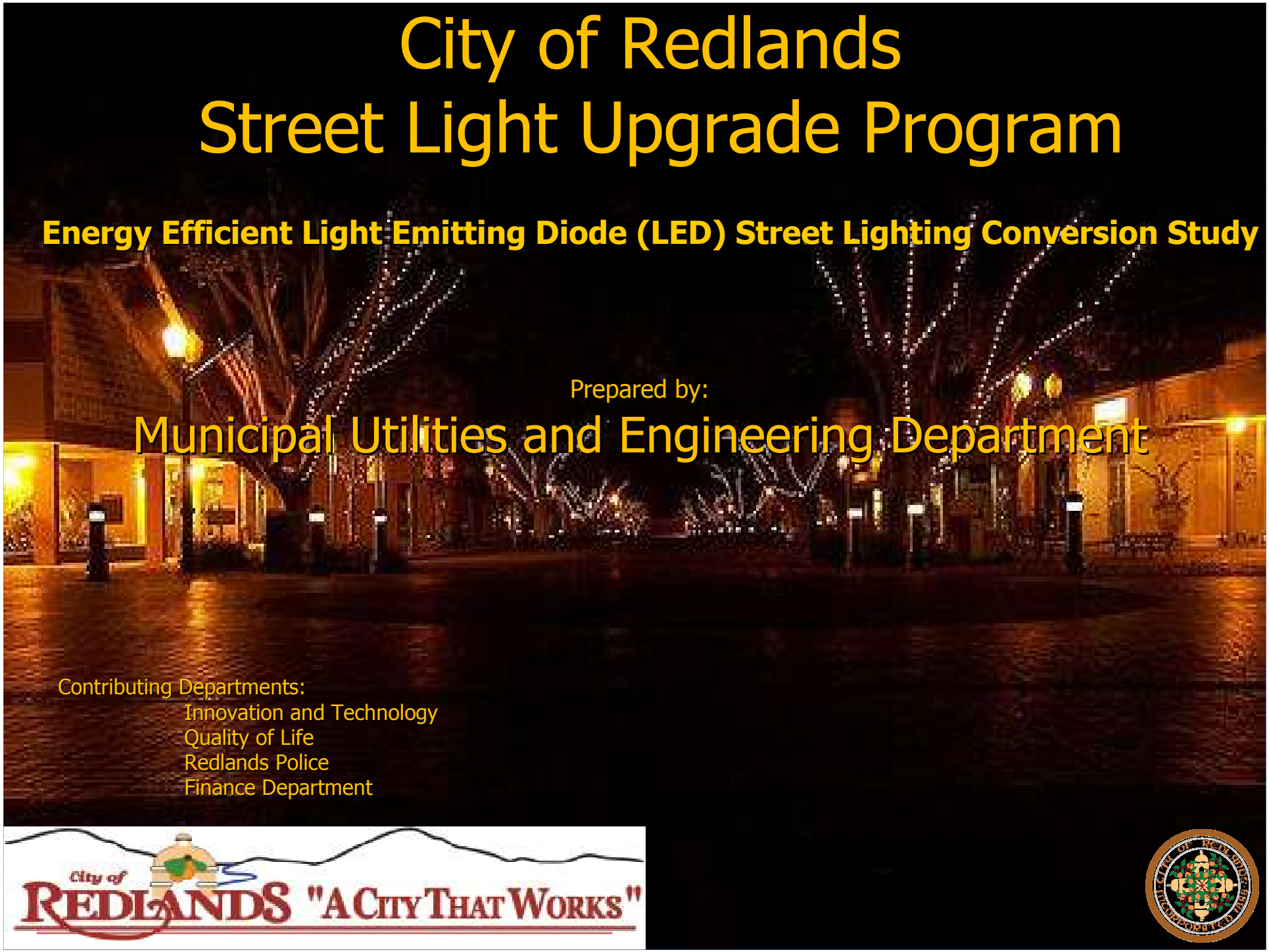
City of Redlands
Street Light Upgrade Program

Energy Efficient Light Emitting Diode (LED) Street Lighting Conversion Study



Prepared by:

Municipal Utilities and Engineering Department

Contributing Departments:
- Innovation and Technology
- Quality of Life
- Redlands Police
- Finance Department

City of REDLANDS "A City That Works"

Presentation Objectives

- Introduce LED as an innovative street lighting "Green" technology desirable for city of Redlands.
- Approve the proposed general upgrade implementation strategy .
- Authorize staff to apply for SCE and EPA loan to cover capital costs of initial phases

Overview

1. LED street lighting technology
2. Current LED Programs
3. City of Redlands annual street lighting costs
4. Implementation Criteria
5. Potential funding sources
6. Implementation Strategy
7. Conclusion

Objectives of Street Lighting

1. To attain a level of visibility which enables motorists and pedestrians the ability to see road geometry and road obstructions both quickly and distinctly.

2. Reduction of street crimes after dark.

3. Enhance commercial properties by attracting evening shoppers and audiences.

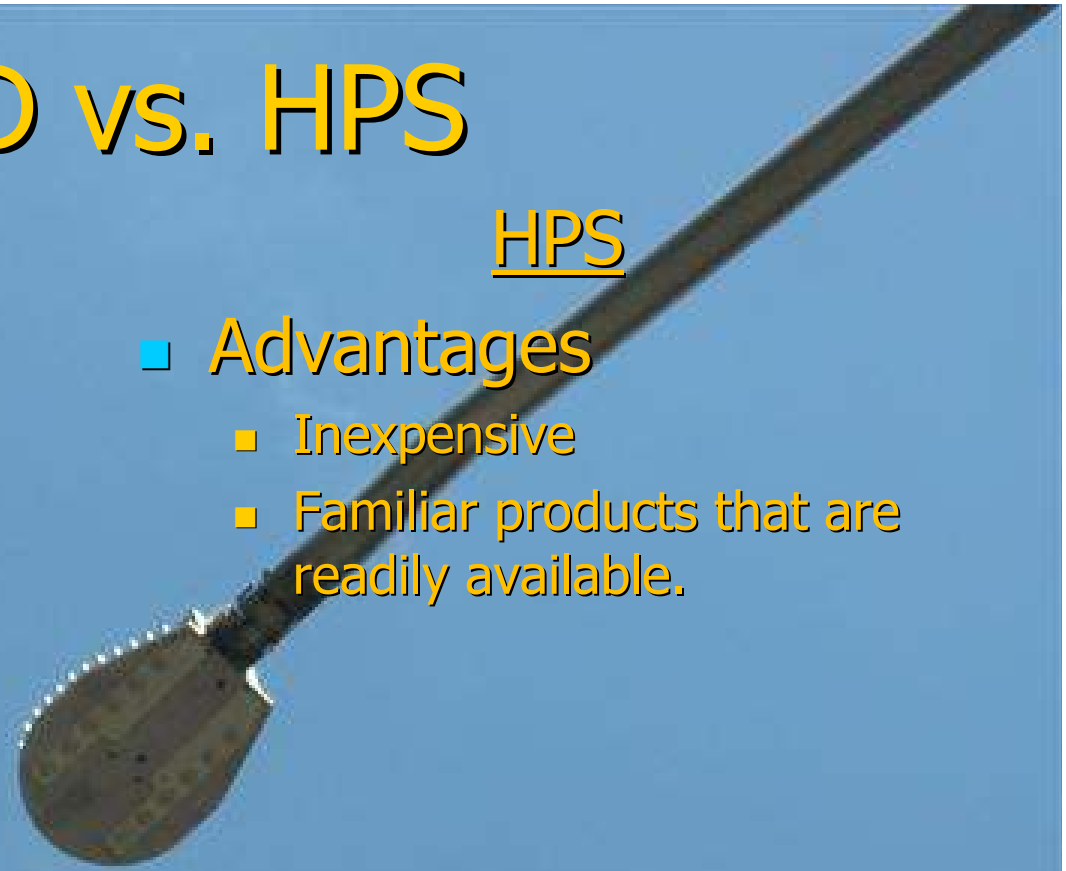
What is HPS Light?

