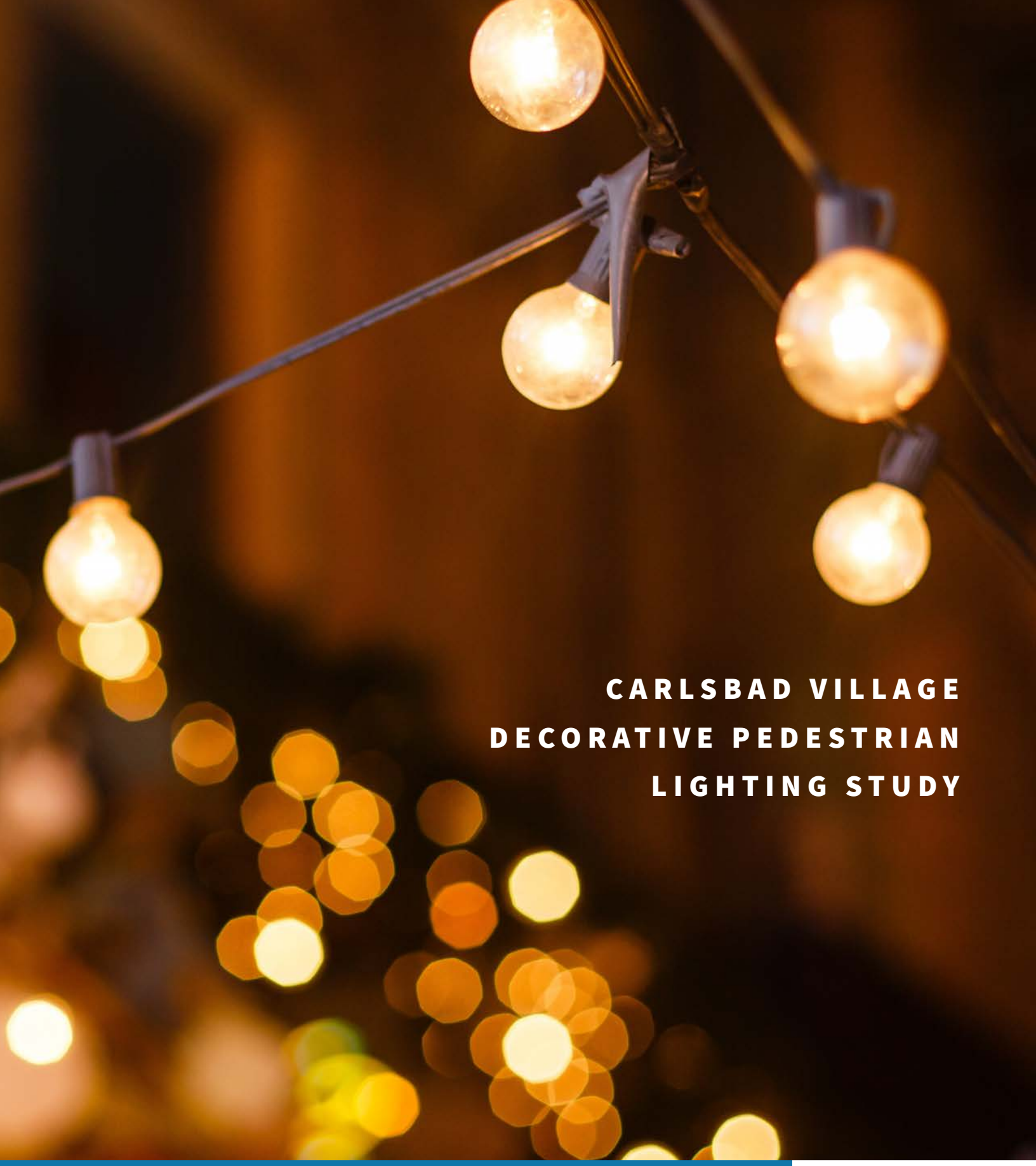

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

MAY 28, 2019

City of Carlsbad
California

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

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executive summary

This study aims to support economic vitality in the Village with a placemaking and decorative lighting plan that will enhance public safety, enrich the pedestrian experience and attract more people to area streets and businesses. This study used the streetscape vision and goals of the 2018 Village and Barrio Master Plan to inform the basis of its recommendations for decorative lighting. Although the purpose of this study is to address decorative lighting to make the Village more appealing at night, part of that appeal is intrinsically tied to a visually comfortable environment, which will by its very nature include the functional lighting.

To that end, this report includes a discussion of the existing functional lighting along with the decorative lighting where necessary to present a complete picture of the nature of the light in an area. Taking advantage of the functional lighting and supplementing it with decorative lighting will enhance the pedestrian experience in the Village by creating a sense of liveliness which will increase pedestrian activity, and ultimately, support economic growth.

A brief discussion of the basic principles of lighting design will set the stage for the recommendations that follow. In order to understand the recommended changes, it's first important to take stock of the existing conditions which are used as a base to build from. In order to make this study comprehensive, existing conditions are presented first for each district, and then recommendations for decorative improvements are discussed. Further, the complete picture of decorative lighting is a combination of lighting in the public and private realm. Façade lighting of Village businesses is part of the private realm and is controlled by the building owners. In many instances, lighting of the alleys behind the buildings is controlled by the business but is of interest to the city from a safety, security and placemaking standpoint. There are also opportunities for more engaging lighting in the alleys to create an atmosphere that goes beyond the typical functional activities of an alley. The sidewalks are entirely the public realm and the lighting for them has a clear functional requirement but presents the opportunity to add a decorative element through the style of fixture and different lighting treatments. Each of these components is integral to the fabric of a decorative lighting plan.

The existing conditions and recommendations described herein were developed as a joint effort between city staff, urban designers at MIG, electrical engineers and lighting designers at Stantec, and community stakeholders. Site surveys were conducted by Stantec to establish existing conditions. Meetings were held with the Carlsbad Village Association Board of Directors to coordinate and develop our

recommendations for business façade lighting and alley lighting. Case studies from other cities were developed through questionnaires administered by MIG.

The case studies from nine California cities of similar size show an on-going conversion to LEDs. Several of the case study cities are looking at "smart city" applications, but none have implemented anything yet. Twinkle lights and decorative lamp posts are the most commonly mentioned decorative elements. Several of the cities believe anecdotally that attention to decorative lighting has helped the nearby merchants, but none have done independent studies of their full impact. One independent study from Liverpool, England reported a significant positive impact form improved façade lighting and that is discussed further in Chapter 1.

Meetings with Village business owners revealed several key considerations that informed the recommendations in this report. First, they noted that the Village seems to end at Grand Avenue and State Street, although it continues well beyond that, and they attribute that to lack of continuity in the decorative pedestrian and façade lighting. Second, they expressed concerns about under-illuminated parking lots and alleys that seem to foster a feeling of unsafe conditions, which anecdotally was reversed after one business's alley lighting was upgraded. Third, they were largely in favor of upgrading their façade lighting, especially with the reduced operating costs of LED over the traditional lamp sources that most of them are using currently; however, there was some apprehension about the first cost of procuring and installing new façade lighting luminaires. There is a chapter included herein that discusses the variety of components that make up building façade lighting and alley lighting, to assist property owners and business owners in their decision-making regarding these critical areas, and to enhance a cohesive sense of placemaking while still allowing for individual styles. Parameters for lighting styles, and attributes for lighting fixtures are reviewed, and the lists of these elements can be employed as a guideline by owners and developers as properties are upgraded or redeveloped. City staff can also use it to review drawings that come through the city for permitting.

- Define areas existing within the Village Central District, and create distinct lighting themes for these areas through the addition of decorative lighting in the form of pedestrian-scale lamp posts in most areas and twinkle lighting, tree uplighting, or artistic lighting in specific areas.
- Beautify the secondary streets, drives, and avenues with common lighting themes employed throughout, by adding decorative pedestrian lamp posts to encourage walkability and to provide a sense of safety and facial recognition on all streets within the Village Central District.
- Create and highlight "key intersections" to encourage civic pride and sense of place at specific intersections.
- Create "arrival beacons" at eastern and southern Village entry points. An arrival beacon was recently installed at the northern Village entry.

- Illuminate existing Village entry signage and city parking signage in a clear manner to aid wayfinding.
- Encourage lighting design to be incorporated into any future public art projects as part of their design and/or installation.
- Provide examples of building façade and alley lighting components, so that future private lighting upgrades or new installations are enabled to contribute in a positive way to the visual fabric of the city and support the hierarchy of lighting this study establishes as a key to success.

Adding decorative pedestrian lighting, in a wide variety of ways, will create a walkable, engaging, and entertaining night-time environment for Village visitors and residents alike.

ABBREVIATIONS

BUG **Backlight – Uplight – Glare,** an acronym describing the optical performance of luminaires relative to light trespass, sky glow, and high angle brightness control, based on zonal lumen calculations for solid angles, where backlight is light directly behind the luminaire, uplight is light above 90-degrees, and glare is the visibility of 'offensive light'.[1] Rated 0-5 for each component, the higher the value, the more of the characteristic

CRI **Color Rendering Index.** This is a measurement that refers to the ability of a light source to accurately reveal the colors of various objects as compared to an ideal light source. For exterior lighting, a CRI of 70 is generally acceptable, but 80 CRI is preferred for enhancing the quality of night time pedestrian activities.

The lighting design industry is moving towards a new standard for color fidelity called TM-30, but for the purposes of this study, CRI is still useful as an applicable index.

HPS **High Pressure Sodium.** This is a lamp source, orange in color, primarily used for street lighting.

IESNA; IES **Illuminating Engineering Society of North America**

LED **Light-Emitting Diode**

RGB **Red Green Blue,** the primary colors of light, the intermixing of which will create a wide variety of other colors. Sometimes RGBA (Amber), RGBW (White), used to create softer pastels than what are generally available with RGB

RP **Recommended Practice,** a document published by the IES on a variety of topics, numbered according to subject. For the purposes of this study, the referenced RPs are RP-8 Roadway Lighting, and RP-33 Lighting for Exterior Environments. These documents are copywrited and available for purchase.

[1] IESNA TM-15-11: Backlight, Uplight, and Glare (BUG) Ratings

GLOSSARY

Acorn A traditional luminaire shape that is similar to an acorn. Also, the luminaire itself.

Bollard A low-level post luminaire, usually less than 42” tall and integrated into its post.

BUG Rating A measurement that stands for Backlight, Uplight and Glare. Ratings are from ‘0’ to ‘5’ determined by how much light is distributed in each of these zones around the luminaire. For instance, a U0 rating would have no light going up toward the sky.

Circadian Clock Humans and our bodily systems are tuned to a 24-hour clock also known as our biological clock. Exposure to light can impact our entrainment and if out of synchronization cause a host of health problems. Our exposure to light can affect hormone release, eating habits and digestion and other bodily functions. The total impact is not known at this time but research suggests a connection to sleep disorders, obesity, diabetes, and some forms of cancer.

Cutoff Classification The classification system of the Illuminating Engineering Society of North America (IESNA) that describes the light distribution of an outdoor luminaire. Cutoff classifications define the luminous intensity limits in two illumination zones that occur within the range of 80° to 180° above nadir.[2] This classification has been superseded by the use of BUG ratings.

Cutoff Luminaire IESNA classification that describes a luminaire having a light distribution in which the candela per 1000 lamp lumens does not numerically exceed 25 (2.5%) at or above an angle of 90° above nadir, and 100 (10%) at or above a vertical angle of 80° above nadir. This applies to all lateral angles around the luminaire.[3] This classification has been superseded by the use of BUG ratings.

Festoon Lighting Strings of lights suspended in an arcing shape between poles.

Glare The sensation produced by luminances [brightness] within the visual field that are sufficiently greater than the luminance [ambient brightness] to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility.[4]

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[2] www.lrc.rpi.edu Glossary

[3] www.lrc.rpi.edu Glossary

[4] www.lrc.rpi.edu Glossary

Gobo	A template (usually of steel or glass) used to shape a beam of light into desired patterns.
LED	Light-Emitting Diode; a semiconductor that emits light when conducting current.
Light Trespass	Light trespass occurs when spill light is cast where it is not wanted. Light trespass is somewhat subjective because it is difficult to define when, where, and how much light is unwanted. An example of light trespass is when spill light from a streetlight or floodlight enters a window and illuminates an indoor area.[5]
Pedestrian Scale	Pole lighting that is mounted less than 15 feet above the ground.
Post-top	A luminaire mounted to the top of a post, usually less than 15 feet tall.
Sky Glow	Brightening of the sky caused by outdoor lighting and natural atmospheric and celestial factors.[6]
Street Lights	Luminaires extended via long arm from tall poles over a street, to illuminate the street for vehicular traffic. Generally located at intersections, and mid-block. Not to be confused with “traffic lights” or “traffic signals”.
Twinkle Lighting	Small, clear lamps with visible filaments or diodes, usually attached to a cable, and of minimal output so as to create a pleasing and not disabling sparkle effect

[5] www.lrc.rpi.edu Light Pollution Q&A

[6] www.lrc.rpi.edu Glossary

1 | village and barrio master plan (2018)

1.1 SUMMARY OF MASTER PLAN

The 2018 Village and Barrio Master Plan is a comprehensive document prepared by a host of designers, planners, and consultants in coordination with members of the City of Carlsbad. It "establishes the vision for the ideal future character and development of the two areas and sets forth the strategy or 'roadmap' for achieving that vision through goals and policies, standards and guidelines, and an implementation plan". [1]

The Master Plan discusses land use and lays out guidelines thereto, provides recommendations for maximizing connectivity between the streets and neighborhoods of the Village and the Barrio, establishes design guidelines for future developments, and proposes implementation plans for its recommendations. This document builds on the Master Plan by addressing decorative lighting in ways that will help make the spaces appealing after dark, drawing night time crowds that enliven the spaces and encourage economic growth. In order to increase pedestrian activity, lighting must be more than just functional: it should be another layer beyond the strictly functional lighting provided by the street lighting. It needs to have some sparkle and have a hierarchy. Decorative lighting is a combination of light in the public realm (sidewalks, plazas and promenades) and building and storefront lighting. While building and storefront lighting is largely in the hands of private building owners, the city can prescribe decorative lighting for them by creating a set of recommendations that will further enhance the night time lit environment in a way that is environmentally responsible and that supports the overall vision.

Although this study is primarily concerned with decorative lighting, to be successful decorative lighting must work hand-in-hand with functional lighting. Some comments and recommendations will include the functional lighting where adjustments are necessary to optimize with the decorative lighting.

1.2 ALIGNING WITH MASTER PLAN

Key Village Recommendations

The Master Plan listed thirteen Key Recommendations that pertain to the Village. Several of them are outside the scope of this report, but a few of them are harmonious with the decorative pedestrian lighting recommendations that will be discussed in detail later. The relevant recommendations include creating additional pedestrian scrambles at some intersections, developing public plazas at key intersections, converting part of a street to a pedestrian promenade, and

creating other civic spaces in the Village. For these recommendations to be successful, each of these places will need to be as appealing at night as they are during the day. Harmonizing the functional lighting with proper distribution, glare control and color along with adding the decorative lighting will help animate the spaces after dark, encourage pedestrian activity and increase patronage of nearby businesses, especially restaurants.

Decorative lighting, for the purposes of this study, embodies two concepts. The first is the decorative pedestrian lamp posts. These are the most obvious decorative element and the primary one associated with the public realm which is controlled by the city. The second is the accent lighting which can take a variety of forms including tree uplights, signage lighting, twinkle lights, façade lighting and other "non-essential" lighting. Each of these elements will be discussed in this report.

Master Plan Lighting Recommendations

The Master Plan included a brief discussion of Lighting in subsection E, Chapter 2. This report expands upon those discussion points by explaining their relevance, providing examples and details of each, and recommending specific courses of action to take for each street in the Village.

1. **Provide Exterior Building Lighting, particularly in commercial and high-pedestrian areas.**

   Illuminating a building's exterior creates an identifiable night time presence for the building and contributes to the look and feel of the street. With that said, not every building needs lighting and buildings that are illuminated should follow good design practice so as not to create excessive light pollution, visual clutter and/or glare to the passersby. Since this lighting will be at the discretion of the building owner or developer, the toolkit will provide recommendations for specific techniques. In general, it will encourage illuminating exterior façade details with accent lighting or wallwashing, using the light from within to create a lantern-like effect and incorporating lighting for building signage.

2. **Design or select fixtures that are architecturally compatible with the building.**

   This element is also in the purview of the building owners, but the city can prescribe how façade lighting is to be designed. See Chapter 5.

3. **Integrate fixtures that are downcast or cut-off type fixtures to prevent glare and light pollution.**

   Design lighting in such a way as to prevent the direct view of the light source from the adjacent properties or uses, particularly residential properties or uses.

4. **Use energy-efficient lamps such as LED lights for all exterior lighting along with adaptive lighting controls to contribute to energy conservation and potentially reduce long term costs.**

Each of these items above is incorporated into the building façade lighting recommendations for future upgrades to existing lighting and new developments and are good strategies to minimize detrimental effects on the

environment and people. The language provides specific guidance to owners and developers as well as those who will be designing in the public realm for the city. These guidelines also include color temperature and CRI requirements and address glare control and light output for functional and decorative lighting.

1.3 METHODOLOGY

This study was conducted over a period of 15 months. During that time Stantec made 10 site visits to document the existing conditions through photographs, sketches and selective illumination measurements. The results of this data gathering are detailed in Chapter 3 Existing Conditions and shown in map format in Appendix B, and in table format in Appendix C.

In addition, MIG conducted a survey with nine California towns of a similar size and asked representatives the same set of questions in an effort to determine if there are commonalities in how they approached urban lighting in their cities.

The information gathered from both the existing Village conditions and from the case studies informed the recommendations herein.

1.4 DECORATIVE LIGHTING CASE STUDIES

Telephone interviews were conducted with city representatives from Chula Vista, Del Mar, La Mesa, Laguna Beach, Los Gatos, Santa Barbara, Santa Cruz, Solana Beach, and Ventura. Each city representative was asked eight questions designed to gather substantive data on the existence of decorative lighting within each city, including the means by which such lighting was funded. Appendix A includes the complete survey results along with photographs, if they were provided by the city.

The decorative lighting was described most commonly as decorative lamp posts and/or string lights. There were a few cities with tree uplights. Some cities are dark-sky-compliant, so they do not have any decorative lighting. Some cities have made improvements as recently as 2015 and others have not made changes since the 1980s. Funding for improvements came from grants, business district taxes and from the cities themselves. The maintenance for anything on public property was paid for by the cities. If it was on private property, the property owners paid for it. One city was offering matching grants to encourage private property owners to add string lights. For most cities, Christmas lighting was the only seasonal lighting. Most cities have either already converted to LEDs or are in the process of doing it. No city has measured data on increased sales/traffic or changes in safety after they made improvements, but several cities reported anecdotal results that the business owners are happier with the additional lighting and they perceive that traffic has increased.

Besides the case studies done specifically for this document, the only publicly reported study that measured the effects of decorative urban lighting was done in Liverpool, England. This study was highlighted in a lecture titled “Light Fight” given by Denise Fong of Stantec, in New York City in April, 2010. After making improvements to the façade lighting of some selected buildings, the city measured the results with an independent evaluation. They found that 88% of visitors agreed that the lighting

scheme increased their enjoyment of Liverpool, 84% felt safer with the buildings illuminated and 57% said they would spend more time there because of the lighting scheme. The improved lighting generated an additional revenue of £3.2 million to local businesses after the first phase was implemented.

Additionally, the City of Alingsås, Sweden hosts a light festival each year for a month in the fall. Stantec's Denise Fong attended in 2012 in the role of installation team leader. Although it's not a direct comparison because it is a temporary condition, the merchants report that their revenues are higher during that time than they are during the Christmas season.

Taken all together, the existence of decorative lighting in a city appears to have a positive effect on visitor attraction, the amount of time people will stay in a given area, and their spending on goods and services.

2 | overview of lighting design

A discussion of lighting design is important to inform the recommendations that are presented later in the study. The practice of lighting design is a complex mixture of science and art. The science centers around the technology of illumination, and how humans, animals, and plants perceive light, as well as its effect on those lives. The artistic application of lighting is found in how it reveals architecture and spaces, not just with what is illuminated but also by what is left unilluminated.

How spaces and objects are illuminated gives humans cues about emotions, the structure or environment of a space, and wayfinding in and through that space. Creating a lighting hierarchy that includes each of these elements helps define the spaces and not only make them safe and functional, but also desirable to be in after dark. The hierarchy can be defined as the layers of light that are applied to an area. Each layer has its own purpose, such as the street area, the pedestrian zone and the building façades and shop windows, but all the layers work together to create a harmonious environment. All of these aspects of lighting are considered when making recommendations for decorative improvement of a city's lighting scheme.

2.1 HIERARCHY OF LIGHT

Richard Kelly, one of the pioneers of architectural lighting design, described three qualities of lighting that create a hierarchy of light: ambient luminescence, focal glow, and play of brilliants. Ambient luminescence is the general diffuse light that is all around us. It is indistinct and soft in nature. Focal glow applies to the limited areas that we want to call attention to. In an exterior environment,

Figure 1 – Example of corner ambient luminescence, focal glow and play of brilliants (photo credit Denise Fong)

that might be an illuminated sign, an uplit tree, or a grazing light on a building façade. Play of brilliants is something that happens only occasionally and creates surprise and delight in those who see or experience it. This could include an illuminated fountain with sparkling drops of water or a piece of art that reflects and refracts the light or changes color over time. They are most effective when you happen upon them in an unexpected place.

Lighting for any space whether interior or exterior, when well-conceived, will have a hierarchy. The hierarchy allows the eye to travel naturally over the entire space and be drawn to the areas of most importance first, while still perceiving the lesser illuminated features. In exterior spaces, the hierarchy can be defined as street lighting and pedestrian lighting (ambient luminescence), façade lighting (focal glow) and sparkle/artwork lighting (play of brilliants). A wide variety of lighting types can make up pedestrian lighting, but it's generally described in the form factors of lamp posts and illuminated bollards. Festoon lighting, tree uplighting, signage lighting, and urban feature lighting (such as fountains or sculptures) are all decorative lighting that contribute to the pedestrian experience. Façade lighting refers to how businesses illuminate their façades and includes architectural feature lighting (such as washing columns or walls with light), decorative lighting (such as wall sconces), and signage lighting. Organizing all of these different elements into a hierarchy creates a comfortable, fulfilling, and easily navigable night time urban experience.

When we design environments, soft light reminds us of cloudy days, shadowless and

Figure 2 – Example of midblock ambient luminescence, focal glow and play of brilliants (photo credit Denise Fong)

indistinct, comfortable. This is ambient luminescence. Sharp light is like a sunny day or a glaring spotlight, bright and with distinct shadows, and possibly causing some physical pain. Light coming from above reminds us of sunlight and sky, business and work, whereas light coming from below recalls campfires and candlelight, relaxation and familiarity. Usually there is some combination of soft and sharp lighting found in exterior environments. How they work together to create a pleasant visual scene is where design comes into play. For instance, in Figure 1, the lamp posts provide the ambient luminescence as lighting onto the walking surface; and as objects, they also provide the focal glow because of the brightness of their diffusers. Also in Figure 1, various forms of façade lighting provide additional focal glow, whereas signage lighting around the entries provides the play of brilliants. In Figure 2, the lamp posts provide the ambient luminescence, the backlit glass at the elevator and integrated façade lighting both provide the focal glow, and twinkle lights at the restaurant in the lower left of the photo provide the play of brilliants. Together these figures illustrate how a variety of lighting fixture types and illumination intensities can be used to create a harmonious picture in an urban setting.

2.2 UNIFORMITY

Uniformity is the main component of ambient luminescence. If it is constant with little variation, we say it is uniform. If there are areas that are brighter, and areas that are darker, then we say the area is non-uniformly lit. Lack of uniformity can be a good thing when it adds interest (focal glow) to an environment: areas that are highlighted are attention-grabbers and can aid in way finding and create distinctions

Figure 3 – Example of uniform lighting (photo credit Denise Fong)

Figure 5 – Example of glare (photo credit Jeff Fong)

Figure 4 – Example of non-uniform lighting (photo credit Jeff Fong)

Figure 6 – Example of well-shielded lighting (photo credit Denise Fong)

that define the hierarchy of light. It can also be a negative element if the contrast between the lit and unlit areas is too great. This creates a condition that can result in some level of visual disability because the human eye has difficulty adapting quickly to the variation in illuminance levels. Figures 3 and 4 show the difference between uniform and non-uniform lighting.

2.3 GLARE

Glare is a negative attribute and one that lighting professionals work hard to avoid. It means that a luminaire is too bright to be seen comfortably and it will cause physical pain if it's viewed directly or can be highly distracting if seen in one's periphery. Careful luminaire design, that shields the lamps from direct view, and appropriate luminaire placement are ways that glare is avoided. Figures 5 and 6 show examples of light fixtures that create glare, and light fixtures that are well-shielded.

2.4 SPARKLE

Sparkle or play of brilliants is a positive attribute, one that generates interest and stimulates the spirit when used deliberately and sparingly. In Carlsbad Village, an example of sparkle is found in the twinkle lights along State Street. Figure 7 shows an example of sparkle.

2.5 COLOR

With the rise in the adoption of LED sources for area lighting, colored light is becoming prevalent in outdoor environments. A consequence of that prevalence, though, is that colored lighting is most effective when used sparingly as its overuse can minimize its distinctiveness. Even so-called “white” light has a color associated with it. It can be a warm white, or a cool white, or something in between. These different colors are described in terms of degrees of Kelvin (K), or color temperature. Higher Kelvin temperatures are much cooler, and on the blue end of the spectrum while lower Kelvin temperatures are much warmer, and on the red end of the spectrum. Color-matching white light sources helps a community’s lighting plan to feel deliberate and coordinated. As well, an LED source with a higher CRI (80 or above) can add to humans’ ability to perceive color distinctions, which serves to enhance and beautify the night time lit environment. Figure 8 shows an image of different color temperatures in ascending order, with luminaires lighting a white wall. Figure 9 is a graph of how a variety of color temperatures may be used in familiar settings.

See the Light and Health section below for further discussion of this topic.

Figure 7 – Example of sparkle (New Westminster, Front Street, CanuckMediaMonitor.org)

Figure 8 – Color Temperature Scale (image from Google search, no copyright evident)

Kelvin Color Temperature	2700K	3000K	3500K	4100K	5000K	6500K
Associated Effects and Moods	Ambiant Intimate Personal	Calm Warm	Friendly Inviting	Precise Clean Efficient	Daylight Vibrant	Daylight Alert
Appropriate Applications	Living/Family Rooms Commercial/ Hospitality	Living/Family Rooms Commercial/ Hospitality	Kitchen/Bath Light Commercial	Garage Commercial	Commercial Industrial Institutional	Commercial Industrial Institutional

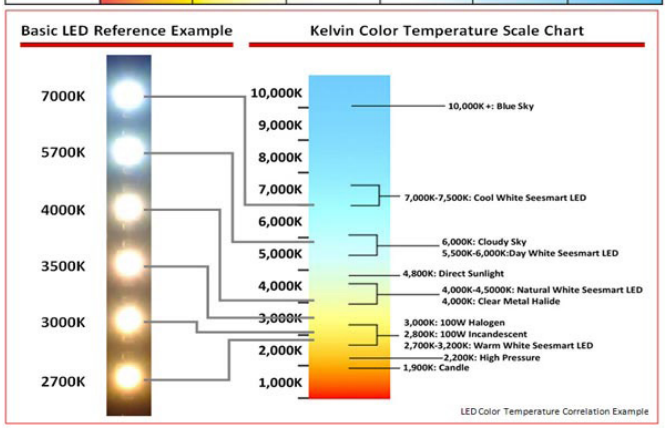


Figure 9 – Color temperature graph (image from Google search, no copyright evident)

Figure 10 – LED Acorn, similar to city standard

Figure 11 – Bell-shaped luminaire with shepherd's crook style arm, similar to Carlsbad Station

2.6 AESTHETIC

What does the luminaire look like? Different styles are evocative of different eras, locales, and cultures. Using dissimilar colors can emphasize distinctions in different areas, even if the luminaires have an identical form. Carlsbad Village is a place with a "small town beach community" feel. Any luminaire style used in the Village must also support that characterization. Figures 10 and 11 show two examples of luminaire styles that can be found within Carlsbad Village.

