lighting – LEDR
3. Beta – LEDway
4. Dialight – LED cobra head
5. LeoTek – LED cobra head
6. Lumec - Roadstar

Bench Test

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Field Installation

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AIT (Induction)

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AEL LEDR

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Beta LEDway

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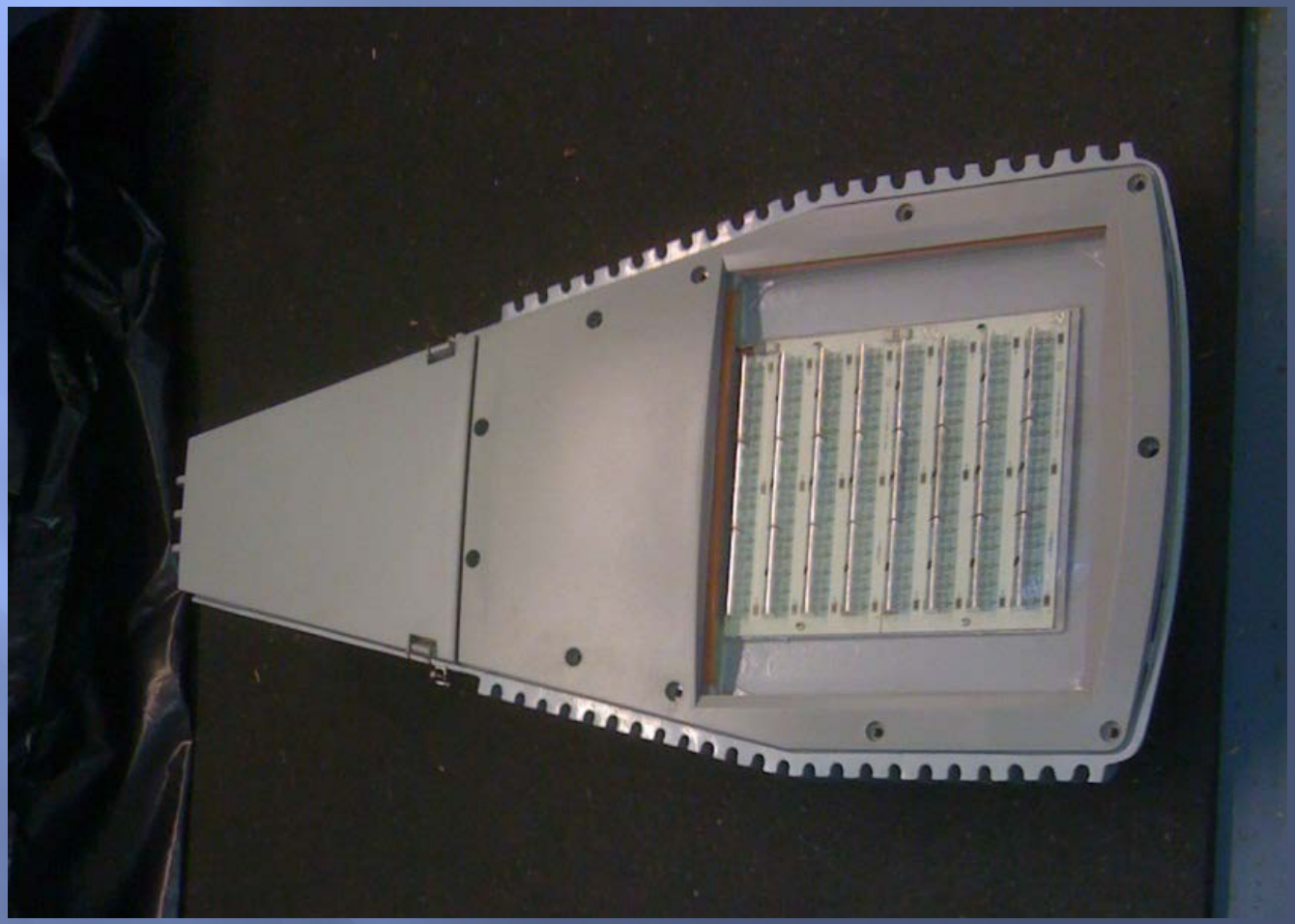
Dialight



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LeoTek

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Lumec Roadstar

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Light Meter Measurement

Measured foot candles (measure of light) on the pavement at 10 ft. increments.

