

SAN ANTONIO URBAN LIGHTING MASTERPLAN

ISSUED APRIL 2019



TEXT FROM COUNCILMAN TREVINO

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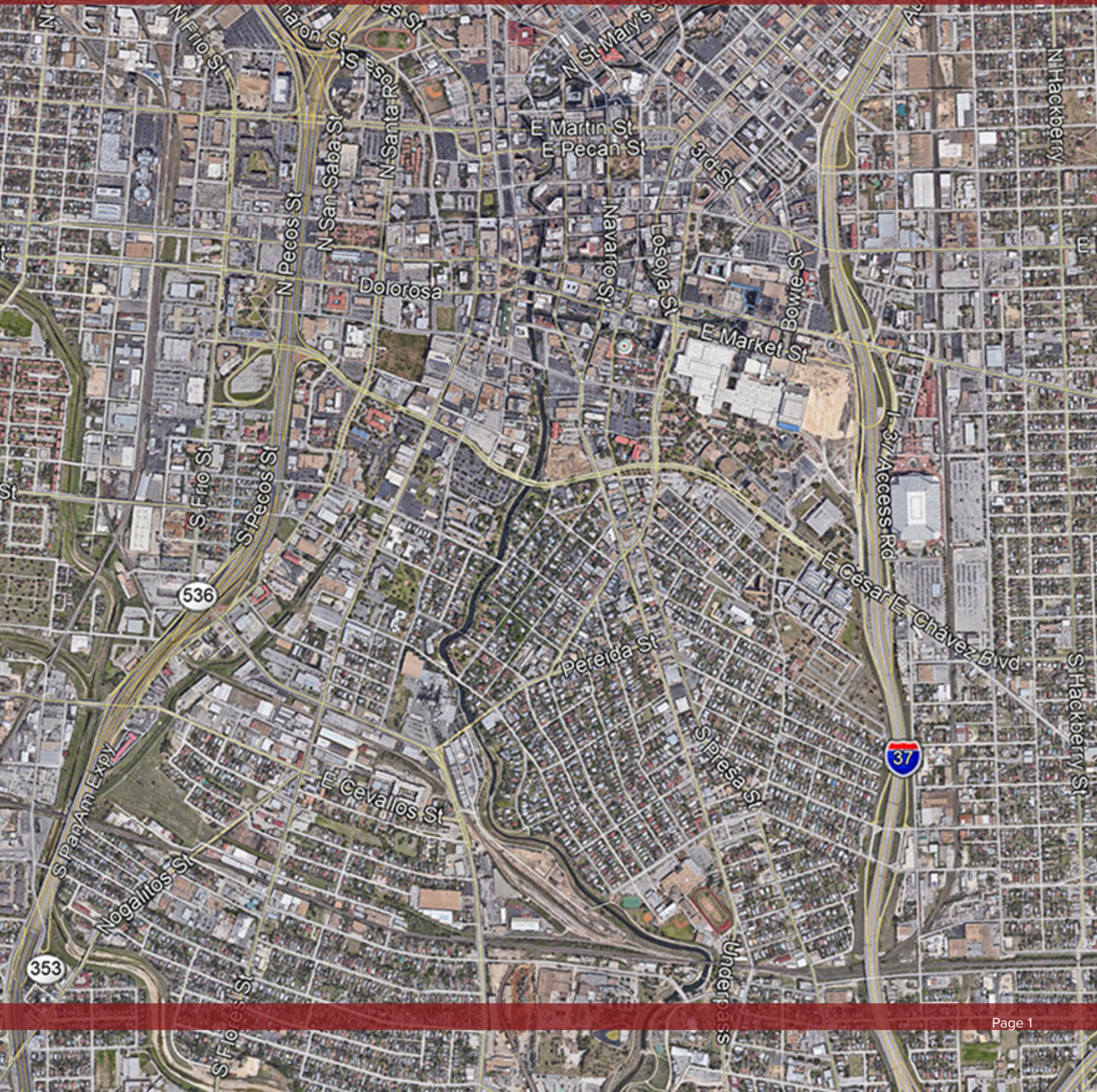
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SCOPE OF WORK



SCOPE OF WORK

The project limits were defined in the December 2016 Urban Lighting Master Plan (ULMP) RFQ (TCI #121616KY) as the area of San Antonio, Texas bordered by IH-35 to the north, IH-10 to the west, the southern boundary of San Antonio City Council District # 1 to the south, and IH-37 to the east, with the addition of the Alamodome area bordered by E Houston Street to the north, Cherry Street to the east and Cesar E. Chavez to the south. (See inset opposite page)

The Lighting Master Plan scope consists of four (4) principal elements.

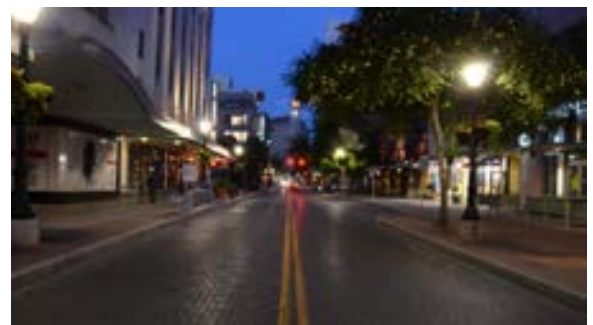
1. Streetscapes – Defined as the lighting for streets and public thoroughfares. Streetscapes include both vehicular and bicycle roadway traffic, and pedestrian activity on sidewalks and crosswalks.
2. City Parks – A total of seventeen (17) parks within the confines of the project's scope area were identified for study and recommendations. The principal park scope focused on after-dark pedestrian activity including routine engagement, recreation and special events. Aesthetics and beautification also help define this scope element.
3. City Art – Public art that can be found within the scope boundary that has or can have a positive nighttime impact for the community through illumination. Encouraging private entities to display and light their art for the betterment of the City is an additional aspiration.
4. Building Facades – A study of the current and potential impact of lighting exterior building facades for both aesthetic appeal and overall contribution to safety and security within the urban environment.

The goals of the project are focused upon the design and distribution of successful lighting strategies throughout the identified scope area for the betterment of urban San Antonio and the greater community at large. The Master Plan RFQ document included this overarching statement of purpose:

“The selected firm will gather stakeholder input and other data to develop a Master Plan that will improve



Alamo Plaza, daytime; looking north towards Houston St.



Houston St., evening; looking east towards Presa St.



S St. Mary's St., daytime; looking north towards S Alamo St.



S Presa St., evening; looking north towards Devine St.



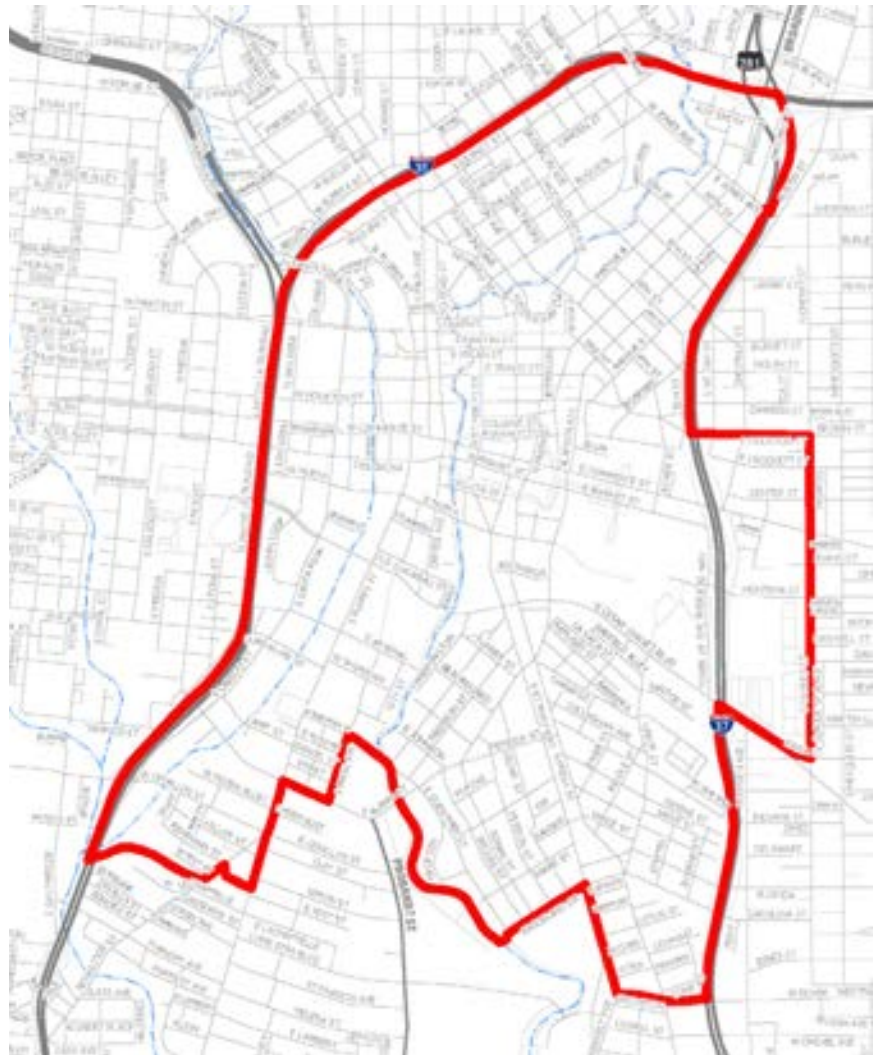
illumination, improve lighting location, improve aesthetics, improve public safety, evaluate more energy efficient and cost saving lighting, and provide options regarding the use of technologically advanced lighting features. The Master Plan should include architectural lighting recommendations to enhance existing elements of the city's infrastructure including: architecture, landscape, water-scape, and iconic elements to broaden the appeal of San Antonio's downtown."

This ULMP document proposes lighting approaches to address this statement of purpose.

STREETSCAPES

San Antonio is home to historically rich and culturally diverse communities. Knitting together those neighborhoods are streets and roadways whose origins are as varied as the localities themselves. Commercial business districts, tourist and visitor destinations, progressive enclaves, and older historic residential areas are found within just a few square miles.

Appropriate lighting for the streets that provide interconnectivity for San Antonio is vitally important. It serves as a cornerstone for the greater urban community's desire to have nighttime environments that are safe, secure and suitable for each neighborhood's



Urban Lighting Masterplan scope area map



Broadway St., daytime; looking south towards Ninth St.



Broadway St., evening; looking south towards Brooklyn Ave.



Delaware St., daytime; looking east from Staffel St.



Florida St., evening; looking east from Staffel St.

need.

The streetscape portion of the ULMP focuses on a number of major issues regarding illumination for both vehicles and pedestrians, each important to the function and vitality of the community. Principal to that purview are:

1. Overall light quality with regards to pedestrian and driver visibility
2. Suitability of lighting for reinforcing the desired look and feel of the surroundings into which it is being deployed
3. Functional lighting needs with respect to street and sidewalk surfaces for drivers and pedestrians
4. Potential for light trespass, light pollution and nuisance glare
5. Sensitivity to historic context, where applicable
6. Sensitivity to matters regarding long term operation, energy, and sustainability
7. Suitability/flexibility for “smart pole” adoption
8. Understanding of costs






History’s imprint on San Antonio is ever-present. It is admired and celebrated by residents and visitors alike. The following historic district descriptions are adapted from the City of San Antonio’s Mission Trail’s website (www.sanantonio.gov/Mission-Trails/Home), and provide a brief glimpse at some of the city’s remarkable diversity.

ALAMO PLAZA HISTORIC DISTRICT

The district is located at the center of the city and includes the Alamo Chapel and complex, open/public use space formerly part of the courtyard of the Mission San Antonio de Valero (the Alamo), and the commercial resources that developed around the plaza during the late nineteenth



Left: Neighborhoods and Study Areas of Note

1.  Central downtown core
2.  Zona Cultural
3.  Hemisfair
4.  The Alamo
5.  La Villita
6.  St. Paul Square
7.  Alamodome
8.  King William
9.  Lavaca
10.  Arsenal
11.  River North
12.  Medical Campus
13.  Museum of Art
14.  Tobin Center for Performing Arts

and twentieth centuries.

HEMISFAIR PARK HISTORIC DISTRICT

The park was the site of the 1968 World's Fair, a planned cultural fair to celebrate, "the confluence of civilizations in the Americas" and the City of San Antonio's cultural diversity. Today it contains numerous buildings and structures dating from the Spanish Colonial Era through the mid-twentieth century; many of which have been designated as State Archaeological Landmarks. Hemisfair Park is also a City of San Antonio local historic district.

KING WILLIAM HISTORIC DISTRICT

The district is listed on the National Register of Historic Places. It is located in an area bounded by the San Antonio River, Cesar Chavez Boulevard, S St. Mary's Street, and S Alamo Street. Most of the houses within the district were built between 1850 and 1899, and are large and ornate.

LA VILLITA HISTORIC DISTRICT

The La Villita Historic District, listed on the National Register of Historic Places, is located a few blocks from Alamo Plaza near the city's center. It includes nearly thirty nineteenth century dwellings representing unique examples of early residential development in the city. Most of the dwellings are simple, masonry structures constructed between the 1820s and 1860s with some later examples displaying Victorian characteristics.

LAVACA HISTORIC DISTRICT

The district is located southeast of downtown San Antonio about two blocks east of the King William Historic District and south of Hemisfair Park. The majority of the buildings within the district are smaller-sized homes built during the late 1800s and early 1900s, along with a small concentration of commercial buildings, mostly dating to the early twentieth century, located along the western

edge of the district.

SOUTH PRESA STREET (NOT REPRESENTED ON MAP)

S Presa Street and S St. Mary's Street (formerly Garden Street) are parallel roads that begin near the center of San Antonio and travel southeast through the city. These streets bisect King William and Lavaca neighborhoods. This area was originally part of agricultural lands that belonged to the Mission Concepción and Mission San Antonio de Valero (the Alamo).

PARKS

The seventeen (17) city parks identified in the scope for this project vary widely, from small "pocket" park green spaces to multi-block expanses with lawns, trees, recreation and pathways. The lighting challenges associated with these parks are just as diverse, as supporting after-dark illumination differs by both functional and aesthetic requirements.

The parks development for the ULMP focuses on issues related to the specific visual needs of park visitors, principally at night, as it relates to safety, security and suitability to activity. Aspects of those needs include:

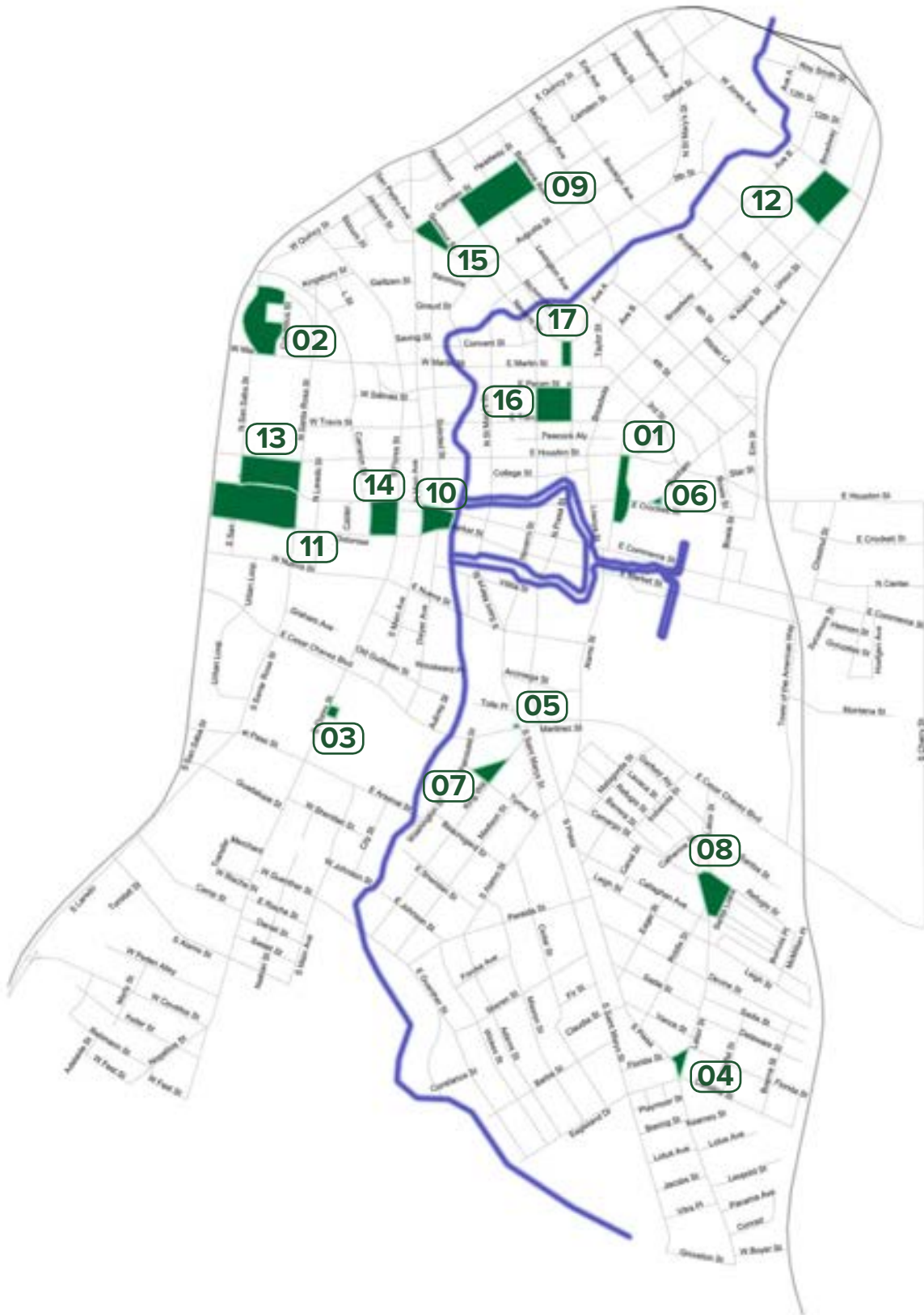
1. Overall light quality with regards to pedestrians
2. Suitability of the lighting for reinforcing the desired look and feel of the park and its surroundings
3. Functional lighting needs with respect to pathways, plazas and other pedestrian gathering spaces
4. Functional lighting needs with respect to recreational needs and special events (festivals, movies, etc.)
5. Aesthetic lighting needs for the nighttime visual enhancement of in-park architecture, art and landscape
6. Potential for light trespass, light pollution and nuisance glare
7. The role of lighting controls
8. Sensitivity to surrounding neighborhood and historic

Urban Lighting Masterplan Parks in Scope

1. Alamo Plaza
2. Columbus Park
3. Commanders House Park
4. Florida Park
5. Huizar Park
6. Johnson Fountain
7. King William Park
8. Labor Park
9. Madison Square Park
10. Main Plaza
11. Market Square
12. Maverick Pack
13. Milam Park
14. Military Plaza
15. Romana Park
16. Travis Park
17. Veteran Memorial



Maverick Park



context, where applicable

9. Sensitivity to matters regarding long term operation, energy, and sustainability
10. Suitability/flexibility for “smart pole” adoption
11. Understanding of costs

The ultimate goal of the Master Plan for parks is to define lighting and lighting control approaches that will enhance their nighttime usability and appeal.

CIVIC ART

Openly accessible art can play an important role in enhancing a community’s everyday life. Like many cities in America, San Antonio has made significant strides in recent years elevating public art to a prominent position throughout the urban area. The city’s Department of Arts & Culture advocates for the growth of the local creative industry by increasing awareness of the impact and value of arts and culture to the community.

The revelation of artwork in the nighttime is of prime importance to the goal of extending its impact and enjoyment to both citizens and visitors to San Antonio. The ULMP helps in establishing guidelines for the lighting of art, including addressing the following issues:

1. Design approaches and methods for best enhancing art
2. Suitability of various light sources and equipment types
3. Potential impacts to surroundings brought about by illuminating artworks including: light trespass, light pollution and nuisance glare
4. Sensitivity to surrounding neighborhood and historic context, where applicable
5. Sensitivity to matters regarding long term operation, energy, and sustainability
6. Understanding of costs

Art need not go dormant after dark. Appropriately illuminated pieces are not only made more conspicuous



Map of public artwork across greater San Antonio



Leon Creek Crossing - Barbara Grygutis

(Hausman Road at the Howard Peak Greenway Trail at Leon Creek)



600 Navarro St (Navarro St & E Houston St)



San Antonio Express News building; 301 Ave E (3rd St & Ave E)

through light, but the inherently dimmer surroundings present during evening hours affords opportunities for dramatic enhancement and material enrichment.

BUILDING ARCHITECTURE

One of San Antonio's greatest treasures is its architecture. The city-wide collection of both historic and contemporary buildings, public and privately owned, tell the story of San Antonio through its early days to the present.

A number of San Antonio's existing buildings and structures have incorporated nighttime aesthetic enhancement lighting. Some of these lighting efforts are well-conceived and flattering to the building, while other more modest attempts add little to the structure's posture after dark. Still other attempts have fallen into disrepair or neglect such that they are no longer successful or appealing. The Master Plan strives to provide the much needed guidance for building owners – whether they be city or private entity – on how to best consider illuminating their structures for the enhancement of the property and the betterment of San Antonio.

The ULMP will help in establishing basic approaches for the lighting of building facades and similar structures, addressing the following

issues:

1. Recognizing the real benefits of lighting buildings and feature structures from both ownership and public viewpoints
2. Understanding the building and how best it could be enhanced through lighting after dark
3. Sensitivity to historic considerations where appropriate
4. Approaches and strategies for nighttime illumination
5. Mitigating through good design, the potential negative impacts to surroundings due to light trespass, light pollution and nuisance glare
6. Examples of building lighting designs possible in San Antonio, using mock-ups, renderings, and narrative communicating effects
7. Sensitivity to matters regarding long term operation, energy, and sustainability
8. Understanding of costs



615 E Houston St, Hipolito F. Garcia Federal Building and U.S. Courthouse
(N Alamo St & E Houston St)



Lighting mock-up performed on The Savoy Building as part of the public engagement process for the ULMP.

VISION



The citizens of San Antonio share a city with a rich and storied history, worthy of both honor and celebration. So, too, do they look to a future as a modern urban community, working together to improve the city and the quality of life for all that live, work, and visit. It is against this backdrop that San Antonio considers this master plan for lighting throughout the urban center and beyond into surrounding communities.

At its core the successful urban lighting master plan seeks to define the role of illumination in supporting, sustaining and nurturing the nighttime urban environment. The master plan also gives perspective to the lighting system impact on the city's daytime street life, in addition to its potential role as a broader, active participant in a digital communication infrastructure. It provides a construct and basis for current and future development of lighting throughout the city. It is not limited to street and sidewalk lighting alone but, rather, it embraces other salient aspects of the nighttime street-level visual experience to better portray the true interactive human experience. Ultimately, the lighting master plan establishes the basis for creating the highest level of lighting quality possible throughout the urban core.

OVERVIEW

The development of urban street overlays with a detailed hierarchical portrait of street usage, vehicular traffic flow and pedestrian interaction, is a cornerstone to a lighting master plan. It assists in forming lighting approaches suited specifically to streetscape use and community or neighborhood needs. Derived from these overall plans is insight related to:

1. Establishment of pole heights and scales reflective of functional lighting and aesthetic needs for each streetscape type.
2. Forming of dedicated pedestrian streetscape lighting zones in areas where such lighting is beneficial and reinforcing of neighborhood requirements and future



Urban Lighting



San Antonio street pole hierarchy



Illustrative cross-section graphic of reference lighting approach



Understanding the impacts of off-street lighting on the public right-of-way.



Integrated light pole and components

demands.

3. Assignment of vehicular and pedestrian illumination levels by area and determined need.
4. Assessment of uniformity of illumination by area and determined need.
5. Creation of guidance for light source color temperature and color rendering characteristics by neighborhood.
6. Identification of building frontage where facade lighting would make a measurable and positive contribution to streetscape enrichment.

Although the visual revelation that lighting provides to a city after dark is its most tangible and identifiable contribution, the means and methods used to deliver that illumination are equally as important. Some of the less obvious and frequently ignored or misunderstood attributes include:

1. Aesthetic suitability of poles and lighting equipment.
2. Integration of non-lighting digital components into lighting system structures including such items as wireless control equipment, environmental sensors, diagnostic devices, activity monitors, cameras, Wi-Fi, crisis response systems and similar technologies
3. Use of light poles and related gear for engagement of other streetscape elements such as planters, graphics, signage, pedestrian amenities and similar conveniences.
4. Incorporation of local and system-wide lighting controls.
5. Monitoring and management of energy use and conservation techniques.
6. Realizing sustainability.
7. Emphasizing operational and maintenance considerations.
8. Incorporating future system growth, management and elasticity.

LIGHTING QUANTITY

How much light is enough? How much is too much? The understanding of lighting intensity and its distribution is a functional cornerstone to vision in the natural and built environments. Much has been learned about the science of seeing over the past century, and this knowledge has led to the development of practical illumination standards. In North America, the illuminating Engineering Society is recognized as the preeminent authority in the establishment of consensus standards of practice for lighting levels.

The lighting master plan clearly identifies illumination levels appropriate to each street type and pathway setting, further tempered with insights as to how these lighting levels relate to the total visual experience.

LIGHTING QUALITY

PEDESTRIANS

The pedestrian visual experience varies significantly across activities found in the outdoor urban environment. This depends on many factors, some manageable and others uncontrollable. All too often, attention is paid principally - if not exclusively - to the quantity of illumination when formulating a nighttime lighting approach, rather than its quality. Although lighting levels are significant, they are only one of many ingredients in a successful lighting design. In fact, ignoring qualitative aspects of light may lead to a failed nighttime condition regardless of the quantity of illumination provided.

The horizontal plane seen by pedestrians, including sidewalks, streets, plaza paving, etc., occupies only 10% to 15% of a person's common view. Building facades, storefronts, canopies, landscape, graphics and even other pedestrians, along with the sky itself, make up most of the visual scene. Understanding how these other elements interact and are seen, especially at night, can be just as important, if not more so, as any view to the surrounding

Lighting Design Criteria for Streets					
Street Classification	Pedestrian Area Classification	Ave. Luminance Lavg (cd/m ²)	Ave. Uniformity Ratio Lavg/Lmin	Max Uniformity Ratio Lmax/Lmin	Max Veiling Luminance Ratio Lvmax/Lavg
Primary throughways/ Intermediate throughways (IES cross referenced as Major)	High	1.2	3.0	5.0	0.3
	Medium	0.9	3.0	5.0	0.3
	Low	0.6	3.5	6.0	0.3
Intermediate/ Secondary (IES cross referenced as Collector)	High	0.8	3.0	5.0	0.4
	Medium	0.6	3.5	6.0	0.4
	Low	0.4	4.0	8.0	0.4
Minor (IES cross referenced as Local)	High	0.6	6.0	10.0	0.4
	Medium	0.5	6.0	10.0	0.4
	Low	0.3	6.0	10.0	0.4

Lavg - minimum maintained pavement luminance

Lmin - minimum pavement luminance

Lvmax - max veiling luminance

Illuminating Engineering Society recognized lighting level ranges across street types within scope area. Extracted from IES RP-8.

Maintained Illuminance Values for Walkways		
	Average Horizontal Illuminance (FCs)	Uniformity Ratio Ave/Min
Mixed Vehicle and Pedestrian	2.0	4:1
Pedestrian Only	1.0	4:1

Illuminating Engineering Society illuminance standards for streets and sidewalks. Extracted from IES RP-8.



Vehicular lighting quality



Pedestrian lighting quality

horizontal pavement surfaces.

The lighting for pedestrians, whether along streetscapes, in parks or in other nighttime outdoor social settings, must take into account the full visible environment.

DRIVERS AND BICYCLISTS

Good lighting for vehicle drivers and bike riders begins with the control of glare in the field of view. Research has shown that a high percentage of nighttime urban accidents – especially those involving automobiles and pedestrians – are due to direct or reflected glare creating compromised visibility for the driver or bicyclist. The better glare is managed at its source, the less likely it will be to compromise visibility along city streets.

Adequate illumination of street surfaces, curb edges, crosswalks and other potential auto, bicycle and pedestrian interaction areas is an important aspect of lighting quality in streetways. Detection of potential hazards or unwanted interactions is best accomplished with lighting levels at or slightly exceeding recommended practice. Lighting for driving and bicycling must emphasize qualitative aspects of good lighting practice through the application of low-glare lighting systems.

The vision for the ULMP must consider the essential elements that contribute to the overall visual environment, as well as how those elements can help provide for the greater good of the community at large. The city of San Antonio has committed through the development of the ULMP to thoughtfully look to the future to help improve and promote a high quality of light for its citizens.

QUALITY OF LIGHT



There are two kinds of light - the glow that illumines, and the glare that obscures. - James Thurber

Light is both simple and complex. It sustains our existence and provides revelation for our perceptions of the world. Often lighting for streets, sidewalks, and parks is reduced to an exercise of “How much light do we need to see?” Although the physiological function of seeing is relatively well understood and, to a degree, quantifiable, it is far from the only important aspect of good lighting.

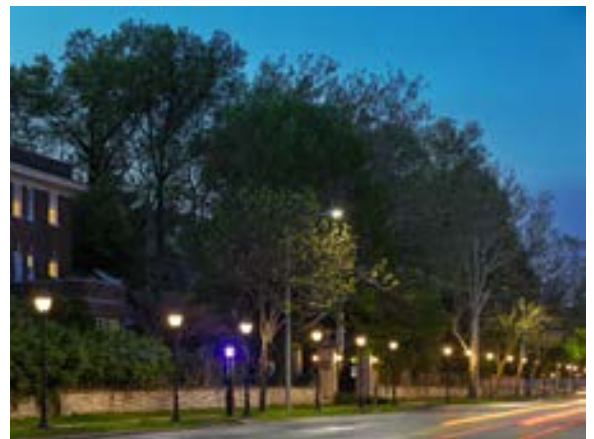
Much of our everyday lives are influenced by visible and non-visible aspects of light. Often referred to as our “internal clock,” circadian rhythm, which is impacted significantly by light, is a cycle that tells our bodies when to sleep, rise, and refuel — regulating a number of important human biological processes. As recently as 2017 the American Medical Association (AMA) released a position paper commenting on the potential impact of both visible and non-visible light in the outdoor environment on people. It addressed predominately short-wave length light (“bluish”) and possible adverse effects to the human biological system. This prompted further review and discussion throughout the lighting industry, and will continue to grow in its magnitude of importance over the growing years.

How we feel – our moods, psychological well being and perceptions about the world at large - can all be influenced by lighting.

Defining light quality in the outdoor built environment is difficult and often elusive. Acknowledging the importance of illumination to make visible driver and pedestrian tasks is straightforward, but the non-quantifiable aspects of the lighted environment relating to quality that are less tangible. Significant research from as early as the 1970's has helped identify ways that lighting influences, both positively and negatively, the subjective impression of space. Lighting designers and illuminating engineers have long since embraced these fundamental understandings and used them to inform design decisions. Some of the



Lighting can create a signature nighttime skyline



Illumination for pedestrians and vehicular uses



Building lighting - facades illumination and storefronts - help activate the streetscape at night



Lighting for a sense of safety and prospect (security)



Lighting for Orientation and Wayfinding



Lighting for dramatic effect

most recognizable areas of perception that have been shown to be affected by visible light include:

1. The sense of safety and prospect (security)
2. Anxiety or calmness
3. Orientation
4. Wayfinding
5. Expansiveness or privacy
6. Social space or public space
7. Excitement or calmness

A variety of lighting design techniques and application approaches have been shown to influence these aspects of subjective impression. Understanding how light can reinforce these impressions can help us create friendlier looking parks, easier to navigate streets, and enhancements in the overall perception of safety and security.