2.7 LIGHT TRESPASS

Light trespass describes unwanted light falling into other places. It can mean light that crosses property boundaries, or light that escapes into the night skies, creating a sky glow that impairs the ability to see the stars. In all cases, light trespass is considered a negative attribute, and something to avoid by carefully placing luminaires, and selecting those with minimal unwanted distribution. Figure 12 is an illustration of how electric lighting that is misdirected becomes sky glow. Figure 13 shows

Figure 12 – Light trespass, sky glow (image credit Department of Energy)

Figure 13 – Light trespass, unwanted light into residences (image credit Dark Skies Awareness)

how electric lighting can impact residential units by flooding them with unwanted light during the evening hours.

2.8 LIGHT AND HEALTH

Recent research suggests a connection between high color temperature (blue end of the spectrum) light sources at night and sleep interruption and health concerns for humans. The research is not dose-specific so the amount or time duration of exposure to light is unknown. Many early municipal LED lighting systems used high color temperatures (4000K and higher) with poor color rendering due to efficiency limits at that time. There were negative reactions to these very cool color temperatures and some of those same cities are now replacing them with warmer color temperatures. [2]

As the technology has evolved, warmer color temperatures with high efficiencies and good color characteristics have come on the market. It is prudent to be cautious in color temperature selection until further research is available. This would suggest 3000K as the upper limit for exterior lighting with 2700K for lighting that creates focal glow. With a minimum CRI of 80, white light in the 3000K color range will provide an excellent quality of light with good color rendering, which is one important aspect of lighting that is both healthy for humans and that renders a sense of public safety.

Shielding the directionality of the light so it does not enter dwelling units is also critical. Selecting fixtures that minimize output in the range of 70-90 degrees above nadir will minimize this negative situation.

Lighting controls are an important consideration for human, animal, and plant health. Historically, exterior lighting has been turned on at dusk and turned off at dawn. Everything used to be on at full output whenever it was energized; there were no intermediate light outputs available. This was the case primarily because the light sources commonly used (high pressure sodium, metal halide and induction) were not dimmable. LEDs of today that are replacing the historic light sources have the capability to be dimmed. This allows for the control of street and pedestrian lighting to be at its highest level during the busiest time of the evening and dimmed down later in the night as pedestrian and vehicular traffic is reduced.

Non-essential lighting such as that created by luminaires fulfilling the focal glow and play of brilliants functions in the lighting hierarchy should be programmed to turn off after the businesses in the areas close for the night. Current energy codes require that this function be built into new projects: San Diego Municipal Code, Chapter 14 and the San Diego County Code of Regulatory Ordinances both detail curfew times for lighting and should be consulted when determining what time decorative will be turned off.

To follow suit, the city can set a curfew and state that non-essential lighting must be turned off or its output reduced after a specified time, even for existing conditions, assuming the circuiting and controls to accomplish that are in place.

These techniques result both in energy savings and reduced light pollution.

3

3 | existing conditions

Carlsbad Village street layouts are angled roughly 45-degrees counterclockwise from north, following the angle of its coastline. For simplicity's sake in this lighting study, the terms "east", "west", "north", and "south" are used to describe the Village's layout as if it has been rotated 45-degrees clockwise. This means that "east" is technically "northeast" and "west" is technically "southwest", and so on.

The Village and Barrio Master Plan, Appendix B.3.4 (page B-4) gives a graphic map of the boundary of Carlsbad Village, in terms of "Village", "Barrio", and "Study Area (Village / Barrio)" boundaries. This lighting study follows the Village boundary, shown in solid black outline in Figure 14.

The existing conditions can be divided into four layers of light: the functional lighting on the streets for vehicular traffic provided by 30 foot "cobrahead" style street lights; the lighting on the sidewalks provided by a combination of street lights and pedestrian lamp posts and some minor contributions from façade lighting; lighting in alleys from both building mounded lights of various types and cobrahead poles; and the decorative lighting from "twinkle" lights wrapped around some pedestrian poles and trees. Also in the category of decorative lighting are building façades. The decorative accent, sconce, and sign lighting installed on

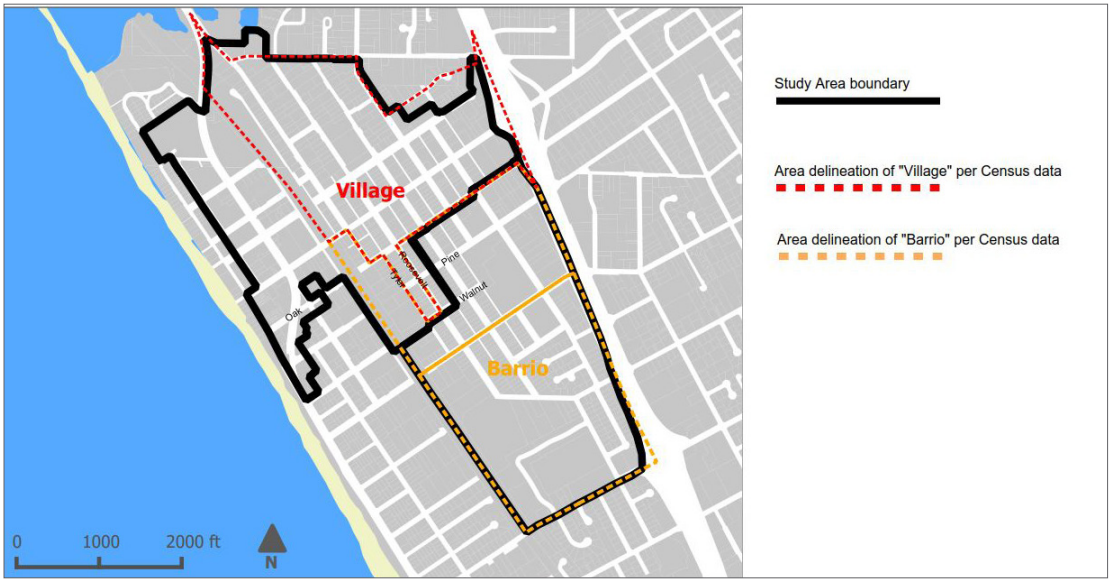


Figure 14 – Master Plan Study Area, Figure B-1 from Master Plan (page B-4)

façades is from a variety of sources and color temperatures.

The street and pedestrian lighting has been laid out in the Carlsbad Village over time, as needs evolved. It is unclear whether any standardized recommendations, such as the IES Recommended Practice 8 for Roadway Lighting has been used in determining luminaire spacing and illuminance targets, but the RP-8 should be used for all future development within the Village. Currently all pedestrian lamp posts in the Village use LED sources. Cobrahead street lights are targeted for upgrade to LED on a zone-by-zone basis as part of a future Capital Improvements Project.

Existing street lighting is from mast arm luminaires on 24'-26' poles. Originally, 40-watt induction-lamp units in residential areas and 100W luminaires in most other areas were installed to replace High Pressure Sodium street lights. The City is developing a plan to replace the induction street lights with LED, and while some of this work has been completed as units fail, many of the luminaires have yet to be replaced. Typical replacement upon unit failure has been 40W in residential areas and 100W elsewhere, with 3000K, Type III luminaires. At signalized intersections, the color temperature is 4000K. The units that have not been retrofitted are performing well below their rated outputs, as is typical for luminaires of that age. All existing induction street lights should to be retrofitted as soon as possible.

Existing pedestrian lamp posts are hexagonal, concrete posts, approx. 14' tall, with new LED acorn-style heads attached. The new luminaires are typically 70W, Type V, 4000K. These luminaires are considered to have a cut-off distribution, meaning that the amount of light exiting the luminaire above 90 degrees from vertical is less than 2.5% of its rated lumen output, and the amount of light exiting the luminaire between 80-90 degrees from vertical is less than 10% of its rated lumen output. Cut-off is a term that has been superseded in the lighting industry by the calculation of BUG ratings. The BUG rating of these LED acorns is B2-U2-G1. Additionally, there are acorn-style refractor luminaires with High Pressure Sodium lamps on hexagonal concrete posts, in one area within the Village. HPS lamps are 2100K and have very poor color rendering.

Existing twinkle lighting on State Street is an incandescent, non-commercial grade product that requires regular maintenance and replacement a few times a year.

Existing lamp posts in the vicinity of the Carlsbad Village (Railroad) Station are light green in color, dual-headed, metal halide, bell-shaped luminaires, dating from the time the station was built in the 1990s.

Appendix B shows a map of the existing lighting conditions. Appendix C is a summary of the existing conditions in table format.

3.1 VILLAGE CENTER DISTRICT (MAJOR COMMERCIAL STREETS)

Carlsbad Village Drive

Carlsbad Village Drive is the main east-west access route through the Village from the I-5 freeway. It is heavily traveled with five lanes and a central median. At the median directly at the freeway offramp and onramp exists a

Figure 15 – Carlsbad Village Drive

sign that welcomes visitors to "The Village of Carlsbad". In addition to regularly spaced street lights (typically four at each intersection), City Standard pedestrian lamp posts exist the entire length of the street, from the freeway offramps to the ocean. These are 14' tall, with hexagonal concrete poles, whose luminaires have recently been replaced with cut-off LED acorn-style heads. Starting at Madison Street and continuing to the ocean, the top two or

Figure 16 – Image of twinkle light-wrapped poles on Carlsbad Village Drive

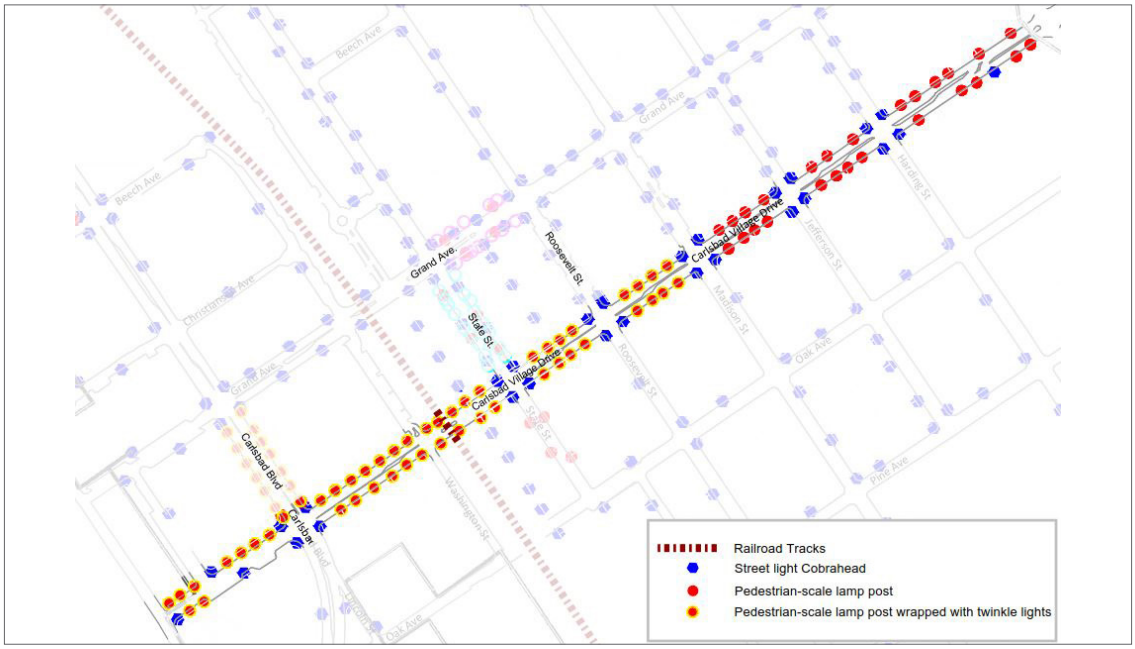


Figure 17 – Map of existing lighting conditions (Carlsbad Village Drive)

three feet of the lamp posts are wrapped with incandescent twinkle lights; see Figures 15 and 16 for representative images of this street and a close-up of the twinkle light-wrapped lamp post. Businesses (shops, restaurants, gas stations, and the like) and parking lots line both sides of Carlsbad Village Drive.

There is sufficient functional lighting on Carlsbad Village Drive for a street as busy as it is, with a constant combination of pedestrian and fast-paced vehicular activity. The frequency of the decorative pedestrian lamp posts creates a uniformity of light that allows pedestrians to be seen by drivers, and which clearly demarcates the pedestrian zones. The building façade lighting varies in degrees of success – some façades contribute positively to the visual image of the street, while others are lacking in design quality. The building façades in essence form a backdrop to the pedestrian lamp posts and as such, the lamp posts seem to disappear against some façades, but are prevalent against others. The twinkle lighting wrapping some of the lamp posts, notably, is not very obvious against such backdrops. The Recommendations chapter discusses ways to make the decorative lighting more uniformly successful along this important street. Figure 17 shows a map of the existing pattern of street lights and pedestrian lamp posts along the length of Carlsbad Village Drive.

Grand Avenue

Grand Avenue is an east-west street that dead-ends at the I-5 freeway at its eastern end, and dead-ends at Ocean Street at its western end, and primarily has businesses on both sides. From its eastern end until Roosevelt Street, and from State Street to Ocean Street, the only lighting is street lighting, with four poles

Figure 18 – Image of Grand Avenue at Roosevelt Street looking east

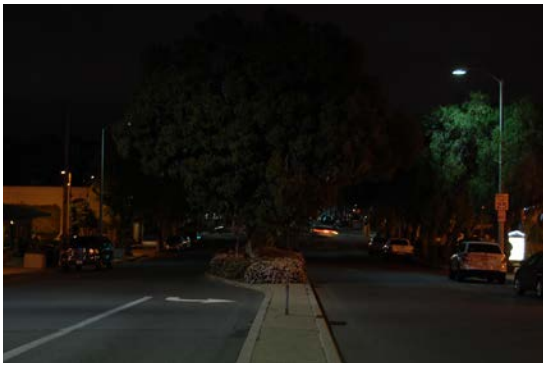


Figure 19 – Image of Grand Avenue showing trees in median, at Carlsbad Boulevard looking east

at all but one intersection, and between one and three poles in the mid-blocks. Between Roosevelt Street and State Street, twelve large ficus nitida trees on each side of Grand Avenue are fitted with metal bands holding three color-changing LED luminaires each. See Figures 18 and 19 for representative images of Grand Avenue, and Figure 20 for an image of the tree-band lights. These luminaires alternately aim up into the branches or down onto the sidewalks, and the light output is poor. It's unclear whether, or how, the color is being controlled.

At the northwest corner of the intersection of Grand Avenue and State Street, there is a feature

Figure 20 – Image of tree-band lighting (photo credit Chris Dragman)

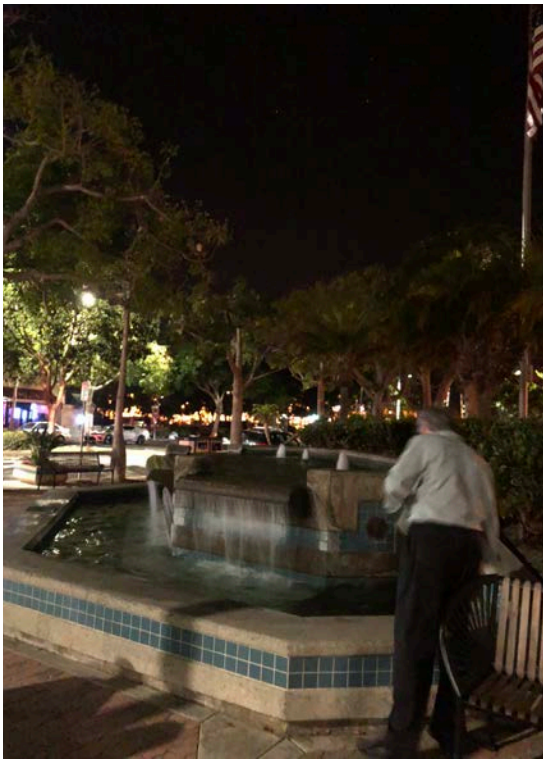


Figure 21 – Image of fountain at Grand Avenue and State Street

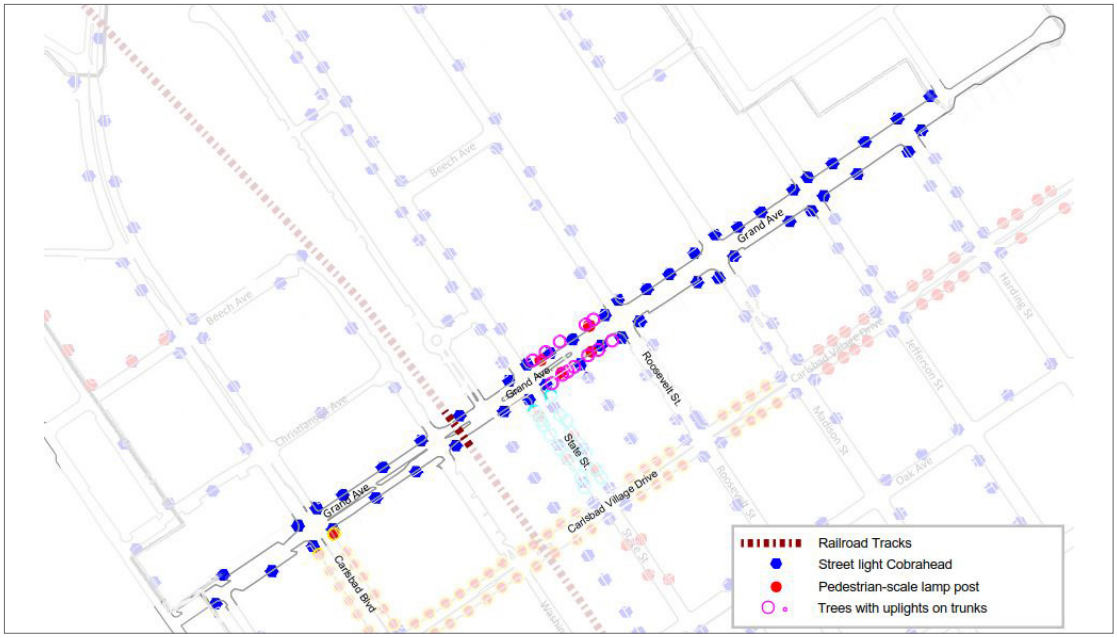


Figure 22 – Map of existing lighting conditions (Grand Avenue)

Figure 23 – Image of State Street, portion without twinkle lights in trees

plaza and fountain. Summertime events are hosted at this corner, most notably the Carlsbad Village Association's weekly Flicks at the Fountain. While lighting exists in the fountain, it is non-operational. The original fountain lighting is provided by round recessed luminaires most likely incandescent. See Figure 21 for an image of the fountain.

Grand Avenue's lighting feels insufficient for its level of commercial activity. While the cobrahead street lights have been upgraded with LED components, much of the light is lost in the tree canopies. Additionally, the beauty of the trees is not celebrated and is in fact lost in the darkness at night. There is limited light available at the pedestrian level, and facial recognition, which improves the sense of safety, suffers as a result. The Recommendations chapter discusses ways to bring the lighting to a human level on this street, to enhance its night-time appearance and celebrate the beauty of its trees.

Figure 24 – Image of State Street, with twinkle lights in trees

Figure 22 shows a map of the existing pattern of street lights and tree-band lighting along the length of Grand Avenue.

State Street

State Street intersects Carlsbad Boulevard at its northern point and dead ends at Oak Avenue at

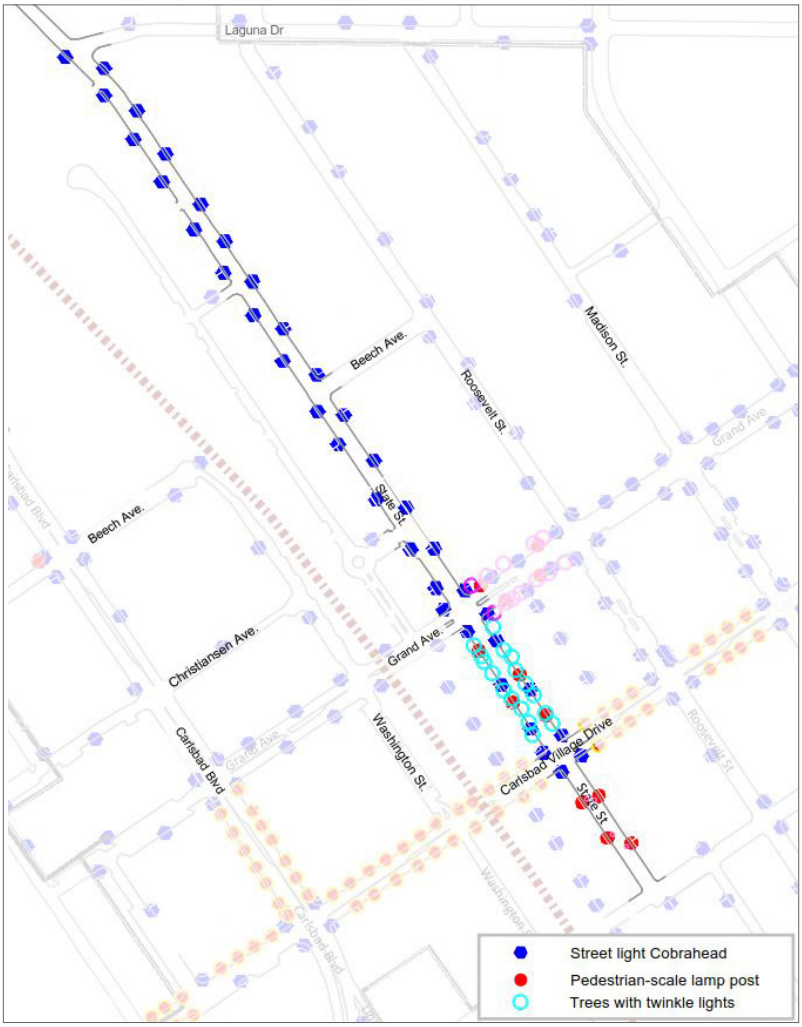


Figure 25 – Map of existing lighting conditions (State Street - partial)

its southern point. In addition to street lights, in the two blocks between Grand Avenue and Oak Avenue, State Street is illuminated with city-standard pedestrian lamp posts with LED acorn-style heads, alternating sides of the street. From Grand Avenue north to its intersection with Carlsbad Boulevard, State Street is lit with street lights on alternate sides of the street, in a much denser spacing than other streets in the Village. See Figures 23 and 24 for representative images of State Street. Figure 25 shows a map of the existing pattern of street lights and pedestrian lamp posts along the length of State Street.

Much of State Street has business frontage, yet only two blocks contain lighting at the pedestrian level. Its induction lamp cobraheads have been partially replaced with LED modules, and continuing that replacement will be necessary for the street lighting to be successful. The block of State Street between Carlsbad Village Drive and Grand Avenue, which has

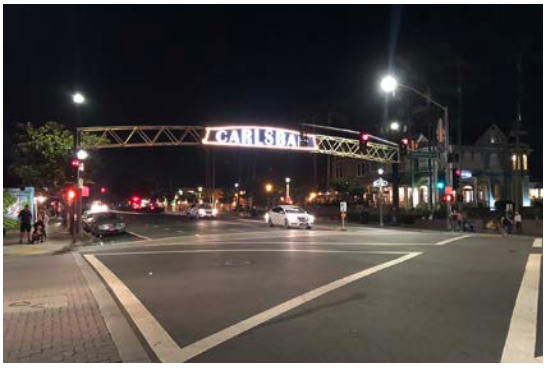


Figure 26 – Carlsbad Boulevard, showing landmark sign and twinkle-light-wrapped lamp posts

Figure27 – Village of Carlsbad sign, at Carlsbad Boulevard near Oak Avenue (image credit Google Maps Streetview)

twinkle lights in the trees as seen in Figure 24, feels better than the other blocks because the twinkle lights add a feeling of festivity while also casting light onto the building façades. The Recommendations chapter discusses how lighting can be improved on this street.

3.2 HOSPITALITY DISTRICT

Carlsbad Boulevard

The Carlsbad Village portion of Carlsbad Boulevard extends from its intersection with State Street at the roundabout at the northern end, to Walnut Street at its southern point. Carlsbad Boulevard is the spine of the area designated as the "Hospitality District" in the 2018 Village and Barrio Master Plan. The Carlsbad Landmark sign is at Carlsbad Boulevard's intersection with Carlsbad Village Drive, and north of that, in the block to Grand Avenue, are city standard pedestrian lamp posts with LED acorn-style heads on both sides of the street. These lamp posts, similar to those on Carlsbad Village Drive, have twinkle lights wrapped around the top two to three feet of the concrete lamp posts. See Figure 26 for an image of this intersection. In the several blocks north of Grand Avenue, Carlsbad Boulevard

Figure 28 – "Coastal Helix" (2014, by Roger White Stoller) at Carlsbad Boulevard and State Street (image from artist''s website)

is illuminated with street lights that alternate sides of the street. At the intersection with Christiansen Avenue there is a single street

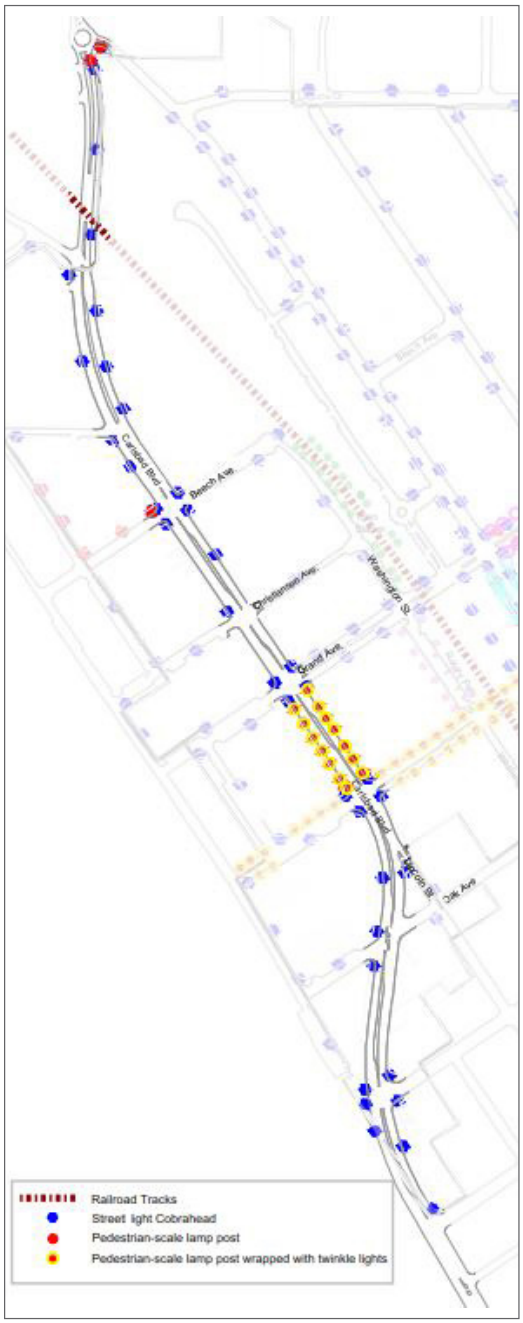


Figure 29 – Map of existing lighting conditions (Carlsbad Boulevard)

light on the northwest corner, but at the Beech Avenue intersection, there are four. South of Carlsbad Village Drive, Carlsbad Boulevard is illuminated with street lights only, alternating sides of the street. At the intersection with Oak Avenue, there are two street lights and at the intersection of Pine Avenue, there are four. Near the intersection with Oak Avenue is a stone plinth with wording announcing visitors' arrival to the "Village of Carlsbad". See Figure 27 for an image of this sign. At the northernmost portion of Carlsbad Boulevard at State Street, is a traffic roundabout with an illuminated sculpture, "Coastal Helix" (2014, by Roger White Stoller) at its center point. See Figure 28 for an image of this sculpture. Figure 29 shows a map of the existing pattern of street lights and pedestrian lamp posts along the length of Carlsbad Boulevard.