- Old technology that uses high-pressures gasses and toxic materials. Existing street lights use High Pressure Sodium (HPS) bulbs to illuminate the roadways. This is the most typical method of street lighting today.

What is LED Light?

- New and emerging green technology for street lighting purposes. Light Emitting Diodes are a Solid State Lighting technology, 100% toxin free and recyclable.

LED vs. HPS



LED

- Advantages
  - Superior light quality
  - Long lifetime, >50,000 hrs
  - Directional
  - Reduced greenhouse gas emissions.
  - 100% Recyclable
- Disadvantages
  - Higher capital cost
  - Technology is evolving

HPS

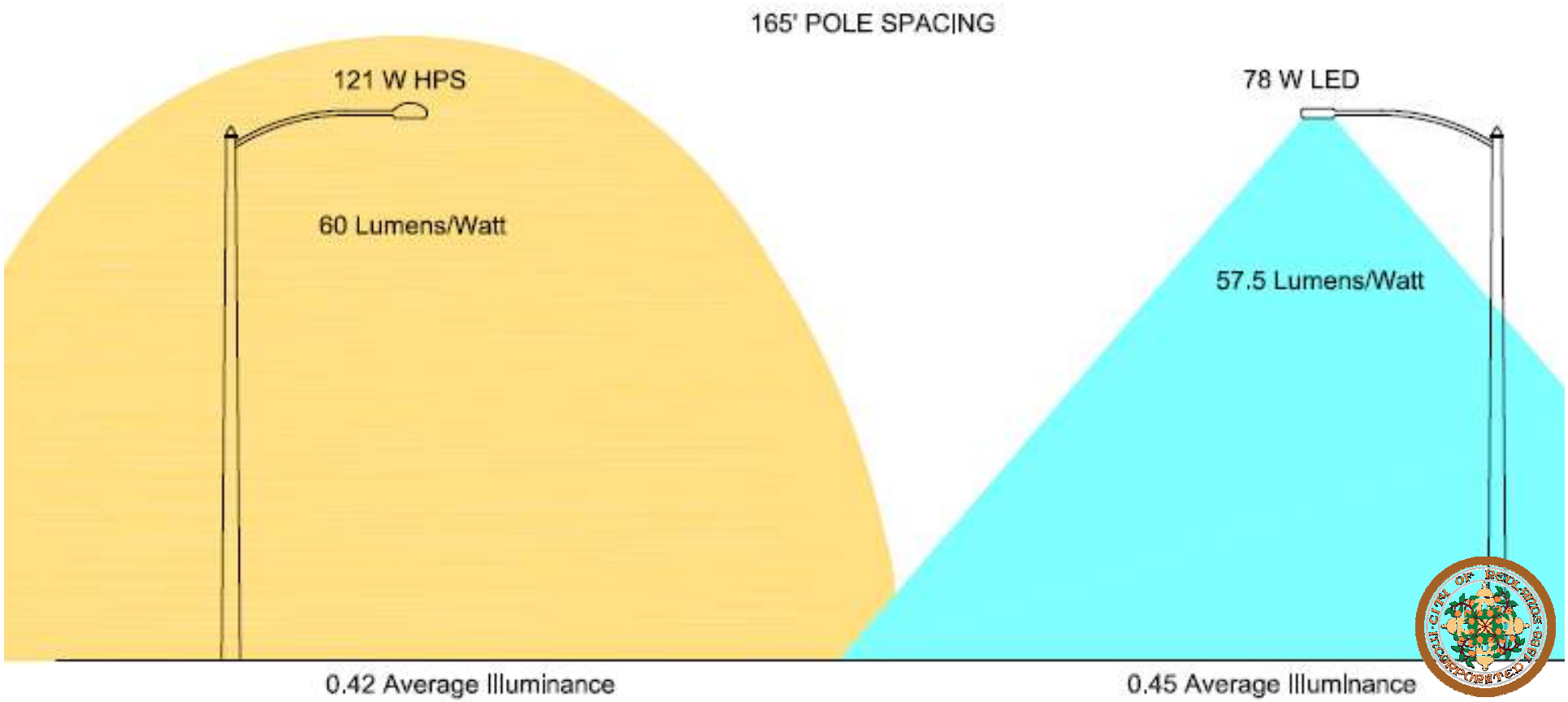
- Advantages
  - Inexpensive
  - Familiar products that are readily available.
- Disadvantages
  - Poor color rendition
  - Little to no potential for improvement.
  - Not recyclable; contains toxic materials.
  - 3-5 year lifetime