Light Performance

- Met our target foot candles (fc)
- Improved our Uniformity (ratio of light and dark spots)

Photometric Readings (fc)

Reading Location	BEFORE LED Install	AFTER (Sept-2010)
1	1.9	1.5
2	1.5	1.1
3	1.0	0.8
4	0.7	0.8
5	0.4	0.5
6	0.2	0.4
7	0.1	0.3
8	0.0	0.2
9	0.2	0.3
10	0.2	0.4
11	0.3	0.5
12	0.6	0.5
13	1.0	0.9
14	1.6	1.1
15	2.2	1.4
16	2.5	1.3
17	2.5	0.8
18	2.1	0.9
19	1.6	1.1
20	1.2	0.8
21	1.0	0.6
22	0.7	0.4
23	0.5	0.2
24	0.4	0.1
25	0.2	0.2
26	0.1	0.2
27	0.0	0.3
28	0.1	0.4
29	0.2	0.5
30	0.5	0.7
31	0.9	1.2
32	1.4	1.4
33	2.0	1.5
34	2.3	1.1
35	1.9	0.8

Green = bright spots Red = dark spots

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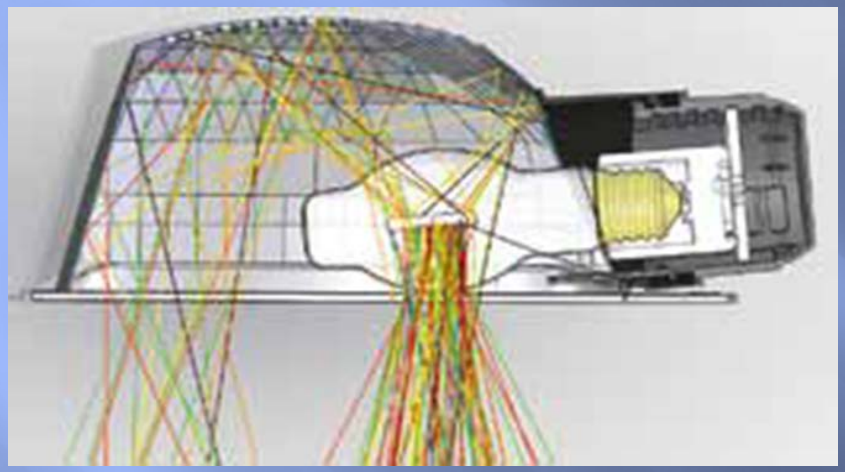
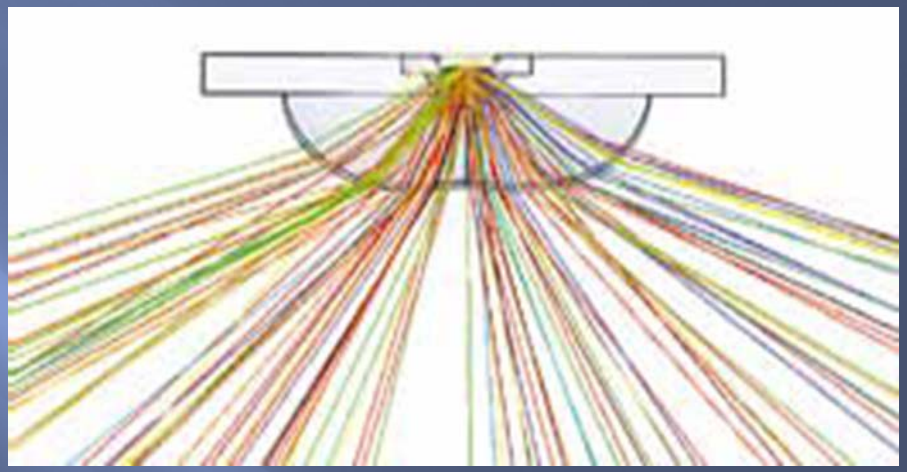
Difference in Photometry