Carlsbad Boulevard is mainly business-oriented frontage with a high tourist draw due to its iconic sign and its proximity to the beach. In the blocks between Carlsbad Village Drive and Grand Avenue, where there are pedestrian-scale lamp posts, the lighting feels appealing and sufficient. Beyond those blocks, however, there is substantial drop off in illumination levels, which coincides with a drop off in pedestrian activity. The Recommendations section addresses ways to enliven the entirety of the Hospitality District along Carlsbad Boulevard and its side streets.

Figure 30 – Image of Tyler Street, looking north between Walnut Avenue and Pine Avenue

3.3 PINE-TYLER MIXED USE DISTRICT– SOUTH OF OAK AVENUE

The Pine-Tyler mixed use district was identified as an eclectic neighborhood in the Village and Barrio Master Plan, as it contains a variety of residential and light-industrial uses that make it suitable for future development of start-up businesses, shops, restaurants, and live-work units. It comprises Tyler Street and Roosevelt Street, from Oak Avenue at their northern point, to Walnut Avenue at their southern point, with Pine Avenue forming the east-west axis between Tyler Street at the west end, and the alley between Roosevelt Street and Madison Street at its east end. This district includes the notable and historic Lola's Market as its cornerstone. Its current lighting consists of street lights at intersections and mid-blocks. Figure 30 shows a representative image of this district, taken at Tyler Street. Figure 31 shows a map of the existing pattern of street lights along the length of Roosevelt and Tyler streets.

This district contains mainly day time businesses along the west side of Tyler Street, and mainly residences on the east side of Tyler Street and

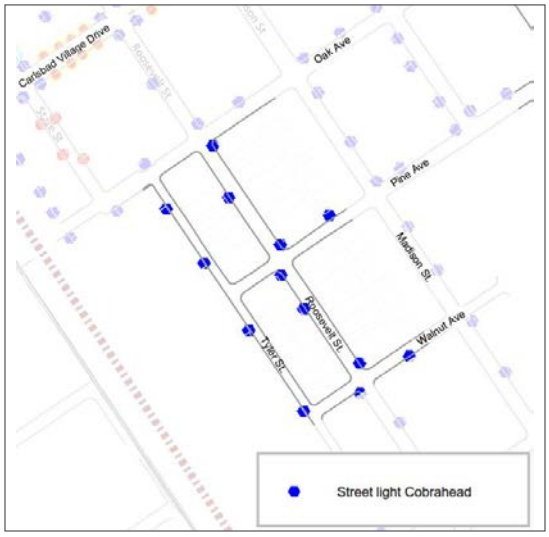


Figure 31 – Map of existing lighting conditions (Pine - Tyler Mixed Use District)

Roosevelt Street. While some of the cobrahead street lights have been upgraded to LED, not all of them have and there is a large contrast in illumination levels between the two sources. The Recommendations chapter provides guidance for how the lighting in this district must change in order to support future pedestrian activity and encourage economic growth, as well as connectivity between the Village and the Barrio.

3.4 SECONDARY DRIVES, AVENUES AND STREETS

Oak Avenue

Oak Avenue is an east-west street that dead-ends at the I-5 freeway at its eastern end, and dead-ends at Ocean Street at its western end, with a mixture of residential lots and businesses along its length. The Village blocks north of Oak Avenue constitute the "Village Center" area of town per the 2018 Village and Barrio Master Plan. Its illumination consists of street lights only, one at each intersection and one at each

Figure 32 – Image of Oak Avenue

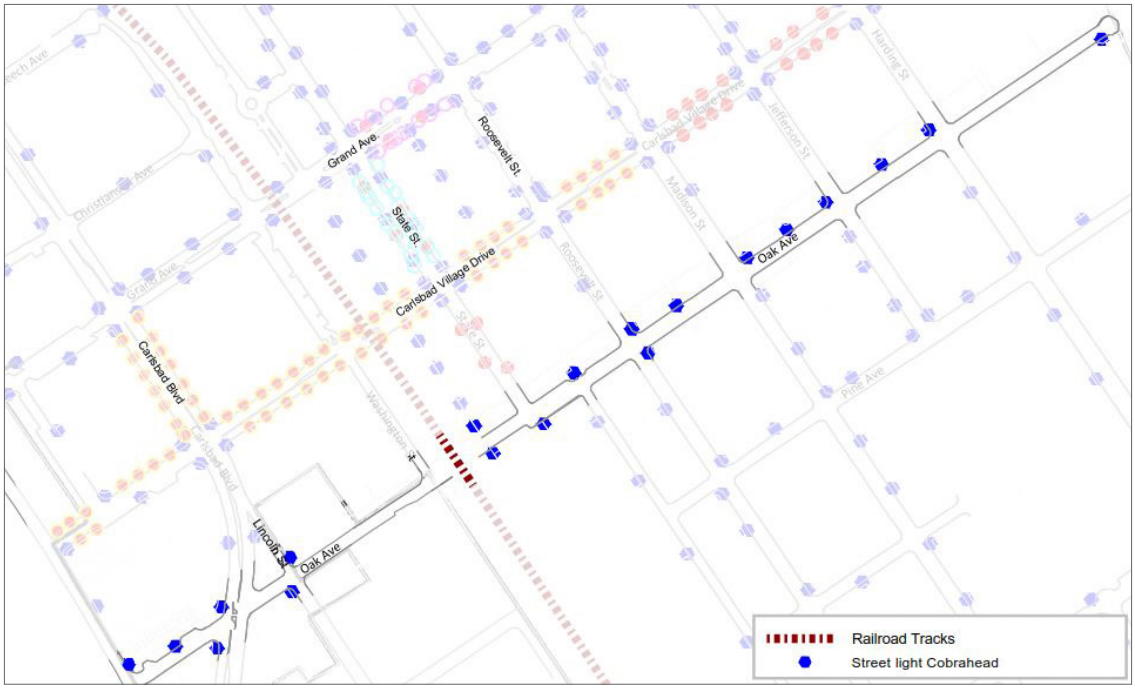


Figure 33 – Map of existing lighting conditions (Oak Avenue)

mid-block. See Figure 32 for a representative image of Oak Avenue. Unlike Carlsbad Village Drive and Grand Avenue, Oak Avenue is broken by the railroad tracks; one must go around them in order to reach the western portion of the street. Figure 33 shows a map of the existing pattern of street lights along the length of Oak Avenue.

Oak Avenue has very few cobraheads along its length compared to other similar streets in the Village. As a result, the light feels very dark;

however, much of its eastern side is residential, and the businesses along its length are mainly open in the daytime and not at night. The Recommendations chapter talks about how to improve the lighting for pedestrians, in the event that businesses become night-time oriented in the future.

Christiansen Avenue

Christiansen Avenue comprises two blocks, with the Train Station at its eastern end and Ocean Street at its western end. It has both businesses and residences, including the Carlsbad by the Sea retirement community, as well as the St. Michael by the Sea church, along its two-block length. It is illuminated with street lights only, one at each intersection and one at each mid-block, and these cobraheads have not yet been upgraded to LED. See Figure 34 for a representative image of Christiansen Avenue. Figure 35 shows a map of the existing pattern of street lights along the length of Christiansen Avenue.

Figure 34 – Image of Christiansen Avenue with train station in background

Christiansen Avenue feels very dark, yet it's a critical connector to the transit hub at the Train Station. The Recommendations chapter addresses ways to make the lighting more attractive to pedestrians.

Beech Avenue

Beech Avenue exists between Roosevelt Street and State Street at its eastern end, and between the railroad tracks and Ocean Street at its western end. It is illuminated with street lights only, one at each intersection, except for the

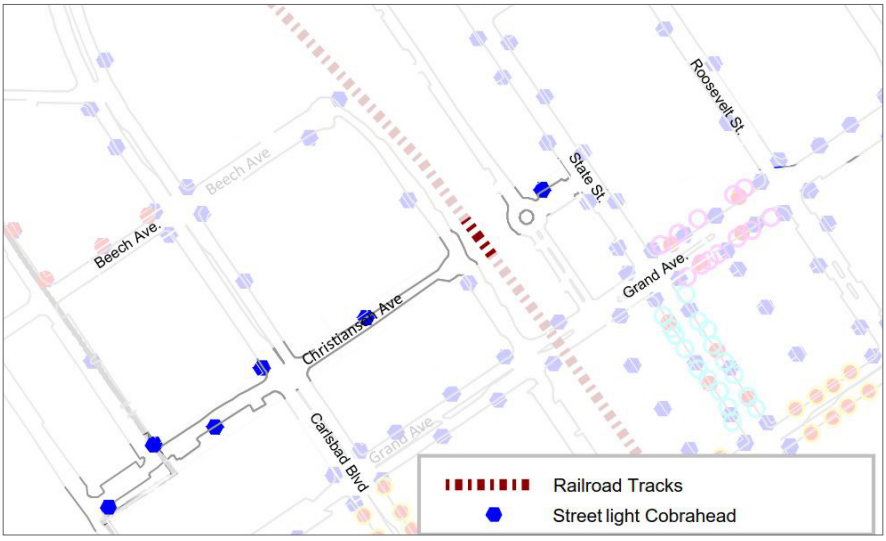


Figure 35 – Map of existing lighting conditions (Christiansen Avenue)

block between Carlsbad Boulevard and Garfield Street, where there are three City-Standard pedestrian lamp posts with LED acorn-style heads. This is the block where the Carlsbad Historical Society has its home in the historic Shipley Magee house (1887). See Figure 36 for a representative image of Beech Avenue. Figure 37 shows a map of the existing pattern of street lights and pedestrian lamp posts along the length of Beech Avenue.

Beech Avenue is primarily residential use, with some day time businesses as well as the Army Navy Academy Sports Complex along its length. Its cobraheads have yet to be upgraded to LED and as a result it feels very dark. The Recommendations chapter discusses Beech Avenue's intersection with the Hospitality District and provides a plan for increasing its visual presence and encouraging pedestrian activity where needed.

Figure 36 – Image of Beech Avenue

Harding Street

IIn the Village, Harding Street runs between Grand Avenue at its northern end, and up to and beyond Pine Avenue at its southern end, its southern end continues into the Barrio. Harding Street is the first intersection one encounters

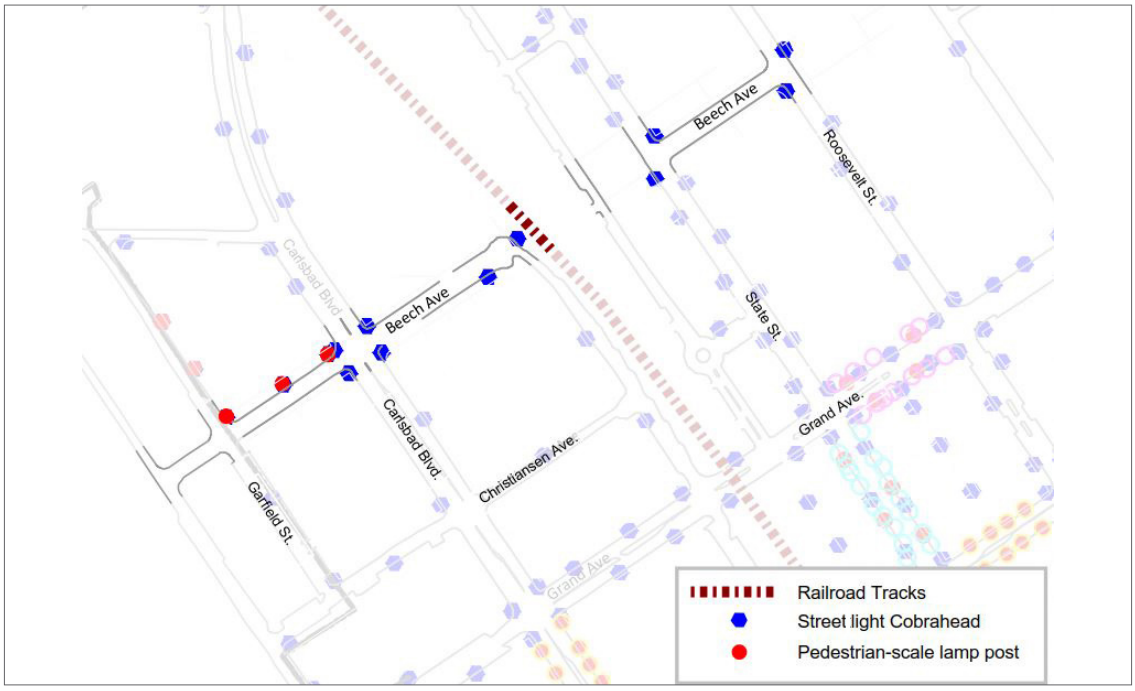


Figure 37 – Map of existing lighting conditions (Beech Avenue)

after exiting the I-5 freeway at Carlsbad Village Drive. North of Carlsbad Village Drive, it is illuminated by several street lights flanking both sides of the street. South of Carlsbad Village Drive, the street lights are less frequently placed, with one at each subsequent intersection and one at the mid-blocks. See Figure 38 for a representative image of Harding Street. Figure 39 shows a map of the existing pattern of street lights along the length of Harding Street.

Harding Street contains commercial, civic, and residential uses and is a connection from the

Village to the Barrio because it leads to Pine Avenue Park. Its cobraheads have not yet been upgraded to LED and as a result the street feels very dark. The Recommendations chapter provides commentary on how to increase the visual presence of this street and encourage pedestrian activity between the Village and the Barrio.

Figure 38 – Image of Harding Street

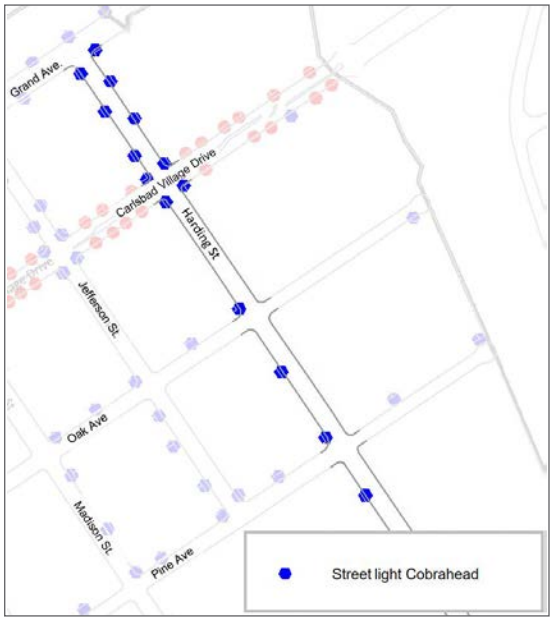


Figure 39 – Map of existing lighting conditions (Harding Street - partial)

Jefferson Street

The Carlsbad Village portion of Jefferson Street extends from Laguna Drive at its northern end to Pine Avenue at its southern end, where it deadends at the Senior Center. It is illuminated with street lights on alternating sides north of Carlsbad Village Drive, and from the west side only south of Carlsbad Village Drive. See Figure 40 for a representative image of Jefferson Street. Figure 41 shows a map of the existing pattern of street lights along the length of Jefferson Street.

Jefferson Street is very similar to Harding Street in its primarily residential and daytime business uses. It has relatively few cobrahead street lights that haven't yet been upgraded to LED. The Recommendations chapter provides

Figure 40 – Image of Jefferson Street

Figure 41 – Map of existing lighting conditions (Jefferson Street)

commentary on how to increase the visual presence of this street and encourage pedestrian activity and connectivity between the Village and the Barrio.

Madison Street

The Carlsbad Village portion of Madison Street runs from Laguna Drive at its northern end to Oak Avenue at its southern point. Madison Street is illuminated with street lights on alternating sides north of Carlsbad Village Drive, and from only the east side of the street south of Carlsbad Village Drive. See Figure 42 for a representative image of Madison Street. Figure 43 shows a map of the existing pattern of street lights along the length of Madison Street.

Madison Street is mostly residential with a few businesses. Its cobrahead street lights have not yet been upgraded to LED. The spacing of these street lights is not very dense and so in general,

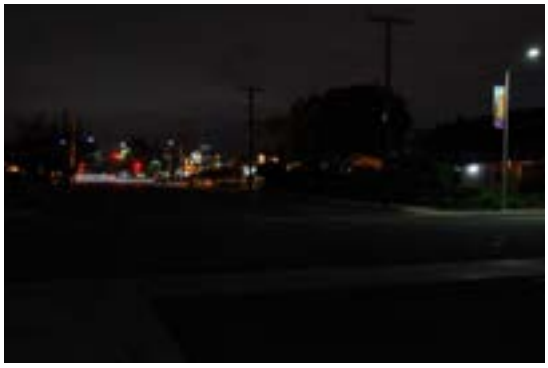


Figure 42 – Image of Madison Street

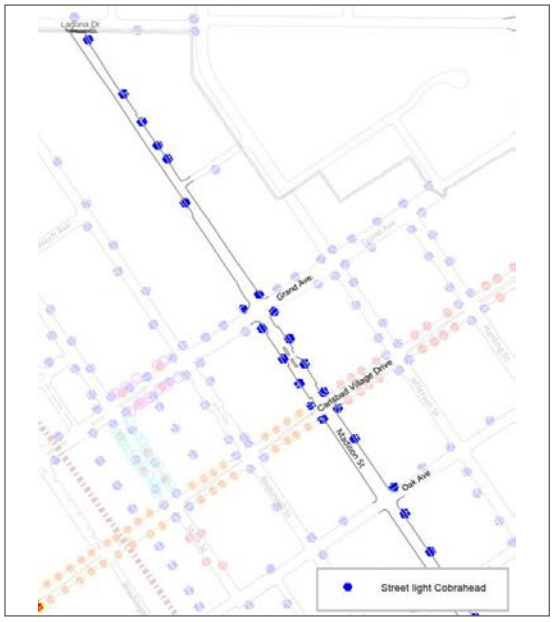


Figure 43 – Map of existing lighting conditions (Madison Street - partial)

it feels very dark. The Recommendations chapter provides commentary on how to increase the visual presence of this street and encourage pedestrian activity and connectivity between the Village and the Barrio.

Roosevelt Street

The Carlsbad Village portion of Roosevelt Street runs from Laguna Drive at its northern

end to Walnut Avenue at its southern point. Roosevelt Street is illuminated with street lights on alternating sides. At its intersections with Carlsbad Village Drive and Grand Avenue, there are four street lights. All other intersections are lit with two street lights. See Figure 44 for a representative image of Roosevelt Street. Figure 45 shows a map of the existing pattern of street lights along the length of Roosevelt Street.

Roosevelt Street is a mixture of businesses, parking lots and the town Post Office, and its street lights have been upgraded to LED. The

Figure 44 – Image of Roosevelt Street

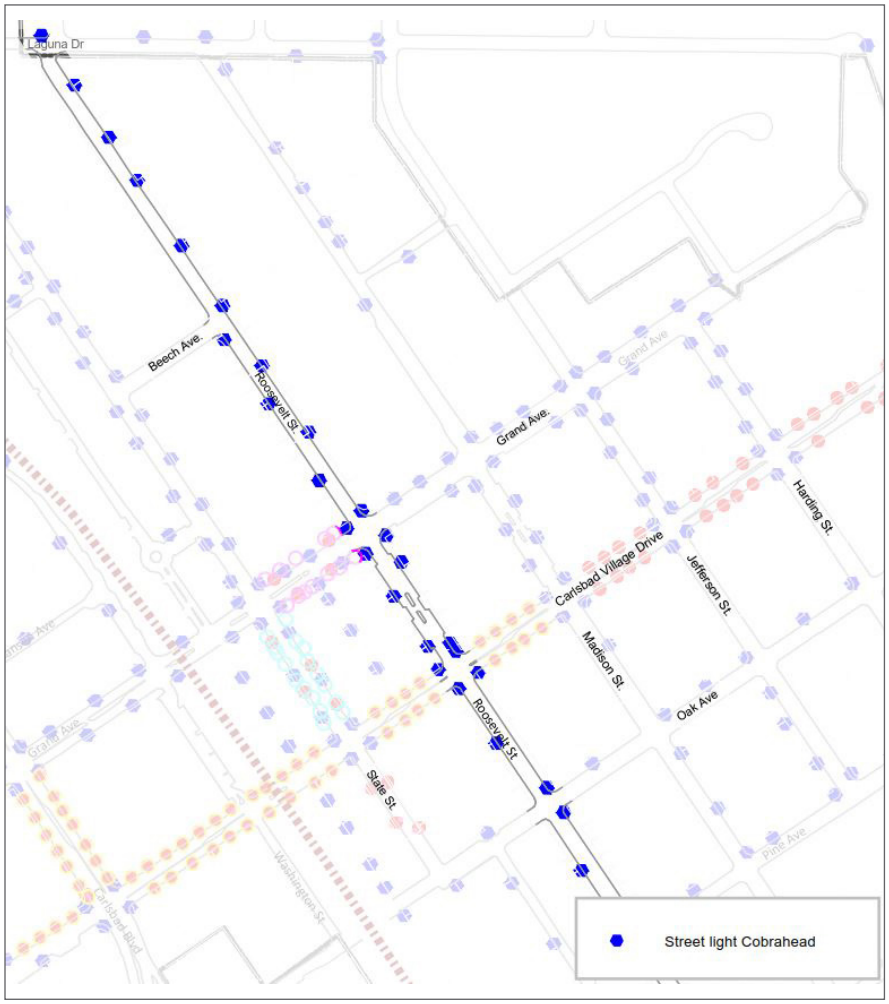


Figure 45 – Map of existing lighting conditions (Roosevelt Street - partial)

lighting is sufficient in areas where businesses have augmented the street lighting with additional building-mounted lights or parking poles, but the lighting is very much geared towards vehicles and not pedestrians. The Recommendations chapter lays out ways to improve the pedestrian experience along Roosevelt Street in the areas where the businesses currently are or will become night time-oriented.

Washington Street

The Carlsbad Village portion of Washington Street runs from Beech Avenue at its northern end to Oak Avenue at its southern point. North of Carlsbad Village Drive, in the block between that and Grand Avenue, Washington Street is illuminated on both sides with city-standard pedestrian lamp posts with acorn-style refractor diffusers and HPS lamps, that have not been retrofitted with new LED acorn-style heads. North of Grand Avenue, in one and a half blocks between that and Beech Avenue, it is illuminated with pedestrian-scale bell-shaped, metal halide luminaires on light green lamp posts that are typical of the Train Station area. The half-block north of Christiansen Avenue, to Beech Avenue, is unlit. The lamp posts that do exist are on the east side of the street only. On the west side are street lights, but only a single street light exists between Christiansen Avenue and Beech Avenue, and the area feels quite dark. See Figure 46 for an image of the acorn-style refractor diffusers, and Figure 47 for an image of the bell-shaped lamp posts typical of the Train Station area. Figure 48 shows a representative portion of Washington Street. Figure 49 shows a map of the existing pattern of street lights

Figure 46 – Pedestrian-scale lamp post with acorn refractor (image credit Google Maps Streetview)

Figure 47 – Bell-shaped lamp posts, typical of Train Station (image credit Google Maps Streetview)

and pedestrian lamp posts along the length of Washington Street.

Washington Street is a short street connecting the Train Station district with Oak Avenue and is populated with businesses mainly north of Carlsbad Village Drive. South of Carlsbad Village Drive are an empty lot, a parking lot, and a few businesses. The blocks north of Carlsbad Village Drive, while sufficiently illuminated, are lit with HPS which is a less-desirable source due to its poor color rendering characteristics. South of Carlsbad Village Drive there are no street lights at all, and so the area feels very dark. The Recommendations chapter offers suggestions for how to make Washington Street a more viable area for businesses and pedestrians.

Figure 48 – Image of Washington Street with HPS acorn pedestrian lamp posts in background

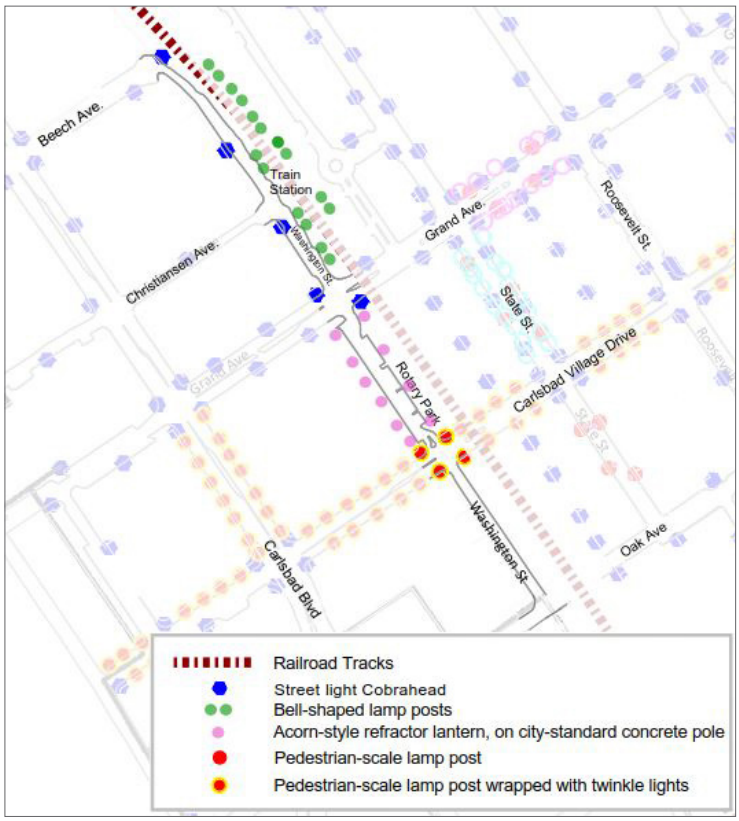


Figure 49 – Map of existing lighting conditions (Washington Street)

4 | recommendations

Types of Decorative Lighting

Before the recommendations for each district and street can be discussed in detail, groundwork must be laid for the types of lighting that will feature prominently in the specific recommendations. These are: decorative lamp posts in the public realm and on private property, tree uplights, and city signage lighting. Building façade lighting also plays an important part in the visual fabric of the urban night-time lit environment, as discussed in Chapter 2 Section1 Hierarchy of Light.

This topic will be covered in detail in Chapter 5 because decorative lighting improvements for building façades are within the purview of the business / building owners, and not the city.

Decorative Post Top Luminaires in the Public Realm

The city has begun to standardize on a luminaire for its pedestrian lamp post; however, it is problematic for a few reasons. The individual LEDs are visible from below and from some angles they are very glary. This distracts from the goal of having soft illumination that bathes the area in light. Instead, the luminaire should be designed so that individual LEDs are minimized or not visible from any normal viewing angles. It is possible that the city standard luminaire has a retrofit component, such as a lens accessory, that solves the direct glare problem. In addition, it is desirable that the luminaires to match the color of the poles they are mounted on. Since the poles are a grey concrete, the luminaire heads should be in the silver/gray range, or the poles can be painted to match the color of the luminaire heads. BUG ratings are used to classify fixtures relative to back

Figure 50 – Acorn luminaire option with glare-reducing lens (Image A)

Figure 51 – Acorn luminaire option with glare-reducing lens (Image B)

light, uplight and glare. Lower numbers indicate less of each; higher numbers indicate more of each characteristic. In Carlsbad, a luminaire with a BUG rating not to exceed B2-U2-G2 will provide the right balance of visual comfort and overall light distribution that will create a soft, comfortable and inviting light. The luminaire should be standardized across the Village as a whole; the exception being in the Train Station area. Figures 50 and 51 are representative products with the characteristics described above. There are other fixtures on the market that also meet these criteria.

The city should create a short list of products that meet these criteria and should complete an on-site, life-size mock-up using operable luminaire samples (with cord and plug so that they can be energized) before making a final selection. This allows stakeholders to experience the visual quality, examine the quality of construction and verify the level of service the manufacturer can provide. In order to reinforce the character of the four areas described in this report, the city can consider variations in style and/or color to give some areas their own identity.

