ROSSMOOR

COMMUNITY SERVICES DISTRICT

Special Meeting of the Board

Agenda Package

November 27, 2018

BOARD OF DIRECTORS

CALL AND NOTICE OF A SPECIAL MEETING

TO THE MEMBERS OF THE BOARD OF DIRECTORS OF THE ROSSMOOR COMMUNITY SERVICES DISTRICT:

NOTICE IS HEREBY GIVEN that the President has called a Special Meeting of the Board to be held in the West Room at Rush Park, 3021 Blume Drive, Rossmoor, California at 8:00 a.m. on Tuesday, November 27, 2018. The agenda for the meeting is set forth below:

BOARD OF DIRECTORS
ROSSMOOR COMMUNITY SERVICES DISTRICT

SPECIAL MEETING

RUSH PARK
WEST ROOM
3021 Blume Drive
Rossmoor, California 90720

Tuesday, November 27, 2018

8:00 a.m.

A. ORGANIZATION

1. CALL TO ORDER: 8:00 a.m.

2. ROLL CALL: Directors Casey, Kahlert, Maynard, Nitikman
President DeMarco

3. PLEDGE OF ALLEGIANCE

B. PUBLIC COMMENT

C. REGULAR AGENDA

1. POTENTIAL AMENDMENT AND/OR UPGRADE TO SOUTHERN CALIFORNIA EDISON STANDARD LIGHTING AGREEMENT

D. ADJOURNMENT

It is the intention of the Rossmoor Community Services District to comply with the Americans With Disabilities Act (ADA) in all respects. If, as an attendee or a participant at this meeting, you will need special assistance beyond what is normally provided, the District will attempt to accommodate you in every reasonable manner. Please contact the District Office at (562) 430-3707 as soon as possible prior to the meeting to inform us of your particular needs and to determine if accommodation is feasible. Please advise us at that time if you will need accommodations to attend or participate in meetings on a regular basis.

CERTIFICATION OF POSTING

I hereby declare, under penalty of perjury, that this Agenda for the Tuesday, November 27, 2018, 8:00 a.m. Special Meeting of the Board of Directors of the Rossmoor Community Services District was posted on Wednesday, November 21, 2018 at the Rush Park and Rossmoor Park bulletin boards and on the Rossmoor CSD website at 1:00 p.m. on November 21, 2018.

ATTEST:

Joe Mendoza Date 11/20/2018

Joe Mendoza
General Manager

ROSSMOOR COMMUNITY SERVICES DISTRICT

AGENDA ITEM C-1

Date: November 27, 2018

To: Honorable Board of Directors

From: General Manager

Subject: **POTENTIAL AMENDMENT AND/OR UPGRADE TO SOUTHERN CALIFORNIA EDISON STANDARD LIGHTING AGREEMENT**

BACKGROUND

At the November 13, 2018 Regular Board Meeting, the Board of Directors reviewed and discussed the upcoming Rossmoor community-wide streetlights upgrade of 796 Southern California Edison (SCE)-owned High Pressure Sodium Vapor (HPSV) streetlights on all District residential and arterial streets with newer Light Emitting Diode (LED) streetlights, scheduled for December 2018/January 2019. The discussion centered around 3000 Kelvins (K) versus 4000K and the variation of color tones and temperatures related to each. The District is currently scheduled for 4000K with varied wattage. Southern California Edison has stated that we can vary from the standard and amend the installation of Kelvins and wattages. The Board reviewed information provided that included a list of cities that have converted to LED technology and identified the colors and wattages that each city selected for their residential and arterial streetlights. The Board discussed several options for Rossmoor areas that included: residential streets, streets around schools and parks, and streetlights on the main thoroughfares of Orangewood, Montecito Road (26), St. Cloud and Bradbury Road, as well as the 113 lights, designated for upgrades, outlined in the attached Rossmoor Lighting and Illumination Upgrade Chart **(Attachment 1).**

Information about the City of Cerritos' LED conversion evaluation process had been provided to the Board, including identification of a test area demonstrating 3000K versus 4000K and various wattages that was used to survey their residents. Some members of the Board had visited the test area and shared their thoughts.