There is one aspect of outdoor lighting that is more problematic than any other when it comes to the disruption of our nighttime. It is glare. The Illuminating Engineering Society defines glare as: "...the sensation produced by luminances (brightnesses) within the visual field that are sufficiently greater than the luminance (brightness) to which the eyes are adapted to cause annoyance, discomfort, or loss in visual performance or visibility." An even more direct characterization of glare would be "excessive brightness in the field of view." Glare makes it more difficult for the eye to function. Eliminating or greatly minimizing glare in the outdoor setting is the hallmark of good quality lighting. In the age of solid state LED light sources, the danger of introducing glare into the visual environment, even accidentally, is greater than ever before.

This master plan seeks to establish lighting quality as the cornerstone of San Antonio's nighttime visual environment.

UNDERSTANDING & MITIGATING GLARE

Nothing erodes or compromises human vision more than glare. Certainly all sighted people recognize the sun as a natural glare source and when needed take measures necessary to mitigate the often disabling and uncomfortable aspects of its overwhelming brightness. The fully functioning human visual system is perhaps our most wondrous and resilient sense, but dealing with excessive brightness variations in the natural and built environments is a difficult challenge.

The alleviation of effects from light source glare in nighttime conditions is fundamental to good visibility, comfort, and psychological wellbeing. One of the core goals of the ULMP is to provide a framework of design understanding that emphasizes high quality lighting as a cornerstone to a successful nighttime environment. There are no actions with regard to lighting and its application that will be more impactful in fostering a high quality visual environment than that of good glare control.

The effective shielding of harsh light sources, lenses, reflectors and other bright elements within normal fields of view allows the eye to see more clearly and effectively. Low-glare environments are perceived as visually richer, more finely detailed and particularly colorful when there is a near absence of glare. As visibility is heightened under these conditions, so too, is the awareness, engagement and enjoyment of the surroundings.

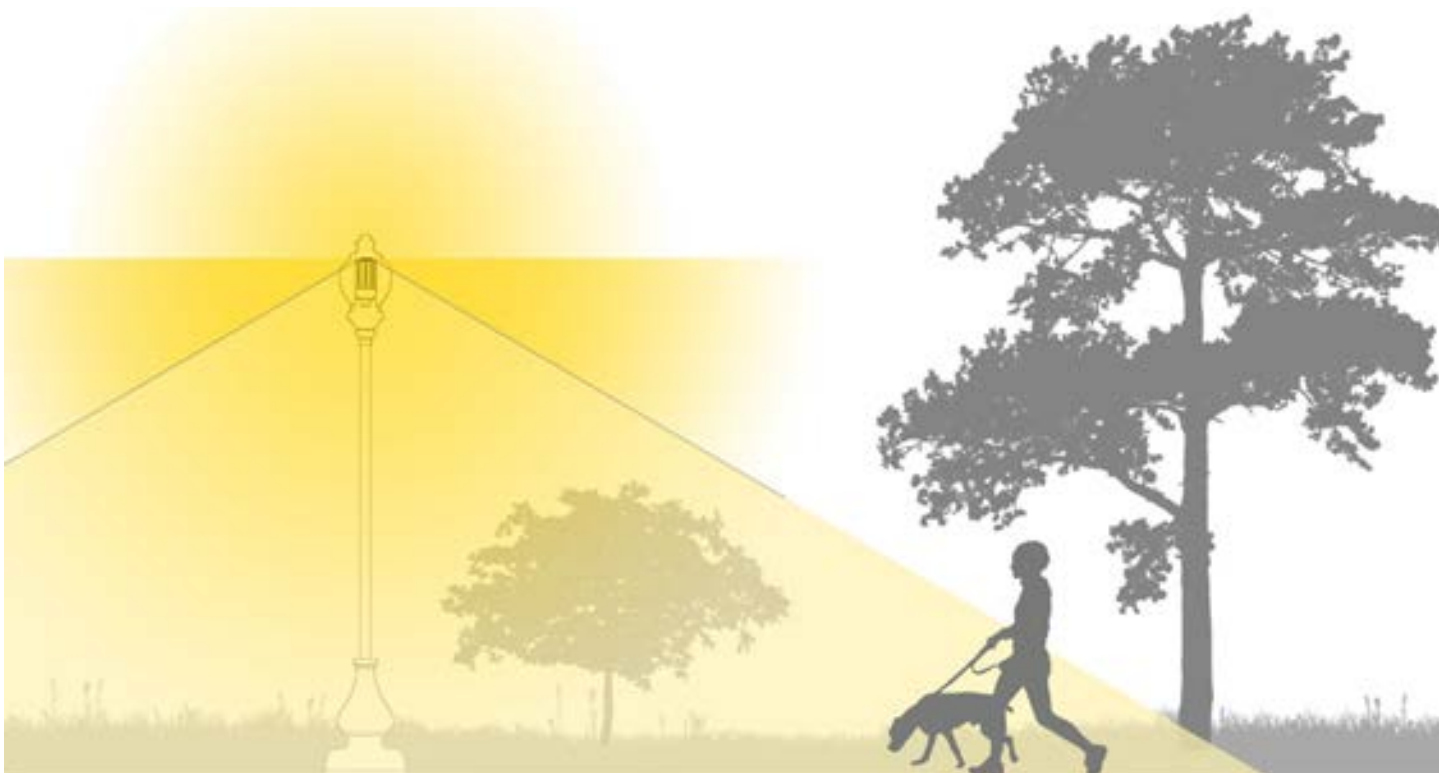
Backlight-Uplight-Glare (B-U-G) is a rating system developed by the Illuminating Engineering Society and the International Dark Sky Association. It is used to evaluate lighting fixture optical performance related to light trespass, sky glow and high angle brightness. The rating values are based on total lumen output in various angular zones. Threshold values (maximums) are established for each zone as a guide for control of unwanted or compromising light.



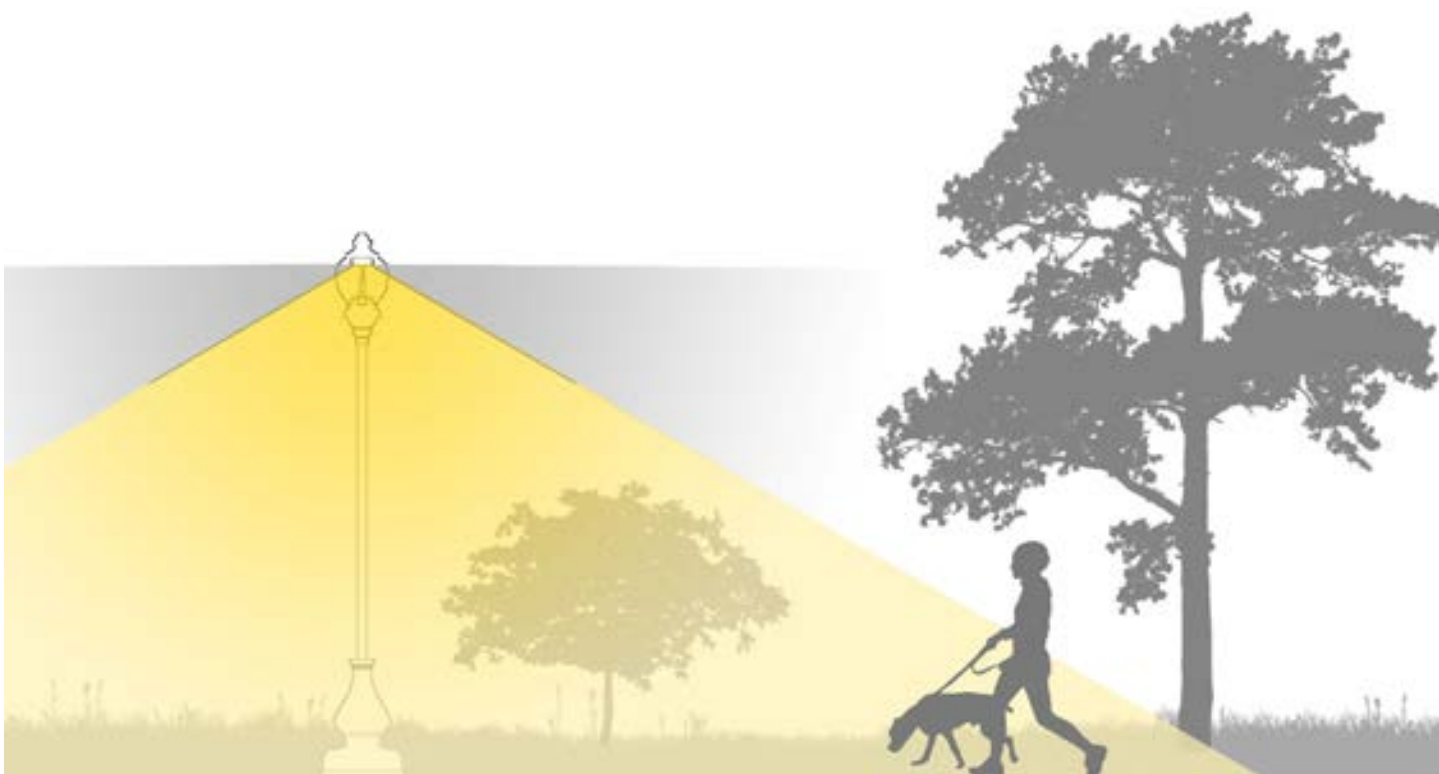
Providing soft vertical light that is conducive to good visibility of nearby pedestrian and aids in the creation of functional illumination of pathways.



Stray light and glare can severely erode visibility and compromise perception, heightening pedestrian feelings of uncertainty.



Traditional refractor or diffuse 'acorn' style globe luminaires that utilize non-shielded sources create both glare and excessive spill lighting including upward directed.



New and retrofit fixtures that obscure the source and use a cutoff optic system reduce glare as well as greatly minimize uplight.

DEFINING AND UNDERSTANDING WHAT WE SEE

The constituents of the visual environment are brimming with textures, colors, and contrast, all constantly changing as we move about and alter our focus and attention. After dark, when we consider the functional needs for illumination - how much light and where – often only the street and sidewalk ground planes are given concerted consideration. Although the need to avoid obstacles or hazards while walking, and deal with pedestrian crossings or other vehicles while driving is important, what we actually “see” is far greater in scope. A comprehensive lighting design approach must consider all portions of the field of view and how lighting conditions associated with those features will collectively influence the users of the streetscape.

The quality of light often depends far more on how vertical objects and planes in the field of view are revealed – whether planned or not. Are important boundary areas illuminated in a manner that reinforces wayfinding and helps dispel security concerns? Can the faces of people approaching or nearby be clearly seen? Is the color of light realistic and reassuring for helping to comprehend the surroundings? Are attractive or interesting facades exposed by appropriate lighting for aesthetic enjoyment? All of these issues should be addressed as a part of thoughtful lighting design process.



Facade and other structures in the downtown core can create walls and perceived boundaries.



Dominating trees, adjacent parking lots and distant landmarks define a strong asymmetric view.



Much-varied street perimeter loosely defines the vehicular path.



A typical pedestrian view in downtown San Antonio.



What is it we really see in a complex visual scene?

STREETSCAPE OVERVIEW

Views in the urban environment can take on aspects of an outdoor "room," complete with walls, ceilings, floors and a many-textured collection of ornament or surface cover. During daytime, the perception of urban scenes are altered significantly by the sun and attendant weather conditions. The resulting contrast situations affect the visual hierarchy, perceptual cues and resulting actions arising from those judgments.

After dark, the ordering of visual importance is up to happenstance or by means of planned implementation of an electric lighting design. It is this understanding that should be the motivation for addressing quality of light.

The reinforcement of key visual cues that relate to perceptions of safety, security, wayfinding and the general sense of space, may be critical to the overall visual success of a street experience.

ROADWAY PLANE

The roadway plane is often seen by the pedestrian as partially obscured or cluttered and is a secondary surface for normal views or search scan. The view of the street surface from sidewalk view, frequently makes up only 10% or less of the overall visual scene.



The roadway plane



The roadway surface at night is more impactful to the driver's view.



Pedestrian walkway surface

PEDESTRIAN WALKWAY SURFACE

Sidewalks and pathways are important visual planes for pedestrians, but often only peripherally. A walker's gaze downward to check for hazards is fleeting and often subconsciously less important and causal than farther afield focus. More distant views to the sidewalk plane aid in orientation and pacing on longer journeys. Like roadways, sidewalk planes may make up only 5% to 15% of the normal view of a pedestrian, often impacted by the presence of street amenities, plant materials, poles, signage and other pedestrians.



Pedestrians see the walking surface as both a near and far field plane, each being important to decision making.

STOREFRONT AND STREET LEVEL FACADES

Storefronts and vertical planes at street level are often among the most important components in the visual field. Much of the pedestrian gaze is occupied by both casual and deliberate viewing of these surfaces. They offer multi-dimensional, frequently variegated views and interest beyond simple or subconscious orientation. The light at, in, or on these surfaces, or lack of it, is crucial to pedestrian understanding of space and the subliminal reinforcement of orientation and wayfinding. The visual richness and frequent irregularity of the views to these planes can add interest and vitality to the experience of the streetscape.



Storefront and Street level facade elements are multi-dimensional and often non-planner



The dimensional aspects of storefront planes make them particularly influential in the visual field.



Building canopies and overhangs have strong impacts both up close and from a distance.

STREET LEVEL CANOPIES AND BUILDING OVERHANGS

San Antonio is a city of canopies. Much of the commercial downtown core exhibits building mounted or column supported roof coverings. They provide protection from the weather – especially the sun, extend space, provide a pleasant pedestrian scale and can serve as an extended front door for building entries. After dark they become ceiling planes and strong influences on both pedestrian and driver. They frame views to windows, storefronts and doors. The nature of how they are lighted must be considered from both near and far field viewing. Pedestrians' sense of scale is impacted dynamically by canopies as they are actively engaged.



Lighting of and beneath canopies is a major influence, especially to pedestrians.

UPPER LEVEL FACADE ELEMENTS

The facades of buildings are often the most dominant element in far field pedestrian or driver view. They are the walls of the streetscape enclosure. Up to 40% to 50% of a common pedestrian gaze can be occupied by perimeter building faces. The light from these surfaces can make an enormous impact on the overall quality of the nighttime urban environment. Controlling glare from light sources so that these surfaces can be seen, and thereby participate in an active role as form-giver for the streetscape, is an extremely important design precept. Deliberate illumination of facades, even partially, can reinforce a sense of safety and security, as well as establish a grander or more engaging feeling of space.



View to facades can comprise a surprisingly high percentage of a streetview,



A street facade can be the singularly most dominant contributor to a streetscape view.



Streetscape influence from landscape, signage and street amenities can vary dramatically from street to street.

LANDSCAPE AND STREET AMENITY ELEMENTS

Trees, landscape, benches, bus stop shelters, signage and other street amenities can be seen throughout urban San Antonio. Both singularly and collectively, these elements impact the visual experience for those who use streets and parks. It is not unusual on heavily landscaped streets or park areas, for instance, to see trees occupy a substantial part of the visual field. Their influence can be significant and often even disproportionately so after dark. This influence during the nighttime should not be ignored. Highlighting landscape for aesthetic purposes or to dispel shadows, invitingly illuminating bus stops, accenting signage and graphics, and visually acknowledging key orientation markers, are all measures that should be considered.



Landscape and secondary street elements are often major contributors to human scale and sense of place.

STREETSCAPES



INTRODUCTION



An active streetscape at night



Looking east along Market Street from The Briscoe Western Art Museum



A residential street in the King William neighborhood

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Streetscape design must take into account a number of different factors across the scope area of this ULMP. From a dense, commercial central core supporting business, tourism, conventions, and cultural buildings; to multi-use developments and light commercial in the area north of the central core; to low density single and multi-family residential in the southern portions; the scope area exhibits wide ranging diversity. Each of these zones and land uses share a common characteristic, however, which is the need for a higher quality, better balanced lighting system for both pedestrians and vehicular users.

As the trend in urban planning shifts to more diversified land use, 'pedestrian walkability', and a shift in younger generations towards urban living, this only increases nighttime activity and the demands for quality lighting. Lighting of streetscapes should strive to go beyond safety and security to include place making and way-finding. The City Connected and Reference Streetscape Lighting Approaches that follow provide the necessary planning tools, outlining a series of lighting characteristics, to support these primary streetscape lighting demands.

This section will also address other systems that influence streetscape design including how private spaces interact with the public right-of-way and how they can be designed to positively impact the night-time environment. Lastly, it will address options for deployment of Smart City systems that can be incorporated into the lighting infrastructure.

SURVEY & ASSESSMENT OF EXISTING CONDITIONS

LOOKING AT THE CITY

In order to maximize the benefit of the ULMP effort, it was best to first understand present-day illumination conditions throughout the scope area. Although lighting circumstances cannot be defined simply by measuring and reporting illuminance levels on streets and sidewalks, nor described fully by only surveying the type and efficiency of existing lighting equipment, the comprehension of the quantifiable aspects of lighting does provide basic insight.

Many of the most important aspects of the lighted environment are best assessed observationally. Questions like: Is it glary and uncomfortable? Does it feel safe and secure? Is it helpful for orientation and wayfinding? Is it appropriate for the application needs? Is it aesthetically suitable day and night? Answers to these and similar queries are foundational in recognizing the overall quality and effectiveness of an existing lighting system.

SURVEY & ASSESSMENT OVERVIEW

A detailed daytime and nighttime review of the project scope area was conducted at the outset of the master planning effort. This survey had a number of specific goals important to the development of the overall ULMP.

1. Gain a comprehensive understanding of the streetscape conditions germane to the development of the lighting master plan.
2. Make use of street classification designations, derived from the Federal Highway Administration (FHWA), for the specific needs of San Antonio streets for helping to establish illumination level guidelines throughout the downtown scope area.
3. Identify street and sidewalk lighting conditions where detailed daytime and nighttime measurements would be taken. Streetscapes selected would provide a



N Alamo St. looking north, daytime



N St. Marys St. looking north, daytime



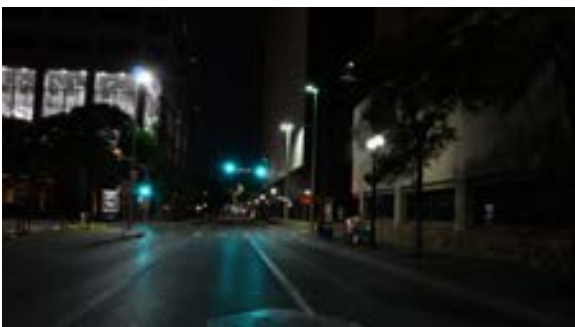
McCullough Ave. looking east, daytime



S Presa St. looking north, daytime



N Alamo St. looking south, evening



Navarro St. looking north, evening



E Market St. looking east, evening



S Alamo St. at E Guenther St. looking south, evening

representative cross section of those found throughout the entire master plan scope area.

4. Conduct an evaluation of street-side buildings and structures for further consideration as possible lighting contributors to the overall streetscape environment.
5. Consider nocturnal impacts of other streetscape contributors such as:
 - a. Building overhangs and canopies
 - b. Streetside icons, graphics and signage
 - c. Alleyways and underpasses
 - d. Private parks and plaza zones
 - e. Off-street parking lots (surface and garage)

The scope-wide lighting review provided a basis from which the master planning process began. Both objective and subjective assessments were included in the survey and investigation.

OBJECTIVE EXAMINATION INCLUDED:

1. Measurable lighting quantities of illuminance and uniformity of light distribution
2. Light source identification (high pressure sodium, metal halide, compact fluorescent and LED)
3. Light source color attributes (Color temperature, color rendering properties - quantified when possible)
4. Currently installed lighting equipment types
5. Presently operating lighting control systems (where known)

SUBJECTIVE JUDGMENTS INCLUDED:

1. General quality of light
2. Impact of light source glare on drivers, bikers and pedestrians
3. Appropriateness of lighting equipment selection with respect to visual needs
4. Impression of existing lighting equipment aesthetics
5. Observation of existing lighting layouts and their effectiveness in the reinforcement of orientation, wayfinding and safety

This survey work was done across a range of representative street types throughout the scope area. Detailed results can be found in Appendix 2 'Street Lighting Survey Results'.

SUMMARY OF FINDINGS

The nearly five-month long streetscape review and assessment process provided valuable background on aspects of the current lighting conditions. Technical appraisals and general observations for the detailed reviews are included in A2 - Street Lighting Survey Results.

As it was not practical, nor necessary, to visually inspect and take illuminance level measurements on every block across the entire scope area, a first pass evaluation of all the streets was done to identify the typical lighting conditions throughout the downtown. As a result of this appraisal, thirty (30) street blocks



N Main St. at W Pecan St. looking south, daytime



N Main St. at E Houston St. looking north, evening

were identified as representative of the lighting situations occurring in the ULMP scope area.

The surveyed streets were segregated into four (4) distinct groupings – Minor, Secondary, Intermediate Throughway, and Primary Throughway - with each group representing the basic street use within the City. This was done to better align with the proposed classifications used elsewhere in this master plan. In the City Connected subsection that follows, these classifications are described in detail.

MINOR STREETS - PRIMARILY RESIDENTIAL

These are streets that serve principally as local access, with little dedicated through-traffic. This would include areas with single-family and duplex homes, as well as other multi-family dwellings. These streets are most closely associated with FHWA Classification Urban Local.



Erie Ave looking west from Camden



Dallas looking north from McCullough

King William Street is representative of the current City lighting strategy for the Minor street category. This, and typical blocks of this type, normally use pole mounted (25' +/-), cobra-head style High Pressure Sodium (HPS) fixtures at street intersections and pole mounted (25' +/-), cut-off style LED fixtures at the midpoints of the block, when the block exceeds 300'-0". Some streets not yet fully converted still use all HPS sources, while others are completely changed out to LED cut-off style heads. The spacing between these fixtures can be over 200' depending on the street length. Illumination levels at the intersections were found to be 0.2 to 0.5 foot-candles, 0.4 to 0.7 at the mid-block pole, and 0.01 to 0.03 foot-candles in between the poles. Overall maximum:minimum uniformity levels were found to be over 20:1 in most areas. Both the average illuminance and uniformity of illuminance were found in non-compliance with the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed.

Other observations of this and typical streets in this category include:

1. Excessive spacing of light poles heightens impact of, light fixture glare, especially at mid-block conditions, resulting in diminished visibility to both drivers and pedestrians.
2. The extreme non-uniformity of illuminance on these streets diminishes wayfinding ability by effectively suppressing many visual cues. This condition can also result in perceptions of an unsafe environment to many residents.
3. The color temperature of the LED fixtures deployed on these streets is quite cool in appearance (4000K CCT), a whiteness which is normally perceived by home-dwellers in residential areas as sterile, unflattering to pedestrians, and a dissimilar aesthetic.
4. The height of 25'+ poles in residential neighborhoods compromises scale and de-emphasizes pedestrian activity.
5. The poor color rendering High Pressure Sodium fixtures in areas where found compromises visual perception and enjoyment of the nighttime neighborhood environment.
6. The use of wood power poles for attaching streetlights is not ideal, as many of the poles are unsightly and out of-plumb.

Other similar streets surveyed include: Adams St., Carolina St., Keller St., and others.

MINOR STREETS - PRIMARILY MIXED-USE AND COMMERCIAL

These are streets that serve urban-centered mixed-use and commercial zones with destination street level activity such as retail, with limited dedicated through-traffic. These streets are most closely associated with FHWA Classification Urban Local.

There is little consistency in lighting approach among the typical streets of this type in the scope area. Principal examples of what techniques are used for these blocks highlights the lack of continuity within this important street type.



Florida looking west from Staffel



E Guenther St looking west past Madison

Alamo Plaza uses pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) lighting equipment for general illumination, augmented by 14' to 16' poles with five diffuse globes operating compact fluorescent sources. The stretch of street with only the decorative diffuse globe assemblies in place sees only an average of 0.2 to 0.3 average foot-candles. High pressure sodium areas are in the 0.8 to 3.0 foot-candle range, with reasonably good uniformity.

Auditorium Circle uses pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) lighting equipment for general illumination, augmented by nearby light columns adjacent at the auditorium. Illuminance levels are generally consistent with consensus standards of practice exhibiting an average illuminance of 0.8 to 2.2 foot-candle. Uniformity of illuminance is also good.



Navarro looking south from Market

College Street uses only pole mounted (30') tri-party metal halide cut off luminaires for general street and area lighting. General illumination at intersections is adequate with an average of 1.4 to 2.9 foot-candles. With only a single pole at mid-block, illuminance falls to 0.4 to 0.9, on average, but with relatively good uniformity.

E Crockett, between Losoya and N Presa, is illuminated by only 14' to 16' poles with five diffuse globes between intersections, operating compact fluorescent sources. Lighting levels average near 0.5 foot-candles, while uniformity of illuminance is substandard. These results do not meet the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed.



Dwyer Ave looking south at Stumberg St

Old Guilbeau Street is illuminated using a combination of mostly pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) 2200K fixtures with just a few pole mounted (30' +/-), cut-off style LED 4000K fixtures. Illumination levels average 2.5 and 5.0 foot-candles between intersections, with good uniformity. Intersections average 3.5 to 7.5 foot-candles. Overall maximum:minimum uniformity levels were found to be within acceptable

values. Both the average illuminance and uniformity of illuminance were found to comply with the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed, however the street has an appearance of being over-lighted when compared with some other streets and areas nearby.

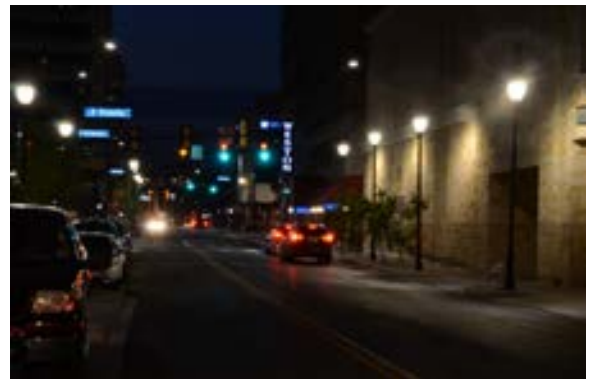
Sections of Soledad Street, that were surveyed include relatively recent lighting upgrades. The blocks include a limited number of pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) 2200K fixtures. Most of the streetscape in this zone is illuminated using pole mounted (30' +/-), cut-off style LED 4000K fixtures, augmented by mid-height (18') acorn style fixtures operating a semi-cutoff optic LED assembly. Lighting levels average between 1.5 and 2.5 foot-candles with good uniformity.

Other observations of this and typical streets in this category include:

1. Where dropped-refractor high pressure sodium (HPS) cobra head style fixtures are still in use, their direct glare is in marked contrast to the better LED semi-cutoff optic luminaire styles used with other poles.
2. Where still utilized, the poor color rendering High Pressure Sodium fixtures diminish visual perception and acuity, while making it considerably more difficult to discriminate colors in the environment.
3. The color temperature of the LED fixtures deployed on these streets is quite cool in appearance (4000K CCT), a whiteness which is not normally associated with historic downtowns.
4. On Soledad, where there is limited deployment of the acorn shade style heads using internal semi-cutoff LED optics, effective pedestrian illumination and additional pavement illuminance for vehicles and bicycles is a welcome addition.
5. A number of street blocks in this category include 14' to 16' poles with diffuse globes operating compact fluorescent sources - including one, two, four and five-globe configurations. These fixtures are neither historic, nor effective. They produce glare and add little functional



Jefferson looking south from Auditorium



Soledad looking north from Houston

illumination to either pedestrian or vehicular areas. They are difficult to maintain.

SECONDARY STREETS

These are streets that serve both land access and traffic circulation in higher density residential and commercial/mixed-use areas. They distribute and channel trips between Minor Streets and Intermediate and Primary Thoroughfares. These streets are most closely associated with FHWA Classification Urban Collector.

S Presa is representative of the current City lighting strategy for the majority of the Secondary Street category. This, and typical blocks of this type, normally use pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) 2200K fixtures and/or pole mounted (30' +/-), cut-off style LED 4000K fixtures. Tri-party, pole mounted (30'+/-) metal halide 4000K cut-off style fixtures in one, two and three unit configurations are used at some intersections and mid-block applications. On typical blocks, the spacing between pole mounted fixtures varies between 100' and 130'.

On some blocks surveyed, 14' to 16' poles with diffuse globes are illuminated using compact fluorescent sources.

In most areas, illumination levels average between 1.5 and 5.0 foot-candles between intersections, with low points at 0.4 and 0.7 foot-candles. Intersections average 2.2 and 5.0 foot-candles. Overall maximum:minimum uniformity levels were found to be within acceptable values on these streets. Both the average illuminance and uniformity of illuminance were found to comply with the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed.

E Houston Street is an exception for the Secondary Street standard, as it uses an acorn shade style with internal semi-cutoff LED optics along the street blocks between intersections. Average lighting levels are between 2.0 and



S Presa St looking north from Callaghan Ave



S Presa St looking north from Sadie St

3.5 foot-candles, with a good illuminance uniformity of approximately 3:1.

Other observations of this and typical streets in this category include:

1. Where dropped-refractor high pressure sodium (HPS) cobra head style fixtures are still in use, their direct glare is in marked contrast to the better LED cut-off optic luminaire styles used with other poles.
2. Where still utilized, the poor color rendering High Pressure Sodium fixtures diminish visual perception and acuity, while making it considerably more difficult to discriminate colors in the environment.
3. The color temperature of the LED fixtures deployed on these streets is quite cool in appearance (4000K CCT), a whiteness which is not normally associated with historic downtowns.
4. The uses of wood power poles for attaching streetlights is not ideal.
5. A number of street blocks in this category include 14' to 16' poles with diffuse globes operating compact fluorescent sources - including one, two, four and five-globe configurations. These fixtures are neither historic, nor effective. They produce glare and add little functional illumination to either pedestrian or vehicular areas. They are difficult to maintain.

Streets surveyed in this category include representative blocks from: E Houston, Navarro, N Alamo, N St. Mary's and S Presa.

INTERMEDIATE THROUGHWAYS

These are streets that Interconnect with, and augment, the higher-level Primary Throughways. They provide more land access than Primary Throughways without penetrating identifiable neighborhoods. These streets are most closely associated with FHWA Classification Urban Minor Arterials.

Broadway is representative of the current City lighting strategy for the majority of the Intermediate Throughways



E Quincy St



E Quincy St looking north from Richmond Ave

category. This, and typical blocks of this type, normally use pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) 2200K fixtures and/or pole mounted (30' +/-), cut-off style LED 4000K fixtures. Tri-party, pole mounted (30' +/-) metal halide 4000K cut-off style fixtures in one, two and three unit configurations are used at some intersections and mid-block applications. On typical blocks, the spacing between pole mounted fixtures varies between 150' and 175'.

On some blocks surveyed (S Flores St., for example), 12' to 14' poles with acorn shade style heads using internal semi-cutoff LED optics are used for partial street and predominant pedestrian illumination. These are effective options.

Additionally, on several blocks surveyed, 14' to 16' poles with diffuse globes are illuminated using compact fluorescent sources.

In most areas, illumination levels average between 0.8 and 3.0 foot-candles between intersections, with low points at 0.4 and 0.9 foot-candles. Intersections average between 1.0 and 5.0 foot-candles. Overall maximum:minimum uniformity levels were found to be within acceptable values on most street blocks. Both the average illuminance and uniformity of illuminance were found to comply with the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed.

