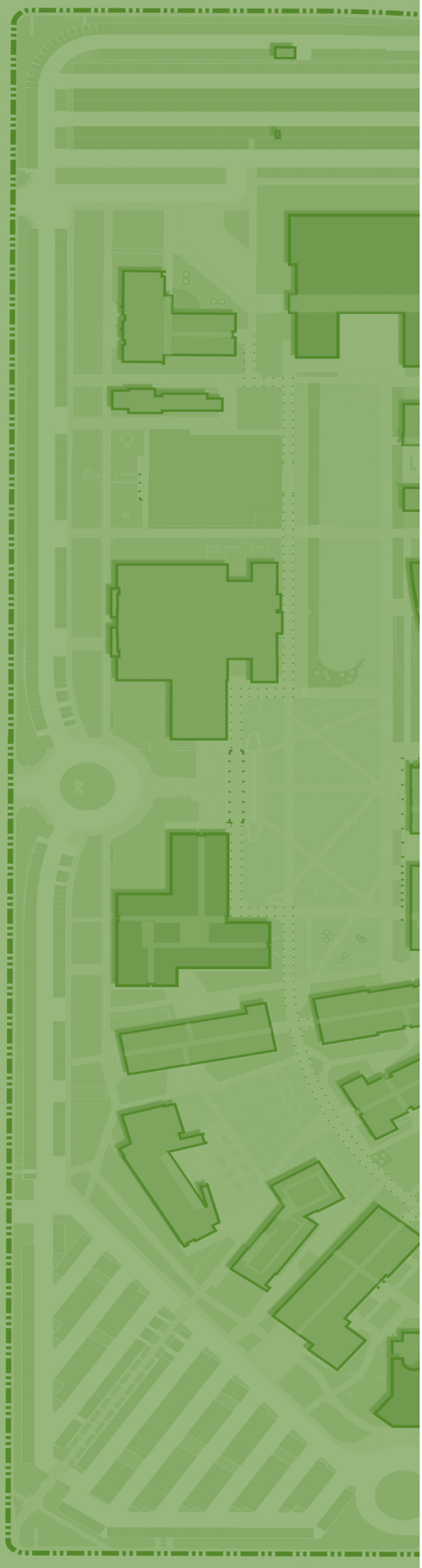

Los Angeles Valley College

LOS ANGELES COMMUNITY COLLEGE DISTRICT
VALLEY GLEN, CALIFORNIA

Exterior Lighting Criteria Document

Campus-wide Exterior Lighting Master Plan

November 3, 2011

LIGHTING DESIGN ALLIANCE | Steinberg Architects

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Table of Contents

1 | Project Description

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Executive Summary

Introduction

In June 2011, Los Angeles Valley College (College or LAVC) requested Steinberg Architects to develop a Campus-Wide Exterior Lighting Master plan.

The Exterior Lighting Master Plan will help to ensure that the campus develops over time in a manner consistent with previous upgrades and future additions to the College. They should be used as criteria for reviewing future development plans and proposals so that the campus evolves as a high quality institution.

A campus-wide outdoor lighting upgrade shall be implemented that supports the circulation hierarchy, creates a unified campus lighting aesthetic, limits light pollution, preserves and utilizes effective energy measures, and creates an atmosphere in which people feel safe while walking through campus at night.

Furthermore, as projects are implemented over time, integration of design elements (site planning, building placement, form, materials, landscape materials, sustainability, parking, et al) throughout the site will provide a cohesive identity for Los Angeles Valley College. In general, design guidelines indicate minimum requirements and are flexible in their interpretation and application to allow for unforeseen changes over time. This Lighting Master Plan document will be made available to all future design consultants to the College for use during the design process. Additionally, the College will review all projects on campus to ensure adherence to the guidelines established in this document.

Program Goals

The LAVC Campus-wide Exterior Lighting Master Plan provides overall campus lighting design guidelines for campus development. The following goals have been identified as guiding principals for these developments (detailed descriptions of these goals are outlined in Section 2.0 Goals):

- Comfort
- Safety
- Sustainability
- Efficiency
- Maintainability
- Campus Identity

Process

This Exterior Lighting Masterplan identifies the detailed recommendations for campus exterior lighting development. It was established from information generated and analyzed from the Exterior Lighting Study prepared by P2S which identifies lighting deficiencies at the campus. Working with the College, Steinberg Architects further developed the information into lighting recommendations specific to campus requirements. A night time campus site walk helped the Building User Group (BUG) define the appropriate light levels for the various campus zones. Various workshops and meetings were held with the BUG to discuss and refine items such as goals, campus lighting zone areas, landscape lighting recommendations, evacuation area lighting requirements, code requirements, lighting control recommendations and specific maintenance requirements. The following are a list of the workshops held:

Workshops & Meetings

Meeting 1:	Meeting Preparation with Focus Group	07.07. 2011
Workshop 1:	Kick-off Meeting	07.15. 2011
Workshop 2:	Project Goals and Criteria, and Campus Site Walk	07.26. 2011
Workshop 3:	Site Lighting Criteria Review	08.09. 2011
Workshop 4:	Draft Site Lighting Criteria Review	08.11. 2011
Workshop 5:	Draft Site Lighting Criteria Comments Review	09.12. 2011

Participants

Los Angeles Valley College- Administration
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Los Angeles Valley College- Building User Group (BUG)
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P2S - MEPT Consultant
Aravind Batra
Prabu Shankar
Fred Flores

Referenced Documents

2010 UPDATE TO THE 2003 FACILITIES MASTER PLAN Los Angeles Valley College; Los Angeles Community College District
December 2010, Steinberg Architects

MEASURE J UTILITY MASTER PLAN Los Angeles Valley College; Los Angeles Community College District
April 2010, PSOMAS

EXTERIOR LIGHTING STUDY Los Angeles Valley College; Los Angeles Community College District
March 2011, P2S/STEINBERG ARCHITECTS

LAVC URBAN FOREST MASTER PLAN: A GUIDE TO PRESERVE AND ENHANCE THE LOS ANGELES VALLEY COLLEGE URBAN FOREST
August 2011, SWA/STEINBERG ARCHITECTS

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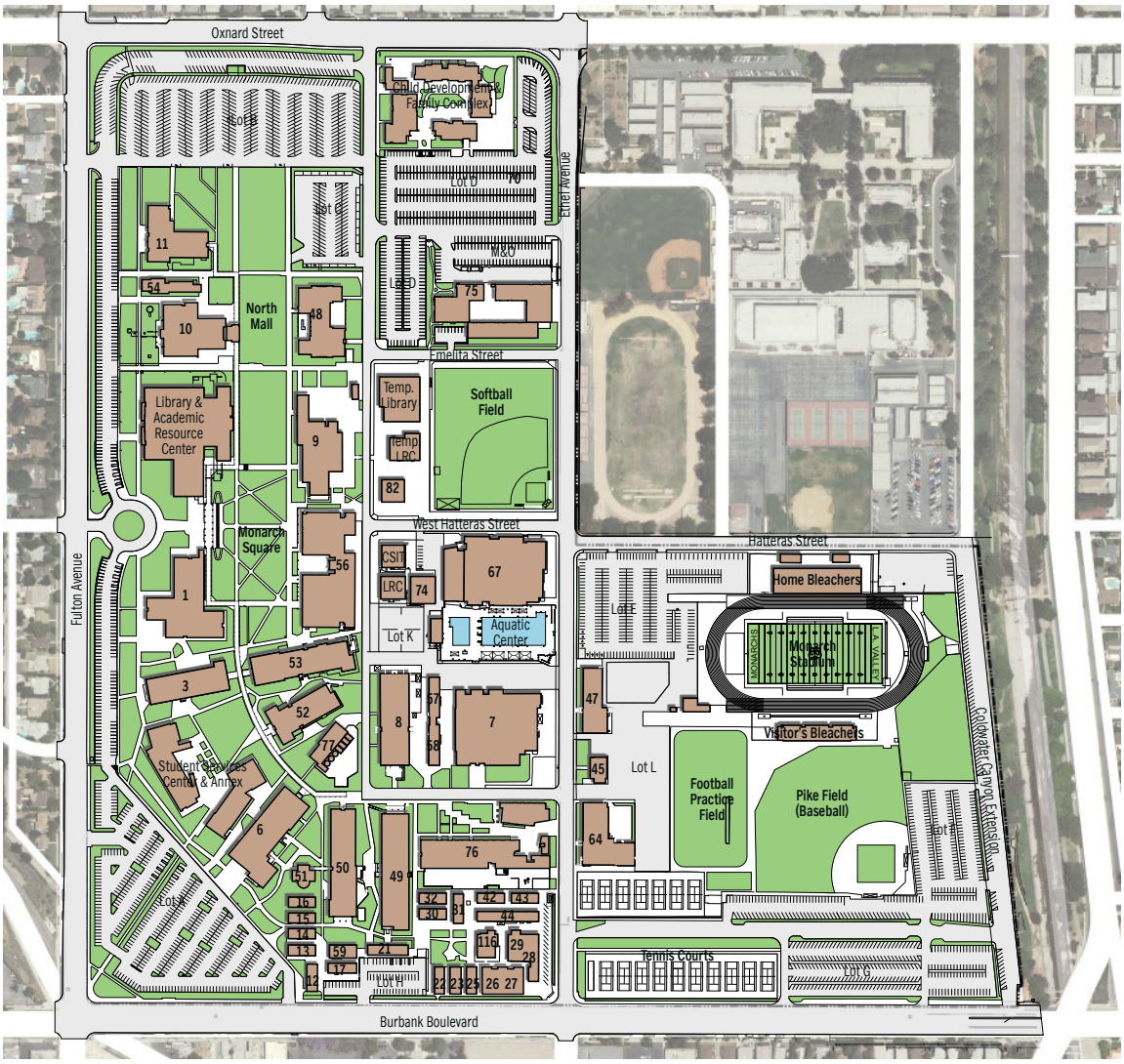
Aerial Views

LAVC Existing Campus Plan

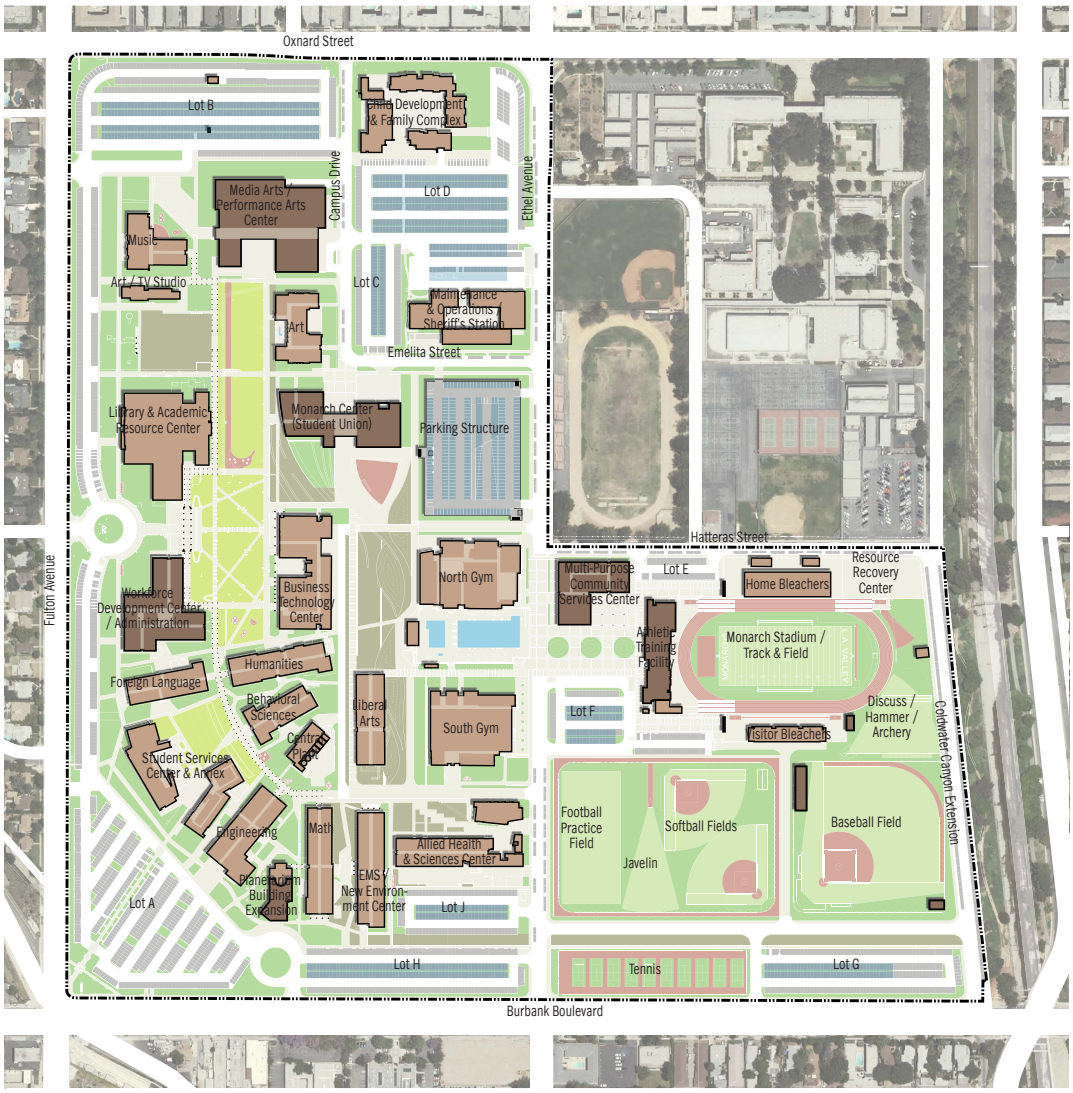


Existing Building

N

	Parking Structure Count Repeater plus lot information
1	Administration
3	Foreign Language
6	Engineering
7	South Gym
8	Life Science
9	Cafeteria
10	Theater Arts
11	Music
12	Bungalow 1-2
13	Bungalow 4-5
14	Bungalow 7-8
15	Bungalow 9-10
16	Bungalow 13-14
17	Bungalow 15
21	Bungalow 24-25-26
22	Bungalow 30-31
23	Bungalow 32-33
25	Bungalow 35-36
26	Bungalow 37-38
27	Bungalow 39-40
28	Bungalow 41-42
29	Bungalow 43-44
30	Bungalow 45-46-47
31	Bungalow 48-49
32	Bungalow 50-51-52
42	Bungalow 70-71
43	Bungalow 72-73
44	Bungalow 74-75-76
45	Bungalow 78
47	Field House
48	Art
49	Business - Journalism
50	Math - Science
51	Planetarium
52	Behavioral Science
53	Humanities
54	Motion Picture
56	Campus Center
57	Bungalow 83-84-85
58	Bungalow 80-81-82
59	Bungalow 11-12
61	Bungalow 76
62	Bungalow 77
64	Gymnastic Center
67	North Gym
70	Child Development Center
74	Financial Aid
75	M&O - Sheriff
76	Allied Health & Science Center
77	Central Power Plant
82	Business Office
116	Coffee House