In further discussion Director Nitikman presented the Board with a *Report of the Council on Science and Public Health – Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting* - 2016 American Medical Association (**Attachment 2**). The report outlines potential health and environmental effects of LED lighting and provides recommendations by the Council on Science and Public Health regarding LED lighting. The report specifies that "That our AMA encourages the use of 3000K or lower lighting for outdoor installations such as roadways. All LED lighting should be properly shielded to minimize glare and detrimental human and environment effects".

In a November 14, 2018 email to the District General Manager, John King, BCD Manager of Street Light Projects for Southern California Edison, has stated that 4000K and 3000K both are on the warm side of the light spectrum. However, he noted that if there is any concern at all from the Board, he suggests selecting the 3000K. Most of the coastal communities have chosen 3000K according to Mr. King.

The Board did not take action and encouraged one another to tour the City of Cerritos demonstration site. They further directed staff to conduct a survey of cities to ask the following questions:

1. What was the rationale with going with the color ___000K/wattage you chose?
2. Have you had any complaints regarding the difference in color and wattage between residential streets and arterial streets?
3. If you had to do it over again, would you still choose the color (K) and wattage originally selected?
4. When making the decision, were you aware of any American Medical Association (AMA) reports regarding health issues associated with LED streetlights (i.e. sleeping pattern disturbances, etc.)

FINDINGS

District staff conducted a phone survey of 15 cities that were identified on the "Survey of California Cities with Conversion" that was included in the November 13, 2018 agenda report. The City of Cerritos was added to the list. **Attachment 3** is the "Survey of Cities with Conversion and Follow Up Questions".

In summary, staff found that each city is unique in their approach and that 3000K versus 4000K was very similar in lumens. In selecting Kelvins and wattages, overall very few complaints had been received by any of the cities surveyed. Based on the feedback staff received, the cities contacted were all pleased with their selection and would not change their decision. The majority of cities stated that they were aware of the AMA report, but that it had not affected their decision. Additionally, the larger cities varied in wattage in order to provide additional lighting in blighted areas that were subject to gang violence and graffiti. Therefore, each agency is unique in their decision-making process to meet the needs of their respective community.

In retrospect, the conversions the Board had chosen are consistent with the findings and we have identified residential, schools and parks, and main arterials as being different in needs. The Board is to be commended for being critical in their thinking and for seeking as much information as possible to make an informed decision for the Rossmoor Community Services District.

To proceed with the LED conversion project, it is imperative that the Board at this special meeting makes a decision. The General Manager has made repeated requests of John King of SCE for a timeline and deadline for our final decision, and has not been successful in getting answers. Staff was informed on November 14, 2018 by Mr. King that Rossmoor is the second community queued up for 2019 so they will be ordering materials quickly, however, again no date was provided. Mr. King indicated at that time that if a decision is not made, we will be passed by and postponed to later in 2019 when they can work Rossmoor back into their schedule.

RECOMMENDATION

Based on the research and feedback from other municipalities, staff recommends selecting only one uniform color temperature throughout the community and increasing the wattage where additional brightness is desired.

Staff recommends that the Board consider the following options:

Option A – 3000K
Residential: 70W
Schools and parks: 100W
Arterial Streets: 150W (Orangewood, Montecito Road, Bradbury Road, St. Cloud)

Option B – 4000K
Residential: 70W
Schools and parks: 100W
Arterial Streets: 150W (Orangewood, Montecito Road, Bradbury Road, St. Cloud)

Option C – Direct staff with alternatives the Board determines other than Options A or B.

* The 26 upgraded light poles located on Montecito Road are 150w and will be salvaged for future District use.