LED/HPS Comparison

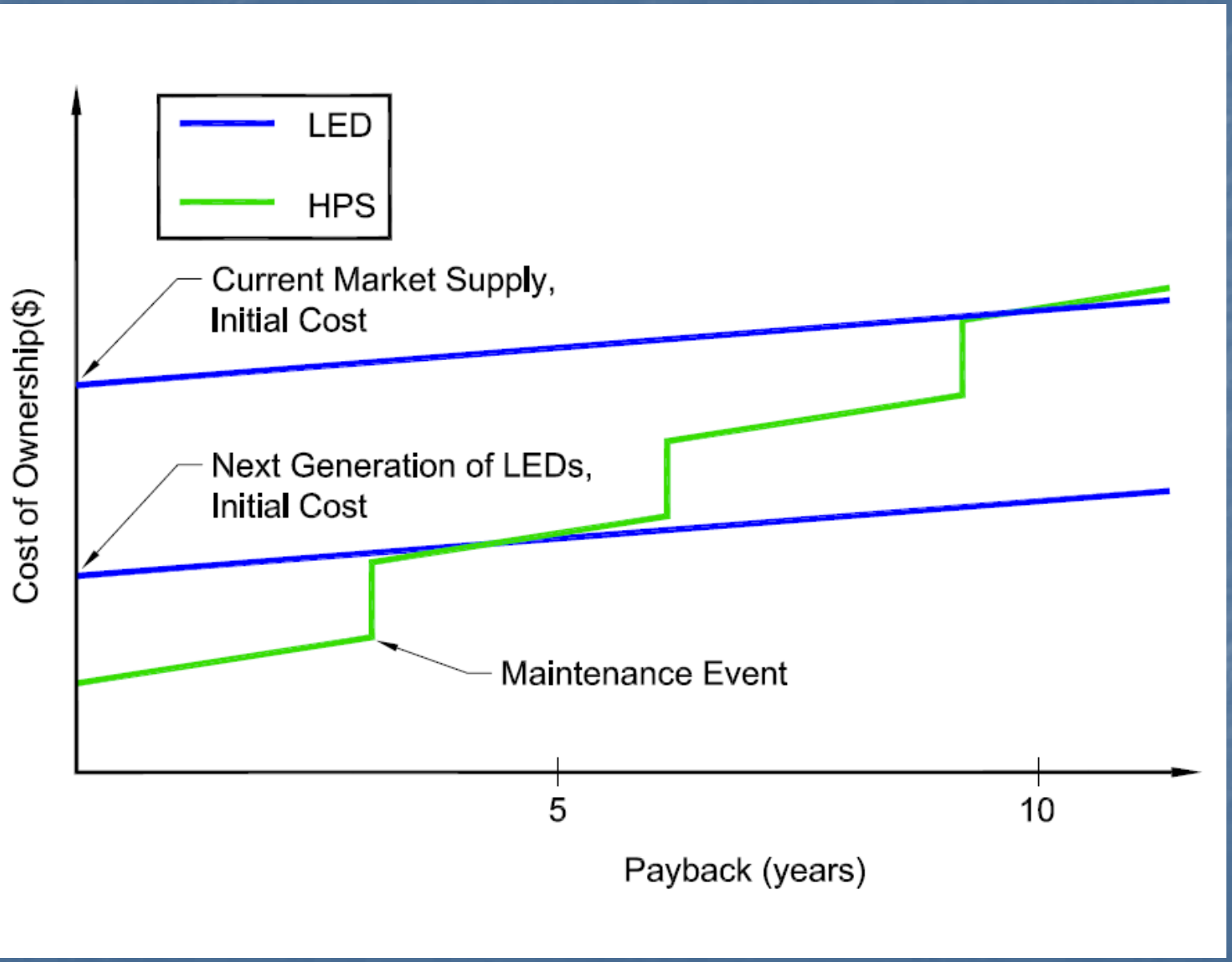
- LED street lights consume fewer watts,
- LED street lights output fewer lumens per watt,

Due to the Directional nature of LED;

A more uniform distribution of light intensity on the trafficway.



LED Benefits



Reduce Carbon Footprint

~~2,516,094 kWh/Yr.~~
(Redlands Street Lights)

1,258,047 kWh/Yr.
(50% Reduction)

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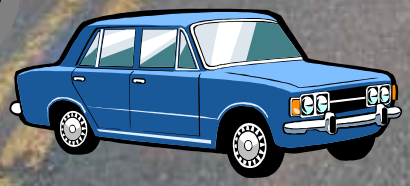
~~3,774,141 Lbs. CO_2~~

1,887,071 Lbs. CO_2
(50% Reduction)

11,450 Lbs.
CO_2/ Car



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165 Cars/Yr.
Removed from
the road

GOAL: Systematic, city-wide upgrade of street lights from HPS to LED to achieve the following;

1. Superior lighting quality
2. Substantial energy reduction
3. Substantial reductions in replacement and maintenance costs.
4. Reduce the city's carbon footprint.

Before

After

Current LED Programs

- The following Cities were interviewed regarding their LED programs;
  - Raleigh, NC
  - Valdez, AK
  - Los Angeles, CA
  - Chula Vista, CA
  - Boston, MA
  - Austin, TX

Scope of their conversion/ research programs varied considerably.