2010 Master Plan Update - Horizon 1

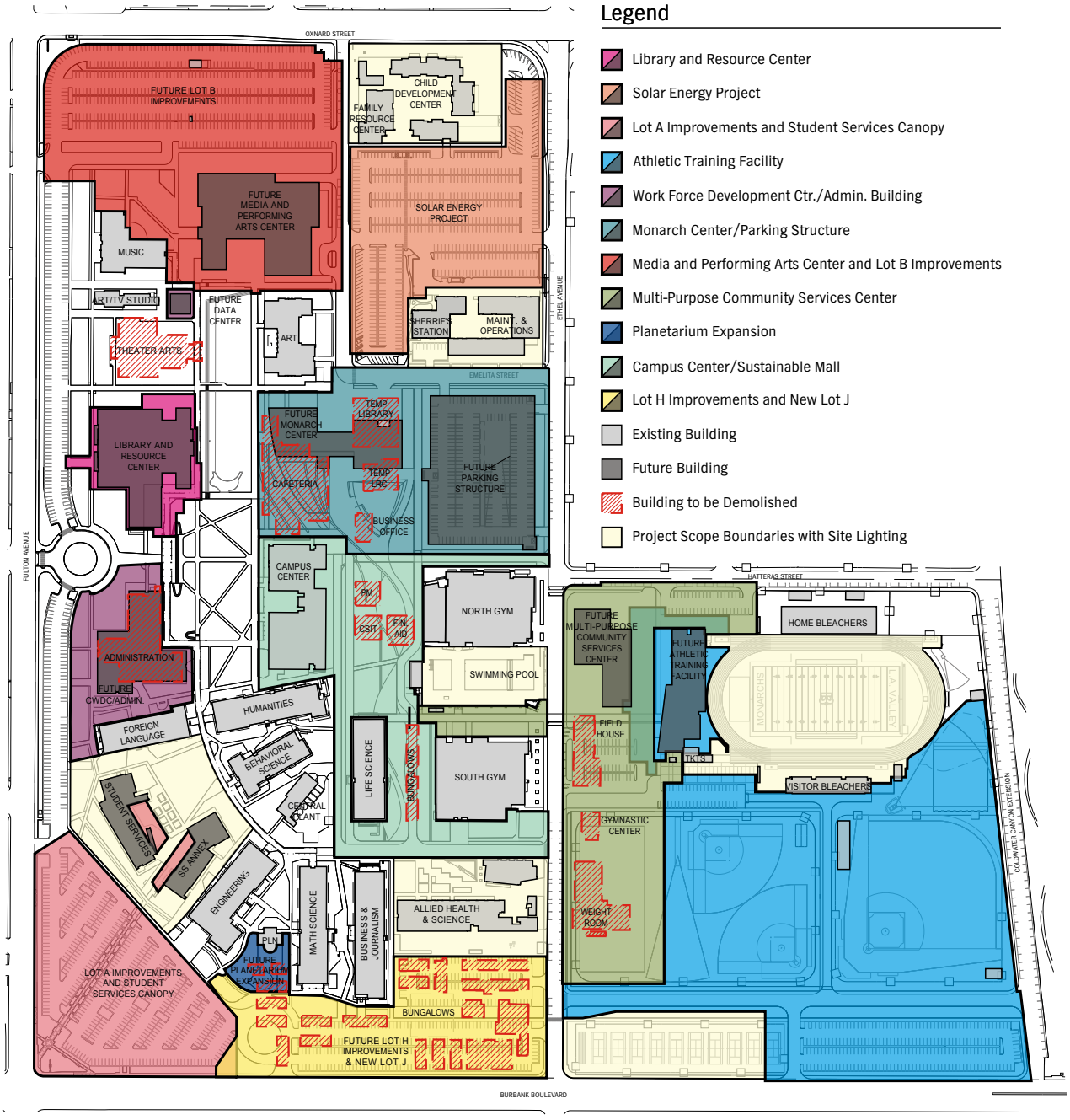


Existing Building

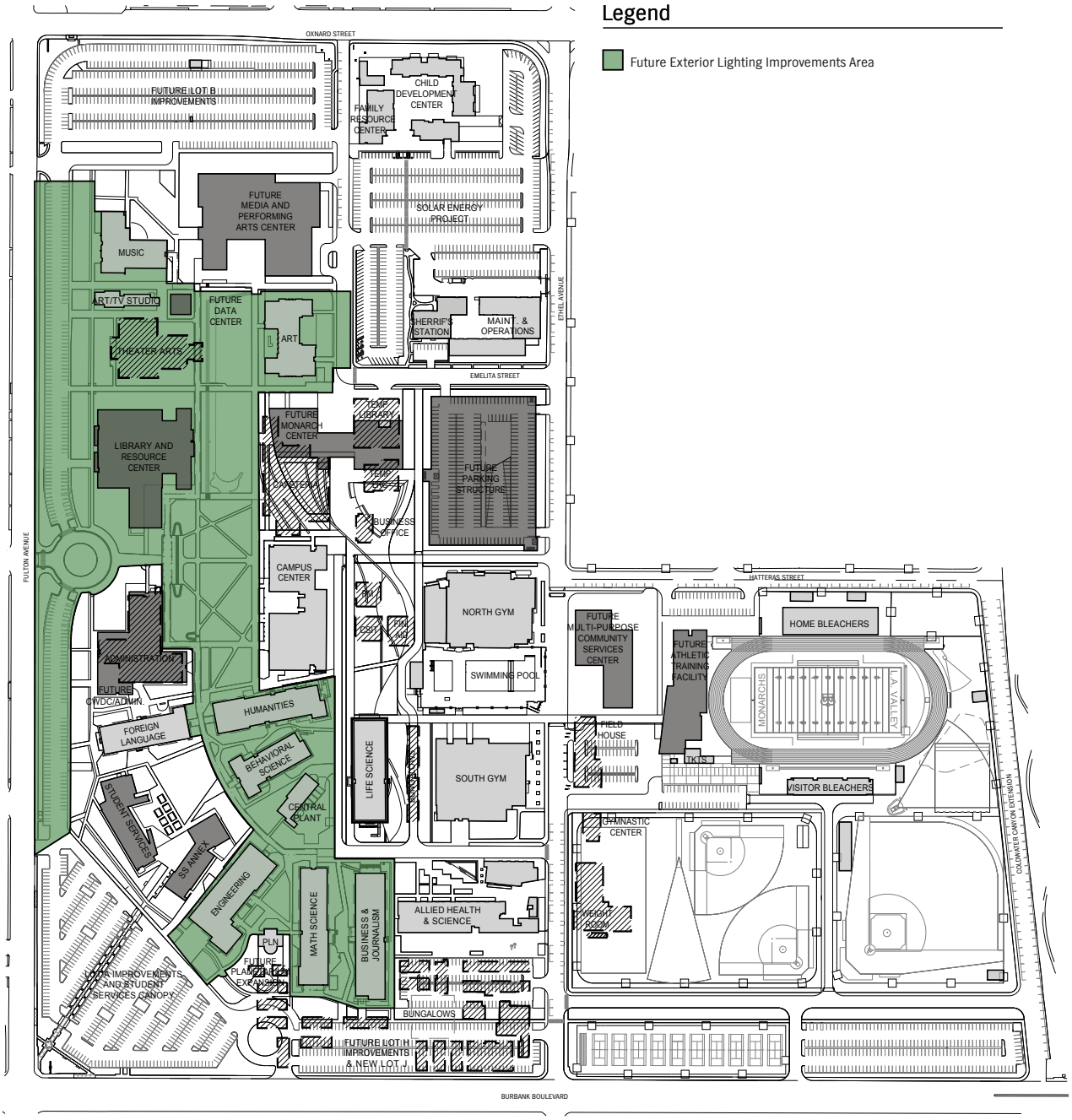
Proposed Building

N

LAVC Project Boundary Plan



LAVC Project Boundary Plan



This project boundary plan identifies areas that will require upgrades to improve deficient lighting levels identified in the Existing Exterior Lighting report. For details, refer to Existing Exterior Lighting Level plans under the appendix section in this document.

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2 | Goals

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Project Goals

Comfort

Comfortable outdoor lighting cannot be defined by a single element, but must be addressed with many physical and emotional factors. Color of light, uniformity of the light, the lighting of surrounding areas and the amount of direct glare all play a role in making a space comfortable or not. The campus lighting, both pedestrian and vehicular, should be designed to be as comfortable as possible.

Below are lighting strategies to help create a comfortable environment.

Uniform illumination:

Uniform light levels (maximum illumination level-to-minimum illumination level ratio) provide users with pathways that are evenly illuminated preventing visual discomfort, glare and strain.

Minimize Glare:

A major source of visual discomfort comes from glare. Four factors contribute to the perception of glare: Luminance of the glare source, size of the glare source, position of the glare source in the field of view and the luminance of the background. By using properly designed luminaires and strategically placing them, glare can easily be reduced.

High Color Rendering Lamps:

By utilizing high color rendering lamps users will be able to identify people and objects with higher fidelity and better accuracy therefore heightening their sense of comfort and safety.

Safety

Lighting is obviously the most visible form of security after dark. Properly designed lighting is what gives people the sense of safety.

Below are lighting strategies to help create a safe campus environment.

Uniform Illumination:

Uniform light levels (maximum-to-minimum ratio) provide users with pathways that are evenly illuminated preventing visual discomfort, glare and strain while providing a clear sense of the surroundings.

Facial Recognition:

Vertical illuminance levels play a major role in facial recognition not only for humans but also for video surveillance. Being able to identify someone from afar directly contributes to a sense of safety.

Evacuation Areas:

Provide emergency back-up lighting for the designated evacuation areas. Evacuating users is vital for campus safety.

Landscape Lighting:

Providing subtle illumination in landscaped areas near walkways eliminates dark areas or pockets that contribute to a sense of insecurity. Providing illuminance in the surrounding areas also reduces glare because the luminance of the background is higher.

Sustainability

Green, efficient, sustainable or environmentally friendly all fall under the same design principle - Reduce the use of resources and use them as effectively as possible.

Efficient Sources:

The newest applicable technology in the form of lamp developments and technology should be an automatic part of every design. This includes the use of high color rendering ceramic metal halides and fluorescent, LEDs, solar lighting, energy saving ballasts and dynamic control systems.

Minimize/eliminate Light Trespass:

By using efficient and responsibly designed lighting fixtures, light can be directed where it is needed and blocked where it is unwanted. This refers to both side to side light but also light that is projected above the horizon. In most cases uplight is wasted light and only contributes to a brighter night sky.

Retrofitting Where Possible:

Re-using existing power locations and poles reduces the amount of labor involved in installing a new fixture as well as the cost of adding a new pole.

Operating Costs:

Reducing operational costs is a priority for the College including the amount of maintenance required. By selecting efficient sources and lamps the operational costs are reduced as maintenance teams need fewer visits to each fixture.

LEED - Light Pollution Reduction

INTENT

To minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.

LZ3:MEDIUM

Design exterior lighting so that all site and building-mounted luminaries produce a maximum initial luminance value no greater than 0.20 horizontal and vertical foot-candles at the site boundary and no greater than 0.01 horizontal foot-candles 15 feet beyond the site. No more than 5% of the total initial designed fixture lumens (sum total of all fixtures on site) shall be emitted at an angle of 90 degrees or higher from nadir (straight down)

Design interior lighting to maintain the majority of direct beam illumination within the building. To accomplish this, project teams should strive to locate interior lighting fixtures in such a way that the direct beam illumination produced by the interior luminaires intersects solid opaque building surfaces, preventing light spill through transparent and translucent surfaces to exterior areas.

Efficiency

A similar term to sustainability, efficiency focuses on the ability of the lamp, and the design to function at its best with minimal waste in energy. In lighting terms this means having and using requisite knowledge, skill, and industry to compile the most energy efficient design possible.

Low Wattage:

Reduced wattage lamps with high output sources combined with efficient reflectors/lenses will ultimately increase the light levels and reduce the energy used.