Attachments:

1. Rossmoor Lighting and Illumination Upgrade Chart
2. Report of the Council on Science and Public Health – Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting - 2016 American Medical Association
3. Survey of Cities with Conversion and Follow Up Questions

ROSSMOOR STREET LIGHT UPGRADES

70 WATTS – RESIDENTIAL

- **Rossmoor Community**: **683*** (Resident Side)
  *Includes 6 on Wallingsford Rd

100 WATTS – PARKS & SCHOOLS

- **Rush Park**: **12** (Resident Side)
  - Blume 4
  - Main Way 4
  - Chianti 2
  - Silver Fox 2

- **Rossmoor Park**: **13** (11 Park Side / 2 Resident Side)
  - Hedwig/Foster 6
  - Pemberton 3
  - Kerth 2
  - Baskerville 2 (Resident Side)

- **Lee Elementary**: **11** (Resident Side)
  - Shakespeare 2
  - Wembley 4
  - Silverwood 2
  - Foster 3
- **Weaver Elementary**: **14** (Resident Side)
  - Piedmont 2
  - Wembley 5
  - Bostonian 2
  - Foster 5

- **Hopkinson Elementary**: **14** (13 Resident Side / 1 School Side)
  - Argyle 3
  - Salmon 4
  - Kensington 4
  - Gertrude 3 (1 on School side)
- **Rossmoor Elementary**: **7** (6 Resident Side / 1 School Side)
  - Shakespeare 4
  - Bostonian 3 (1 on School side)

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150 WATTS – ARTERIAL

- **Bradbury**: **5** (Apt/Condo Side)
- **St. Cloud**: **5** (Resident Side)
- **Orangewood**: **8**
- **Montecito**: **24** (21 Resident Side)(3 Apt/Condo Side)

RESIDENTIAL	**683**	
PARKS & SCHOOLS	**71**	(Upgrades)
ARTERIAL	**42**	(Upgrades)
TOTAL=	**796**	

Send out to all BOD Members

B

REPORT OF THE COUNCIL ON SCIENCE AND PUBLIC HEALTH

CSAPH Report 2-A-16

Subject: Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting

Presented by: Louis J. Kraus, MD, Chair

Referred to: Reference Committee E
(Theodore Zanker, MD, Chair)

INTRODUCTION

With the advent of highly efficient and bright light emitting diode (LED) lighting, strong economic arguments exist to overhaul the street lighting of U.S. roadways.[1-3] Valid and compelling reasons driving the conversion from conventional lighting include the inherent energy efficiency and longer lamp life of LED lighting, leading to savings in energy use and reduced operating costs, including taxes and maintenance, as well as lower air pollution burden from reduced reliance on fossil-based carbon fuels.

Not all LED light is optimal, however, when used as street lighting. Improper design of the lighting fixture can result in glare, creating a road hazard condition.[4,5] LED lighting also is available in various color correlated temperatures. Many early designs of white LED lighting generated a color spectrum with excessive blue wavelength. This feature further contributes to disability glare, i.e., visual impairment due to stray light, as blue wavelengths are associated with more scattering in the human eye, and sufficiently intense blue spectrum damages retinas.[6,7] The excessive blue spectrum also is environmentally disruptive for many nocturnal species. Accordingly, significant human and environmental concerns are associated with short wavelength (blue) LED emission. Currently, approximately 10% of existing U.S. street lighting has been converted to solid state LED technology, with efforts underway to accelerate this conversion. The Council is undertaking this report to assist in advising communities on selecting among LED lighting options in order to minimize potentially harmful human health and environmental effects.

METHODS

English language reports published between 2005 and 2016 were selected from a search of the PubMed and Google Scholar databases using the MeSH terms "light," "lighting methods," "color," "photic stimulation," and "adverse effects," in combination with "circadian rhythm/physiology/radiation effects," "radiation dosage/effects," "sleep/physiology," "ecosystem," "environment," and "environmental monitoring." Additional searches using the text terms "LED" and "community," "street," and "roadway lighting" were conducted. Additional information and perspective were supplied by recognized experts in the field.