S St Mary's (@ Villita) and its adjacent blocks were found to be an exception to the surveyed areas. Illuminance levels at mid-block between poles averaged 0.2 to 0.3 foot-candles. These street sections had mostly 14' to 16' poles with diffuse globes between intersections, operating compact fluorescent sources. Uniformity of illuminance was also substandard and did not meet the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed.

Other observations of this and typical streets in this category include.



Broadway St looking south from Brooklyn Ave



Broadway St looking north from Eighth St

1. Where dropped-refractor high pressure sodium (HPS) cobra head style fixtures are still in use, their direct glare is in marked contrast to the better LED cut-off optic luminaire styles used with other poles.
2. Where still utilized, the poor color rendering High Pressure Sodium fixtures diminish visual perception and acuity, while making it considerably more difficult to discriminate colors in the environment.
3. The color temperature of the LED fixtures deployed on these streets is quite cool in appearance (4000K CCT), a whiteness which is not normally associated with historic downtowns.
4. Where in limited deployment, the “acorn” shade style heads using internal semi-cutoff LED optics are effective for pedestrian illumination and for providing additional pavement illuminance for vehicles and bicycles.
5. A number of street blocks in this category include 14’ to 16’ poles with diffuse globes operating compact fluorescent sources - including one, two, four and five-globe configurations. These fixtures are neither historic, nor effective. They produce glare and add little functional illumination to either pedestrian or vehicular areas. They are difficult to maintain.
6. Where occurring, the use of wood power poles for attaching streetlights is not ideal.

Streets surveyed in this category include representative blocks from: Broadway (@ 8th), Broadway (@ E Travis), S Flores Street, S St. Mary’s (@ Alamo), South St Mary’s (@ Villita), and West Jones.

PRIMARY THROUGHWAYS

These streets serve major activity centers, have the highest traffic volume corridors and longest trip demands. They interconnect and provide continuity for entering and leaving the urban area and movements through the urban area. They serve demand for intra-area travel between the central business district and outlying residential areas. These streets are most closely associated with FHWA Classification Urban Major Arterials.



McCullough Ave looking east near Avenue B



S Flores St looking north from E Arsenal St



E Commerce St looking east at S Presa St



E Commerce St looking west towards S Alamo St

E Cesar Chavez (@ Alamo) is representative of the current City lighting strategy for the majority of the Primary Thoroughway category. This, and representative blocks of this type, typically use pole mounted (30' +/-), cobra-head style High Pressure Sodium (HPS) fixtures at street intersections and pole mounted (30' +/-), cut-off style LED fixtures at the midpoints of the block. Some streets not yet fully converted to LED still use all HPS sources, and some others are completely changed out to LED cut-off style heads. The spacing between these fixtures are typically 125' to 150' depending on the street length. In most areas, illumination levels average between 2.0 and 3.5 foot-candles between intersections, with low points at 0.5 and 0.7 foot-candles. Intersections average between 0.8 and 3.0 foot-candles. Overall maximum:minimum uniformity levels were found to be within acceptable values on most street blocks. Both the average illuminance and uniformity of illuminance were found to comply with the Illuminating Engineering Society's consensus recommendations, under which this equipment was originally deployed.

Other observations of this and typical streets in this category include:

1. Several streets in this category utilize unshielded LED acorn style fixtures in either pedestrian-scaled post-top configuration (E Commerce St. (@I-37) and E Commerce (@St. Paul)) or on 30' street light poles, with the "acorn" in an inverted mounting (E Commerce @ Cherry) – just east of scope area. These fixtures introduce disability and discomfort glare and are counterproductive to good visibility. Additionally, those on pedestrian poles effectively mask from view the adjacent shop fronts, architecture and signage.
2. Where in limited deployment, the acorn shade style heads using internal semi-cutoff LED optics are effective for pedestrian illumination and for providing additional pavement illuminance for vehicles and bicycles.
3. A number of street blocks in this category include 14' to 16' poles with diffuse globes operating compact fluorescent sources - including one, two, four and five-globe configurations. These fixtures are neither historic,

nor effective. They produce glare and add little functional illumination to either pedestrian or vehicular areas. They are difficult to maintain.

4. The color temperature of the LED fixtures deployed on these streets is quite cool in appearance (4000K CCT), a whiteness which is not normally associated with historic downtowns.
5. Where still utilized, the poor color rendering High Pressure Sodium fixtures diminish visual perception and acuity, while making it considerably more difficult to discriminate colors in the environment.
6. Where occurring, the use of wood power poles for attaching streetlights is not ideal.

Streets surveyed in this category include representative blocks from: E Cesar Chavez Blvd. (@ Alamo), E Commerce St. (@ Navarro), E Commerce St. (@ I-37), E Commerce St. (@ Cherry St.) – just east of scope area, E Commerce St. (@ St. Paul Square), and N Santa Rosa St.



W Market St looking east from S Presa St



W Market St looking west from S St. Mary's St



Downtown San Antonio skyline



Downtown San Antonio skyline during evening

A city's street network serves as the primary introduction to a region. Whether traveling by car, bus, bicycle, or foot, visitors and residents will enter, and travel through, along its roads and sidewalks of the community. The urban center of San Antonio offers a range of nighttime activities such as businesses along the Riverwalk, performances at the Tobin Center for the Arts, and sporting events at the Alamodome. Burgeoning growth districts in River North and the established neighborhoods of Lavaca and King William are another sign of the city's health. While there is a great diversity of activity and development density, it is imperative that the streetscape lighting provide some visual connection.

To achieve this, the lighting of streetscapes must consider both technical requirements and fulfillment of more subjective needs. This sub-section will provide scope area planning tools addressing pole types, color temperature, and lighting intensity. When implemented by lighting design professionals and engineers, these planning tools become the heart of connecting the city through light.

USING THE CITY CONNECTED PLANNING TOOLS

The City Connected planning tools lay out the necessary technical requirements for developing a lighting design within the Urban

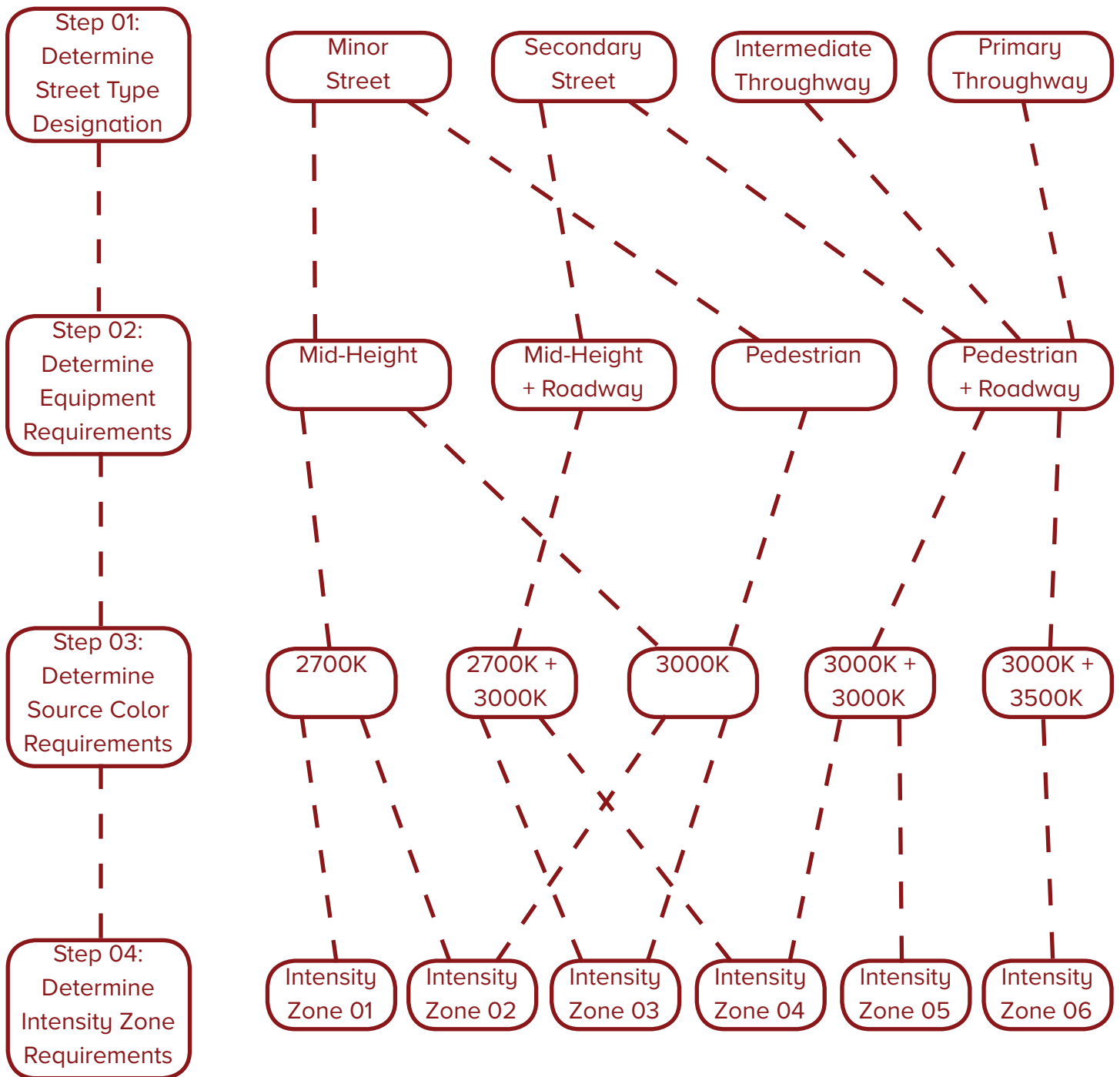
Lighting Master Plan study area. Each tool breaks down into several sub-categories accompanied by descriptive text and maps. In general, the process for determining the appropriate requirements are as follows: street type > equipment > source color(s) > intensity zone.

With any new project, the first element to verify is the designated street type: Minor, Secondary, Intermediate Throughway, or Primary Throughway. The evolution of any city will necessitate adjustments to the categorization of streets as development goals change.

Equipment requirements are outlined in detail including recommended height ranges, optical approaches, lensing, shielding, B-U-G ratings, and other similar design and performance attributes. The selection of equipment will also need to take into account the physical environment, adjacencies, stakeholder interests and preferences, budget, maintenance requirements, operational issues and other analogous concerns. Adjustments may be needed to satisfy as many of these interests as necessary.

With the introduction and rapid adoption of the LED source, there has been a concentrated effort to shift away from the focus on source efficiency to ensuring that the light source color is appropriate for creating a comfortable ambiance for those within the public realm. With this in mind, the recommendation is for warmer and more neutral color temperatures.

These tools are meant to serve as the macro level guidelines, but may be adjusted over time to meet the present and future needs of the City of San Antonio. Generally, it is expected that any shift would likely be a single step (ex: 3000K to 3500K) in either direction. For this reason, it is important that a specialty lighting consultant be a member of any project team, working alongside project team members including City planners and partners.



STREET CLASSIFICATIONS

The Federal Highway Administration offers a series of functional considerations to aide in the engineering and planning of street systems. According to a recent FHWA planning/criteria publication, “functional classification carries with it expectations about roadway design, including its speed, capacity and relationship to existing and future land use development.” To avoid confusion with more rigorous and technical streets planning, this document does not directly reference those classifications. Where appropriate, the most similar FHWA street type classification is noted. This notation does not infer any additional requirements of the streets beyond the lighting.

For the purposes of the ULMP, four street type classifications are utilized. Those include: minor streets, secondary streets, intermediate throughway, and primary throughway. In some instances, a street may change classifications as it travels through the scope area.

MINOR STREETS

Minor streets are most closely associated with FHWA Classification Urban Local and are the lowest traveled streets within a system. Not typically designed for through traffic, the primary purpose is to provide land use access to residences, businesses,



Minor streets across Downtown San Antonio scope area



Secondary streets across Downtown San Antonio scope area

and local features such as parks. Both one way and bi-directional traffic is served on minor streets.

In the case of the ULMP scope area, they are the dominant street type. Primarily one or two lane streets, with some exceptions, these streets have lower speeds and serve pedestrians as much, or more, than they do vehicles.

Reference secondary streets would include: Beauregard St., Devine St., E Rische St., Dallas St., 8th St.

Lighting characteristics of minor streets include:

1. Bias towards pedestrian scaled lighting, while also illuminating street.
2. Lighting levels that vary by primary land-use in the given area. Low-density residential will differ from medium density residential and higher-density commercial/mixed-use.
3. Glare and spill light control to minimize light trespass will be crucial in residential areas.

SECONDARY STREETS

Most closely associated with FHWA Classification Urban Collector, secondary streets serve a critical role in a given network by gathering traffic from minor streets and funneling them to the throughways. Secondary streets are present in both low and medium density areas, providing land use access as much as mobility.

Within primarily residential areas, they tend to support the adjacent commercial businesses like coffee shops, restaurants, etc. Both one way and bi-directional traffic is served on secondary streets.

Secondary streets typically have two lanes or more, supporting higher vehicular speeds and more signalized intersections. While this street type supports pedestrian use, the vehicular experience begins to become the dominant element.

Reference secondary streets would include: Houston, Presa, Laredo, S Cherry St., N St. Mary's St., Quincy, and others.

Lighting characteristics of secondary streets include:

1. Presence of pedestrian and roadway lighting systems.
2. Consistent lighting levels regardless of area within scope.

INTERMEDIATE THROUGHWAY

Intermediate Throughways serve as the principal means of getting from one activity center to another within a metro area, without penetrating identifiable neighborhoods. These streets are most closely associated with FHWA Classification Urban Minor Arterials. In the case of the scope area, these function as the key north-south connections. In the River North area, they also function as the main east-west throughway's. While land use



Intermediate Throughway's across Downtown San Antonio scope area



Primary Thoroughway's across Downtown San Antonio scope area

access is still provided, the primary use of these streets is mobility.

Given the context of a downtown district, these streets are primarily 2-4 lanes serving bi-directional traffic. Speeds are elevated through a combination of sign/enforcement, nature of street size/right-of-way, and distance between signalized intersections. These streets tend to favor vehicular mobility over the pedestrian.

Reference Intermediate Throughways would include: Broadway, McCullough, S St. Mary's St., Flores and others.

Lighting characteristics of Intermediate Throughways include:

1. Presence of pedestrian and roadway lighting systems.
2. Consistent lighting levels and uniformity regardless of area within scope.

PRIMARY THOROUGHWAY

Many cities of the size and density of San Antonio feature a number of broad thoroughways servicing their central business districts and related prominent neighborhoods. Often these significant thoroughways are designated as boulevards (an arterial variant) due to their prominence as gateways for the city and their level of street side development. These streets are most closely associated with FHWA Classification Urban



Major Arterials. They interconnect and provide continuity for entering and leaving the urban area and movements through the urban area. San Antonio features several such streets that should be considered for elevated design and prominence.

Primary Throughways include: Cesar Chavez, Market St., and Commerce St..

Lighting plays an important role in helping to establish the Primary Throughway's appearance in both its scale and vocabulary. The principal elements include:





1. The generation of higher vehicular street lighting levels than other arteries to reinforce roadway as a primary city gateway.
2. The inclusion of pedestrian scale lighting.
3. The use of higher poles and tighter spacing's/cadence to reinforce a stronger and more prominent visual rhythm of the street edge.
4. The careful choreography of poles with other streetscape elements in an attempt to strengthen the overall cohesiveness of the route, including use of the median for pole mounting position when practical.
5. The selection of a pole and luminaire that is unique to the city's Primary Throughways.

CONCLUSION

The street classifications serve as the starting point for the higher level streetscape lighting plans that follow. A minor street in a low-density residential zone will have different, but similar, characteristics to a minor street in the midst of a medium to high density commercial zone. With secondary streets the lighting approach starts to homogenize with subtle differences. Throughways, regardless of land-use adjacencies, will utilize the same approach; with design features being elevated on those designated as primary.

While the general lighting approach may be similar or the same across the scope area, the use of unique or identifying lighting fixtures can help to differentiate different zones.

Overall street designations across Downtown San Antonio scope area (left):

1.  Purple - Minor Streets
2.  Green - Secondary Streets
3.  Red - Intermediate Throughways
4.  Orange - Primary Throughways

POLE TYPE HIERARCHY

Given the wide variety of land-uses across the ULMP scope area, a number of different pole types are proposed. While the master plan stops short of making product recommendations, the following section establishes the performance criteria for use in the design and implementation of appropriate street and pedestrian lighting.

With no specific code requirement for dark sky compliance in effect at time of this ULMP, it is recommended that fixtures selected be either semi-cutoff or full-cutoff.

PEDESTRIAN SCALED LUMINAIRES

Within the central corridor of downtown and along key road types where pedestrian activity is heightened, it is important to provide dedicated pedestrian scaled lighting. A good quality pedestrian lighting strategy provides functional illumination, heightened visibility of other pedestrians, appropriate scale, reinforcement of way-finding, and a sense of place. With a high density of mixed land uses, including a significant concentration of hospitality businesses and cultural facilities, a system of pedestrian scaled luminaires will also help reinforce the walkability of the downtown core.

On minor streets and some secondary streets within the central core, pedestrian scaled lighting can provide



Pedestrian scaled light poles (12'-0" to 16'-0" in height) across Downtown San Antonio scope area



Mid-height light poles (16'-0" to 20'-0" in height) across Downtown San Antonio scope area

illumination for both walkways and the roadway. E Houston St., as currently illuminated, is a good example of this design approach.

Along Intermediate and Primary Throughways, pedestrian scaled luminaires serve to soften the vehicular-focused nature of those streets. These fixtures also serve to provide a more uniform street edge illumination, beneficial to bicyclists using either dedicated or shared bike-lanes.

Pedestrian scaled luminaires should be primarily 12'-0" to 16'-0" in height from grade to top of luminaire. Optic systems that diffuse or obscure the light source, working to reduce source glare, are recommended. House-side shielding as an accessory, or integrated optic element, should be considered where needed. Luminaires should have a maximum B-U-G rating of B2-U1-G2.

Fixture spacing should favor uniformity and good vertical illuminance. Poles can be selected to support smaller banners, convenience power for holiday or special event needs, or planter baskets.

MID-HEIGHT/DUAL-PURPOSE POLE

For a majority of the central corridor, pedestrian mobility - and connection - is still significantly valued, but it is not economical to deploy both pedestrian and roadway illumination. Further, the land use and activity along

these streets does not necessitate high lighting levels. The primarily residential (or mixed-use) land uses, however, favor a solution that is able to balance pedestrian and roadway illumination along with lower lighting levels. In order to achieve this, the ULMP proposes a mid-height pole and luminaire that is proportioned between the dedicated pedestrian and roadway pole assemblies.

Given the height of this fixture and its relative position with respect to second floor windows, it is recommended that these units avoid the use of refractor or diffuse lensing (creating luminous objects) as part of its aesthetic design. Using full-cutoff fixtures or those that obscure the source and any optical lensing is imperative. House-side shielding as an accessory, or integrated optic element, should be considered where needed. Luminaires should have a maximum B-U-G rating of B2-U1-G2.

This mid-height/dual-purpose pole should be between 16'-0" and 20'-0" in height from grade to top of luminaire. Fixture spacing should serve to meet recommended illuminance levels for streets and walkways, favoring glare control over maximizing spacing.




ROADWAY LUMINAIRES

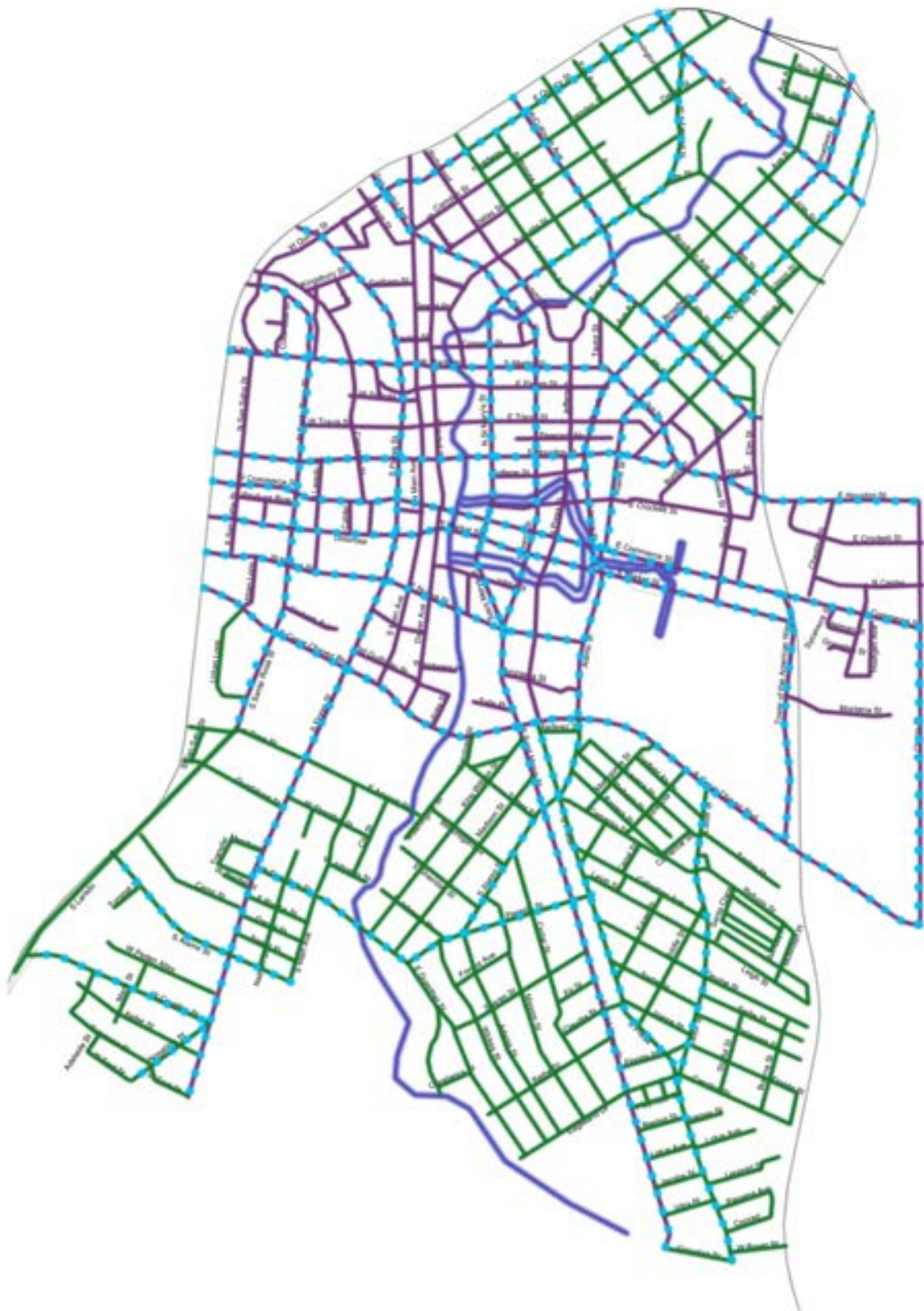
Roughly 27'-0" to 35'-0" in height, this pole and luminaire combination serves to provide the primary functional illumination for vehicle



Roadway scaled light poles (27'-0" to 35'-0" in height) across Downtown San Antonio scope area

Pole typology across Downtown San Antonio scope area (right):

1.  Purple - pedestrian scaled
2.  Green - mid-height scaled
3.  Cyan - roadway scaled



mobility. Typically this arrangement will also include a davit arm. Fixtures and arms can be mounted to a number of different pole structures - including but not limited to: traditional steel or aluminum light poles, telephone or power transmission poles (though not a preferred option), signal standards, and in some instances building structures. Pole and arms can be either utilitarian or more decorative in nature, depending on location or use. Adding brackets for banners or flower baskets, can also help to provide differentiation within different geographical zones.

When located for purely functional purposes, a simple LED cobra-head style luminaire with a high B-U-G rating such as B1-U0-G2 is recommended. Avoid roadway style luminaires that use excessive high angle light output to achieve broader spacing ratios at the expense of greater glare for drivers and pedestrians.

In certain areas, and along Primary Throughways, utilization of a decorative luminaire may be desired. It is recommended that a luminaire of sufficient size and scale for the mounting height being used. In these instances a maximum rating of B1-U1-G2 is recommended; however, in these instances a mock-up and sample review is always recommended prior to final selection.

CONCLUSION

The thoughtful deployment of multiple pole types helps in managing equipment while ensuring that proper illumination can be achieved throughout the urban core of San Antonio. This approach also allows for better definition of the streetscape while supporting the multiple users and uses. Enhancing the street edge lighting with either a pedestrian scale or mid-height pole and luminaire helps pedestrians as well as bicyclists. Roadway luminaires provide added visual separation as well as increased lighting levels where interaction between vehicles and pedestrians can be most severe.

SOURCE COLOR HIERARCHY

One of the simplest ways in which to create visual identification with lighting is through the adjustment of source color. Through the careful application of color, even in streetscape lighting, different identities can be created.

With the advancement and on-going deployment of LED lighting, there has been a renewed conversation concerning the proper source color for streetscape and public space lighting. The International Dark Sky Association promotes a reduction in short-wave length light in the environment to reduce light scatter. Coupled with the American Medical Association's report of the health impacts of blue colored electrical light, there has been a concentrated effort to shift away from focusing principally on source efficiency to ensuring the color of light is appropriate and creates a comfortable ambiance for those within the public realm.

PRIMARY LOW-DENSITY RESIDENTIAL

Low-density residential areas require the careful consideration of light source color. This plan recommends a baseline of 2700K, with a color rendering index of 80+. This color quality will provide high quality recognition while seeming more incandescent and hospitable in nature for primarily residential land uses.

When roadway luminaires are deployed within or adjacent to these areas, an 80+ CRI, 3000K source is recommended. This will naturally appear cooler when viewed next to the 2700K mid-height luminaires, helping to define the higher volume vehicular streets.



Single source; 2700K



Two sources; 2700K and 3000K



PRIMARY MEDIUM DENSITY AND MIXED USE

Across most of the remaining scope area, the recommended color temperature is 3000K with a CRI of 80+. This would include pedestrian scaled, mid-height dual-purpose, and roadway luminaires. This will simplify deployment across the greater scope area and provide a cleaner visual experience given the commercial and mixed use land-uses in these areas.



Single source; 3000K



Two sources; 3000K and 3000K



VISUAL IDENTIFICATION OF PRIMARY THROUGHWAYS

The Primary Throughways provide the most focused vehicular connection moving east-west through the urban core. In order to distinguish this street type, the plan recommends utilizing 3500K sources for the roadway luminaires. The pedestrian luminaires on these streets would continue to be 3000K, providing the visual identity and separation for pedestrians.

CONCLUSION

Color preference is highly subjective, but there is growing consensus amongst the professional lighting organizations towards warmer or neutral color temperatures with high color rendering characteristics. This is seen in keeping a baseline of 3000K across the city, with slight shifts both lower and higher to create the potential for 'lighting identification' in unique districts.

When viewing two sources in close proximity, the difference in color is further magnified; as such, the recommendation is to maintain a maximum of 1000K variance between adjacent and connecting streets. Where possible, it is recommended that the variance be limited to 300K to 500K as this will provide sufficient visual separation without being visually jarring.

As color can have a significant impact of perception of brightness, it is prudent to use luminaires with a high color rendering index. This is readily apparent when going from low or high pressure sodium fixtures with a CRI value between 20 and 30, to high intensity discharge (metal halide) sources and LED sources with values of 60 and above. The monochromatic nature of legacy sources reduces color perception and discrimination, and thus appear darker. By using high color rendering luminaires, less light can often appear brighter due to the higher visual acuity.



Two sources; 3000K and 3500K

Overall source color mapping across Downtown San Antonio scope area (right):

1. ● Orange - single source; 2700K
2. ● Yellow - two sources; 2700K + 3000K
3. ● Green - single source; 3000K
4. ● Cyan - two sources; 3000K + 3000K
5. ● Purple - two sources; 3000K + 3500K



LIGHT INTENSITY HIERARCHY

Intensity is not only considered for roadways but also bike-ways and pedestrian paths. Values for each of these elements are well defined by the Illuminating Engineering Society. Vehicular guidelines are based on pavement luminance (candelas/square meter and maximum veiling luminance ratio), while pedestrian lighting levels are assessed in pathway surface illuminance (in Foot-candles or Lux). Together, these criteria are the cornerstone for the ULMP light intensity recommendations.

Recommendations are based on aspects of street type, location, vehicle and pedestrian volume, and adjacent land uses. All levels are derived from the IES Lighting Handbook and RP-8 'Roadway Lighting'.

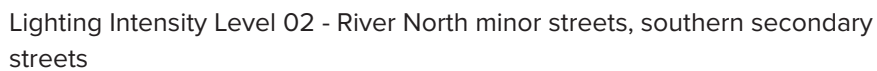
INTENSITY LEVEL 01

1. Pedestrian Classification: low to medium
2. Avg Luminance L_{avg} :
 - a. 0.3 - 0.5 (cd/m^2)
3. Avg Uniformity Ratio L_{avg}/L_{min}
 - a. 6.0
4. Max Uniformity Ratio L_{avg}/L_{min}
 - a. 10.0
5. Max Veiling Luminance Ratio L_{vmax}/L_{avg}
 - a. 0.4



Lighting Intensity Level 01 - primarily single family residential and southwest quadrant minor streets

1. Pedestrian Classification: medium to high
2. Avg Luminance L_{avg} :
 - a. 0.6 (cd/m^2)
3. Avg Uniformity Ratio L_{avg}/L_{min}
 - a. 6.0
4. Max Uniformity Ratio L_{avg}/L_{min}
 - a. 10.0
5. Max Veiling Luminance Ratio L_{vmax}/L_{avg}
 - a. 0.4



INTENSITY LEVEL 03

1. Pedestrian Classification: medium
2. Avg Luminance L_{avg} :
 - a. $0.6 \text{ (cd/m}^2\text{)}$
3. Avg Uniformity Ratio L_{avg}/L_{min}
 - a. 3.5
4. Max Uniformity Ratio L_{avg}/L_{min}
 - a. 6.0
5. Max Veiling Luminance Ratio L_{vmax}/L_{avg}
 - a. 0.4



Lighting Intensity Level 03 - Center Corridor minor streets

INTENSITY LEVEL 04

1. Pedestrian Classification: medium to high
2. Avg Luminance L_{avg} :
 - a. $0.8 \text{ (cd/m}^2\text{)}$
3. Avg Uniformity Ratio L_{avg}/L_{min}
 - a. 3.0
4. Max Uniformity Ratio L_{avg}/L_{min}
 - a. 5.0
5. Max Veiling Luminance Ratio L_{vmax}/L_{avg}
 - a. 0.4



Lighting Intensity Level 04 - River North and Center Corridor secondary streets

INTENSITY LEVEL 05

1. Pedestrian Classification: low to medium
2. Avg Luminance L_{avg} :
 - a. $0.9 \text{ (cd/m}^2\text{)}$
3. Avg Uniformity Ratio L_{avg}/L_{min}
 - a. 3.0
4. Max Uniformity Ratio L_{avg}/L_{min}
 - a. 5.0
5. Max Veiling Luminance Ratio L_{vmax}/L_{avg}
 - a. 0.3



Lighting Intensity Level 05 - Intermediate Throughways across Downtown San Antonio scope area

INTENSITY LEVEL 06

1. Pedestrian Classification: high
2. Avg Luminance L_{avg} :
 - a. 01.2 (cd/m^2)
3. Avg Uniformity Ratio L_{avg}/L_{min}
 - a. 3.0
4. Max Uniformity Ratio L_{avg}/L_{min}
 - a. 5.0
5. Max Veiling Luminance Ratio L_{vmax}/L_{avg}
 - a. 0.3



Lighting Intensity Level 06 - Primary Throughways

Lighting Design Criteria for Streets					
Light Intensity Level	Pedestrian Area Classification	Ave. Luminance Lavg (cd/m ²)	Ave. Uniformity Ratio Lavg/Lmin	Max Uniformity Ratio Lmax/Lmin	Max Veiling Luminance Ratio Lvmax/Lavg
Level 01	Low to Medium	0.3 - 0.5	6.0	10.0	0.4
Level 02	Medium to High	0.5 - 0.6	6.0	10	0.4
Level 03	Medium	0.6	3.5	6.0	0.4
Level 04	Medium to High	0.6 - 0.8	3.5 - 3.0	6.0 - 5.0	0.4
Level 05	Low to Medium	0.6 - 0.9	3.5 - 3.0	6.0 - 5.0	0.3
Level 06	High	1.2	3.0	5.0	0.3

Lavg - minimum maintained pavement luminance

Lmin - minimum pavement luminance

Lvmax - max veiling luminance





Recommended lighting level ranges across ULMP scope area

CONCLUSION

Many of the intensity zones exhibit small differences in the average street pavement luminance. The control of brightness and perception of intensity, however, is significantly impacted by both the average uniformity and the maximum uniformity ratios. While these criteria do not account for glare, it is recommended that the glare value noted in the B-U-G ratings for any fixture in use be no greater than '2', with '1' being preferred whenever practical. Minimizing glare will help increase the perception of intensity within the overall lighting system by reducing the brightness of the source.

