AUSTIN TRANSPORTATION DEPARTMENT

M E M O R A N D U M

TO: Mayor and Council Members

CC: Spencer Cronk, City Manager

FROM: Robert Spillar, P.E., Director, Austin Transportation Department
Jackie A. Sargent, General Manager, Austin Energy
Brian Manley, Chief of Police, Austin Police Department

DATE: January 31, 2019

SUBJECT: **West Campus Lighting Study (Resolution No. 20170518-043)**

On May 18, 2017, the Austin City Council passed Resolution No. 20170518-043 directing the City Manager to complete a lighting study of the West Campus neighborhood and to make recommendations for lighting strategies to improve pedestrian safety. This memo presents the results of that study and staff recommendations.

The City initiated a public engagement process with West Campus stakeholders to better understand lighting concerns in the area. The City then hired Stanley Consultants to perform the West Campus Lighting Study. Stanley gathered all relevant data and studied the West Campus neighborhood to develop a complete inventory of City-owned light fixtures and to provide recommendations based on existing lighting conditions. During that time, Austin Energy accelerated streetlight repair work in the area which is ongoing. On July 3, 2018, Stanley Consultants issued its final report (attached).

The City has completed its assessment of the study, agrees in principle with its results, and has produced the recommendations below for addressing the study's findings. For this study, West Campus was defined as the area between Guadalupe Street, Lamar Boulevard, 29th Street, and Martin Luther King, Jr. Boulevard.

Study Findings:

- There is currently no dedicated City of Austin pedestrian lighting program. City streetlight systems are designed to illuminate roadways.
- At the time of inspection, 3% of existing lighting fixtures in West Campus required maintenance due to vandalism, weathering, or physical damage, 8% of fixtures were found to be obstructed by trees or other objects, and nearly 10% were non-operational due to unknown factors. Note that the lighting inventory represents a snapshot in time, and ongoing construction activity in the neighborhood may have influenced whether power was turned on at the time of the inventory.
- The City is replacing all high-pressure sodium lighting with LED lighting where applicable. At the time of inspection, only 23 of the 1,148 lights in the West Campus neighborhood were recorded as being LED.
- If street lighting is to be used to provide the recommended pedestrian lighting levels, it is recommended that approximately 228 new fixtures be installed at an estimated cost of $578,000, excluding costs for design, civil work, extra wire, power source, permitting fees, or other infrastructure needed to install the lighting. These additional costs are estimated to bring the total to between $1.7 million and $2.3 million. Each site will need to be individually evaluated to determine more precise costs.

Study Recommendations:

- Continue to repair or replace non-functioning lights and implement corrective measures for obstructed lights.
- Review the City of Austin Building Criteria Manual and West Campus/University Neighborhood Overlay Design Guidelines for potential updates in conjunction with the lighting study, adjusting lighting intensity and spacing criteria.
- Continue the transition to LED lights and add fixtures where needed.
- Develop a comprehensive lighting plan to include roadway and pedestrian lighting strategies for the entire city.

Staff Recommendations on Implementation

Austin Energy, Austin Transportation Department, and the Austin Police Department (APD) contributed to the West Campus Lighting Study. All three departments agree in principle with the consultant's findings and recommendations and propose the following phased response.

Short-term Response

- The City is repairing non-functioning fixtures and crews will trim tree limbs that are obstructing existing lighting. Streetlight repair work identified in the report is estimated to be completed summer 2019. Austin Energy has started the process of contacting landowners for the purpose of trimming trees affecting streetlights in the West Campus area and is coordinating with Austin Transportation Department – ROW Management on the scope and scale of its work and any permitting concerns.

Mid-term Response

- The City will allocate funding, in its 5-year Capital Spending Plan for 2019-2023 and Fiscal Year 2019 Operating Budget, for new lighting in the West Campus study area. Currently, Austin Energy has capital funding for some of the LED change outs in its LED Street Lighting project budget. Operations and maintenance expenses for the existing street lighting are in the Electric Service Delivery budget. Both Capital and O&M spending plans will need to be reviewed to include the scope of work in West Campus. Based on current staffing levels, design and installation of the new fixtures will take approximately five years. This would be done in a phased approach, prioritizing improvements at locations based on the degree of lighting deficiencies identified in the study, followed by locations with crime and crash history, and locations identified by the community as part of this study's community outreach efforts. Currently, Austin Energy has 11 crewmembers dedicated to installing and maintaining the streetlight system citywide. A more accelerated installation process would require additional design staff and crews to be identified in the FY20 budget process.
- Monitor new development in the area such that street lighting continues to be upgraded as a part of this development.
- Determine if there are any pedestrian-focused lighting solutions that can be implemented by the Transportation Department in this area in conjunction with Austin Energy.
- Review the West Campus/University Neighborhood Overlay Design Guidelines as well as its current standard lighting fixtures and seek an accelerated LED re-lamping schedule for all streets in West Campus. LED lights can improve the amount and quality of light in the West Campus area.
- To supplement the recommended lighting improvements in West Campus, APD and UTPD will continue to build on existing partnerships related to information sharing and community outreach, enhancing the combined law enforcement presence in West Campus and improving safety for pedestrians in the neighborhood.

Long-term Response

- A larger, city-wide evaluation of lighting policies and infrastructure, revolving around the issues of traveler safety is needed. During the West Campus Lighting Study, staff heard concerns about street lighting from numerous stakeholders outside of West Campus, including a desire for similar lighting studies in other parts of Austin. Rather than taking a piecemeal approach to

this issue, the study team recommends that the City undertake a comprehensive Citywide Lighting Plan to identify a holistic and sustainable strategy to improve lighting throughout Austin. A Citywide Lighting Plan could include the following elements:

- A citywide analysis of existing lighting conditions and complete asset inventory.
- A robust public engagement process to better understand stakeholder concerns about street lighting, opinions on aesthetic considerations, light pollution, and Dark Skies policies.
- Recommendations for unified standards for roadway and pedestrian-scale lighting, including fixture types and other design considerations.
- Recommended City Code updates needed to enable street lighting improvements.
- Confirmation of roles, responsibilities, and funding among various City departments for the design, construction, and maintenance of roadway and pedestrian-scale lighting.
- Analysis of whether public-private partnerships are a possibility to fund additional lighting.

City staff will recommend resources needed to advance such a study as part of the Fiscal Year 2020 Budget.

Attachment B – Stanley Consultants Lighting Study

West Campus Lighting Study

Including Recommendations for Potential Improvements

City of Austin/Austin Energy
Austin, Texas

Final
July 3, 2018

Stanley Consultants INC.
A Stanley Group Company
Engineering, Environmental and Construction Services - Worldwide

West Campus Lighting Study

Including Recommendations for Potential Improvements

City of Austin/Austin Energy
Austin, Texas

Final
July 3, 2018

Stanley Consultants INC.

Executive Summary

Purpose

On May 18, 2017, the City of Austin, Texas, passed a City Council resolution instructing the City Manager to conduct an extensive lighting inventory study in the West Campus area with the focus on pedestrian safety. The purpose of this report and project is to develop a complete inventory/database of City-owned light fixtures (assets) and to provide recommendations based on observed existing lighting conditions. The inventory includes locations of the fixtures along with asset attributes observed by field engineers. Stanley Consultants utilized field-based knowledge, technical criteria, and engineering knowledge to evaluate Austin Energy's current lighting conditions, standards, and specifications. The standards and specifications were compared to other local, state, and national codes. Additionally, Stanley Consultants sought to provide an analysis of the opportunities and challenges associated with expanding the public/private lighting partnership beyond Austin Energy's Nightwatchman program to include pedestrian lighting; and to make recommendations for collaborative public/private pedestrian lighting strategies based on Stanley Consultants' analysis of the issues and any examples of successful lighting partnerships elsewhere in the United States. Herein the terms Roadway, Combination, and Area light are used to differentiate between different light fixtures utilized by Austin Energy. The design intent of these fixtures is to provide roadway lighting only at this time. All pedestrian pathway lighting that occurs in the West Campus Area is a byproduct of roadway lighting.

Findings

- At present there is no dedicated City of Austin/Austin Energy pedestrian lighting. There are pedestrian guidelines such as the City of Austin Building Criteria Manual and the West Campus/University Neighborhood Overlay (UNO) Design Guidelines that require additional coordination and implementation with Austin Energy. Currently Austin Energy's design focus is on roadway lighting only and would require additional resources to undertake a pedestrian lighting program.

- At the time of inspection 96 light fixtures in the area were found to be obstructed by trees or other objects, 30 fixtures were identified as requiring immediate maintenance due to vandalism, weathering, physical damage, or absence of a fixture entirely, and nearly 10 percent or 117 fixtures were non-operational due to unknown factors.
- Austin Energy is in the process of adopting a plan to replace all High-Pressure Sodium (HPS) lighting with LED lighting. At the time of inspection only 23 of the 1,148 assets were recorded as being an LED-fixture type.
- During the data collection phase inspectors noticed a common theme or correlation between citizen points of interest and common deficiencies such as non-functioning light fixtures and fixtures obscured by trees.
- Based on a gap analysis, assuming all existing light fixtures are operational and unobstructed, it would require 228 additional roadway/combination fixtures to meet recommended footcandle levels. It is assumed that without further study or preferred course of action, the only way to achieve adequate pedestrian lighting is through adding additional roadway/combination lighting until a time that a pedestrian lighting plan of action is adopted by Austin Energy/City of Austin.

Recommendations

- Repair or replace non-functioning light fixtures and implement corrective measures for obscured light fixtures.
- Update and harmonize the City of Austin Building Criteria Manual, and West Campus/University Neighborhood Overlay (UNO) Design Guidelines, and coordinate with Austin Energy standards and specifications for roadway lighting.
- Move to LED luminaries and add fixtures where needed.
- Develop a comprehensive lighting masterplan to include roadway and pedestrian lighting strategies to create a baseline for lighting going forward. Further update City codes and guidelines to include findings from the masterplan.

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Section 1

Data and Information Collection

The data collection phase included two different types of information collection. Light fixture asset data and fixed-point spot light level data measured in footcandle (Fc). The asset data collection phase included both a daytime and a nighttime component. The data collection for spot light level data was performed during nighttime hours. Throughout this report the term assets and light fixtures are used interchangeably.

Asset Data Collection

Asset data collection was required in order to document conditions and attributes of assets at the time of inspection. For this phase of data collection, Apple iPads with the app Collector for ArcGIS were used. Collector for ArcGIS allows inspectors in the field to create and manage data that is important to the client. In this case the assets are light fixtures within the West Campus area defined by Austin Energy and the City of Austin. Stanley Consultants was provided an existing GIS map of the West Campus area that included required spatial data and existing data points for assets. The GIS map and data received by Stanley Consultants contained 976 data points (light fixtures). During data collection Stanley Consultants identified and collected data for an additional 172 assets that were not part of the original data set. The left image of Photo 1-1 represents the data given to Stanley Consultants prior to the field inventory. The image on the right is a consolidated image of all of the assets including added fixture assets (green) and light meter reading data points (pink).

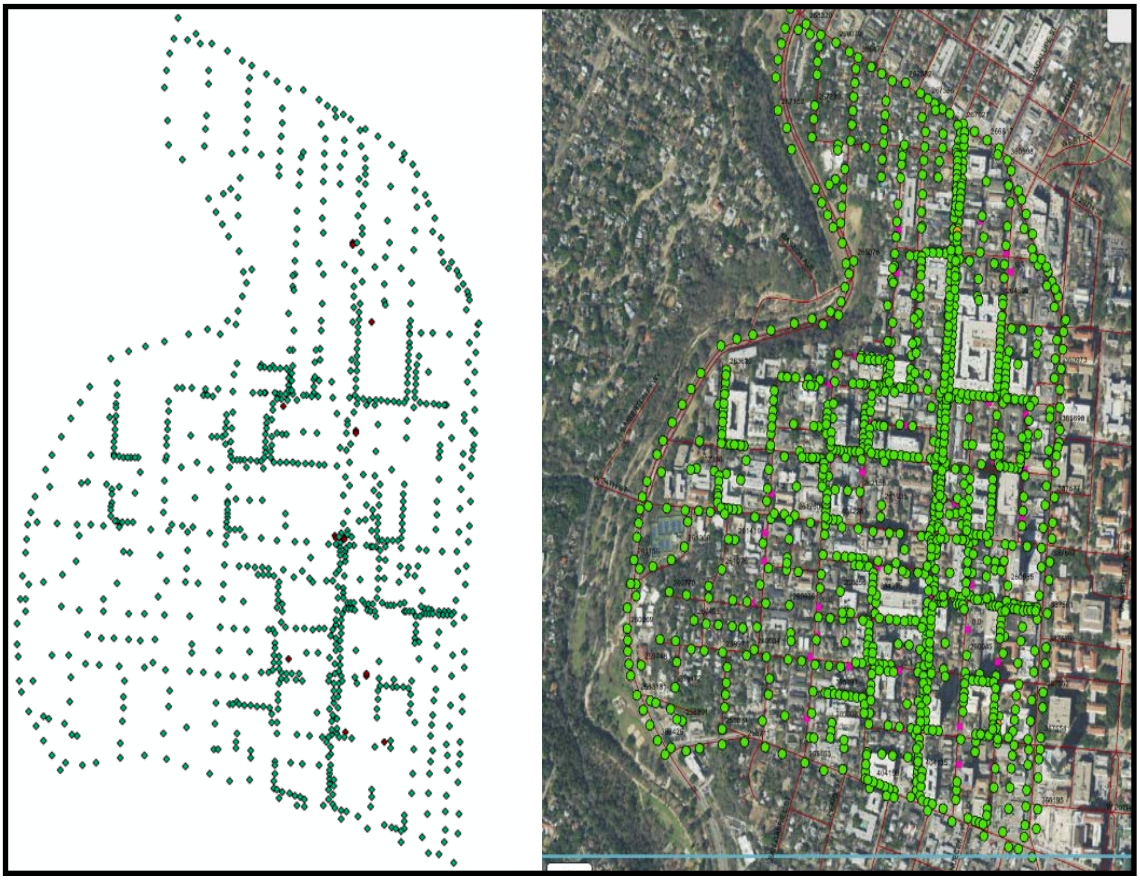


Photo 1-1 West Campus Overall

In order to accurately collect data in a coordinated manner between several different field personnel, Stanley Consultants developed a standard data collection process. The data collection process was performed at each existing and new data point. The process involved in collecting asset data for a new or existing data point was nearly identical. For each existing data point a field inventory team member located an asset on the iPad screen via their current location, using iPad GPS data. The blue location indicator was used to help orient field inventory team members near the data collection point.