Los Angeles, CA

6th Street Bridge

Before

After

Valdez, AK

Before

After

Chapel Hill, NC

Before

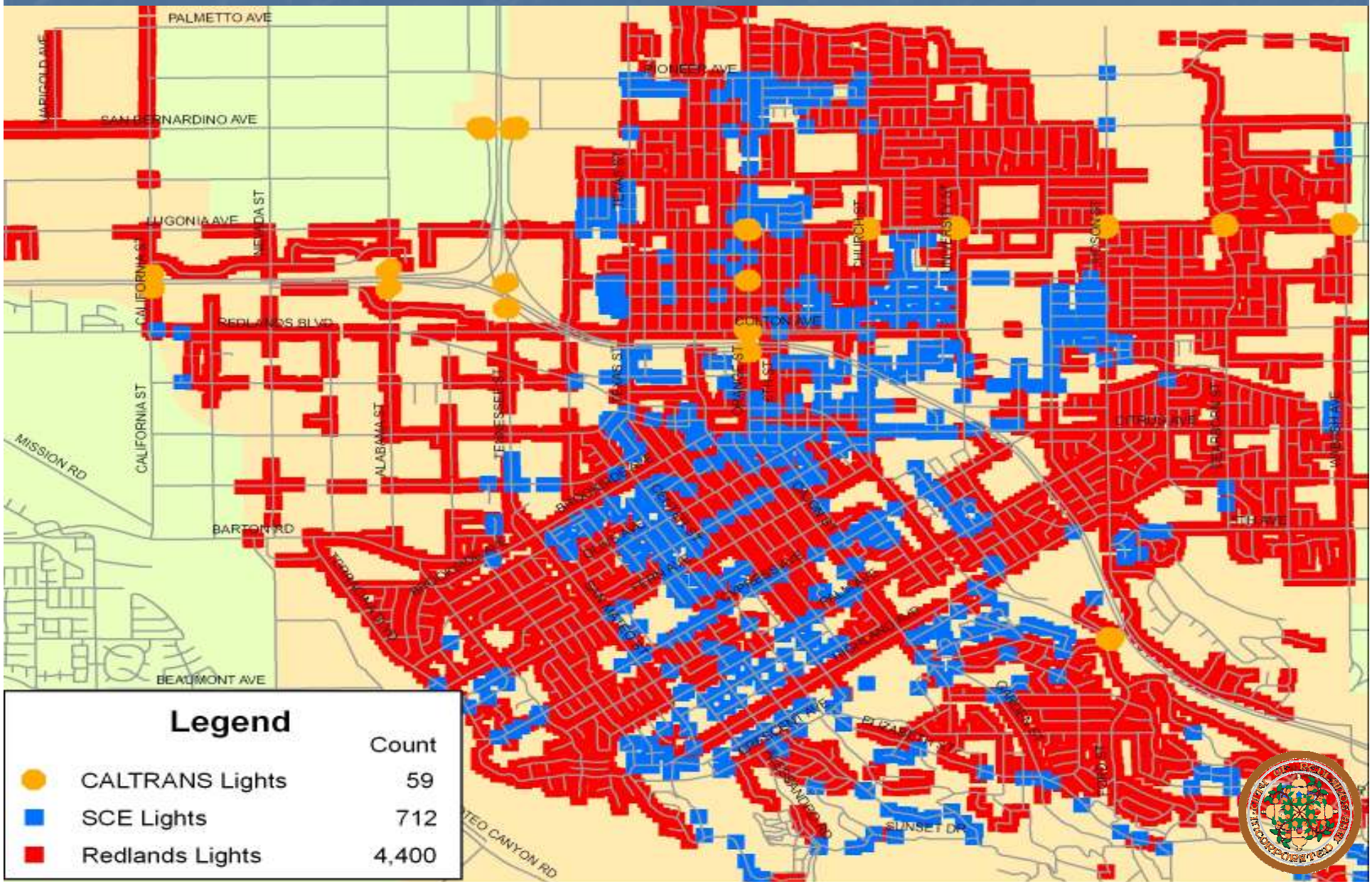
After

Halifax, Nova Scotia

Before
195 W HPS
0.8 Foot-candles

After
88 W LED
1.0 Foot-candles
55% energy savings

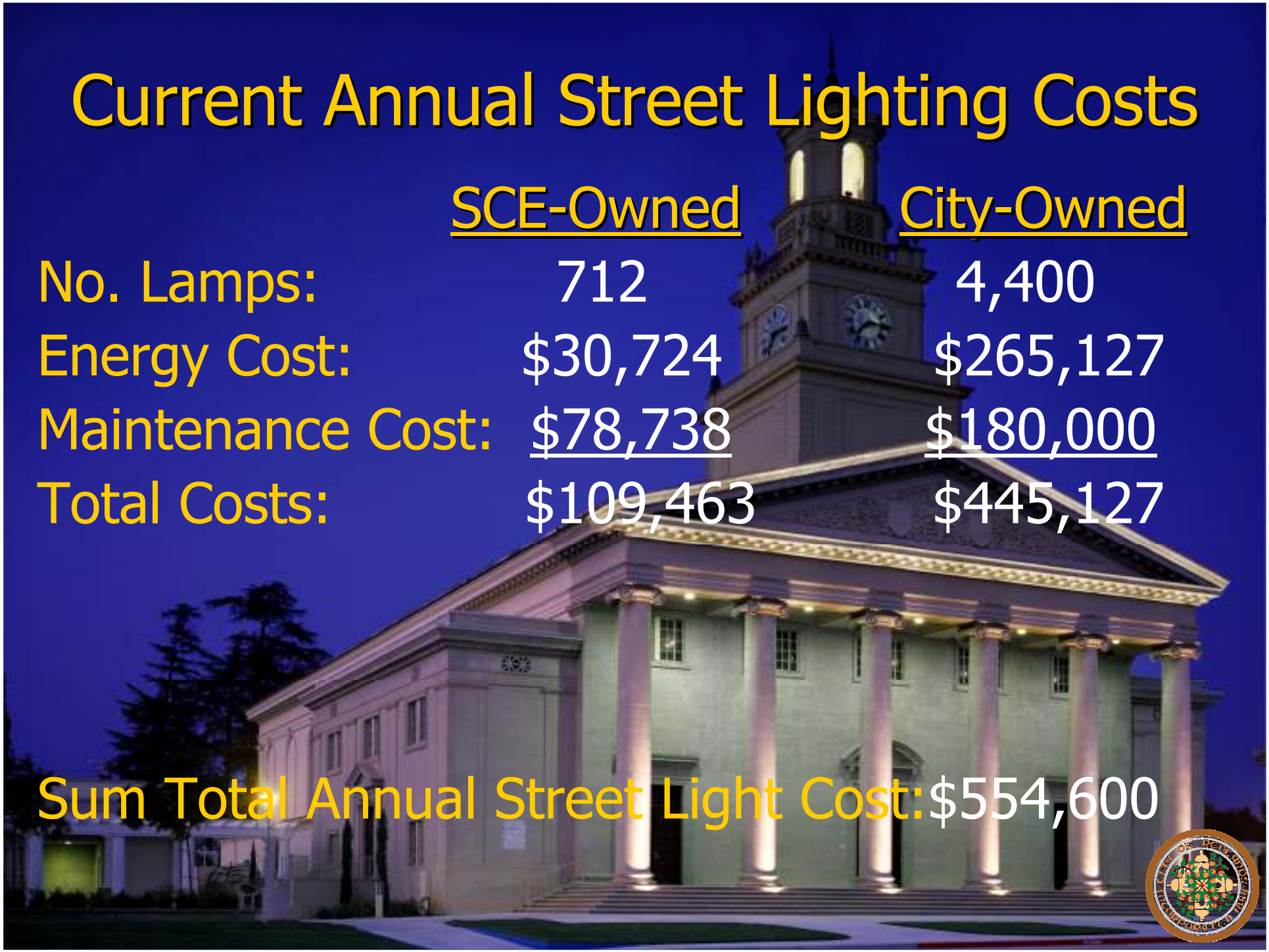
Street light ownership map



Current Annual Street Lighting Costs

	SCE-Owned	City-Owned
No. Lamps:	712	4,400
Energy Cost:	$30,724	$265,127
Maintenance Cost:	$78,738	$180,000
Total Costs:	$109,463	$445,127