While not indicated in the maps, it is recommended that when a lower intensity zone street approaches a street with an intensity four steps higher, it should have its intensity increased by two levels at least one-half block in advance of the intersection. This will allow for the eye to adapt while still providing visual identification of street type and primary use.

Overall source color mapping across Downtown San Antonio scope area (left):

1.  Blue - lighting intensity zone 01
2.  Green - lighting intensity zone 02
3.  Red - lighting intensity zone 03
4.  Orange - lighting intensity zone 04
5.  Cyan - lighting intensity zone 05
6.  Yellow - lighting intensity zone 06

INTERSECTIONS

As the highest level of interaction between vehicles and pedestrians, it is crucial that lighting for intersections be specifically addressed to provide appropriate illumination for both mobility types. Given the variety of street classifications, combination of one-way and bi-directional traffic, as well as variety of land uses and densities, two macro approaches are recommended: a 2-pole approach (with two sub-options) and a 4-pole approach.

2-POLE APPROACH

Where primarily low volume streets - minor to minor, minor to secondary - out of the central core intersect, the interaction rate of vehicle and pedestrian is relatively low. While still necessary to illuminate these intersections appropriately, it can be done with lower levels in line with the overall levels for the adjacent streets. These intersections are also typically with smaller right-of-ways to illuminate, and therefore can utilize just two pole and fixture locations.

In Approach A, fixtures are placed perpendicular to the principal street, before the intersection begins. This works well with two one-way or one-way/two-way intersections. Approach B locates fixtures at two corners, with the fixture davit arm stretching diagonally towards the center of the intersection.



2-pole intersection, Approach A



2-pole intersection, Approach B

Overall 2-pole intersection lighting across Downtown San Antonio scope area (right)

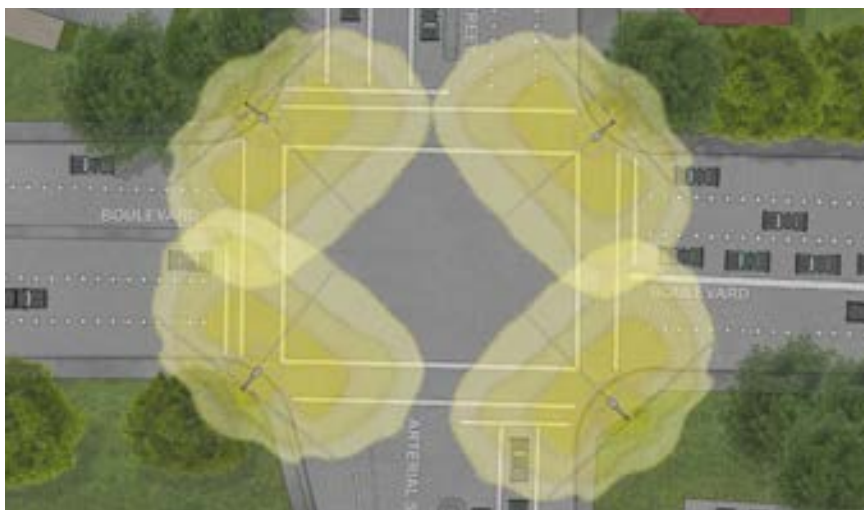
4-POLE APPROACH

Along both types of throughways and some secondary streets, the higher volume of traffic and potential interaction between vehicle and pedestrian, requires additional pole and fixture positions at intersections. As most of these intersections are larger in right-of-way, the additional fixtures provide necessary coverage to ensure the intersection is illuminated to a level that is contextually appropriate with the adjacent street.

While it is possible to locate fixtures on davit arms stretching diagonally from the corner of an intersection towards the center of the intersection (shown in Approach D), this serves the vehicular mobility foremost. As the primary concern is vehicular-pedestrian interaction, it is recommended that fixtures be placed perpendicular to the adjacent drive lanes whenever possible to provide more focused illumination for the pedestrian crosswalk.



4-pole intersection, Approach C



4-pole intersection, Approach D

CONCLUSION

Whether using two or four poles, the objective is to ensure that the pedestrian crossing is adequately illuminated, and that the relationship of luminaire to pedestrian crossing is appropriately managed. Whenever possible, place the luminaires before the crossing in the direction of traffic. This ensures that the pedestrian conflict zone is illuminated in full and not creating silhouettes of those crossing. Lighting of the intersection space is not the goal, but ensuring pedestrians can be easily and quickly identified is of the utmost import.



While the identifying maps attempt to account for both traffic patterns and volume, it may be necessary to make adjustments. The factors to consider include adjacent land uses (i.e. parking lot across from commercial property), vehicle and pedestrian volume, as well as surrounding ambient lighting levels.

Illumination for Intersections				
Functional Classification	Average Maintained Illumination at Pavement by Pedestrian Area Classification (FCs)			Uniformity Ratio Avg/Min
	High	Medium	Low	
Throughway/Throughway	3.4	2.6	1.8	3:1
Throughway/Secondary	2.9	2.2	1.5	3:1
Throughway/Minor	2.6	2.0	1.3	3:1
Secondary/Secondary	2.4	1.8	1.2	4:1
Secondary/Minor	2.1	1.6	1.0	4:1
Minor/Minor	1.8	1.4	.8	6:1

Illumination for intersections

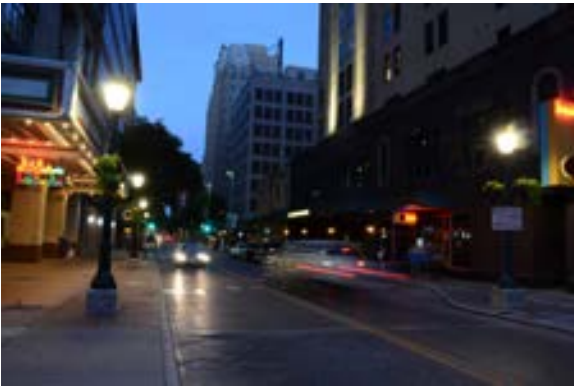
Overall 4-pole intersection lighting across Downtown San Antonio scope area (left)

Overall intersection lighting approach across Downtown San Antonio scope area (following):

1.  Orange - 2-poles per intersection
2.  Pink - 4-poles per intersection



REFERENCE STREETSCAPE LIGHTING APPROACHES



Houston Street at night



Quincy Street looking south at night

While the previous ‘City Connected’ subsection provides the necessary macro planning tools for streetscape lighting, there are a number of approaches to implement lighting at the micro/street level. The following pages represent a select number of model or typical layout approaches that a professional lighting designer or engineer might utilize to deploy poles and luminaires along a street.

These layouts are meant to summarize the planning tools (street designation, pole type, color, and intensity) while also providing spacing and layout recommendations. In each case, the final deployment of fixtures will depend on the unit selected, real-life street conditions, utilities, right-of-way, and other conditions. For instance, it may be necessary to utilize an aligned rather than staggered side-to-side layout due to fixture selection, aesthetic preference, etc.

It is also possible that an alternate approach that diverges from one or two of the macro planning tools is required due to budget, stakeholder preference, obstructions, etc. This should be avoided whenever realistically possible, but there will be situations due to right-of-way clearances, changing development and land use, where this will be necessary.

Included after the model approaches are insights into approaches for equipment conversions and intermediate deployment of the ULMP. Here again, it is imperative to maintain the City Connected planning tools as much as possible.

These are not an exhaustive set of approaches but are meant to provide a baseline. Once a project is initiated, it will be the up to the project team and stakeholders to determine which is the most appropriate design for the given conditions. At some point, the city may want to rely on a limited number of standard equipment solutions or design approaches that meet the criteria for each street. These prototypical strategies may evolve out of a desire to normalize solutions or minimize inventory stock.

MINOR STREET - VARIANT A

1. Minor street designation; primarily residential, low density development
2. Primarily one-way streets of minimal right-of-way (up to 30'-0")
3. Mid-height/dual purpose luminaire along single side of street, spacing should be 3x - 5x fixture height
4. 2700K or 3000K depending on zone (see: City Connected - Source Color Hierarchy)
5. Lighting intensity Zone 01 or 02, depending on street location (see: City Connected - Light Intensity Hierarchy)
6. Fixture would be located within courtesy strip, with optics that will provide illumination across right-of-way including minimum illumination for far-side sidewalk
7. Optic system should include house-side shield to avoid light trespass into street-side adjacent properties



Reference: Delaware Street



Minor Variant A: illustrative cross-section graphic



Minor Variant A: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

MINOR STREET - VARIANT B

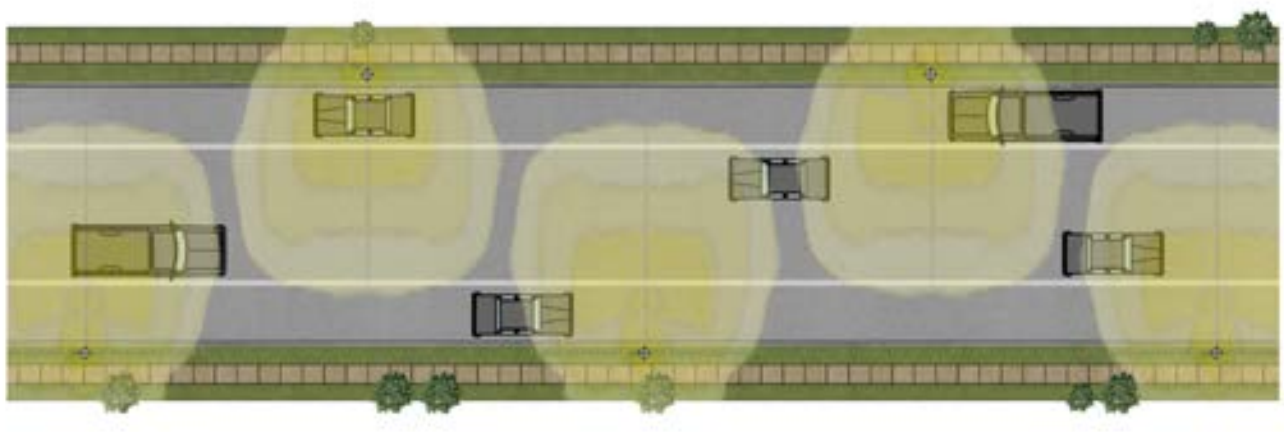
1. Minor street designation; primarily residential, low to medium density development
2. Either wide one-way or bi-directional streets of minimal right-of-way (32'-0" - 45'-0")
3. Mid-height/dual purpose luminaire on staggered, alternate side spacing 4x - 7x's fixture height on ONE side (2x-4x's spacing on stagger)
4. 2700K or 3000K depending on zone (see: City Connected - Source Color Hierarchy)
5. Lighting intensity Zone 01 or 02, depending on street location (see: City Connected - Light Intensity Hierarchy)
6. Fixture would be located within courtesy strip, with optics that will provide illumination across right-of-way including some contribution to opposite side sidewalk to maintain minimum lighting levels
7. Optic system should include house-side shield to avoid light trespass into street-side adjacent properties



Reference: Adams Street



Minor Variant B: illustrative cross-section graphic



Minor Variant B: illustrative plan graphic

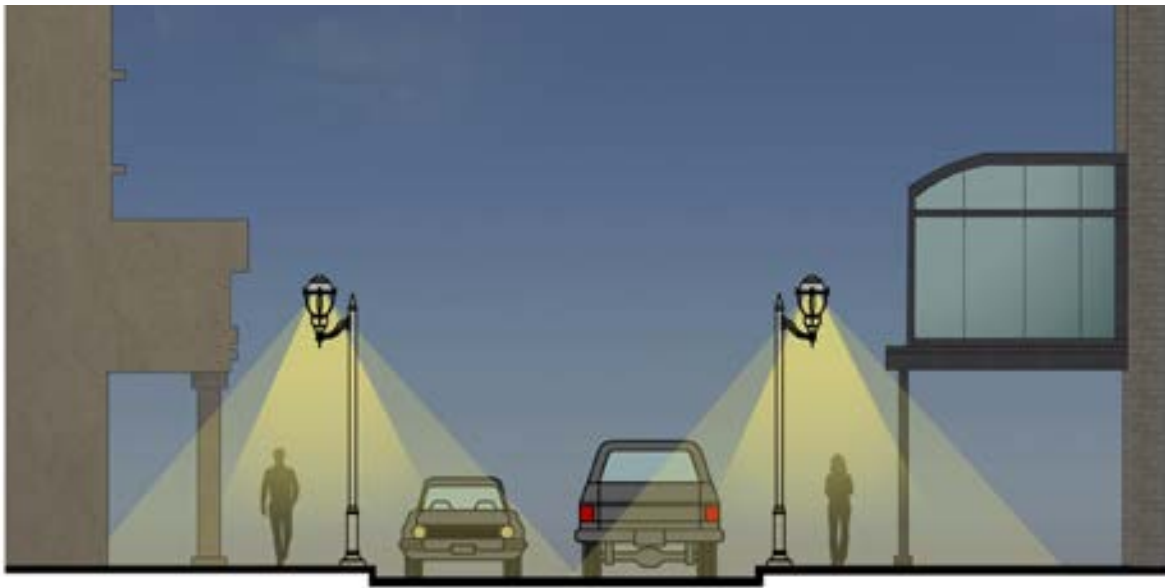
(note: graphic intended for visual purposes of layout, not light distribution)

MINOR STREET - VARIANT C

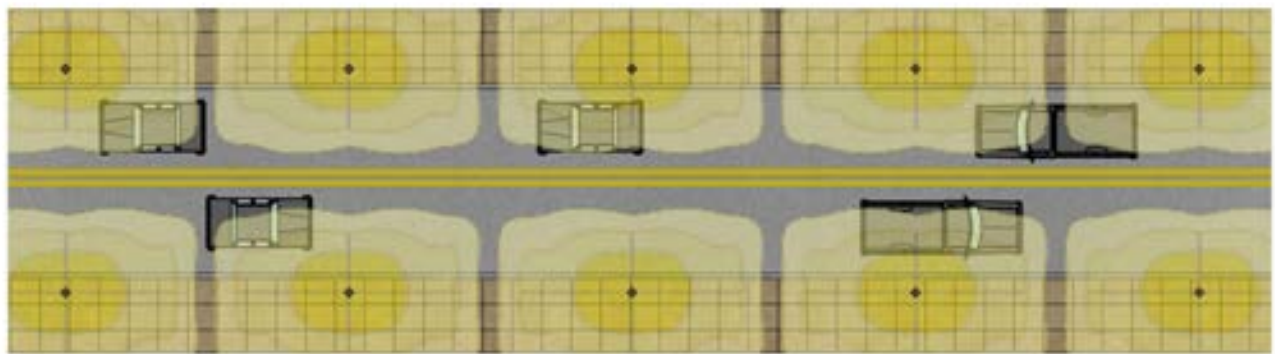
1. Minor street designation; primarily commercial, medium to high density development
2. Either one-way or bi-directional streets of minimal right-of-way (32'-0" - 45'-0")
3. Pedestrian scaled luminaire on aligned, alternate side spacing 3x-5x's fixture height
4. 3000K color source (see: City Connected - Source Color Hierarchy)
5. Lighting intensity Zone 03 depending on street location (see: City Connected - Light Intensity Hierarchy)
6. Fixture would be located within courtesy strip



Reference: E Houston Street



Minor Variant C: illustrative cross-section graphic



Minor Variant C: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

SECONDARY STREET - VARIANT A

1. Secondary street designation; primarily residential, medium density developments
2. Either wide one-way or bi-directional streets of typical right-of-way between 40'-0" - 55'-0"
3. Mid-height/dual purpose luminaire plus roadway luminaire
4. Mid-height/dual purpose luminaire on aligned, alternate side spacing 3x - 6x's fixture height
5. Roadway luminaire on staggered, alternate side spacing; 5x - 8x's fixture height on ONE side (2.5x-4x's spacing on stagger)
6. 2700K or 3000K depending on zone for mid-height/dual purpose; 3000K for roadway luminaire (see: City Connected - Source Color Hierarchy)
7. Lighting intensity Zone 03 or 04 depending on street location (see: City Connected - Light Intensity Hierarchy)
8. Fixtures would be located within courtesy strip
9. Optic system should include house-side shield to avoid light trespass into street-side adjacent properties
10. If desired, mid-height luminaire could be mounted to same pole as roadway luminaire if spacing aligns



Reference: Pereida Street



Secondary Variant A: illustrative cross-section graphic



Secondary Variant A: illustrative plan graphic

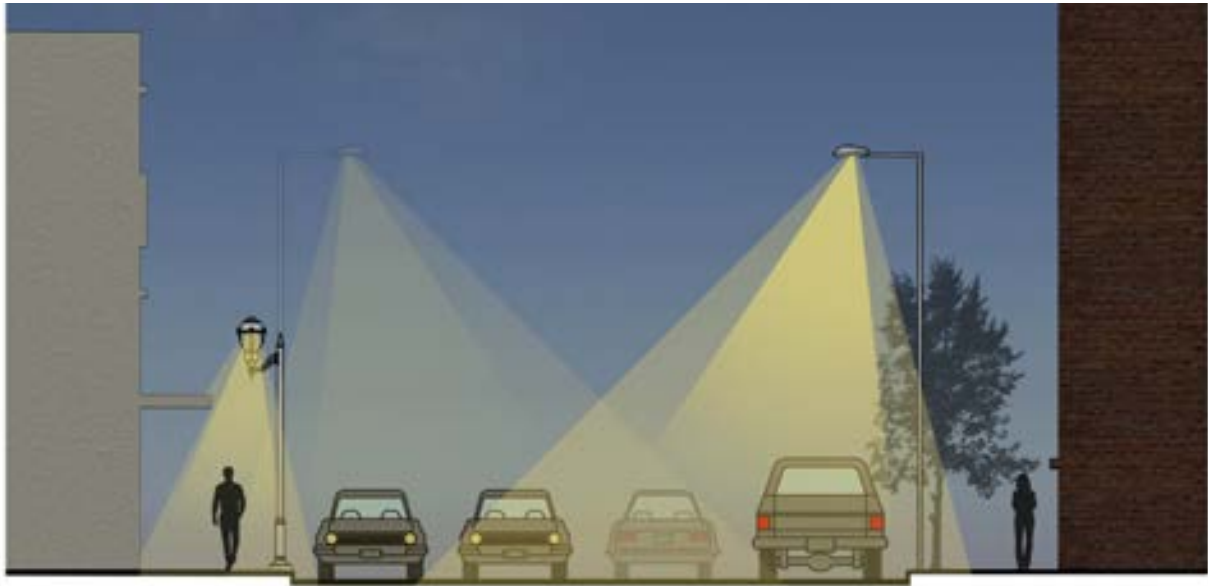
(note: graphic intended for visual purposes of layout, not light distribution)

SECONDARY STREET - VARIANT B

1. Secondary street designation; primarily commercial and mixed use, medium to high density developments
2. Either wide one-way or bi-directional streets of typical right-of-way between 40'-0" - 55'-0"
3. Pedestrian luminaire plus roadway luminaire
4. Pedestrian scaled luminaire on aligned, alternate side spacing 3x - 4x's fixture height
5. Roadway luminaire on staggered, alternate side spacing 4x - 6x's fixture height on ONE side (2x - 3x's on stagger)
6. 3000K light source for both luminaires (see: City Connected - Source Color Hierarchy)
7. Lighting intensity Zone 04 depending on street location (see: City Connected - Light Intensity Hierarchy)
8. Fixtures would be located within courtesy strip
9. If desired, pedestrian scaled luminaire could be mounted to same pole as roadway luminaire if spacing aligns



Reference: S Flores Street



Secondary Variant B: illustrative cross-section graphic



Secondary Variant B: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

INTERMEDIATE THROUGHWAY - VARIANT A

1. Intermediate Throughway street designation; mixed multi-family residential plus commercial zoning, low to medium density developments
2. Either wide one-way or bi-directional streets of typical right-of-way between 40'-0" - 65'-0"
3. Pedestrian height pole, aesthetically connected to adjacent mid-height/ dual-purpose unit and roadway luminaire
4. Pedestrian scaled luminaire on aligned, alternate side spacing 3x - 4x's fixture height
5. Roadway luminaire on same side spacing 3x - 5x's fixture height
6. 2700K or 3000K depending on zone for pedestrian pole; 3000K for roadway luminaire (see: City Connected - Source Color Hierarchy)
7. Lighting intensity Zone 04 or 05 depending on street location (see: City Connected - Light Intensity Hierarchy)
8. Fixtures would be located within courtesy strip
9. Optic system should include house-side shield to avoid light trespass into street-side adjacent properties
10. If desired, pedestrian scaled luminaire could be mounted to same pole as roadway luminaire if spacing aligns



Reference: S St. Mary's Street



Intermediate Variant A: illustrative cross-section graphic



Intermediate Variant A: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

INTERMEDIATE THROUGHWAY - VARIANT B

1. Intermediate Throughway street designation; mixed multi-family residential plus commercial zoning, medium to high density developments
2. Either wide one-way or bi-directional streets of typical right-of-way between 50'-0" - 65'-0"
3. Pedestrian scaled luminaire on aligned, alternate side spacing 3x - 4x's fixture height
4. Roadway luminaire on staggered, alternate side spacing 3x - 5x's fixture height on ONE side (1.5x - 2.5x's on stagger)
5. 3000K light source for both luminaires (see: City Connected - Source Color Hierarchy)
6. Lighting intensity Zone 05 depending on street location (see: City Connected - Light Intensity Hierarchy)
7. Fixtures would be located within courtesy strip
8. If desired, pedestrian scaled luminaire could be mounted to same pole as roadway luminaire if spacing aligns



Reference: Broadway Street



Intermediate Variant B: illustrative cross-section graphic



Intermediate Variant B: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

PRIMARY THROUGHWAY - VARIANT A

1. Primary Throughway street designation; roadway with no median
2. Bi-directional streets of typical right-of-way between 60'-0"+
3. Pedestrian scale pole and luminaire plus roadway scaled pole luminaire
4. Pedestrian scaled luminaire on aligned, alternate side spacing 3x - 4x's fixture height
5. Roadway luminaire on aligned, alternate side spacing 3x - 5x's fixture height
6. Pedestrian luminaire (3000K) and roadway luminaire (3500K) (see: City Connected - Source Color Hierarchy)
7. Lighting intensity Zone 06 depending on street location (see: City Connected - Light Intensity Hierarchy)
8. Fixtures would be located within courtesy strip
9. Spacing for pedestrian luminaires and roadway should be a multiple of each other, such that overall spacing is uniform and allowing for pedestrian luminaire to mount to roadway pole when spacing aligns.
10. Primary throughway variants will often be used together. Spacing should be same for both.



Reference: W Cesar Chavez (no median)



Primary Variant A: illustrative cross-section graphic



Primary Variant A: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

PRIMARY THROUGHWAY - VARIANT B

1. Primary Throughway street designation; roadway with median
2. Bi-directional streets of typical right-of-way between 60'-0"+
3. Pedestrian scale pole and luminaire plus roadway scaled pole luminaire, in some instances pedestrian luminaire will mount to the roadway pole.
4. Pedestrian scaled luminaire on aligned, alternate side spacing 3x - 4x's fixture height
5. Roadway luminaire on aligned, alternate side spacing 3x - 5x's fixture height
6. Pedestrian luminaire (3000K) and roadway luminaire (3500K) (see: City Connected - Source Color Hierarchy)
7. Lighting intensity Zone 06 depending on street location (see: City Connected - Light Intensity Hierarchy)
8. Fixtures would be located within courtesy strip (for pedestrian fixture) and median (for roadway fixture)
9. Spacing for pedestrian luminaires and roadway should be a multiple of each other, such that overall spacing is uniform and allowing for pedestrian luminaire to be aligned with roadway pole when possible.
10. Primary throughway variants will often be used together. Spacing should be same for both.



Reference: E Cesar Chavez (median)



Primary Variant B: illustrative cross-section graphic



Primary Variant B: illustrative plan graphic

(note: graphic intended for visual purposes of layout, not light distribution)

INTERMEDIATE DEPLOYMENT OF THE LIGHTING MASTER PLAN RECOMMENDATION

There are a significant number of existing decorative, pedestrian scaled architectural light poles throughout San Antonio. Many of the light fixtures are traditionally styled, with some emulating historic appearances from an earlier time in the city's history. A significant number of these luminaires still operate legacy light sources such as high pressure sodium (HPS) and metal halide (MH), while many others have been retrofitted with a variety of hybrid replacement lamps - LED, compact fluorescent, and induction technologies - or modification kits. A single, consistent approach has not been used.

Whenever possible, a full pole and luminaire assembly should be considered as a one-for-one replacement of the current equipment. When it is deemed that an existing pole can be reused, then the luminaire itself can be replaced with an appropriate upgrade. These approaches are well documented in both the Streetscape and Park sections of the report.

Neighborhood streets within the scope area characterized as predominantly single and two-family residential, are defined as Minor streets. Presently, most of these streets have little to no lighting, except at intersections. The ULMP recommends the distribution of mid-height LED-based light poles in these areas in order to provide illumination levels consistent with Illuminating Engineering Society recommendations for both streets and sidewalks. Additionally, these poles would be meant to provide more appropriate pedestrian scale and a heightened level of safety and security.

Since the deployment of the outlined lighting approach would be a significant undertaking, it is suggested that the City consider a pilot study on one or two streets in a residential area. This study would include the installation of equipment meeting the planning and technical requirements of the ULMP for the Minor Street type and



Community engagement mock-ups help to educate and demonstrate to residents the importance of lighting quality and provide a period for input.



Mock-ups and pilot studies can serve to illustrate the positive impacts of improved public right-of-way illumination as well as how light trespass can be mitigated.



Two examples of LED conversion kits with semi or full cut-off optic assemblies and their integration into historically styled fixture heads.



Two LED conversion modules with integrated power supply/driver, optics, heat sink, and mounting plates.

its electrical infrastructure. Included as a part of this pilot study would be a post-installation review and analysis of objective and subjective conditions. Through technical measurements and user surveys, this study would help determine the worthiness and impact of the design, and assist in plotting a course for broader implementation. Also, a reasonable assessment of installation costs would be a byproduct of the study.

EQUIPMENT CONVERSIONS AND REPLACEMENTS LUMINAIRE OPTIONS

CONVERSION KITS

If new equipment and technologies cannot, for whatever reason, be installed in the near future, a well designed LED source conversion assembly kit that meets most of the ULMP recommendations regarding lighting performance and light quality, can be considered as an interim solution. On these pages are examples of products currently found in the marketplace that can be considered for conversion applications. In all cases, the City must work closely with the project team, stakeholders, and manufacturer to ensure that the proposed solution can be integrated into the existing lighting equipment for appropriate performance and long term viability.

Any conversion solution must still meet key criteria related to light quantity and quality including:

1. Light output as required by specific application to meet 'City Connected' planning tool for the intensity zone.
2. Cutoff optics for glare control
3. 'City Connected' designated color temperature with an 80 or higher Color Rendering Index (CRI)

A mock-up of any conversion solution should be done prior to procurement and implementation.

As of the writing of the ULMP, these types of conversions have already occurred in several locations including along Houston St. and within Travis Park. New poles with

a similar LED engine and acorn style globe have been installed along Soledad and Main between Houston and Travis. These improvements are notable not only for the improvement in lighting performance but also reduced glare compared to a screw-in style LED replacement lamp.

Conversion kits will also provide a noticeable energy savings benefit when compared to the legacy sources typically found in these units. These types of upgrades can result in savings anywhere from 40% to 60% per unit. This savings will vary based on a number of factors including:

1. Color temperature
2. Optical distribution
3. Cut-off designation
4. Shielding requirements

REPLACEMENT LUMINAIRES - TRADITIONAL STYLED FULL CUT-OFF EQUIPMENT

The lighting fixture examples illustrated on this page are representative of full-cutoff style light distribution for pedestrian and mid-height scaled luminaires. This LED source equipment distributes all of its direct light below 90 degrees, complying with good dark sky practice and greatly minimizing glare from distant views. The fixtures can deliver recommended color temperatures of white light with good color rendering properties, and are a preferred approach for pedestrian applications when new equipment can be installed. Aspects of aesthetic suitability, operations and maintenance must also be considered in the intended application.

It is important to note that when using full cutoff optics such as that outlined for these luminaires, any lensing should be clear or very lightly frosted, in order to maintain the integrity of the predominant downward light distribution. Additionally, clear or very lightly frosted lensing will also greatly reduce any scattered light above 90 degrees.





REPLACEMENT LUMINAIRES - CONTEMPORARY STYLED FULL CUTOFF 'SOFT OPTIC' EQUIPMENT

The lighting fixture examples illustrated on these pages are representative of “soft optic” style light distribution for pedestrian scaled luminaires. These optical delivery systems obscure their LED sources from direct view, greatly reducing glare and enhancing overall visibility, while maintaining good light cutoff characteristics. This approach to obscuring bright individual LED nodes from the pedestrian field of view, while delivering recommended color temperatures of white light with good color rendering properties, is the preferred approach for pedestrian applications when new equipment can be installed. Aspects of aesthetic suitability, operations and maintenance must also be considered in the intended application.



It is important to note that when using full cutoff optics such as that outlined for these luminaires, any lensing should be clear or very lightly frosted, in order to maintain the integrity of the predominant downward light distribution. Additionally, clear or very lightly frosted lensing will also greatly reduce any scattered light above 90 degrees.



ENGAGING THE CITY'S ARCHITECTURE

OVERVIEW

There is much known about the physiological process of seeing. The human eye transmits visual data to the brain which is converted from an electrical signal to useful information about the physical make-up of the world. With this understanding, science has determined how much light is needed in order to visually detect and comprehend various aspects of our environment. In North America, the Illuminating Engineering Society (IES) has established consensus standards for street and sidewalk illumination that provide guidance as to how much light is required to perform the routine tasks of driving and walking. This is often referred to as the quantitative aspect of lighting.