High Output - Lumens per Watt:

Using the newest technology with the highest efficacy (lumens per Watt) lamps ensures an energy efficient lighting system.

New Technology - LED, Solar, etc:

Exploring brand new technology may have a higher initial cost but may save over the life of the project. New technologies my reduce installation cost, reduce the number of fixtures needed to produce the required light and reduce overall energy usage.

Design Efficiencies:

Properly spacing fixtures (height of poles and plan spacing), using the correct reflectors, and coordinating with other design disciplines (landscape and architecture) all contribute to using fewer fixtures and less wattage while still achieving all of the design goals.

Maintainability

Maintaining lighting fixtures can become a hassle and a large investment of money, time and resources. By consciously designing fixtures that reduce the amount of overall maintenance the campus can save time and money.

Minimize Lamp Types and Wattages:

By reducing the amount of lamp types and wattage types maintenance teams can stock less equipment and more easily maintain campus fixtures

Sealed Fixtures:

When fully sealed fixtures are in use, dust and insects cannot infiltrate the lighting fixtures; this minimizes the need to dismantle and clean fixtures as often.

High Quality Finishes:

Providing fixtures with corrosion-resistant finishes and tamper-proof accessibility reduces rust and vandalism and therefore reducing maintenance.

Accessibility of Fixtures:

Placing fixtures in accessible locations allows time-efficient service and relamping.

Central Lighting Control:

All exterior lights will be connected to the centralized, campus-wide, exterior lighting control system which facilities efficient lighting schedule management. The centralized system fosters master control based on astronomical time clocks, which dynamically monitor all exterior light fixtures and notify staff when lamps are out.

Proper Pole Bases:

All light poles and bollards shall have a footing that extends 4” above grade to provide protection from landscape maintenance.

Campus Identity

Establishing a presence can be developed through a combination of elements, including landscaping, lighting, and signage.

A campus identity begins to subtly shape all visitor's perceptions about the campus and is an important part of creating a clear image of Los Angeles Valley College. As the campus grows, its environment will be enhanced through the implementation of a consistent lighting program.

Consistent Campus-Wide Scheme:

For users to identify the campus as a whole typical fixtures, typical pole heights, and standardized lamps throughout provide a concise consistent look, not only during the night but also during the day.

Light Level Hierarchy:

By establishing and emphasizing types of areas with light, people tend to use light and lighted features as way finding elements. Listed below are areas, in order of perceived brightness, that should be studied and designed together to create a structured and organized design.

- Athletic Facilities
- Drop-off Areas
- Roadways and Parking Lots
- Pedestrian Pathways
- Signage / Monuments
- Specialty Areas - Observatory
- Building Specific Landscape Areas

Beyond the areas listed above design teams should study hierarchy of individual buildings and decide how the lighting will fit into the overall campus design.

3 | Existing Lighting

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Existing Lighting

Campus Findings and Current Lighting Deficiencies

A variety of exterior light fixtures equipped with a wide range of lamp sources currently illuminate the walkways, roadways, and building exteriors of LAVC. High pressure sodium lamps in either cobra head or shoe box fixtures are typically used for lighting roadways and parking lots. High pressure sodium metal halide and fluorescent lamps are utilized in fixtures at building exteriors and pathways.

Although many areas meet or exceed the light levels currently recommended by the Illuminating Engineering Society (IES), there are numerous areas on campus where light levels fall below these recommended levels. Some of the contributing factors for the inconsistent exterior lighting throughout the campus are:

Inconsistent lighting (light levels and ratios):

- Previous site survey measured lighting levels ranging from 0.01fc and 30.0fc.
- Previous site survey measured uniformity ratios of 3,000:1 - far exceeding the recommended IESNA levels

Inconsistent lamping

- Several different wattages of the same lamp in different fixtures (50, 70 and 100W metal halide lamp)
- High pressure sodium, ceramic metal halide, standard metal halide, compact fluorescent and LED fixtures all lighting the same type of area creates inconsistent colors for consistent areas

Inconsistent fixture types

- No campus standard for pedestrian poles, parking poles, wall mounted fixtures and ceiling mounted fixtures

Insufficient lighting in many areas

- Many areas with deficient light levels throughout
- Dark landscaped areas create areas that feel unsafe

Obsolete technology and inefficient fixtures used:

- Incandescent, Halogen and compact fluorescent fixtures with dated reflectors provide little to no light but still use a substantial amount of power.

Exterior Lighting Control:

- Not all exterior lights are controlled by a centralized lighting system.

Incorrect Spacing and Pole Heights

Pedestrian walkway poles are mounted too low (10-12 feet) and are spaced too closely creating large and unwanted uniformity ratios. This also reduces the beneficial spill light onto the surrounding landscaped areas.

Inefficient and Polluting Light Fixtures

Throughout the currently designed campus there are several wall mounted and pole mounted fixtures that direct light above the horizon. This not only causes glare but also wastes energy by not directing that light to the ground.

Improperly Trimmed Landscape

Currently, trees are not trimmed to allow proper light distribution from pole fixtures. Overgrowth causes shadows and non-uniform light levels.

Campus Exterior Lighting Control System

An overall exterior lighting control system has recently been installed, but further expansion is needed for new projects and other exterior lighting zones. The graphics portion of the lighting control software will need to be updated as additions are made.

Athletic Facility Lighting

Lighting fields while they are in use is important but continually running light fixtures while not in use wastes energy and creates unwanted glare. Sports fixtures should be properly shielded to minimize the amount of spill light onto the surrounding areas.

In many cases areas were over illuminated and over illuminated while not in use. Most of the athletic facilities were at competition brightnesses while not in use or during practices.

Proper Tree Maintenance

Existing and overgrown trees block pedestrian and roadway light fixtures and create unwanted dark spots. Trees should be trimmed to 15 feet at pedestrian walkways and 20 feet for parking and roadway areas to eliminate the chance of overgrowth and blockage of light.

Over Lighting

While some areas of the campus are under lit, some areas uses fixtures such as floodlights which causes glare and an overlighting of areas. The contrast of lighting and dark pockets creates a feeling of discomfort and strain.

Planetarium Lighting

General lighting for the planetarium area uses wall mounted floodlights that project light above the horizon and cause glare into the optical instruments. To prevent this shields have been placed on the fixtures rendering them nearly useless.

Assorted Campus Light Fixtures

Each of the below existing campus fixtures are either out of date, has an outdated lamp or reflector system, is not dark sky compliant and does not fit into the campus standard. These fixtures are typical throughout the campus and should be removed and/or replaced. The numbered keynote found below the images refer to the Existing Lighting Fixture Schedule located under the Existing Lighting Level Plans in the Appendix.

EXISTING LIGHTING FIXTURE PHOTOS BY TYPE

See EXTERIOR LIGHTING STUDY in Section 6 _ Appendix for locations of the fixture types above.

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4 | Recommendations

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General Lighting Criteria

Based on the IESNA (Illuminating Engineering Society of North America) Los Angeles Valley College is defined as an LZ3 with Medium Activity Levels. These definitions are used to determine recommended lighting levels for all areas defined within this section.

Defined LIghting Zone

Nighttime Outdoor Lighting Zone Definition

MODERATELY HIGH AMBIENT LIGHTING

Areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security and/or convenience and it is often uniform and/or continuous. After curfew, lighting may be extinguished or reduced in most areas as activity levels decline.

Defined Activity Zone

Indoor and Nighttime Outdoor Activity Level Definitions

MEDIUM

Areas with relatively moderate volumes of pedestrians and vehicles or solely people during dark hours. Activity level is relative to a locale's population, density of related applications, and general expected norms across the community. Typified by some amount of constant activity over extended periods. Outdoor facilities typical of small-to-moderate population centers.

- Civic and cultural districts
- College campuses
- Libraries
- Office complexes
- Outdoor pools at business hotels and community recreation centers
- Recreation centers
- Residential complexes
- Small shopping areas or centers
- Transit lines
- Urban central and waterfront parks

Lighting Requirements

Lamp Color Temperature

All fixtures throughout the campus should use lamps and systems that are warm white and have a color temperature of 2700K through 3500K

Lamp Color Rendering Index

All lamps/systems should have a color-rendering index of at least 80 and in some cases higher as defined below.

Metal halide - 80 CRI or higher

LED - 85 CRI or higher

Fluorescent - 80 CRI or higher

Lamp Efficacy

All lamps should have an efficacy of at least 40 Lumens/Watt. With this requirement all incandescent, halogen and low-efficient LEDs are prohibited.

Light Distribution

All roadway and pedestrian light poles are to have at least a Cutoff classification defined as:

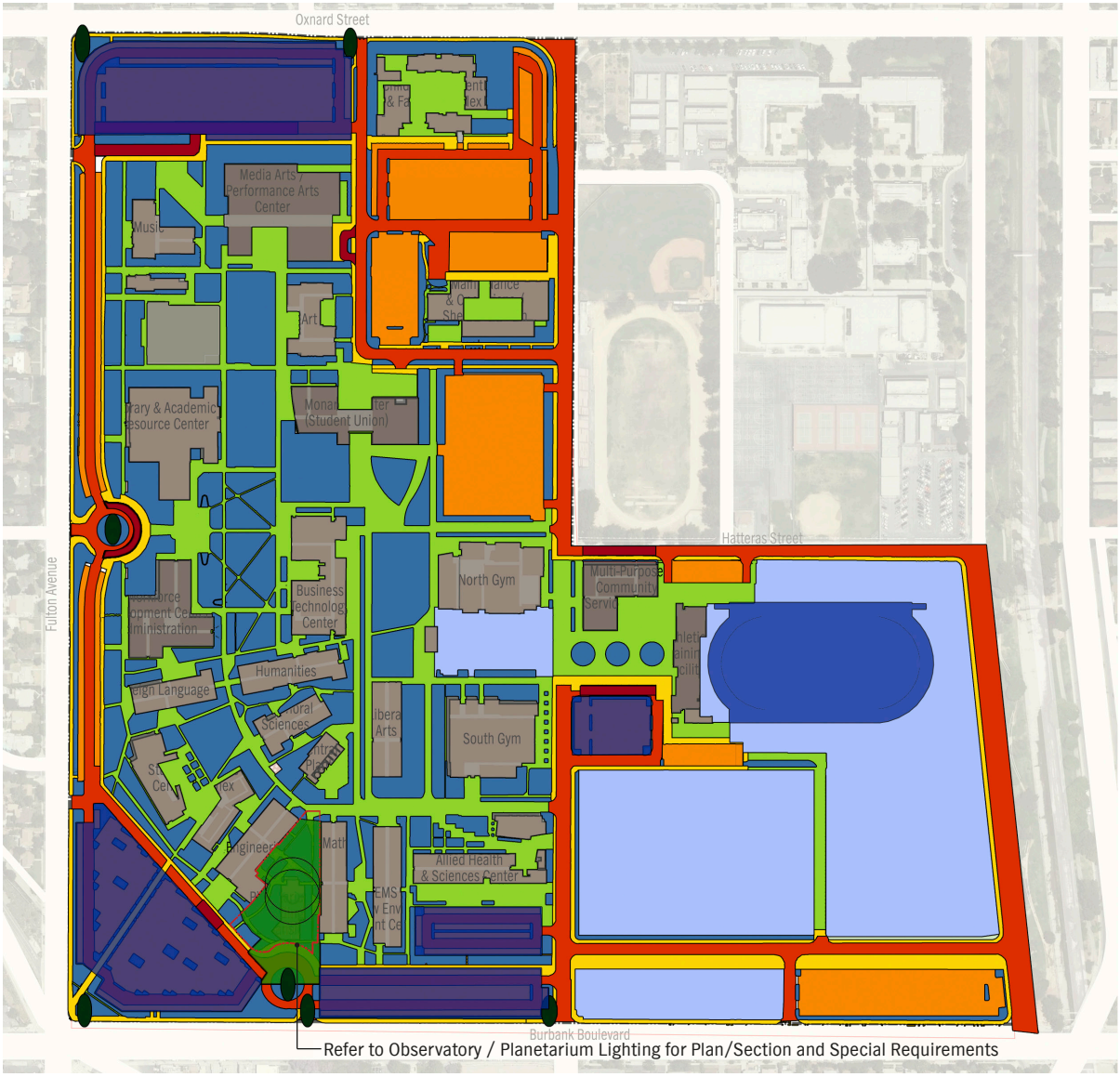
Intensity at or above 90° (horizontal) no more than 2.5% of lamp lumens, and no more than 10% of lamp lumens at or above 80°.

All wall mounted external lights are to have a full cutoff classification defined as:

Zero intensity at or above horizontal (90° above nadir) and limited to a value not exceeding 10% of lamp lumens at or above 80°.