ADVANTAGES AND DISADVANTAGES OF LED STREET LIGHTS

The main reason for converting to LED street lighting is energy efficiency; LED lighting can reduce energy consumption by up to 50% compared with conventional high pressure sodium (HPS) lighting. LED lighting has no warm up requirement with a rapid "turn on and off" at full intensity. In the event of a power outage, LED lights can turn on instantly when power is restored, as opposed to sodium-based lighting requiring prolonged warm up periods. LED lighting also has the inherent capability to be dimmed or tuned, so that during off peak usage times (e.g., 1 to 5 AM), further energy savings can be achieved by reducing illumination levels. LED lighting also has a much longer lifetime (15 to 20 years, or 50,000 hours), reducing maintenance costs by decreasing the frequency of fixture or bulb replacement. That lifespan exceeds that of conventional HPS lighting by 2-4 times. Also, LED lighting has no mercury or lead, and does not release any toxic substances if damaged, unlike mercury or HPS lighting. The light output is very consistent across cold or warm temperature gradients. LED lights also do not require any internal reflectors or glass covers, allowing higher efficiency as well, if designed properly.[8,9]

Despite the benefits of LED lighting, some potential disadvantages are apparent. The initial cost is higher than conventional lighting; several years of energy savings may be required to recoup that initial expense.[10] The spectral characteristics of LED lighting also can be problematic. LED lighting is inherently narrow bandwidth, with "white" being obtained by adding phosphor coating layers to a high energy (such as blue) LED. These phosphor layers can wear with time leading to a higher spectral response than was designed or intended. Manufacturers address this problem with more resistant coatings, blocking filters, or use of lower color temperature LEDs. With proper design, higher spectral responses can be minimized. LED lighting does not tend to abruptly "burn out," rather it dims slowly over many years. An LED fixture generally needs to be replaced after it has dimmed by 30% from initial specifications, usually after about 15 to 20 years.[1,11]

Depending on the design, a large amount blue light is emitted from some LEDs that appear white to the naked eye. The excess blue and green emissions from some LEDs lead to increased light pollution, as these wavelengths scatter more within the eye and have detrimental environmental and glare effects. LED's light emissions are characterized by their correlated color temperature (CCT) index.[12,13] The first generation of LED outdoor lighting and units that are still widely being installed are "4000K" LED units. This nomenclature (Kelvin scale) reflects the equivalent color of a heated metal object to that temperature. The LEDs are cool to the touch and the nomenclature has nothing to do with the operating temperature of the LED itself. By comparison, the CCT associated with daylight light levels is equivalent to 6500K, and high pressure sodium lighting (the current standard) has a CCT of 2100K. Twenty-nine percent of the spectrum of 4000K LED lighting is emitted as blue light, which the human eye perceives as a harsh white color. Due to the point-source nature of LED lighting, studies have shown that this intense blue point source leads to discomfort and disability glare.[14]

More recently engineered LED lighting is now available at 3000K or lower. At 3000K, the human eye still perceives the light as "white," but it is slightly warmer in tone, and has about 21% of its emission in the blue-appearing part of the spectrum. This emission is still very blue for the nighttime environment, but is a significant improvement over the 4000K lighting because it reduces discomfort and disability glare. Because of different coatings, the energy efficiency of 3000K lighting is only 3% less than 4000K, but the light is more pleasing to humans and has less of an impact on wildlife.

Glare

Disability glare is defined by the Department of Transportation (DOT) as the following:

> "Disability glare occurs when the introduction of stray light into the eye reduces the ability to resolve spatial detail. It is an objective impairment in visual performance."