Designing lightingsystemsforstreetscapesandconsidering only the impact of the street and sidewalk surfaces would mean that much of the visual environment would be left to chance. A typical streetscape scene is composed of far more than then the two mostly horizontal planes we use for walking, driving or peddling. In most outdoor urban settings, street and sidewalk surfaces routinely take up only 12% to 18% of the usual gaze of a driver or pedestrian. Building elements - facades, storefronts, canopies, signage, and similar - can occupy between 30% and 40% of the field of view. It is for this reason that we must consider the important influences of the vertical plane in creating the complete visual experience.

The 'Building Architecture' section of this master plan examines the importance of building facades and how they appear at night - lighted or unlighted - as an influential constituent of the lighted streetscape.



The Vistana at N Santa Rosa St. and W Commerce St.



GSA Hipolito Garcia Federal Building at E Houston St. and N Alamo St.



Looking east along Commerce at N Presa



Pedestrian view of street plane



Pedestrian view of building facades

BUILDING CANOPIES & OVERHANGS

Some of the downtown core's most conspicuous structures are the many building canopies and overhangs found along pedestrian friendly streets. Large and small; metal, stone or fabric; simple or ornamental; these predominantly horizontal features make a significant impact on the streetscape. At their best they provide pedestrian scale and relatability, offer shade and protection from the elements, frame storefronts, businesses and building entries, offer up locations for signage and graphics, and add to the overall aesthetic character of the street experience.

During evening hours, canopies and overhangs continue to be scale-givers, while providing both weather protection and architectural definition. However, their impact on lighting conditions can vary widely depending on several important factors:

1. Do the canopies produce sharp, disruptive shadows from nearby street or pedestrian light poles? Are those shadows detrimental?
2. Is the area under the canopy supported with electric light sources, either at the ceiling or on the adjacent building or canopy columns?
3. Is there adequate illumination for both the sidewalk and visual identification of other pedestrians or objects?
4. Do the lighting fixtures utilized provide good glare control and are their lighting sources of good color quality?
5. If ornamental or decorative lighting equipment is used, is it of a suitable aesthetic complementary to building or streetscape?

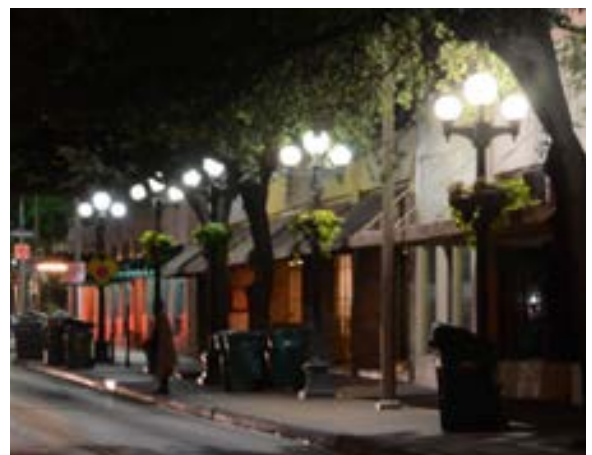
The perception of scale and sense of sanctuary provided by canopies during the daylight hours can give rise to a sense of dinginess and foreboding if lighting conditions are not meeting the needs of pedestrians.



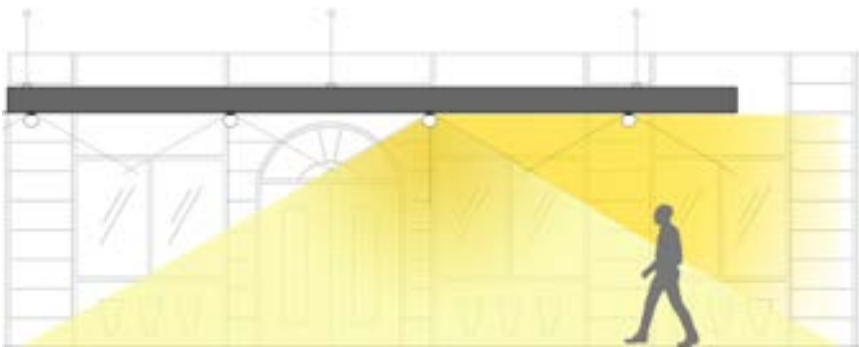
Typical overhang condition along Houston St. and elsewhere. Overhangs offer significant benefits for pedestrians but can have negative impacts on lighting during the evening.



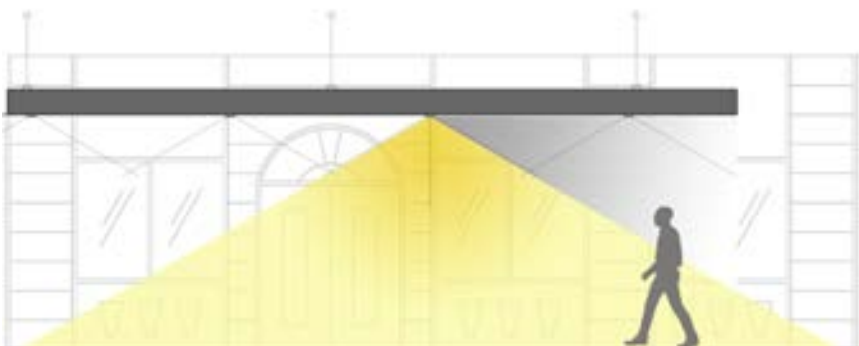
In this instance, recessed downlighting has been installed in a canopy overhanging the right-of-way.



When canopies or overhangs are installed below, and close to the pedestrian poles, deep, dark shadows can create a feeling of the public space being poorly lit and un-safe. In this instance, despite frequency and number of luminaires, objects and people are barely visible in shadows.



While globes and other decorative luminaires can make an architectural statement, avoiding most light above 70 degrees is recommended to reduce glare for pedestrians.



Ceiling mounted fixtures with good glare control limit light above a 70 degree angle to less than 10%.



Wrap around lenses without proper glare shielding can create significant glare conditions.

RECOMMENDATIONS

To avoid the negative visual situations possible when canopy lighting is not properly deliberated, there are several standards of practice that should be followed.

1. If a canopy or overhang covers more than 50% of the adjacent sidewalk, and its underside is at or below 10 feet, supplemental lighting for the sidewalk is suggested. A relatively bright, low glare storefront can also provide complementary illumination.
2. Use ceiling lighting fixtures with good glare control to avoid distractions of brighter fixtures against nominally dim canopy surface backgrounds. Total light emitted above a 70 degree angle should be not more than 10% of the fixture's total output at any canopy height (See inset left).
3. When using surface mounted ceiling-based lighting equipment avoid wrap-around lenses without proper glare shielding.
4. Column mounted lighting fixtures can be decorative in nature, but care should be taken to manage direct source views, which can be quite glary and erode visibility. If an existing canopy's decorative fixtures are exhibiting glare, consider adding shields to the units as a modification or incorporate dimming to reduce brightness.
5. When using retrofit lamps (bulbs) in older existing equipment – often LED sources - use replacement sources with nearly identical output

and shape to retain the original fixture's optical characteristics.

6. If a canopy fronts a retail or hospitality window exposure, make certain to consider how lighting in the canopy zone may affect the visibility through the window to the interior.
7. Lighting beneath canopies should remain on after normal working or business hours for the spaces within the adjacent building, in order to provide a safe after-hour's pedestrian setting. Even a reduced or dimmed level will provide the much needed late night continuity. A simple time-clock can be added to a lighting circuit to manage this asset after hours.

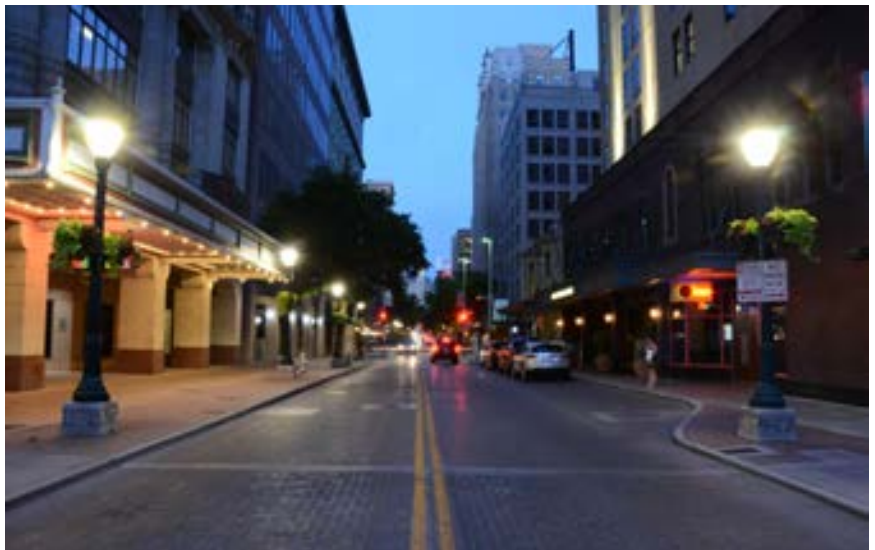
Canopies and overhangs are features in the downtown, helping to provide a pleasurable scale and ambiance. Thoughtful consideration and planning with lighting can extend their positive influence into the nighttime.

OFF STREET PARKING

The scope area includes a significant number of both off-street surface parking lots and multi-story parking garages. The lighting of these parking facilities impacts the greater visual environment based on their contributions of light to the streetscape and adjacent public realm. Generally speaking, these areas should be illuminated to meet the needs of the functional activities – property entry, driving, parking, vehicular/pedestrian interaction, and other related tasks –



Care should be taken to ensure visibility into interior spaces under overhangs if so desired.



Example of both well-lit (left-hand side) and under-lit (right-hand side) overhangs along Houston St.



Surface parking lot lit from single location, using arrangement of tilt up floodlights. This approach causes considerable nuisance glare for users of the lot as well as motorists and pedestrians using the streetscape adjacent. An all too common approach to parking lot illumination within downtowns.



Canopy mounted floodlights aimed out into the parking field as seen under use at night. The low mounting heights and flat aiming angle creates exaggerated shadows, pockets of darkness within the parking field, and significant nuisance glare for motorists and pedestrians using the adjacent streetscape.

without adversely affecting the nearby visual environment for pedestrians and drivers. The same can be said of any aesthetic or signage lighting associated with these properties.

SURFACE PARKING

Surface lots are typically illuminated in one or more of several ways, including: pole mounted area lighting fixtures, building mounted area lighting fixtures, or simply “borrowed” illumination from adjacent street pole spill light. Any of these solutions can be workable, providing the lot owner or operator understands the fundamentals of good lighting for parking areas.

The illumination of surface parking areas from pole or building mounted lighting equipment should consider a number of fundamental guidelines for achieving a high quality lighted condition.

1. Recommended consensus standards from the Illuminating Engineering Society (IES), for lighting levels and uniformity of light, should be used as the design standard for lots. These standards consider the needs of both drivers and pedestrians. The IES also offers additional insight concerning enhanced lighting for high security or lot surveillance. (See inset on following pages for table)
2. The potential of adverse nighttime influences of these parking areas on the streetscape cannot be overstated. Although it is certainly

the desire of lot owners and operators to provide a safe, secure parking experience for patrons, care must be taken so as not to adversely impact the public realm or adjacent private property in the process. Lighting fixtures used to illuminate parking expanses should not produce excessive off-site spill light, expose users - both street bound drivers and sidewalk pedestrians – to direct lighting fixture glare, or over-light the site itself. Avoid “tilt-up” style lighting equipment and floodlights focused to produce light above 80 degrees, both of which adversely impact the off-site environment.



Avoid tilt-up light fixtures focused to produce light above 80 degrees which adversely impact off-site environment. These aiming angles also cause 'skyward' lighting pollution.

3. Affordable lighting equipment that is efficient, long lasting and possessing of good glare and spill light control is readily available in the marketplace. Lighting fixtures with cutoff type optics should be strongly considered for controlling the negative impacts of errant light. Use efficient, good color rendering light sources whenever practical; LED sources are preferred. All light above 90 degrees should be avoided or greatly minimized.



Nuisance glare from tilt-up style surface parking lot lighting can cause problems for both vehicular and pedestrian users.

4. Controls for nighttime light level reduction when parking lot is closed or infrequently accessed should be considered.

Ideally, a professional engineer or lighting designer should be engaged to assist in meeting these standards of care for parking lot illumination.



The use of luminaires with a full cut-off optic system will reduce glare, spill light, light trespass, and direct upward light.

Recommended Maintained Illuminance Values for Surface Parking Lots		
Application & Tasks	Minimum Horizontal Illuminance (FCs)	Uniformity Ratio Min:Max
Drive Aisles	1:0	15:1
Parking Area	1:0	15:1
Entries & Exits	3:0	N/A

Illuminating Engineering Society recommendations for surface parking lots

Recommended Maintained Illuminance Values for Parking Garages		
Application & Tasks	Minimum Horizontal Illuminance (FCs)	Uniformity Ratio Min:Max
General Parking Area	1:0	10:1
Drop off/Pick up	1:0	10:1
Lobbies, Transactions, etc.	1:5	5:1
Entries & Exits		
Day	50	10:1
Night	1.0	10:1
Stairs		
Pre-curfew	5	2:1
Post-curfew	2.5	2:1

Illuminating Engineering Society recommendations for parking garages

ENCLOSED PARKING STRUCTURES

Downtown San Antonio contains a number of both private and public use, above-grade parking structures. These garages are often stand alone, but can also be found occupying one or more floors of a multi-story building. The illumination of parking areas within such facilities can have a substantial influence on the nearby streetscape environment. Careful consideration should be given to understanding such effects and caution exercised in avoiding negative outcomes for the public realm or nearby private concerns.

Similar to surface parking areas, the illumination of interior, open-to-view parking structures should consider a number of fundamental guidelines for achieving a high quality lighted condition.

1. Recommended consensus standards from the Illuminating Engineering Society (IES), for lighting levels and uniformity of light, should be used as the design standard for parking structures (See inset left). These standards consider the needs of both drivers and pedestrians using the facility. The IES also offers additional insight concerning enhanced lighting for high security or surveillance in the enclosed parking lot setting.
2. Care must be taken in the planning of parking structure illumination so as not to adversely impact

the public realm or adjacent private properties in the process. Lighting equipment used to illuminate interior parking spaces should include provisions for controlling excessive spill light into the outdoors. Many fixtures can be factory or field-fitted with internal or external shielding to minimize light lost to the exterior. Comfort and visibility in streetscape areas adjacent to parking garages can be badly compromised when unnecessary fixture light spill is allowed to escape out of the structure. Direct views of the interior fixtures from street level can also hinder the nighttime environment.



Luminaires with parking structure producing direct glare and nuisance conditions from street level.

3. Affordable parking garage lighting equipment that is efficient, long lasting and possessing of good glare and spill light control is readily available in the marketplace. High color rendering light sources are preferred.
4. Controls for nighttime light level reduction when parking lot is closed or infrequently accessed should be considered.

Ideally, a professional engineer or lighting designer should be engaged to assist in meeting these standards of care for parking structure and garage illumination.



Example of glare reducing optical system for parking garage luminaires



Example of glare reducing optical system for parking garage luminaires

INTEGRATION WITH EXISTING STREETScape ELEMENTS

The ULMP focuses on fostering insightful, high quality lighting practice for streets, pedestrian areas and parks in the urban setting. It should not, however, be devoid of context. The level of success of a lighting master plan's deployment will depend to a great degree, on how well it is integrated into the City's overall street and pedestrian environments.

Lighting equipment and its infrastructure must be carefully coordinated with other physical elements within the common environment. This coordination must not only be one of conflict avoidance, but it should consider complimentary integration whenever possible or desired. Lighting plans and implementation strategies should be mindful of such issues as:

1. Trees, planters and landscape
2. Signage and graphics
3. Artwork
4. Pedestrian seating and related amenities
5. Building canopies and overhangs

Superimposing master planned lighting elements into a streetscape or park without regard to these and other urban elements, is simply shortsighted. The coordination of lighting and other streetscape features must occur as a part of the



Street edge in downtown core with wide pedestrian way, sheltered from a dense tree canopy.



Existing VIA bus shelter with integrated lighting



Well executed and maintained landscaping can soften urban areas and provide much needed shade. Coordination with lighting to avoid extreme shadowing, or worse, complete blocking of light is necessary.

lighting design and engineering process in order to ensure a single cohesive result.

TREES, PLANTERS AND LANDSCAPE

Well-conceived and properly maintained vegetation can make an invaluable contribution to the beautification of an urban neighborhood. It can also provide much welcome pedestrian scale amidst an otherwise harsh hardscape surround.

Light pole placements should be closely coordinated with trees and planters to avoid direct conflict, both above and below grade (root ball, foundations, etc.). Additionally, it is important to understand the potential short and long term impacts of tree growth on the distribution of light for its intended purpose.

Often, good planning can lead to integrated solutions such as planter baskets mounted to light poles or landscape beds accommodating a cut out for light pole positioning.

SIGNAGE AND GRAPHICS

Street and park settings are frequently enhanced with signage and graphics. Its use can be informational, directional, or way find assisting. Its visibility, both day and night, can be important for routine content communication or critical safety and security messages.

In some cases, signage or graphics can be attached directly to light poles to reduce street clutter or enhance visibility. If this is considered, it should be done so in a consistent manner, with a well-designed bracket, so as not to compromise pole finish integrity or aesthetic. Back-lighted graphics using internally illuminated sign boxes can provide a crisp, distinctive message. Freestanding graphics without internal illumination should be considered at positions where nighttime illumination from light poles will highlight them, rendering them more visible.



Signage can be integrated into the streetscape lighting poles but is often a secondary element. Coordination of signage type and locations to avoid clutter on the sidewalk is necessary.

ARTWORK

When possible, light pole placements should consider impact on existing artwork installations. Avoiding the disruptive blocking of views to artwork is always desirable, where functional lighting levels are not significantly compromised. In some cases, light poles can serve as mounting positions for accent lights to highlight an art piece (see ULMP 'Civic Art' section).

Sometimes, spill light from pole mounted fixtures can actually help reveal art, when dedicated accent lighting is not feasible.

PEDESTRIAN SEATING AND AMENITIES

Outdoor seating along streets and in parks can be a vital part of a well-planned pedestrian environment. It can be enhanced at night with light from poles whose positions are selected with a close proximity in mind. Ideally, this coordination would take place in the design process to maximize this impact and to possibly take advantage of hardscape shaping and alignment.

Trash and recycling receptacles are also typically located near light poles, or in some instances are mounted to the light poles, to increase visibility.

CANOPIES & OVERHANGS

The layout of street side light poles should take into account the impacts



Pedestrian amenities such as benches encourage visitors and residents to linger in commercial areas.



Coordination of pedestrian lighting near canopies and overhangs is necessary to avoid deep shadows. Increased lighting under canopies and overhangs would also alleviate this concern.



A bus shelter adjacent to Travis Park during the day.



At night, a bus shelter near Travis Park with no integrated or dedicated lighting.



Bus shelters vary in style and streetscape presence throughout the ULMP.



Integrated lighting into bus shelters enhances both the streetscape and rider experience.

of building canopies and overhangs. The positioning of poles adjacent to such structures should account for the possible shadowing effects they cause on pedestrian walkways. Where this situation occurs, consideration should be given to relocating the pole or, when that is not practical, fitting the light fixture with a “house side shield” to minimize backlight.

Some canopies may include supplemental lighting beneath them that will effectively offset this shadowing effect. (Note: see ULMP ‘Building Canopies & Overhangs’ earlier in this section)

BUS STOPS AND SHELTERS

While bus stops and shelters may typically be located at or near intersections, very few, if any, of those within the ULMP scope area have dedicated lighting. While ambient illumination from adjacent street and pedestrian lighting fixtures may be present, their proximity often produces long and deep shadows. Integrating low-glare illumination of an appropriate, high color rendering, color temperature (3000K or 3500K) would be beneficial to both VIA riders and pedestrians. Brightness levels should be elevated 2x - 3x higher than the corresponding intensity zone. This will provide a recognizable element without creating a significant contrast resulting in the surrounding areas seeming dark and uninviting.

CONCLUSION

The thoughtful integration of lighting with other streetscape elements should be a cornerstone of good design and engineering. A plan that is attentive to the entire street experience will go a long way in ensuring a successful and cohesive lighting approach.

ALLEY'S & UNDERPASSES

ACTIVATING ALLEYWAYS BEYOND COMMON USES

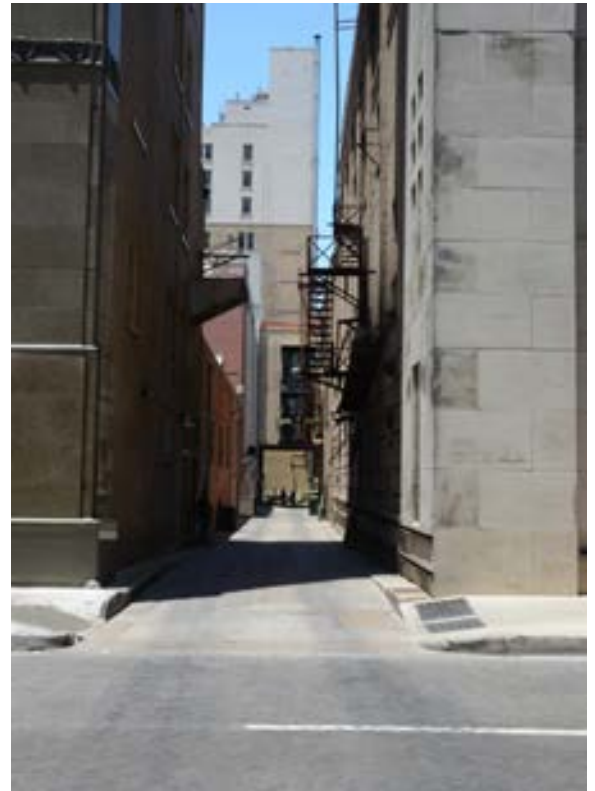
All cities have alleyways. They are often viewed as necessary evils, existing only to access service areas, loading docks and refuse bins. Most take on an almost menacing appearance after dark, causing most pedestrians to look away in fear of what unsightliness might present itself. Although it is true that most alleys are, ostensibly, utilitarian and functional in their purpose, they need not go quietly into the night.

Some cities are turning select alleys and backstreets into social engagement zones, complete with shops, eateries and special attractions. This can be particularly effective with alleys that are fundamentally open, serving as simple separations between buildings, rather than predominantly service areas. At night, they come to life with festive illumination that can actually beckon pedestrians to wander. A more unique focus for some alleys can be theatrical and artistic, especially as darkness falls. Special lighting effects and light-as-art programs can help create discovery zones and view portals for passersby. These effects help energize the downtown and provide an outlet for imagination. The expressions reinforce the notion that the city really does care about urban life after dark. Such initiatives help blunt concerns about unsavory individuals using alleys as hangouts.

A number of San Antonio's alleyways and backstreets are good candidates for nighttime activation.

REFERENCE: PEACOCK ALLEY

Peacock Alley is a one-way vehicular access alleyway running through the central section of downtown San Antonio. It occurs between secondary facades of buildings that front on Navarro, Broadway, Jefferson and North Alamo. It is 13 feet wide and is used mainly as a commercial delivery and loading/unloading zone. The illumination is provided along this several-block stretch by an assortment of building mounted floodlights, refractor wall packs, hybrid streetlights and over-door area-light



Peacock alley looking west from Jefferson



Peacock alley looking east from Navarro St.



Peacock alley at night looking east from Navarro St. The dark nature of the space is not only inhospitable for pedestrians to use the alley as an east-west passage, but also creates an uncomfortable feeling when crossing on main streets.



Alley activation supporting retail and hospitality purposes.



Alley activation supporting urban art and energizes an otherwise dark space.

fixtures. Several different sources and light colors are found. Equipment glare is common in most sections of the alley.

Due to its accessibility and central location within the downtown, a number of pedestrians use the Peacock alleyway as a short cut to commute across blocks. This appears to be common during the day, but some locals and tourists alike can also be seen making the journey after dark – despite the inhospitable lighting.

The various activation-through-light concepts illustrated on these pages could fit well into Peacock Alley, even if only on a partial basis for a defined or limited amount of time. Since alleys like Peacock have a functional life during at least some hours – delivering or servicing buildings – programmatic insight would be needed before considering any intervention. A few possible lighting stimulation opportunities could be:

1. First and foremost, an effort with each building owner should be made to change out their existing lighting equipment for better glare-sensitive LED source area lights. A consistent color temperature of 3000K could be shared throughout the alley, providing a consistent volumetric aesthetic at night, while creating continuity of light quality.
2. Festoon-style light strings could be suspended between buildings across the alley, either in random patterns or to imply a canopy, to provide a festive sense of space. Lanterns could be used in lieu of the twinkle-style “bulbs” to provide more texture and color. These could be rotated or changed periodically.
3. A light-as-art installation could be installed in sections of the side street, inviting pedestrians to use the commuting route. Light would serve as a draw for the pedestrian and imply safe passage. This could be developed as an art commission or even a competition, providing community and social media buzz. If the artwork can be mounted at a higher elevation or out of harms way, perhaps suspended between buildings, it could remain up for an extended time without impacting commercial

traffic. The work could be rotated out seasonally or for special events.

4. Light projection units could be attached to buildings or utility poles to provide a changing display of projected images. Gobos or templates for the LED source projectors could be changed seasonally to reflect holiday or event themes.
5. Lighting could be just a part of weekend, nighttime-only pop-up retailing carts that could be wheeled into the front sections of the alley to provide an inviting portal into the passageway. Power could be temporary and installed with authorized access by the vendors only.

With any of these initiatives, support from both public and private entities will be needed to properly execute the work.

CREATING PORTALS AT UNDERPASSES

When it comes to the visual environment, there are few places in a city streetscape that prove more challenging to address from both driver and pedestrian perspectives than the ubiquitous underpass. With few exceptions, the presence of an underpass in an urban community almost always raises concerns about negative impacts, both day and night, on the neighborhoods that border it.

Besides the normally restraining geometry and often bustling, close-in traffic, underpasses have social undertones as simply uncomfortable places. They are invariably transient for both cars and people. As a pedestrian, walking through the tunnel-like space can raise anxieties about safety and security. These apprehensions may be magnified by poor or indiscriminate lighting that does little to reinforce wayfinding, orientation and glare-free visibility. The color of light – often from high pressure sodium (HPS) sources – can be unnatural and of poor rendering quality. This further impersonalizes the space and discourages engagement.

Often underpasses are lighted with glary, high-angle floodlights or refractor-style wraparound luminaires that



Light-as-art programs can find a home in alleyways, taking advantage of the dark space while adding light for pedestrian passage.



W Cesar Chavez Blvd, looking east towards I-10 and downtown.



W Houston looking west toward I-10



Montana St looking west towards IH-37 into downtown



Montana St looking east under IH-37 towards the Alamodome

may provide light to the road or street surface, but do little to foster good quality visibility for drivers. Even if pavement illumination and glare management is accomplished appropriately, it may still be neglectful of the interaction of vehicles and pedestrians.

The ULMP scope area is bounded by a number of underpass conditions, many of which include or provide access to both pedestrians and vehicles.

When designing for lighting at underpasses, impacts of dedicated roadway and/or pedestrian zone illumination on one another should be closely considered.

DESIGN APPROACHES FOCUSED ON THE PEDESTRIAN

There are a number of design approaches for using lighting and related measures to make underpasses more effective and hospitable to pedestrians. Each of these methodologies seeks to humanize the experience by addressing issues of scale, orientation, wayfinding, color, safety and security.

1. Utilize traditional pedestrian-centric lighting techniques

Incorporate appropriately scaled poles, bollards and other low level lighting equipment to provide critically needed personalized illumination. This helps set people at ease by

Recommended Illumination Values for Pedestrians Using Underpasses			
	Eavg (lux/ft)	EVmin (lux/ft)	Eavg/Emin*
Day	100.0/10.0	50.0/5.0	3.0
Night	40.0/4.0	20.0/2.0	3.0

Eavg - Minimum maintained average horizontal illuminance at pavement

Emin - Minimum horizontal illuminance at pavement

EVmin - Minimum vertical illuminance at 1.5m above pavement

* Horizontal Only

Illuminating Engineering Society recommendations for pedestrian lighting at underpasses

defining pathways and directing access, both of which speak to perceptions of safety and security. Scaled lighting approaches also offer better revelation of the human form and general surroundings, which aids in raising personal awareness and projecting a greater degree of certainty. Additionally, using low-glare, high color rendering sources (preferably LED) for these lighting applications establishes the most naturalistic appearance of the pedestrian's surroundings. Sidewalk illuminance levels should also be designed to meet or improve upon the IES recommended consensus minimum standards.

2. Incorporate non-traditional scaled lighting elements

Another method to achieve appropriate, high quality illumination and pedestrian-scaled reinforcement is through the use of alternative light source options. This normally involves one of the following techniques:

- a. The washing of adjacent bridge walls or abutments and relying on the reflected light as the principal or secondary illumination source. It may be possible to add creative/artful painting or finishes to these surfaces to further enhance the adjacent volume.
- b. The construction of secondary vertical surfaces in the pedestrian zone that can be either internally illuminated or used as a reflecting surface for other light sources.
- c. The surface or suspended mounting of lighting fixtures to the bridge walls or underside of deck to provide general illumination to pathway zones.

With each of these methods, low-glare, high color rendering light sources (preferably LED) should be used. Sidewalk illuminance levels should also be designed to meet or improve upon the IES recommended consensus minimum standards.



Light-as-art programs can find a home in alleyways, taking advantage of the dark space while adding light for pedestrian passage.



W Cesar Chavez Blvd, looking east towards I-10 and downtown.



W Houston looking west toward I-10



Light-as-art programs can find a home in alleyways, taking advantage of the dark space while adding light for pedestrian passage.



W Cesar Chavez Blvd, looking east towards I-10 and downtown.



Existing underpass art activation, 'Light Channels' by Bill Fitzgibbons

DESIGN APPROACHES FOCUSED ON THE DRIVER

Most streets and roadways beneath urban underpasses are illuminated from lighting equipment mounted to the bridge deck or other vertical surfaces of the structure. Although lighting fixtures normally used by highway departments are glary and color-deficient (low CRI High Pressure Sodium), alternative luminaire selections can make good use of these attachment positions. Whether from the underside of the overpass deck or attached to its supporting beams, full cutoff optics downlights using 3000K to 4000K LED sources, can provide high quality light directly over the roadway. Care must be taken to gain necessary approvals from the bridge authority so as not to compromise structure. In a similar manner, side mounted 3000K to 4000K LED source area lights with full-cutoff asymmetric optics, can be positioned on main deck support beams parallel to the road surface to illuminate the pavement. As with the deck itself, installation approvals must be secured from the proper authority.

Another approach to light streets and roadways beneath urban underpasses is to use more conventional pole-mounted street lighting systems. For continuity and visibility purposes, this approach would be a continuation of the roadway lighting leading into the underpass zone. Designers and engineers addressing this issue should consult the ULMP for guidance with the on lighting for the street type in question.

With any of these design and engineering approaches, pavement luminance levels and veiling luminance uniformity should also be designed to meet or improve upon the IES recommended consensus minimum standards.

LIGHTING CONTROLS & SMART CITY

A common characterization used to describe a “Smart City” is, “an urban expanse that uses an assortment of electronic data collection sensors and related devices to supply information which is, in turn, is analyzed and ultimately used to manage assets and resources efficiently, including long-term planning”. While the definition and scope of what that really means continues to evolve at a rapid pace, perhaps the most readily accepted aspect of this emerging 21st century trend is wrapped up in the control, management and operation of a city’s lighting assets.

San Antonio and public utility CPS Energy has already been working with the city on piloting smart lighting controls using various communication platforms. A more limited application of light intensity control has been installed on a number of city blocks in the heart of the commercial district. More pilot programs are underway to understand the value of other smart city applications.