Zoning Plan

- DROP-OFFS
- ROADWAYS
- PARKING AREAS / BUS LOADING & UNLOADING
- PEDESTRIAN WALKWAYS (ROAD ADJACENT)
- PEDESTRIAN WALKWAYS (NON-ROAD ADJACENT)
- OBSERVATORY
- MONUMENTS/SIGNAGE
- ATHLETIC FACILITIES
- LANDSCAPED AREAS
- EVACUATION/ PARKING AREAS



Drop-off Lighting

LIGHT LEVELS

Horizontal illuminance: 0.5fc minimum, 1.0fc average
Vertical illuminance: 0.4fc

UNIFORMITY RATIOS

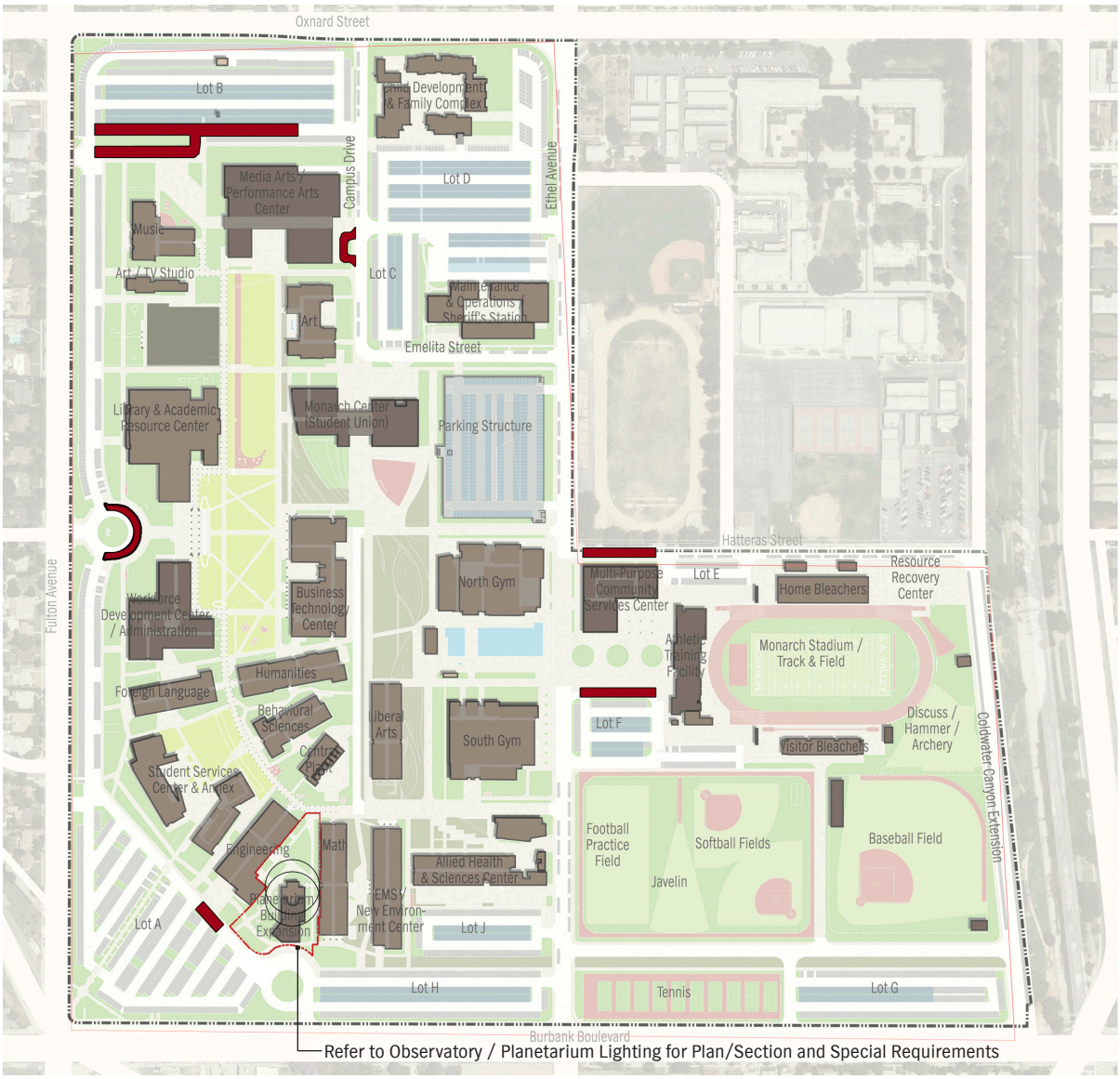
Avg/Min = 3:1

FIXTURE REQUIREMENTS

Pole heights of 12-18 feet are recommended to produce the most efficient system as possible
Fixture should have semi-cutoff light distributions to reduce glare and light trespass but allow for some decorative elements to add to the drop-off focal point

SPECIAL NOTES

Drop-off adjacent to Observatory should meet the requirements set for the observatory lighting zone.
Lower full cutoff poles are recommended within the observatory lighting zone.



Roadway Lighting

LIGHT LEVELS

Horizontal illuminance: 0.5fc minimum, 0.6 - 1.0fc average

Vertical illuminance: 0.1 - 0.25fc average

UNIFORMITY RATIOS

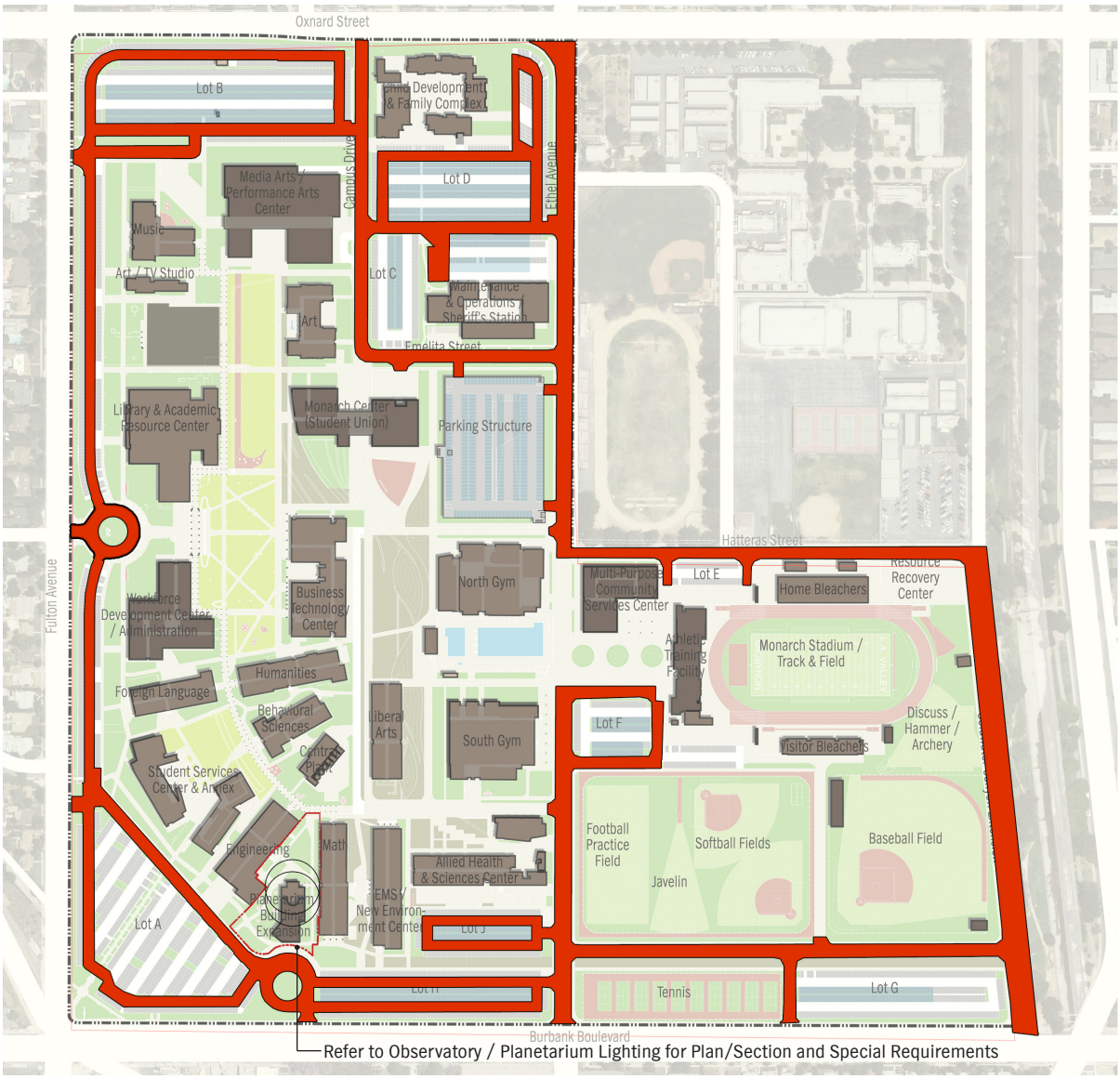
Avg/Min = 10:1

FIXTURE REQUIREMENTS

Pole heights of 20-25 feet are recommended to produce the most efficient system as possible

Use of Type II or Type III distribution reflectors is recommended for roadways to spread the light more horizontally. This increases the distance between poles, reducing wattage, cost and maintenance.

Fixture should have full cutoff light distributions to reduce glare and light trespass.



Parking Lot Lighting

LIGHT LEVELS

Horizontal illuminance: 0.5fc minimum, 0.6 - 1.0fc average

Vertical illuminance: 0.1 - 0.25fc average

UNIFORMITY RATIOS

Avg/Min = 5:1

FIXTURE REQUIREMENTS

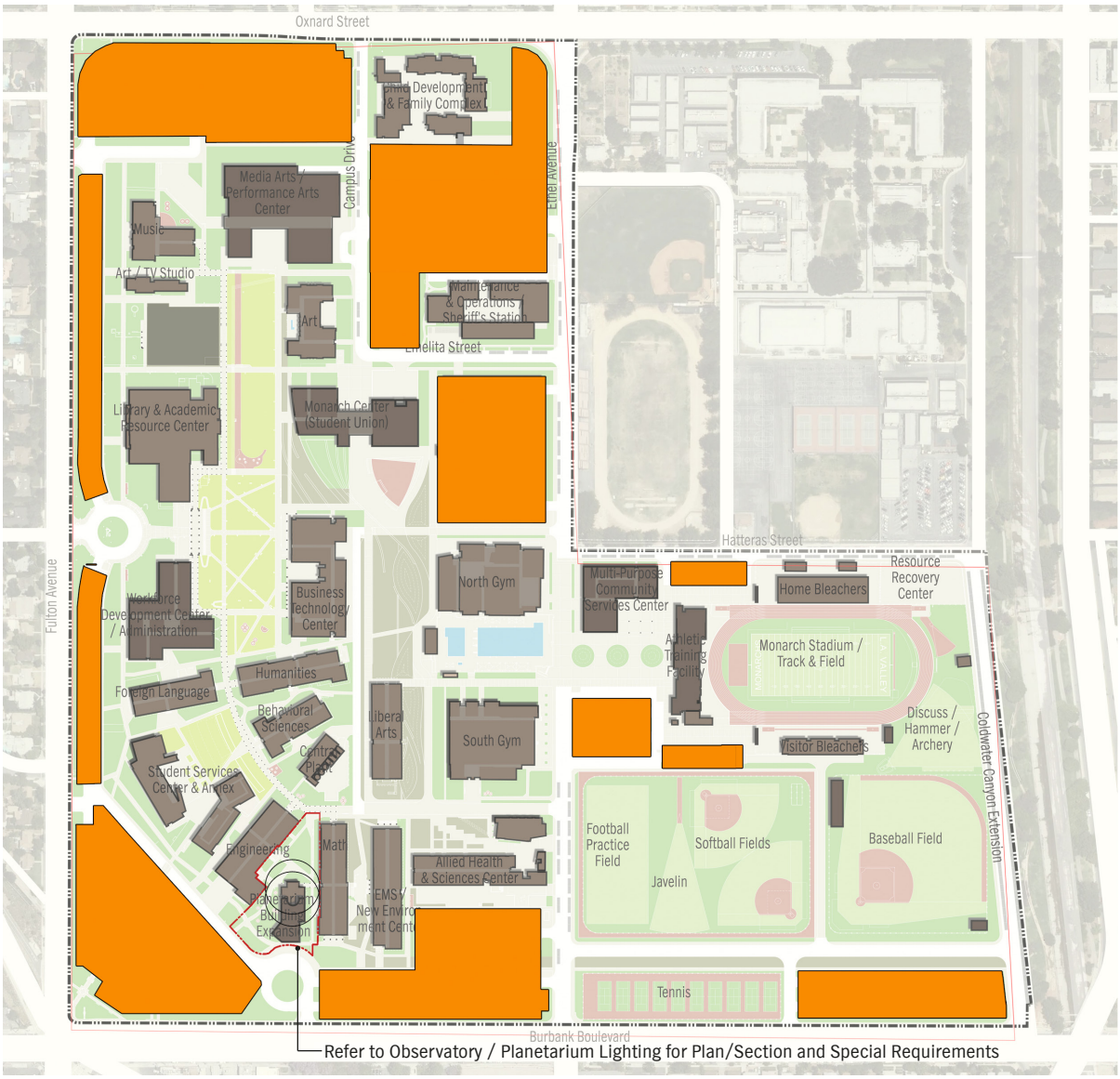
Pole heights of 20-25 feet are recommended to produce the most efficient system as possible

Use of Type II or Type V distribution reflectors is recommended for parking lots to spread the light evenly and uniformly. This increases the distance between poles, reducing wattage, cost and maintenance.

Fixture should have full cutoff light distributions to reduce glare and light trespass.

CONTROLS

Motion sensors could be utilized to reduce wattage consumption by reducing the light levels by 50% in areas where no motion is detected. Once motion is detected the lights would then go to full brightness..