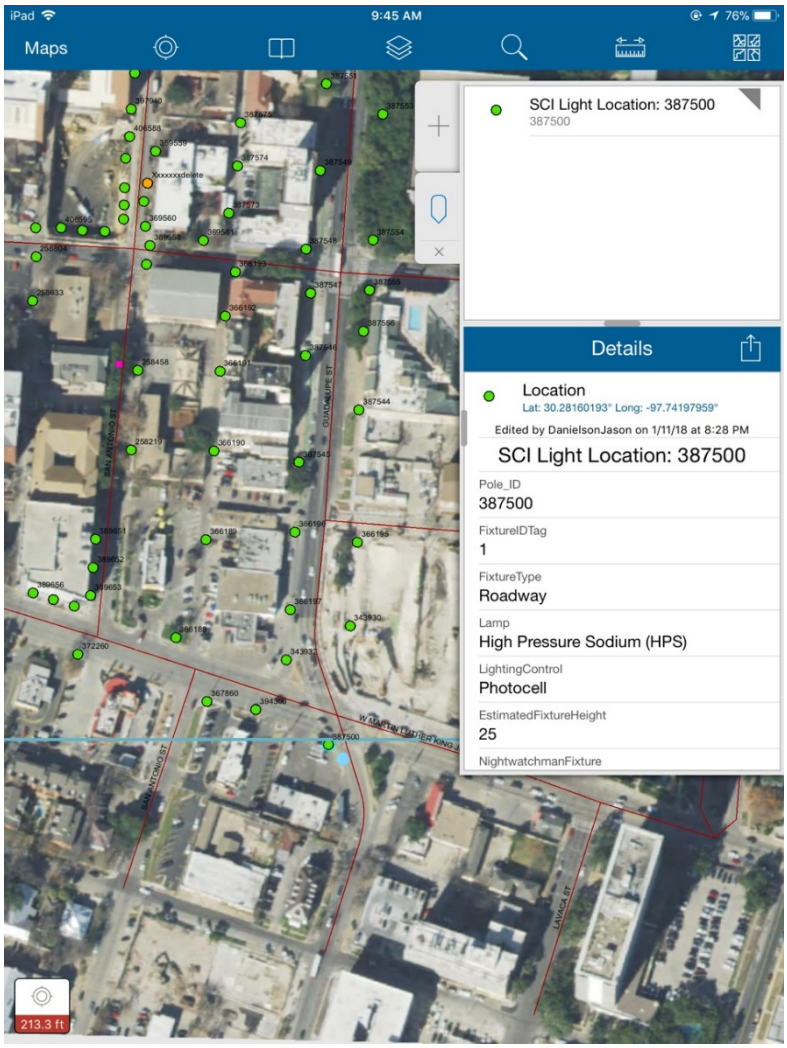


Photo 1-2 GIS Collector Example

Once the asset was identified the user edited the asset data. Austin Energy's existing lighting locations included the following fields used for reference only:

- Watts
- Lamp Type
- Lamp Voltage
- Rotation/Angle

Using the existing Austin Energy data for reference, Stanley Consultants developed the comprehensive attribute list below. The attribute fields would help distinguish each asset from one another and provide Austin Energy with observed information that was not previously available. The field inventory team members inspected each asset and filled out each attribute field.

- Fixture ID Tag #
- Fixture Type

- Lamp Type
- Photocell
- Light Fixture Condition (Rating 9-1)
- Fixture Condition Assessment
- Nightwatchman Fixture
- Pole ID # – Fillable Field
- Estimated Pole Height
- Mast Arm
- Estimated Mast Arm Length
- Street Name
- Intersection Street Names
- General Comments

For the light fixture condition rating, Stanley Consultants developed a flow chart used to help guide the inventory team member in assigning an asset rating. A sample of the rating flow chart can be found in Section 3 of this report. In addition to the user input fields the inspector utilized the iPad camera feature to document each asset with two to three photos. Asset data sheets can be found in Appendix A. The appendix also includes a vicinity map for each asset. The vicinity map is sorted by the ObjectID, a unique identifier assigned to each asset. The photos captured by the inspector are attached to each asset report. Typically, photo sets included a full profile of the pole and fixture (Photo 1-5), an enlarged photo capturing only the light fixture (Photo 1-3), and a photo of the Pole ID Tag (Photo 1-4). Pole ID Tags are used as unique identifiers found on each pole. Typically, each individual light fixture was marked with a two-digit number. The number is used to indicate the wattage of each fixture. For example, a fixture marked with a "10" indicates the fixture is 100 watts.

Photo 1-3 Fixture

Photo 1-4 Pole ID

Photo 1-5 Profile

After the photos were reviewed and were deemed to be satisfactory with little to no blurring and adequate lighting, the inspector finalized the inspection by assigning an "NA" inspection status to the fixture to indicate the daytime inspection was complete and that the fixture still required nighttime investigation. During the nighttime investigation inspectors checked the status of each fixture marked as "NA" to confirm the daytime fixture rating was adequate and whether the fixture functioned properly at night. A rating of '1' was assigned if the fixture was not operating as expected during nighttime conditions. After updating the fixture condition, the inspector updated the status of the inspection to "complete," finalizing the asset inventory for that data point.

Spot Light Level Data Collection

The lighting levels of pedestrian areas within the West Campus area of Austin were measured during the nights of January 8–14, 2018. The measurements were made using a handheld light meter with attached light sensor. The Extech SDL400 has a 0.1 Fc resolution with ±4 percent accuracy.

At each data point the light sensor was placed at the ground level. A minimum of 5 seconds was given to allow the sensor to adjust and ensure shadows produced by surroundings and the data collector would not obscure the results. The readings shown on the light meter LCD screen were observed for an additional 5 seconds to ensure the most accurate possible reading. It was noted during the data collection phase that passing cars and pedestrians would influence the data recording process. The light values were shown to fluctuate drastically when moving objects were nearby.

Photo 1-6 Light Meter

Each light level data point was assigned a physical location in the GIS environment. The reading in footcandle (Fc) was recorded and a timestamp associated with the reading was recorded. To complete the data collection phase of each light level data point a minimum of three pictures were taken from the data point to give the pedestrian perspective of lighting levels.

Section 2

Specifications and Standards Analysis

When examining the existing specifications and standards for pedestrian lighting it is important to note that current pedestrian lighting conditions in the West Campus area are a by-product of roadway lighting implemented and maintained by Austin Energy. Pedestrian lighting is not specified by the Utility and currently the City does not maintain pedestrian lighting standards or specifications that could be applied to the West Campus area. Consequentially, pedestrian lighting guidance must be dealt with by utilizing recommendations and publications developed by industry experts such as the Illuminating Engineering Society of North America (IESNA). IESNA recommendations are the most widely accepted for pedestrian lighting. IESNA recommendations are an important starting point when examining pedestrian lighting but it is equally important to examine the standards and specifications of state, local, and city governments. Pedestrian lighting should be a comprehensive effort; therefore, we will examine each entity's existing standards, specifications, and recommendations.

IESNA

The IESNA is an internationally recognized technical authority in the illumination field of study. Illuminating Engineering Society (IES) is an accredited standards development organization that develops lighting standards in accordance with the American National Standards Institute (ANSI). Standards are developed through the creation of committees such as the IES Committee on Roadway Lighting. The committees have met regularly throughout the years as technology, safety, and requirements have advanced or changed. Committees develop standards or recommendations based on studies, investigations, research, and discussions. Recommendations are issued in the form of Recommended Practice publications (RP).

In additional to the individual publications produced in committee by the IESNA, the IES publishes "The Lighting Handbook." The Lighting Handbook is a comprehensive, single source of information for all things in the lighting field. The IES Handbook discusses a wide variety of topics including science-based lighting information, recommended lighting levels, controls, sustainability, energy management, and much more.

IESNA Pedestrian Lighting Recommendations

When considering illuminance, using recommendations set forth by IESNA for safety and security, it is important to note that target illuminance levels are not to be interpreted as regulatory minimum requirements. Due to the variation in individual person, weather conditions, seasons, or any number of other conditions it is impossible to conclude that the recommendations set forth are absolute and conclusive for the safety and security for all. IES RP-33 states that lighting alone cannot provide security. Simply increasing lighting levels does not necessarily enhance the level of security. Often the quality of light not the quantity is associated with an increased perception of safety. There are four main goals for security lighting:

- Increase the effectiveness of other security measures.
- Illuminate people, objects, and places with low-glare light to allow observation and identification.
- Deter criminal activity by increasing the risk of detection.
- Reduce the fear of crime by enhancing the perception of safety.

When examining recommendations for pedestrian lighting there is no single comprehensive guide or standard. IES RP-8-14 – Roadway Lighting is the most referenced and commonly referred to as RP-8. The current version of RP-8 was published in 2014. The description for RP-8 is "The primary purpose of this Standard Practice is to serve as the basis for design of fixed lighting for roadways, streets, adjacent bikeways, and pedestrian ways." IES had a design guide, IES DG-5 – Recommended Lighting for Walkways and Class 1 Bikeways published in 1994 but it has since been withdrawn and most of the information transferred to RP-8. See Table 2-1 (Table 2).

Table 2-1 DG-5 Table 2 – Recommended Illumination

DG-5 Table 2 - Recommended Illumination (Values in lux/Fc)				
	Average Conditions		Special Conditions	
Walkway Class (Sidewalks along streets by Area classification*)	Avg. Maintained Illuminance Levels Horizontal Levels	Horizontal Avg. to Min Average	Min. Maintained Avg. Vertical Levels (E Avg.) [3]	Avg. to Min Ratio
Commercial	10/1.0	4:1	20/2.0	5:1
Intermediate	5/0.5	4:1	10/1.0	5:1
Residential	2/.02	10:1	5/0.5	5:1
Park Walkways & Class I Bikeways	5/0.05	10:1	5/0.5	5:1
Pedestrian Tunnels	20/2.0	4:1	55/5.5	5:1
Pedestrian Overpass	2/0.2	10:1	5/0.5	5:1
Pedestrian Stairways	5/.05	10:1	10/1.0	5:1

Source: IES DG-5 – Recommended Lighting for Walkways and Class I Bikeways

RP-8 does not give construction guidance but is merely a guideline for recommended best practices for design and engineering.

When examining RP-8 and its role in recommended illuminance levels for pedestrian lighting we must look at Section 4.2.1. Section 4.2.1 breaks pedestrian lighting and recommended illuminance values for walkways down into three categories: High Pedestrian Conflict Areas, Medium Pedestrian Conflict Areas, and Low Pedestrian Conflict Areas.

High Pedestrian Conflict Areas:

"Commercial areas in urban environments can have high nighttime pedestrian activity. It is important to provide systems that will increase the visibility of pedestrians. Since the visual environment is much more cluttered, and high probability for detection of pedestrians is required, the use of both horizontal and vertical illuminances are recommended for design, Table 4 includes recommended horizontal and vertical illuminances for pedestrian areas. Vertical illuminance is measured at a height of 1.5 m (5 ft.) in both directions and parallel to the main pedestrian flow. Glare from the luminaires should be restricted by paying careful attention to luminaire mounting heights, light output, and photometric distribution."

Table 2-2 RP-8 Table 4 – Recommended Values for High Pedestrian Conflict Areas

RP-8 Table 4 - Recommended Values for High Pedestrian Conflict Areas Maintained Illuminance Values for Walkways			
	E avg lux/fc	E min lux/fc	E avg/E min
Mixed Vehicle and Pedestrian	20.0/2.0	10.0/1.0	4.0
Pedestrian Only	10.0/1.0	5.0/0.5	4.0

Source: IES RP-8-14 – Roadway Lighting

Medium Pedestrian Conflict Areas:

"Intermediate areas have moderate night pedestrian activities. These areas might typically be those near community facilities such as libraries and recreation centers. Safety for the pedestrian as well as providing guidance to primary travel ways are key elements in the design of a lighting system in these areas. Table 5 includes recommended illuminance values."

Table 2-3 RP-8 Table 5 – Recommended Values for Medium Pedestrian Conflict Areas

RP-8 Table 5 - Recommended Values for Medium Pedestrian Conflict Areas Maintained Illuminance Values for Walkways			
	E avg lux/fc	E min lux/fc	E avg/E min
Pedestrian Areas	5.0/0.5	2.0/0.2	4.0

Source: IES RP-8-14 – Roadway Lighting

Low Pedestrian Conflict Areas:

"The lighting system in residential areas can allow both driver and pedestrian to visually orient in the environment, detect obstacles, identify other pedestrians, read street signs, and recognize landmarks. Table 6 includes recommended illuminance values."