HPS
(spotlight under the lamp)



LED
(controlled light pattern)

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Night-time comparison photos

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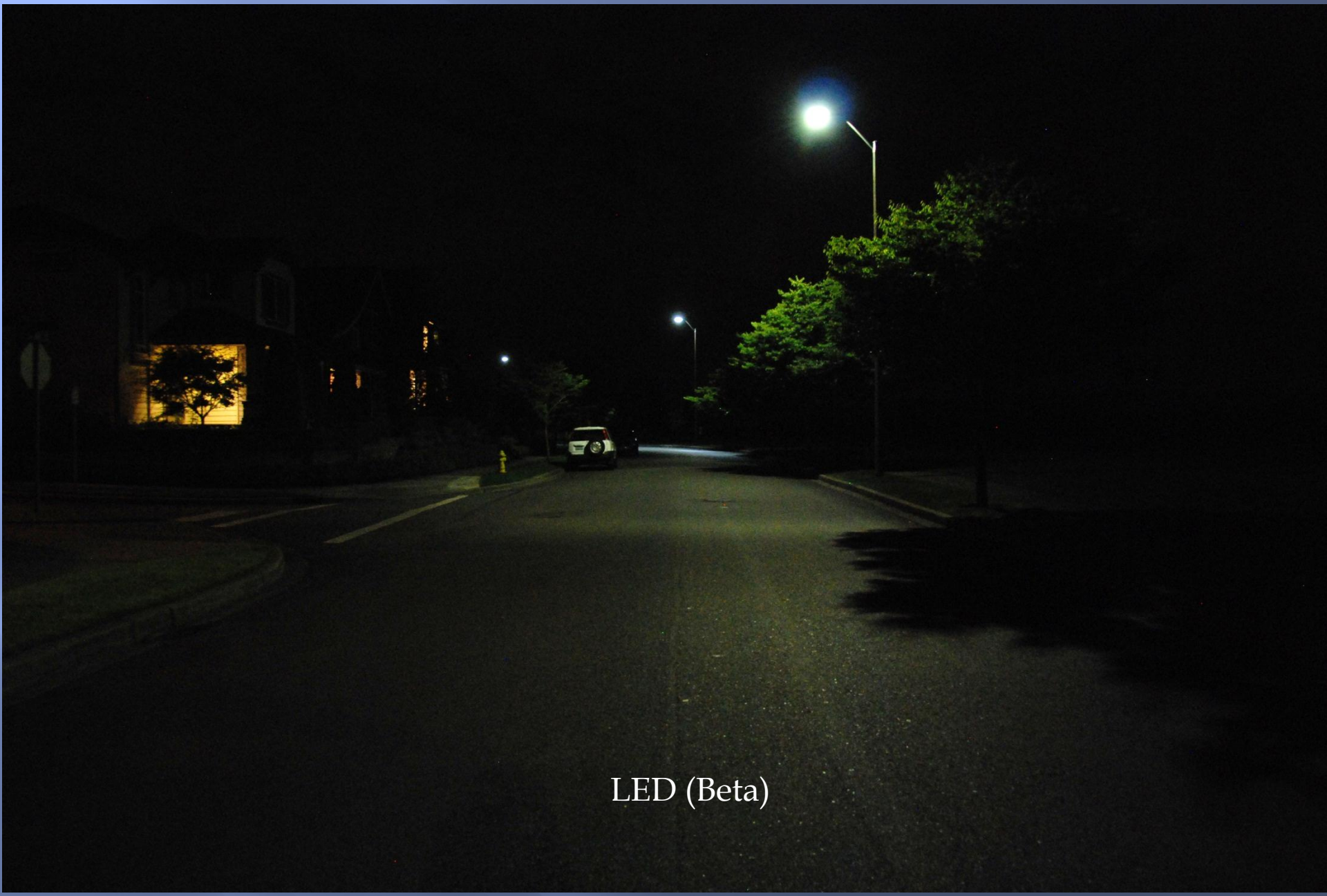
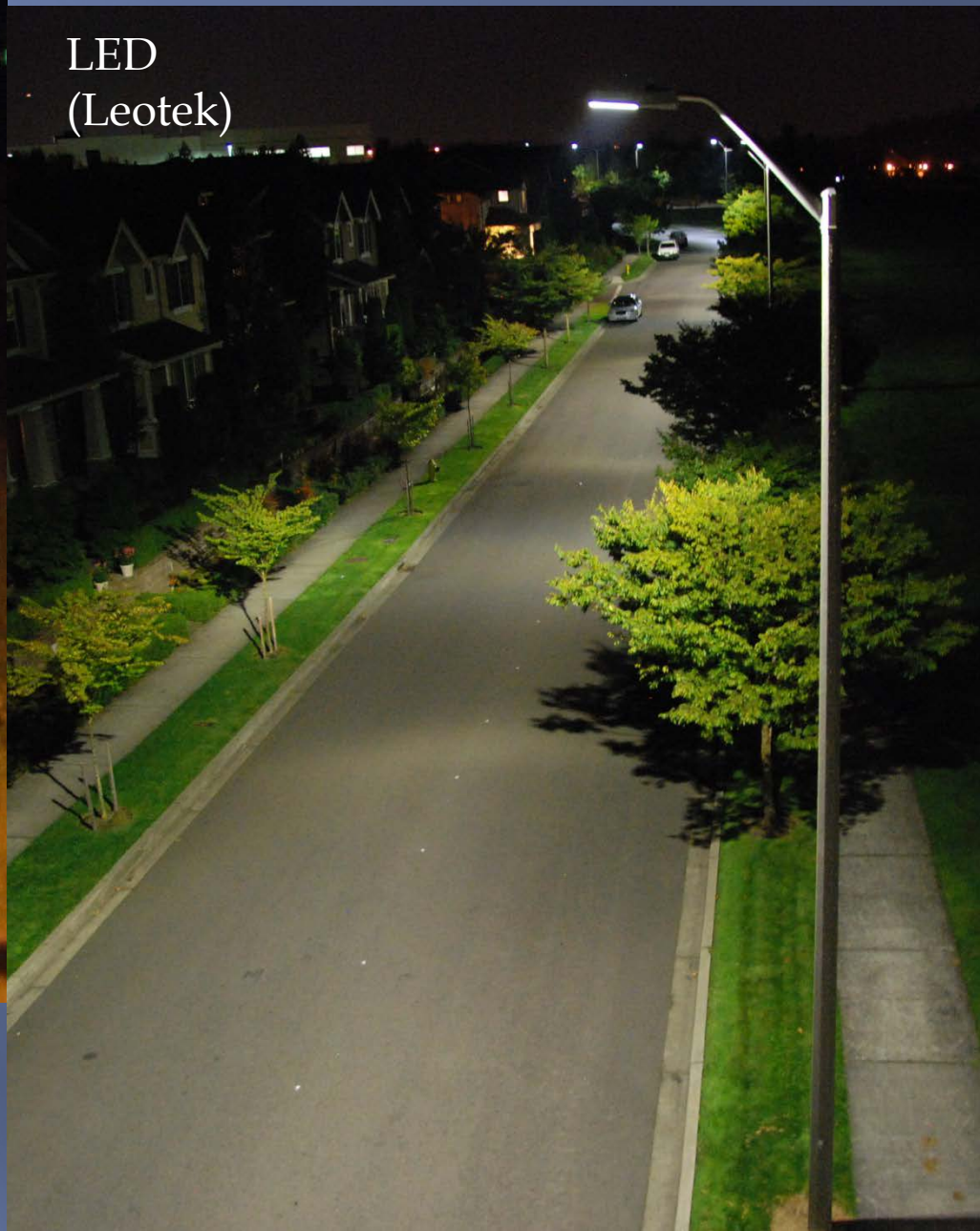
High Pressure Sodium