Summary of luminaire criteria:

- LEDs should not be visible from normal viewing angles, or should be shielded with a glare-minimizing lens
- BUG rating should be B2-U2-G2 or better
- Luminaire finish should match the concrete poles or the surface they are mounted on
- Color temperature should be 3000K
- CRI should be 80 or higher
- Luminaire should be compatible with 'smart lighting' technology for future control applications
- Luminaire should be evaluated for vandal resistance

These criteria also apply to the Train Station area bell-shaped luminaires as well. Examples of potentially appropriate luminaires are shown in Figures 52 and 53, or the existing luminaires can be retrofitted if such components exist. The pole and luminaire should be examined by a testing company if retrofitting the components will be considered.

In general, the guidelines found in the IES Recommended Practice 8 for Roadway Lighting should be followed to determine luminaire spacing and illuminance targets. This publication, known as RP-8, discusses pedestrian lighting as well and is updated periodically with new recommendations. The most recent version is dated from 2014 and states the following criteria:

- Average maintained illuminance in footcandles (fc) for walkways that are

Figure 52 – Bell-shaped luminaire option with glare-reducing lens

Figure 53 – Bell shaped luminaire option with more modern aesthetic and glare-reducing lens

mixed vehicular and pedestrian in high conflict areas is 2.0; minimum maintained illuminance is 1.0, and average to minimum uniformity is 4:0

- Average maintained illuminance in fc for walkways that are pedestrian only in high conflict areas is 1.0; minimum maintained illuminance is 0.5, and average to minimum uniformity is 4:0
- Average maintained illuminance in fc for walkways that are pedestrian only in medium conflict areas is 0.5; minimum maintained illuminance is 0.2, and average to minimum uniformity is 4:0

The most current version of RP-8 should be consulted during the design and planning phases after luminaires are selected.

The city currently uses 4000K street lights for signalized intersections, 3000K street lights elsewhere, and 4000K pedestrian scale lamp posts. Although this can work to create a hierarchy with color, there is mounting evidence that 4000K illumination has the potential to be detrimental to our health and the maximum color temperature for exterior lighting should therefore be capped at 3000K. Additionally, multiple lamp color options create inventory complexities for maintenance staff. The recommended color temperature for luminaires is at 3000K for all street lights, pedestrian lamp posts, bollards, signage lighting, tree uplighting, and fountain lighting, and 2700K for sconces and twinkle lights. The city should standardize these color temperatures for all new luminaires. The minimum recommended CRI is 80 or greater for all light sources.

Decorative Lamp Posts on Private Property

When a private developer decides to use a lamp post on their property, the selected lamp post and luminaire should have the same qualitative elements as the municipal luminaires, but the style can be determined by the developer.

Summary of luminaire criteria:

- LEDs should not be visible from normal viewing angles, or should be shielded with a glare-minimizing lens
- BUG rating should be B2-U2-G1 or better
- Color temperature should be 3000K
- CRI should be 80 or higher

When located in the public right-of-way, the developer must use the city standard lamp posts and luminaires and use luminaire placement spacing consistent with the city's standards.

Tree uplights

Trees can be uplit from the ground with either fully recessed fixtures or fixtures above grade that are mounted to a small recessed foundation or a spike. Fully recessed (in-grade) fixtures have the advantage of being well-shielded and less likely to be vandalized because they are less apparent in the landscape. They can be difficult to install around existing mature trees with large root balls and require maintenance of ground cover and low-level plantings so they do not interfere with the beam of the light. Above-grade fixtures, commonly referred to as bullet fixtures, can be mounted on a spike so those elements are easier to install around mature trees and can also sit at about the same height as many low growing plants, but because of that they are more visible and more likely to be attractive to vandals.

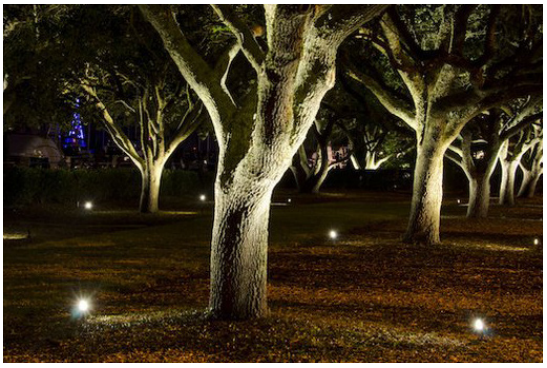


Figure 54 – Image of tree uplighting (large trees)

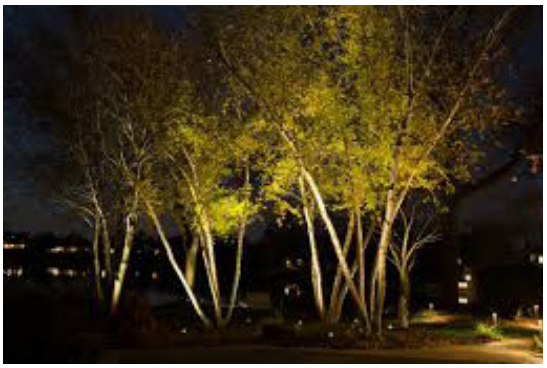


Figure 55 – Image of tree uplighting (small trees)

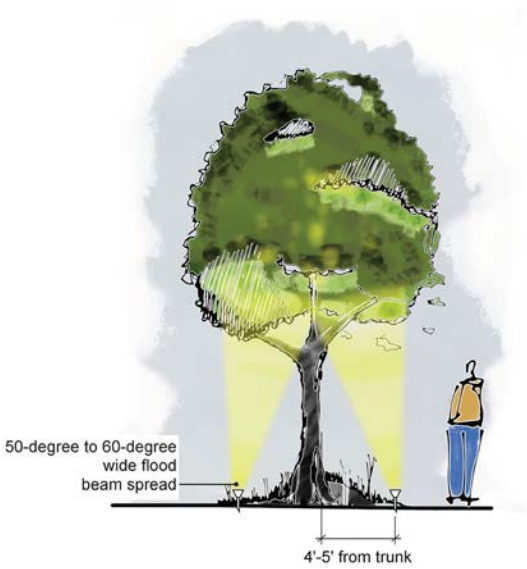


Figure 56 – Branching tree uplighting schematic elevation

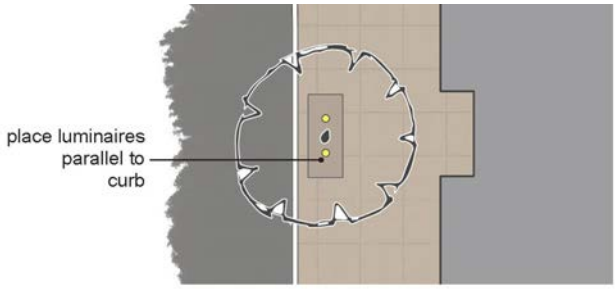


Figure 57 – Branching trees uplighting plan view

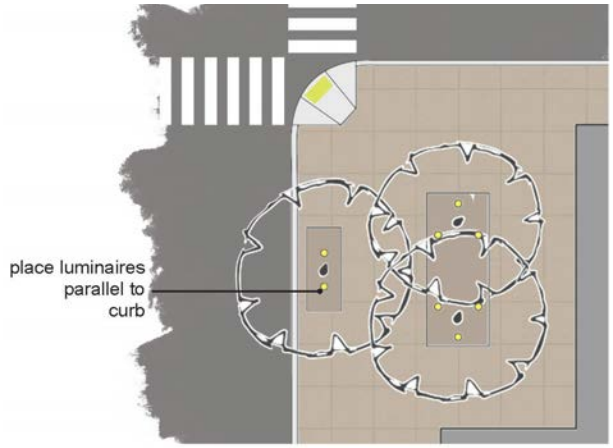


Figure 58 – Branching trees uplighting plan view, wide planter, corner condition

The goal of lighting deciduous or evergreen trees with branch structures is to light up the undersides of the branches, with light continuing to travel into and through the branch structures. This serves to softly highlight the trunk, the leaves and the undersides of the branches, and almost as importantly, to bounce reflected light back down to the human level where it lends a glow to the environment. See Figures 54 and 55 for example images of successful tree uplighting from the ground. Figure 56 shows recommended spacing and beam spreads for branching trees, while Figures 57 and 58 indicate placement of luminaires in plan view relative to the street.

This study is not proposing the installation of new palm trees. The goal of lighting existing palm trees is to graze light up the length of the trunk and light the undersides of the fronds. Figures 59 and 60 are example images of successful palm tree uplighting. See Figures 61 and 62 for recommended spacing and beam spreads for palm trees and luminaire placement relative to the street.

Although different beam spreads and placements are used depending on the tree type, both techniques call attention to the beauty of the tree and provide reflected light that helps to shape the space. However, it is

Figure 59 – Image of palm tree uplighting

Figure 60 – Image of palm tree uplighting

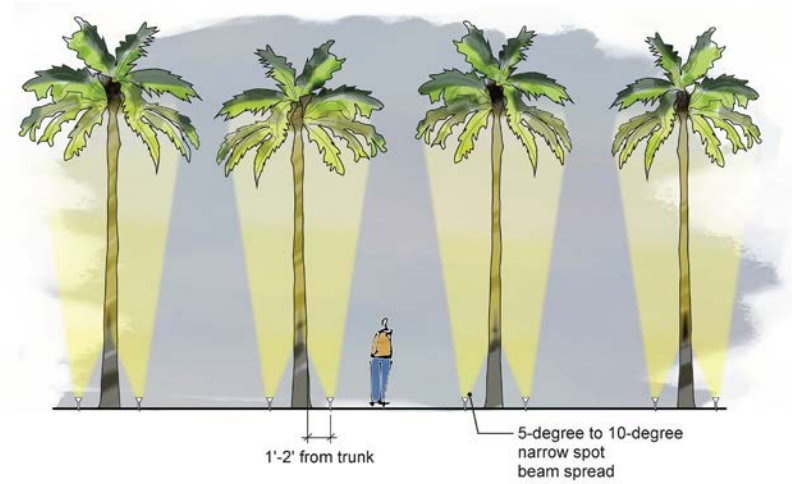


Figure 61 – Existing palm trees uplighting schematic elevation

Figure 63 – Bullet style uplight with glare shield

Figure 64 – In-grade style uplight

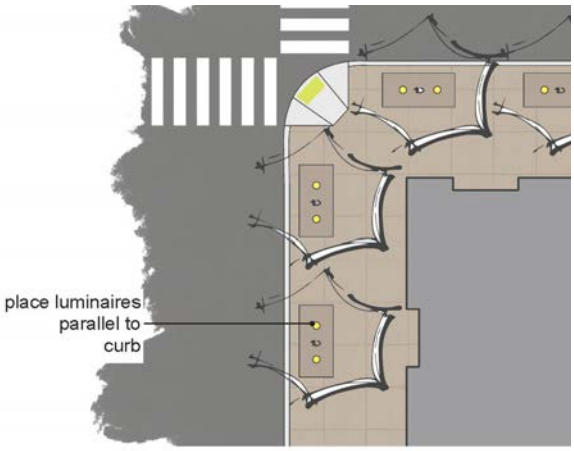


Figure 62 – Exisitng palm trees uplighting, plan view

important for the health of the tree that the illumination be turned off for several hours each night. It is recommended that tree uplights are scheduled to turn off at the time that the adjacent businesses close, or by 11pm or midnight if adjacent businesses are not regularly open during night time hours. San Diego Municipal Code, Chapter 14 and the San Diego County Code of Regulatory Ordinances both detail curfew times for lighting and should be consulted when determining what time decorative tree lighting will be turned off.

Tree uplights and signage lighting should be in-grade and protected by concrete collars from pedestrians and landscape trimming equipment. Above grade luminaires offer more directionality for the aiming but may possibly be damaged by landscapers and/or pedestrians, so this is a consideration when selecting luminaires. A very few solar-powered options are also available, but often with limited glare reduction options and color temperatures. Figures 63, 64, 65 and 66 show examples of the variety of luminaire style options.

City Signage Lighting

City signage consists primarily of parking lot signs which are consistently designed with similar elements of weathered wood slat construction and branded teal-painted circle

with a white-painted "P" in the center. They are topped with a light green banner, and sometimes read "Carlsbad Village". While some are identical, the rest are similar in theme. They are not lit now and are difficult to see during hours of darkness. They should be illuminated in order to aid in wayfinding. As they exist, they can be illuminated with lights installed in the planting beds where they are mounted. These luminaires can be either hard-wired or solar operated, as the signs themselves present an opportunity for concealment of auxiliary batteries necessary for lighting fixture operation. When installed in the planting beds and aimed up, the luminaires should be supplied with glare shields and lumen output should be limited to 700 lumens. See Figures 67, 68 and 69 for examples of signage lighting placements, and Figures 63, 64, 65 and 66 in the tree uplighting discussion for luminaire style options.

The signs may be due for a change-out as the Village considers re-branding efforts. In this case, new signs can be designed that incorporate integral lighting into their design.

Figure 65 – Bullet style solar option with pole mounted solar panel

Figure 66 – In-grade solar uplight option with pole mounted solar panel

District and Street-specific Recommendations

The recommendations which follow are divided into districts that encompass the primary streets of the City as described in the Master Plan, and as further defined herein. They are the Village Center District, State Street, Hospitality District, Train Station/Theater area, and the Pine-Tyler

Figure 67 – Sign lighting, bullet luminaires with snoots for glare control

Figure 68 – Sign lighting, in-grade luminaires

Figure 69 – Sign lighting, signage-integrated lighting aimed downward

Mixed-Use District. Some segments of certain primary streets fall outside the established district boundaries, with the exception of portions of Madison, Roosevelt and Washington streets. These segments, along with other streets outside the established district boundaries, are termed secondary streets for the purpose of this study. Madison, Roosevelt and Washington streets do fall within the established Village Center District boundary, but Madison and Roosevelt streets are included in the section on secondary streets, and Washington Street is included in the Train Station / Theatre area identified in this study.

The extents of each district are shown in the color-coded map in Figure 70.

4.1 VILLAGE CENTER DISTRICT (MAJOR COMMERCIAL STREETS)

As defined in the 2018 Village and Barrio Master Plan, the Village Center encompasses the core of the Village and comprises “continuous commercial street frontage…to provide destinations and workplaces in a walkable environment that is centered around the main

Figure 70 –Map of various Village district boundaries

destinations of the Carlsbad Village Station, State Street, Grand Avenue, and Carlsbad Village Drive" [1]. Carlsbad Village Drive is the east-west spine of this district, with Grand Avenue providing a supporting role. Further classifications within the Village Center District are already starting to exist and can be supported and furthered by appropriate lighting choices. State Street, between Carlsbad Village Drive and Grand Avenue, is already one of the most walkable streets in the Village, because of its shade trees, layout of shops and restaurants on both sides, and role as host to the weekly Farmers' Market events. As redevelopment continues, the Village Center will ensure a lively and ever-changing environment, where there are a variety of activities for residents and visitors alike.

Carlsbad Village Drive

Carlsbad Village Drive is the primary thoroughfare to the Village from the I-5 freeway, and therefore must immediately resonate as the wow moment, giving visitors a "you have arrived" sensation. From a branding perspective, it's a prime opportunity for staking territory with the Carlsbad brand. The existing pedestrian lamp posts are closely spaced and there are a lot of them, but they don't stand out against the visual noise of the variously lit building façades, street lights, traffic signals, and car headlights. A custom luminaire bracket that incorporates the Carlsbad logo into its design, with a standard luminaire attachment will create a corridor of branding that visually engages visitors and residents, both during the day and at night. The sketches in Figures 71 and 72 are examples of how this feature could be designed.

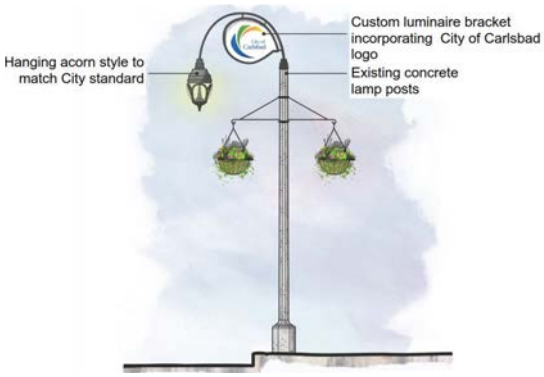


Figure 71 – Custom bracket with Carlsbad logo, idea 1

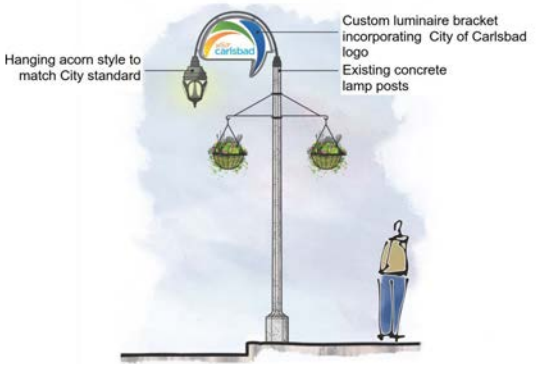


Figure 72 – Custom bracket with custom logo, idea 2

The twinkle lights that wrap the pedestrian lamp posts between Madison Street and Ocean Street should be removed, as their effect is lost in the visual noise of this thoroughfare.

The sign in the median just off the I-5 off-ramps (see Figure 73 for an image of this sign) should be illuminated to aid in wayfinding as discussed previously. Refer to Chapter 5 City Signage Lighting for recommendations.

A landscaping element including the addition of palm trees at each major intersection along Carlsbad Village Drive may be introduced by the

Figure 73 – Village of Carlsbad Sign in Median (image credit Google Maps Streetview)

city as part of a comprehensive beautification plan that reinforces the Village's sense of being a "small town beach community". If this plan is implemented, then ground mounted uplights for the palms should be included as an integral component.

The map images in each recommendation section are excerpted from a comprehensive map of lighting recommendations, found in Appendix D. See Figure 74 for the Carlsbad Village Drive recommendations map.

Grand Avenue

Grand Avenue is an adjacent thoroughfare that is quite dark and as such, new city standard pedestrian lamp posts as described earlier should be added to encourage pedestrian activity after nightfall. The spacing of these lamp posts does not need to be as dense as it is on Carlsbad Village Drive, because there are fewer shops and the foot-traffic activity is less. The recommended spacing for new pedestrian lamp posts is three to four lamp posts per block (or, 30'-50' on center), on each side of the street, in between the street lights. An exact spacing will be dependent on the location of street lights, street trees, and other physical elements, along with the light distribution of

Figure 74 – Map of lighting recommendations (Carlsbad Village Drive)

the selected luminaire. The goal is to create a rhythm of glowing pedestrian-scale luminaires that bring the lighting effects down to a human scale, adding focal glow and aiding in facial recognition.

The strap-mounted uplights attached to the ficus nitida trees between Roosevelt Street and State Street should be removed, as the straps are not adjustable to allow the tree trunks to grow naturally. Instead, ground-mounted uplighting should be installed in the planting strips adjacent to each tree. The goal is to uplight into and through the branches, to allow the beauty of these mature trees to be evident at night. In addition, there are trees between Washington Street and Carlsbad Boulevard that do not currently have strap-mounted lighting but that will benefit from uplights.

A minimum of two lights per tree is recommended. Figures 56, 57 and 58 show a section and plan views of where the luminaires should be installed relative to the trees, as well as recommended beam spreads for appropriate lighting coverage.

Because many of these trees are established and mature, an arborist should be consulted to assist in determining where it is safe to locate fixtures without damaging the tree roots.

Finally, the medians in the center of Grand Avenue between Roosevelt Street and Carlsbad Boulevard contain established trees with beautiful branch structures, along with assorted shrubbery. Ground-mounted uplighting should be installed in the medians, with a minimum of two lights per tree. Placing uplights in the medians will increase vertical illuminance and bounce light, highlighting the tree canopies with a focal glow and making travelling on Grand Avenue into an enjoyable and pleasant experience.

Along the sidewalks of both sides of Grand Avenue between Carlsbad Boulevard and Garfield Street are mature palm trees that should be uplit as well. Refer to Figures 61 and 62 earlier in this chapter that show a section and plan view of where the luminaires should be installed relative to the palm trees, as well as recommended beam spreads for appropriate lighting coverage.

The Master Plan designates Grand Avenue as an area that has high potential for becoming even more pedestrian-friendly and suggests that changing it to a promenade or shared vehicular-pedestrian space, including potentially removing some curbs, will encourage that development. Its Key Village Recommendations, item H, states, “Make Grand Avenue a signature space by converting half the street into a pedestrian promenade” [1]. If the changes to the street and sidewalk configurations are made to accommodate the reclassification as a promenade or shared space, the tree uplighting should be installed as part of that process.

As mentioned in Chapter 3 Existing Conditions, the intersection of Grand Avenue and State Street boasts a fountain at its northwest corner. The existing lighting integral to the fountain should be replaced with new LED versions to illuminate the moving water and add an element of sparkle to the hierarchy of lighting. The products shown in Figures 75 and 76 are representative of the type of luminaire that

Figure 75 – Submersible fountain light option – niche mounted

Figure 76 – Submersible fountain light option – base mounted

will be needed. A final fixture selection will be dependent on verification of what is currently installed, for physical reasons.

The Master Plan identifies this intersection in its Key Village Recommendations to consider, item K: "Create a new civic space at the corner of Grand Avenue and State Street; energize the space through conversion of the adjacent building into an attractive and active use" [1]. Re-habilitating the fountain lighting supports this Master Plan recommendation by creating a focal point of the existing plaza that will draw people in.

Figure 77 shows the lighting recommendations for Grand Avenue on a keyed map.

State Street

For many, State Street is considered "the heart of Carlsbad Village" [3] between Carlsbad Village Drive and Grand Avenue. The existing tree-wrapped twinkle lights in this block augment the feeling of festivity and conviviality that is found in this lively center. Its daytime and night time market ambience is enhanced by its sidewalk and curb restaurant seating.

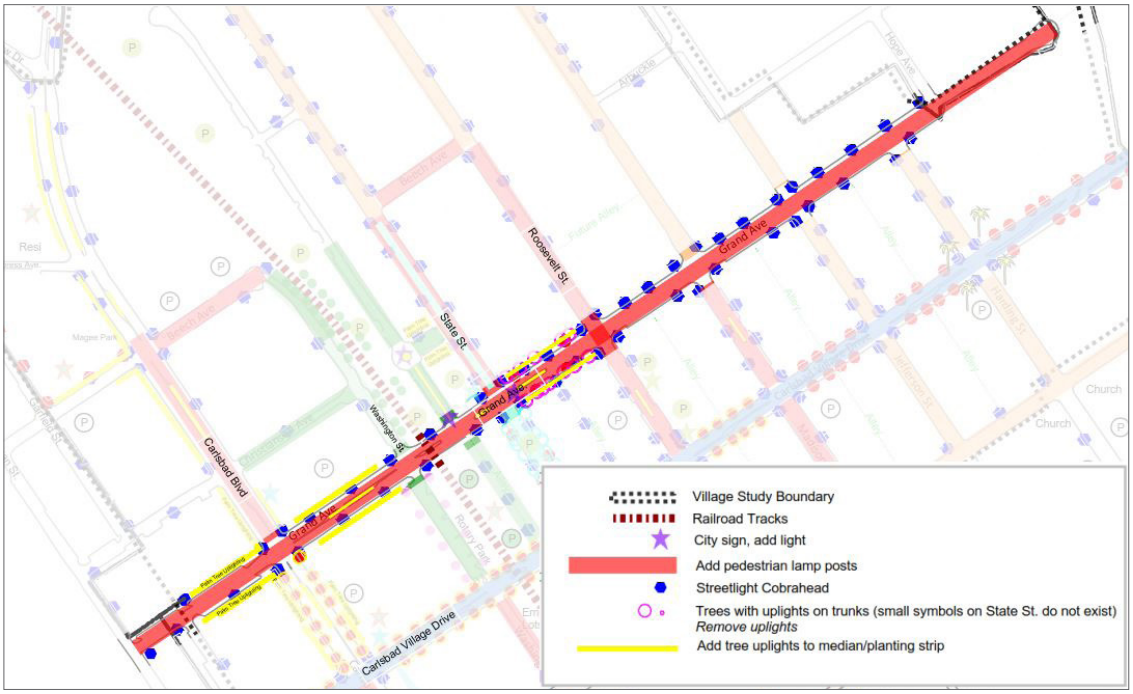


Figure 77 – Map of Lighting Recommendations (Grand Avenue)

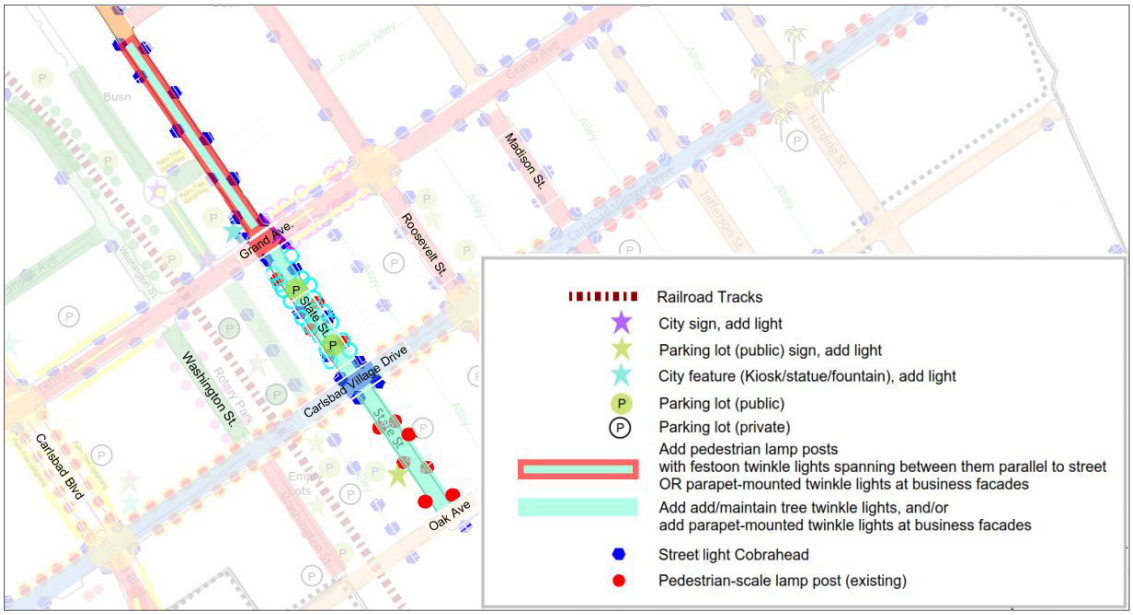


Figure 78 – Map of lighting recommendations (State Street)

Spreading the sparkle of the twinkle lights to the adjacent blocks north of Grand Avenue to Beech Street, and south of Carlsbad Village Drive to Oak Avenue, will create a distinct "State Street" feeling and further reinforce the hierarchy of lighting that will be established throughout the Village as a whole. Refer to Figure 78 for the map of recommendations for State Street.

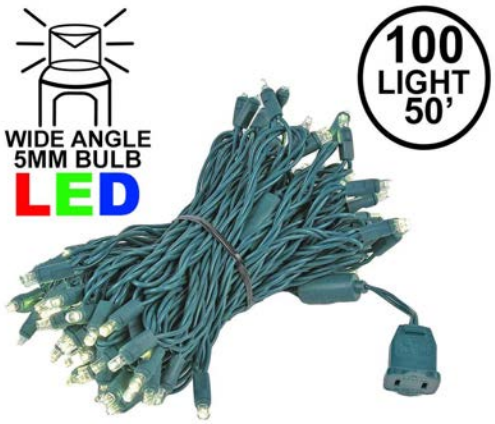


Figure 79 – Residential-grade twinkle lights currently used on State Street

Figure 80 – Commercial-grade twinkle lights for trees

State Street Recommendations

Carlsbad Village Drive to Grand Avenue

The existing incandescent twinkle lights on the ficus nitida trees in the block of State Street between Carlsbad Village Drive and Grand Avenue, shown in Chapter 3 Existing Conditions Figure 24, are beloved by city residents and visitors but require significant year-round maintenance. It is recommended that the residential-grade twinkle lights (Figure 79) be replaced with commercial-grade LED twinkle lights in 2700K color temperature, to increase the

life expectancy and reduce the time required for maintenance. Refer to Figure 80 for an image of a commercial-grade twinkle light. Additionally, the city can consider outsourcing the installation and maintenance of these twinkle lights to a company that specializes in such tasks, allowing city facilities staff to focus their efforts elsewhere if it makes financial sense.