Table 2-4 RP-8 Table 6 – Recommended Values for Low Pedestrian Conflict Areas

RP-8 Table 6 - Recommended Values for Low Pedestrian Conflict Areas Maintained Illuminance Values for Walkways			
	E avg lux/fc	E min lux/fc	E avg/E min
Rural/Semi Rural Areas	2.0/0.2	0.6/0.06	10.0
Low Density Residential	3.0/0.3	0.8/0.08	6.0
Medium Density Residential	4.0/0.4	1.0/0.1	4.0

Source: IES RP-8-14 – Roadway Lighting

While there is no true "ideal" pedestrian lighting guidelines for all circumstances, the recommendations set forth by RP-8 are the best practice for design and engineering. The recommendations in RP-8 combined with guidance from other national, state, and local codes can help guide the City of Austin to illuminance levels that meet the requirements for roadway and pedestrian lighting projects. It is important to consider that requirements or recommended illuminance values will vary on a case-by-case bases and should be closely examined.

Local Guidelines and Recommendations: Austin Energy Illumination Design Guideline and City of Austin Building Criteria

The Austin Energy Illumination Design Guidelines, August 2011 refers to pedestrian lighting in several areas. Most important to note are the RP-8 tables for recommended values in high, medium, and low conflict pedestrian areas and are utilized as reference material. It is important to note that Austin Energy Design Guidelines do not provide guidance for providing pedestrian lighting. Austin Energy is solely concerned with lighting roadways and pedestrian crosswalks in the roadways. Any lighting currently provided on pedestrian pathways and bikeways is a by-product of roadway lighting and not intentionally designed. Austin Energy does not have dedicated personnel responsible for pedestrian lighting.

The City of Austin Building Criteria Manual Section 12.1.7 references pedestrian scale street lighting requirements. The requirements state spacing criteria and the recommended light pole style.

"II. PEDESTRIAN SCALE STREET LIGHTING: All development shall provide pedestrian scale street lighting along an adjacent street right-of-way.

a) The standard pedestrian scale street light pole spacing is 44′-0″ O.C.; lights may be placed as far apart as 72′-0″ O.C. if existing conditions preclude the recommended spacing.

b) On corner properties, the distance between the corner and the first light pole shall not exceed 25′-0″.

c) Light poles shall be installed 4′-0″ O.C. back from face of curb, aligned with the street trees.

d) A minimum spacing of 11′-0″ O.C. shall be maintain between a light pole and a street tree.

e) The "Pecan Street Light Pole" is the University Neighborhood Overlay fixture"

The requirements of The City of Austin Building Criteria Manual should be coordinated with the West Campus/University Neighborhood Overlay Design Guidelines and the findings within this report. The spacing criteria and footcandle levels should be reviewed and updated accordingly.

American Association of State Highway and Transportation Officials (AASHTO) Recommendations

AASHTO Roadway Lighting Design Guide (RLDG) states in addition to the safety benefits lighting may serve as a crime deterrent that may aid law enforcement agencies, contribute to overall user and public comfort, and contribute to community pride. AASHTO hypothesizes that because of these benefits local government agencies should see the benefits in paying an appreciable percentage of the cost or wholly finance installation, maintenance, and operation of lighting

facilities. This is an important point where bikeways and pedestrian ways are adjacent to state-constructed, maintained and operated highways. AASHTO is encouraging local municipalities to participate financially in the construction of pedestrian ways and bikeways that may benefit the municipalities and not particularly state-run Department of Transportation programs.

AASHTO determines recommended illuminance with several factors. The first factor when considering pedestrian or bikeway lighting is area classification. There are three types of area classification; Commercial, Intermediate, and Residential. The secondary illuminance factor is pavement type, these are defined in Table 2-5 (Table 3-5a) in one of the following categories R1, R2, R3, or R4

Table 2-5 RLDG Table 3-5a – Illuminance and Luminance Design Values (English)

Table 3-5a. Illuminance and Luminance Design Values (English)					
Roadway and Walkway Classification	Off-Roadway Light Sources	Average Maintained Illuminance			
		R1	R2	R3	R4
	General Land Use	Foot Candles (min)	Foot Candles (min)	Foot Candles (min)	Foot Candles (min)
Principal Arterials					
Sidewalks	Commercial	0.9	1.3	1.3	1.2
	Intermediate	0.6	0.8	0.8	0.8
	Residential	0.3	0.4	0.4	0.4
Pedestrian Ways and Bikeways	All	1.4	2.0	2.0	1.8

Source: AASHTO Roadway Lighting Design Guide

West Campus/University Neighborhood Overlay (UNO) Design Guidelines

The University Neighborhood Overlay (UNO) Design Guidelines is a document developed in 2004, sponsored by the City to provide long-term guidance and standards for developers in the West Campus area. The guidelines were developed to promote a safe environment for pedestrians and to include guidelines for a walkable, urban environment in which multiple architectural styles could thrive. The UNO Design Guidelines present three main principals for streetscape lighting. Properties are recommended to have a 0.5 footcandle lighting level along all pedestrian pathways, High-Pressure Sodium (HPS) lighting is not permitted, and street lighting shall not shine into windows of occupied spaces above.

The recommended lighting level of 0.5 footcandle is consistent with what is recommended by RP-8 Table 2-3 (Table 5) Recommended Light Levels for Medium Pedestrian Conflict Areas. Currently most light fixtures within the UNO area are HPS fixtures. Currently Austin Energy is in the process of adopting a plan to replace all HPS lighting with LED lighting. At the time of inspection decorative fixtures within the UNO area were designed to allow minimal upward light throw, Austin Energy will be replacing these fixtures with cutoff-type fixtures to reduce upward throw.

Section 3

Asset Inventory Data Analysis

Asset Inventory Statistics

During asset inventory data was assessed for 1,148 assets within the West Campus area, see Figure 3-1. The West Campus area can be defined as the areas North and South between W. Martin Luther King Jr. Boulevard and W. 29th Street, East and West between N. Lamar Boulevard and Guadalupe Street. The original GIS data provided by Austin Energy indicated there were 976 assets within our area of interest. A total of 172 assets were added during the inventory process by data collectors. The majority of the additional assets could be attributed to the completion of new development projects within the area of interest. Part of the new development guidelines require the developer to apply Austin Energy lighting standards and fixture selections to the final development. The developers are provided with fixture selections to provide lighting adjacent to new developments.

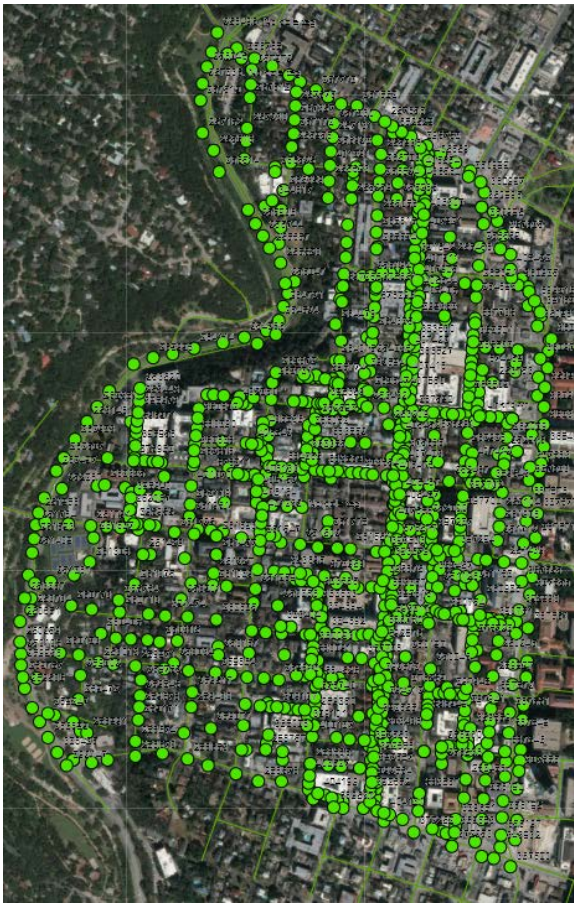


Photo 3-1 Total Assets

The fixture types within the area of interest can be broken down into different categories, roadway, area, and combination roadway/pedestrian fixtures. Each lighting fixture type is summarized below: Of the 1,148 assets in the area of interest only 23 were noted as being an LED-fixture type.

- Roadway
  - Fixture typically mounted between 20'-30' on wood, steel, or aluminum poles
  - HPS typically between 75W-400W
  - LED typically between 50-80W
- Combination (Pedestrian/Roadway)
  - "Drop Acorn" style fixture
  - Decorative pole and mounting arm
  - Fixture typically mounted at 10'
  - Wattage unknown
- Area Fixtures
  - See roadway fixtures for specifications

For each asset, a fixture condition assessment was performed. The fixture condition assessment assigned a numerical rating to each asset. Inspectors utilized a Light Fixture Condition Assessment Rating Flowchart to assign the asset a rating. The rating flowchart was developed so that ratings could be consistently assigned based on asset observations. Without a descriptive flowchart to guide inspectors, results could possibly vary within the inspection team. With a numerically-driven assessment rating, the inspector could quickly assign a rating that could provide maintenance personnel with information that could be used to determine if assets require replacement or maintenance. During the inventory, no obsolete fixtures were observed in the field. The inspection team defined obsolete fixtures as a fixture that no longer matches the quality or technology of modern day light fixtures.

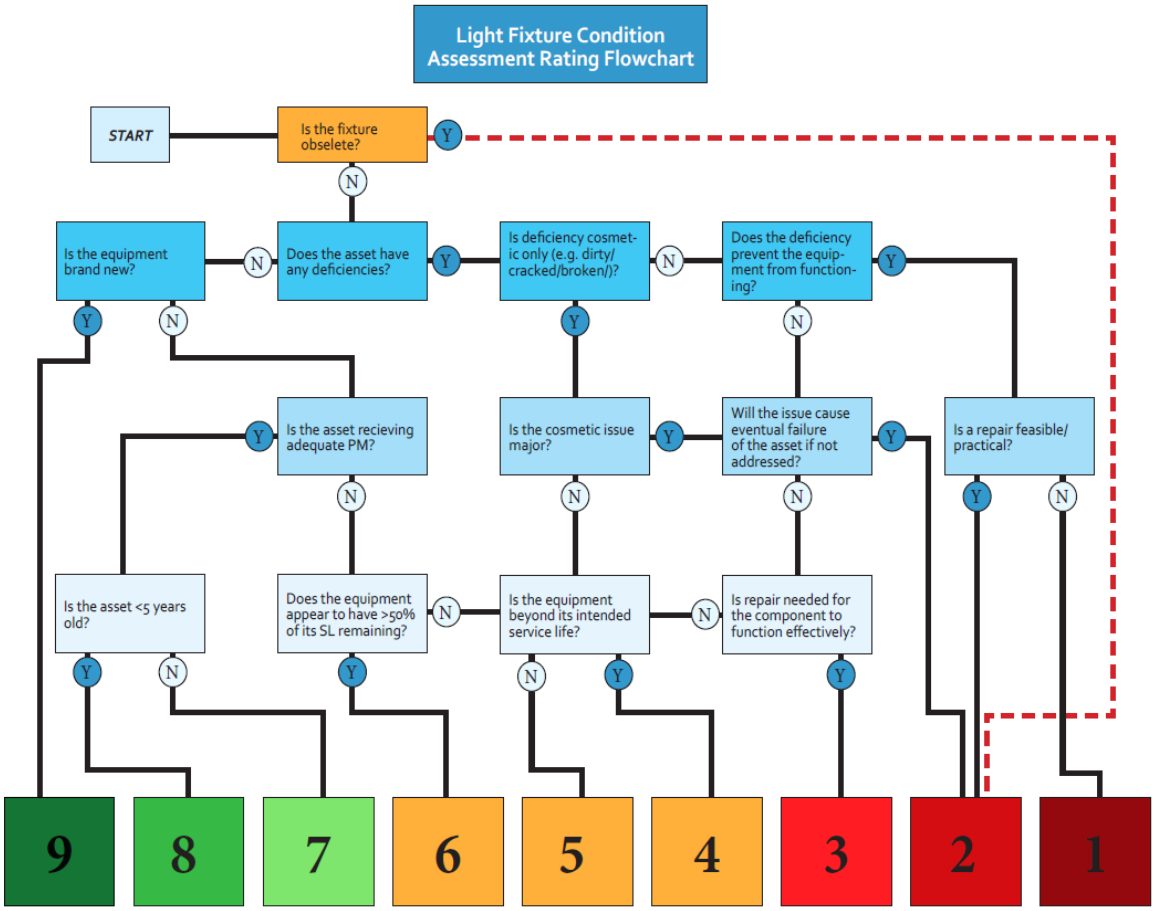


Photo 3-2 Assessment Rating Flowchart

Deficiencies

During the inspection process inspectors were not only tasked with rating each fixture but were also asked to determine what other factors could have an impact on lighting in the West Campus area. Through the inspection process three different common attributes were noticed that affected lighting in the West Campus area.

Fixtures obscured by trees or other objects. Of the 1,148 assets in the West Campus area 96 assets (light fixtures) or approximately 8.4 percent of the fixtures were partially or fully obscured by trees and other objects, see Figure 3-2. Typically, a fixture that is obscured does not permit the full light throw of a light fixture as originally intended or designed, thus creating dark or dead spots at the pavement/sidewalk level. Obscured light fixtures create potentially unsafe conditions for pedestrians and motorists.

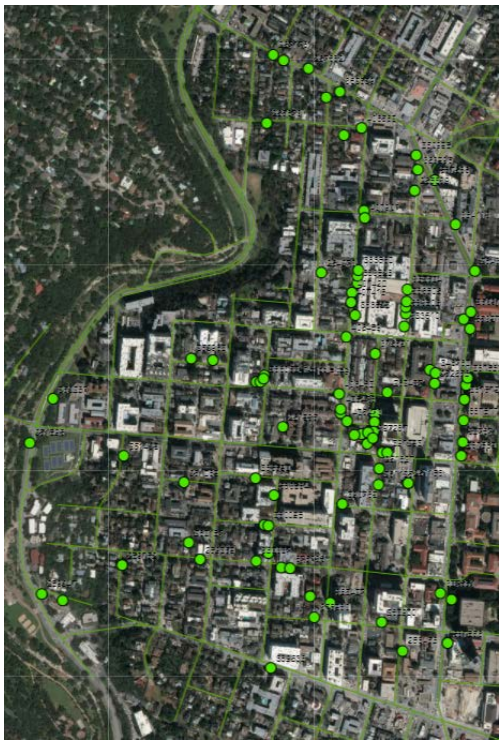


Photo 3-3 Fixtures Obscured by Trees

Vandalism, weathered, physically damaged, or missing fixtures were much less of a problem than expected. Approximately 30 or 2.6 percent of the light fixtures were deficient because of vandalism, weathering, physical damage, or missing fixtures.

