

LED Exterior Lighting Demonstration Project

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Customer Advanced Technologies Program

Sacramento Municipal Utility District

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Customer Advanced Technologies Program



Mission:

“Work with researchers, customers, and others to develop, test, evaluate and promote new and underutilized energy efficiency technologies.”

Benefits:

- Help customers sort fact from fiction
- Identify most promising technologies through direct, first-hand experience
- Avoid making major investments in technologies that don't work

Lake Forest ARCO LED Demonstration Project

Basecase

- Canopy: twenty-four 320 Watt, pulse-start metal halide fixtures (346 Watts / fixture)
- Parking lot: eight 1,000 Watt, pulse-start metal halide fixtures mounted on 20 ft. poles (1,071 Watts / fixture)
- Car wash: four 100 Watt, pulse-start, metal halide fixtures (119 Watts / fixture)



Retrofit

- Canopy: twenty-four 118.5 Watt Beta LED fixtures (60 LEDs @ 525 mA)
- Parking lot: eight 138 Watt Beta LED fixtures mounted on 20 ft. poles (120 LEDs @ 350 mA)
- Car wash: four 104 Watt wall-mounted, Beta LED fixtures (80 LEDs @ 350 mA)

Lake Forest ARCO

13401 Folsom Blvd.
Folsom CA 95630

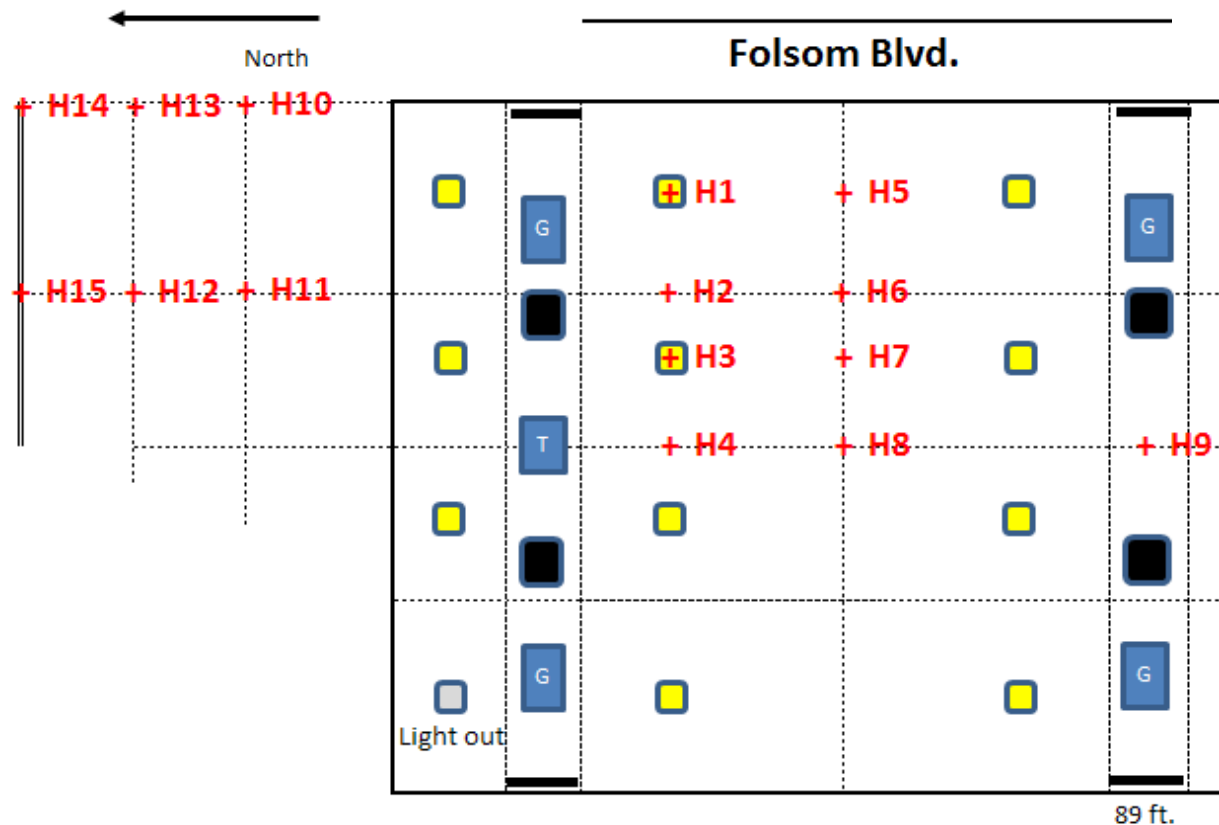
Key to Symbols

Gas pump		320 Watt, MH fixture	
Pillar		Concrete seam	
Trash can		Safety barrier	

NOTE: Not drawn to scale!



Horizontal Illumination Measurements



Point	Metal Halide	Initial LED
H1	20.0	29.4
H2	32.6	44.6
H3	27.7	46.0
H4	30.8	40.5
H5	28.3	34.5
H6	35.8	41.3
H7	37.8	44.5
H8	40.9	46.8
H9	40.9	45.1
H10	13.2	15.6
H11	21.8	29.0
H12	12.2	14.2
H13	8.4	8.9
H14	2.5	2.1
H15	3.2	3.3

Key to Symbols

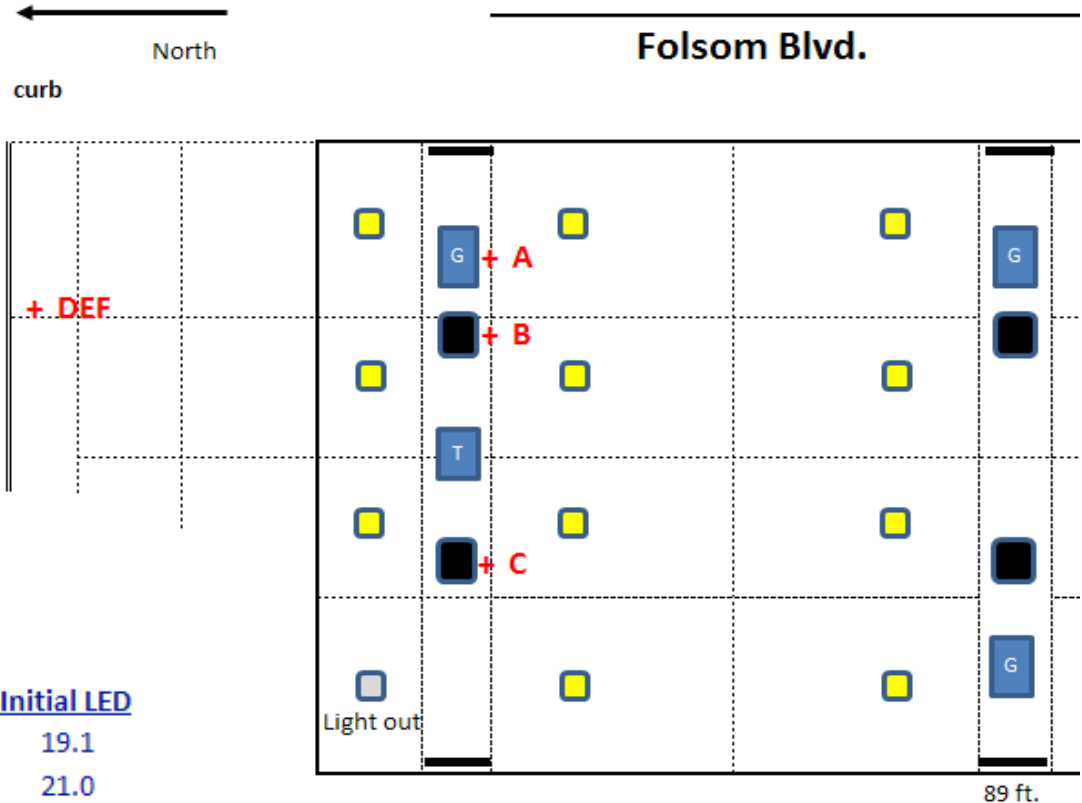
Gas pump		320 Watt, MH fixture	
Pillar		Concrete seam	
Trash can		Safety barrier	

NOTE: Not drawn to scale!