Classic models of this type of glare attribute the deleterious effects to intraocular light scatter in the eye. Scattering produces a veiling luminance over the retina, which effectively reduces the contrast of stimulus images formed on the retina. The disabling effect of the veiling luminance has serious implications for nighttime driving visibility.[15]

Although LED lighting is cost efficient and inherently directional, it paradoxically can lead to worse glare than conventional lighting. This glare can be greatly minimized by proper lighting design and engineering. Glare can be magnified by improper color temperature of the LED, such as blue-rich LED lighting. LEDs are very intense point sources that cause vision discomfort when viewed by the human eye, especially by older drivers. This effect is magnified by higher color temperature LEDs, because blue light scatters more within the human eye, leading to increased disability glare.[16]

In addition to disability glare and its impact on drivers, many residents are unhappy with bright LED lights. In many localities where 4000K and higher lighting has been installed, community complaints of glare and a "prison atmosphere" by the high intensity blue-rich lighting are common. Residents in Seattle, WA have demanded shielding, complaining they need heavy drapes to be comfortable in their own homes at night.[17] Residents in Davis, CA demanded and succeeded in getting a complete replacement of the originally installed 4000K LED lights with the 3000K version throughout the town at great expense.[18] In Cambridge, MA, 4000K lighting with dimming controls was installed to mitigate the harsh blue-rich lighting late at night. Even in places with a high level of ambient nighttime lighting, such as Queens in New York City, many complaints were made about the harshness and glare from 4000K lighting.[19] In contrast, 3000K lighting has been much better received by citizens in general.

Unshielded LED Lighting

Unshielded LED lighting causes significant discomfort from glare. A French government report published in 2013 stated that due to the point source nature of LED lighting, the luminance level of unshielded LED lighting is sufficiently high to cause visual discomfort regardless of the position, as long as it is in the field of vision. As the emission surfaces of LEDs are highly concentrated point sources, the luminance of each individual source easily exceeds the level of visual discomfort, in some cases by a factor of 1000.[17]

Discomfort and disability glare can decrease visual acuity, decreasing safety and creating a road hazard. Various testing measures have been devised to determine and quantify the level of glare and vision impairment by poorly designed LED lighting.[20] Lighting installations are typically tested by measuring foot-candles per square meter on the ground. This is useful for determining the efficiency and evenness of lighting installations. This method, however, does not take into account the human biological response to the point source. It is well known that unshielded light sources cause pupillary constriction, leading to worse nighttime vision between lighting fixtures and causing a "veil of illuminance" beyond the lighting fixture. This leads to worse vision than if the light never existed at all, defeating the purpose of the lighting fixture. Ideally LED lighting installations should be tested in real life scenarios with effects on visual acuity evaluated in order to ascertain the best designs for public safety.

Proper Shielding

With any LED lighting, proper attention should be paid to the design and engineering features. LED lighting is inherently a bright point source and can cause eye fatigue and disability glare if it is allowed to directly shine into human eyes from roadway lighting. This is mitigated by proper design, shielding and installation ensuring that no light shines above 80 degrees from the horizontal. Proper shielding also should be used to prevent light trespass into homes alongside the road, a common cause of citizen complaints. Unlike current HPS street lighting, LEDs have the ability to be controlled electronically and dimmed from a central location. Providing this additional control increases the installation cost, but may be worthwhile because it increases long term energy savings and minimizes detrimental human and environmental lighting effects. In environmentally sensitive or rural areas where wildlife can be especially affected (e.g., near national parks or bio-rich zones where nocturnal animals need such protection), strong consideration should be made for lower emission LEDs (e.g., 3000K or lower lighting with effective shielding). Strong consideration also should be given to the use of filters to block blue wavelengths (as used in Hawaii), or to the use of inherent amber LEDs, such as those deployed in Quebec. Blue light scatters more widely (the reason the daytime sky is "blue"), and unshielded blue-rich lighting that travels along the horizontal plane increases glare and dramatically increases the nighttime sky glow caused by excessive light pollution.

POTENTIAL HEALTH EFFECTS OF "WHITE" LED STREET LIGHTING

Much has been learned over the past decade about the potential adverse health effects of electric light exposure, particularly at night.[21-25] The core concern is disruption of circadian rhythmicity. With waning ambient light, and in the absence of electric lighting, humans begin the transition to nighttime physiology at about dusk; melatonin blood concentrations rise, body temperature drops, sleepiness grows, and hunger abates, along with several other responses.