LED (Beta)

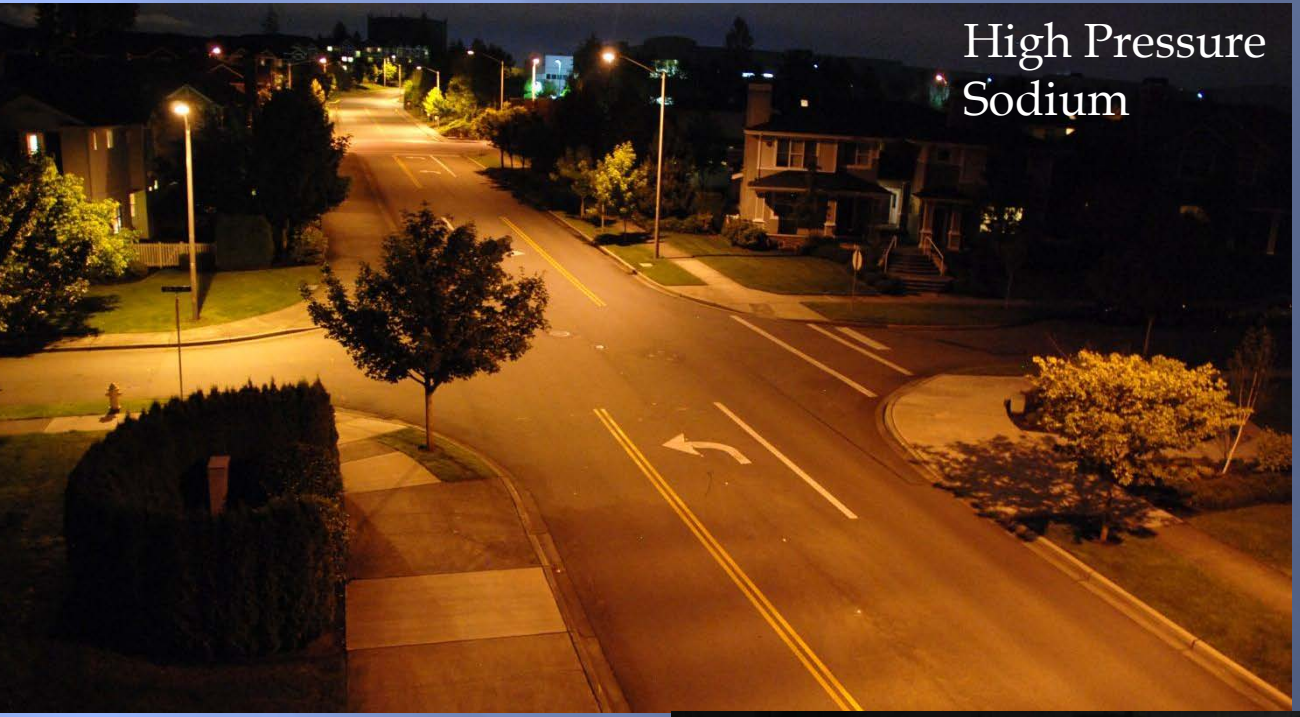
HPS

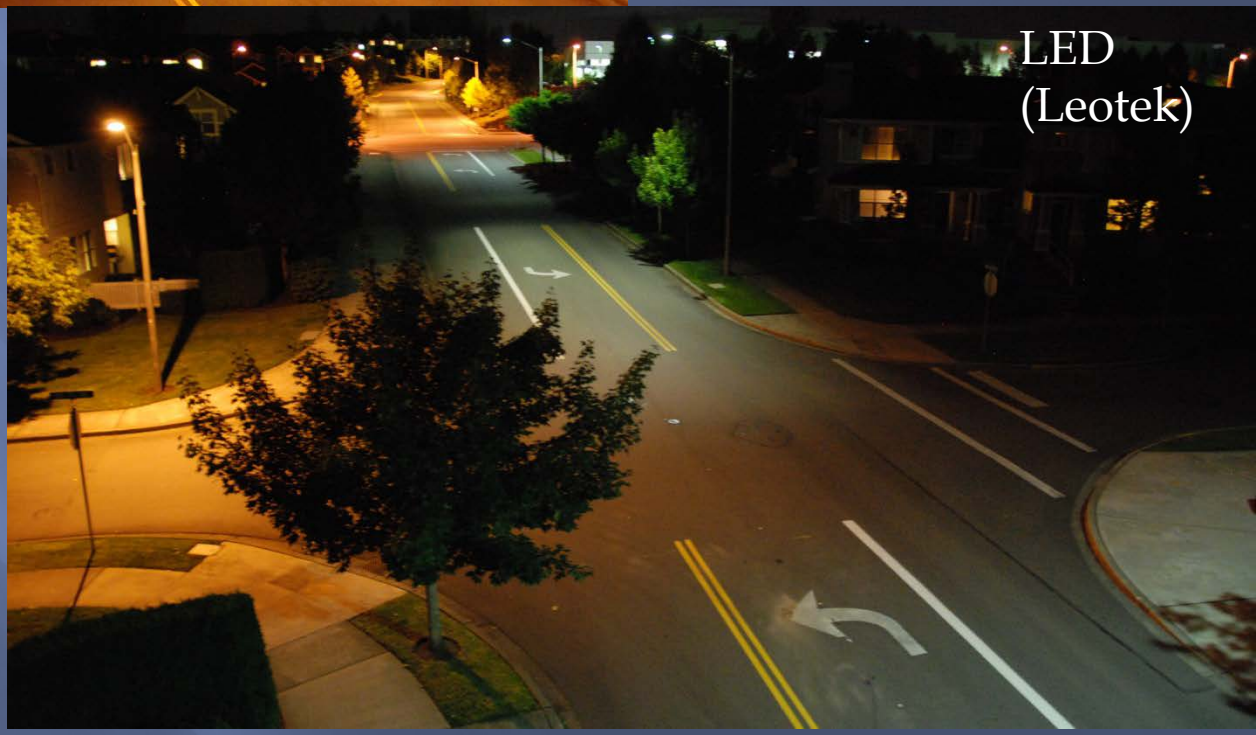