Part of the inspection process included a nighttime element that involved confirming fixture operation during expected nighttime hours. Fixtures in the West Campus are controlled by either photocells or other lighting control methods. Of the 1,148 assets 959 or 84 percent of fixtures were verified as being controlled by photocell. At the time of inspection 117 or 10 percent of light fixtures were non-functioning, see Figure 3-3. The cause of the malfunction could not be determined during the inspection process. It was noted that some of the fixtures within the area of interest would emit an amber flashing light from the control unit if the fixture was not operating as intended.

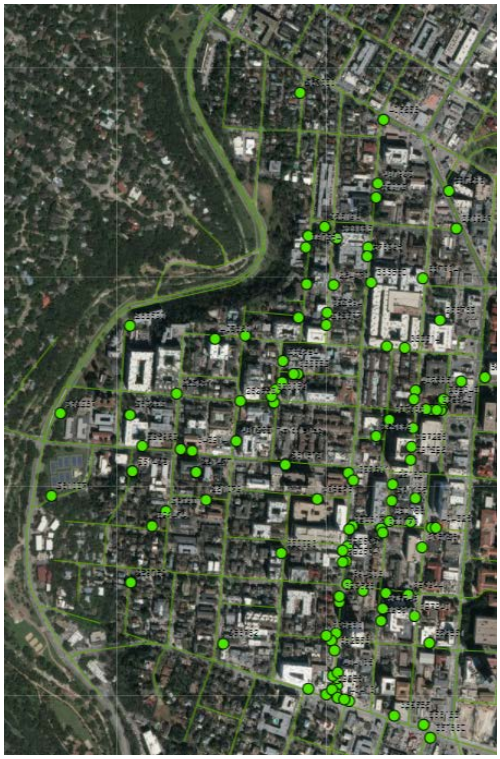


Photo 3-4 Non-Operating Light Fixtures

Citizen Points of Interest and Light Level Measurement Data Points

The City of Austin has set up a project webpage (http://austintexas.gov/westcampuslighting) for the West Campus lighting project. Citizens were asked to provide input on a "West Campus Input Map." Users were directed to a webpage map of the area of interest where "points of interest" could be placed on the map to help the City identify locations where more or better lighting is needed to help improve pedestrian safety. Users were asked to provide a comment with each input point placed on the map. Of the 115 total points inserted within the area of interest, 54 points were produced with comments to help inspectors determine the types of problems/concerns citizens had within in the West Campus area. Citizen points of interest comments typically fell into two categories; safety concerns due to perceived lack of lighting in areas, and general safety concerns due to location or surroundings. The majority of the comments in regard to dark areas and lack of lighting typically could be attributed to three different causes, construction projects where lighting is currently not present or circuits are shut off, fixtures obscured by trees or other objects, or non-functioning light fixtures. Other citizen points of interests expressed concerns for general safety. Often comments implied that the citizen simply did not feel safe in the area. After observing some of these areas, we determined that in some cases lighting seemed adequate at the time of inspections. The assumption that can be made from this is that sometimes, adequate lighting is only one piece of the puzzle when considering citizen safety.

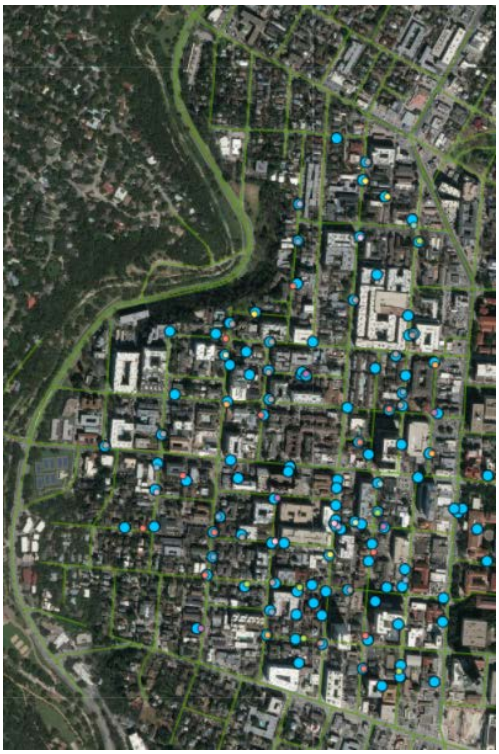


Photo 3-5 Citizen Points of Interest

During the inspection period, Stanley Consultants obtained light level measurements that corresponded to citizen determined points of interest, see Figure 3-4. Points were chosen based on the citizen input map, some points were excluded based on the safety of obtaining a point or if the conditions at the time of inspection did not allow for an accurate reading. A total of 65 data points were compiled into reports that represented each light meter readings. The data sheets with photos can be found in Appendix B.

The process for obtaining data points mentioned in Section 1 was necessary to confirm data being collected was as accurate as possible. In some cases, while obtaining points it was determined that field conditions would not allow accurate readings. Below is a list of factors that created inaccurate data that was either not recorded or deleted through engineering judgement. In these three cases, a constant accurate footcandle reading was not obtainable:

- Heavy pedestrian traffic
- Heavy vehicle traffic
- Heavy foliage or tree cover combined with windy conditions

During the data collection phase inspectors noticed a common theme or correlation between citizen points of interest and common deficiencies such as non-functioning light fixtures and fixtures obscured by trees. These deficiencies were the common contributing factor for low light level readings.

Modeling and Analysis

To better understand "ideal" existing lighting levels in the West Campus area Stanley Consultants modeled three street sections in AGI32. The three different street and roadway sections in the West Campus area were chosen to be spot modeled based on how adequate the lighting was perceived to be during the asset inventory and how it would appear in a "modeled" environment. Each street represents one of three categories, exceeds pedestrian illumination expectations (Rio Grande Street), meets illumination expectations (Nueces Street), does not meet pedestrian illumination expectations W. 22nd Street). AGI32 is a lighting analysis software capable of modeling the design parameters or real-world conditions of lighting installations to obtain statistics based on user defined calculation areas. The lighting analysis software helps engineers, lighting designers, and industry professionals prove lighting design concepts. The lighting computations are capable of producing footcandle computations and renderings for specific lighting scenarios and scenes. In the examples below Stanley Consultants modeled a section of Rio Grande Street, Nueces Street, and W. 22nd Street. The lighting levels at Rio Grande were observed/assumed to meet or exceed recommended lighting levels. Lighting levels on Nueces Street were observed/assumed to be adequate. Lighting levels on W 22nd Street were observed to be adequate but due to tree obstructions inspectors deemed that action needs to be taken to realize the full potential of lighting resources.

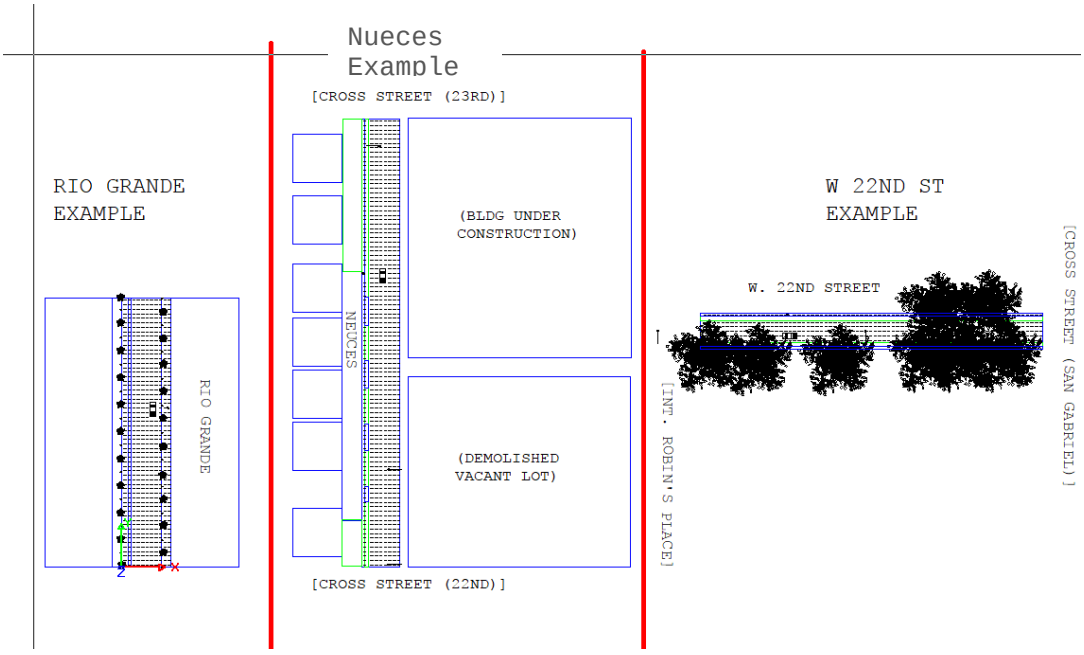


Photo 3-6 Lighting Analysis Computation

Photo 3-6 shows the overhead plan view for sections of the three observed streets. The blue lines represent 3D objects drawn to represent the streets, sidewalks, and buildings. Each dot on the roadway and sidewalk represents a calculation point. The calculation points are at the pavement level on roadways and sidewalks. For this computation only, the readings at pavement level on the sidewalks were considered. Nueces Street reported an average of 0.57 footcandles at the top of the sidewalk, above the recommended value of 0.5 in the UNO Design Guidelines. Rio Grande reported an average of 5.30 footcandles, well above the recommended level. West 22nd Street reported a value of 0.54 footcandles average, above the recommended value. It is important to note that the results for West 22nd Street are not representative of the real-world conditions which were measured using a light meter to be 0.0 footcandles near the fixture obscured by trees.