Walkway Lighting (Roadside)

LIGHT LEVELS

Horizontal illuminance: 0.6fc minimum, 0.75 - 1.0fc average

Vertical illuminance: 0.2fc average

UNIFORMITY RATIOS

Avg/Min = 5:1

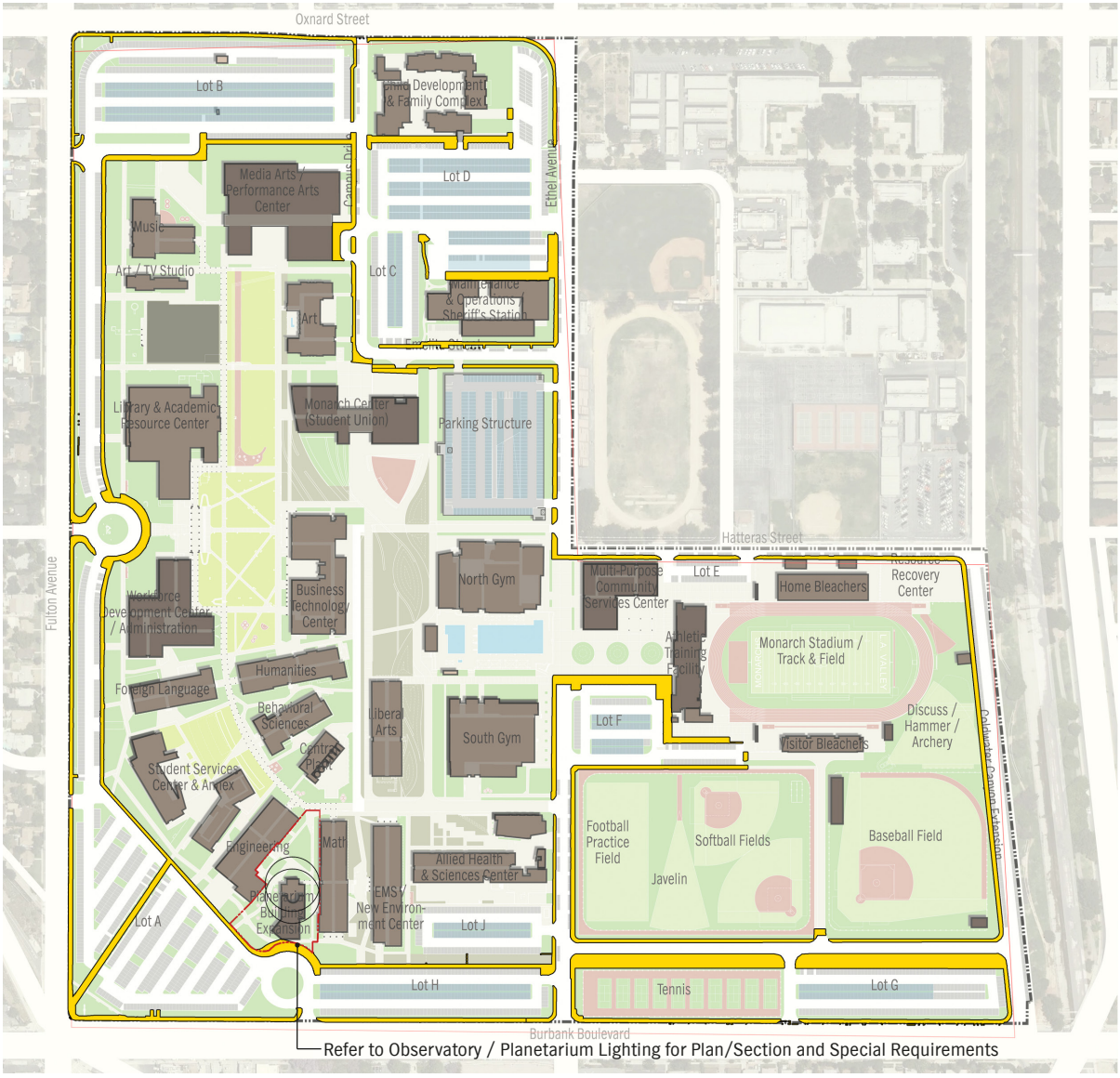
FIXTURE REQUIREMENTS

Pole heights of 15-18 feet are recommended to produce the most efficient system as possible

Use of Type II or Type III distribution reflectors are recommended for walkways to spread the light more horizontally. This increases the distance between poles reducing wattage, cost and maintenance. Fixture should have full cutoff light distributions to reduce glare and light trespass.

CONTROLS

Fixtures should be tied to the central control system and be turned off after hours.



Walkway Lighting (Non-Roadside)

LIGHT LEVELS

Horizontal illuminance: 0.5fc minimum, 0.6 - 0.75fc average

Vertical illuminance: 0.1 - 0.2fc average

UNIFORMITY RATIOS

Avg/Min = 10:1

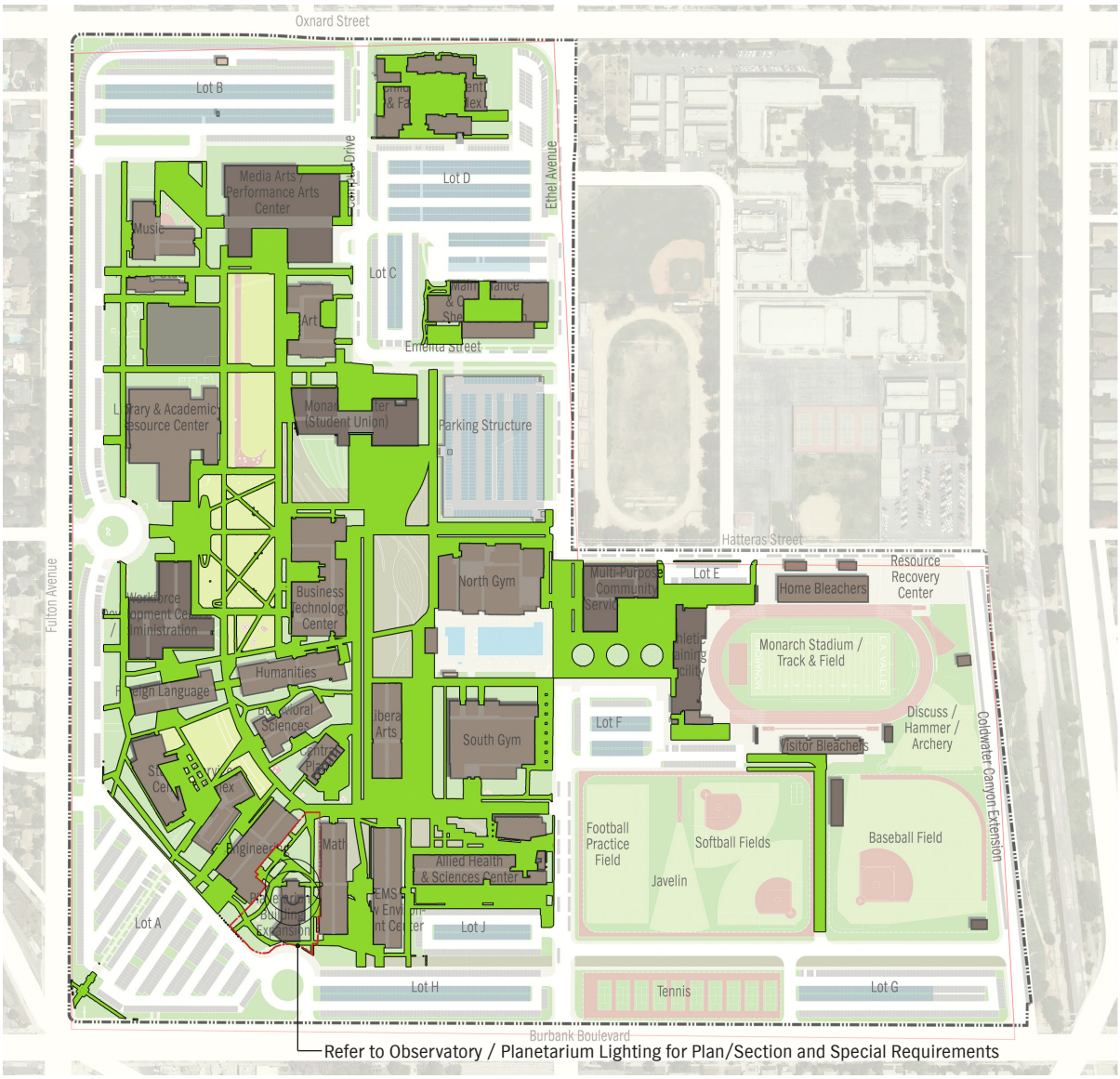
FIXTURE REQUIREMENTS

Pole heights of 15-18 feet are recommended to produce the most efficient system as possible

Use of Type II or Type III distribution reflectors are recommended for walkways to spread the light more horizontally. This increases the distance between poles reducing wattage, cost and maintenance. Fixture should have full cutoff light distributions to reduce glare and light trespass.

CONTROLS

Fixtures should be tied to the central control system and be turned off after hours.



Observatory / Planetarium Lighting

LIGHT LEVELS

Horizontal illuminance: 0.4fc minimum, 0.5fc average

Vertical illuminance: 0.1fc average

UNIFORMITY RATIOS

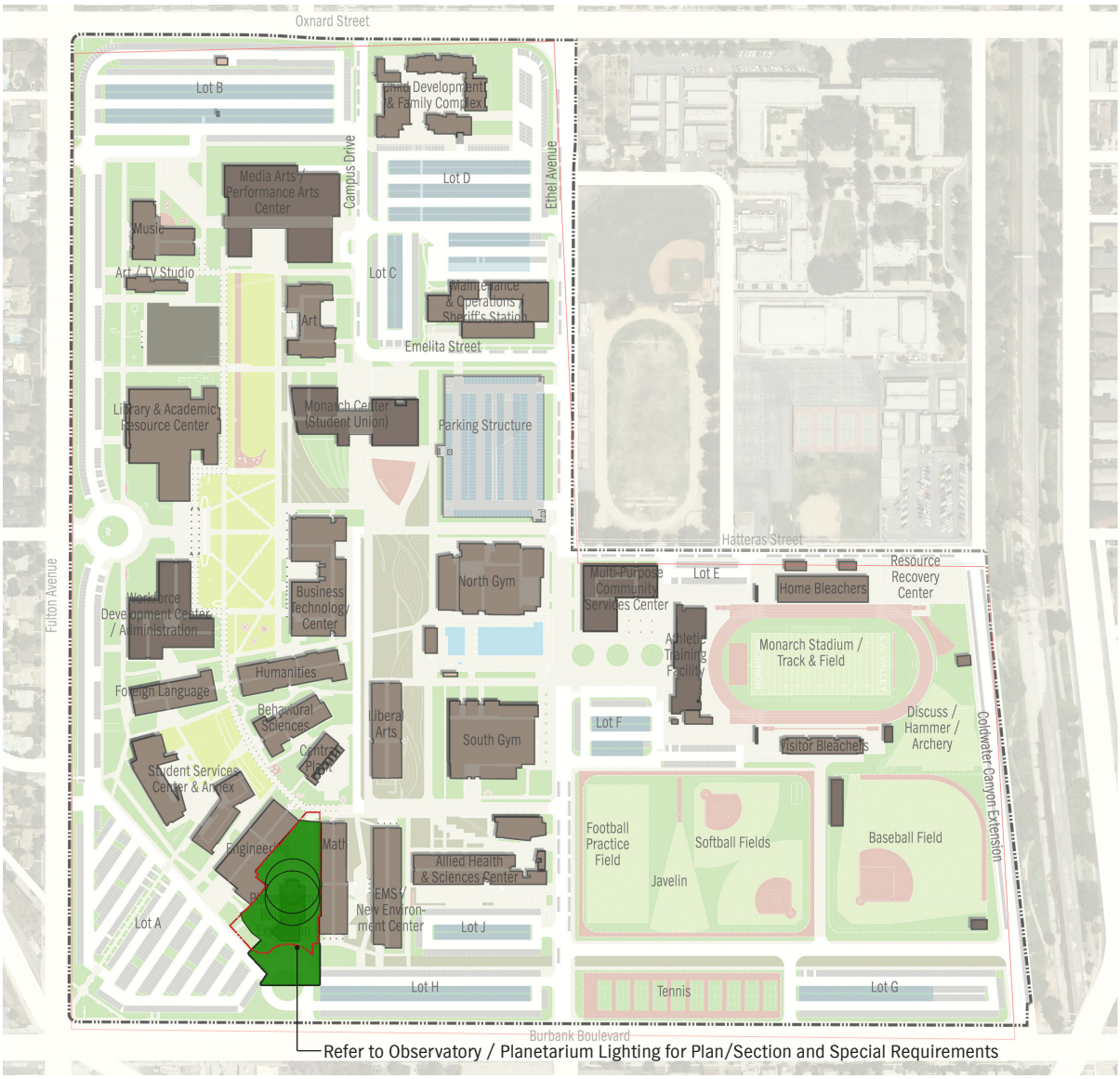
Avg/Min = 10:1

FIXTURE REQUIREMENTS

Pole heights not to exceed 12 feet to eliminate glare onto the 2nd story observation deck.

Full cutoff fixture optics required - Zero intensity at or above horizontal (90 dgree above nadir) and limited to a value not exceeding 10% of lamp lumens at or above 80 degrees.