LED
(Leotek)



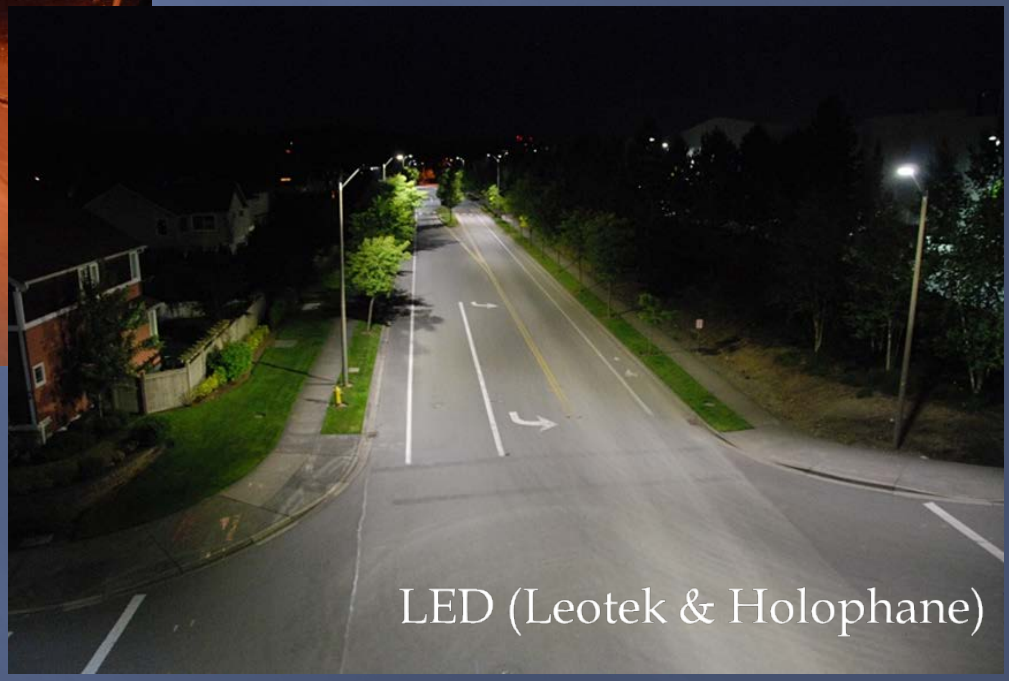

HPS


LED (Beta)