Sum Total Annual Street Light Cost: $554,600

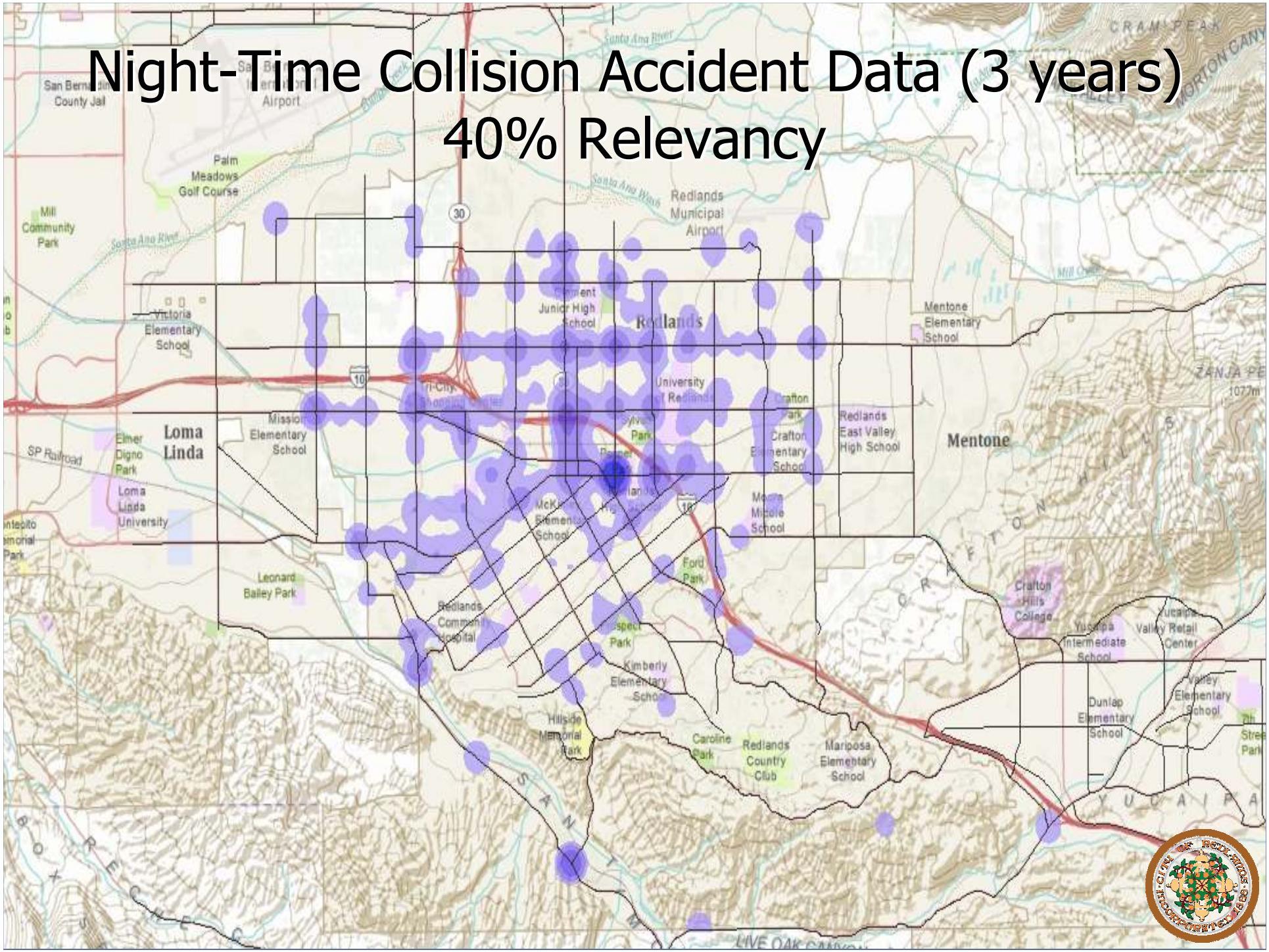


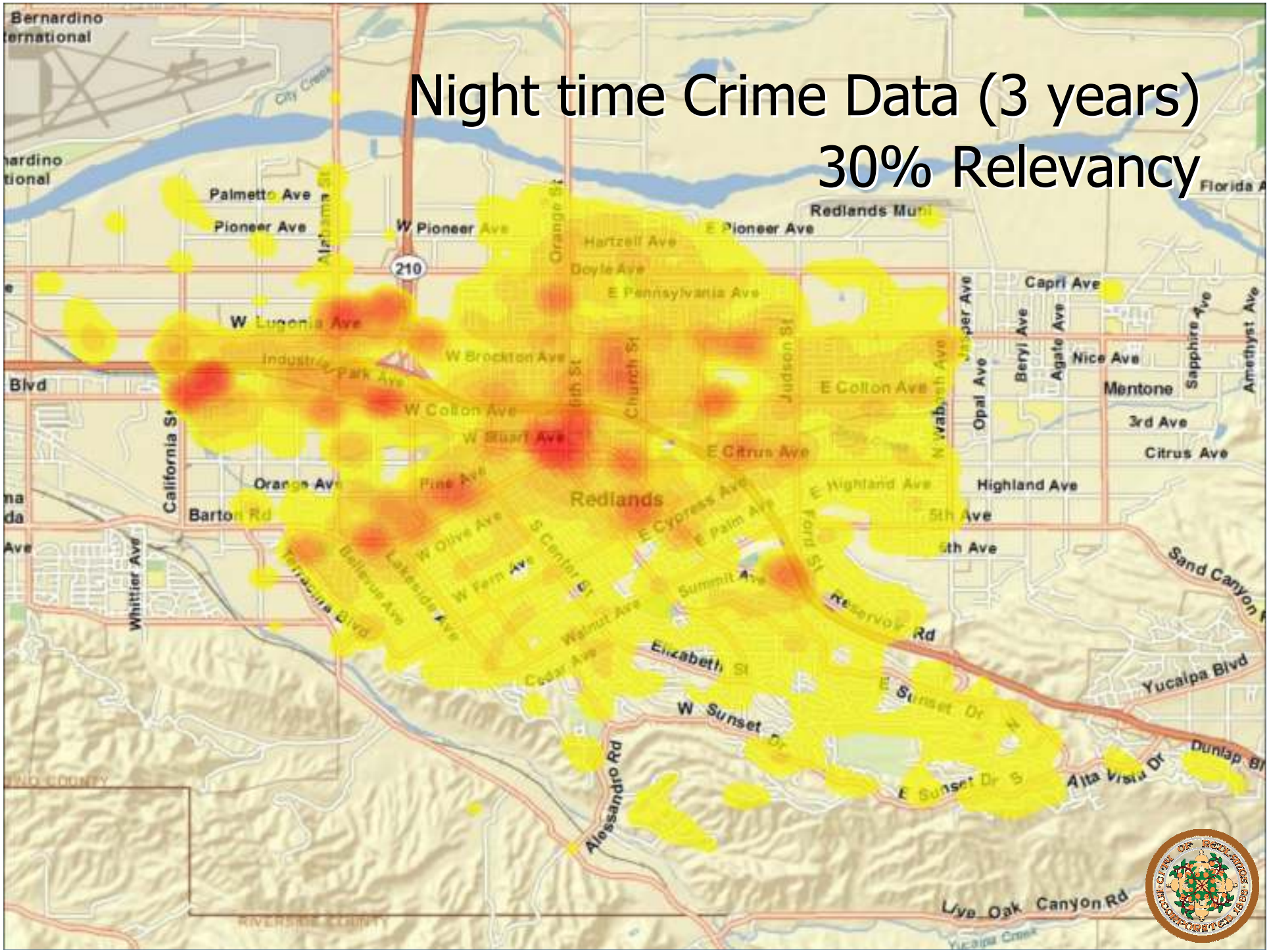
Priority Criteria

Street Lighting Objectives	Relevance Factor
1. Visibility of the Roadway	40%
Collision accident data*	
2. Reduction of night time crime	30%
Redlands PD night time crime data*	
3. Retail/entertainment areas	20%
Attract shoppers and audiences	
Business Permits	
4. Population density	10%
Population density data	