Vertical Illumination Measurements

Vertical Measurements

<u>Point</u>	<u>Description</u>	<u>Metal Halide</u>	<u>Initial LED</u>
A	Gas pump display	20.1	19.1
B	Screw holes on pillar	19.0	21.0
C	On "Cash" sign	18.6	19.2
D	On post near curb	6.0	4.6
E	On face of curb	6.7	7.1
F	Side of person's face	7.5	6.4



Key to Symbols

Gas pump		320 Watt, MH fixture	
Pillar		Concrete seam	
Trash can		Safety barrier	

NOTE: Not drawn to scale!

Energy Savings Calculations

Canopy Lights

$$\begin{aligned}\text{Energy savings} &= \frac{[(\text{Total original Watts}) - (\text{Total LED Watts})] \times 4,200 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= \frac{[(346 \text{ Watts} \times 24 \text{ fixt.}) - (118.5 \text{ Watts} \times 24 \text{ fixt.})] \times 4,200 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= \frac{[(8,304 \text{ Watts}) - (2,844 \text{ Watts})] \times 4,200 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= 22,932 \text{ kWh / year}\end{aligned}$$

$$\text{Utility bill savings: } 22,932 \text{ kWh / year} \times \$0.10377 / \text{kWh} = \$2,379 / \text{year}$$

Energy Savings Calculations

Parking Lot Lights

$$\begin{aligned}\text{Energy savings} &= \frac{[(\text{Total original Watts}) - (\text{Total LED Watts})] \times 4,000 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= \frac{[(1,071 \text{ Watts} \times 8 \text{ fixt.}) - (138 \text{ Watts} \times 8 \text{ fixt.})] \times 4,000 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= \frac{[(8,568 \text{ Watts}) - (1,104 \text{ Watts})] \times 4,000 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= 29,856 \text{ kWh / year}\end{aligned}$$

$$\text{Utility bill savings: } 29,856 \text{ kWh / year} \times \$0.10377 / \text{kWh} = \$3,098 / \text{year}$$

Energy Savings Calculations

Car Wash Lights

$$\begin{aligned}\text{Energy savings} &= \frac{[(\text{Total original Watts}) - (\text{Total LED Watts})] \times 8,760 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= \frac{[(119 \text{ Watts} \times 4 \text{ fixt.}) - (104 \text{ Watts} \times 4 \text{ fixt.})] \times 8,760 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= \frac{[(476 \text{ Watts}) - (416 \text{ Watts})] \times 8,760 \text{ hrs / year}}{1,000 \text{ Watts / kW}} \\ &= 525 \text{ kWh / year}\end{aligned}$$

$$\text{Utility bill savings: } 525 \text{ kWh / year} \times \$0.10377 / \text{kWh} = \$54 / \text{year}$$

Lake Forest ARCO LED Demonstration Project

Results

- ✓ Excellent initial illumination levels
- ✓ Less glare
- ✓ Reduced light pollution
- ✓ Significant energy savings

Canopy lights (65.7%): 22,932 kWh per year

Parking lot lights (87%): 29,856 kWh per year

Car wash lights (12%): 525 kWh per year

Total annual savings: 53,313 kWh per year

- ✓ Estimated annual utility bill savings: \$5,532
- ✓ Cost of project: \$36,746
- ✓ SMUD research grant: \$10,000
- ✓ Simple payback: $\$26,746 \div \$5,532 = 4.8$ years



The new LED lighting system was installed by Fillner Construction Inc.

SMUD 2010 LED Rebate Program

SMUD Exterior LED Lighting Rebate Program

- ✓ Products must be on SMUD's qualified product list.
- ✓ List will be updated approximately every two weeks
- ✓ All future applicants need to apply via the Design Lights Consortium (DLC) <http://designlights.org/solidstate.about.php>
- ✓ Incentive level
 - \$0.10/kWh saved (first year savings)
 - Maximum limit: up to 20% of project cost or \$50,000 (whichever is less)

Need more information? Please visit SMUD's Web site at <http://www.smud.org/en/business/rebates/Pages/index.aspx> or contact SMUD's Commercial Products and Services Dept at 1-877-622-7683.