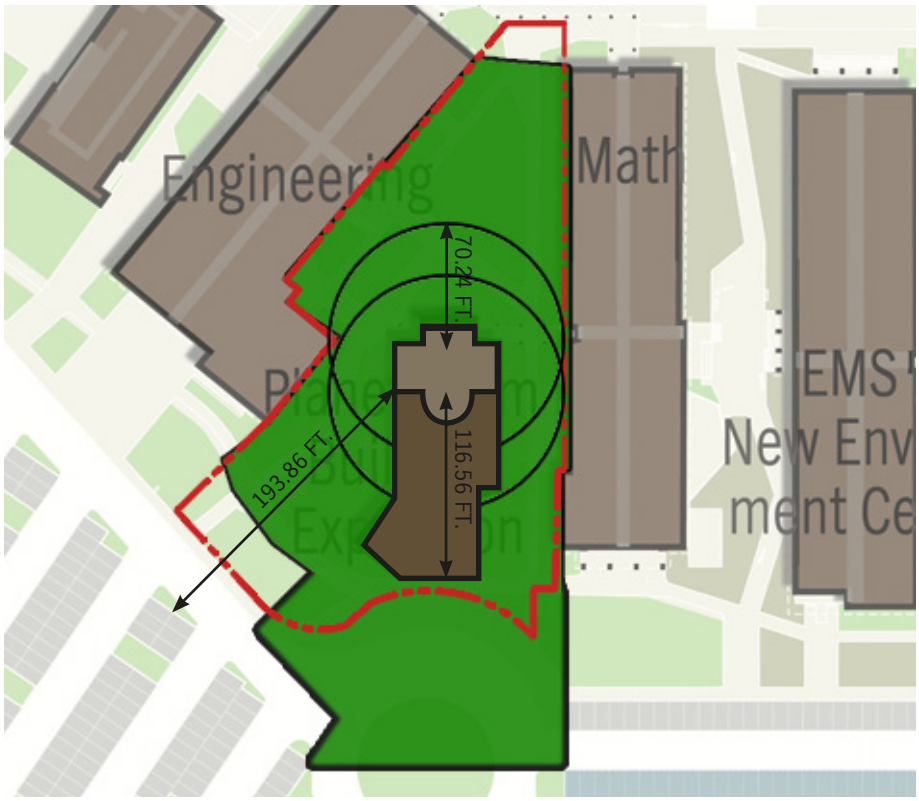
Landscape lighting is not recommended within the area shown below. However, in order to achieve lighting uniformity, dark landscape areas adjacent to walkways may be lit with the use of bollards. No uplighting is permitted.



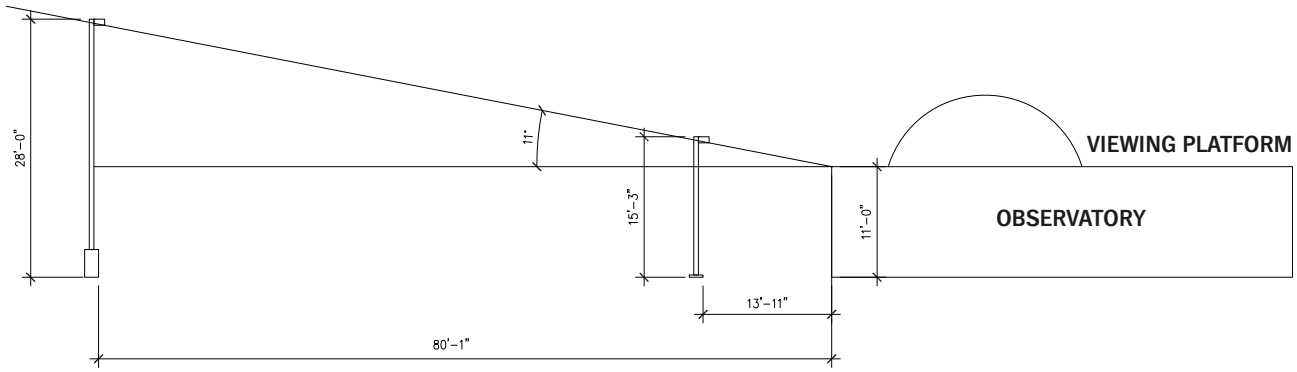
Observatory / Planetarium - Plan

To prevent glare and light trespass which would affect telescopic observations of the sky, no pole mounted or wall mounted fixtures in the green zone highted below are allowed to be above 12’- 0”. All light fixtures within the area below are to have a full cut-off optic preventing light above the horizon.

For the walkways, drop-off, and parking lots adjacent to the Observatory Area refer to the section below showing minimum distances site poles need to be from the observatory building to be higher than the 12’0” requirement outside the Observatory zone.



Observatory / Planetarium - Viewing Section



Monument/Signage Lighting / Public Art

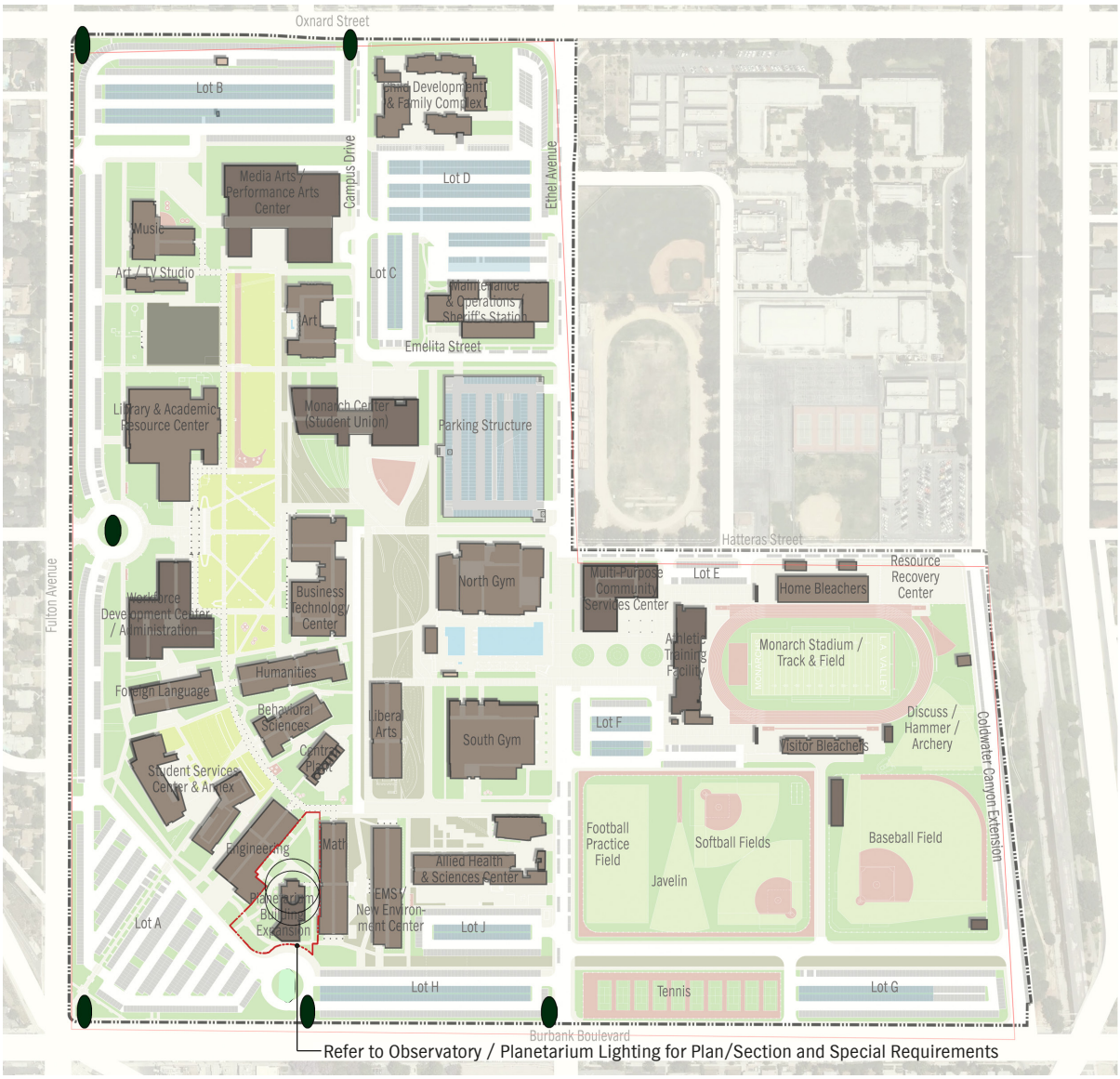
Self illuminated monuments and signage are to be reviewed and approved by the LAVC Building User Group. All other monuments and signage are to follow the following lighting parameters.

FIXTURE REQUIREMENTS

All fixtures with lamps of 50W or higher are required to have full cutoff distribution or better.

Fixtures below 50W can project light upwards but should be properly aimed so that the majority of the light falls upon the signage.

Whenever possible light fixtures should aim downwards to avoid light trespass and glare and should meet the LEED requirements for SS Credit 8: Light Pollution Reduction.



Athletic Facilities

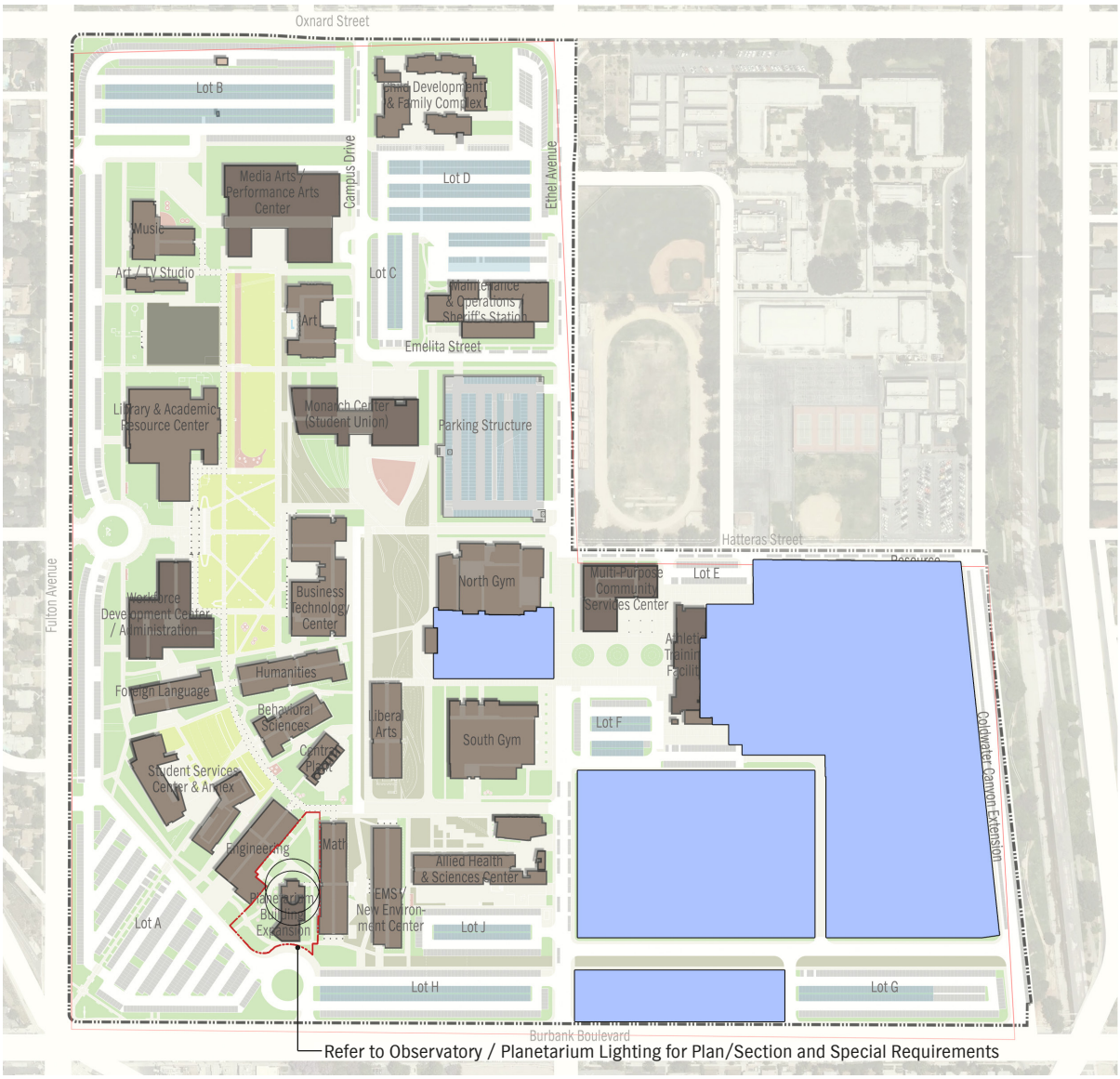
FIXTURE REQUIREMENTS

All fixtures are required to have glare shields to reduce light trespass onto surrounding areas, and full cutoff optics to prevent light from being directed above the horizon.

CONTROLS

Competition, practice and off scenes are to be programmed into the campus wide lighting system to reduce energy consumption and light trespass depending on who is using the facility.

Provide emergency back-up lighting for the designated evacuation areas.



Landscape Lighting

Because visual surroundings play such a pivotal role in creating a safe environment the landscaped areas throughout the campus should be slightly illuminated to enhance the sense of safety. Most of the light onto the landscaped areas will come from spill light emitted from the pedestrian and roadway light poles. In areas where this is not the case low wattage landscape lights or bollards should be used to highlight the landscaped areas.