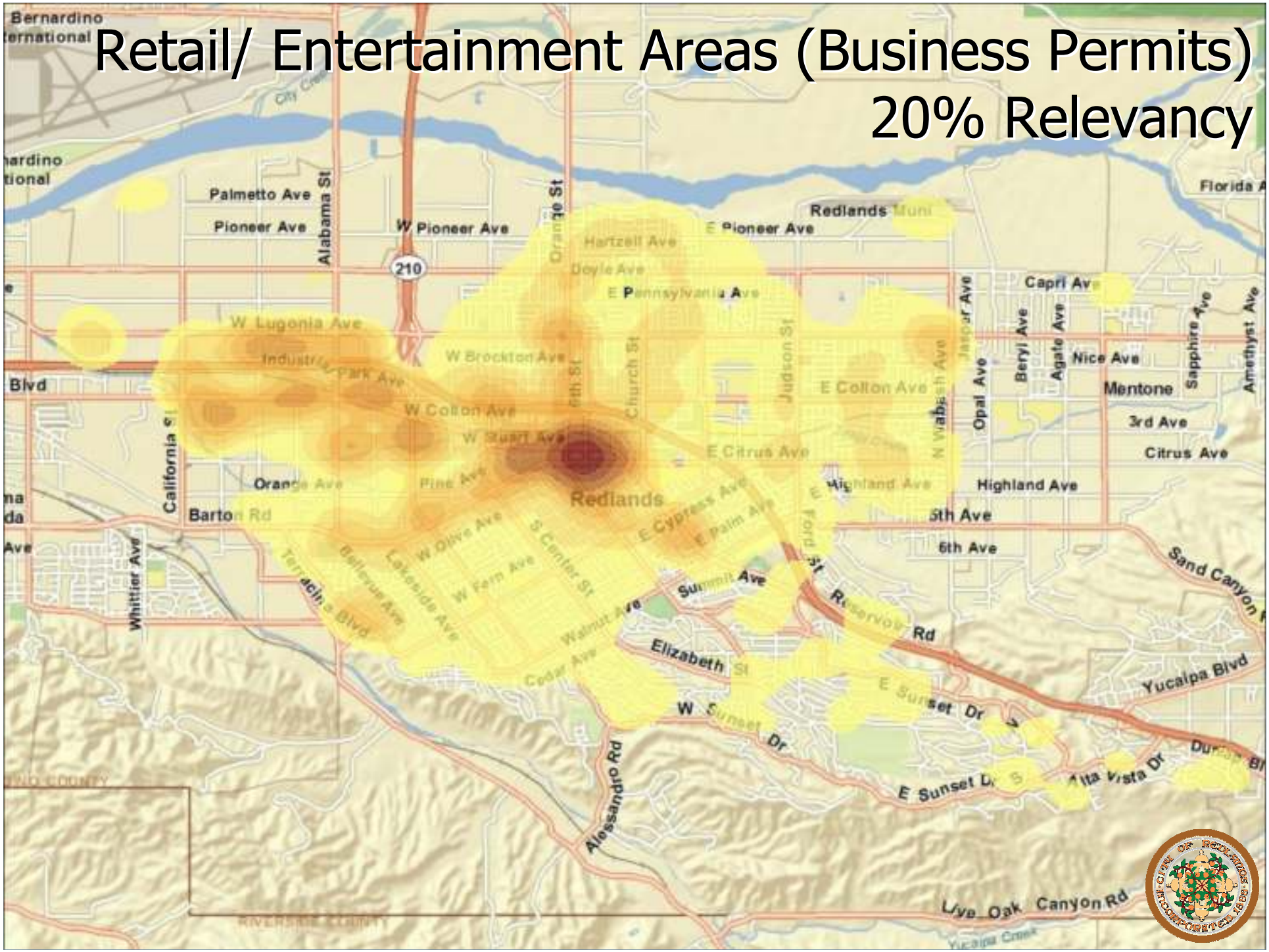
* 3-yr. data collection

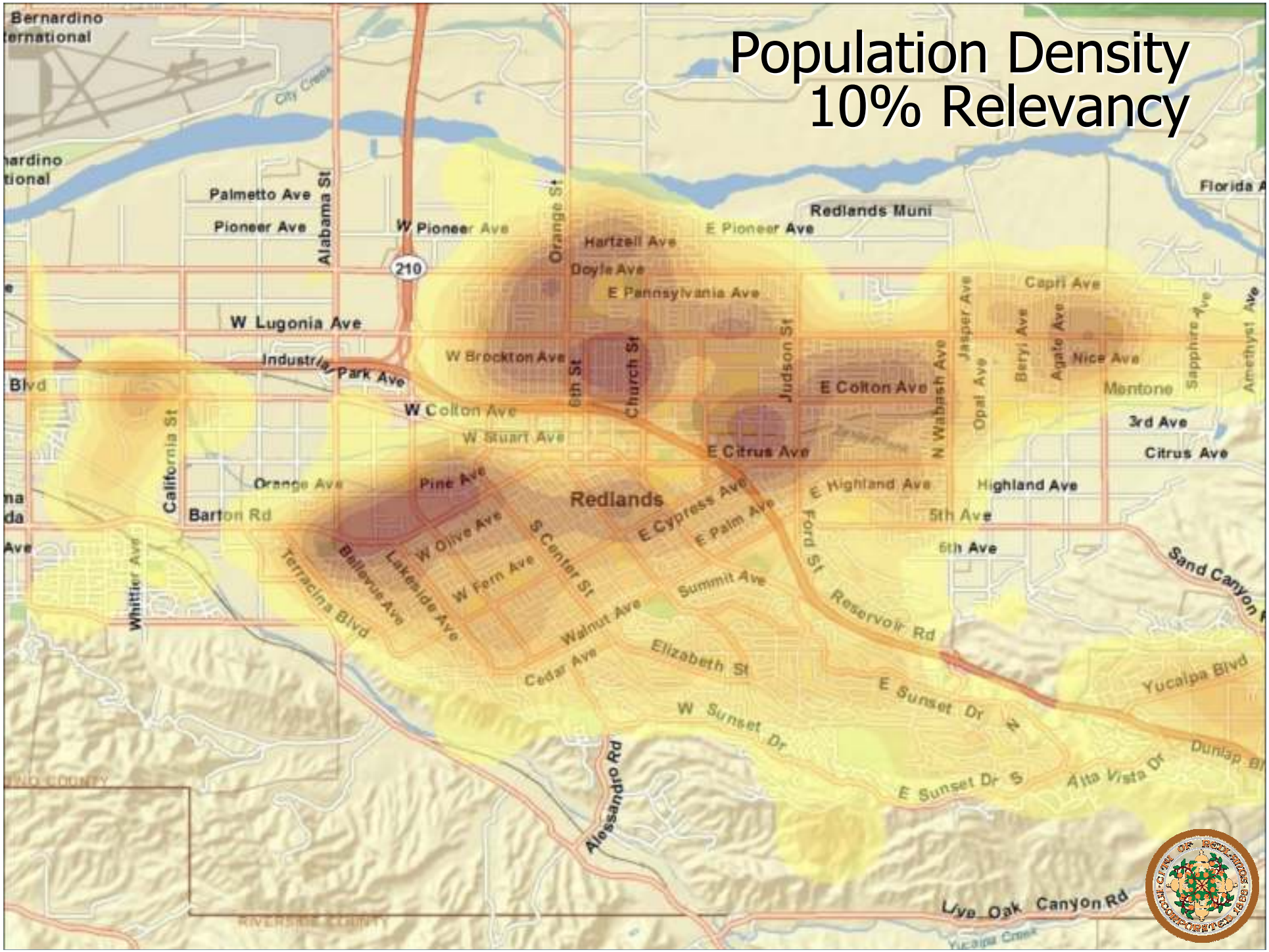
Night-Time Collision Accident Data (3 years)
40% Relevancy