Grand Avenue North to Beech Avenue

City-standard LED pedestrian lamp posts should also be added on both sides of the street on State Street in the block north from Grand Avenue to Beech Avenue. They should be on a spacing module that puts them between the street lights and that achieves the recommended light levels defined in IES RP-8. The LED twinkle lights should be extended to this block and can span the distance between these lamp posts, running parallel to the street as in Figure 81, or as an alternate, they can be mounted to the roofline of the adjacent businesses, as in Figure 82. Mounting these lights to business rooflines will require coordination with and approval from each business owner. The goal of adding these lights is to visually and experientially connect the northern and southern blocks of State Street with its central block.

When twinkle lights are used in a roofline-mounted or catenary cable-mounted configuration, it is preferable to have a more robust construction consisting of thicker sockets and clear polycarbonate protective globes. As an added benefit, the use of clear globes increases the visible size of the illuminated area without either causing glare or reducing sparkle. Most of the buildings in the Village are single-story in height. For buildings of this size, and up to

Figure 81 – Twinkle lights parallel to street (Santa Cruz, CA - Google 360 photo by Daniel Lanovaz)

Figure 82 – Roofline-mounted twinkle lights (Google image search)

two stories high, LED lamp spacing that is 12” to 18” on center, and maximum 1.5w in output, is recommended. For buildings that are three stories or taller, a greater on-center spacing of 18” to 24” can be employed. Twinkle lights should be 2700K color temperature, with clear globes for the preferred effect. An example of a luminaire of this type is shown in Figure 83.

Carlsbad Village Drive to Oak Avenue

In the block south from Carlsbad Village Drive to Oak Avenue, city-standard LED pedestrian lamp posts already exist. However, additional lamp posts should be added to each side of the street with the goal being that each lamp post should be within 30’ to 50’ of the next closest

Figure 83 – Commercial-grade twinkle lights with globes, for catenary or roofline mounting

lamp post. The LED twinkle lights can then be extended on State Street in the block south from Carlsbad Village Drive to Oak Avenue. This block is fronted primarily by parking lots, and what building façades are there are inappropriate for roofline-mounted lighting; as well, there are a couple of private residences. To that end, installing LED twinkle lights parallel to the street and mounted to the LED pedestrian lamp posts is the recommended course of action, similar to that shown in Figure 81. Finally, lighting should be added to the city parking lot sign. Refer to the section earlier in this chapter for a discussion on city signage lighting.

4.1.1 Key Intersections

To further enhance the sense of place embodied by the Village streetscapes, key intersections can be selected, and highlighted with special treatments. These special treatments will confer a placemaking characteristic to the intersection, engaging the community and delighting the tourists, by adding a play of brilliants to the hierarchy of lighting. They will make the intersections become destinations, each with its own identity, and also assist with wayfinding for visitors to the city. There are several ways to highlight key intersections; a few are mentioned here, but likely there are even more possibilities. Three intersections from the I-5 freeway to the ocean along Carlsbad Village Drive, and two

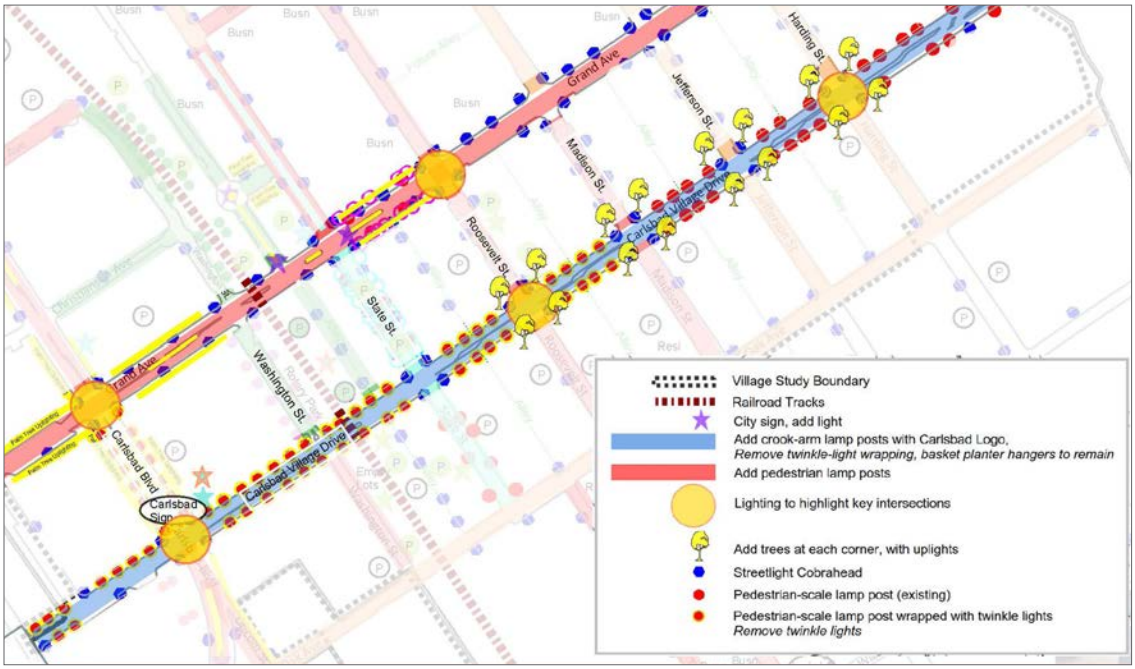


Figure 84 – Map of lighting recommendations (Key Intersections)

Figure 85 – Catenary Cable-mounted lighting example, night time, Tacoma, WA (photo credit: Lauren Hoogkamer)

Figure 87 – Catenary Cable-mounted Lighting example with color as primary feature, daytime (D Street Corridor, Boston, MA)

Figure 86 – Catenary Cable-mounted Lighting example with color as primary feature, night time (D Street Corridor, Boston, MA)

Figure 88 – Catenary Cable-mounted Lighting with color/logo as primary feature (Bourke Street Mall, Melbourne, Australia)

intersections along Grand Avenue, are identified as key intersections suitable for such treatment. Each of the five intersections, highlighted in the keyed map in Figure 84 are described in the following sections.

In addition, there are opportunities to augment the lighting on Carlsbad Village Drive by adding new trees at four select intersections, Key Intersections selected for specialty lighting treatment: Harding Street, Jefferson Street, Madison Street and Roosevelt Street. The trees should be lit from uplights at their bases to provide an enhanced entry experience to and from Carlsbad Village. The concept sketches shown in Figures 89, 90, 91 and 92 indicate one to two new trees at each corner. On those corners where only one tree is indicated, this is due to the presence of an existing large tree in close proximity to the corner (typically a Ficus tree).

Carlsbad Village Drive and Harding Street

This is the first major intersection along Carlsbad Village Drive after vehicles exit the I-5 freeway. It is currently bounded by a fast-food restaurant, a gas station, a parking lot, and a retail store, with tall poles supporting both a street light and traffic signals on each corner,

Figure 89 –Trees at Carlsbad Village Drive and Harding Street

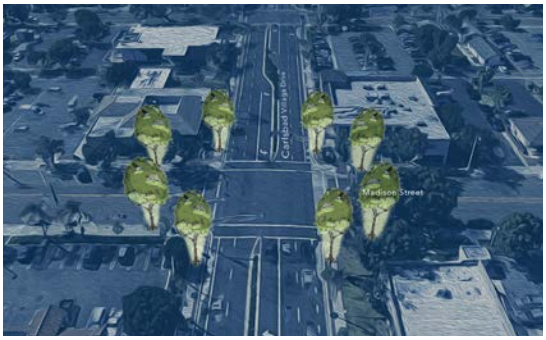


Figure 91 – Trees at Carlsbad Village Drive and Madison Street

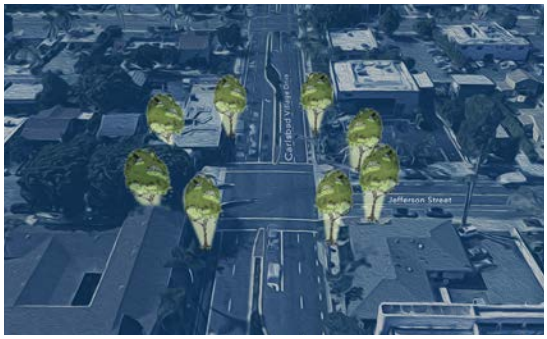


Figure 90 – Trees at Carlsbad Village Drive and Jefferson Street

Figure 92 – Trees at Carlsbad Village Drive and Roosevelt Street

and as such it is a blank canvas for special treatment. Both segments of Carlsbad Village Drive at this intersection have tidy, planted medians, and all adjacent sidewalks have brick-laid edging with a variety of well-spaced, medium-sized and healthy street trees. These existing elements can be worked into a special lighting treatment consisting of catenary cables with decorative luminaires suspended from them, perhaps with the Carlsbad logo or signature color worked into the design. The existing street lights can potentially be modified with an extension from the top of the pole, to allow for mechanical and electrical connection of the catenary cable lighting. Although the poles are likely to be able to carry the additional load, a detailed review by a qualified Structural Engineer will be required to confirm that assumption. As an alternate, less preferred option, new poles can be added. Finally, any element that spans the intersection will need to be held 17’ above the ground to allow for safe passage of utility trucks and buses.

Night time and/or daytime examples of several applications of such lighting, less the logo option, are shown in Figures 85, 86, 87 and 88. Because of the existence of four street lights at this intersection, the catenary cable-mounted lighting can be purely decorative; it will not be necessary to augment the illuminance levels at the street, but rather merely to add an

element of beauty and significance to this key intersection.

In addition to adding decorative lighting at this key intersection, adding eight trees to its four corners will establish the "small town beach community" theme at the first major Village intersection off I-5. Uplighting for these trees should also be included; refer to Figure 89 for an image.

Carlsbad Village Drive and Jefferson Street

The intersection of Carlsbad Village Drive and Jefferson Street should have seven new trees added, with uplighting, as shown in Figure 90.

Carlsbad Village Drive and Madison Street

The intersection of Carlsbad Village Drive and Madison Street should have six new trees added, with uplighting, as shown in Figure 91.

Carlsbad Village Drive and Roosevelt Street

The intersection of Roosevelt Street is similar in layout to that of the intersection of Harding Street in terms of sidewalks, medians, plantings, street trees, and street lighting. Its four corners are anchored by a parking lot, a bank, a restaurant, and a set of small shops. Roosevelt Street is almost the midpoint of Carlsbad Village Drive, and as such is perfectly situated to be treated as a key intersection. Catenary cable lighting of a decorative nature and five new trees should be added here. Refer to Figure 92 for an image of the tree layout at this intersection, and Figures 85, 86, 87 and 88 for representations of catenary cable lighting.

Carlsbad Village Drive and Carlsbad Boulevard

The intersection with Carlsbad Boulevard is a tourist must-see because it is the location of the Carlsbad landmark sign. Each of the intersection's four corners, connected via pedestrian scramble, are anchored by retail stores, and its northwest corner features a sidewalk-integrated mosaic tile art piece called "Bird of Paradise" (1989, by James Hubbell). With the already energetic atmosphere at this intersection and recognizing that the overhead Carlsbad sign should remain the focal point, lighting this key intersection can take the form of projected patterns on the walking surfaces. These patterns can be projected from weatherproof luminaires attached to the existing street light poles at a minimum of 20' above grade and aimed down onto the sidewalks and the pedestrian scramble, to guide the way with interesting color and pattern. If desired, controls can allow the pedestrian scramble to be illuminated when the signal to walk is given. Not to be overlooked is the fact that the "Bird of Paradise" sidewalk mosaic is not currently lit, so adding these lights from above will provide an opportunity also to illuminate and celebrate the existing artwork. There are a wide variety of patterns (light-blocking templates called gobos) that can be projected: geometric designs, words, or amorphous blobs are possibilities, to name a few. And given the nature of luminaires such as these, changing the patterns and colors seasonally will be reasonable. The images in Figures 93, 94 and 95 represent a small sample of the variety of patterns that are available, but images evoking water are preferred.

4.1.2 Train Station / Theatre Area

The Theatre / Train Station Area is a sub-area, of the Village Center District, that for the purposes of the area thematic lighting encompasses the Carlsbad Village Station, the two community Theatres, the historic Santa Fe Train Depot (home to the Visitors' Center), and Rotary Park. Early in the settlement of western cities and towns, the establishment of a train station meant a connection with the rest of the country and perhaps some assurance of continued prosperity and relevance for a burgeoning town. Although train travel is no longer the primary means of transit for residents and visitors, the Carlsbad Village Station still serves as a transportation hub for coastal travelers, for both train and bus transit. Because the Village's two theatres and the State Street shopping area are less than a block away from the station, a natural pedestrian link is formed that can be reinforced by decorative lighting connecting one to the other.

The Village Station already has a distinct pedestrian lamp post in use with its bell-shaped luminaires. A distinct form is appropriate for this area but a new luminaire is preferable to a retrofit component. The luminaire and pole assemblies are approximately 25 years old and being in a marine environment have exceeded their expected life. Earlier in this chapter some options for complete replacement are presented.

Changing the bell-shaped luminaire and pole and adding more of the new assemblies throughout this district will shift the lighting from vehicle-oriented to pedestrian oriented.

Figure 93 – Geometric pattern projection (Ishoj Station, Denmark)

Figure 94 – Words projected as a pattern onto sidewalks (Poland)

Figure 95 – Amorphous patterns projected onto sidewalks (Rotterdam, Netherlands)

Further, adding uplighting to the existing palm trees and lighting to the signage will add focal glow and provide increased ease of wayfinding.

Figure 96 – Map of lighting recommendations (Train Station / Theatre Area)

An enlarged map of the recommendations for this area is shown in Figure 96.

Washington Street and Christiansen Avenue

Placing luminaires that match those at the train station into the surrounding blocks will help to create a bread-crumb trail of sorts that leads people away from the station and into the heart of the Village, and likewise leads them back to the station at the end of their visiting time. The buses that stop at the station do so along Washington Street at Christiansen Avenue. The dual-head bell-shaped lamp posts already exist along a portion of Washington Street between Grand Avenue and Beech Avenue, and these should be replaced with the new bell-shaped luminaires described for this area. Figure 97 is an image of this area. Also, new bell-shaped lamp posts should be added along Washington Street north to Beech Avenue, from about the midpoint between it and Christiansen Avenue, where there are none currently.

Figure 97 – Image of Washington Street at Christiansen Avenue

Washington Street between Grand Avenue and Carlsbad Village Drive

Extending the bell-shaped lamp posts between Grand Avenue and Carlsbad Village Drive (near Rotary Park) will begin the re-connection of the original Historic Santa Fe Depot that served Carlsbad in the late 1880s, to its contemporary counterpart. The existing concrete lamp posts with refractor acorn luminaires and HPS lamps should be removed and replaced with Train Station lamp posts to match the others described for this area. The concrete poles can be reserved for future use around the Village.

Figure 98 – Sign at Entry from Grand Avenue (image credit Google Maps Streetview)

Figure 99 – Historic Santa Fe Depot in alley parallel to Washington Street

Alley Parallel to Washington Street

The main entrance to Carlsbad Village Station is off an alley that runs between Washington Street and State Street. This alley starts near the 2500 block of State Street, at the backside of relatively new condominiums, and runs south to Grand Avenue. This alley mainly serves the parking for the Village Station and also provides one of the two main vehicular entrances to the station: at Grand Avenue, and at the Christiansen Avenue spur between it, and State Street. The portion of this alley between Beech Avenue and its Grand Avenue terminus should be populated with Train Station lamp posts spaced between 40' and 50' on center. As well, new bell-shaped lamp posts should be added to the adjacent parking lots on both sides of the Historic Depot, to complete the Train Station / Theatre Area. At the main entry from Grand Avenue, the Carlsbad Village Station sign that is in the median should be illuminated, as should the existing palm trees also in the median planter. Figure 98 shows an image of the median sign at the entry from Grand Avenue.

There is a portion of this alley south of Grand Avenue that connects to the original Historic Santa Fe Depot (see Figure 99). That historic building is entered from the alley, and so the Train Station lamp posts should continue for this block, to visually connect it to the Train Station. All existing street lighting in this alley should have the city standard LED replacement light engines installed into the luminaires, and Train Station lamp posts should be added to the parking lot, which is currently unlit. Refer to Alley recommendations in Chapter 6 for additional recommendations.

Christiansen Avenue Spur

The easternmost portion of Christiansen Avenue is a small spur from State Street west to a roundabout that is the second entrance to the Village Station. Train Station lamp posts should be added to this spur, and the existing palm trees that flank the street should be uplit.

The Carlsbad Village Station sign in the central planter of the roundabout should be illuminated, as should the existing palm trees in the same location (see Figure 100 for an image of

Figure 100 – Entry sign at Christiansen Avenue roundabout (image credit Google Maps Streetview)

this planter). Metal halide signage lighting exists currently, so circuiting is in place to accomplish this. If this sign and its lighting is under the jurisdiction of the North County Transit District agency, then the city and the NCTD should collaborate on replacement luminaires. Refer to the section earlier in this chapter for a discussion on city signage lighting.

4.2 HOSPITALITY DISTRICT

The Hospitality District is identified in the Master Plan as a transitional area "between the beach and the heart of the Village". This area primarily serves visitors with its ground floor commercial businesses, but also contains residential buildings, the Army and Navy Academy, historic St. Michael by the Sea church, the Carlsbad Alkaline Water retail store and nearby statue, a retirement community and Village Faire. Installing decorative lighting to enhance this district's sophisticated assemblage of architecture and landscaping will reinforce the elegance of the Hospitality District. Right now, the block between Carlsbad Village Drive and Grand Avenue is the most well-lit, with lighting that caters to the pedestrian. In other areas along Carlsbad Boulevard, the lighting is mainly geared towards the benefit of the vehicular traffic and not pedestrians. These recommendations augment the elegance that is found in a small portion of this district by adding uplighting to existing trees and extending pedestrian lamp posts across much of the remainder of the district. See Figure 101 for a map of the recommendations for the Hospitality District.

Carlsbad Boulevard

The Master Plan includes the Tamarack Beach Resort, on Carlsbad Boulevard between Walnut Avenue and Pine Avenue as part of the Hospitality District. Carlsbad Boulevard is a major 4-lane divided highway up until this point. The median in front of the Tamarack Beach Resort is a prime location for an illuminated sculpture that marks the southernmost entry point to the Village. This is envisioned as becoming a beacon similar wow factor to that of the "Coastal Helix" sculpture (2014, by Roger White Stoller) at the roundabout intersection of State Street and Carlsbad Boulevard, at the northernmost entry point.

At the intersection of Pine Avenue, the median is home to several large trees and they should be uplit . These trees continue in the median up until Oak Avenue. Entryway signs, such as at Oak Avenue's "Village of Carlsbad" stone plinth, should be illuminated, as well as the trees in that median. This portion of Carlsbad Boulevard joins with Lincoln Street at the east. There are trees in planting strips along the last portion of Lincoln Street, extending to Carlsbad Village

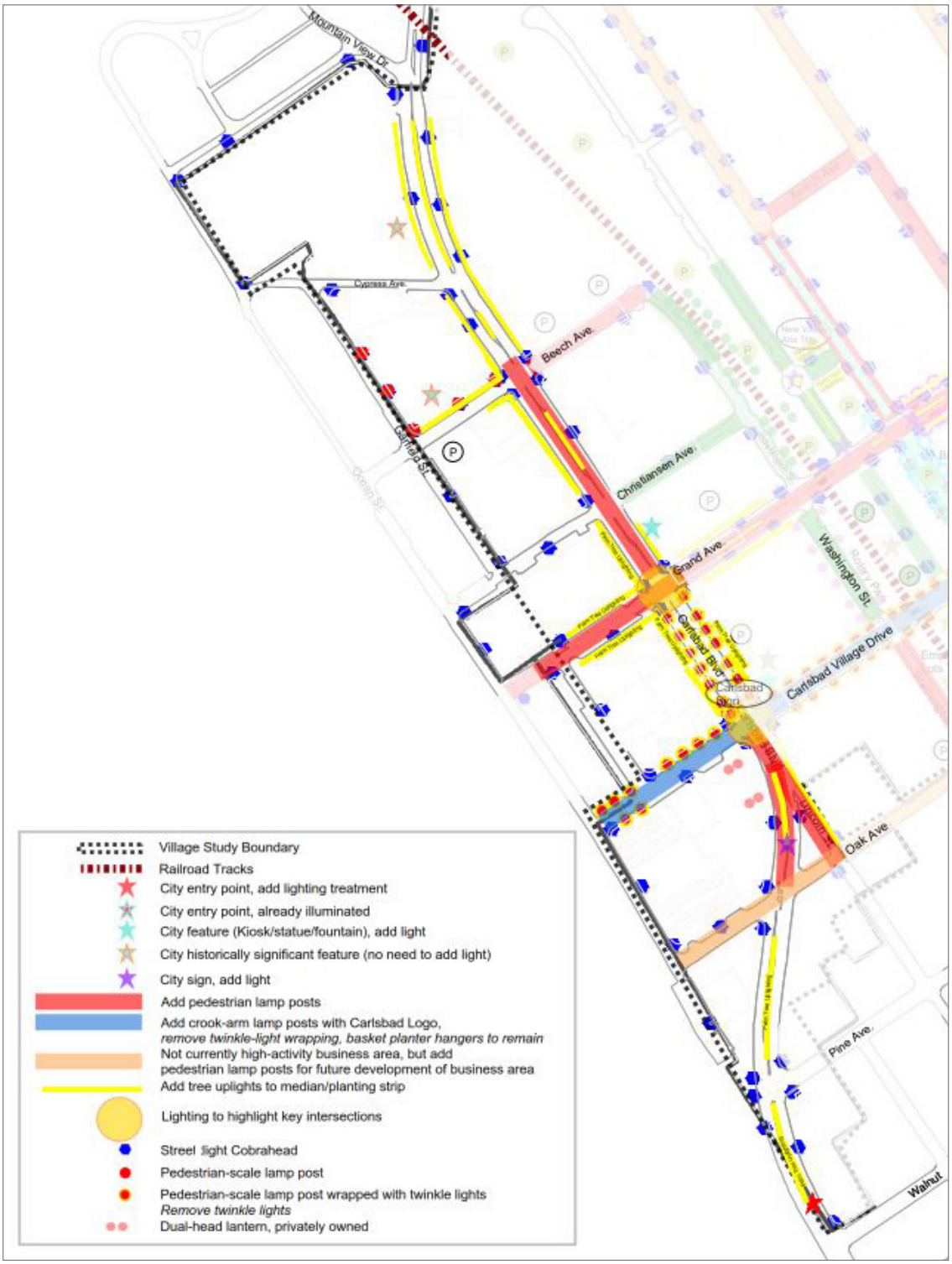


Figure 101 – Map of lighting recommendations (Hospitality District)

Figure 102 – Map showing location of recommended "beacon", existing sign to be illuminated, and blocks from Oak Avenue to Grand Avenue

Drive that should be uplit as well.

Between Carlsbad Village Drive and Grand Avenue, the twinkle lights wrapping the existing LED pedestrian poles should be removed. The effect of these twinkle lights, being of little density compared to the other lighting in the area, is imperceptible. Instead, the mature palm trees on both sides of the street should be uplit. At the intersection with Grand Avenue, the palm trees continue west; and so should the uplighting. Figure 102 is an enlarged recommendation map of these portions of Carlsbad Village Drive.

Between Grand Avenue and Christiansen Avenue, there are existing palm trees in front of the Carlsbad by the Sea Retirement Community with existing uplights that have insufficient output. These uplights should be replaced, and uplighting should also be added to the trees on the east side of the street, in front of the Carlsbad Alkaline Water building. Accent lighting should be added to the Carlsbad Alkaline Water self-serve kiosk and the Captain John Frazier statue that exists nearby. As well, the city standard LED pedestrian lamp posts do not exist in this block and should be added on a spacing module that puts them in between trees.

Between Christiansen Avenue and Beech Avenue, city standard LED pedestrian lamp posts should be added to encourage pedestrian

activity in this block, which contains retail stores on the east side of the street and the historic St. Michael by the Sea Church on the west side. Additionally, trees in the median and on the west side of the street in front of the church should be uplit, as should the trees along the north side of Beech Avenue, in front of Magee Park and the Carlsbad Historical Society. Figure 103 is an enlarged recommendation map of these portions of Carlsbad Boulevard.

In the remaining northern blocks of Carlsbad Boulevard, tree uplighting should be added both to the medians and to the planting strips on the east and west sides of the street up until Mountain View Drive. Because these blocks comprise properties of the Army and Navy Academy, and these blocks are geared more

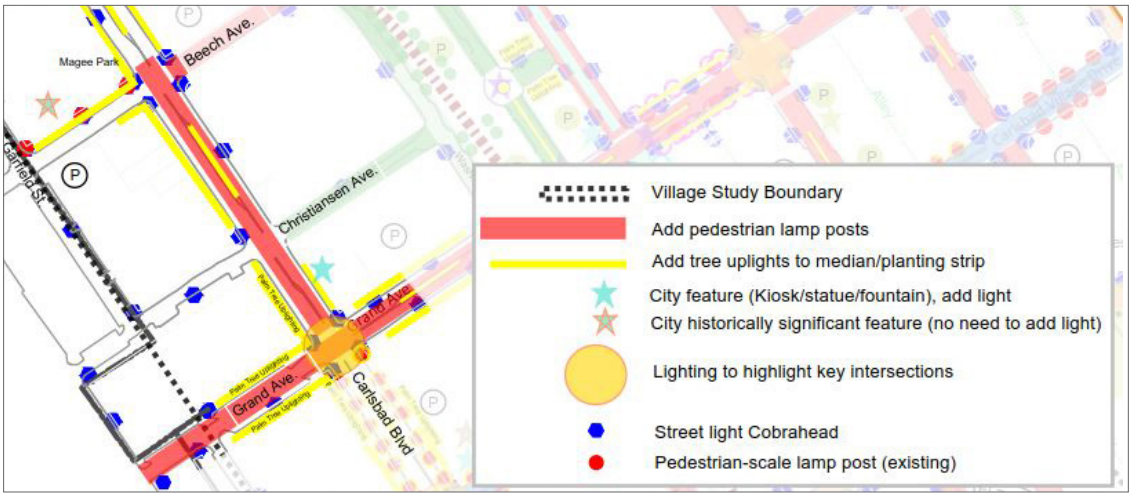


Figure 103 – Map of lighting recommendations (Carlsbad Boulevard and Grand Avenue to Beech Avenue)

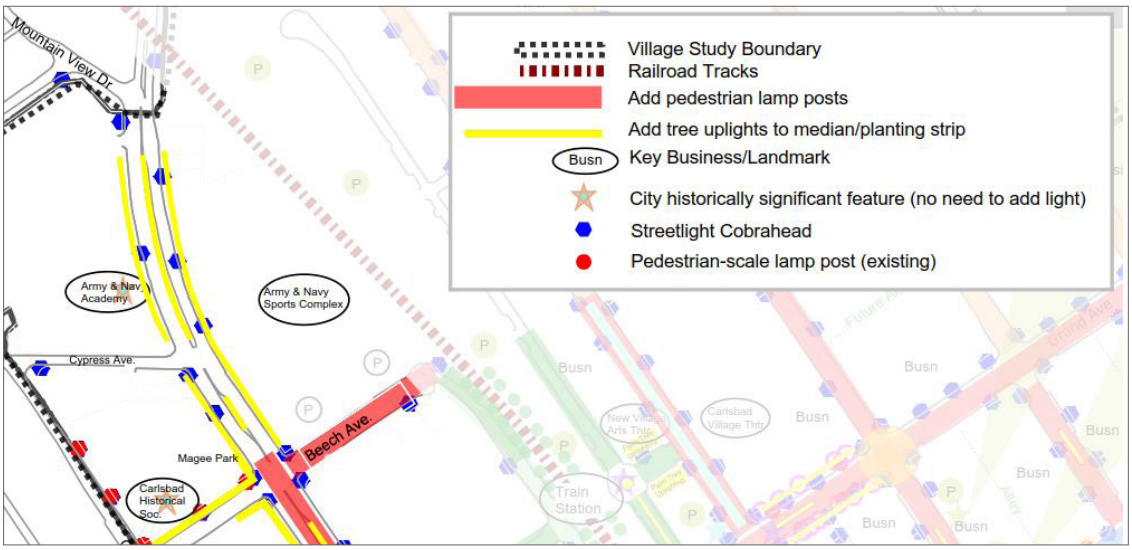


Figure 104 – Map of lighting recommendations (Carlsbad Boulevard, north of Beech Avenue)

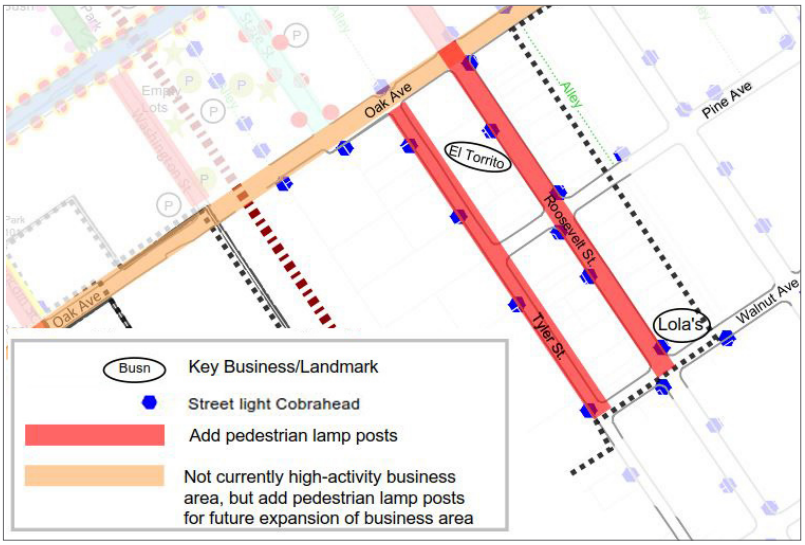


Figure 105 – Map of lighting recommendations (Pine-Tyler Mixed Use District)

for vehicular traffic than for foot traffic, adding pedestrian lamp posts is not recommended under the scope of this report. Figure 104 is an enlarged recommendation map of these portions of Carlsbad Boulevard.