LIGHT LEVELS

Horizontal illuminance: 0.1 - 0.2fc average

UNIFORMITY RATIOS

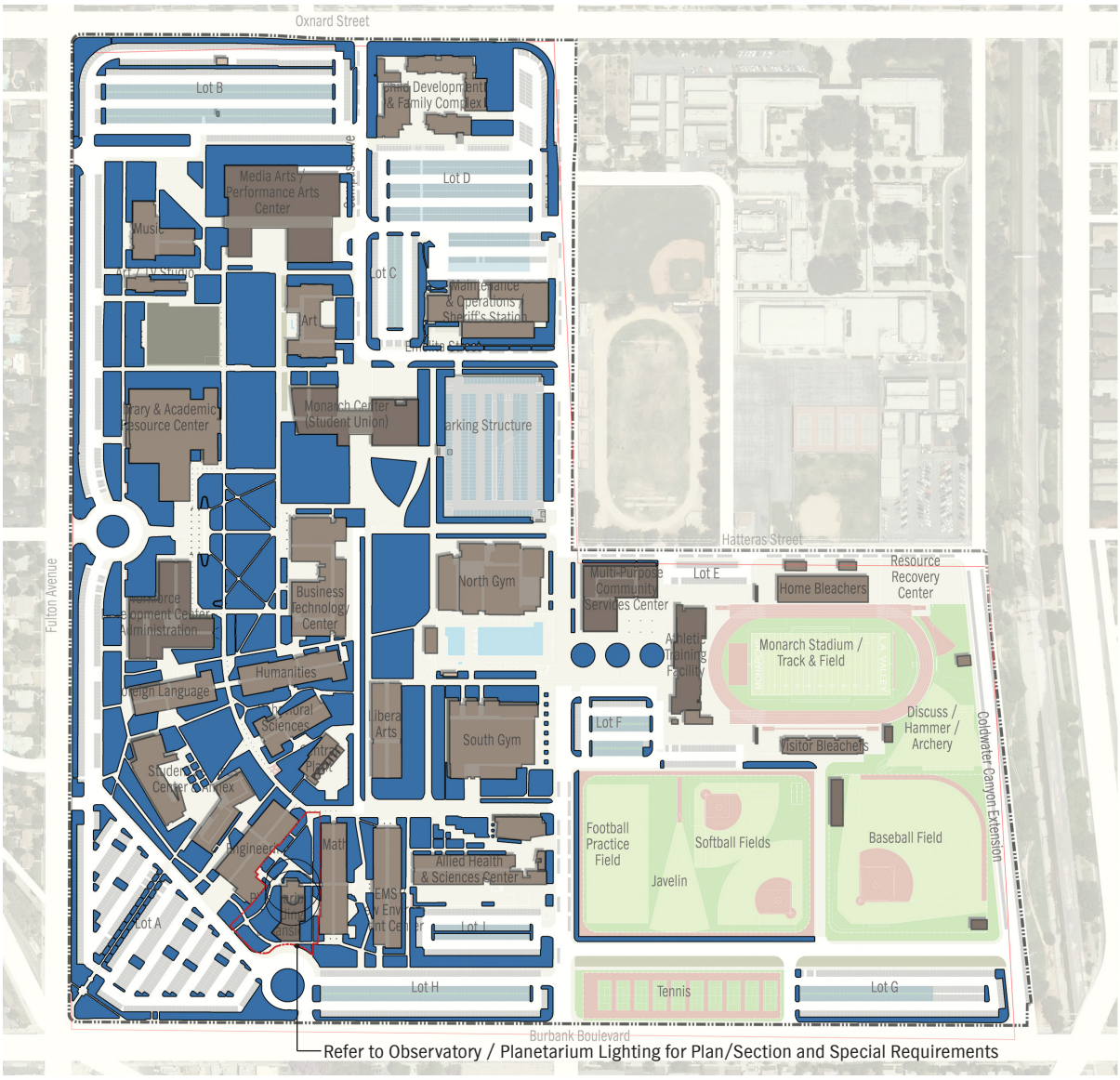
Avg/Min = 20:1

FIXTURE REQUIREMENTS

All fixtures with lamps of 50W or higher are required to have full cutoff distribution or better.

Fixtures below 50W can project light up but should be limited and used only for feature elements and feature trees.

Whenever possible light fixtures should aim downwards to avoid light trespass and glare and should meet the LEED requirements for SS Credit 8: Light Pollution Reduction. The use of landscape uplights are discouraged but should be submitted for review depending on special circumstances.



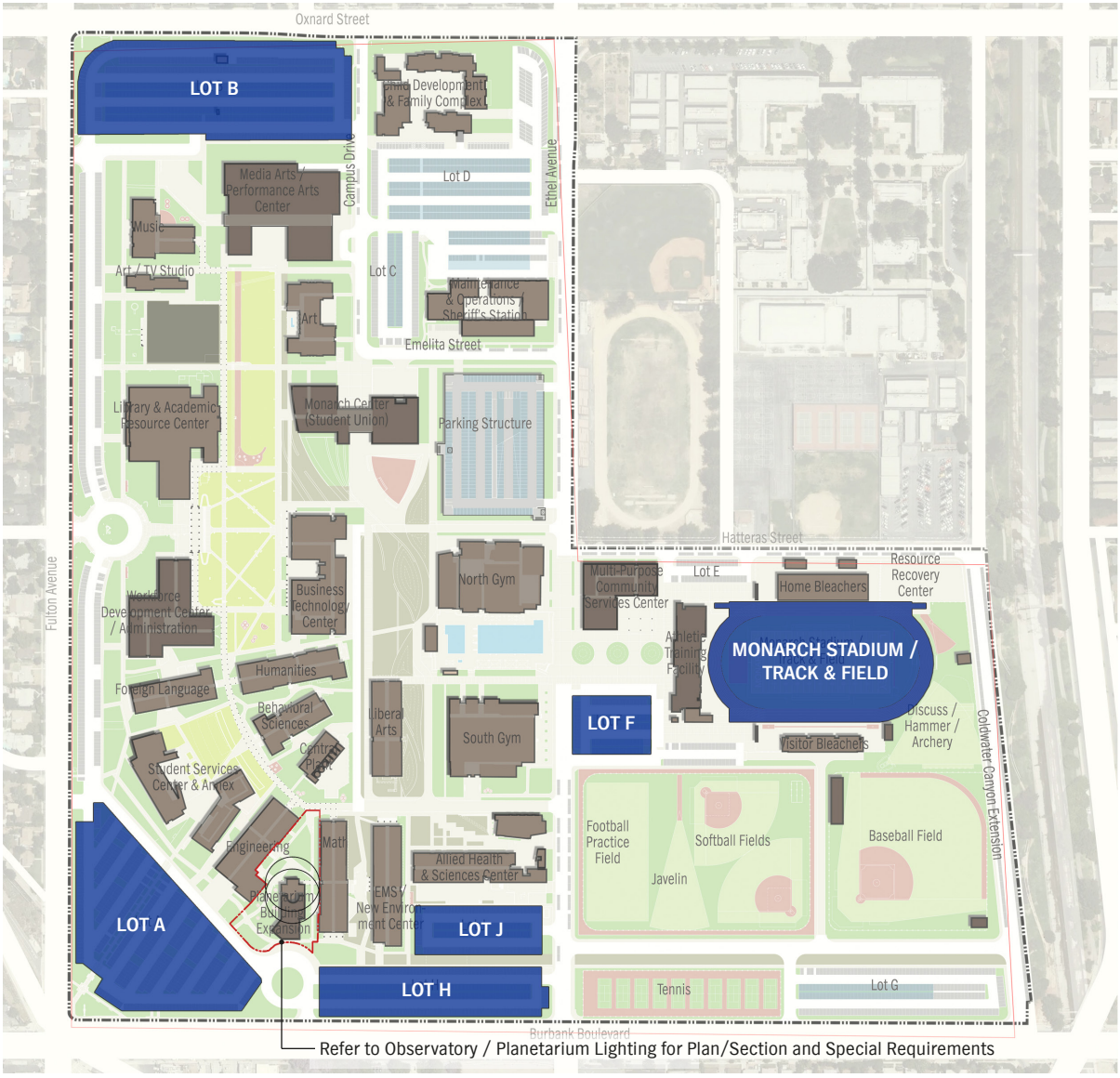
Evacuation/ Parking Area Lighting

The College has identified various areas for evacuation in the event of an emergency such as an earthquake or Fire. The College outlines an Emergency Evacuation Procedure in the Class Schedule published semesterly. Lighting recommendations for these identified areas are as follows:

LIGHT LEVELS

Horizontal illuminance - 0.2fc average

A minimum of 50% of the light fixtures within the defined areas below are to be on backup or battery power and are to provide an average of 0.2fc on the horizontal plane in an emergency situation for a minimum of 90 minutes.



Evacuation Area Recommendations

Basis of Design

The design of the Campus Emergency Evacuation Area Lighting shall be based on the following:

Furnish and install emergency lighting in parking lots that are designated as "Evacuation Areas". Two separate areas in each designated parking lot shall have emergency lighting. During an evacuation event Personnel should proceed to the primary evacuation area, if that area is blocked (cars) then they should proceed to the secondary evacuation area.

Furnish and install emergency lighting system, panels, relays, pullboxes and all electrical apparatus and equipment necessary for a complete and functional lighting distribution system. Provide a .2 foot-candle average cover for a minimum of 90 minutes in the evacuation area supported by a photometric study. A minimum of 50% of the light fixtures in a defined area are to have emergency back up power.

Existing parking lot poles and existing light fixtures shall be used.

Design Criteria

Following design voltages and load calculation criteria shall be followed for the Campus Emergency Evacuation Area Lighting.

- Emergency Lighting Voltages
  - » 480V for lighting
  - » 277V for lighting
  - » 240V for lighting

The latest codes and standards shall be referenced for the electrical design for the proposed Campus Emergency Evacuation Area Lighting.

Basis of Design

Wiring Method

- Perpendicular and Plumb
  - » Run all cables and/or conduits parallel and perpendicular to the structure. Cables and/or conduits run diagonally to the structure are unacceptable.

- Conduit
  - » Minimum conduit size of 3/4 inch when installed above ground, serving contactors, time clocks and other power related items is required.

Support all conduits per current CEC. Allowed length of flex conduit shall be limited to 4 feet or less. Surface mounted conduit is acceptable only in locations where exposed structure is the finished surface; in such cases, locate conduit for minimum visual impact.

» Above ground: rigid conduit, IMC or EMT are acceptable. Rigid conduit is required in outdoor locations and where conduit is exposed to physical damage.

» Underground: Schedule 40 PVC with concrete encasement (red dye on top surface of the duct bank) is required. Use PVC-wrapped or PVC-coated steel elbows for plastic conduit runs and elbows penetrating floor slabs. Minimum underground conduit size shall be 1".

» MC Cable, rigid non-metallic conduits, electrical non-metallic tubing, and screw type fittings are unacceptable.

- Lighting Systems 600V or less
  - » Conductors:
  - » #12 and #10: AWG solid copper
  - » #8 AWG and larger: stranded copper
  - » Minimum conductor size for runs over 100 feet for 120/208V system shall be #10 AWG or larger as per CEC Voltage Drop calculations.

- Lighting
  - » The illumination levels shall conform to the latest edition of Illuminating Engineering Society (IES) guidelines.
  - » Foot-candle levels shall comply with campus energy standards and shall be designed based on user requirements.
  - » Outdoor lighting shall be controlled by a photocell/time clock that interfaces with the lighting control panel.

Monarch Stadium Zone 1

The sports lighting for the Monarch Stadium infield is provided by 4 high mast poles with 1000 watt metal halide lights. Each pole is fed from a circuit breaker in the 480 volt main switchboard located in the electrical room of the Field House south of Hatteras Street. Each circuit breaker serves an exterior transformer mounted on a platform half way up the high mast pole. The transformer serves a lighting panel at the top of the pole just below the lights. Each light is fed from an individual circuit breaker from the lighting panel.

Parking Lot "G" Zone 2

Parking Lot G , the south-east parking lot has Cobra head fixtures with 400 watt HPS lamps mounted 4 to a pole at 240 volts single phase. The 240 volt exterior site lighting panel is located just north of the new tennis courts in Lot G. The lighting control panel that controls the parking lot lights in lot G is located adjacent to the site lighting panel.

Parking Lot "B" Zone 3

Parking Lot B, the north parking lot has Cobra head fixtures with 400 watt HPS lamps mounted 4 to a pole at 277 volts. The 480Y/277v site lighting panel is located in the center of the parking lot and is fed from a 60 amp contactor located in the west utility tunnel under the Music Building. The contactor is controlled be a time clock located on the first floor of the Music Building. There are no controls or control wiring traversing to the site lighting panel.

Parking Lot "A"

Parking Lot "A" the MTA Parking Lot apparently has parking lot fixtures connected to the Student Services Building inverter system.

Parking Lot "F" Future

Future Parking Lot F should be deferred to the Design-Build team of the Multi-Purpose Community Center or the Athletic Field House Building.

Parking Lots "H" & "J" Future

Parking Lot H is located south of the Bungalows and area lighting for the parking lot are mounted to the exterior walls of the Bungalows. The Bungalows are scheduled to be demolished and emergency evacuation area lighting for future parking Lots H and J should be deferred to the Design Builder of the future Planetarium Building Project.

Lighting Controls & Requirements

Lighting Controls

Controls System (Tridium System)

The campus-wide system will be expanded to control all exterior lighting fixtures. The central system includes an astronomic time clock to turn on and off all of the exterior fixtures at dust to dawn respectively. In addition, all exterior lights will be added to the central display screens to easily monitor and control each fixture.

Energy Savings

In addition to the centralized system there are many other ways to reduce energy, reduce maintenance and reduce light trespass throughout the campus. Below is a list of added systems that could be implemented, with certain light sources (LEDs and controlled metal halides).

Part-Night(dimming or bi-level switching)-Lower lighting output to reduce light trespass levels and save energy late at night. User defined but for example - 50% reduction from midnight to dawn during non-operational school hours.

Night trimming - Fine-tuning fixture operation at dusk and dawn decreases run-time.