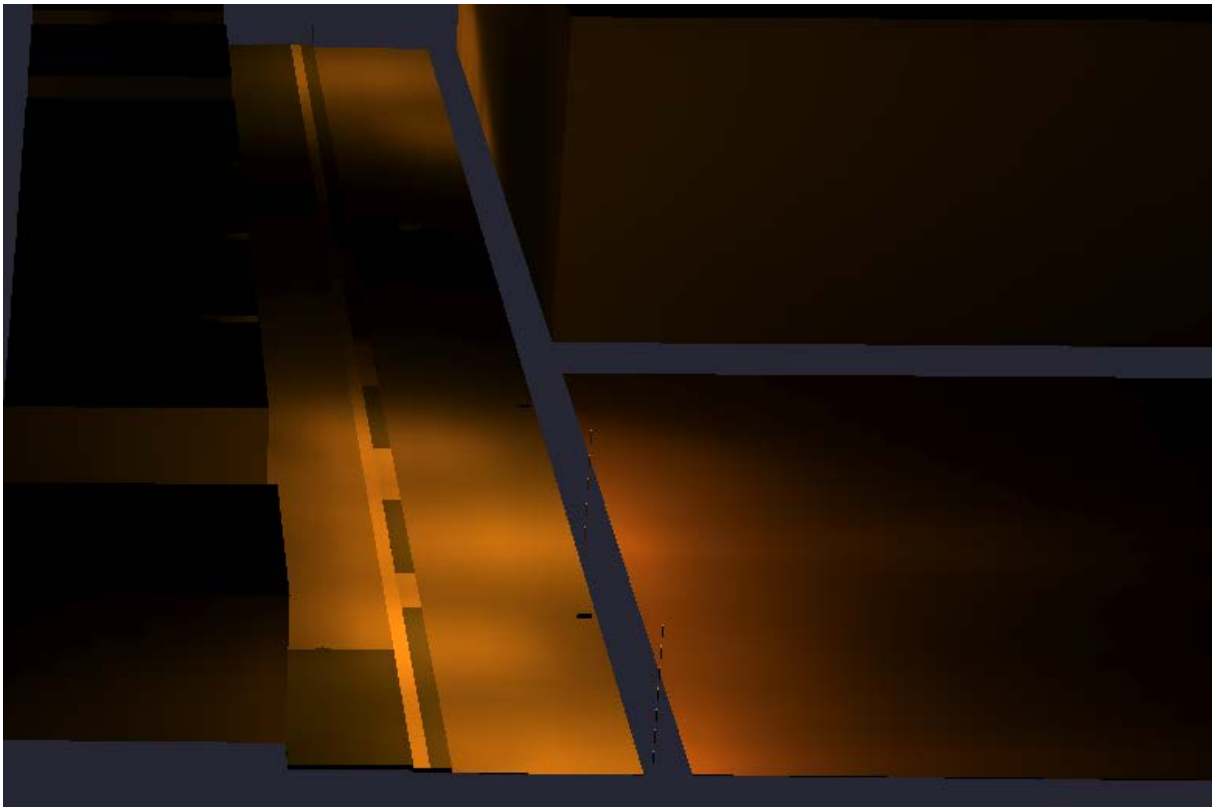


Photo 3-7 Rio Grande Street Rendering

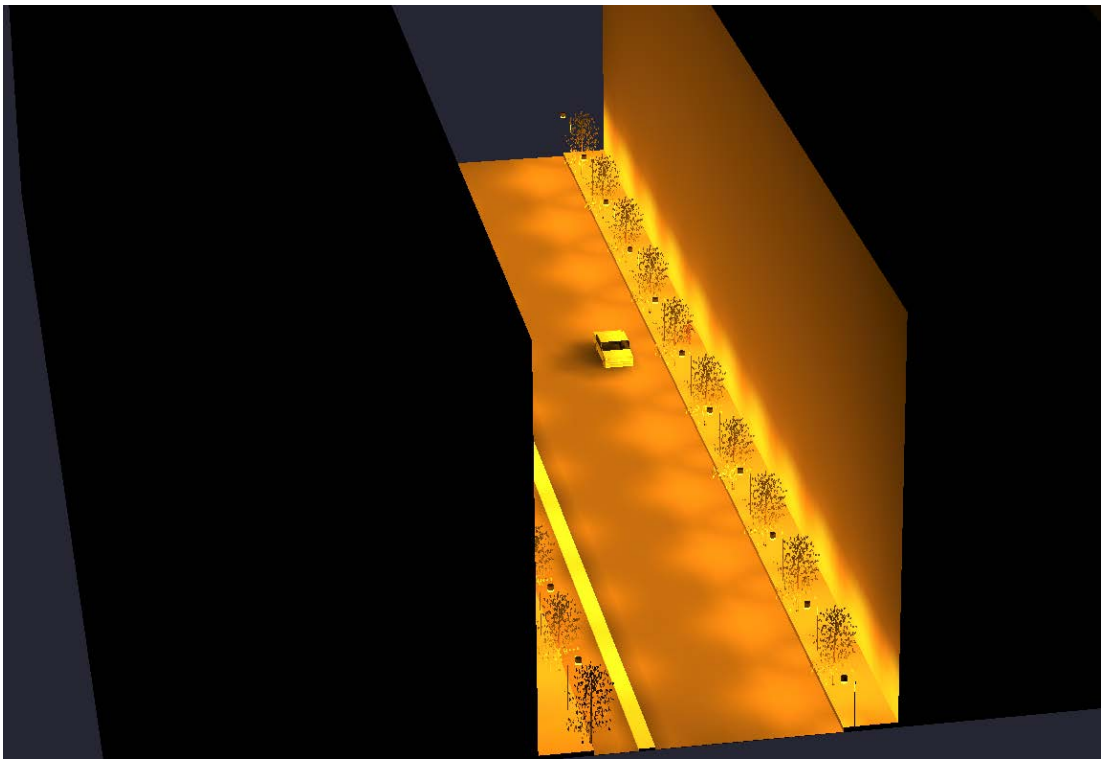


Photo 3-8 Nueces Street Rendering

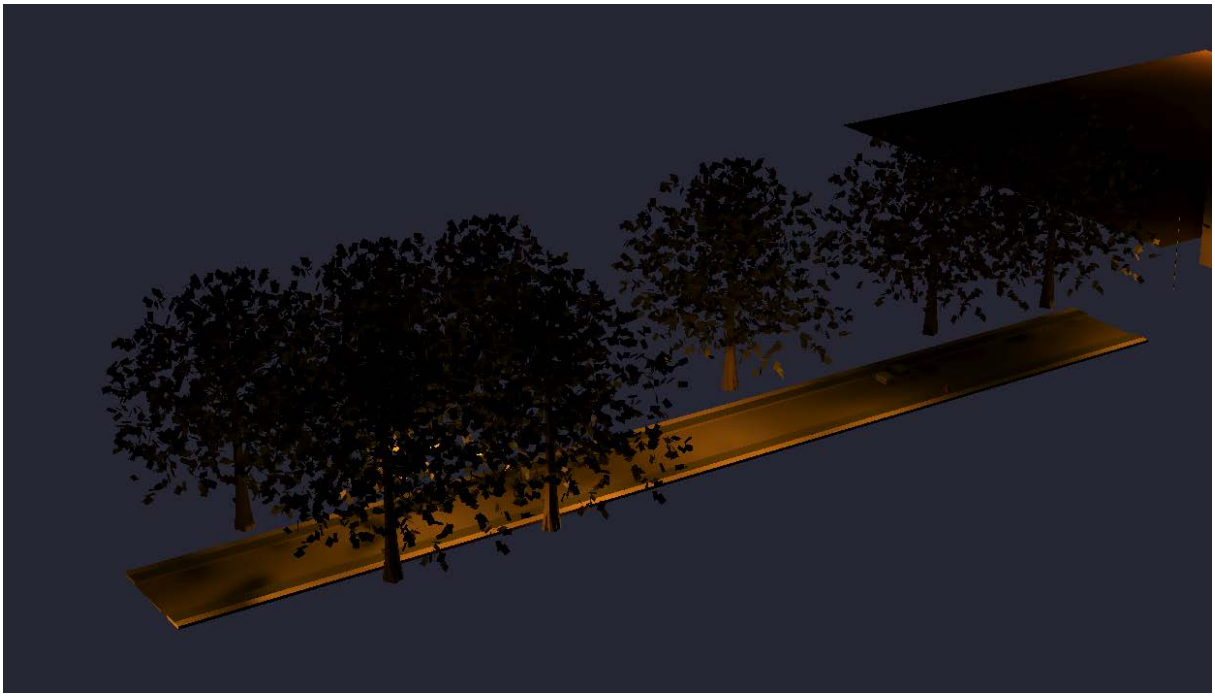


Photo 3-9 W. 22nd Street Rendering

In order to provide the City of Austin a general idea of the current lighting conditions throughout all of the West Campus area, it is important to look at the existing lighting recommendations. Again, AGI32 was utilized to provide light level calculations. The calculations were run for the two main lighting types observed during the site investigation. The spacing criteria that we sought to develop was based on the use of a standard roadway-type fixture and a drop acorn-style fixture, like the combination fixture observed during field investigation. To provide general results for the UNO area several concessions and assumptions had to be made. The following assumptions were made for each fixture type. Each roadway fixture was assumed to be HPS, 250 watt, mounted at 30 feet, and a 15-foot mast arm. Each combination-style fixture was assumed to be HPS with a 10-foot mounting height. The UNO Design Guidelines recommend an illuminance of 0.5 footcandles. To examine if these levels are being met one must look at the maximum spacing between light fixtures and determine what is the maximum spacing that could be allowed to achieve 0.5 footcandles. The computations performed were intended to satisfy the worst-case scenarios where light fixtures were only mounted on one side of the street but footcandle readings on both sides were computed and required to achieve 0.5 footcandles. It is understood that in some cases lighting on both sides of the right-of-way are available, and in these scenarios, these segments of lighting will typically show as achieving the recommended footcandle levels based on performed calculations. Where lighting alternates across streets the desired lighting levels were achieved without intersecting buffers from more than one fixture.

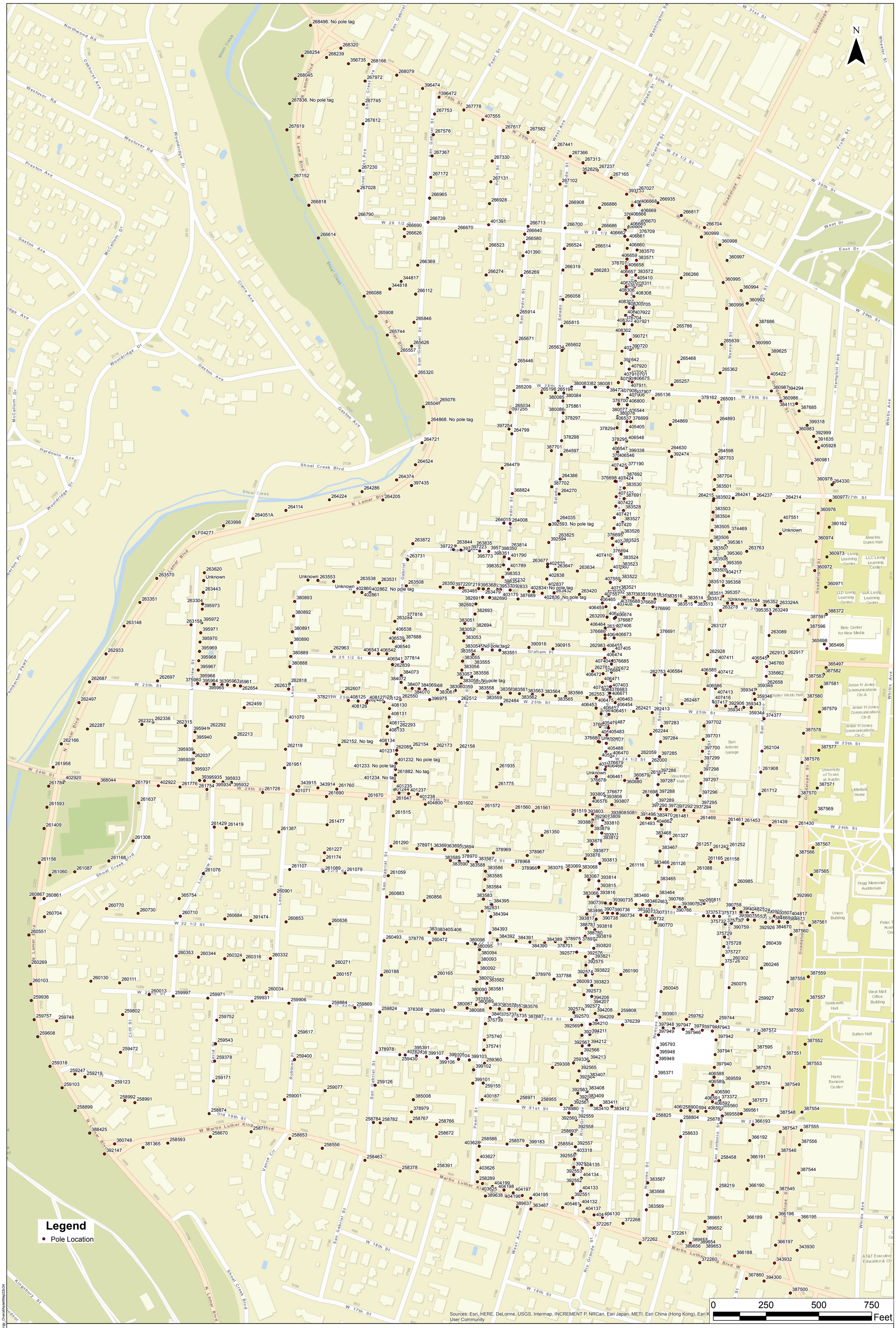
For roadway-type fixtures it was determined that a fixture spacing of 150 feet could produce lighting levels that average greater than or equal to 0.5 footcandles at the sidewalk level on the same side of the right-of-way as the light fixture mounting, see Figure 3-5. Because of the distribution pattern, the sidewalk footcandle readings directly across from the fixture would often read higher; engineering judgment determined we needed to achieve the desired footcandle reading in the worst-case scenario which was the sidewalk area directly behind the fixture.

For combination-type fixtures (drop acorn). It was determined that a spacing of 30-feet maximum was required to achieve a footcandle reading average 0.5 or greater, see Figure 3-6.

The computations show the maximum spacing of fixtures with a calculation area on each roadway and sidewalk. The computation is designed to show where footcandle readings could be meeting the recommended 0.5 footcandles at certain individual calculation points, and on average in the calculation area. Based on the findings from the computations, a color coded visual map of the West Campus area was developed using color markings on the roadway as a visual indicator to show if a buffer intersected based on the calculated maximum distances between fixtures intersects. For example, it could be determined that a red roadway segment indicates that the light fixture buffers for two or more fixtures on that segment of roadway do not intersect; therefore, the light level reading is expected to be less than 0.5 footcandles. Where fixture buffer zones intersected for two or more fixtures, it is assumed that based on the computations and under ideal conditions a reading greater than or equal to 0.5 footcandles could be observed, see Figure 3-7.

The gap analysis provided by Figure 3-7 allows us to assume the additional number of light fixtures that would be required to achieve footcandles greater than or equal to 0.5 footcandles. The gap analysis was performed under the assumption that all existing fixtures within the study area are operational and not obscured by trees or other objects. The gap analysis is representative of a

snapshot in time, regardless of the existing conditions or determinations herein. West Campus/University Neighborhood Overlay (UNO) Design Guidelines must be considered at all times when construction activities that affect pedestrian lighting take place in West Campus. Figure 3-8 indicates the estimated quantity of fixtures that would potentially be required to be installed to achieve a footcandle level of 0.5 footcandles or greater, utilizing the existing types of roadway lighting offered by Austin Energy. It is assumed that without further study or preferred course of action the only way to achieve adequate pedestrian lighting is through adding additional roadway lighting until such time that a pedestrian lighting plan of action is adopted by Austin Energy/City of Austin. This reestablishes the point that under current situations, Austin Energy does not design pedestrian lighting; any pedestrian lighting that occurs in the West Campus area is a byproduct of street lighting. It is not the intent of this report to examine the effects of additional roadway lighting for pedestrian lighting on the resulting roadway conditions. Additional light fixtures that are not pedestrian specific could cause over lighting or glare issues not examined herein. The estimated costs associated with the additional fixtures is based on information provided to Stanley Consultants by Austin Energy. The costs provided do not include any additional civil work, extra wire, a power source, or anything else that may be lacking. Every site must be evaluated by Austin Energy to determine full requirements.



Stanley Consultants INC.