The future of this control management for lighting and associated services is strong and should be expected to expand swiftly in the coming decade. The current and future lighting assets deployed throughout the urban area will serve as an expandable interconnected grid, capable of providing real time sensing and monitoring for both lighting and non-lighting resources.

As the system continues to evolve and upgrade, a more comprehensive deployment of control and monitoring can occur with both lighting and non-lighting initiatives, including:

LIGHTING CONTROL AND MANAGEMENT

LIGHTING LEVELS AND COLOR TUNING OF LED LIGHT SOURCES

The ULMP establishes recommended light intensity and light source color temperatures for illumination throughout the urban downtown core, by street type, use and neighborhood location. This is also the case for City parks within the scope area. The recommendations are based



Light pole with antenna and sensor pack



Sensor and antenna park attached to light pole

on current understandings of street and park requirements and usage profiles. Neighborhood land use and other demographic information also informed strategies for both lighting levels and white light color. As the City grows and evolves, there will inevitably be changes in lighting needs. New lighting equipment will be supplied with remotely addressable LED drivers that will provide both dimming and color tuning for the systems. As streets or city blocks undergo significant shifts in their fundamental nature and usage, then lighting intensities and color temperatures can be re-calibrated to fit their new visual demands.

LOW STREET TRAFFIC VOLUME LIGHT SETTINGS

Remotely dimmable drivers in street and pedestrian lighting equipment can be raised or reduced in output automatically based on time-of-day and seasonal factors. They can also be adjusted for special events in localized areas of the city.

INTELLIGENT LIGHTING INTENSITY CONTROLS

Similar to the centralized dimming controls for curfew and late night setbacks, but responsive to real time traffic and pedestrian activities, lighting levels can be automatically changed based on need.

ENABLING THE SMART CITY

The deployment of environmental sensor technologies throughout the existing CPS/San Antonio mesh network can be a cornerstone of the region's efforts to move more actively into smart city innovation initiatives.

The positioning of sensor networks on streetlight poles can provide a gateway to vast amounts of raw data, collected across a number of increasingly important urban environmental measures. When properly evaluated, these data can offer up valuable insights and information about issues important to San Antonio and its inhabitants. Sensors are essential in a smart city and the foundation of data collection. Some of the most useful sensor

deployments now seeing substantial adoption throughout North America include:

1. Ambient noise and selective frequency monitoring - allows urban noise mapping in real time to monitor crowd patterns, dwell time and incongruent urban disruptions.
2. Air quality sensing including carbon-laden gases (exhaust, greenhouse, etc.)
3. Temperature sensing
4. Rain water pollutant sensing - permits monitoring of particulates that can be markers for toxins or bacteria
5. Parking availability assistance (including pole, meter and pavement sensor options)
6. Traffic density sensing - allows real-time implementation of traffic flow controls.

Collecting such data is only the first step in the processing and mining of information. Algorithms are available, and adaptable, that can provide detailed analytics to assist cities in screening and converting data into pertinent and actionable information. San Antonio will have challenges in common with many cities and can learn much from the experience and reporting of early-adopters. Needs unique to San Antonio, however, may demand new procedures for insightful interpretation and communication of significant patterns in data. Customized analytic models are commonplace in the smart city universe. Ultimately, the goal is to apply the understanding of those patterns towards effective decision making and planning for both current and future needs for the City.

Other data collecting and monitoring techniques will require additional infrastructure or augmentation of the mesh framework already in place. Fiber optic cabling and some non-sensor data collecting techniques being explored in cities across the globe include:



Non-lighting sensor capabilities

1. Electrical transportation charging stations (EV)
2. Parking availability assistance (visual imaging/camera)
3. Structural health monitoring of vibrations and material conditions in city bridges and infrastructure
4. Smartphone detection - detect iPhone and Android devices and similar communication devices that work with Wi-Fi or Bluetooth interfaces.
5. Electromagnetic Field Level detection - measurement of the energy radiated by cell stations and Wi-Fi routers
6. Traffic Congestion camera monitoring of vehicles and pedestrian levels to optimize driving and walking routes.
7. Smart Roads - Intelligent Highways with warning messages and diversions according to climate conditions and unexpected events like accidents or traffic jams.
8. Emergency detection and response systems
9. Small cell, Wi-Fi and other broadband/wireless interfaces
10. Digital signage

As smart city adoption expands and evolves, data sharing will generate new and enhanced business opportunities. The benefits of data sharing cross applications and market segments, as well as the development of data exchanges and marketplaces, are already starting to be realized and are generating benefits for urban dwellers and their local governments. The near ubiquity of smart city technologies and the ongoing extension of shared and open data policies is a true catalyst for urban advancement that is just now beginning to blossom. This is a fertile time for San Antonio to benefit from such industry-wide momentum.

INITIATIVES UNDER CONSIDERATION

CPS and the COSA Office of Innovation conducted smart city workshops in 2018 which resulted in the generation of a series of Use Case proposals for potential deployment in Downtown Innovation Zones. A review of eleven (11) Downtown Innovation Zone Smart City use cases was conducted as a part of this master planning effort. The

Office of Innovation assisted in this analysis by providing further background on the project and its goal. Based on current IoT implementation practice and technology status seen in the marketplace at the close of the 2018 calendar year, a general feasibility rating was assigned to each initiative to represent the practicality of executing the specific innovations in San Antonio at the current time or near future. These ratings and companion comments are found in Appendix A5 - Smart City Case Study Reviews. The initiatives include:

1. Noise sensing
2. Air quality sensing
3. Electrical transportation charging stations (EV)
4. Parking availability assistance (sensor or camera)
5. Emergency detection and response system
6. Small cell, Wi-Fi and other broadband/wireless interfaces
7. Digital signage
8. Ambient noise detection and monitoring
9. Traffic cameras
10. Temperature sensing and monitoring

The road forward for San Antonio and other cities of similar size is both exciting and daunting. Carl Piva of global industry association TM Forum has written “fusing sensor information into our daily life and integrating it all with third party social networks will knit the fabric of society closer together, while leaving city leaders to grapple with serious privacy and security challenges.” A brave new world, indeed.

PARKS



INTRODUCTION

142	Survey & Assessment of Existing Conditions
146	Observations & Recommendations
172	Future Looking

Parks are a vital ingredient of San Antonio's downtown. Seventeen public parks are found within the ULMP scope area (see opposite page). The parks range in size from the multi-block Madison Square Park to small pocket parks like Huizar Garden and Johnson Fountain, some include public amenities such as Market Square.

The role of these parks varies from welcome, quiet oases to social activity hubs and recreational centers. They are enjoyed for daily lunch breaks, jogging and strolling destinations, sunbathing venues, shade seeking spots and simple personal engagement opportunities. Recreation, both organized and informal, can be found in a number of city parks. Seasonal and holiday festivals are frequent occurrences in the city park system as well, serving a broad cross section of users including downtown residents, weekday city workers, weekend county visitors, and a regional and national tourist base.

Unfortunately, the life of San Antonio's metropolitan parks is greatly diminished after dark. Pedestrian activity is low and organized nighttime events are rarely scheduled or supported. As with many American cities, there is thinking by some that urban parks are simply not safe at night. Whether borne out by crime statistics or not, the perception of a lack of safety and security is at the root of this concern.

Although it would be foolish to think that high quality lighting alone could solve such a problem as security, and singlehandedly thrust parks to the forefront of the urban nighttime experience, but can be a significant step in restoring these important spaces to evening hour relevancy.



An event inside Travis Park

Parks Under Review in study (right):

1. Alamo Plaza
2. Columbus Park
3. Commanders House Park
4. Florida Park
5. Huizar Garden Park
6. Johnson Fountain
7. King William Park
8. Labor Park
9. Madison Square Park
10. Main Plaza
11. Market Square
12. Maverick Pack
13. Milam Park
14. Military Plaza
15. Romana Park
16. Travis Park
17. Veteran Memorial

The key elements in a successful urban park lighting design include:

1. Providing adequate functional illumination of pathways, gathering areas, and pedestrian interaction zones, including the creation of soft vertical light conducive to good visibility of nearby pedestrians (see inset right).
2. Exercising precise control over stray light and glare that can severely erode visibility and compromise perception, thereby heightening pedestrian feelings of uncertainty and sense of safety (see inset right).
3. Incorporating, where practical, the use of accent illumination and highlight to reveal landscape, hardscape and architectural features, all of which aids in the reinforcement of orientation and wayfinding for pedestrians (see inset right and opposite page).
4. Furnishing specialty lighting for artwork, memorials and other feature elements worthy of acknowledgment, helping to establish a level of dignity and neighborhood investment to the park's nighttime persona (see inset right).
5. Incorporating special event lighting options, where appropriate, to support evening events and seasonal displays.
6. Emphasizing long-term sustainability measures, along with manageable maintenance and operational strategies.

The following pages provide an



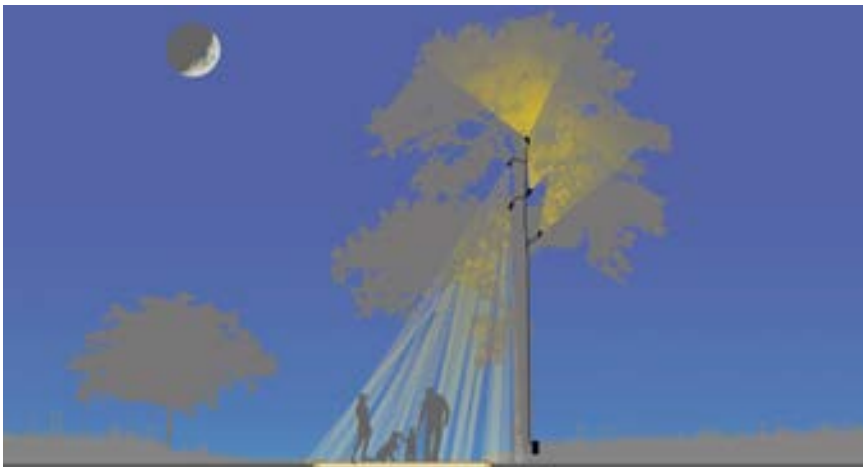
Providing soft vertical light that is conducive to good visibility of nearby pedestrian and aids in the creation of functional illumination of pathways.



Stray light and glare can severely erode visibility and compromise perception, heightening pedestrian feelings of uncertainty.



Architectural and hardscape feature illumination reveals elements and aids in orientation and wayfinding for pedestrians and park users.



Lighting from within mature trees offers several opportunities for ‘area’ illumination to highlighting of landscape.

overview of existing park lighting, an assessment as to the effectiveness of that lighting in the specific park setting, and a look at how lighting can be improved. The elements for success outlined are the common tenets that serve as the foundation for suggested upgrades.



Traditional refractor ‘acorn’ style globe luminaires that utilize non-shielded sources creating both glare and excessive uplighting.



Retrofit and new fixtures that obscure the source and use a cutoff optic system reduce glare as well as greatly minimize uplight.

SURVEY & ASSESSMENT OF EXISTING CONDITIONS

LOOKING AT THE PARKS

A detailed daylight and nighttime review of the seventeen (17) existing parks served as a foundation for understanding the current lighting conditions. Strengths and weaknesses - both technical and design related – had to be clearly understood prior to considering possible lighting upgrades and alternatives.

As with the streetscape environments discussed elsewhere in the master plan, many of the most important aspects of a park's lighted environment are not ones that are easily measured. To answer the key questions about glare, perceptions of safety and security, reinforcement of orientation and wayfinding, and even aesthetic suitability, require keen observations. Each park was visited, viewed and assessed with this in mind.

SURVEY & ASSESSMENT OVERVIEW

The evaluation of each park was conducted at the outset of the master planning effort. The survey had a number of specific goals.

1. Gain a comprehensive understanding of daytime and nighttime park lighting conditions germane to the development of the lighting master plan.
2. Define similarities and differences in park lighting approaches. Compare consistency of design approach across all parks.
3. Take lighting measurements needed to assess technical compliance with recommended Illuminating Engineering Society guidelines.
4. Consider impact of lighting on subjective concerns of pedestrians using the park.
5. Conduct an evaluation of surrounding streets and buildings as to their nighttime impact on lighting conditions in the park.

The lighting review provided a basis from which the master planning process began. Objective and subjective assessments were included in the survey and investigation.



Survey of existing lighting equipment (Milam Park)



Survey of existing lighting equipment (Military Plaza)



Survey of Columbus Park



Survey of existing lighting equipment (Milam Park)



Survey of existing lighting equipment (Commanders House Park)



Labor Park at night

OBJECTIVE EXAMINATION INCLUDED:

1. Measurable lighting quantities of illuminance and uniformity of light distribution
2. Light source identification (high pressure sodium, metal halide, compact fluorescent and LED)
3. Light source color attribute determination (color temperature, color rendering properties)
4. Presently installed lighting equipment and its current condition
5. Currently operating lighting control systems (when possible)

SUBJECTIVE JUDGMENTS INCLUDED:

1. General quality of light
2. Impact of light source glare from lighting equipment in the park on pedestrians or those nearby the park.
3. Impact of light source glare from sources outside and around the park on pedestrians within the park, where occurring.
4. Impact of light source glare from sources in the park on bicyclists and drivers.
5. Appropriateness of lighting equipment selection with respect to the park's visual needs.
6. Impression of existing lighting equipment aesthetics.
7. Observation of existing lighting layouts and their effectiveness in the reinforcement of orientation, wayfinding and safety.

SUMMARY OF FINDINGS

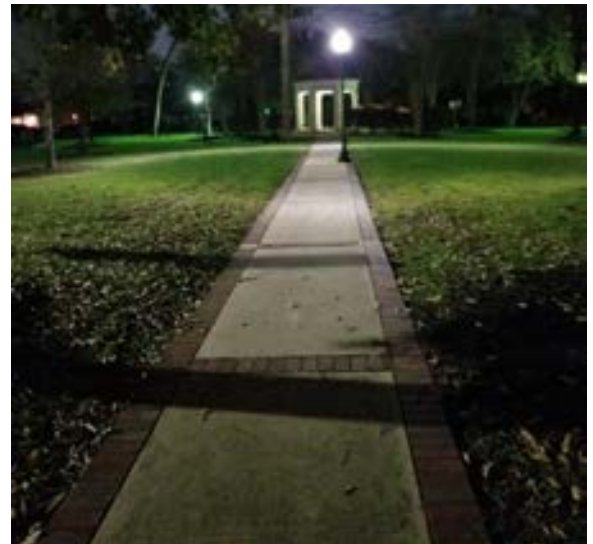
A detailed daylight and nighttime review of the seventeen (17) existing parks served as a foundation for understanding the current lighting conditions. Strengths and weaknesses - both technical and design related - had to be clearly understood prior to considering possible lighting upgrades and alternatives.

As with the streetscape environments discussed elsewhere in the ULMP, many of the most important aspects of a park's lighted environment are not ones that are easily measured or qualified. To answer the key questions about glare, perceptions of safety and security, reinforcement of orientation and wayfinding, and even aesthetic suitability, required keen observations.

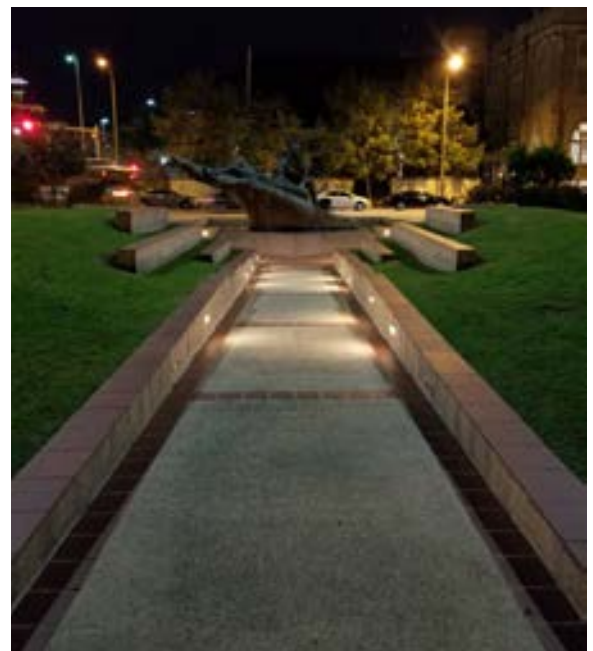
The following pages review the findings and observations for each park in detail. Upgrade recommendations are suggested for the park as appropriate. The more detailed accounting of actual field measurements and supporting graphics is found in Appendix 3 'Park Lighting Survey'.



Maverick Park at night



King William Park at night



Veterans Memorial Park at night

OBSERVATIONS & RECOMMENDATIONS

COLUMBUS PARK

OBSERVATIONS

Currently, there is no dedicated lighting for the park. There are pole mounted floodlights at the basketball court and a wall mounted light at the restrooms. Lighting at night is almost non-existent, except for spill from adjacent areas, so no comprehensive nighttime detailed measurements were taken during this study. Nearby streetlights add very little effective light to the park. Ambient illumination from the surroundings contribute between 0.1 and 0.3 foot-candles in some of the perimeter areas.

The unlighted park is virtually unusable by the public after dark.

RECOMMENDATIONS

It is recommended that the park be illuminated in a manner consistent with the design tenets outlined in the Park lighting section of this report. It is highly recommended that a professional lighting designer and electrical engineer be engaged for this work.

This upgrade should include:

1. Post-top mounted, pedestrian scaled LED sourced area lighting should be provided along pathways and most pedestrian interaction areas for safety and security.
2. Upgraded pole mounted floodlights should replace existing lighting fixtures, incorporating better optical control, off-site glare mitigation louvers or baffles and good color rendering LED sources.
3. Wallpack style lighting at restrooms should be replaced with LED source cut-off style luminaire, with additional units positioned on building walls to meet code level illuminance needs.
4. Serious consideration should be given to providing LED source cut-off optic style area lights beneath the park shelter for general illumination and accent lights for highlighting the outward facing surfaces of the shelters columns.



Daytime image 01



Daytime image 02



Daytime image 03



Daytime image 04



Daytime image 05

COMMANDERS HOUSE PARK

OBSERVATIONS

1. General comments: Both vehicular drive lanes and pedestrian pathways have lower than ideal average illumination levels, based on IES recommendations, including several dimly lighted areas that contribute to an overall non-uniformity (only 0.1 through 0.3 foot-candles at the inner walkway circle). The average is around 0.6 foot-candles. The lighting levels at the building facade are much higher and brighter than needed. Due to this high contrast between two applications (horizontal paths vs. vertical facades), the building surfaces tend to further diminish the effectiveness of the surrounding post top fixtures. The higher illuminance levels from S Flores Street and the adjacent parking lot also add to this counterbalance.
2. The park is illuminated using lantern-style post top fixtures, using exposed source, 26w CFL lamps (bulbs). Both pole and fixture head are in fair condition.
3. Ground mounted LED floodlights are used to illuminate the facade of the house. They are unshielded with poorly controlled optics and no glare shielding.
4. No specialty lighting for special events is found.
5. No landscape lighting is found.
6. This park and the Commanders House are State Historic Landmarks with limitations on improvements that may be possible within the property, including potentially new equipment locations.

RECOMMENDATIONS

Overview assessment: The existing pathways are borderline for meeting IES recommendations, with uniformity falling short in several areas. The post-top fixtures exhibit noticeable glare, as there is no shielding of the CFL lamp. The lighting of the house is far too strong for the context of the park. Once in the park, the perception for the pedestrians is that the house is overly bright and the pathways relatively dim.

The following general recommendations are suggested



Daytime image 01



Daytime image 02



Nighttime image 01



Nighttime image 02



Nighttime image 03

for the park:

1. If existing poles are to be retained, the preferred choice would be to replace current fixture heads with new LED-based, cutoff optic style fixtures, using 80 CRI, 2700K or 3000K sources. This would result in the raising of lighting levels and the minimization of glare impacts.
2. An alternative to item 1 above, is to replace existing fixtures and poles entirely with pole/fixture assemblies similar to the selection and technical approach outlined above.
3. The floodlights are too bright and should, ideally, be replaced with the following changes:
 - a. Lower output (30% to 50% reduction)
 - b. Change from 4000K to 2700K or 3000K, 80 CRI LED source
 - c. Add glare control louvers to minimize spill light
 - d. Provide dimming control for post-curfew lighting level reduction, if practiced.
4. While improvements that include new equipment may be difficult given the historic landmark status, Several poles could be added, including one near the park's center circle and several along at least one completely unlighted path. Lighting calculations would have to be done by a lighting designer or engineer to finalize wattages, distributions and pole locations.

FLORIDA PARK

OBSERVATIONS

Currently, there is no dedicated lighting for the park. Lighting at night is only available from spill light coming from adjacent areas. No comprehensive detailed nighttime measurements were taken in this park. Ambient illumination from the surroundings contributes between 0.1 and 0.5 foot-candles in some of the perimeter areas. The gazebo and connecting path are unlighted but can be accessed without much difficulty, due to the presence of trace amounts of spill light, from the street.

RECOMMENDATIONS

Overview assessment: The unlighted park is virtually unusable by the public after dark.

If lighting is desired in this park after dark for its use by neighborhood residents, then it is recommended that the park be illuminated in a manner consistent with the design tenets outlined in the introduction of this section of the ULMP. It is highly recommended that a professional lighting designer and electrical engineer be engaged for this work.

DON PEDRO HUIZAR GARDEN

OBSERVATIONS

Currently, there is no dedicated lighting for the park. Lighting at night is only available from spill light coming from adjacent areas. No comprehensive detailed measurements were taken during the nighttime in this park. Ambient illumination from the surroundings contributes between 0.2 and 0.3 foot-candles in some of the perimeter areas. The garden does not have a formal nighttime gathering area and only heightened security lighting need be considered.

RECOMMENDATIONS.



Florida Park from overhead



Huizar Garden daytime image 01



Huizar Garden daytime image 02



Johnson Fountain daytime image 01

Consider limited safety lighting with good glare control fixtures, to avoid off-site spill.

LADY BIRD JOHNSON FOUNTAIN

OBSERVATIONS

Currently, there is no dedicated lighting for this small park. Lighting at night is only available from spill light coming from adjacent streets. No comprehensive detailed nighttime measurements were taken during in this park.

RECOMMENDATIONS.

No lighting is necessary in this park. The only reason to add illumination would be to render the area more visible through aesthetic accent lighting. If this is considered desirable, then it is highly recommended that a professional lighting design and electrical engineer be engaged.

KING WILLIAM PARK

OBSERVATIONS

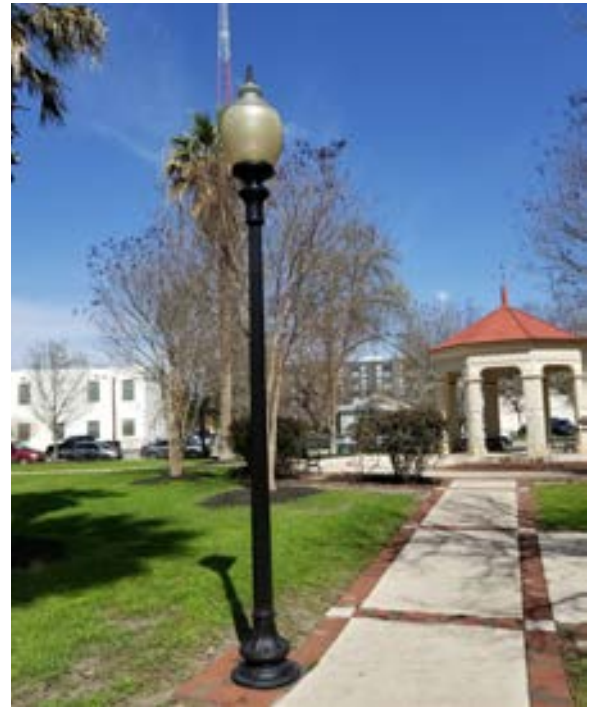
1. General comments: Pathway lighting levels in the park are moderate, at best, and low in some areas. The average is between 0.4 and 0.5 foot-candles, with the occasional high of 1.0 foot-candle, but with lows approaching 0.1 foot-candles. The levels are actually adequate in most zones, as the park is small and open, helping to reinforce perceptions of safety. Adjacent street lighting levels are also on the lower end of normal values for residential zones.
2. The park is illuminated using Acorn-style, post top fixtures operating a conventional base LED retrofit lamp (bulb). The fixtures are somewhat glary due to the retrofit lamp (bulb) not being well shielded. Both pole and fixture head are in fair condition. The source's color temperature is a non-residential appearing 4000K.
3. Wall mounted indirect LED fixtures are mounted to the inside face of the central gazebo to illuminate the structure, providing a pleasant ambiance. Lighting levels within are more than adequate. The color temperature is 3500K.
4. No specialty lighting for special events appears present.
5. No landscape lighting is found.

RECOMMENDATIONS

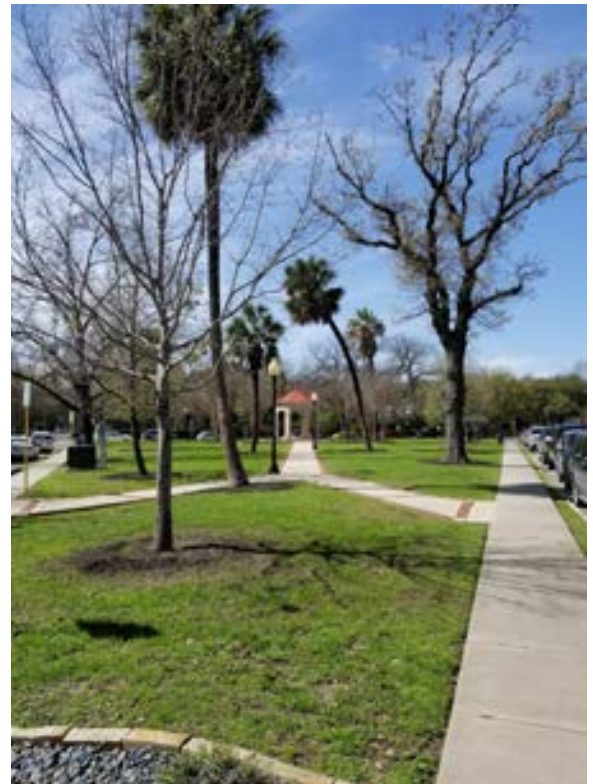
Overview assessment: The existing pathways could be slightly brighter and uniformity is poor in a couple of areas. The post-top fixtures are a bit glary, as there is no shielding of the retrofit lamp (bulb). This produces noticeable glare for pedestrians.

The following general recommendations are suggested for the park:

1. If existing poles are to be retained, the preferred choice would be to replace current fixture heads with new LED source, cutoff optic style fixtures, using 80 CRI, 2700K sources. This would allow the raising of lighting levels and the minimization of glare impacts.



Daytime image 01



Daytime image 02



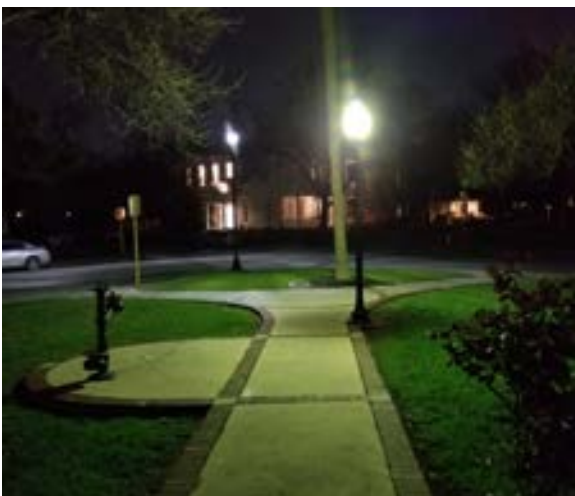
Nighttime image 01

One or two poles should be added to heighten uniformity. Lighting calculations would have to be done by a lighting designer or engineer to finalize wattages, distributions and new pole locations where they are needed.

2. An alternative to item 1 above, is to replace existing fixtures and poles entirely with new pole/fixture assemblies similar to the selection and technical approach outlined above.
3. If nothing else is done, the color temperature of the LED source should be lowered to 2700K to better conform to the surrounding residential areas.
4. Provide dimming control for curfew lighting level reduction, if possible.



Nighttime image 02



Nighttime image 03

LABOR PARK

OBSERVATIONS

1. General comments: The park is illuminated using dual-head (180 degrees to one another) LED area light fixtures mounted on concrete posts. Both pole and fixture are in relatively good condition, but the fixture exhibits excessive brightness and glare. The light levels provided by these LED fixtures are adequate in some areas, however, the poles are spaced excessively far apart leading to great variations in illumination levels and uniformity. Near pole light locations, levels from 3.5 to 4.5 foot-candles can be measured. Between poles, values as low as 0.1 foot-candles are not unusual. This results in very poor uniformity of light on the pathway, elevating the maximum-to-minimum ratio to 40 or 50 to 1, nearly 10 times the recommended IES standard. The LED source color temperature is 4000K.
2. Playground area and recreational fields do not have nighttime-use illumination provided.
3. Limited spill light is provided by streetlights.
4. No specialty lighting for special events or sports appears present.
5. No landscape lighting is found.

RECOMMENDATIONS

Overview assessment: The existing pathways are far too non-uniform, brought about by improperly spaced light poles. The perception of safety and security is, significantly compromised due to this situation.

The following general recommendations are suggested for the park:

1. If existing poles are to be retained, the preferred choice would be to replace current fixture heads with new LED sourced, cutoff optic style fixtures, using 80 CRI, 2700K or 3000K sources. This would allow the lighting levels to be more even along the path, when combined with new poles and fixtures between the existing ones. Lighting calculations would have to be done by a lighting designer or engineer to finalize



Daytime image 01



Daytime image 02



Daytime image 03



Nighttime image 01



Nighttime image 02



Nighttime image 03

wattages, distributions and pole locations where they are needed.

2. An alternative to item 1 above, is to replace existing fixtures and poles entirely with new pole/fixture assemblies, with selection and technical approach similar to that outlined in the general recommendations at the front of this section.
3. All LED fixture color temperatures should be changed to 2700K or 3000K
4. Provide dimming control for curfew lighting level reduction, if possible.
5. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

MADISON SQUARE PARK

OBSERVATIONS

1. Light for pathways is provided using an acorn style, post-top refractor fixture with spacing's at approximately 60' on center. This spacing results in somewhat low lighting levels between pole positions, but still maintains borderline uniformity.
2. The existing post-top area light is a refractive-obscuring globe shade with little useful optical control. It was an HID-source, which has in recent years been replaced with a LED retrofit lamp, perpetuating the glare from the original fixture. Source color temperature is 4000K, creating a harsh general appearance to the ambient light in the park – certainly not warm and inviting.
3. Seating areas and social zones have no additional lighting or visual reinforcement than that provided by the pole-based lighting system.

RECOMMENDATIONS

Overview assessment: The existing pathways are borderline for meeting IES recommendations, with uniformity falling short in some areas. Average illuminance ranges between 0.5 and 0.6 foot-candles with lows at or below 0.2 foot-candles. The post-top fixtures are a bit glary, as there is no shielding of the LED lamp. It is quite dim and non-uniform in and around the dog park, as there are currently only a few broadly spaced light poles placed within it. They do little to illuminate the grassy areas which form the majority of the dog run.