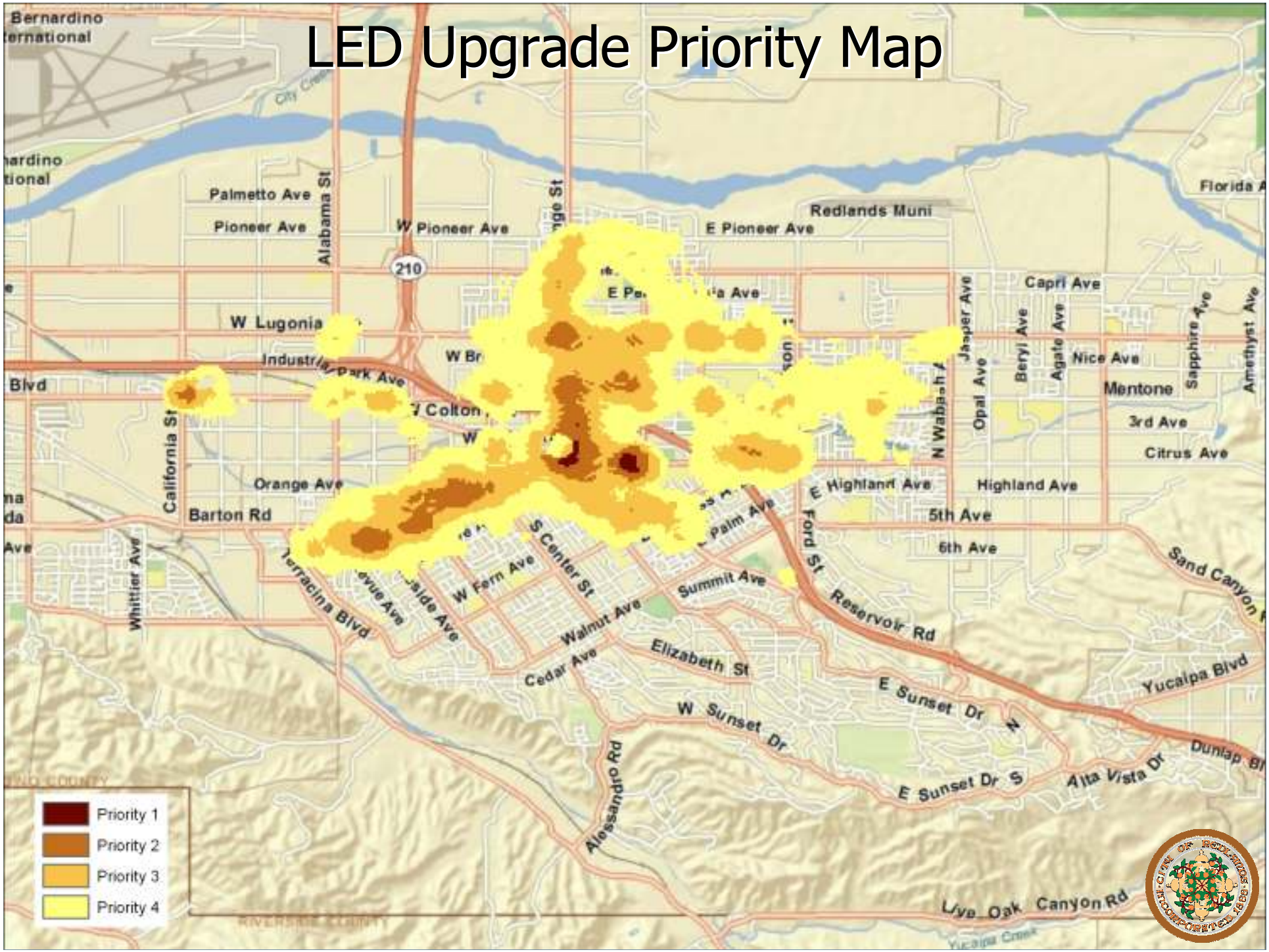

Night time Crime Data (3 years)
30% Relevancy
Redlands
Palmetto Ave
Pioneer Ave
W Pioneer Ave
E Pioneer Ave
Alabama St
Orange St
Hartzell Ave
Doyle Ave
E Pennsylvania Ave
210
W Lugonia Ave
Industrial Park Ave
W Brockton Ave
W Colton Ave
W Stuart Ave
E Colton Ave
E Citrus Ave
Church St
Judson St
Capri Ave
Nice Ave
Mentone
3rd Ave
Citrus Ave
Highland Ave
5th Ave
Opal Ave
Beryl Ave
Agate Ave
Sapphire Ave
Amethyst Ave
California St
Orange Ave
Pine Ave
Barton Rd
E Cypress Ave
E Palm Ave
E Highland Ave
Ford St
W Olive Ave
S Center St
W Fern Ave
Terracina Blvd
Bellevue Ave
Lakeside Ave
Whittier Ave
Summit Ave
Walnut Ave
Cedar Ave
Elizabeth St
Reservoir Rd
Sand Canyon
Yucaipa Blvd
W Sunset Dr
E Sunset Dr
E Sunset Dr S
Alessandro Rd
Alta Vista Dr
Dunlap Blvd
Live Oak Canyon Rd
Yucaipa Creek
RIVERSIDE COUNTY
SAN BERNARDINO COUNTY
Florida Ave
Redlands Municipal
Bernardino International
City Creek