Figure 3-1 - Austin Energy Light Study Overall Asset Map

AUSTIN ENERGY

Date: 3/12/2018 Document Name: AustinEnergy_OverallAssetMap22x34

N

Legend

Obscured Light Locations

Obscured by trees or otherwise

Sources: Esri, HERE,

0 500 1,000 1,500

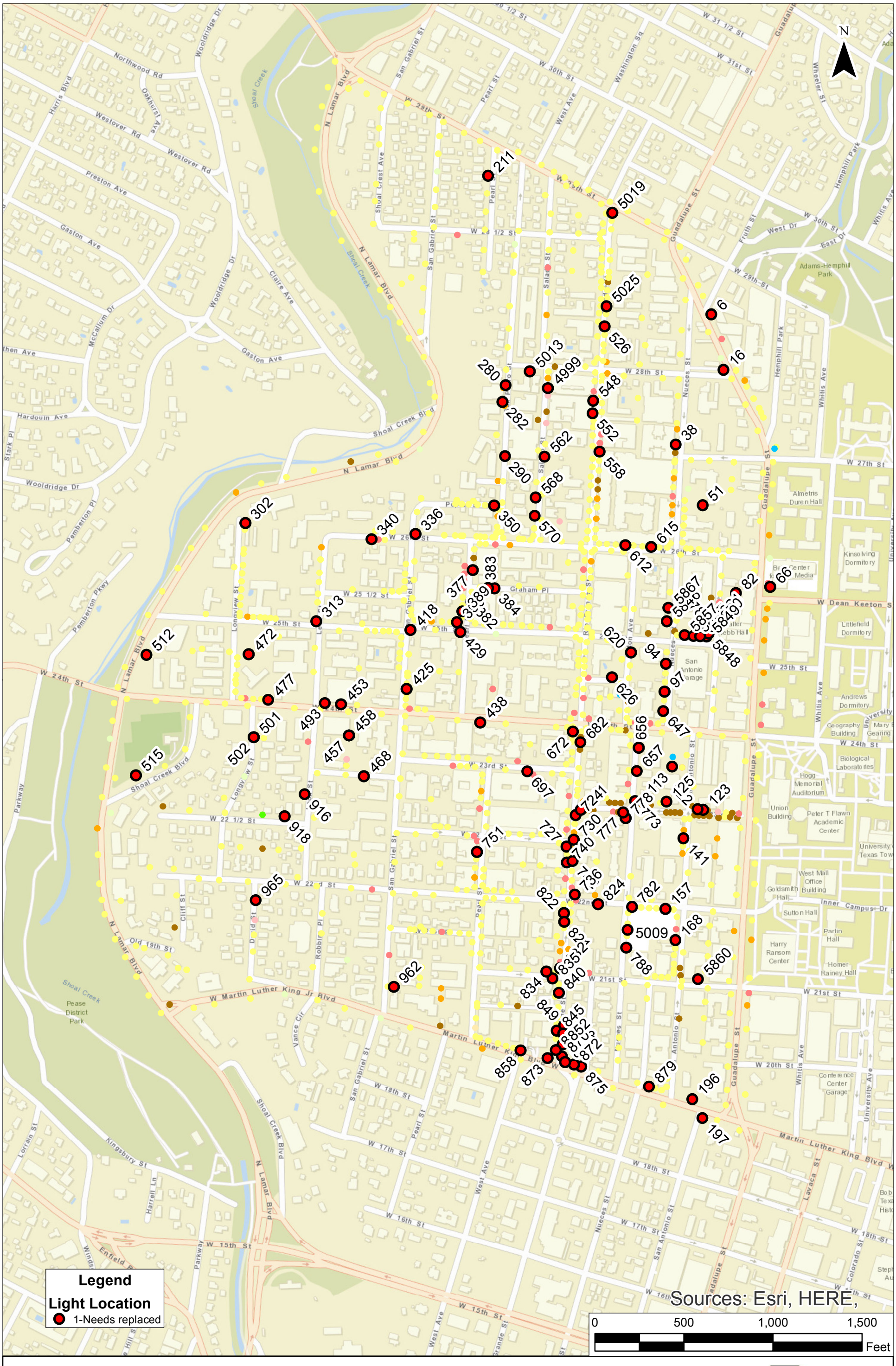
Feet

Stanley Consultants INC.

Figure 3-2 - Austin Energy Light Study Obscured Lights

AUSTIN ENERGY

Date: 3/12/2018 Document Name: AustinEnergy_ObscuredLights11x17



Stanley Consultants INC.

Figure 3-3 - Austin Energy Light Study Non-Operational Lights

AUSTIN ENERGY

Date: 3/12/2018 Document Name: AustinEnergy_NonOperationalLights11x17

N

Legend

Light Meter Readings

Foot Candles

- 0.0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.8
- 0.9
- 1.0
- 1.1
- 1.2
- 1.3
- 1.5
- 1.6
- 2.6
- 3.1
- 3.7
- 4.0
- 4.3
- 4.4
- 5.2

Citizen Suggested Lighting

Sources: Esri,

0 500 1,000

Feet

Date: 3/14/2018 Document Name: AustinEnergy_LightLevelPoints11x17

Stanley Consultants INC.

Figure 3-4 - Austin Energy Light Study Light Level Measurements

AUSTIN ENERGY

Luminaire Schedule					
Symbol	Qty	Lum. Watts	Lum. Lumens	LLF	Description
	3	276	17326	0.850	115 25S R2 FG
	9	128	7372	0.850	ESU100HP00X4

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
COMBO ROADWAY SURFACE_Illum	Illuminance	Fc	4.31	7.1	1.4	3.08	5.07
COMBO ROADWAY SURFACE_Luminance	Luminance	Cd/Sq.m	2.74	7.1	0.8	3.43	8.88
COMBO SIDEWALK NORTH_1_Top_1	Illuminance	Fc	0.65	0.7	0.5	1.30	1.40
COMBO SIDEWALK SOUTH_1_Top_1	Illuminance	Fc	3.64	4.3	2.6	1.40	1.65
ROADWAY SIDEWALK NORTH_Top_1	Illuminance	Fc	1.78	2.8	0.7	2.54	4.00
ROADWAY SIDEWALK SOUTH_Top_1	Illuminance	Fc	0.81	1.8	0.1	8.10	18.00
ROADWAY SURFACE_Illum	Illuminance	Fc	1.74	4.5	0.2	8.70	22.50
ROADWAY SURFACE_Luminance	Luminance	Cd/Sq.m	1.09	4.3	0.3	3.63	14.33

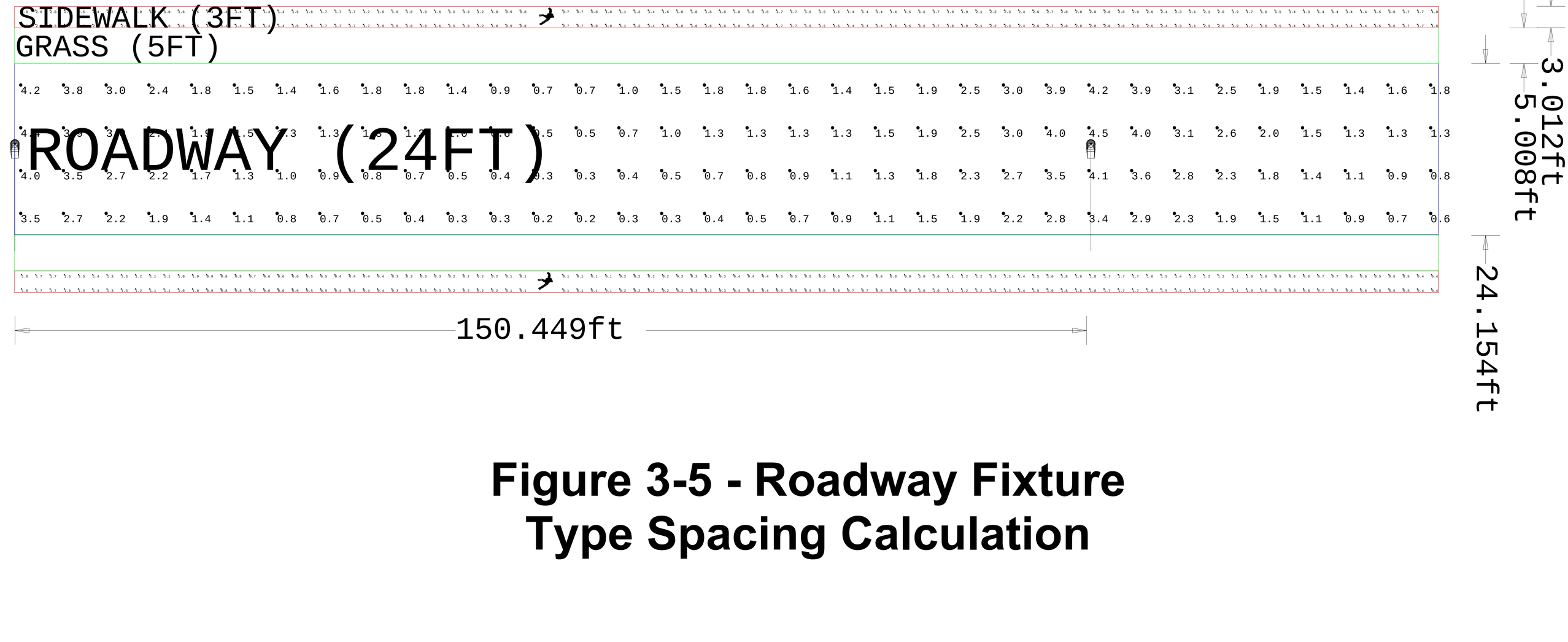


Figure 3-5 - Roadway Fixture Type Spacing Calculation

Luminaire Schedule					
Symbol	Qty	Lum. Watts	Lum. Lumens	LLF	Description
	3	276	17326	0.850	115 25S R2 FG
	9	128	7372	0.850	ESU100HP00X4

Calculation Summary							
Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
COMBO ROADWAY SURFACE_Illum	Illuminance	Fc	4.31	7.1	1.4	3.08	5.07
COMBO ROADWAY SURFACE_Luminance	Luminance	Cd/Sq.m	2.74	7.1	0.8	3.43	8.88
COMBO SIDEWALK NORTH_1_Top_1	Illuminance	Fc	0.67	0.7	0.5	1.34	1.40
COMBO SIDEWALK SOUTH_1_Top_1	Illuminance	Fc	3.73	4.4	2.7	1.38	1.63
ROADWAY SIDEWALK NORTH_Top_1	Illuminance	Fc	1.73	2.8	0.7	2.47	4.00
ROADWAY SIDEWALK SOUTH_Top_1	Illuminance	Fc	0.78	1.7	0.1	7.80	17.00
ROADWAY SURFACE_Illum	Illuminance	Fc	1.74	4.5	0.2	8.70	22.50
ROADWAY SURFACE_Luminance	Luminance	Cd/Sq.m	1.09	4.3	0.3	3.63	14.33

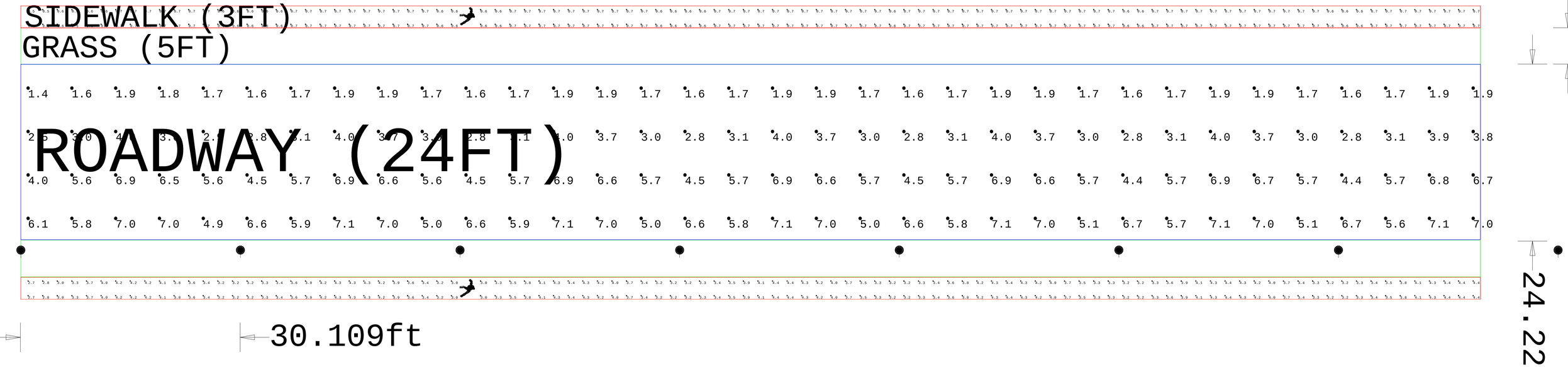
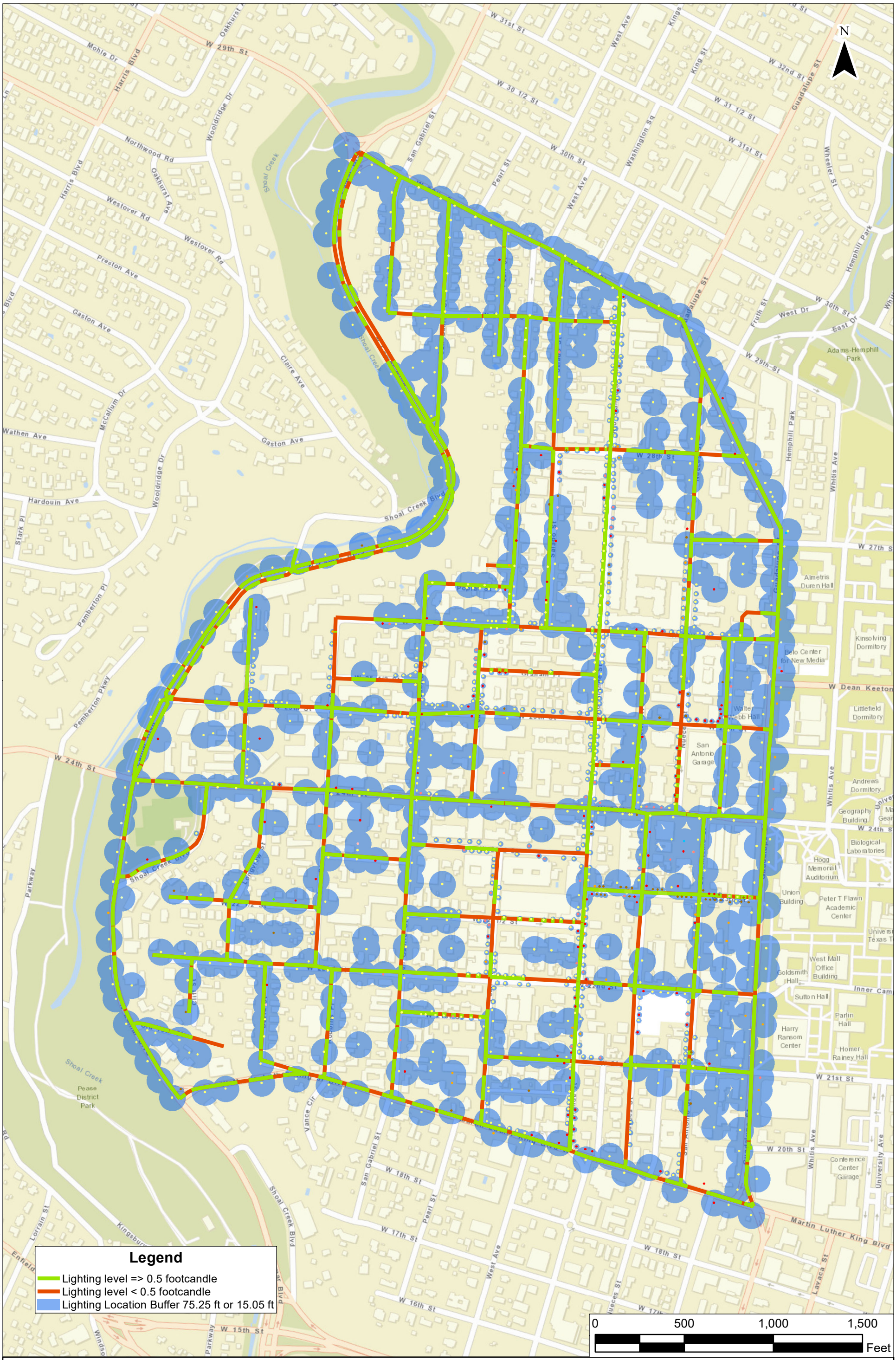