4.3 PINE-TYLER MIXED USE DISTRICT

The Pine-Tyler Mixed Use District is a concept from the Master Plan that envisions a future of burgeoning start-up businesses, artists' live/work units, breweries, dance studios, and the like. The Pine-Tyler mixed use district establishes the connection between the Village and the Barrio, with Lola's Market as the gateway. As it stands now, a mixture of light industrial and residential properties with cobrahead street lights only, its importance as a transitional area can be amplified by the addition of decorative pedestrian lamp post lighting, bringing the lighting down to a human level and adding focal glow. Figure 105 shows a map of the recommendations for the Pine-Tyler Mixed Use District.

Roosevelt Street from Oak Avenue to Walnut Avenue

Install city-standard LED pedestrian lamp posts on both sides of this street, 30' to 50' on center, as existing conditions allow.

Tyler Street from Oak Avenue to Walnut Avenue

Install city-standard LED pedestrian lamp posts on both sides of this street, 30' to 50' on center, as existing conditions allow.

4.4 SECONDARY DRIVES, AVENUES AND STREETS

These streets comprise areas that are mainly residential, as shown on the two maps in Figures 106 and 107. They are within the Village boundary lines, and the recommendations to add city standard LED pedestrian lamp posts or not is largely a factor of whether these streets will eventually contain businesses that might be nighttime-oriented such as restaurants, instead of daytime businesses such as real estate offices

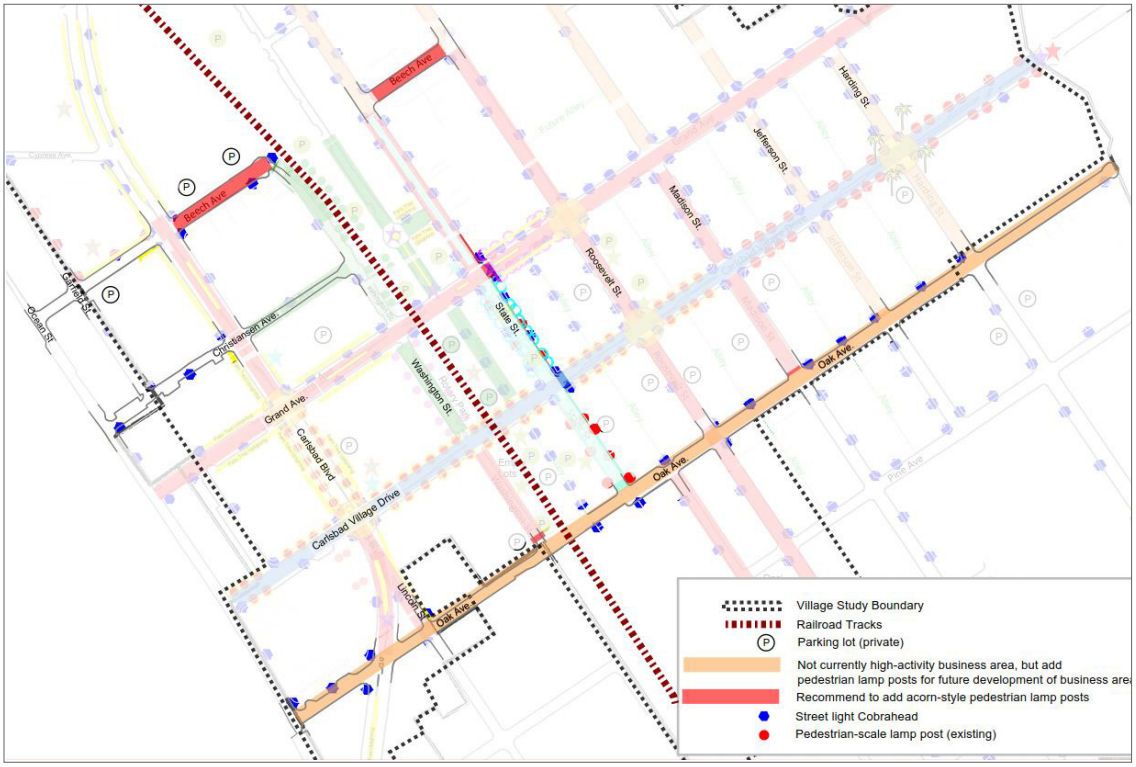


Figure 106 – Map of lighting recommendations (secondary east-west running drives and avenues)

or auto repair shops, and private residences.

Oak Avenue

A good portion of Oak Avenue comprises the border between Carlsbad Village and the Barrio. As properties are redeveloped, city-standard LED pedestrian lamp posts should be added on both sides of this street, 30’ to 50’ on center as existing conditions allow.

Christiansen Avenue

The portion of Christiansen Avenue that is not designated as part of the Train Station District runs from Carlsbad Boulevard west to Ocean Street and is just one block containing a church and residences. No decorative pedestrian lighting is recommended for this area in order to preserve its quiet nature.

Beech Avenue

Beech Avenue constitutes many of the endpoints for the primary north-south streets in Carlsbad Village. As well, it contains some residential properties that can see increased foot traffic into the center of the Village. For that reason, pedestrian lamp posts are recommended to be added to these portions of Beech Avenue.

Harding Street

Harding Street is a quiet street without many shops, but it leads to the Harding Community Center and the Pine Avenue Community and Park in the Barrio and as such is a likely pedestrian travel path. Decorative city-standard LED pedestrian lamp posts should be added from Grand Avenue at the north end, down to Oak Avenue at the south end.

Figure 107 – Map of lighting recommendations (secondary north-south running streets)

Jefferson Street

Similar to Harding Street, Jefferson Street also leads to the Pine Avenue Community Center and Park. City-standard LED pedestrian lamp posts should be added from Grand Avenue at the north end, to Oak Avenue at the south end, as adjacent properties are redeveloped.

Madison Street

The two blocks of Madison Street between Grand Avenue and Oak Avenue will also benefit from the addition of city-standard LED lamp posts which should be added on a 30’ to 50 on-center spacing. The median that exists between Carlsbad Village Drive and Grand Avenue has trees worthy of uplighting. The blocks north of Grand Avenue, to Laguna Drive, should be targeted for city-standard LED lamp posts at such time as the area is redeveloped. Refer to previous sections in this chapter for discussion and diagrams regarding tree uplighting.

Roosevelt Street

Part of Roosevelt Street is contained within the

Pine-Tyler Mixed Use District, but it extends up to Laguna Drive. The secondary blocks between Oak Avenue and Beech Avenue should receive city-standard LED lamp posts on 30' to 50' spacing, on both sides of the street as existing conditions allow. The median on Roosevelt Street contains some street trees which should be uplit. Refer to the section earlier in this chapter for tree uplighting guidelines. There are two city parking lot signs in this block which should have lighting added to them. Refer to previous sections in this chapter for discussion and diagrams regarding city signage lighting. For the northernmost portion between Beech Avenue and Laguna Drive, this stretch can remain as-is until the adjacent properties are redeveloped. Then, the city-standard LED lamp posts should be added on both sides of the street, on 30' to 50' centers.

Washington Street

Most of Washington Street is contained within the Train Station District, except one block between Carlsbad Village Drive and Oak Avenue. City-standard LED lamp posts should be added to this block on both sides of the street, to encourage pedestrians to use the city parking located here. As well, lighting should be added for the city parking lot signage, following the guidelines presented earlier in this chapter for city signage lighting.

5

5 | building façade lighting

As is discussed in Chapter 2 of this study, establishing a hierarchy of light will go a long way towards augmenting the Village's night time appearance. Businesses' building façades play an important role in the visual landscape at night, because the human eye perceives brightness on vertical surfaces first, before being drawn to any incident light on the ground. Reflected light greatly informs a human's understanding of the built environment by allowing us to see the shapes of the buildings, comprehend where the entries are, and read the signage that tells us what the business is offering.

The Village's building façades are currently lit with various techniques – some are illuminated uniformly, others are not illuminated at all or have spotty illumination. Although the city cannot mandate that businesses follow a prescriptive path for façade lighting, the following are parameters and attributes to consider that will improve the night time appearance of the city's streets. Not to discourage creativity, these recommendations may be implemented in a variety of ways and are designed to complement the recommendations set forth in the Master Plan. These recommendations comprise a guideline to be used by developers when they are designing or redesigning a building. City staff should use this guideline in their building permit review process. Doing so will, over time, create a cohesive look to the night time appearance of buildings throughout the Village.

In general, LED lighting at 2700-3000K (a warm color range similar in appearance to incandescent and halogen; refer to discussion in Chapter 2) should be used throughout, with a CRI of 80 or higher. Timeclock controls that turn the lights off after a designated hour should be utilized to maximize energy conservation, reduce long-term costs, and to protect the night skies and preserve human and animal circadian rhythms. San Diego Municipal Code, Chapter 14 and the San Diego County Code of Regulatory Ordinances both detail curfew times for lighting and should be consulted when determining what time non-essential lighting will be turned off.

Finally, IES RP-33 Lighting for Exterior Environments (RP-33) is an additional resource that can be useful as building owners consider their façade lighting, particularly if a lighting design professional is employed to assist in the effort. The principles outlined below are discussed at length and in great technical detail within the RP-33. The RP-33 is updated periodically and so the most recent version should be consulted.

Figure 108 – Successful accent lighting

Figure 110 – Successful storefront illumination (image A)

Figure 109 – Successful wallwashing

Figure 111 – Successful storefront illumination (image B)

5.1 ACCENT LIGHTING / WALL WASHING

Accent lighting and wallwashing are similar in that both are techniques used to highlight specific features of a building. They are different in that accent lighting implies an isolation of a feature, while wallwashing implies a uniformly lit surface. Both are acceptable ways to add brightness to façades, but care must be taken to ensure that the beams of light are appropriately aimed, that color consistency between different light fixtures is maintained, and that the contrast between the areas that are lit and the areas that are left dark is not too great, as too-great contrast will be distracting. An example of successful accent lighting is shown in Figure 108 and an example of successful wallwashing is shown in Figure 109.

Another valid way of brightening a façade is to consider storefront windows as the lighting source. In this case, lively displays with illumination from the front, or backlit, translucent displays such as window paintings will provide vertical illuminance while also advertising the business. See Figures 110 and 111 for successful examples of this technique.

5.2 SIGNAGE LIGHTING FOR PRIVATE BUILDINGS

Chapter 3 in the Master Plan discusses signs at length. For the variety of signs that are permitted to be installed on buildings, listed on page 3-2 of the Master Plan, appropriate

signage lighting techniques vary. If a sign is to be illuminated, then sign lights should complement the style and color of the sign and the business's particular aesthetic, have LED sources with a maximum color temperature of 3000K, a CRI of 80 or higher, and should be aimed downward whenever possible so as not to cause glare or light trespass into the night sky. The principles of successful accent lighting and wallwashing discussed above also apply to signage lighting.

5.3 DECORATIVE SCONCES

Decorative sconces are accessories to a building façade and their design aesthetic must be architecturally compatible with the building design. Sconces are a source of light that can complement the architecture by highlighting certain features. They can emit light upward, downward, or glow internally. Sconce lamp sources should be LED with a maximum 3000K color temperature and 80 CRI or higher. Glare is an important consideration and at no time should the LED source be visible. Additionally, if the design of the sconce is to emit a glow, it is important to evaluate the brightness of that glow in an on-site mock-up using a working luminaire sample to ensure it doesn't cause discomfort to anyone viewing it. Refer to the discussion and images in the section on Glare in Chapter 2 for additional information. Figures 112 and 113 show examples of different sconce lighting.

5.4 ROOFLINE LIGHTING

Twinkle lighting that follows the roofline of a building is a simple but effective way to create an atmosphere of festivity and energy. It is most effective when a long row of buildings installs

Figure 112 – Decorative sconces complementing a storefront, traditional aesthetic

Figure 113 – Decorative sconces complementing a storefront, modern aesthetic

Figure 114 – Roofline-mounted twinkle lights

this lighting, so that the scale of it can compete with the general busy-ness of street lighting and pedestrian lamp posts. Most of the buildings in the Village are single-story in height. For buildings of this size, LED lamp spacing that is

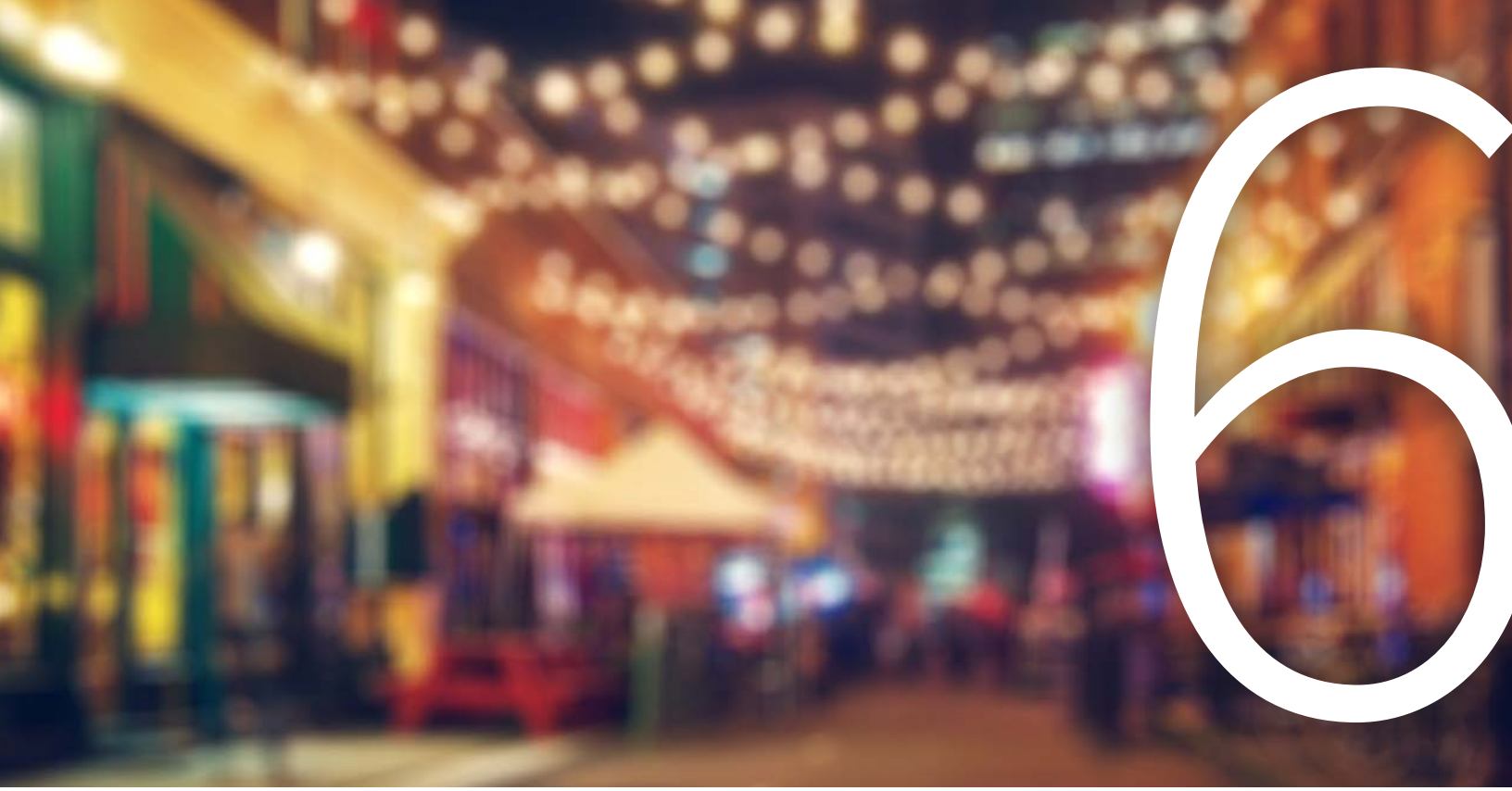
Figure 115 – Commercial-grade twinkle lights for roofline mounting

Figure 116 – Uniformly illuminated awnings and signage

12”-18” on center, and maximum 1.5w in output, is recommended. Twinkle lights should be 2700K color temperature, with clear globes for the preferred effect. Commercial-grade twinkle lights should be used instead of residential-grade “Christmas lights”. See Chapter 4 sections describing recommendations for State Street and Figure 114 for an example image. See Figure 115 for an image of an appropriate commercial-grade luminaire.

5.5 AWNING LIGHTING

While awnings and signage on awnings is allowed per the Master Plan, plasticized, vinyl or backlit awnings are to be avoided per the Master Plan p. 2-82. Lighting may be incorporated into the awning if it is for the purpose of downlighting onto the sidewalk. The tops of awnings may be lit from the building façades above, but lighting that uplights into an awning to create a glow effect is not allowed. When awnings are lit from above, light sources should be LED, 3000K color temperature and 80 CRI or higher. They should also be placed in such a manner as to create a uniformly lit surface without hot spots. Refer to Figure 116 for an example of awning lighting.



6 | alley lighting

Dark alleys engender a sense of foreboding that discourages walking at night. Therefore, lighting of the Village's alleys is a key component of furthering progress towards a pedestrian-friendly and welcoming area. In fact, the Master Plan chapter 2.8.2E3 states "ensure that alleys are well-lit, open, and visible to passersby" [3]. Each alley is unique and so there are no prescriptive lighting recommendations that are applicable to every situation. Instead, the recommendations below can be adapted for each individual circumstance as the business owners see fit. Any lighting attached to the building is to be installed and maintained by the building owner.

All new light sources should be LED, maximum 3000K and 80 CRI or higher. Ideally, non-essential lighting like wall sconces and bollards should be turned off after designated hours. Cobraheads may be left on, at a dimmed level (which is possible with 'smart lighting' technology, refer to Controls chapter 7.3) to discourage vandalism overnight. Additionally, poles with weatherproof gobo projectors such as was described in 4.1.1 Key Intersections, is another idea for creating interesting and engaging alleys, and can be installed on existing poles in the public right of way by the city, where appropriate. Figures 93, 94 and 95 show examples of this type of lighting.

At all times, 14'-0" clearances for delivery and city utility trucks must be maintained. This height restriction applies in parking lots and zero-lot-line alleyways. Reference the United States Department of Transportation Federal Highway Administration Vertical Clearances Requirements for additional mounting constraints. Wall mounted lighting that is

not immediately adjacent to a traffic area is generally more suitable at lower heights in the 8' to 10' range, depending on the architecture.

Following is a discussion of the relevant lighting recommendations along with example layout sketches. When building walls directly abut the drive path, it's important to illuminate the wall and the pavement. See Figure 117 for an example layout sketch. This allows for pedestrians to be seen by drivers, in addition to lighting the walking paths. Wall sconces that either complement the building architecture, or that are neutral in appearance, should be used. Some examples of typical luminaire options are shown in Figures 118, 119, 120 and 121. All new luminaires should be reviewed in mock up format, with working samples in situ, prior to selection, to ensure desired attributes are present.

When building walls are set back from the drive path, it allows space for parking, dumpsters, electrical service, and various other items of use to be situated. In some cases, parking lot lighting already exists. Existing lighting should be retrofitted with LED if possible. If area lighting does not currently exist, then pedestrian scale lamp posts, 12'-15' tall, should be installed at about 30'-50' on center. The style should be similar to the city standard lamp posts, since the businesses are likely to change over time. See Figure 122 for an example layout sketch.

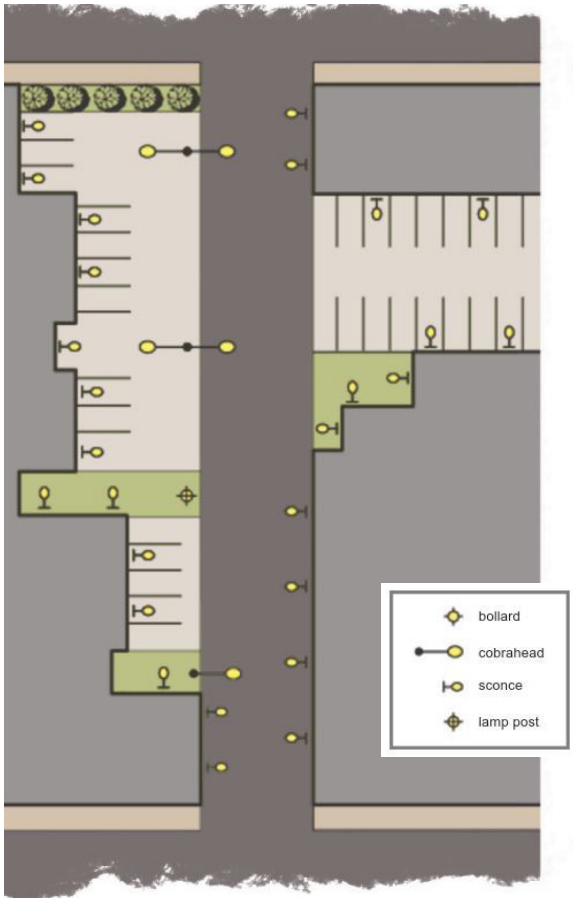


Figure 117 – Alley lighting when the building walls abut the drive path

Sometimes there are back-of-house entries to business establishments from the alley. In this

Figure 118 – Wall sconce with utilitarian aesthetic

Figure 119 – Wall sconce with modern aesthetic

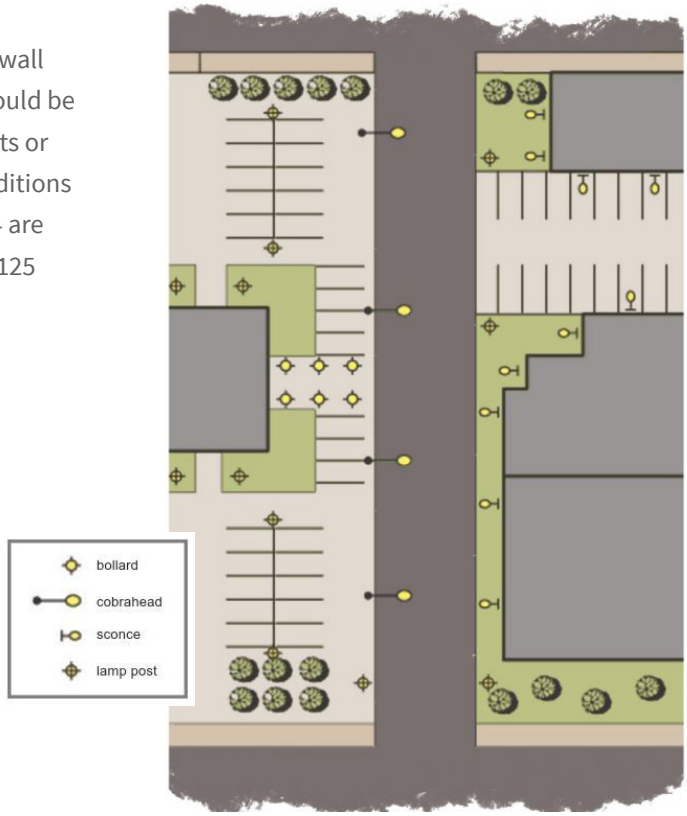
Figure 120 – Wall sconce with neutral aesthetic

Figure 121 – Wall sconce with neutral aesthetic

case, the door should be marked with a wall sconce, and the pathway to the alley should be lit either with pedestrian scale lamp posts or bollards, whichever fits the existing conditions more appropriately. Figures 123 and 124 are example bollard luminaires, and Figure 125 shows an example layout sketch.

Figure 123 – Bollard with traditional aesthetic

Figure 124 – Uniformly illuminated awnings and signage



ABOVE RIGHT:
Figure 122 – Alley lighting with pedestrian poles

BOTTOM RIGHT:
Figure 125 – Alley lighting with bollards for secondary entrances to businesses

7 | power and controls for added poles and luminaries

7.1 POWER

Obtaining power for the new pedestrian scale luminaires will depend on where they are located, who will be paying for the electricity, the time that they are supposed to operate, i.e.: dusk-to-dawn or dusk to a fixed shut-off time, and if there are needs for other power in the same area.

Street lighting, both intersections and mid-block post tops, are currently directly connected to SDG&E street circuits and are billed via a standard SDG&E, dusk-to-dawn, street lighting rate. These do not require a meter or additional controls other than a photocell on the luminaire. The standard street lighting rate is based on the luminaires running from dusk to dawn every day and is a calculated (non-metered) rate.

In addition, the City has negotiated an agreement with SDG&E for other dusk-to-dawn lights such as the twinkle lights on Carlsbad Village Drive and State Street to be added to this existing SDG&E rate system. Each location must be identified by street light and/or pole number, with location and device description and wattage in a contract table called "Exhibit A – Connected to LS2 Customer Owned Facility" which is part of the above agreement. Luminaires must be documented and may be added and removed from this system as needed. This rate is also non-metered and is calculated assuming the lights operate from dusk to dawn.

Art installations and gobo lights will typically require a meter pedestal as the luminaires may be non-standard and will not typically fit into a standard SDG&E rate. It should be noted that if these are installed near signalized intersections, there should already be a metered system for the traffic signals at that intersection that can be used. Receptacles can be installed high on poles near these intersections for seasonal holiday lighting as the meter pedestal will accommodate this.

Façade and building mounted alley lighting will have to be powered from the building that they are connected to for electrical code reasons. The energy that these lights utilize will be paid for by the building owner and/or the tenants in the building.