A number of controlled laboratory studies have shown delays in the normal transition to nighttime physiology from evening exposure to tablet computer screens, backlit e-readers, and room light typical of residential settings.[26-28] These effects are wavelength and intensity dependent, implicating bright, short wavelength (blue) electric light sources as disrupting transition. These effects are not seen with dimmer, longer wavelength light (as from wood fires or low wattage incandescent bulbs). In human studies, a short-term detriment in sleep quality has been observed after exposure to short wavelength light before bedtime. Although data are still emerging, some evidence supports a long-term increase in the risk for cancer, diabetes, cardiovascular disease and obesity from chronic sleep disruption or shiftwork and associated with exposure to brighter light sources in the evening or night.[25,29]

Electric lights differ in terms of their circadian impact.[30] Understanding the neuroscience of circadian light perception can help optimize the design of electric lighting to minimize circadian disruption and improve visual effectiveness. White LED streetlights are currently being marketed to cities and towns throughout the country in the name of energy efficiency and long term cost savings, but such lights have a spectrum containing a strong spike at the wavelength that most effectively suppresses melatonin during the night. It is estimated that a "white" LED lamp is at least 5 times more powerful in influencing circadian physiology than a high pressure sodium light based on melatonin suppression.[31] Recent large surveys found that brighter residential nighttime lighting is associated with reduced sleep time, dissatisfaction with sleep quality, nighttime awakenings, excessive sleepiness, impaired daytime functioning, and obesity.[29,32] Thus, white LED street lighting patterns also could contribute to the risk of chronic disease in the populations of cities in which they have been installed. Measurements at street level from white LED street lamps are needed to more accurately assess the potential circadian impact of evening/nighttime exposure to these lights.

ENVIRONMENTAL EFFECTS OF LED LIGHTING

The detrimental effects of inefficient lighting are not limited to humans; 60% of animals are nocturnal and are potentially adversely affected by exposure to nighttime electrical lighting. Many birds navigate by the moon and star reflections at night; excessive nighttime lighting can lead to reflections on glass high rise towers and other objects, leading to confusion, collisions and death.[33] Many insects need a dark environment to procreate, the most obvious example being lightning bugs that cannot "see" each other when light pollution is pronounced. Other environmentally beneficial insects are attracted to blue-rich lighting, circling under them until they are exhausted and die.[34,35] Unshielded lighting on beach areas has led to a massive drop in turtle populations as hatchlings are disoriented by electrical light and sky glow, preventing them from reaching the water safely.[35-37] Excessive outdoor lighting diverts the hatchlings inland to their demise. Even bridge lighting that is "too blue" has been shown to inhibit upstream migration of certain fish species such as salmon returning to spawn. One such overly lit bridge in Washington State now is shut off during salmon spawning season.

Recognizing the detrimental effects of light pollution on nocturnal species, U.S. national parks have adopted best lighting practices and now require minimal and shielded lighting. Light pollution along the borders of national parks leads to detrimental effects on the local bio-environment. For example, the glow of Miami, FL extends throughout the Everglades National Park. Proper shielding and proper color temperature of the lighting installations can greatly minimize these types of harmful effects on our environment.

CONCLUSION

Current AMA Policy supports efforts to reduce light pollution. Specific to street lighting, Policy H-135.932 supports the implementation of technologies to reduce glare from roadway lighting. Thus, the Council recommends that communities considering conversion to energy efficient LED street lighting use lower CCT lights that will minimize potential health and environmental effects. The Council previously reviewed the adverse health effects of nighttime lighting, and concluded that pervasive use of nighttime lighting disrupts various biological processes, creating potentially harmful health effects related to disability glare and sleep disturbance.[25]

RECOMMENDATIONS

The Council on Science and Public Health recommends that the following statements be adopted, and the remainder of the report filed.