High Pressure
Sodium


LED
(Leotek)

Arterials



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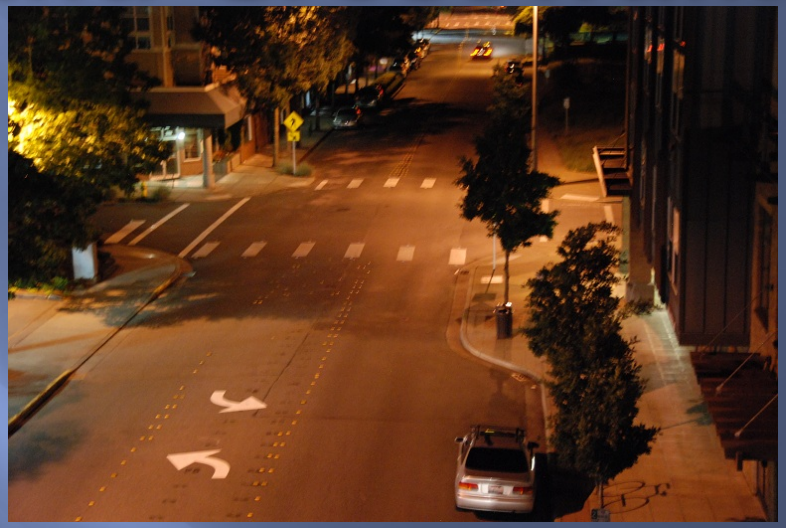
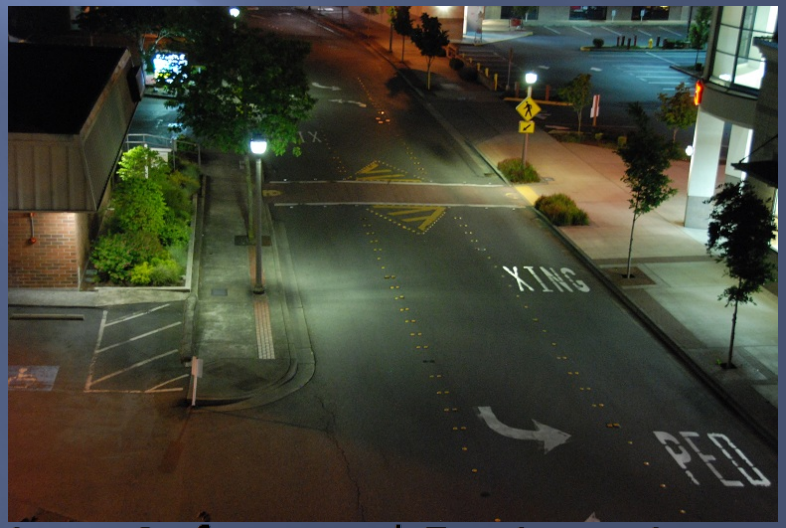
Urban Areas and Crosswalks





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Typical Energy Savings

150w HPS fixture = 171w total consumption @ $89.88/yr
105w LED fixture = 105w total consumption @ $55.19/yr

$34.69 Annual Savings per light or 39%

* Based on 2013 Leotek LED test fixture

Reduction in Re-Lamping

1. Less maintenance cost
2. Less lane closures
3. Safety for public
4. Safety for staff

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Pay-Back

Hubbell 150w HPS fixture = $175

Leotek 105w LED fixture = $350

No need to re-lamp every 4 years. Saves $100 in labor and equipment costs per light.

Operating cost savings of $240/4yrs

New Installation = 4 years

Retro-Fit Installation = 7 years

Findings

1. Improved lighting uniformity
2. Improved color rendering
3. 30%reduction in energy consumption
4. No failures during this test. Less Maintenance.
5. 3-5 year payback on New installation
6. 6-8 year payback on Retrofit installation
7. LED technology is continuing to improve efficiency while lowering cost

Next Steps

1. Installing LED streetlights for new installations
2. Program retrofit installations
3. Continue evaluating improvements in LED streetlight technology

Questions?

Paul Cho
City of Redmond
Traffic Operations
Safety and Engineering
425-556-2751
pcho@redmond.gov

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