7.2 CONTROLS

Tree uplights should be controlled by dusk to a fixed time utilizing timers so that they can be shut off at a designated time such as midnight or 2AM depending on when businesses close on the street. This will allow some 'dark time' for the health benefit of the trees. At the time this study was done, the only way to accomplish this is to provide meter pedestals with built in controls on the block where these lights are

located. In the future, the 'smart lighting' nodes mentioned below may be able to control these without a meter pedestal.

Art installations should be shut off when the nearby businesses close. This can be accomplished within the nearby meter pedestal discussed above with photocell/timeclock controls.

Façade and building mounted alley lighting should be controlled by photocell/timeclock devices within or on the buildings to turn lights on at dusk and off or at reduced output when the business closes to minimize energy costs and reduce light pollution.

7.3 'SMART LIGHTING' CONTROLS & METERING

The city has started a process to replace its intersection and mid-block lighting with LED luminaires. As part of this upgrade, the City has purchased 'smart nodes' for some of these luminaires that are capable of controlling the luminaires and meter them each directly.

A fully operating control system can control each luminaire or device via a custom schedule, either timeclock or photocell based. The system can monitor the status of the luminaire for maintenance issues and can monitor the energy usage of the luminaire.

With on-board billing and controls, the energy savings by shutting off the decorative luminaires mentioned above at midnight or around the time businesses close can be realized. Depending on the timing, level of shutoff (complete or dimmed) and the load, savings can be significant. Building mounted lighting will still have to be connected to building service for controls and metering.

The 'smart' system can use a mesh node structure between luminaires with a gateway or direct cellular communications to a cloud-based server. For these services the city would contract with a vendor and arrange with SDG&E for automated billing for the energy used. When this system is operational, luminaires can be added, billing groups assigned, and control timing revised with software tools remotely via a desktop interface.

At the time this study is written, the control system has not been activated due to the small quantity of nodes that have been purchased. The currently installed nodes are operating as a local photocell only.

8 | maintenance

One of the keys to a successful lighting program is to provide high quality products that will withstand the harsh environments that the lighting products will experience outdoors. The Village area is close to the coast and will experience nightly coatings of moisture (dew) and potentially wind-blown, sea salt-laden moisture. Materials such as powder coated aluminum, stainless steel and composite housings for underground luminaires are appropriate and necessary to have a long-lasting system.

For State Street, where twinkle lights are proposed to wrap the trees, commercial grade products that are rated for long term sun exposure should be utilized. Since these products are at pedestrian level, this level of product will also provide more protection from passersby handling them.

Tree uplights and signage lighting should be in-grade and protected by concrete collars from pedestrians and landscape trimming equipment. Above grade luminaires may possibly be damaged by landscapers and/or pedestrians, so this is a consideration when selecting luminaires. It is sometimes appropriate for signage lighting to be above ground to achieve an appropriate lighting angle to the sign. Careful design can minimize potential damage as mentioned above.

9

9 | implementation phasing and financing

Traditionally, many California cities financed public street and pedestrian scale decorative lighting with re-development funding. When this source became unavailable, cities turned to other sources such as using general city funds, grants from SANDAG, CALTRANS, and other entities, separate lighting districts with taxing authority and Business Owner/Tenant Associations.

Cities that received grant funding often bundled lighting projects with other multi-modal infrastructure projects. Refer to the Case Studies in Attachment A for more information on how some similar sized cities have funded these efforts.

The Opinion of Probable Cost in the next section was developed showing potential phases of work. Timing for implementation of the recommendations will depend on availability of funds, analysis of investment impact for specific areas and further discussions with business owners and city staff.

10

10 | opinion of probable cost

An opinion of probable cost (OOPC) has been developed for this pedestrian lighting plan. Refer to Appendix E for details. This OOPC was only developed for lighting systems installed in the public right of way. Costs for building façade and alley lighting in the private realm can only be developed after discussions with the individual owners and tenants and detailed designs are conceived.

For areas that currently have in-ground distribution to street lighting, adding additional lighting to these systems from a load standpoint should not be a problem. These existing circuits were designed for traditional High Intensity Discharge (HID) systems that utilize two to three times more energy than current LED systems. Additional trenching to the nearest connection point will be required, but new circuits should not be necessary.

The pricing presented in Appendix E depends not just on unit prices and tariffs, but labor rates, demand and other fluctuations. The opinion presented is an estimate to give a framework for the overall project impacts.

Some manufacturers may be interested in direct negotiations with the City to obtain market share for their factories. This method can be explored at the time of project implementation.

11 | conclusion

When a city is beautiful to look at and comfortable to be in at night, people will want to spend time there, which in turn fosters economic growth. To date, there has not been a comprehensive lighting plan for Carlsbad Village. The lighting as it exists now is mainly functional: there are cobraheads to illuminate streets and intersections, and there are some decorative pedestrian-scale lamp posts to illuminate sidewalks along select streets.

Many of the existing street lights have aging technology and are not emitting enough light. Where they have been upgraded with LED, the illumination levels are better, but the fact remains that these luminaires are geared towards improving visibility for vehicular traffic and not for improving the pedestrian experience.

Case studies of nine cities of similar size as the Village were conducted, and the studies revealed that investment in decorative lighting can draw people into the cities and support, if not increase, their economic growth. Carlsbad Village can fold decorative lighting into their planning in the forms of adding pedestrian-scale lamp posts along the Village Center's major streets, increasing the amount of twinkle lighting along a select portion of State Street, upgrading and augmenting the use of the signature lamp post in the Train Station / Theatre area, and adding tree uplighting along Grand Avenue and within the Hospitality District.

Developing key intersections as a placemaking strategy, and supplementing these intersections with special lighting treatments, will create a sense of excitement among residents and visitors alike. Adding signage lighting for enhanced wayfinding within the Village and encouraging building owners to improve their façade lighting using the strategies laid out in this study will all contribute to enriching the visual fabric of the Village and make it a place where people will want to come and stay a while.

Adding pedestrian lamp posts in the Pine-Tyler Mixed Use District will allow businesses there to flourish and also support the connection between the Village and the Barrio. These steps can be implemented through phasing as discussed in the study, with the city determining the appropriate order according to where the best investment impact might be at any given moment.

Ultimately, controlling the decorative lighting so that it turns off after the businesses close will be a strategy that the city will want to implement as well, not only for saving energy but also for reducing the lighting impact on the night skies and the health of the humans, animals, and vegetation that inhabit the Village.

REFERENCES

[1] RRM Design Group, et al, ***"Village and Barrio Master Plan 2018,"*** 2018.

[2] J. Benya, ***"Outdoor Lighting: A Comprehensive Overview of Research Findings, Regulatory trends, and best Design Practices,"*** 2019.

[3] Carlsbad Village Association, ***"www.carlsbad-village.com,"*** 2019. [Online]. Available: www.carlsbad-village.com.

[4] Lighting Research Center, ***"Light Pollution Q&A,"*** 2007. [Online]. Available: https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/lightpollution/lightPollution.asp#.

appendix

APPENDIX A
CASE STUDIES

MIG conducted research on behalf of the City of Carlsbad, CA, to evaluate and compare how nine comparable downtowns have used lighting in the public right-of-way to make their downtowns more attractive to shoppers and pedestrians at night. The following summarizes the research for each city.

A.1 CITY OF CHULA VISTA

Interviewed: Patricia Ferman, Senior Landscape Architect

1. **What types of decorative lighting are in your downtown business district?:**
    - String lighting in trees
    - A weather proof J-box located under the tree grate for connection to low voltage twinkle lights has been provided at each street tree.
    - Festoon lighting between light standards - NO
    - String lighting on poles - NO
    - Façade lighting on buildings – Façade lighting on buildings is generally provided by the property owners. No additional façade lighting was provided as part of the Third Avenue Streetscape.
    - Up-lighting on trees – Up lighting is provided for palm trees at the street median and for accent trees at the bulbouts.
    - Other (please describe) - Street lighting is composed of Single (12' high) and double (20' high at bulbouts) ornamental lights with LED luminaires.
2. **When were these lighting improvements made?**
    - Phases I and II were completed in 2015-2016
3. **How were these lighting improvements funded?**
    - SANDAG's SGIP grant funding
4. **Who pays for the maintenance and operating costs of this lighting?**
    - Third Avenue Business Association and City
5. **Do you have additional seasonal lighting? If so, what does that include?**
    - Christmas holiday lighting

Figure 126 - Chula Vista (Image A)

Figure 127 - Chula Vista (Image B)

6. **Are you using LED/Smart technology in your lighting?**
    - Yes
7. **Which grants have you been able to access for lighting?**
    - Lighting improvements were completed as part of the Third Avenue Streetscape project which was funded with SANDAG's SGIP funds and City's matching funds.
8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
    - Please contact Kevin Pointer in Economic Development.
9. **Do you have any photography of this lighting at night?**
    - See Figures 126 and 127 for representative images of this lighting.

A.2 CITY OF DEL MAR

Interviewed: Kathleen Garcia, Planning and Community Development Director

1. **What types of decorative lighting is in your downtown business district?**
   - String lighting in trees very minimal, and only done by businesses
   - Façade lighting on buildings very minimal
   - Del Mar is very much a dark sky community with very minimal lighting; we only have street lights at intersections and on Camino del Mar.
2. **When were these lighting improvements made?**
   - Incrementally by property owners, primarily in the 1980s because not much has changed since then.
3. **How were these lighting improvements funded?**
   - By private property owners/businesses
4. **Who pays for the maintenance and operating costs of this lighting?**
   - Private property owners/businesses
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - No, not now.
6. **Are you using LED/Smart technology in your lighting?**
   - Street lights are being replaced with LED when replaced.
7. **Which grants have you been able to access for lighting?**
   - None currently.
8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
   - Not measured
9. **Do you have any photography of this lighting at night?**
   - Not applicable
10. **Added by interviewee:**
    - Del Mar is in construction on a downtown Streetscape project (in the public right-of-way) that will be adding infrastructure to support some lighting improvements. The City is adding convenience power at each tree well and at all the new street lights. We will have a combination of existing SDG&E tall poles (they do not have convenience power, have been left over since this street was Highway 1) and

pedestrian level light fixtures (+12'). These have been installed at City Hall just recently and will be continued in all of our downtown commercial stretch (9th to 15th). These pedestrian lighting have convenience power.

- With the new streetscape project, the actual tree string lighting, festivity lighting, or seasonal lighting is not funded in the CIP project. The Main Street organization, the Del Mar Village Association, is looking for grants to pay for proposed holiday lighting on the light poles and lights in the trees, but to date, nothing has been secured.
- The City will pay for all the electricity use in the public right-of-way, including any new string lighting in trees.
- Del Mar does not provide separate meters for decorative lighting. City pays for all lighting.
- The City of Del Mar is by intention a dark sky community. All uplighting is prohibited.
- Businesses are allowed to add decorative lighting to their façades and roof lines. They typically go through a rigorous review with the Del Mar Design Review Board.
- Funding and projects originate within the city as a whole. The city is too small to distinguish between Community Development and Public Works as originations of lighting projects and funding. Funding comes for the City-wide CIP program.

A.3 CITY OF LA MESA

Interviewed: Mike Kinnard, City Engineer, Public Works

1. What types of decorative lighting is in your downtown district?

- Festoon lighting hanging across the streets
- String lighting on poles (seasonal)
- String lighting in trees (seasonal, planned for next year)

2. When were these lighting improvements made?

- All improvements were made between 2014-2015.

3. How were these lighting improvements funded?

- Festoon lighting was part of the capital improvements made as part of the overall streetscape project described in # 7.
- Capital costs for string lighting on light poles (in place) and string lighting for trees (in progress) are funded by the downtown business improvement district (private).

4. **Who pays for the maintenance and operating costs of this lighting?**
   - The City of La Mesa funds on-going maintenance, installation, and storage of all lighting equipment.
   - This includes a city-funded contract with a third party for the seasonal lighting installations for poles and trees.
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - Yes, the City of La Mesa funds the annual contract with a third party vendor to install and remove all the seasonal lighting on poles. They are planned to expand this effort next year, with funding support from the downtown businesses.
6. **Are you using LED/Smart technology in your lighting?**
   - No. All the original lighting was induction, they are incrementally replacing the post tops with LED.
7. **What grants have you been able to access for lighting?**
   - The overall streetscape project was supported by several grant sources: Caltrans Transportation Development Act (TDA), ARRA Stimulus funding, and a SANDAG Smart Growth Grant. Each grant provided approximately $1M towards the cost of the $5.8M project, which included major sewer and electrical upgrades. This overall project had a traffic calming element, H20 quality element, major landscaping and lighting improvements.
8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
   - No data is available. Measurable increases in new business locations, property valuations, favorable media coverage. Significant improvement in public perception and civic pride, citing that the area has gone from vacancies to vibrancy, with now parking problems in the area where the improvements were made.
9. **Do you have any photography of this lighting at night?**
   - Photo provided, see Figure 128.

Figure 128 – La Mesa downtown

A.4 DOWNTOWN LAGUNA BEACH

Interviewed: Dale Schuck, Deputy Director of Public Works/Streets and Facilities, City of Laguna Beach

1. **What types of decorative lighting is in your downtown district?**
   - There is no decorative lighting in the downtown area with the exception of the regular street lights and seasonal lighting.
2. **When were these lighting improvements made?**
   - Last capital improvements for streetscape/electrical infrastructures were completed in 2005, when they undergrounded all utilities.
3. **How were these lighting improvements funded?**
   - Redevelopment. No recent investments made.
4. **Who pays for the maintenance and operating costs of this lighting?**
   - NA.
   - The City of Laguna Beach is in the process of purchasing 790 out of 1,100 street lights currently owned by SCE, using general funds. This purchase is to provide the City with more control and flexibility to adapt to technology, control data, etc. They will assume all operating and maintenance costs for all existing downtown street lights.
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - Yes, seasonal decorative lighting is the only noteworthy decorative lighting in their downtown core. The City of Laguna Beach annually donates $30K to the Laguna Beach Chamber of Commerce, who uses the funds to contract for the labor and installation of string lighting on trees for a two-month period.
6. **Are you using LED/Smart technology in your lighting?**
   - Not currently using LED in street lights; expect with ownership change the City will be incrementally adapting these lights for LED. All of the seasonal string lighting is LED.
7. **Which grants have you been able to access for lighting?**
   - Not aware of any grants, except the City's grant support for holiday décor.
8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
   - Unknown – no meaningful lighting program.
9. **Do you have any photography of this lighting at night?**
   - No photo provided.

A.5 DOWNTOWN LOS GATOS

Interviewed: Jim Harbin, Facilities and Environmental Programs Manager, Town of Los Gatos

1. **What types of decorative lighting is in your downtown district?**
   - Long history of having string lighting on their tree trunks and limited large branches only, year-round.
   - Installed on all trees on Main Street, and for ½ mile of N. Santa Cruz, and around their Plaza Park and its trees.
2. **When were these lighting improvements made?**
   - Last capital improvements for streetscape/electrical infrastructures dates to Redevelopment days.
3. **How were these lighting improvements funded?**
   - The Town of Los Gatos pays for all the costs, capital and maintenance, for this lighting installation year-round.
4. **Who pays for the maintenance and operating costs of this lighting?**
   - The Town of Los Gatos pays for all maintenance and operating expenses associated with both the year-round and seasonal lighting efforts.
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - During the holidays, the Town of Los Gatos also funds the lighting of an old large tree as the Town's Christmas Tree, with the lighting installed year-round but only operated during the holiday season. Additional seasonal lighting is also added in Plaza Park.
6. **Are you using LED/Smart technology in your lighting?**
   - All of the string lighting is LED. The historic lamp posts that are part of the streetscape have NOT been updated.
7. **Which grants have you been able to access for lighting?**
   - A grant was received from PG&E in 2016 in support of converting all of their downtown lamp posts to LED and this work was completed last year.
8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
   - This decorative lighting tradition of wrapping their tree trunks is one valued by the merchants and the City staff; they do not have any evidence or data documenting impact but anecdotally visitors and residents comment favorably about these decorative lighting impacts.
9. **Do you have any photography of this lighting at night?**
   - Still waiting on a photo.

A.6 DOWNTOWN SANTA BARBARA

Interviewed: Jim Dewey, Streets Operation and Infrastructure Manager; Erik Krueger, Plaza Administrator, Downtown Santa Barbara, Inc.

1. **What types of decorative lighting is in your downtown district?**
   - No year-round decorative lighting. Extensive seasonal décor. Ambient lighting provided by historic lamp posts.
2. **When were these lighting improvements made?**
   - Streetscape improvements including electrical infrastructure and pedestrian lamp posts last updated in late 1990's, with Redevelopment funds. Seasonal lighting installed annually.
3. **How were these lighting improvements funded?**
   - Electrical infrastructure design and construction funded by Redevelopment Agency; subsequently replacement and maintenance costs have been assumed by the City of Santa Barbara, with maintenance support/coordination for needs from the downtown organization.
   - Downtown Santa Barbara uses funding from its "Plaza Maintenance Contract" with the City of Santa Barbara to annually fund the replacement and labor for seasonal décor installation. This contract for services is funded annually as part of the Parking Dept. budget (previously in Parks).
4. **Who pays for the maintenance and operating costs of this lighting?**
   - Downtown Santa Barbara staff monitor and report maintenance issues related to electrical infrastructure to City Public Works.
   - Downtown Santa Barbara responsible for operations, maintenance, funding and insurance for all décor installed in the public right of way in downtown Santa Barbara.
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - Long history of having string lighting in trees along State Street consistent with the Holiday Parade route (nine blocks), as well as shooting stars décor installed on lamp posts at intersections, seasonally.
   - Décor installed beginning in November, stays up through end of December with string lighting in trees remaining up through the end of February. Décor also includes seven kinetic holiday art sculptures along State Street sidewalks every other year.
6. **Are you using LED/Smart technology in your lighting?**
   - Yes, pedestrian street lamps are in the process of being converted to LED.
   - Seasonal lighting transitioning to LED by the downtown organization.
   - Garage and parking lot lighting being converted incrementally using City's annual capital budgets.

7. **Which grants have you been able to access for lighting?**
    - Some of the LED retrofit for the historic streetlamps was funded from a safety-related grant from the Police Department Foundation. Did not receive details about state grant funds that also supported this retrofit.

8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
    - Customer and business perspective on lighting/safety improved each year during the holidays, businesses generally believe it helps increase local patronage during the holiday season; no empirical evidence. Increased customer satisfaction in public garages and lots due to lighting and other safety improvements.

9. **Do you have any photography of this lighting at night?**
    - Photo not provided.

A.7 CITY OF SANTA CRUZ

Interviewed: Bonnie Lipscomb, Economic Development Director

1. **What types of decorative lighting is in your downtown district?**
    - Festoon lighting hanging between lamp posts, parallel to street. Installed evenly thoroughout the downtown district year-round, on three downtown streets.

2. **When were these lighting improvements made?**
    - Last round of capital improvements were made in 2010-2011, when local Redevelopment Agency was still in place.

3. **How were these lighting improvements funded?**
    - The capital costs were funded by Redevelopment Agency; subsequently replacement and maintenance costs have been assumed by the City with maintenance support/coordination for needs from the downtown organization.
    - The City considered creating an infrastructure lighting district, but with push back from downtown taxpayers they set that idea aside and instead created a matching grant program – similar to their existing façade and signage grants – that provide 50% match from the City to the property owner - to expand festoon lighting on private property and alleyways in their downtown.

4. **Who pays for the maintenance and operating costs of this lighting?**
    - The City of Santa Cruz. Downtown Santa Cruz BID monitors and reports maintenance issues to City Public Works. The City is currently working on a six-month maintenance plan, getting needed buy-in

from other city departments.

5. **Do you have additional seasonal lighting? If so, what does that include?**
   - No, not anymore. Their downtown district previously had seasonal twinkle lights in all the trees along 9 blocks of Pacific Avenue, paid for annually by the Downtown BID. Businesses on side streets complained, and a mandate for equity led to the festoon lights in place of the seasonal twinkle lights in the trees. Now, there's not an adequate budget or anything impactful for the holiday décor, which the downtown organization is working to address with additional private funding.

6. **Are you using LED/Smart technology in your lighting?**
   - No, the historic lamp posts have not been converted and the lighting impact has declined; staff expects with climate goals being a priority this could become a project in the coming years.

7. **Which grants have you been able to access for lighting?**
   - The only grant funding for decorative lighting is related to lighting improvements on their levy, details were not available but am waiting to receive photos of their lighted kinetic art installation that is part of those lighting improvements.

8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
   - Customer and business perspective on lighting/safety improved, no empirical evidence.

9. **Do you have any photography of this lighting at night?**
   - None provided.

A.8 CITY OF SOLANA BEACH

Interviewed: Mo Sammak, City Engineer

1. **What types of decorative lighting is in your downtown business district?**
   - The Cedros Design District has goose-neck light fixtures that are combined with signage and other wayfinding elements that add to the Cedros District image and brand.
   - The second area that includes decorative lighting is the west side of Highway 101 between Dahlia and Lomas Santa Fe Drive. These are taller goose-neck light fixtures that are more geared towards general street lighting.

2. **When were these lighting improvements made?**
   - The Cedros Design District lighting improvements were made in 1999 approximately.

- The Highway 101 lighting improvements were completed in 2009.

3. **How were these lighting improvements funded?**
   - The Cedros Design District lighting improvements were funded through fees collected by the Cedros Design District Association.
   - The Highway 101 lighting improvements were funded through Transnet funds. Lighting was included as part of the larger funded projects that included roadways, sidewalks, infrastructure, etc.
4. **Who pays for the maintenance and operating costs of this lighting?**
   - Both Cedros Design District and Highway 101 lighting maintenance and operating costs are paid for through a city-wide Lighting District that collects fees from all property owners.
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - No additional seasonal lighting other than Holiday displays that may include secondary lights.
6. **Are you using LED/Smart technology in your lighting?**
   - Both Cedros Design District and Highway 101 light fixtures (that the city owns) have been converted to LED. The city does not utilize smart technology on street lighting.
   - It should be noted that approximately one-third of all street lights in Solana Beach are owned by SDGE, which was grandfathered in when the city was incorporated in 1986.
7. **Which grants have you been able to access for lighting?**
   - The city has not utilized grants for lighting projects.
8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
   - The city does not track increase in retail/restaurant sales, but they did note that their electrical bills have dropped significantly since they converted to LED.
9. **Do you have any photography of this lighting at night?**
   - The city does not have nighttime photographs.

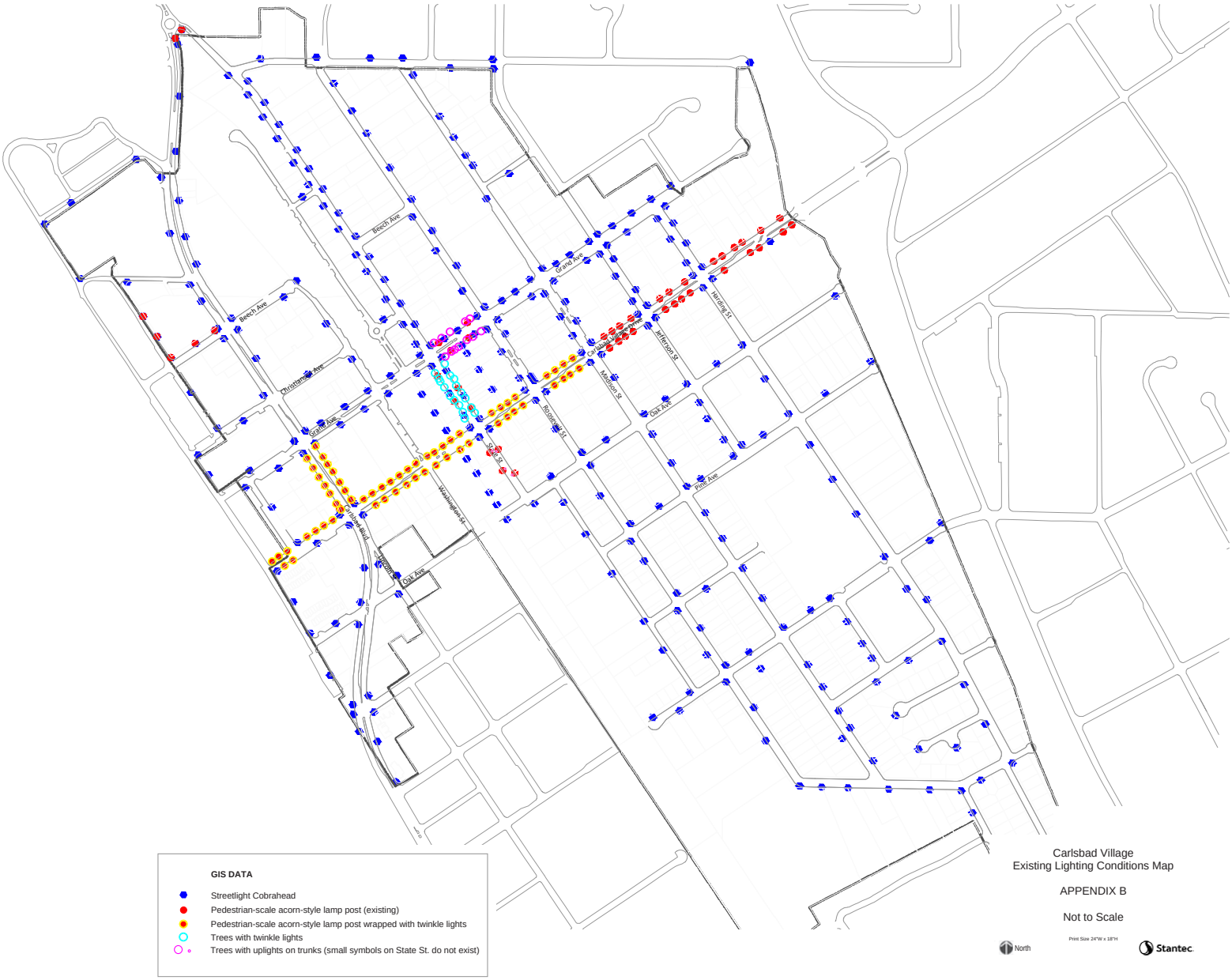
A.9 CITY OF VENTURA

Interviewed: Vince Toeby, Head Electrician; Kevin Clerici, Downtown Ventura Association

1. **What types of decorative lighting is in your downtown district?**
   - Long history of having string lighting in trees, seasonally. Last installed in 2014.
   - Currently have festoon lighting hanging between lamp posts, parallel to street. Installed evenly on seven blocks of Main Street year-round, as well as installed on several side streets/alleyways that also support pedestrian movement.
2. **When were these lighting improvements made?**
   - Last round of lighting improvements to provide festoon lighting year-round made in 2010, providing the needed infrastructure to power lighting from established circuits. Expanded to side streets in 2014.
3. **How were these lighting improvements funded?**
   - Electrical infrastructure design and construction funded by Redevelopment Agency; subsequently replacement and maintenance costs have been assumed by the City of Ventura, with maintenance support/coordination for needs from the downtown organization. Downtown Ventura Association conducted a fundraising campaign to pay for the lighting improvements.
4. **Who pays for the maintenance and operating costs of this lighting?**
   - Downtown Ventura staff monitor and report maintenance issues to City Public Works. The City of Ventura covers all labor and direct maintenance costs, including power.
5. **Do you have additional seasonal lighting? If so, what does that include?**
   - Their downtown district previously had seasonal twinkle lights installed in the trees on Main Street, paid for annually by the Downtown Ventura Association.
   - They elect now to keep the festoon lighting up year-round, and they add holiday décor at intersections on light posts as well as holiday banners and greenery.
6. **Are you using LED/Smart Technology in your lighting?**
   - Yes, pedestrian street lamps are LED, converted incrementally using city budget funding, beginning in 2014.
7. **Which grants have you been able to access for lighting?**
   - Local grant support provided to Downtown Ventura Association as part of their private fundraising effort from their Chamber, local college foundation, and Patagonia.