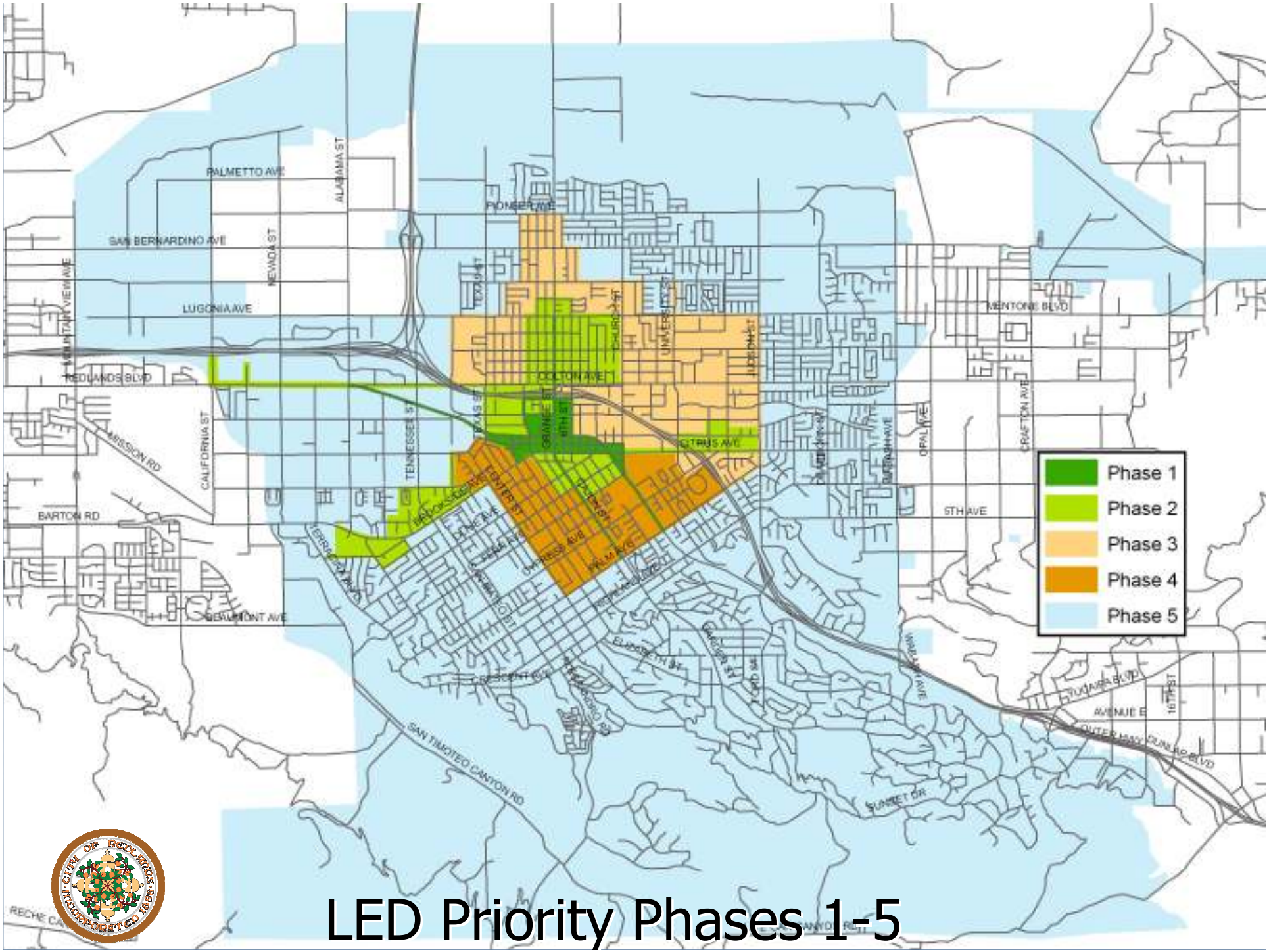
Retail/ Entertainment Areas (Business Permits) 20% Relevancy




Population Density
10% Relevancy
Redlands
Redlands Muni
Palmetto Ave
Pioneer Ave
Alabama St
W Pioneer Ave
E Pioneer Ave
Orange St
Hartzell Ave
Doyle Ave
E Pennsylvania Ave
210
W Lugonia Ave
Industrial Park Ave
W Brockton Ave
6th St
Church St
Judson St
E Colton Ave
W Colton Ave
W Stuart Ave
E Citrus Ave
N Wabash Ave
Jasper Ave
Opal Ave
Beryl Ave
Agate Ave
Capri Ave
Nice Ave
Mentone
Sapphire Ave
Amethyst Ave
3rd Ave
Citrus Ave
Highland Ave
E Highland Ave
5th Ave
6th Ave
Sand Canyon
California St
Orange Ave
Pine Ave
Barton Rd
E Cypress Ave
E Palm Ave
Ford St
Reservoir Rd
W Olive Ave
W Fern Ave
S Center St
Terracina Blvd
Bellevue Ave
Lakeside Ave
Whittier Ave
Summit Ave
Walnut Ave
Cedar Ave
Elizabeth St
E Sunset Dr
W Sunset Dr
Yucaipa Blvd
Alessandro Rd
E Sunset Dr S
Alta Vista Dr
Live Oak Canyon Rd
Yucaipa Creek
RIVERSIDE COUNTY

LED Upgrade Priority Map





LED Priority Phases 1-5

Potential Funding Sources

- Southern California Edison (SCE)
  - 0% interest loan, 10-year term, $250,000 max.
- Federal Stimulus Funding, EPA
  - $500,000 max. grant ($750,000 total budget)
  - 50% match-funds (from SCE loan)
- California Alternative Energy and Advanced Transportation Financing Authority (CAEATFA)
  - Low-interest loan, 10-year term.

Implementation Plan

Project	Capital Cost $	Energy Savings $/Yr	Maintenance Savings * $/Yr	Cost of Loan $/Yr.	Cost/ Benefit Ratio
Phase 1: Downtown Reinvestment Program	$250,000 SCE Loan	$8,000	$17,000	$25,000	1:1
Phase 1 and Phase 2	$250,000 SCE Loan+$500,000 EPA Grant	$25,000	$53,000	$25,000	1:3
Phase 3	$53,000 savings + $200,000 remain. grant/other	$11,000	$23,000	$0	__
Phase 4	$400,000 grant/other	$12,000	$25,500	?	?
Phase 5 (Remaining Street Lights)	$1,800,000	$60,000	$127,000	?	?

* Estimated low-range of maintenance costs for street lighting systems of various municipalities.

Proposed Implementation Strategy

1. Authorize staff to apply for SCE and EPA loan to cover capital cost of initial phases.

2. Based on amount of secured outside funds, implement any combination of phases 1, 2, and 3.

3. Savings due to lower energy and maintenance costs resulting from phases 1, 2, and 3 implementation will fund future LED upgrades throughout the city.


Questions?