Figure 3-6 - Combination Fixture Type Spacing Calculation



Stanley Consultants INC.

Figure 3-7 - Austin Energy Light Study Lighting Level Analysis

AUSTIN ENERGY

Date: 4/9/2018 Document Name: AustinEnergy_LightingLevelAnalysis11x17

Figure 3-8 Rough Order of Magnitude Cost Estimate

Rough Order of Magnitude Cost Estimate							
		Estimated Number of Additional Fixtures Required (Ea.)		Cost Per Fixture ($)		Cost Per Street Section ($)	Total Cost Per Street ($)
		Roadway	Combination	Roadway	Combination		
N. Lamar Blvd.							
Between							
W. 25th Street	W. 29th Street	4	0	$2,100	$3,100	$8,400	$12,600
W. 24th Street	Shoal Creek Blvd.	1	0	$2,100	$3,100	$2,100	
Shoal Creek Blvd.	West Martin Luther King Jr. Blvd.	1	0	$2,100	$3,100	$2,100	
Shoal Crest Avenue							
Between							
W. 29th Street	W. 28th 1/2 Street	1	0	$2,100	$3,100	$2,100	$2,100
San Pedro Street							
Between							
W. 28th 1/2 Street	W. 28th Street	1	0	$2,100	$3,100	$2,100	$7,300
W. 28th Street	Poplar Street	1	0	$2,100	$3,100	$2,100	
Poplar Street	W. 26th Street	0	1	$2,100	$3,100	$3,100	
Salado Street							
Between							
W. 28th 1/2 Street	W. 28th Street	1	0	$2,100	$3,100	$2,100	$12,500
W. 28th Street	W. 26th Street	2	2	$2,100	$3,100	$10,400	
Rio Grande Street							
Between							
W. 23rd Street	W. 22nd 1/2 Street	0	2	$2,100	$3,100	$6,200	$6,200
Nueces Street							
Between							
Guadalupe Street	W. 28th Street	1	0	$2,100	$3,100	$2,100	$121,100
W. 28th Street	W. 27th Street	1	0	$2,100	$3,100	$2,100	
W. 27th Street	W. 26th Street	1	0	$2,100	$3,100	$2,100	
W. 26th Street	W. 25th Street	0	6	$2,100	$3,100	$18,600	
W. 25th Street	W. 24th Street	0	8	$2,100	$3,100	$24,800	
W. 23rd Street	W. 22nd Street	0	12	$2,100	$3,100	$37,200	
W. 22nd Street	W. 21st Street	1	4	$2,100	$3,100	$14,500	
W. 21st Street	W. Martin Luther King Jr. Blvd.	2	5	$2,100	$3,100	$19,700	
Poplar Street							
Between							
San Gabriel Street	San Pedro Street	1	0	$2,100	$3,100	$2,100	$2,100
Shoal Cliff Ct.							
Between							
San Pedro Street		1	0	$2,100	$3,100	$2,100	$2,100
Longview Street							
Between							
W. 25th Street	W. 24th Street	1	0	$2,100	$3,100	$2,100	$8,400
W. 24th Street	W. 22nd 1/2 Street	1	0	$2,100	$3,100	$2,100	
W. 22nd 1/2 Street	W. 22nd Street	2	0	$2,100	$3,100	$4,200	
Leon Street							
Between							
W. 26th Street	W. 25th 1/2 Street	2	0	$2,100	$3,100	$4,200	$16,800
W. 25th 1/2 Street	W. 25th Street	1	0	$2,100	$3,100	$2,100	
W. 25th Street	W. 24th Street	1	0	$2,100	$3,100	$2,100	
W. 24th Street	W. 22nd 1/2 Street	2	0	$2,100	$3,100	$4,200	
W. 22nd 1/2 Street	W. 22nd Street	2	0	$2,100	$3,100	$4,200	
San Gabriel Street							
Between							
W. 26th Street	W. 25th 1/2 Street	0	2	$2,100	$3,100	$6,200	$19,800
W. 25th 1/2 Street	W. 25th Street	0	1	$2,100	$3,100	$3,100	
W. 23rd Street	W. 22nd 1/2 Street	1	0	$2,100	$3,100	$2,100	
W. 22nd 1/2 Street	W. 22nd Street	1	0	$2,100	$3,100	$2,100	
W. 22nd Street	W. 21st Street	1	0	$2,100	$3,100	$2,100	
W. 21st Street	W. Martin Luther King Jr. Blvd.	2	0	$2,100	$3,100	$4,200	

Rough Order of Magnitude Cost Estimate

		Estimated Number of Additional Fixtures Required (Ea.)		Cost Per Fixture ($)		Cost Per Street Section ($)	Total Cost Per Street ($)
		Roadway	Combination	Roadway	Combination		
Pearl Street							
Between							
W. 26th Street	Gotham Place	0	2	$2,100	$3,100	$6,200	$36,400
W. 25th Street	W. 24th Street	2	0	$2,100	$3,100	$4,200	
W. 23rd Street	W. 22nd 1/2 Street	0	4	$2,100	$3,100	$12,400	
W. 22nd 1/2 Street	W. 22nd Street	2	0	$2,100	$3,100	$4,200	
W. 22nd Street	W. 21st Street	2	0	$2,100	$3,100	$4,200	
W. 21st Street	W. Martin Luther King Jr. Blvd.	1	1	$2,100	$3,100	$5,200	
Seton Avenue							
Between							
W. 26th Street	W. 25th Street	2	0	$2,100	$3,100	$4,200	$4,200
San Antonio Street							
Between							
W. 23rd Street	W. 22nd Street	2	0	$2,100	$3,100	$4,200	$14,700
W. 22nd Street	W. 21st Street	2	0	$2,100	$3,100	$4,200	
W. 21st Street	W. Martin Luther King Jr. Blvd.	3	0	$2,100	$3,100	$6,300	
Guadalupe Street							
Between							
W. 23rd Street	W. 22nd Street	1	0	$2,100	$3,100	$2,100	$4,200
W. 22nd Street	W. Martin Luther King Jr. Blvd.	1	0	$2,100	$3,100	$2,100	
Shoal Creek Blvd.							
Between							
W. 24th Street	N. Lamar Blvd.	2	0	$2,100	$3,100	$4,200	$4,200
Cliff Street							
Between							
Old 15th Street	West 22nd Street	1	0	$2,100	$3,100	$2,100	$2,100
David Street							
Between							
W. 22nd Street	W. Martin Luther King Jr. Blvd.	2	0	$2,100	$3,100	$4,200	$4,200
Robbins Place							
Between							
W. 22nd Street	W. Martin Luther King Jr. Blvd.	1	0	$2,100	$3,100	$2,100	$2,100
Graham Place							
Between							
Pearl Street	Rio Grande Street	3	0	$2,100	$3,100	$6,300	$6,300
W. 29th Street							
Between							
Salado Street	Rio Grande Street	0	0	$2,100	$3,100	$0	$0
Rio Grande Street	Guadalupe Street	0	0	$2,100	$3,100	$0	
W. 28th 1/2 Street							
Between							
Shoal Crest Avenue	San Gabriel Street	1	0	$2,100	$3,100	$2,100	$8,400
Pearl Street	San Pedro Street	1	0	$2,100	$3,100	$2,100	
San Pedro Street	Salado Street	1	0	$2,100	$3,100	$2,100	
Salado Street	Rio Grande Street	1	0	$2,100	$3,100	$2,100	
W. 28th Street							
Between							
San Pedro Street	Salado Street	1	0	$2,100	$3,100	$2,100	$14,700
Salado Street	Rio Grande Street	3	0	$2,100	$3,100	$6,300	
Rio Grande Street	Nueces Street	2	0	$2,100	$3,100	$4,200	
Nueces Street	Guadalupe Street	1	0	$2,100	$3,100	$2,100	
W. 27th Street							
Between							
Nueces Street	Guadalupe Street	1	0	$2,100	$3,100	$2,100	$2,100

Rough Order of Magnitude Cost Estimate

		Estimated Number of Additional Fixtures Required (Ea.)		Cost Per Fixture ($)		Cost Per Street Section ($)	Total Cost Per Street ($)
		Roadway	Combination	Roadway	Combination		
Hume Place							
Between							
26th Street	Guadalupe Street	1	0	$2,100	$3,100	$2,100	$2,100
W. 26th Street							
Between							
Leon Street	San Gabriel Street	2	0	$2,100	$3,100	$4,200	
San Pedro Street	Salado Street	1	0	$2,100	$3,100	$2,100	
Salado Street	Rio Grande Street	0	1	$2,100	$3,100	$3,100	
Rio Grande Street	Seton Avenue	0	1	$2,100	$3,100	$3,100	$36,300
Seton Avenue	Nueces Street	0	4	$2,100	$3,100	$12,400	
Nueces Street	San Antonio Street	0	3	$2,100	$3,100	$9,300	
San Antonio Street	Guadalupe Street	1	0	$2,100	$3,100	$2,100	
W. 25th 1/2 Street							
Between							
Leon Street	San Gabriel Street	1	0	$2,100	$3,100	$2,100	$2,100
W. 25th Street							
Between							
N. Lamar Blvd.	Longview Street	2	0	$2,100	$3,100	$4,200	
Longview Street	Leon Street	2	0	$2,100	$3,100	$4,200	
Leon Street	San Gabriel Street	1	0	$2,100	$3,100	$2,100	
Pearl Street	Rio Grande Street	1	6	$2,100	$3,100	$20,700	$47,800
Seton venue	Nueces Street	1	0	$2,100	$3,100	$2,100	
Nueces Street	San Antonio Street	0	4	$2,100	$3,100	$12,400	
San Antonio Street	Guadalupe Street	1	0	$2,100	$3,100	$2,100	
W. 24th 1/2 Street							
Between							
Rio Grande Street	Seton Avenue	1	0	$2,100	$3,100	$2,100	$2,100
W. 24th Street							
Between							
N. Lamar Blvd.	Shoal Creek Blvd.	2	0	$2,100	$3,100	$4,200	
Longview Street	Leon Street	1	0	$2,100	$3,100	$2,100	$8,400
Pearl Street	Rio Grande Street	1	0	$2,100	$3,100	$2,100	
W. 23rd Street							
Between							
Leon Street	San Gabriel Street	1	0	$2,100	$3,100	$2,100	
San Gabriel Street	Pearl Street	0	4	$2,100	$3,100	$12,400	$28,000
Pearl Street	Rio Grande Street	2	0	$2,100	$3,100	$4,200	
San Antonio Street	Guadalupe Street	0	3	$2,100	$3,100	$9,300	
W. 22nd 1/2 Street							
Between							
N. Lamar Blvd.	Longview Street	1	0	$2,100	$3,100	$2,100	
Longview Street	Leon Street	2	0	$2,100	$3,100	$4,200	$44,600
San Gabriel Street	Pearl Street	2	0	$2,100	$3,100	$4,200	
Pearl Street	Rio Grande Street	0	11	$2,100	$3,100	$34,100	
W. 22nd Street							
Between							
Cliff Street	David Street	1	0	$2,100	$3,100	$2,100	
David Street	Robbins Place	1	0	$2,100	$3,100	$2,100	
Robbins Place	San Gabriel Street	1	0	$2,100	$3,100	$2,100	
San Gabriel Street	Pearl Street	0	4	$2,100	$3,100	$12,400	$29,200
Pearl Street	Rio Grande Street	2	0	$2,100	$3,100	$4,200	
Rio Grande Street	Nueces Street	1	0	$2,100	$3,100	$2,100	
San Antonio Street	Guadalupe Street	2	0	$2,100	$3,100	$4,200	

Rough Order of Magnitude Cost Estimate

		Estimated Number of Additional Fixtures Required (Ea.)		Cost Per Fixture ($)		Cost Per Street Section ($)	Total Cost Per Street ($)
		Roadway	Combination	Roadway	Combination		
Old 19th Street							
Between							
N. Lamar Blvd.		1	0	$2,100	$3,100	$2,100	$2,100
W. 21st Street							
Between							
San Gabriel Street	Pearl Street	0	4	$2,100	$3,100	$12,400	
Pearl Street	Rio Grande Street	1	0	$2,100	$3,100	$2,100	
Rio Grande Street	Nueces Street	1	3	$2,100	$3,100	$11,400	$31,100
Nueces Street	San Antonio Street	0	1	$2,100	$3,100	$3,100	
San Antonio Street	Guadalupe Street	1	0	$2,100	$3,100	$2,100	
W. Martin Luther King Jr. Blvd.							
Between							
N. Lamar Blvd.	Robbins Place	3	0	$2,100	$3,100	$6,300	
Robbins Place	San Gabriel Street	2	0	$2,100	$3,100	$4,200	
San Gabriel Street	Pearl Street	2	0	$2,100	$3,100	$4,200	
Pearl Street	Rio Grande Street	3	0	$2,100	$3,100	$6,300	$29,400
Rio Grande Street	Nueces Street	1	0	$2,100	$3,100	$2,100	
Nueces Street	San Antonio Street	1	0	$2,100	$3,100	$2,100	
San Antonio Street	Guadalupe Street	2	0	$2,100	$3,100	$4,200	
						Grand Total ($)	$577,800

Section 4

Public vs. Private Pedestrian Lighting Strategies

The City does not currently have a formal public/private partnership program for providing pedestrian lighting. Under the City of Austin's Building Criteria Manual, the City does require all new developments to include pedestrian-scale street lighting; however, this does not address existing developments with inadequate pedestrian lighting. Although not a formal program targeting pedestrian lighting, Austin Energy's Nightwatchman Security Lighting program has in some cases resulted in added pedestrian lighting benefits.