8. **Have you seen or been able to measure any increases in sales/traffic, and/or changes in safety, perception from these lighting improvements? How were these results determined?**
    - Customer and business perspective on lighting/safety improved, no empirical evidence. Merchants are happier with festoon lighting, but some still want the tree lighting done seasonally.
9. **Do you have any photography of this lighting at night?**
    - Photo not provided.

APPENDIX B
EXISTING LIGHTING CONDITIONS MAP



APPENDIX C
EXISTING CONDITIONS SUMMARY

Carlsbad Village Drive		
Land Use type ("street typology")	Business, (busn)	
Lighting fixture types	-Cobraheads - mid block, -Lamp posts	
Light sources	-Induction, -LED	
Additional comments	--	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Roosevelt/State	1.3	mid block & post-top
Harding/Jefferson, north side	1.3	mid block & busn
Harding/Jefferson, south side	0.84	mid block & church

Grand Avenue		
Land Use type ("street typology")	Business	
Lighting fixture types	-Cobraheads - intersections -Cobraheads - mid block, -Lamp posts	
Light sources	-Induction, -LED	
Additional Comments	-Large trees blocking cobraheads & post-tops. -Some tree-strapped RGB accent lights.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Roosevelt/State	1.18	mid block & busn
Washington/Carlsbad Blvd.	0.74	mid block
Carlsbad Blvd./Garfield	0.57	mid block & hotel
Madison/Roosevelt	0.56	mid block & busn

Oak Avenue		
Land Use type ("street typology")	Mixed use	
Lighting fixture types	--	
Light sources	--	
Additional Comments	Only commercial bldg- and resi-mounted lights	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Madison/Roosevelt	0.07	none
Washington/Lincoln	0.09	nearby apartments

Christiansen Avenue		
Land Use type ("street typology")	Mixed use	
Lighting fixture types	Cobra head mid block	
Light sources	Induction	
Additional Comments	Construction sites. Shephred's Crooks along west side of tracks.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Carlsbad Blvd/Washington	0.15	mid block (construction site)
At intersection with Washington	2.1	Bell-shaped luminaires along west side of RR tracks
Along Washington toward Beech	0.14	none

Christiansen Avenue		
Land Use type ("street typology")	Mixed use	
Lighting fixture types	Cobra head mid block	
Light sources	Induction	
Additional Comments	Construction sites. Shephred's Crooks along west side of tracks.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Carlsbad Blvd/Washington	0.15	mid block (construction site)
At intersection with Washington	2.1	Bell-shaped luminaires along west side of RR tracks
Along Washington toward Beech	0.14	none

Harding Street		
Land Use type ("street typology")	Mixed use	
Lighting fixture types	Cobrahead at intersection	
Light sources	Induction	
Additional Comments	Commercial, civic & resi. One induction at end-of-life. Several bldg-mounted lights.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Oak/Carlsbad Village Drive	0.79	busn lights
Carlsbad Village Drive/Grand	0.69	mid block & busn lights

Jefferson Street		
Land Use type ("street typology")	Residential (resi)	
Lighting fixture types	Cobraheads mid block/intersections	
Light sources	Induction	
Additional Comments	Some bldg-mounts	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Oak/Carlsbad Village Drive	0.18	none
Carlsbad Village Drive/Grand	0.72	mid block & busn lights

Madison Street		
Land Use type ("street typology")	Mixed use	
Lighting fixture types	Cobraheads mid block/intersections	
Light sources	Induction	
Additional Comments	Very dark on south side of Madison	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Oak/Carlsbad Village Drive	0.24	mid block & resi & busn
Carlsbad Village Drive/Grand	0.28	mid block & busn

Roosevelt Street		
Land Use type ("street typology")	Business	
Lighting fixture types	Cobraheads mid block/intersections	
Light sources	LED	
Additional Comments	LED at intersection performs well	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Oak/Carlsbad Village Drive	0.69	mid block & busn
Grand/Beech	0.89	mid block & busn
Carlsbad Village Drive/Grand	0.85	mid block & busn

State Street		
Land Use type ("street typology")	Business	
Lighting fixture types	Cobrahead at intersection/Lamp posts	
Light sources	LED, Induction	
Additional Comments	Construction site at State and Oak. Mid block lamp posts. Twinkle lights in trees.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Carlsbad Village /Grand, west sid	1.5	mid block & twinkle & busn
Grand/Beech	1.15	mid block & busn
Carlsbad Village /Grand, east side	2.6	mid block & twinkle & busn

Washington Street		
Land Use type ("street typology")	Business	
Lighting fixture types	Cobrahead at intersection	
Light sources	LED	
Additional Comments	Only fixture on block was BO. Only light was from LED in parking lot across the street	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Oak/Carlsbad Village	0.08	none, parking lot across street
Carlsbad Village/Grand	0.57	parking lot & acorn post-top

Carlsbad Blvd.		
Land Use type ("street typology")	Business	
Lighting fixture types	Cobrahead mid block	
Light sources	Induction	
Additional Comments	--	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Carlsbad Village/Grand	1.3 (4:1)	mid block & twinkle & post-top
Christiansen/Beech	0.31	none
Grand/Christiansen	0.2	hotel

Pine-Tyler (mixed use A)		
Land Use type ("street typology")	Residential	
Lighting fixture types	Cobraheads at intersection	
Light sources	LED	
Additional Comments	Floods on poles in front of appartment bldg.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
At intersection Pine and Tyler	0.24	mid block & resi

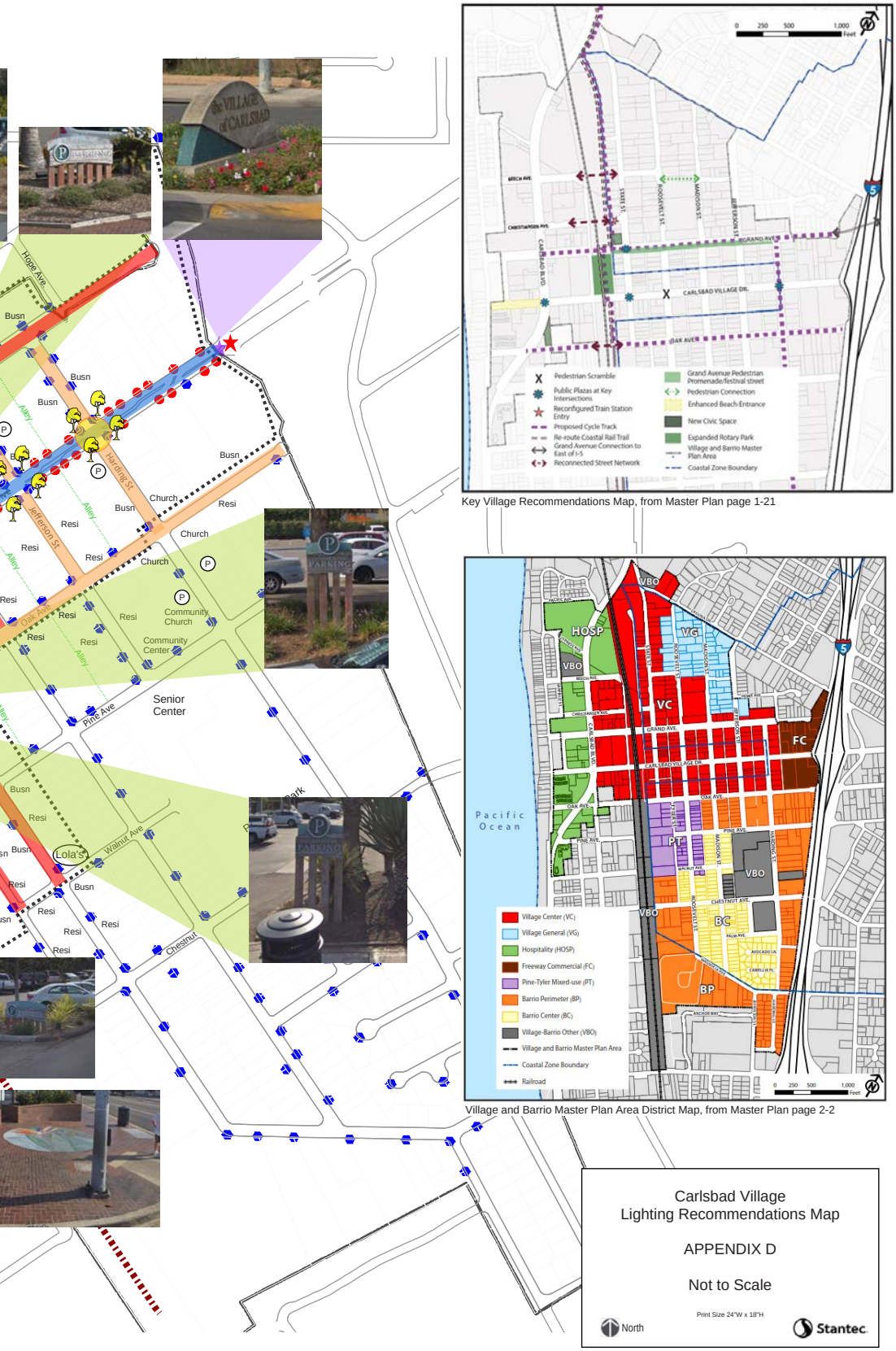
Pine-Tyler (mixed use A)		
Land Use type ("street typology")	Residential	
Lighting fixture types	Cobraheads at intersection	
Light sources	LED	
Additional Comments	Floods on poles in front of appartment bldg.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
At intersection Pine and Tyler	0.24	mid block & resi

Pine-Tyler (mixed use B)		
Land Use type ("street typology")	Residential & business	
Lighting fixture types	Cobraheads at intersection	
Light sources	LED, Induction	
Additional Comments	Big contrast between LED and Induction sources	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Along Roosevelt - Pine/Walnut	0.13	mid block & busn

Pine Avenue		
Land Use type ("street typology")	Mixed use	
Lighting fixture types	Cobraheads at mid block & intersection	
Light sources	Inuction, LED	
Additional Comments	One mid block is BO. Most light comes from bldg mounts.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
Harding/Jefferson	0.25	mid block BO, church & school
Jefferson/Madison	0.28	mid block & resi
Madison/Roosevelt	0.19	mid block

Train Station, East Side		
Land Use type ("street typology")	Transit	
Lighting fixture types	Bell shaped fixtures on Shepherd's Crooks	
Light sources	Metal Halide	
Additional Comments	West side well lit. East side toward Carlsbad Village is badly underlit.	
Location along street - x/y, (along block between x street and y street)	Average Light level, (fc)	General sources of light
East side of traffic circle	1.8	Shepherd's Crook-front of station
Grand at alley leading to station	0.17	mid block inside of trees
In alley leading to train station	0.11	none
In alley - Grand/Carlsbad Village	0.31	alley mid block

APPENDIX D | CARLSBAD VILLAGE LIGHTING RECOMMENDATIONS MAP


Hope Ave
Busn
Alley
Harding St
Church
Resi
Jefferson St
Oak Ave
Community Church
Community Center
Senior Center
Pine Ave
Walnut Ave
Lola's
Chestnut
Key Village Recommendations Map, from Master Plan page 1-21
Village and Barrio Master Plan Area District Map, from Master Plan page 2-2
Pacific Ocean
HOSP
VG
VBO
VC
FC
PT
BC
BP
Village Center (VC)
Village General (VG)
Hospitality (HOSP)
Freeway Commercial (FC)
Pine-Tyler Mixed-use (PT)
Barrio Perimeter (BP)
Barrio Center (BC)
Village-Barrio Other (VBO)
Village and Barrio Master Plan Area
Coastal Zone Boundary
Railroad
Pedestrian Scramble
Public Plazas at Key Intersections
Reconfigured Train Station Entry
Proposed Cycle Track
Re-route Coastal Rail Trail
Grand Avenue Connection to East of I-5
Reconnected Street Network
Grand Avenue Pedestrian Promenade/festival street
Pedestrian Connection
Enhanced Beach Entrance
New Civic Space
Expanded Rotary Park
Village and Barrio Master Plan Area
Coastal Zone Boundary
Carlsbad Village
Lighting Recommendations Map
APPENDIX D
Not to Scale
Print Size 24"W x 18"H
North
Stantec

APPENDIX E
OPINION OF PROBABLE COST TABLE

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Summary of Opinion of Probable Cost		
Phase	Description	Subtotals
1	State Street, and ped poles on Madison, Roosevelt, Tyler, Washington, and Carlsbad Boulevard	**$1,359,337.40**
2	Grand Avenue to Carlsbad Boulevard	**$456,383.00**
3	Carlsbad Village Drive from Harding Street to Ocean Street	**$295,337.85**
4	Train Station Area	**$371,148.80**
5	Hospitality District (excepting ped poles, see phase 1)	**$553,117.60**
6	Key Intersection lighting (5 intersections) plus two "arrival beacons" (Harding Street and Walnut Avenue); lighting for added trees at select intersections and pattern projection lighting at intersections and select alleys	**$830,078.00**
7	Add ped poles to secondary streets to encourage future development (peach color on map)	**$1,280,511.20**
	Grand Total	**$5,145,913.85**

26-Jun-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 1

Summary:
State Street, and ped poles on Madison, Roosevelt, Tyler, Washington, and Carlsbad Boulevard

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
1	State Street	Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the block of State Street between Grand Avenue and Beech Avenue	8	$2,450.00	$22,288.60	$41,888.60	**$699,609.65**
		Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the block of State Street between Carlsbad Village Drive and Oak Avenue	4	$2,450.00	$4,699.30	$14,499.30	
		Add twinkle lights to building parapets, to the blocks of State Street between Grand Avenue and Beech Avenue (linear footage estimated)	2000	$75.00	$22,000.00	$172,000.00	
		Add twinkle lights catenary-style between the pedestrian poles, at the block between Carlsbad Village Drive and Oak Avenue (linear footage estimated)	800	$75.00	$8,800.00	$68,800.00	
		Remove existing residential-grade twinkle lights from 17 trees on State Street in the block between Carlsbad Village Drive and Grand Avenue	5100	$1.00	$3,740.00	$8,840.00	
		Replace the twinkle lights in those same 17 trees with new commercial grade twinkle lights	5100	$75.00	$9,350.00	$391,850.00	
		Add signage lighting to parking lot sign.	1	$500.00	$1,231.75	$1,731.75	
2	Carlsbad Boulevard	Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 2 blocks of Carlsbad Boulevard between Grand Avenue and Beech Avenue (Optional: provide conduit for tree uplighting listed in phase 7)	21	$2,450.00	$56,597.10	$108,047.10	**$161,226.30**
		Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 1 block of Carlsbad Boulevard and Lincoln Street between Carlsbad Village Drive and Oak Avenue (Optional: provide conduit for tree uplighting listed in phase 7)	10	$2,450.00	$27,125.20	$51,625.20	
		Remove "twinkle lights" from poles between Carlsbad Village Drive and Grand Avenue	14	$1.00	$1,540.00	$1,554.00	

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

3	Pine-Tyler Mixed Use Area	Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 3 blocks of Roosevelt Stree between Carlsbad Village Drive and Walnut Avenue	22	$2,450.00	$65,697.40	$119,597.40	**$195,662.20**
		Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 2 blocks of Tyler Street between Oak Avenue and Walnut Avenue	14	$2,450.00	$41,764.80	$76,064.80	
4	Roosevelt Street	Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 2 blocks of Roosevelt Stree between Carlsbad Village Drive and Beech Avenue	20	$2,450.00	$55,845.00	$104,845.00	**$122,041.40**
		Add inground uplights to the trees in the median between Carlsbad Village Drive and Grand Avenue (6 trees, 2 lights per tree)	12	$800.00	$7,596.40	$17,196.40	
5	Madison Street	Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 2 blocks of Madison Street between Oak Avenue and Grand Avenue	20	$2,450.00	$55,845.00	$104,845.00	**$122,041.40**
		Add inground uplights to the trees in the median between Carlsbad Village Drive and Grand Avenue (6 trees, 2 lights per tree)	12	$800.00	$7,596.40	$17,196.40	
6	Washington Street	Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to the 1 block of Washington Street between Carlsbad Village Drive and Oak Avenue	10	$2,450.00	$32,378.00	$56,878.00	**$58,756.45**
		Add signage lighting to parking lot sign.	1	$500.00	$1,378.45	$1,878.45	
						Total Phase 1	**$1,359,337.40**

19-Mar-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 2

Summary:
Grand Avenue to Carlsbad Boulevard

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
7	Grand Avenue	Remove existing uplights from 12 trees	12	$1.00	$2,640.00	$2,652.00	**$456,383.00**
		Add inground uplights to those 12 trees (4 per tree)	48	$800.00	$25,434.00	$63,834.00	
		Add inground uplights to medians in the three blocks of Grand Avenue between Roosevelt Street and Carlsbad Boulevard. (12 trees, 2 per tree)	24	$800.00	$22,978.20	$42,178.20	
		Add inground uplights to sidewalk planting strips along the three blocks of Grand Avenue between Roosevelt Street and Carlsbad Boulevard. (21 trees, 2 per tree) (the portion of Grand Avenue between Carlsbad Boulevard to Ocean Street is tallied in the Hospitality District)	42	$800.00	$31,558.80	$65,158.80	
		Add pedestrian poles to match existing City Standard concrete hexagonal pole and existing LED acorn luminaires, to Grand Avenue from its easternmost point near I-5, to Carlsbad Boulevard (the portion of Grand Avenue between Carlsbad Boulevard to Ocean Street is tallied in the Hospitality District)	54	$2,450.00	$130,380.00	$262,680.00	
		Replace lighting in fountain at corner of Grand Avenue and State Street	14	$1,200.00	$3,080.00	$19,880.00	
						Total Phase 2	**$456,383.00**

19-Mar-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 3

Summary:
Carlsbad Village Drive from Harding Street to Ocean Street

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
8	Carlsbad Village Drive	Remove existing LED acorn luminaires and store them for future use	73	$5.00	$8,030.00	$8,395.00	**$295,337.85**
		Remove "twinkle lights" from poles	47	$1.00	$2,585.00	$2,632.00	
		Design custom bracket with City Logo, to hold new luminaire	1	$0.00	$5,000.00	$5,000.00	
		New luminaire	73	$950.00	$27,083.00	$96,433.00	
		Fabricate and install custom brackets with new luminaires	73	$2,000.00	$32,120.00	$178,120.00	
		Add signage lighting to parking lot signs and Carlsbad Village Sign	3	$500.00	$3,257.85	$4,757.85	
						Total Phase 3	**$295,337.85**

19-Mar-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 4

Summary:
Train Station Area

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
9	Train Station Area	Remove existing concrete lamp posts and luminaires on Washington Street between Carlsbad Village Drive and Grand Avenue; reserve concrete lamp posts for future use	10	$500.00	$2,200.00	$7,200.00	**$371,148.80**
		Add new bell-shaped LED luminaires and lamp posts to match those at Carlsbad Village Station to existing locations on Washington Street between Carlsbad Village Drive and Grand Avenue	10	$2,500.00	$23,818.10	$48,818.10	
		Add new bell-shaped LED luminaires and lamp posts to match those at Carlsbad Village Station to alley at historic Santa Fe Depot, between Carlsbad Village Drive and Grand Avenue	8	$2,500.00	$19,152.80	$39,152.80	
		Add new bell-shaped LED luminaires and lamp posts to match those at Carlsbad Village Station to alley at entry to Village Station up to and beyond the roundabout, to Beech Avenue	12	$2,500.00	$28,729.20	$58,729.20	
		Add new bell-shaped LED luminaires to match those at Carlsbad Train Station to Christiansen Avenue between State Street and Carlsbad Boulevard	14	$2,500.00	$33,517.40	$68,517.40	
		Add inground uplighting to 22 palm trees at median in alley entrance to Train Station, and along spur of Christiansen Avenue between the alley and State Street	44	$1,000.00	$25,687.40	$69,687.40	
		Add sign lighting to two Carlsbad Village Station signs	2	$750.00	$2,171.90	$3,671.90	
		Optional: Replace existing dual-head bell-shaped lamp posts throughout Train Station area with new LED versions and updated paint color (use this pole/luminaire for all new instances of this pedestrian lamp post if this option is taken)	22	$2,500.00	$20,372.00	$75,372.00	
						Total Phase 4	**$371,148.80**

19-Mar-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 5

Summary:
Hospitality District (excepting ped poles, see phase 1 tab)

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
10	Hospitality District (ped pole installation on Carlsbad Boulevard included in Phase 1)	Add in-ground uplights to the palm trees in the medians in the 2 blocks of Carlsbad Boulevard between Walnut Avenue and Oak Avenue (40 trees 2 lights per tree)	80	$1,000.00	$49,203.60	$129,203.60	**$553,117.60**
		Add in-ground uplights to the trees in the median in the 1 block of Carlsbad Boulevard between Oak Avenue and Carlsbad Village Drive (5 trees, 2 lights per tree)	10	$800.00	$6,559.60	$14,559.60	
		Add in-ground uplights to the trees in the sidewalk planting strips of Carlsbad Boulevard / Lincoln Street, between Carlsbad Village Drive and Oak Avenue (7 trees, 2 lights per tree)	14	$800.00	$8,768.60	$19,968.60	
		Add in-ground uplights to the palm trees in the sidewalk planting strips in the block of Carlsbad Boulevard between Carlsbad Village Drive and Grand Avenue (11 trees, 2 lights per tree); the block of Grand Avenue between Carlsbad Boulevard and Ocean Street (40 trees, 2 lights per tree); and the west side of Carlsbad Boulevard between Grand Avenue and Christiansen Avenue (12 trees, 2 lights per tree)	126	$1,000.00	$58,303.60	$184,303.60	
		Add in-ground uplights to street trees in median and sidewalk planting strips in the block of Carlsbad Boulevard between Carlsbad Village Drive and Grand Avenue (24 trees, 2 lights per tree); the east side of Carlsbad Boulevard between Grand Avenue and Chirstiansen Avenue (6 trees, 2 lights per tree); the west side and the median of Carlsbad Boulevard between Christiansen Avenue and Beech Avenue (17 trees, 2 lights per tree).	94	$800.00	$43,988.60	$119,188.60	
		Add in-ground uplights to street trees in medians and sidewalk planting strips in the 2 blocks of Carlsbad Boulevard between Beech Avenue and Mountain View Drive, including the block of Beech Avenue between Carlsbad Boulevard and Garfield Street (34 trees, 2 lights per tree)	68	$800.00	$31,493.60	$85,893.60	
						Total Phase 5	**$553,117.60**

19-Mar-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 6

Summary:
Key Intersection lighting (5 intersections) plus two "arrival beacons" (Harding Street and Walnut Avenue); lighting for added trees at 4 intersections and Pattern (Gobo) projectors at alleys

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
11	Key Intersection Lighting (1 intersection) - Carlsbad Village Drive and Harding Street	Assuming 8 trees are added to the 4 corners of the intersection of Carlsbad Village Drive and Harding Street, add uplighting (2 lights per tree). Cost does not include palms.	16	$1,000.00	$7,040.00	$23,040.00	**$65,500.00**
		Decorative catenary cable lighting allowance	1	$16,000.00	$8,800.00	$24,800.00	
		Extend street light poles by 5' vertically to attach catenary cables to, for decorative lighting to span intersection	1	$16,000.00	$1,660.00	$17,660.00	
12	Key Intersection Lighting (2 intersections) - Carlsbad Village Drive and Roosevelt Street; Grand Avenue and Roosevelt Street	Assuming 5 trees are added to the 4 corners of the intersection of Carlsbad Village Drive and Roosevelt Street, add uplighting (2 lights per tree) Cost does not include palms.	10	$1,000.00	$3,300.00	$13,300.00	**$98,220.00**
		Decorative catenary cable lighting allowance	2	$16,000.00	$17,600.00	$49,600.00	
		Extend street light poles by 5' vertically to attach catenary cables to, for decorative lighting to span intersection	2	$16,000.00	$3,320.00	$35,320.00	
13	Key Intersection Lighting (2 intersections) - Carlsbad Village Drive and Carlsbad Boulevard; Grand Avenue and Carlsbad Boulevard	Attach t-bar extensions with weather-proof 120V power and control distribution to top of each street light pole, for gobo projectors at Carlsbad Village Drive	4	$20,000.00	$5,280.00	$85,280.00	**$332,677.00**
		Gobo projectors (Carlsbad Village Drive)	12	$3,500.00	$10,560.00	$52,560.00	
		Lighting for Bird of Paradise mosaic artwork	2	$2,500.00	$440.00	$5,440.00	
		Attach t-bar extensions with weather-proof 120V power and control distribution to top of each street light pole, for gobo projectors at Grand Avenue	4	$20,000.00	$5,517.00	$85,517.00	
		Gobo projectors (Grand Avenue)	12	$3,500.00	$10,560.00	$52,560.00	
		Controls to adjust lighting and to connect to walk signals (one unit for both intersections)	1	$50,000.00	$1,320.00	$51,320.00	
14	Add Lighting to Trees at Carlsbad Village Drive and Jefferson Street	Assuming 7 trees are added to the 4 corners of the intersection of Carlsbad Village Drive and Jefferson Street, add uplighting (2 lights per tree). Cost estimate does not include palms.	14	$1,000.00	$4,620.00	$18,620.00	**$18,620.00**
15	Add Lighting to Trees at Carlsbad Village Drive and Madison Street	Assuming 6 trees are added to the 4 corners of the intersection of Carlsbad Village Drive and Jefferson Street, add uplighting (2 lights per tree). Cost estimate does not include palms.	12	$1,000.00	$3,960.00	$15,960.00	**$15,960.00**
16	Arrival Beacon at Carlsbad Village Drive and Harding Street	Hire an artist to engage with the community, and design and fabricate self-illuminated artwork for the "arrival beacon".	1	$50,000.00	$0.00	$50,000.00	**$102,287.00**
		Artwork allowance* + labor for installation	1	$50,000.00	$2,287.00	$52,287.00	
17	Arrival Beacon at Carlsbad Boulevard and Walnut Avenue	Hire an artist to engage with the community, and design and fabricate self-illuminated artwork for the "arrival beacon".	1	$50,000.00	$0.00	$50,000.00	**$102,287.00**
		Artwork allowance* + labor for installation	1	$50,000.00	$2,287.00	$52,287.00	
18	Gobo Projectors at Six Alleys. Two each	Gobo Projectors	12	$3,500.00	$10,560.00	$52,560.00	**$94,527.00**
		Controls to adjust lighting and to connect to building circuits with time clock and photocell	12	$2,500.00	$11,967.00	$41,967.00	
						Total Phase 6	**$830,078.00**

* Artwork allowances and labor estimations will require adjustment once artist is hired and design concepts are approved and budgeted

26-Jun-19

CARLSBAD VILLAGE DECORATIVE PEDESTRIAN LIGHTING STUDY

Appendix E Opinion of Probable Cost
May 28, 2019

Phase 7

Summary:
Add ped poles to secondary streets to encourage future development (peach color on map)

Line	Street	Description of Task/Item	Qty (est.)	CN cost (material), per item (estimated)	Labor (installation or other), estimated total	Total Material and Labor Cost (estimated)	Subtotals
19	Additional Pedestrian Lamp posts at secondary streets	Harding Street, in the 3 blocks between Grand Avenue and Pine Avenue	30	$2,450.00	$61,911.60	$135,411.60	**$1,280,511.20**
		Jefferson Street, in the 3 blocks between Home Avenue and Oak Avenue	30	$2,450.00	$61,911.60	$135,411.60	
		Madison Street, in the 2 long blocks between Grand Avenue and Laguna Drive	40	$2,450.00	$78,685.60	$176,685.60	
		Roosevelt Street, in the 2 long blocks between Beech Avenue and Laguna Drive	40	$2,450.00	$78,685.60	$176,685.60	
		State Street, in the 2 long blocks between Beech Avenue and Laguna Drive	40	$2,450.00	$79,623.60	$177,623.60	
		Oak Avenue, in the 9 blocks between I-5 and Ocean Street	90	$2,450.00	$185,067.60	$405,567.60	
		Beech Avenue, between Carlsbad Boulevard and Washington Street, and between State Street and Roosevelt Street	16	$2,450.00	$33,925.60	$73,125.60	
						Total Phase 7	**$1,280,511.20**

17-May-19

City of Carlsbad
California

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