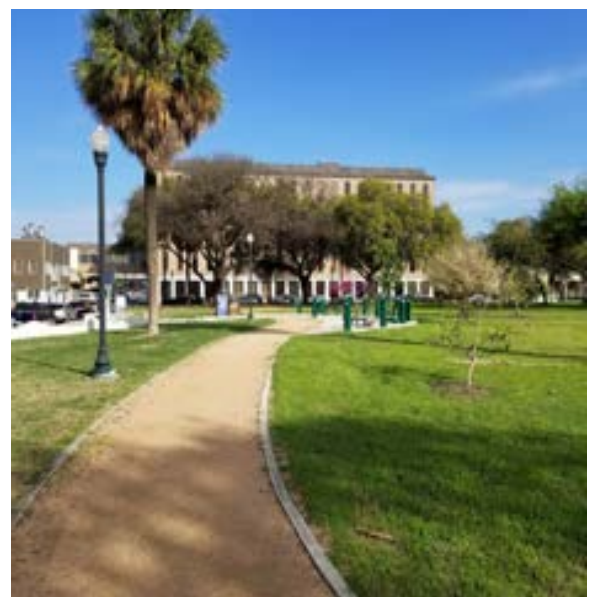
1. Remove the existing post-top luminaires and replace, one-for-one, with new flat-lensed LED soft-optic or other similar full cutoff, low glare optical assemblies. A standard transition fitter to fit the new luminaire atop the existing pole would likely be required. This style of low-glare fixture provides more visually comfortable illumination, while better revealing pedestrian forms and faces. This enhances walkability for the park interior, while providing an increased sense of safety and security.
2. Equip each fixture with an integral dimming LED driver



Daytime image 01



Daytime image 02



Daytime image 03



Daytime image 01



Daytime image 02



Daytime image 03

to facilitate curfew hour setbacks without impacting overall lighting uniformity.

3. Provide a high color rendering 2700K or 3000K LED source to maximize visual effectiveness.
4. If existing poles are to be retained, the preferred choice would be to replace current fixture heads with new LED-based, cutoff optic style fixtures, using 80 CRI, 3000K sources. This would allow for an increase of lighting levels and the minimization of glare impacts.
5. An alternative to item 1 above, is to replace existing fixtures and poles entirely with new pole/fixture assemblies similar to the selection and technical approach outlined above.
6. There are several floodlights used within the park that are too bright and should, be replaced with equipment possessing the following:
 - a. Lower output (30% to 40% reduction)
 - b. Change from 4000K to 2700K or 3000K, 80 CRI LED source
 - c. Glare control louvers to minimize spill light
7. Provide dimming control for curfew lighting level reduction, if practical.
8. Provide new dedicated area light poles at two or four positions around the dog run.
9. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

MAIN PLAZA

OBSERVATIONS

1. Illumination throughout the principal plaza area is provided by 20' to 25' high poles, each equipped with 4 LED adjustable floodlight fixtures. The poles are positioned between 130' and 180' apart from one another, with each floodlight aimed at an angle downward into the plaza. Mid-height trees cast large and long shadows from light distributed by the high poles. The light source color temperature is 4000K.
2. The main north-to-south walkway along the plaza, running adjacent and parallel to the church and Municipal Plaza Building, is illuminated at night by adjustable LED area lights mounted to each of 2 poles, 20' to 25' high. There are 3 fixtures on each pole, all in a reasonably good state of repair. The light source color temperature is 4000K.
3. Specialty projector instruments are mounted to poles fronting the San Fernando Cathedral for use in a multi-media display on the main facade of the church.
4. Seating areas and social zones have no pedestrian scaled lighting or visual reinforcement other than that provided by the pole-based lighting system.

RECOMMENDATIONS

Overview assessment: Illumination throughout the plaza is substandard in both appearance and as measured. The plaza does not meet IES recommended practice for pedestrian lighting levels and the uniformity of light is poor. The overall look of the area at night is unattractive, uninviting and unsafe. Lighting levels range from an average of only 0.2 foot-candles in the crossing path to 0.4 in the plaza zone, where hot spots of light and deep shadows from trees create poor visual conditions. Steps and plaza pavers are seen in poorly lighted conditions and are difficult to traverse.

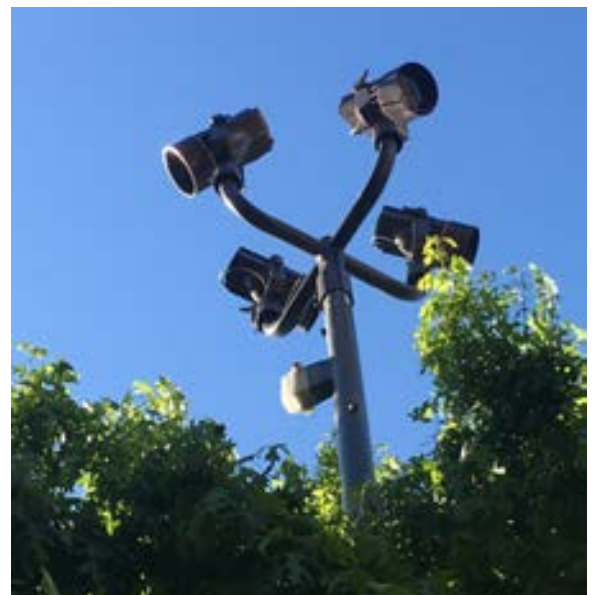
The separate set of projection lighting fixtures mounted to the poles fronting the Cathedral are controlled through a distinct multi-media system, which also dims the general



Daytime image 01



Daytime image 02



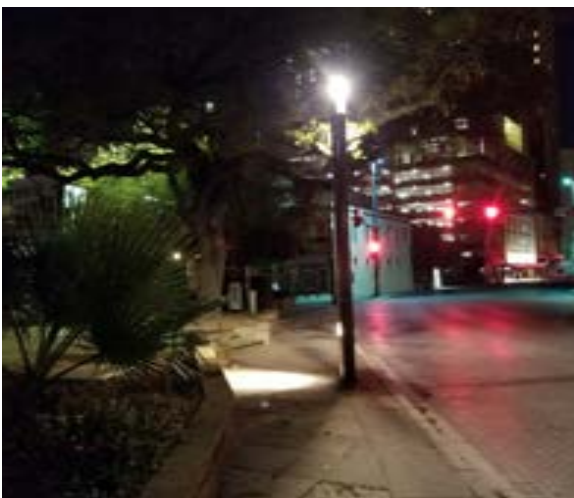
Daytime image 03



Nighttime image 01



Nighttime image 02



Nighttime image 03

park lighting during performances.

Significant upgrades in the Plaza lighting should be made for reasons of safety, security and visual appeal.

These upgrades should include:

1. Provide a new pedestrian scaled lighting system (12' +/- poles) throughout the plaza area for general illumination, wayfinding and to remove the current ominous look of the entire area. Fixtures must have good brightness control and be dimmable for projection shows. Remove the existing high poles in the plaza or retain them for assistance in nighttime clean-up or for special event activities.
2. Along Main Plaza's north-to-south walkway, consider additional poles and fixtures of the same or similar type to those currently installed (20' – 25' with LED adjustable area lights) to elevate lighting levels into acceptable (0.5 and above foot-candles) range. Avoid blocking the projection equipment's view to the cathedral facade with this upgrade.
3. Provide a high color rendering 80 CRI, 2700K or 3000K LED source in all new and retained existing fixtures for continuity of color appearance and pedestrian appeal.
4. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

MARKET SQUARE

OBSERVATIONS

1. Meaningful illumination throughout Market Square is delivered by a combination of 2 and 4 headed decorative architectural area lights, using glass refractors for optical control, positioned along the principal walkways atop 15' +/- poles. The fixture light sources are predominately induction, with some LED retrofits lamps (bulbs) also in use.
2. There are some scattered locations of building mounted area lights matching those mounted to the poles.
3. Building-to-building suspended festoon-style lighting adds additional illumination and a festive marketplace appeal.
4. A predominantly retail setting, spill light from most storefront entries and windows provides additional useful light and ambiance, although inconsistent in quality. When stores are closed, this lighting is not a factor.
5. Some glare from each of these lighting sources is present depending on intensity and viewing angle.

RECOMMENDATIONS

Overview assessment: Illumination throughout the marketplace is generally within recommended IES standards. Some gaps in spacing of the principal pole mounted fixtures does produce dimmer areas. Better glare controlled optics should be considered to heighten visibility to the storefronts. The absence of storefront lighting contributions during “off hours” diminishes the look and feel of the pedestrian experience.

1. Consider one-for-one replacement of existing lighting heads with new fixtures that utilize higher quality lenses and glare control LED optics.
2. Provide in-line dimming for all new fixtures so that an evening ambient condition can be fine-tuned whether the stores are open or not. A separate and higher clean-up light level could then also be utilized.



Daytime image 01



Daytime image 02



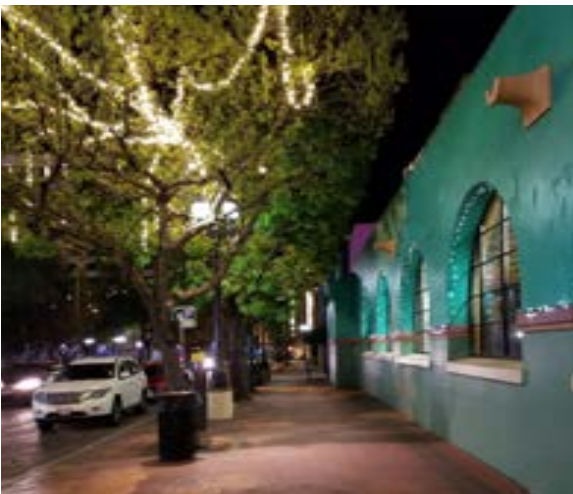
Daytime image 03



Nighttime image 01



Nighttime image 02



Nighttime image 03

3. Provide a high color rendering 80 CRI, 2700K or 3000K LED sources in all new and retained existing fixtures for better color appearance and pedestrian appeal.
4. Consider a program with retailers that encourages storefront window lights to remain on during the nighttime “off hours” to maintain ambiance and improve security.
5. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

MAVERICK PARK

OBSERVATIONS

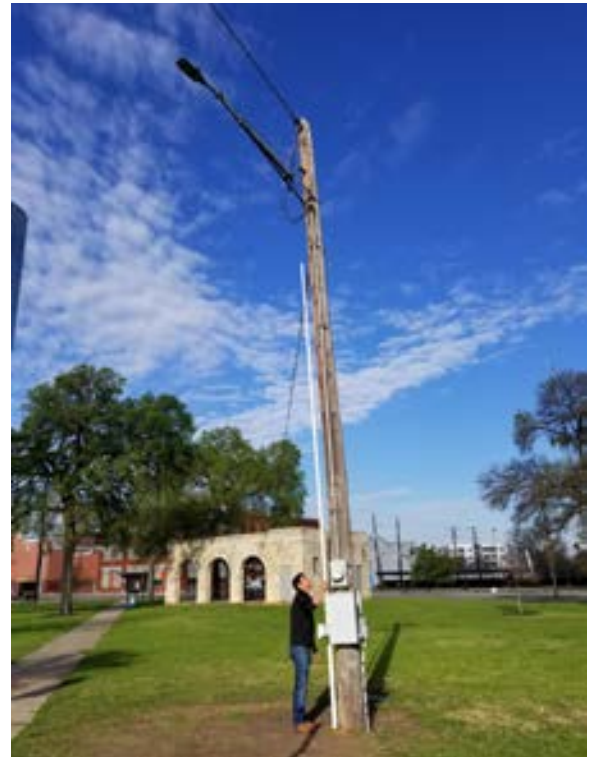
1. The park has little lighting. Only a single 25' high wooden pole mounted LED source cobra-style area light is found in the park, at the central crossing point of the 2 principal pathways. The light source has a 4000K color temperature.
2. There are several lighting fixtures ceiling mounted within the park's only pavilion structure, that cause it to glow at night
3. Additional street pole mounted cobra head style LED fixtures are located along the streets that frame the park, each of which provide some measure of spill light to the park's perimeter.

RECOMMENDATIONS

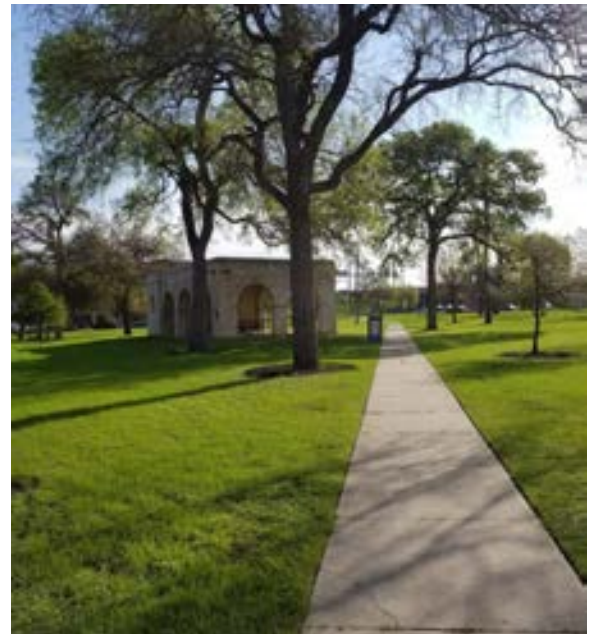
Overview assessment: Nighttime illumination throughout the park is poor and does not meet recommended IES standards. The general perception and feel of the park is gloomy and unappealing.

Recommendations that follow are suited for the park in its condition as of the writing of the ULMP. It is understood that Maverick Park is set to undergo improvements as part of a bond project. The lighting design for those improvements should incorporate as many of the recommendations that fit the new park design, intended uses, and programming.

1. Provide a new and complete pedestrian scaled lighting system (12' +/- poles) throughout the plaza area for general illumination, wayfinding and to remove the current foreboding appearance of the park. Fixtures must have good brightness control and should be dimmable for post-curfew conditions.
2. Fixtures located in the pavilion should be replaced with a less institutional luminaire, but with vandal-resistant properties.
3. The exterior surfaces of the open pavilion should also be illuminated to balance the contrast with the structure's interior. Wall surface mounted wash lights positioned to reinforce the architecture would be



Daytime image 01



Daytime image 02



Daytime image 03

appropriate and would also result in area lighting for the horizontal surfaces surrounding the pavilion.

4. Provide a high color rendering 80 CRI, 2700K or 3000K LED source in all new and retained existing fixtures for better color appearance and pedestrian appeal.
5. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.



Nighttime image 01



Nighttime image 03

MILAM PARK

OBSERVATIONS

1. Light for pathways throughout park is provided using 4-head globe-style fixtures operating with high output compact fluorescent light sources. Fixtures are clustered atop a 12'+- pole with bracket arms supporting each unit. The source is 5000K and open to direct view through the globe surface.
2. A central seating area is illuminated by 20' pole mounted "shoebox" style, cutoff 5000K luminaires.
3. A central gazebo is encircled by single globes similar to the pole mounted units, but bracket attached to the structure's support columns.
4. Additional spill light from street poles surrounding the park – mostly 4000K sources - also contribute.

RECOMMENDATIONS

Overview assessment: The park is severely over lighted, visually glary and unappealing to most anyone. It suppresses the true park identity at night and produces off-site light trespass and nuisance glare to streets and surrounding buildings. The condition of the poles and fixtures is moderate to poor and many are out of alignment and disruptive in appearance during both day and night. The near overwhelmingly high illumination levels are actually counterproductive to good visibility, and the glare from the fixtures can mask surveillance. The 5000K color temperature is completely counter to the desired warmth and softness desired in parks such as this one. The formality and spacing of the poles is fine for this walking park feel.

1. Remove all existing poles and fixtures within the park and replace, either one-for-one or on new spacing's, with a new pedestrian scaled pole using a single fixture possessing the following qualities:
 - a. Appropriate pole and luminaire aesthetic
 - b. LED source with, ideally, a flat-lensed LED soft-optic for pedestrian visibility enhancement



Daytime image 01



Daytime image 02



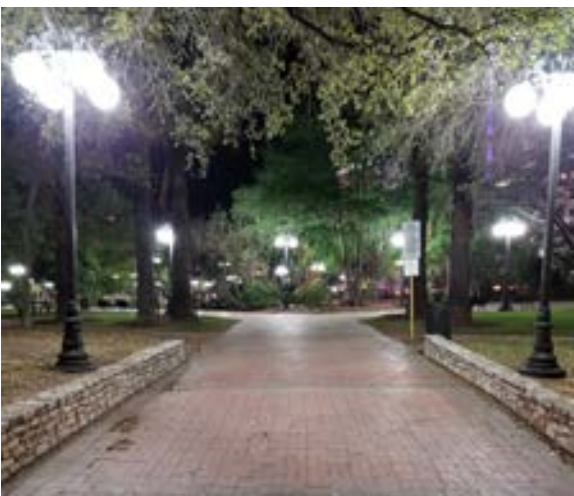
Daytime image 03



Nighttime image 01



Nighttime image 02



Nighttime image 03

- c. Good glare control
 - d. 2700K or 3000K color temperature and 80+ CRI color rendering.
2. This style of low-glare fixture provides more visually comfortable illumination, while better revealing pedestrian forms and faces. It enhances walkability for the park interior, while providing an increased sense of safety and security.
 3. Remove existing “shoebox” style poles and fixtures at seating areas.
 4. The accent lighting of some feature trees with “moonlighting” could be considered for trees within the park.
 5. Remove lighting mounted to gazebo columns and replace with a new, more architecturally appropriate LED luminaire. It should have low-glare optics, 2700K or 3000K and 80+ CRI.
 6. Equip each fixture with an integral dimming LED driver to facilitate curfew hour setbacks without impacting overall lighting uniformity. This feature can also allow for elevation of lighting levels in cases of emergency.
 7. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

MILITARY PLAZA

OBSERVATIONS

Currently, there is no dedicated illumination for the park. It receives spill light from nearby street poles, contributing 0.2 to 0.4 foot-candles of non-uniform illumination. There is flood and accent lighting at the nearby City Hall building whose reflected light also contributes a small amount of light.

RECOMMENDATIONS

Overview assessment: City Hall is undergoing a current renovation that will alter the current lighting conditions in this park. Further consideration should be taken once these upgrades take place.



Daytime image 01



Daytime image 02



Nighttime image 01



Romana Plaza Park from overhead

ROMANA PLAZA PARK

OBSERVATIONS

Currently, there is no dedicated lighting for the park. Lighting at night is almost non-existent, except for spill from adjacent areas, so no comprehensive detailed measurements were taken during this study. Ambient illumination from the surroundings contribute between 0.1 and 0.4 foot-candles in some of the perimeter areas.

RECOMMENDATIONS

Overview assessment: The park could benefit from illumination.

It is recommended that the park be illuminated from LED-based light fixtures mounted to pedestrian-scaled poles along its perimeter. This lighting approach would provide a strong visual boundary condition and illuminate into the park interior. Fundamentals of good design practice outlined in the introduction of this section should serve as a guide for this work.

It is highly recommended that a professional lighting designer and electrical engineer be engaged for this work.

TRAVIS PARK

OBSERVATIONS

This park is well positioned in its neighborhood, bounded by E Pecan St. to the north, Jefferson St. to the east, E Travis St. on the south, and Navarro St. to the west. Travis Park is central to community activity with office, commercial and hospitality enveloping the park on three sides, while the fourth edge opens to surface parking across the street. At just two blocks north of Houston St., The St. Anthony Hotel adjacent, and two blocks south from the Tobin Center for the Performing Arts, it is ideally located to be a central gathering space activated regularly.

The existing pathway lighting within the park, though meeting code minimums, can be substantially improved, especially with regards to lighting quality.

RECOMMENDATIONS

1. Remove the existing post-top luminaires and replace, one-for-one, with a new flat-lensed LED soft-optic or other similar full cutoff, low glare optical assemblies. A standard transition fitter to fit the new luminaire atop the existing pole would likely be required. This style of low-glare fixture provides more visually comfortable illumination, while better revealing pedestrian forms and faces. This enhances walkability for the park interior, while providing an increased sense of safety and security.
2. Equip each fixture with an integral dimming LED driver to facilitate curfew hour setbacks without impacting overall lighting uniformity. This feature can also allow for elevation of lighting levels in cases of emergency.
3. Provide a high color rendering 2700K or 3000k LED source to maximize visual effectiveness.
4. Provide new dedicated area light poles at two or four positions around the central node of the park. Each pole would be 20 to 30 feet high and fitted with four to six adjustable LED source accent and area lights. The fixtures would provide for:
 - a. General illumination within the central court area.



Daytime image 01



Daytime image 02



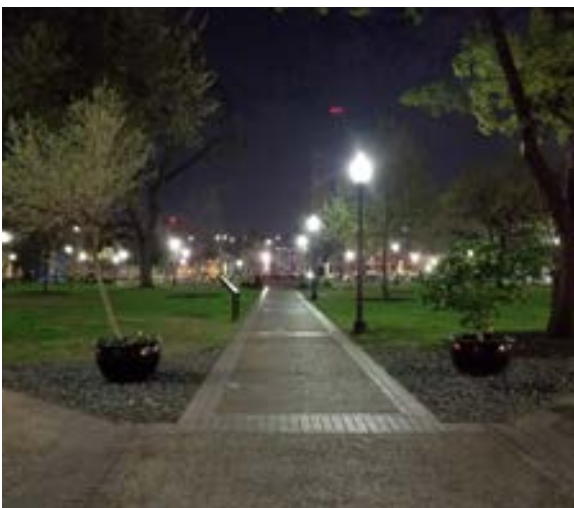
Daytime image 03



Nighttime image 01



Nighttime image 02



Nighttime image 03

- b. Accent lighting for features in and around the court.
 - c. Dedicated and switchable accent lights for event area to be used only when special activities are held at the park's center.
5. Reactivate the in-tree RGB LED projected color displays, but with more effective luminaires. Perhaps include additional trees in the program to reach a visual "critical mass" for impact. With the hotel across the street and a reasonable number of passersby to this park, this effect could be compelling.
 6. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

VETERANS MEMORIAL PARK

OBSERVATIONS

1. The principal light sources are adjustable induction source floodlights mounted to 50'+- poles at the perimeter of the park. Light is broadcast across the park area with high-angle aiming of the equipment. Light source color temperature is believed to be 5000K
2. The principal pathways are illuminated from wall recessed low-level compact fluorescent pathway lights. Fixture optics are unshielded and a bit glary due to that fact.
3. Additional street pole mounted cobra head style LED fixtures are located along the streets that frame the park, each of which provide some measure of spill light to the park's perimeter.
4. The lighted facade of the Tobin Center across Auditorium Circle provides additional soft glow to the memorial area, helping to balance the glare from the pole mounted floodlights.

RECOMMENDATIONS

Overview assessment: Nighttime illumination throughout the park is comfortable. The high pole mounted floodlights are reasonably effective at providing a soft general glow to the park. Lighting levels in the south end of the park, closer to the memorial, are above 1 foot-candle and comfortable, notwithstanding some higher angle peripheral glare from the pole mounted floodlighting. The 5000K light source gives the entire park a bluish cast. The remaining pathways to the north receive approximately 0.5 foot-candles of low level lighting, which is adequate for the area. The presence of bordering light from the Tobin and other nearby light sources is helpful.

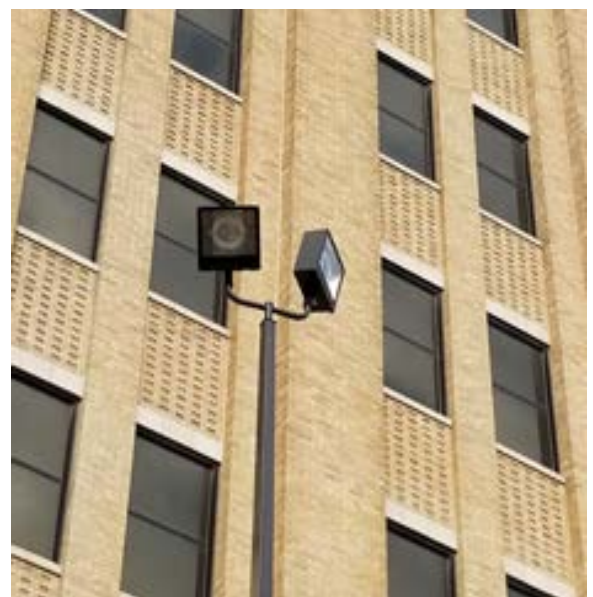
1. Retain the existing high poles on flanking sides of the park. Remove existing floodlights, which have a great deal of undesirable scatter light and light trespass, and replace with new LED adjustable precision floodlights that possess:



Daytime image 01



Daytime image 02



Daytime image 03



Nighttime image 01



Nighttime image 02



Nighttime image 03

- a. Better color attributes – 2700K or 3000K and 80+ CRI
 - b. Higher efficiency and source life
 - c. Better beam distribution (ideal redesign would include a variety of distributions including narrow floods, spots and likely narrow spots for actual accent of the memorial sculpture itself)
 - d. Glare and spill light control louvers
 - e. Dimming control compatibility
2. Provide one-for-one replacements for the wall-recessed low-level compact fluorescent lights, which are better color (3000K) and longer lasting. Source should be LED and possess reasonable upward glare control for pedestrians.
 3. Consider the possibility – though not a necessity – of highlighting perimeter trees with LED source 3000K uplights. This would add a soft perimeter of tree canopy illumination to the entire park.
 4. It is highly recommended that a professional lighting designer and electrical engineer be engaged for the redesign work outlined above.

FUTURE LOOKING

Parks will remain as one of San Antonio's most important assets as the 21st century continues to unfold. With the gentrification taking place in and around the downtown, the significance of parks as respites from everyday life, social hubs, and sites for special events and happenings will be magnified.

The current young adult generation enjoy their urban settings and want to take advantage of whatever the city can offer them. The nighttime is a domain with which they are comfortable, and creating and maintaining parks for after-hours festivals and special gatherings is a part of the future. If additional parklands become available, including, at time of this writing, Civic Park at Hemisfair, the city should consider lighting as an integral part of their design.

As the Internet of Things (IoT) and Smart City technologies continue to evolve, consideration should be given to extending their benefits into park settings. This would provide another reason for park use after dark. An increasing number of cities now use parks as nighttime, spur-of-the-moment crowd gathering nodes, employing IoT to communicate to thousands about pop-up concerts, food truck caravans, and other free-form happenings.

More of San Antonio's parks should consider scheduled nighttime



First Night Charlotte; Bearden Park



First Night Charlotte; Bearden Park



Gateway Arch Park; St. Louis, MO

festivals and events to draw people into the core and/or to give downtown workers a reason to linger after hours. Creating a safe, secure environment for nighttime visitors is first and foremost to attracting such audiences. Hemisfair Park is a good reference within the ULMP scope area of a park with good evening programming. The weather is an advantage in San Antonio and year around events are possible, especially in months with early sunsets.



Gateway Arch Park; St. Louis, MO

CIVIC ART





Map of public artwork across greater San Antonio



Leon Creek Crossing - Barbara Grygutis

Location: Hausman Road at the Howard Peak Greenway Trail at Leon Creek

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A city's public art is one of its greatest treasures. An oft-quoted New York Times op-ed said on public art, "With outdoor sculpture, the private act of looking converges with public habit. Public art is a communal activity; its reach can be powerful for communities and neighborhoods. Artists realize a democratic ideal in outdoor settings that are free to all viewers."

Art can be a vital part of a city's nighttime character. Thoughtful, revealing illumination of artwork enriches the after-dark experience and extends its cultural contribution into hours often not considered for its viewing and enjoyment. The City of San Antonio's soaring "Torch of Friendship", at E Commerce and S Alamo is a good example of how a large scale sculpture can have a powerful nocturnal presence. An informal survey of existing public art installations within the ULMP scope area revealed opportunities for activation of art after nightfall. These findings can be found in the 'Recommendations for Existing Artwork' subsection.

The San Antonio Department of Arts and Culture is at the center of promoting the fine arts in the City. Leadership has emphasized community engagement at all levels. Encouraging art be illuminated for enjoyment by those who live in, work or visit, the downtown after dark is a natural extension of that outreach.

As new art pieces are placed throughout the city's downtown area in the coming years, it is hoped that lighting will be an integral part of its installation and siting. The following pages provide some basic guidance on how art can be illuminated in outdoor environments and some of the considerations that must be given to the formulation of a proper design for each subject.

STRATEGIES FOR ARTWORK ILLUMINATION

LIGHTING DESIGN APPROACHES

A variety of lighting design options can be considered for artwork. The effectiveness of various alternatives should be assessed by a trained eye, seeking to reveal the illuminated piece in a manner most becoming for visual impact and enjoyment. When practical, lighting mock-ups can be done to view the designs likelihood of success prior to purchase and installation of equipment. This can be done with existing art in-situ, or with art pieces yet to be installed at a controlled storage location or venue.

UPLIGHTING

Much artwork can be effectively enhanced by upward illumination from its base or immediate surround (see inset right for references). Oblique light will accentuate textures and varying surface geometries, producing a dramatic presentation. Selection of long life, high color rendering light sources (ideally LED) can help make certain the art is accurately shown.

Depending on mounting options available, equipment may be flush to grade for maximum concealment and minimal intrusion in the right-of-way, or above ground with grade mounted adjustable accent light fixtures (see inset figures opposite page). The quantity of light fixtures required for a given piece will be determined by the artwork's physical size and shape, color, geometry and exposure to view.

For artwork placements near light sensitive buildings or gathering areas, care must be taken to avoid bothersome or objectionable light spill. This could occur when art is located adjacent to residential dwellings, hospitality zones, medical facilities or other similar settings where stray light can compromise normal activities.

REMOTE ACCENT LIGHTING

When mounting lighting equipment at or near the base of an art piece is not physically practical, or would result in a less-than-desirable visual appearance of the work,



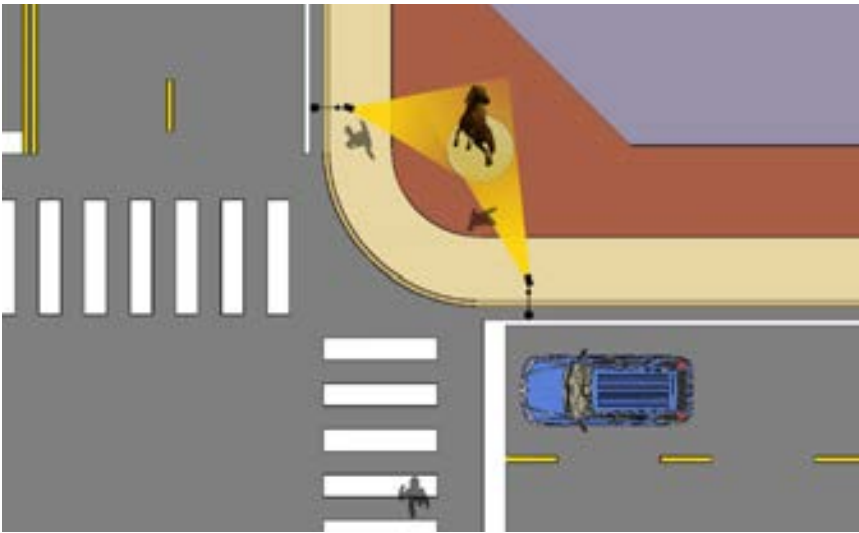
Midden Mound Wickiups - Buster Simpson

Location: Pearsall Park



Spineway - Marc Fornes

Location: Woodlawn Lake Park



Take into consideration all possible viewing angles when determining artwork illumination strategies.



In some instances, the best mounting position is a nearby pole. This places the fixtures out of harms way, and reduces shadowing from passersby.

consideration should be given to attaching accent lights at elevated positions remote from the art (see inset left and following page). These more distant positions must have good “sight lines” to the artwork to permit light access to its target area. Careful deliberation must be given to avoid angles that may result in unwanted glare. Examples of such mounting positions include existing nearby poles, building facades or other nearby structures. If these mounting positions are not under the control of the city, permissions would have to be secured from the controlling entity prior to employing them in the solution.

