



Refining Products for Marketability

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Beta Lighting

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Oakland, CA Demonstration Project

■ Project Objectives

- ◆ Save energy relative to the incumbent technology
- ◆ Match or better the existing illumination and visibility produced by the incumbent technology
 - Meet Required Minimum Illumination values
 - Improve Lighting Uniformity
 - Etc.
- ◆ Offer economic value to users
 - ROI

3 Phases (Application Level)

■ Phase I

- ◆ Application Mock-up in Parking Lot

■ Phase II

- ◆ 1st Street Level Retrofit

■ Phase III

- ◆ 2nd Street Level Retrofit
 - More optimize product solution

Phase I Phase II Solution

- THE EDGE™ Architectural Area Light Luminaire
 - ◆ 60 LED Product
 - Replacing 100W HPS
 - ~ 35% Energy Savings



Phase III (More Optimized Solution)

- Beta LEDway™ Street Light Luminaire
 - ◆ 30 LED Product
 - Replacing 100W HPS
 - ~ 52% Energy Savings



The More Optimized Product

- ◆ Design Specifically for the Street Lighting Market
 - Same Desirable Mechanical Features and Attributes Available in the Most Popular “Cobra-Head” Products
 - “Lean Design”
 - New Optic Designed Specifically for Optimized Street Lighting Performance
 - Three Drive Current Choices
 - 350 mA, 525 mA, 700 mA

*Oakland Phase III – 525 mA (30 LED Type II Distribution)

New Question?

What LED Drive Current Provides
the Best Economic Value?
(350 mA, 525 mA or 700 mA)?

◆ Example 1.

- Very high cost of energy
- Long daily operation
- High Average Ambient

⇒ 350 mA likely for best ROI

More LEDs

⇒ Higher Product Cost
Highest Efficacy & Life

⇒ Higher Energy Savings

◆ Example 2.

- Very low cost of energy
- Short daily operation
- Low Average Ambient

⇒ 700 mA likely for best ROI

Less LEDs

⇒ Lower Product Cost
Lowest Efficacy & Life

⇒ Lower Energy Savings

Performance Comparisons

What is Needed for a Fair Comparison?

1. Side-by-Side Performance Evaluation
 - At the Application Level !!!
2. Certified Photometric Report From an Independent Testing Agency
 - LED System (per IESNA LM-79)
 - Competing Systems (per appropriate IESNA Standards)
3. Life Data (Lumen Depreciation Value) for the LED System Supported by IESNA LM-80
 - Based On the Life of the Application
 - L_{70} = end of life limit
4. Appropriate Maintenance Factors/Light Loss Factors for the Competing Systems
5. Cost/Value Analysis
 - Lighting Performance, Total Power Consumption, Maintenance, etc.

Oakland Measured Results Phase II

120' Spacing

| | Oakland Phase II Beta 60 LED THE EDGE (type III) (350 mA) | Oakland Phase III Beta 30 LED LEDway (type II) (525 mA) | Alternate Phase III Beta 40 LED LEDway (type II) (350mA) (Predicted Perf.) | Oakland existing 100 watt HPS |
|--------------------------------|---|---|---|-------------------------------------|
| average | .53 | .48 | .50 | .8 |
| max | 1.49 | 1.30 | 1.35 | 3.72 |
| min | .09 | .09 | .09+ | .09 |
| avg:min | 5.7:1 | 5.2:1 | 5.2:1 | 8.7:1 |
| max:min | 16.0:1 | 14.0:1 | 14.0:1 | 40.0:1 |
| Delivered Lumens | 4468 | 3090 | 3200 | ~6698 |
| Energy Consumption | 77.7 w | 58.3w | 53 w | 121 w |
| Luminaire Efficacy (LPW) | 57.5 | 53 | 60.4 | ~55.4 |

Oakland Measured Results Phase II

120' Spacing

| | Oakland Phase II Beta 60 LED THE EDGE (type III) (350 mA) | Oakland Phase III Beta 30 LED LEDway (type II) (525 mA) | Alternate Phase III Beta 40 LED LEDway (type II) (350mA) (Predicted Perf.) | Oakland existing 100 watt HPS |
|--------------------------------|---|---|---|-------------------------------------|
| average | .53 | .48 | .50 | .8 |
| max | 1.49 | 1.30 | 1.35 | 3.72 |
| min | .09 | .09 | .09+ | .09 |
| avg:min | 5.7:1 | 5.2:1 | 5.2:1 | 8.7:1 |
| max:min | 16.0:1 | 14.0:1 | 14.0:1 | 40.0:1 |
| Delivered Lumens | 4468 | 3090 | 3200 | ~6698 |
| Energy Consumption | 77.7 w | 58.3w | 53 w | 121 w |
| Luminaire Efficacy (LPW) | 57.5 | 53 | 60.4 | ~55.4 |

Oakland Alternate Phase III vs. 100W HPS 120' Spacing

| | Oakland Phase II Beta 60 LED THE EDGE (type III) (350 mA) | Oakland Phase III Beta 30 LED LEDway (type II) (525 mA) | Alternate Phase III Beta 40 LED LEDway (type II) (350mA) (Predicted Performance) | Oakland existing 100 watt HPS |
|--------------------------------|---|---|---|-------------------------------------|
| average | .53 | .48 | .50 | .8 |
| max | 1.49 | 1.30 | 1.35 | 3.72 |
| min | .09 | .09 | .09 + | .09 |
| avg:min | 5.7:1 | 5.2:1 | 5.2:1 | 8.7:1 |
| max:min | 16.0:1 | 14.0:1 | 14.0:1 | 40.0:1 |
| Delivered Lumens | 4468 | 3090 | 3200 | ~6698 |
| Energy Consumption | 77.7 w | 58.3w | 53 w | 121 w |
| Luminaire Efficacy (LPW) | 57.5 | 53 | 60.4 | ~55.4 |

Oakland Alternate Phase III vs. Actual Phase III 120' Spacing

| | Oakland Phase II Beta 60 LED THE EDGE (type III) (350 mA) | Oakland Phase III Beta 30 LED LEDway (type II) (525 mA) | Alternate Phase III Beta 40 LED LEDway (type II) (350mA) (Predicted Performance) | Oakland existing 100 watt HPS |
|--------------------------------|---|---|---|-------------------------------------|
| average | .53 | .48 | .50 | .8 |
| max | 1.49 | 1.30 | 1.35 | 3.72 |
| min | .09 | .09 | .09 + | .09 |
| avg:min | 5.7:1 | 5.2:1 | 5.2:1 | 8.7:1 |
| max:min | 16.0:1 | 14.0:1 | 14.0:1 | 40.0:1 |
| Delivered Lumens | 4468 | 3090 | 3200 | ~6698 |
| Energy Consumption | 77.7 w | 58.3w | 53 w | 121 w |
| Luminaire Efficacy (LPW) | 57.5 | 53 | 60.4 | ~55.4 |



Thank You
www.betaled.com

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