The Nightwatchman program is an initiative by Austin Energy to provide property owners with an inexpensive, no initial cost investment to provide security lighting in parking lots, private walkways, and general property areas. The program supports customers in discouraging theft and vandalism, enhances personal safety, and reduces the potential for accidents. Currently, Austin Energy installs the Nightwatchman fixtures and systems on existing Utility poles at the request of customers. The customer incurs a monthly charge on their bill to utilize the program and Austin Energy maintains all the equipment associated with the Nightwatchman fixtures. The program does have limitations as to where it can be installed, preventing any type of comprehensive pedestrian lighting application. Stanley Consultants observed 120 fixtures in the West Campus area that fit the description of a Nightwatchman fixture, see Photo 4-1 and Figure 4-1.

Photo 4-1 Nightwatchman Fixture Locations

Examples of Public/Private Pedestrian Lighting Partnerships

In reviewing other City and Utility programs, Stanley Consultants was unable to identify any examples of public/private pedestrian lighting partnerships. Similar to Austin Energy, Nightwatchman-type programs can be found across the country. All programs offer existing customers the opportunity to inquire about additional area or security lighting if they feel as though lighting levels are currently not being met in their service areas.

"CWLP will install outdoor, pole-mounted security lights for customers upon request, as long as the area to be lit has overhead electric service. (Utility-provided security lights are not available in areas fed by underground utilities.)

Whenever possible, lights will be installed on existing CWLP poles, as long as the poles can accommodate the lights and the lights will not interfere with CWLP's primary use of the poles. If this is not feasible, new poles will be installed. The utility will install a maximum of three new light poles per property. There is no maximum on the number of lights that may be installed as long as there is a sufficient number of new and/or existing poles to hold them. Lights will not be installed on any structures other than CWLP poles." City Water, Light, and Power, Springfield, Illinois

"LUS offers free security lighting installations on existing overhead electricity poles. The only cost to the customer is the additional electricity that the light would use. LUS can install light bulbs from 100 to 1000 watts for a service charge of $3.48 to $19.53 per month per light. Most residential security lighting only requires one 150-watt bulb. For added convenience, it can be automatically billed through your LUS utility bill.

If an electricity pole is not in the location where you need lighting, LUS can install a separate light pole, although in that case, labor and materials costs would have to be assessed to the customer." LUS (Lafayette Utilities System), Lafayette, Louisiana

"ROCKWOOD ELECRIC UTILITY can install a private security light on your residential or commercial property under most conditions. All new requests for outdoor lighting require the applicant to sign a minimum two-year contract for security lighting service. If you have security concerns and would like to discuss outdoor lighting options, please contact our Engineering Department to look at the situation with you. Rockwood Electric Utility, Rockwood, Tennessee

These are only a few examples of what exists for additional security lighting services provided by other utilities. While the information is presented in different ways, the objective for each Utility is the same, to provide customers with the option to install additional security/area lighting to supplement existing outdoor/roadway lighting without addressing pedestrian lighting directly.

Program Opportunities and Areas for Improvement

Currently the Nightwatchman program is a lighting system offered to be mounted on existing poles with no equipment options. Giving the customer options for installing fixtures on new poles or providing fixture options would be a potential area for improvement and might create additional incentive for property owners to provide more pedestrian lighting adjacent to their property. The light fixture being installed currently in the Nightwatchman program appears to be a 100-watt, HPS roadway-type fixture. It is possible that more private property or business owners would be enticed to add supplemental security/area lighting if decorative or other LED options were offered by the Utility.

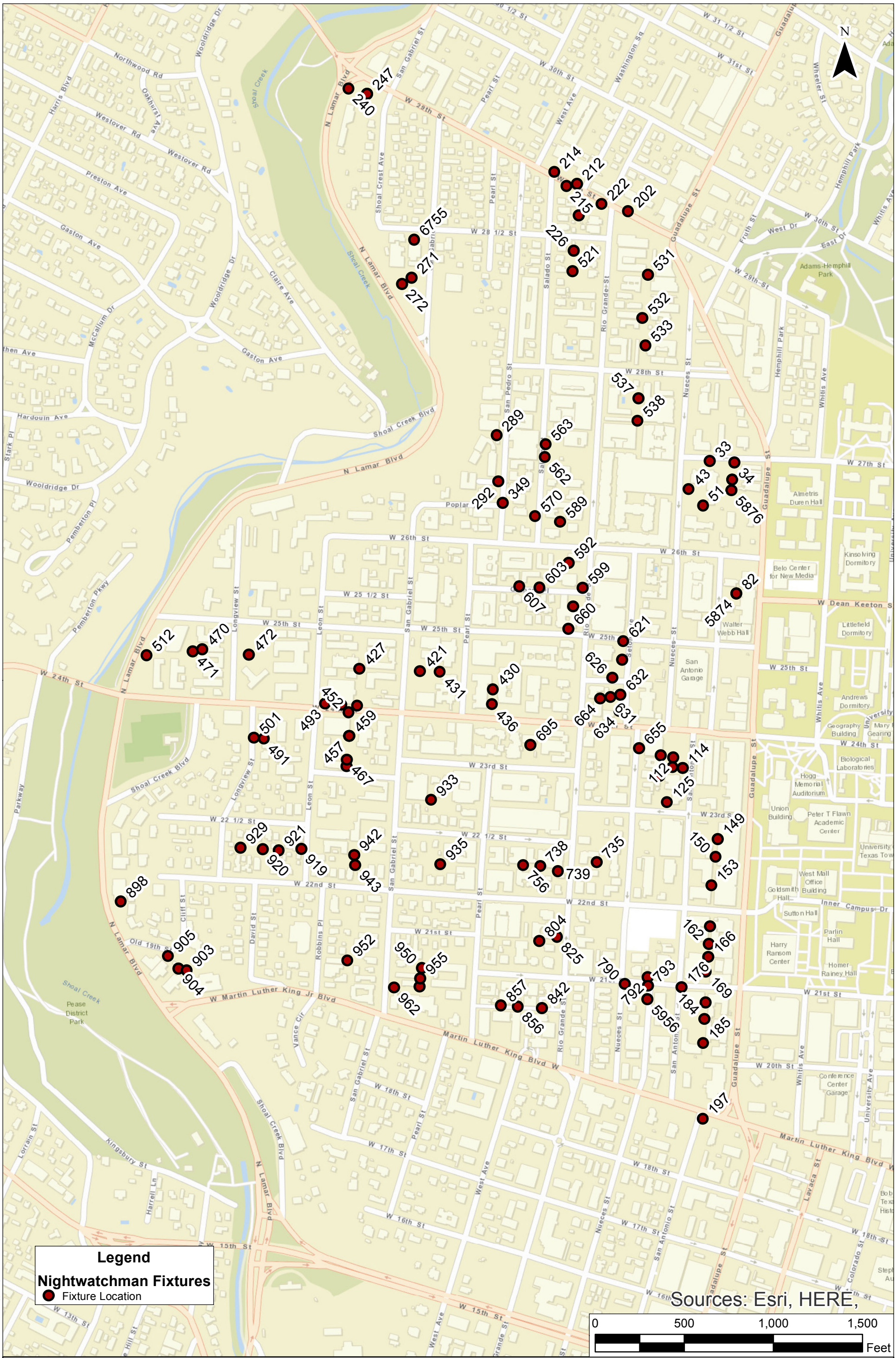
At the time of writing this report, it is unknown how Austin Energy markets the Nightwatchman program outside of what is presented on the Austin Energy website. It is possible that additional community outreach or direct recommendations by Austin Police Department (APD) for Nightwatchman fixtures in areas where crimes occur would increase enrollment in the program.

In presenting these areas for opportunity and improvement, it is important to note there are costs and obstacles when providing these services. Expanding the program to be installed on new poles in addition to existing poles creates risk to privately-owned underground utilities and increases costs associated with material and labor. Providing customers with light fixture options not currently in the Austin Energy inventory creates more models and part numbers that need to be purchased and tracked. It is recommended that the City of Austin and Austin Energy come together to discuss a unified vision for the program.

Privately Owned Lighting

Photo 4-2 Private Parking Area Lighting

The picture above shows a good example of how privately-owned lighting can be used successfully to create a safe environment for a large tenant parking area. This is a case where it is not possible for the Nightwatchman program to assist with security lighting. For this property, there are no existing Utility poles to add a Nightwatchman fixture. Often security lighting is left to the discretion of the property or business owner. Property owners should be encouraged to either participate in the Nightwatchman program where possible or to provide additional security lighting on properties to ensure the safety of tenants and pedestrians who use adjacent pedestrian ways. If tenants do not feel safe, they should be encouraged to contact property owners. Through this program and other safety initiatives, property owners should be encouraged to participate in discussions and be provided with Nightwatchman program information. When considering additional lighting for security, it is important to note that additional illuminance may provide improved conditions; however, increased illuminance does not directly correlate to increased security, lighting is one of the secondary functions of enhanced security. Adequate lighting conditions help to increase the quality of other security measures.



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Stanley Consultants INC.

Figure 4-1 - Austin Energy Light Study Nightwatchman Fixtures

AUSTIN ENERGY

Section 5

Recommended Improvements

Based on this review of the lighting needs in the West Campus area, there are areas in which the pedestrian lighting requires improvement. It is important to address pedestrian lighting in its current state and plan for the future. These improvements have been broken down into recommendations that can be accomplished immediately, in the short term, and in the long term.

Immediate Improvements

Through immediate action, lighting can be improved within the West Campus area by enacting maintenance programs to fix or replace the fixtures identified as nonoperational, obscured, or those requiring immediate maintenance due to vandalism, weathering, physical damage, or absence of fixture entirely.

Short-Term Improvements

Adopt a LED re-lamping schedule for all roadways. LED lights have different characteristics than their HPS counterparts and will make a difference in the amount and quality of light in the West Campus area.

Implement a plan to incorporate additional fixtures within the West Campus area, based on the findings in Figure 3-7 and the associated Rough Order of Magnitude Cost in Figure 3-8, to provide improved lighting levels that align with the West Campus/University Neighborhood Overlay (UNO) Design Guidelines. The Rough Order of Magnitude Cost Estimate indicates by block, where additional light fixtures are required to meet recommended footcandle levels. Overall 228 fixtures are recommended to be added to the area.

Using the data collected, perform additional measurements and community involvement to design modifications that not only increase lighting levels in areas of concern but also decrease lighting levels where necessary to bring the overall lighting in line with the recommended values.

Update the West Campus/University Neighborhood Overlay (UNO) Design Guidelines to coordinate with The City of Austin Building Criteria Manual to more closely reflect current industry standard lighting recommendations; review and update the fixture types, and review and update the spacing criteria and footcandle levels. Coordinate potential fixture selection basis of design with Austin Energy. Wherever possible new installations should consider the use of combination pedestrian/roadway-type fixtures.

Long-Term Improvements

Develop a comprehensive City-wide lighting masterplan that includes recommendations for standards for roadway and pedestrian lighting. A lighting masterplan can serve as a single-source document for all lighting guidelines, fixture types, design principals, and maintenance. New private developments and new/future publicly-funded projects that require lighting improvements in the public right-of-way are given a defined set of parameters for the improvements necessary. The parameters are standardized and eliminate the possibilities of variations between developments and projects. The lighting masterplan could easily be used as a source to update City codes or as a source to create a new one.

As part of the masterplan convene public open house meetings with all stakeholders including staff from City agencies, residents, and Austin Energy. Identify roles within the groups to help improve the process for providing adequate pedestrian and roadway lighting strategies that impact the local community.

Following the masterplan, use it as a basis to update City codes and design guides, and/or adopt a new manual of uniform minimum standards and criteria into a common ordinance, for application, design, construction, and maintenance of roadway and pedestrian lighting expected by the City of Austin. Reference this ordinance from other applicable code chapters (such as planning and zoning, public safety, recreation, business, signage, traffic, etc.).

Consider adoption of a dark sky policy and a light trespass policy.