1. That our American Medical Association (AMA) support the proper conversion to community-based Light Emitting Diode (LED) lighting, which reduces energy consumption and decreases the use of fossil fuels. (New HOD Policy)

2. That our AMA encourage minimizing and controlling blue-rich environmental lighting by using the lowest emission of blue light possible to reduce glare. (New HOD Policy)

3. That our AMA encourage the use of 3000K or lower lighting for outdoor installations such as roadways. All LED lighting should be properly shielded to minimize glare and detrimental human and environmental effects, and consideration should be given to utilize the ability of LED lighting to be dimmed for off-peak time periods. (New HOD Policy)

Fiscal Note: Less than $500

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SURVEY OF CITIES WITH CONVERSION AND FOLLOW UP QUESTIONS

City	Year	Residential Color / HPSV Equivalent Wattage	Arterial Color / HPSV Equivalent Wattage	What was your rationale with going with the color (__000K) / wattage you chose?	Have you had any complaints regarding the difference in color and wattage between residential streets and arterial streets?	If you had it to do over again, would you still choose the color (K) and wattage originally selected?	When making the decision, were you aware of any American Medical Association (AMA) reports regarding health issues associated with LED streetlights (i.e. sleeping pattern disturbances, etc.)
Anaheim	2016-2017	3000K 100W	3000K 150W or greater	Fred Baryarz—714-765-5176—PW Our demographics and input from the Sheriff's Dept. Wattage varies throughout	No complaints	Very satisfied with 3000k—4000k were too white	No the issues were consistency; AMA recommendations were secondary
Cerritos	2018	4000K 100W	4000K 150W	Ramzi—860-0311 Staff recommended 3000k/100w;after demo residents voted 4000k/100w; 4000k/150w	No complaints; residents are very complimentary	No change. Very happy!	Yes, but all reports read "maybe" have an impact with no definitive information. AMA recommended 3000k
Claremont	2016	4000K 70W	4000K 150W or greater	N/A			
Downey	2017	4000K 100W	4000K 150W or greater	N/A			
Fontana	2017	4000K 70W	4000K 150W or greater	N/A			
Fullerton	2017	3000K 70W	3000K 150W or greater	Dana Hoffman—Bldg/Fac Spvsr 714-758-6371 GE Phillips were considered; 3000K popular/4000k & 5000k also good.Four different wattages helped;Tanko Lighting recommend S. Francisco	Not many at all—surprisingly little.	Either 3000k or 4000k	Usually 5000k or above
Huntington Beach	2017	3000K 70W	3000K 150W or greater	George Ruff—Crew Ldr/Traffic Light Coordinator 714-536-5530 Chose 3000k—aesthetically pleasing	Yes, but very few	Yes	Yes, but it didn't affect decision. 3-4 year project—bought out 11,000 streetlights
LADWP	2017	4000K W – varies	4000K 150W or greater	Pending/Sent email			
Lakewood	2017	4000K 100W	4000K 150W or greater	*Pending*—Jack Wopschall-PW Director 562-866-9771 left vm			
La Palma	2017	4000K 70W	4000K 150W or greater	Mike—No other choice available at the time—only 4000k	None	Yes, Everyone seems to be happy	No
Long Beach	2015	4000K 70W	4000K 150W or greater	*Out of Office for holiday*-Mark Whitaker-562-570-6468 left vm			
Oakland	2013-2014	4000K W – varies	4000K 150W or greater	510-238-3961—left vm w/PW			
Oceanside	2015	3000k W – varies	4000K 150W or greater	Jeff 760-435-5323—left vm			
Rancho Cucamonga	2017	4000K 100W	4000K 150W or greater	Fred Lyn—909-774-4035—left vm			
Rosemead	2017	4000K 100W	4000K 150W or greater	N/A			
San Diego	2011-2015	4000K W – varies	4000K 150W or greater	N/A			