An effective lighting strategy for any art piece can only be realized if a dependable electrical service can be identified to support it. For existing art installations, power sources must be located in the general area and acceptable routing to the desirable light source positions explored.

For new installations, power access should be carefully studied by the design and engineering team, with necessary electrical panels, conduits, and other accommodations incorporated into the artwork placement drawings.

Ultimately, the goal for external illumination of artwork should be the most sensitive and effective manner for revealing its form and detail.

LIGHT AS ART

The display of artwork that integrates light as a creative feature can be compelling and encourage activity and engagement. To be successful at night, and in some cases the daylight, several important issues should be considered:

1. From where will the necessary power be furnished?
2. Do the artwork integrated lighting components need some level of protection from the public and how can that be provided?
3. Are the ambient nighttime lighting conditions such that they will not interfere with the visibility of the art? Normally, a difference in overall “brightness” between an integrally illuminated art piece and its immediate surrounding should be at least a 3 to 1 illuminance ratio, up to 10 to 1 for maximum effect.

Perhaps the most important aspect of realizing a successful artwork installation when integrated lighting is involved, is consultation directly with the artist or their studio. The artistic team’s sensitivity to the nuances of the creation can be invaluable in planning an illumination strategy.



Light Channels - Bill FitzGibbons

Location: Commerce St. and Houston St. underpasses at I-37



Aguas Onduladas - RDG Dahlquist Art Studio

Location: Elmendorf Lake Park



Examples of equipment for lighting of sculpture.
Shown: direct burial, adjustable luminaire; small
profile landscape accent luminaire

LIGHTING EQUIPMENT AND SOURCES

Lighting fixtures for outdoor art illumination should utilize solid state LED sources whenever possible. Key attributes to consider in selection include:

1. LED source color temperature (CCT): 3000K in most circumstances, but other CCT's can be considered if their color better flatters the specific artwork.
2. LED source color rendering index (CRI): A CRI of 80 at a minimum should be used, with 90+ preferred.
3. Source life: Most LED sources will provide 30,000 to 50,000 hour life span, with some at or above 70,000 hours.
4. Maintenance expectations: Routine cleaning of fixture lenses or luminous surfaces periodically is suggested to maintain artwork appearance and maximize efficiency. Replacement of LED source modules or companion drivers should be anticipated at 10 +/- years/cycle.

RECOMMENDATIONS FOR EXISTING ARTWORK

CHRISTOPHER COLUMBUS

1. Art Type: Bronze statuary mounted to two-tier stone base/plinth
2. Position: Within shallow pool in pedestrian area within Columbus Park
3. Lighting: None

RECOMMENDED LIGHTING APPROACH

Statuary position within pool makes positioning of conventional lighting fixtures difficult. Flush-to-grade burial lights, ideally LED sources, could be positioned at 90 degrees to one another, off the 'corners' of the plinth, within the perimeter concrete path. An internal tilting mechanism within the burial light would be required and should permit a tilt adjustment of at least 30 - 35 degrees.

A second possible design approach would use new 25' to 30' poles with attached adjustable LED accent lights. A minimum of two (2) poles would be required, at 90 to 120 degrees to one another, with the centerline between them being perpendicular to the front of the sculpture.

Based on statuary finish, 3000K white light color temperature sources should be used. Care should be taken to use cross baffles or optical shields to minimize glare and light trespass into unwanted areas (paths).



MOSES AUSTIN

1. Art Type: Bronze statuary with plinth and mounted to elevated base
2. Position: Slight elevated pedestrian plaza section within lawn located in Military Plaza
3. Lighting: None

RECOMMENDED LIGHTING APPROACH

Siting and position makes a flush-to-grade accent lighting approach to this piece an attractive alternative. Such burial lights, ideally four (4) LED sources, could be positioned at 90 degrees to one another, off the “corners” of the plinth, within the surrounding elevated plaza. An internal tilting mechanism within the burial light would be required and should permit a tilt adjustment of at least 20 - 25 degrees. Distributions should be tailored to provide maximum coverage of the statuary, with just some minimal softer spill light on plinth and base.

A possible alternative to the burial light approach would be to position above-grade adjustable LED accent lights in the planting strip surrounding the statue’s stone base. This would provide dramatic, oblique accent light to graze the figure. Similar to the burial light approach, this technique would require four (4) fixtures mounted at 90 degrees to one another. As this approach will create deeper, somewhat unpredictable shadows, a full scale on-site mock-up is suggested to fully vet this approach and select exact fixture positions.

With either of the two approaches outlined, the statuary finish would be best revealed by 3000K white light color temperature LED sources.





SAN ANTONIO DE PADUA

1. Art Type: Carved stone statuary mounted base with inscription
2. Position: Garden-like setting with pedestrian approach paths
3. Lighting: None

RECOMMENDED LIGHTING APPROACH

Nearby landscape areas provide good locations for ground mounted LED adjustable accent lights. Two (2) fixture positions, separated by enough horizontal distance to provide a lateral aiming angle from each other of 60 degrees, centered on the front facing statue would provide good revelation and texture for the piece.

Based on statuary finish, 3000K white light color temperature sources should be used.

TORCH OF FRIENDSHIP

1. Art Type: Painted steel sculpture
2. Position: Vertical steel sculpture situated within central landscaped traffic circle
3. Lighting: Metal halide floodlights ground mounted within planter near base of sculpture. Partially operational. Equipment in a state of disrepair and unsightly due to peeling paint.

RECOMMENDED LIGHTING APPROACH

Replace all metal halide floodlights with new LED source precision floodlights, on a one-for-one basis. Distributions should be calculated for optimizing “throw” distances for each section of the sculpture. External glare control shields would be recommended in order to minimize disruption to vehicular traffic.

Based on sculpture finish, 3000K white light color temperature sources should be used.





TORIBIO LOSOYA

1. Art Type: Bronze statuary mounted to stone base/plinth
2. Position: Pedestrian plaza/walkway
3. Lighting: None

RECOMMENDED LIGHTING APPROACH

Accent lighting from an elevated position using adjustable LED luminaires attached to facade of building across from sculpture. Two (2) lighting fixture positions, separated by enough horizontal distance to provide a lateral aiming angle from each other of 60 degrees. Fixture mounting heights should be such that tilt angles do not exceed 45 degrees from straight downward. The lighting distribution selected should be such that head, torso and a portion of the base are illuminated, but still should be relatively narrow to avoid collateral glare.

Based on statuary finish, 3000K white light color temperature sources should be used. Care should also be taken to minimize any spill light off the walkway into the area behind the piece.

Note – Flush-to-grade burial uplights are not practical in this location due to the elevated deck on which the sculpture sits.

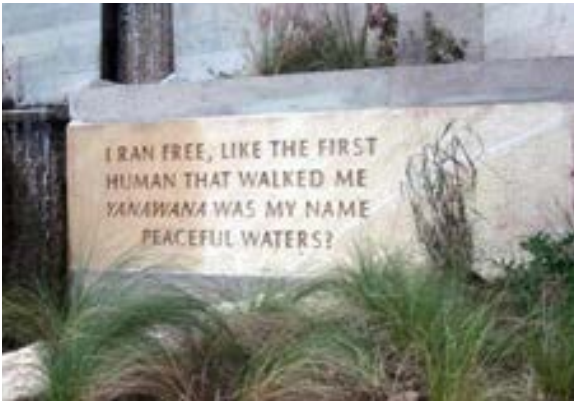
UNITY PLAZA BEACON

1. Art Type: Grade mounted, tapering metallic framework
2. Position: Pedestrian plaza/walkway
3. Lighting: Original uplighting, no longer completely functioning

RECOMMENDED LIGHTING APPROACH

The original lighting approach was well designed and flattering to the piece. Ideally, it should be refurbished and brought back to its original impact using new, current technology lighting equipment.





EL RIO HABLA (THE RIVER SPEAKS)

1. Art Type: Multi-tiered rock and metal with carved inscriptions
2. Position: Pedestrian plaza
3. Lighting: None

RECOMMENDED LIGHTING APPROACH

This complex series of terraces and tiers will require a detailed lighting design effort to reveal. Generally, low, integrated source uplighting would be most effective, however, nearby elevated positions could provide some softer fill light.

Based on the finishes involved, 3000K white light color temperature sources should be used.



ENCOURAGING THE LIGHTING OF PRIVATE ART

San Antonio is a city that loves art. The public art that is seen throughout downtown can inspire the day or soften the soul. Art's impact on the everyday life of those who live, work and visit cannot be adequately measured or completely understood.

The earlier portion of this section examined how public art can make a vital contribution to nighttime San Antonio through its revelation with light. Illumination can bring a specialness to the appreciation of art, dramatized and discovered through light and shadow.

Art owned or on loan to the City for display and enjoyment is a treasure. Revealing it at night can extend its reach and impact. But there is also some remarkable art that is displayed for the enjoyment of the public that is owned by private entities. This art is no less important, and where and when it is shown it, too elevates its surroundings. After-dark illumination of these pieces should also be encouraged, or even required, as private stakeholders in the downtown share their inspired artistic sensibilities in dramatic, yet sensitive fashion.

The City can help to incentivize private entities to light their publicly displayed artworks in a number of ways.

1. Promoting and participating in a nighttime unveiling of the lighted work, and supporting the occasion



Checkmate (1998), Herb Mignery; The Briscoe Western Art Museum; signage and sculpture



Camino de Galvez (2014), T.D. Kelsey; The Briscoe Western Art Museum

through public press outlets and announcements.

2. Acknowledging their willingness to do so as a civic contribution to San Antonio's urban experience.
3. Featuring them on the City's "Get-Creative San Antonio" website and through other digital and print media.
4. Allowing the artwork owners to mount lighting fixtures on public light poles or in right-of-way areas to achieve maximum effectiveness when needed. The fixtures can be metered separately and billed to the owner.

LOOKING AHEAD

As San Antonio's public art program continues to evolve in the coming years, along with its parallel initiatives to encourage private art sharing in the public realm, light should continue to be considered for its vital role. With a well-established tourist presence and an ever increasing number of people choosing to live downtown, nighttime activity will continue to grow and prosper.

Key elements to consider for art and light moving forward:

BUILD A LIGHTING BUDGET INTO EVERY PUBLIC ART PROCUREMENT.

Currently there is no defined art lighting program and the budget for lighting is not clearly articulated. Lighting costs for good quality, long lasting equipment are well known and formulating budgets for a variety of basic lighting applications could allow for insightful planning for new art pieces.

SUPPLY RESOURCES

Supply owners and developers who have publicly viewed art already installed on their property, or are considering such, with a list of lighting design and engineering firms that are capable of providing professional services advice for artwork illumination. These can be firms that the City has worked with before on lighting of art installations, or are well known through their work and practice. This could assist in a private entity's process of seeking and hiring a firm with the necessary expertise and experience.

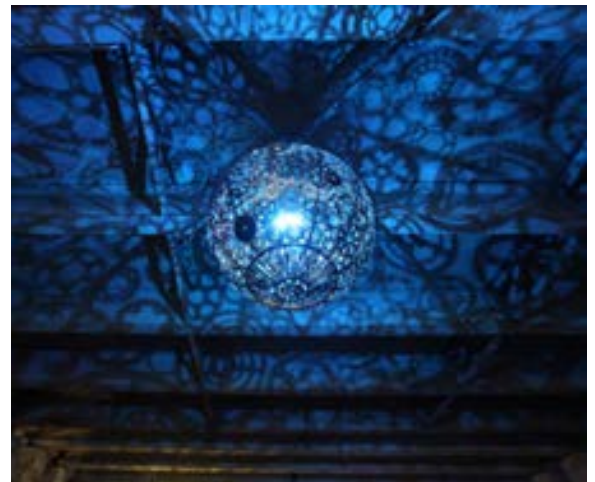
PROMOTE AND GROW LIGHTING-CENTRIC FESTIVALS

A number of cities across the globe have developed nighttime events centered on the celebration of art and light. Events such as Vivid Sydney, the Amsterdam Light Festival, Frankfurt Luminale and the Lumiere Festival in Lyon are excellent examples of these successful nighttime events. San Antonio is well positioned to serve as a backdrop for such an experience given its history of grand cultural and historic celebrations.



Unity Plaza Beacon - Jefre Figueras Manuel

Location: Unity Plaza, Downtown San Antonio



Ballroom Luminoso - Joe O'Connell & Blessing Hancock

Location: IH35 Underpass between Theo Avenue and Malone Avenue



El Bosque - Joe O'Connell & Blessing Hancock

Location: Encino Branch Library



Example light as art presented as part of Amsterdam Light Festival

The City of San Antonio's Luminaria, a contemporary art's festival traditionally held in the autumn, encourages the revelation of light through artistic expression. It is an example of how nighttime events, charged by light and creativity, can become focal points for social gathering and artistic celebration.

BUILDING ARCHITECTURE



INTRODUCTION



301 East Avenue E, San Antonio Express News
(Third St. & Ave E)



405 N St. Mary's St, The Travis Building (N St.
Marys & E Travis)

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The City of San Antonio has some of finest downtown buildings and structures found in Texas. The rich architectural heritage tells the story of San Antonio and its development across several centuries. It is one of the city's irreplaceable treasures.

Commenting in a 2018 on-line issue of *The Architect's Newsletter*, scholar and historian Enrique Ramirez wrote "San Antonio's past and future architectural projects reveals a steady commitment to buildings with bold, expressive forms that reference the city's unique environment, history, and culture."

The buildings, icons and other special structures of San Antonio are worthy of respect and celebration. The implementation of a lighting master plan provides a platform from which to launch a program to illuminate the most meaningful and commendable of these structures at night. The singular and collective contributions of this effort can be significant to San Antonio's after-dark environment.

ARCHITECTURE SHAPING NIGHTTIME ENVIRONMENT

City streetscapes are, to a significant degree, defined by the buildings and structures that front them. These boundaries reveal themselves readily during the day, offering up shade, reflection, scale and oftentimes beautiful character. With daily and seasonal transformations in daylight conditions, the buildings provide constantly changing visual cues for pedestrians and drivers, enriching their experience.

Urban centers throughout the world are using lighting to extend the presence and impact of buildings and structures into the nighttime. Lighting engages the planes and details of these edifices in a way that makes them vital contributors to the city's after-dark identity. Rather than dimly suppressed facades lurking over the street, they become active participants in energizing the pedestrian experience. Expressed artfully, the lighting can expose attractive structural and architectural features that would normally go unseen. Historical structures can be celebrated in a thoughtful, respectful manner. The building's use or purpose can be reinforced through the selection of lighting techniques that feature unique elements, characteristics or effects.

An often overlooked benefit to lighting facades and similar vertical surfaces is the improved perception of safety and reassurance (security)



102 W Crockett St., Casino Club Building (E Crockett St & N Presa St)



600 Navarro St (Navarro St & E Houston St)

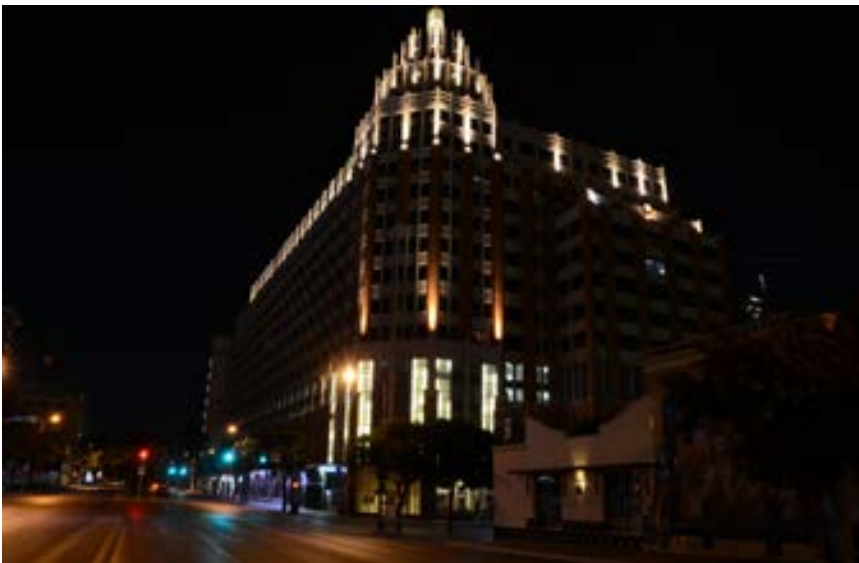


615 E Houston St, Hipolito F. Garcia Federal Building and U.S. Courthouse
(N Alamo St & E Houston St)

among pedestrians. Reflected illumination from the streetscapes' boundary surfaces can soften deep shadows, improve visibility, minimize the effects of glare, and fortify wayfinding cues. Additionally, driver acuity will normally improve under these conditions through the creation of better depth perception.

Some of San Antonio's existing buildings and structures are currently illuminated after dark, to various degrees of visual effectiveness. Even when not seen as a fully realized nighttime expression of the structure, the illuminated buildings do provide a glimpse into how important nighttime lighting is to enlivening the urban center.

There is little question that a comprehensive program of lighting for key building facades and structures in the downtown area would elevate the overall nighttime appeal, functionality and general character of the streetscape experience.



100 N Santa Rosa St, The Vistana (N Santa Rosa St & W Commerce St)

LIGHTING DESIGN FOR AESTHETIC ENHANCEMENT

The appropriate nighttime illumination of buildings and vertical structures should involve an architectural lighting design professional whenever possible. The use of a professional for such a design challenge can help provide a high degree of confidence that the solution arrived at will address all the key considerations for such a project.

There are many questions that must be considered in an exterior facade lighting project, including the following.

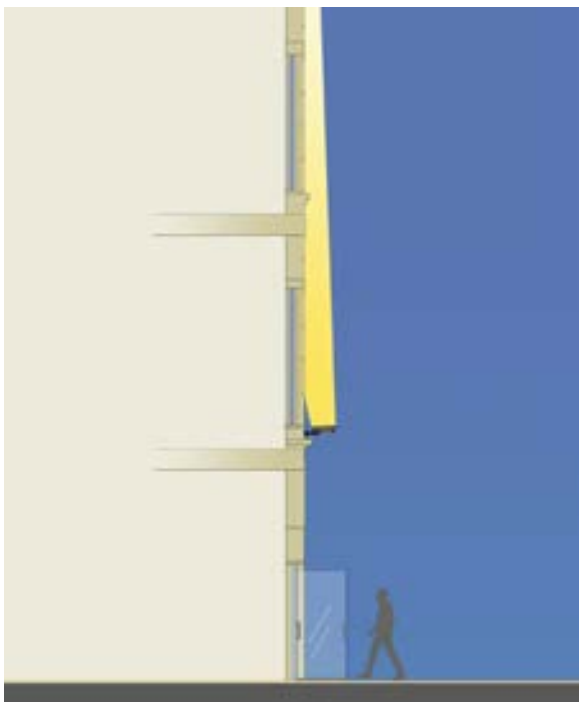
1. What are the principal goals for the job?
2. Does the structure have historic significance that may inform the design approach?
3. What aspects of the architecture will be worthy of revelation after dark? General facade? Details? Special features? Materiality?
4. Are there physical characteristics of the building that would be better left unlighted?
5. Are there special concerns about possible light trespass into the building's windows?
6. If uplighting is being used, can spill light into the sky be minimized by building features such as ledges and cornices?
7. Should louvers or baffles be considered for further optical control and to avoid disturbing adjacent buildings?
8. Are there any physical restrictions



Renaissance Grand; St. Louis, MO



Old Post Office and Customs House; St. Louis, MO



Grazing light is used to emphasize texture or relief to reveal architectural details.



Monolithic faces can be dramatically portrayed through the use of soft wash light.

on where lighting equipment can be mounted?

9. Are there city or neighborhood requirements for the street on which the building is located that may have some bearing on the work or lighting solution?
10. Can high efficiency, long life and low maintenance LED sources be incorporated as a part of the solution?
11. Can lighting controls be effectively integrated into the design to permit dimmable fine-tuning of the lighting scheme, and to allow after-hour reductions in energy use.

Several conventional facade lighting approaches frequently used for historic buildings are illustrated within this section. LED source luminaires of appropriate white-light color, output and optical distribution make for excellent lighting instruments for these tasks.

SURFACE GRAZING LIGHT

The illumination of facade surfaces and details to emphasize their texture or relief is an effective way to reveal architectural characteristics. Normally narrow distribution sources are positioned relatively close to the surface or feature element being lighted to accentuate its attributes. Both point source floodlights and small cross-section linear fixtures are frequently used in this design approach. An LED source would be the most common one used for these types of applications today. Consider 3000K for light source color temperature for most facades, unless material color justifies another option.

SURFACE WASHING

Often, large open surface or monolithic facades can be less dramatically portrayed through the use of a softer, wash light. As with grazing techniques, either point source or linear outdoor lighting products can be utilized. Wider distribution optics are routinely used to bathe larger surface areas with gentle light that reveals the materiality without overly dramatic contrast. The distance of the lighting fixtures from the surface being lighted should be

great enough to minimize deep and long shadows. This approach is often thought of as classical floodlighting technique. A 3000K LED source would be the most common one used for these types of applications today, unless material color justifies another option.

EXPOSED SOURCE HIGHLIGHTING OR CONCEALED SOURCE TRACING

On rare occasions, exposing a light source or its immediate “tracing” effect of an architectural feature, can be considered a viable alternative to surface grazing or washing. Great care must be exercised by the design professional or engineer so as not to create a visibly disruptive lighting condition for surrounding neighborhoods. Some architectural styles or specific designs may be fittingly reinforced or even flattered by the application of an exposed or closely concealed, brightness-controlled source. Some architectural styles such as Art Deco originally used neon as architectural accentuation. Marquees or theater canopies used exposed incandescent lamps as a featured lighting element. An LED source would be the most common one used for these types of applications today. The design professional or engineer involved should seek special approvals from the City for the application of these lighting techniques whenever they are considered.

COLORED LIGHT

The use of colored light, and especially dynamic color changing, should be avoided for routine architectural illumination under most circumstances, especially when an historic structure is being considered. Color should always be used sparingly in permanent situations and for limited accent or highlight. A more restricted use of color for special events, holidays and cause awareness would be a more acceptable approach for its use. The design professional or engineer involved should seek special approvals from the City for the application of these lighting techniques whenever they are considered.



DaVita Headquarters; Denver, CO



600 Washington; St. Louis, MO

MOCK-UPS & VISUALIZATION

The richness of a building's facade can be revealed and celebrated after dark through an insightful lighting composition. Lighting design concepts for the exteriors of buildings are best understood when they can be visualized. This master plan development process includes the use of two distinct approaches for helping to reveal the possibilities inherent in skillful nighttime illumination techniques.

MOCK-UPS

One of the most successful ways that a proposed building facade lighting scheme can be visualized prior to the full procurement and installation of equipment is through a mock-up. The intent of a mock-up is to secure a representative number of sample lighting fixtures of the type, intensity and distribution proposed to be needed to fulfill the desired lighting design concept, and to temporarily install them to the building. When carefully prepared, the viewing of this limited installation will allow for a better understanding of the overall design concept and its intended lighting effect. Mock-ups can help the design team and key decision-makers determine needed alterations in the design concept to maximize the lighting's impact.

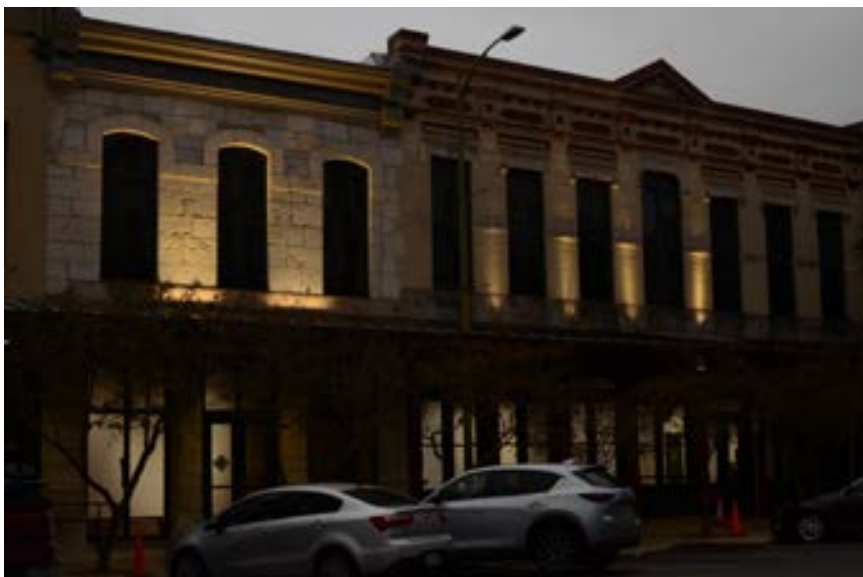
The third public engagement session of the ULMP (October 02, 2018) included the viewing of three nighttime lighting mock-ups of select buildings



Lighting mock-up performed on The Savoy Building as part of the public engagement process for this ULMP.



Lighting mock-up performed on Municipal Plaza Building as part of the public engagement process for this ULMP.



Lighting mock-up performed at Plaza de Armas as part of the public engagement process for this ULMP.

in the downtown scope area. Two of those buildings were city-owned structures and one was owned by a private entity. The selected buildings were:

1. Municipal Plaza Building
 - 114 W Commerce St.
2. Plaza de Armas
 - 115 Plaza De Armas
3. The Savoy Building
 - 116 E Houston St.

These mock-ups were viewed by those in attendance at the public meeting during an hour-long walking tour and discussion after the prepared presentation. (See appendix 'Public Stakeholder Engagement - A1' for notes and reporting from the session). The lighting was also available for view nightly over the subsequent ten days. Lighting portions of these buildings' facades was invaluable in representing the potential contributions of illuminated structures to the perception and beauty of the urban streetscape.

It is strongly recommended that as the city considers the use of building facade and feature lighting as a technique for improving downtown, full-scale mock-ups and demonstrations such as the ones conducted for this ULMP, should be considered as an important tool for decision making.

RENDERINGS

Another technique for communicating the merits of a potential building facade lighting design is an artistic or technical rendering. Nighttime renderings done by professional lighting designers, who understand the behavior of light and how it can engage architectural surfaces and details, can provide an informative representation of how the final installed design will look. This approach to visualization, when done well, can allow a decision-maker to choose among several design options or assist in the fine tuning of a preferred idea. For new construction, these renderings are the primary method for exploring design considerations.

The ULMP study includes the development of renderings for two buildings found in the downtown scope area that offer great promise as lighting subjects. Plausible design schemes were formulated for each structure and possible equipment placements examined. This work served as foundation for the artistic composition of these selected buildings:

1. Rand Building (formerly: Wolf & Marx Department Store)
 - a. Architect: Sanguinet and Staats
 - b. Beaux Arts Style
 - c. Completed: 1913
 - d. Address: 100 East Houston
2. AT&T Building (formerly: Southwestern Bell Building)
 - a. Architect: I.R. Timlin
 - b. Spanish Revival
 - c. Completed: 1930
 - d. Address: 105 Auditorium Circle

When existing buildings are considered for nighttime illumination, it is not always practical to do a representative nighttime lighting mock-up. Physical constraints, mounting limitation, timing and even costs, can make a rendering



Rendering of exterior facade lighting for Pasio Interlomas design study, Mexico

Right: Rand Building rendering

The facade lighting rendering composed for the building proposes a strategy that includes the following:

1. Soft illumination of the main brick facade using narrow-flood distribution style LED floodlighting equipment positioned atop the canopy roof just above the sidewalk.
2. Linear grazing-style LED accent light equipment, mounted atop the ledge directly below the building's crown, to illuminate the crown's architectural detail.
3. Point source, narrow distribution low-wattage LED accent lights, mounted atop the ledge directly below the building's crown between the window bays, to reveal the pilaster details.
4. New downlighting beneath sidewalk canopy and enhanced internal storefront illumination.







Rendering of exterior facade lighting for Chase Park Plaza, St. Louis.

approach more practical. Multiple design styles for a building or structure can be explored through a rendering process, as well, by illustrating each proposed scheme separately and using the artistic depictions for comparing aesthetic impact. Coupled with a preliminary assessment of lighting equipment needs, along with a basic costing exercise, an informed decision about which lighting approach is best can be made.

The results of these renderings help reinforce that a comprehensive lighting design scheme for each building would be advantageous in bringing these beautiful structures into nighttime relevance.

Left: AT&T Building rendering

The facade lighting rendering composed for the building proposes a strategy that includes the following:

1. Point source, narrow distribution low-wattage LED accent lights, mounted at the base of vertically oriented Spanish Revival elements just above street level, to reveal their texture and detail.
2. Linear grazing style LED accent light equipment, mounted below the inset decorative Spanish Revival panels at the base of the tower, to reveal their texture and detail.
3. Point source, narrow distribution high-wattage LED precision accent lights, mounted near the base of the building's corners, to reveal texture and detail, while emphasizing the strong vertically.
4. Linear grazing style LED accent light equipment, mounted at the base of the inset decorative Spanish Revival panels just below the building's upper cornice, to reveal their texture and detail.

ENCOURAGING OWNERS & DEVELOPERS

The lighting of public building exteriors in the downtown can make a significant contribution to the success of the streetscape environment. San Antonio should consider making the lighting of publicly owned and controlled buildings a priority moving forward. This leadership in investing in the nighttime beautification of the city's rich and varied architectural heritage would speak as a long term commitment to enhancing the after-dark environment, an important social and economic element.

Even with a city's focused commitment to illuminating public architecture, encouragement of the private sector of building owners and developers is advisable. The motivation to illuminate a building will differ depending on a variety of considerations of those in control of such decisions. A number of initiatives can be considered by San Antonio to assist in encouraging decision-makers to see the illumination of their building as beneficial to both theirs' and the public's goals.

CIVIC PRIDE

Civic pride is important because it helps shape and reflect the values and aspirations of a city and its people. As an integral part of the streetscape lighting master plan vision, the illumination of building architecture can be seen as a tangible and outward expression of that pride. It is this understanding, when insightfully communicated, which can make a difference in persuading building owners, developers and key decision-makers to illuminate their structures. The City can initiate a program to meet with individuals in influential positions where deciding matters such as lighting their company's building(s) can be made.

HELP EDUCATE

Hosting a gathering focused on a presentation by city officials and design professionals that fosters a discussion regarding exterior architectural building illumination can be a catalyst for private involvement. This would be an opportunity for building owners and developers to learn more about the benefits of building lighting and how the



Caleres Headquarters; Clayton, MO



PNC Place; Washington, D.C.



Columbus Museum of Art; Columbus, OH

city and private enterprise can work together.

PUBLICIZE PRIVATE OWNERSHIP INVOLVEMENT

When an owner or developer proposes to illuminate their building, issue an announcement or press release publicizing their upcoming and important contribution to the city's street environment. Portray their involvement as an investment in downtown San Antonio and an effort to help provide a safe, pleasing nighttime environment.

PROVIDE RESOURCES

Supply owners and developers who are considering lighting their building(s) with a competitive list of lighting design and engineering firms that are capable of providing professional services for such a project. These can be firms that the City has worked with before on building illumination, or are well known through their work and practice. This could assist in a private entity's process of seeking and hiring a firm with the necessary expertise and experience.

CELEBRATE TOGETHER

Once a private concern has agreed to take on the lighting of their building, the City should stay on board throughout the process and do everything reasonable to make the owner's experience in bringing the project to life a positive one. Participate in a nighttime 'unveiling' of the lighting to further to show tangible appreciation of their efforts.