Occupancy sensing - Increase light output when people or cars, etc. are detected.

Zonal controls - Scheduled lighting reduction output for unoccupied zones. Motion sensors are to be used if cost effective, maintenance friendly and meet all security needs.

Code Requirements

TITLE 24 REQUIREMENTS

Title 24 Section 147- Requirements for Outdoor Lighting. The following requirements applied to this project are cited from 2008 BUILDING ENERGY EFFICIENCY STANDARDS FOR RESIDENTIAL AND NONRESIDENTIAL BUILDINGS, refer to the original document for further details.

This section applies to all outdoor lighting, whether attached to buildings, poles, structures or self supporting, including but not limited to, hardscape areas including parking lots, lighting for building entrances, sales and non-sales canopies; lighting for all outdoor sales areas; and lighting for building facades.

EXCEPTIONS to Section 147: When more than 50 percent of the light from a luminaire falls on one or more of the following applications, the lighting power for that luminaire shall be exempt from Section 147(b):

1. Temporary outdoor lighting.
2. Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
3. Lighting for sports and athletic fields, and children's playground.
4. Lighting of public monuments.
5. Lighting used in or around swimming pools, water features, or other locations subject to Article 680 of California Electrical Code.
6. Landscape lighting.

(a) Outdoor Lighting Power Trade-offs.

Outdoor lighting power trade-offs shall be determined as follows:

1. Allowed lighting power determined according to Section 147(d)1 for general hardscape lighting allowance may be traded to specific applications in Section 147(d)2, provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with Section 147(d)1A.
2. Allowed lighting power determined according to Section 147(d)2 for additional lighting power allowances for specific applications shall not be traded between specific applications, or to hardscape lighting in Section 147(d)1.
3. Allowed lighting power determined according to Section 147(d)3 for additional lighting power allowances for local ordinance shall not be traded to specific applications in Section 147(d)2 or to hardscape areas not covered by the local ordinance.
4. Trading off lighting power allowances between outdoor and indoor areas shall not be permitted.

(b) Outdoor Lighting Power.

An outdoor lighting installation complies with this section if the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under Subsection (d). The allowed outdoor lighting shall be calculated by Lighting Zone as defined in Section 10-114. Local governments may amend lighting zones in compliance with Section 10-114.

(c) Calculation of Actual Lighting Power.

The wattage of outdoor luminaires shall be determined in accordance with Section 130(d).

(d) Calculation of Allowed Lighting Power.

The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section 147(d)1, the sum of the additional lighting power allowance for specific applications determined in accordance with Section 147(d)2, and the sum of

the additional lighting power allowances for local ordinance determined in accordance with Section 147(d)3.

1. General Hardscape Lighting Allowance.

- Determine the general hardscape lighting power allowances as follows: The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is 10 times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that are within a building, beyond the hardscape area, beyond property lines, or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to 10 feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from Table 147-A for the appropriate Lighting Zone.
- Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section 147(d)1A. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from Table 147-A for the appropriate lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:
  - » Landscaped areas completely enclosed within the hardscape area, and which have width or length less than 10 feet wide, shall not be added to the hardscape perimeter length.
  - » Landscaped areas completely enclosed within the hardscape area, and which width or length are a minimum of 10 feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
  - » Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.
- Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from Table 147-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.
- The general hardscape lighting allowance shall be the sum of the allowed watts determined from (A), (B) and (C) above.

2. Additional Lighting Power Allowance for Specific Applications:

- Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with Table 147-B for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

3. Additional Lighting Power Allowance for Local Ordinance Requirements:

- For hardscape areas,including parking lots, site roadways, driveways, sidewalks, walkways or bikeways, when specific light levels are required by law through a local ordinance, and provided the local ordinance meets Section 10-114, additional lighting power for those hardscape areas covered by the local ordinance requirement shall be the smaller of the additional lighting allowances for local ordinance determined from Table 147-C for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

TABLE 147-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

TYPE OF POWER ALLOWANCE	LIGHTING ZONE 3
AREA WATTAGE ALLOWANCE (AWA)	0.092W/FT²
LINEAR WATTAGE ALLOWANCE (LWA)	0.92W/LF
INITIAL WATTAGE ALLOWANCE (IWA)	770W

TABLE 147-B ADDITIONAL LIGHTING POWER ALLOWANCE FOR SPECIFIC APPLICATIONS

LIGHTING APPLICATION	LIGHTING ZONE 3
WATTAGE ALLOWANCE PER ALLOCATION. USE ALL THAT APPLY AS APPROPRIATE	
BUILDING ENTRANCES OR EXITS. Allowance per door. Luminaires qualifying for this allowance shall be within 20 feet of the door.	100 WATTS
PRIMARY ENTRANCES TO SENIOR CARE FACILITIES, POLICE STATIONS, HOSPITALS, FIRE STATIONS, AND EMERGENCY VEHICLE FACILITIES. Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 feet of the primary entrance.	120 WATTS

DRIVE UP WINDOWS. Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.	125 WATTS
VEHICLE SERVICE STATION UNCOVERED FUEL DISPENSER. Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.	185 WATTS
WATTAGE ALLOWANCE PER UNIT LENGTH (W/LINEAR FT). MAY BE USED FOR ONE OR TWO FRONTAGE SIDE(S) PER SITE.	
OUTDOOR SALES FRONTAGE. Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.	36 W/LINEAR FT
WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/FT2). MAY BE USED FOR ANY ILLUMINATED HARDSCAPE AREA ON THE SITE.	
HARDSCAPE ORNAMENTAL LIGHTING. Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 watts or less as determined in accordance with Section 130(d), and shall be post top luminaires, lanterns, pendant luminaires, or chandeliers.	0.04 W/FT^2
NON-SALES CANOPIES. Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.408 W/FT^2

STUDENT PICK-UP/DROP-OFF ZONE. Allowance for the area of the student pickup/drop-off zone, with or without canopy, for preschool through 12th grade school Campuses. A student pick-up/drop off zone is a curb side, controlled traffic area on a school campus where students are picked-up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 feet, times the smaller of the actual length or 250 feet. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.	0.45 W/FT²
OUTDOOR DINING. Allowance for the total illuminated hard-scape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	0.258 W/FT²
SPECIAL SECURITY LIGHTING FOR RETAIL PARKING AND PEDESTRIAN HARDSCAPE. This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	0.019 W/FT²

TABLE 147-C ADDITIONAL LIGHTING POWER ALLOWANCE FOR ORDINANCE REQUIREMENTS

ADDITIONAL LIGHTING POWER ALLOWANCE (W/FT2) WHEN AVERAGE LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.	
REQUIRED (HORIZONTAL FOOT-CANDLES, AVERAGE)	LIGHTING ZONE 3
0.5	0
1.0	0
ADDITIONAL LIGHTING POWER ALLOWANCE (W/FT2) WHEN MINIMUM LIGHT LEVELS ARE REQUIRED BY LOCAL ORDINANCE.	
REQUIRED (HORIZONTAL FOOT-CANDLES, AVERAGE)	LIGHTING ZONE 3
0.5	0
1.0	0

LEED REQUIREMENTS

Sustainable Sites (SS) Credit 8 Light Pollution Reduction (1 point)

The intent of this credit is to minimize light trespass from the building and site, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction and reduce development impact from lighting on nocturnal environments.

The following applied requirements for this credit in the project are cited from GREEN BUILDING DESIGN AND CONSTRUCTION 2009 EDITION, refer to the original document for further details.

Light areas only as required for safety and comfort. Lighting power densities must not exceed ANSI/ASHRAE/IESNA Standard 90.1- 2007 (with errata but without addenda) for the classified zone.

LZ3: Medium (all other areas not included in LZ1, LZ2 or LZ4, such as commercial/industrial, and high-density residential)

Design exterior lighting so that all site and building-mounted luminaires produce a maximum initial illuminance value no greater than 0.20 horizontal and vertical footcandles at the site boundary and no greater than 0.01 horizontal footcandles 15 feet beyond the site. Document that no more than 5% of the total initial designed fixture lumens (sum total of all fixtures on site) are emitted at an angle of 90 degrees or higher from nadir (straight down).

Sports Field Lighting (Physical Education Spaces)

Physical education spaces (play fields) do not need to comply with the lighting power density requirements of this credit, as per ANSI/ASHRAE/IESNA Standard 90.1-2007 section 9.4.5, expectation E. Automatic Shutoff: All sports

lighting must be automatically controlled to shut off no later than 11 p.m.. Manual override must be provided to avoid disruption of school sponsored sporting events.

Trespass Calculations

All trespass calculations must be submitted for 2 conditions: (1) with the sports lighting turned off and all other site lighting turned on, the light trespass requirements are as stated above, and (2) with just the sports lighting turned on, the light trespass requirements for horizontal and vertical foot-candles (fc) may be increased to the following illuminance levels.

Environmental Zone	Light Trespass	Light Pollution
LZ1 - Dark	Max. 0.01 fc horizontal and vertical at the site boundary and beyond	0% total initial designed fixture lumens emitted 90° or higher from nadir (uplight).
LZ2 - Low	Max. 0.10 fc horizontal and vertical at site boundary and no greater than 0.01 footcandles 10' beyond.*	Max. 2% total initial designed fixture lumens emitted as uplight.
LZ3 - Medium	Max. 0.20 fc horizontal and vertical at site boundary and no greater than 0.01 footcandles 15' beyond.*	Max. 5% total initial designed fixture lumens emitted as uplight.
LZ4 - High	Max. 0.60 fc horizontal and vertical at site boundary and no greater than 0.01 footcandles 15' beyond.*	Max. 10% total initial designed fixture lumens emitted as uplight.

* "For site boundaries that abut public right-of-ways, light trespass requirements may be met relative to the curb line instead of the site boundary."

Energy and Atmosphere (EA) Prerequisite 2 Minimum Energy Performance

Credit 1 Optimize Energy Performance (1-19 points)

To achieve maximum level of energy efficiency for the project by carefully designed exterior lighting systems to reduce environmental and economic impacts associated with excessive energy use. Possibly points earned under this credit varies from 1 to 19 points.

DARK SKY COMPLIANCE

Unshielded, over lit exterior lighting environment could yield light pollutions such as creating a brightening night sky that has obliterated the stars for much of the world's population; causing negative and deadly effects on a wide range of creatures, including amphibians, birds, mammals, insects, and even plants; producing glare issues in urban areas and the light trespass coming off the property affect neighbors. Dark Sky Compliance requires exterior fixtures or installation to minimize sky glow, obtrusive light, and light trespass.

Model Outdoor Lighting Ordinance June 15 2011

The purpose of this Ordinance is to provide regulations for outdoor lighting that will:

- Permit the use of outdoor lighting that does not exceed the minimum levels specified in IES recommended practices for night-time safety, utility, security, productivity, enjoyment, and commerce.
- Minimize adverse off-site impacts of lighting such as light trespass, and obtrusive light.

- Curtail light pollution, reduce skyglow and improve the nighttime environment for astronomy.
- Help protect the natural environment from the adverse effects of night lighting from gas or electric sources.
- Conserve energy and resources to the greatest extent possible.

General Requirements:

Conformance with All Applicable Codes

All outdoor lighting shall be installed in conformance with the provisions of this Ordinance, applicable Electrical and Energy Codes, and applicable sections of the Building Code.

Applicability

Except as described below, all outdoor lighting installed after the date of effect of this Ordinance shall comply with these requirements. This includes, but is not limited to, new lighting, replacement lighting, or any other lighting whether attached to structures, poles, the earth, or any other location, including lighting installed by any third party.

Exemptions from III.(B.) The following are not regulated by this Ordinance

- Lighting within public right-of-way or easement for the principal purpose of illuminating streets or roads. No exemption shall apply to any lighting within the public right of way or easement when the purpose of the luminaire is to illuminate areas outside the public right of way easement, unless regulated with a street lighting ordinance. Note to adopting agency: if using the street lighting ordinance (Section XI), this exemption should read as follows: Lighting within the public right-of-way or easement for the principal purpose of illuminating roads and highways. No exemption shall apply to any street lighting and to any lighting within the public right of way or easement when the purpose of the luminaire is to illuminate areas outside of the public right of way or easement.
- Lighting for public monuments and statuary.
- Lighting solely for signs (lighting for signs is regulated by the Sign Ordinance).
- Repairs to existing luminaires not exceeding 25% of total installed luminaires.
- Temporary lighting for theatrical, television, performance areas and construction sites;
- Underwater lighting in swimming pools and other water features
- Temporary lighting and seasonal lighting provided that individual lamps are less than 10 watts and 70 lumens.
- Lighting that is only used under emergency conditions.
- In lighting zones 2, 3 and 4, low voltage landscape lighting controlled by an automatic device that is set to turn the lights off at one hour after the site is closed to the public or at a time established by the authority.

Exceptions to III. (B.) All lighting shall follow provisions in this ordinance; however, any special requirements for lighting listed in a) and b) below shall take precedence.

- Lighting specified or identified in a specific use permit.
- Lighting required by federal, state, territorial, commonwealth or provincial laws or regulations.

C. Lighting Control Requirements

1. Automatic Switching Requirements Controls shall be provided that automatically extinguish all outdoor lighting when sufficient daylight is available using a control device or system such as a photoelectric switch, astronomic time switch or equivalent functions from a programmable lighting controller, building automation system or lighting energy management system , all with battery or similar backup power or device.

Exceptions to III.(C.) 1. Automatic lighting controls are not required for the following:

- Lighting under canopies.
- Lighting for tunnels, parking garages, garage entrances, and similar conditions.

2. Automatic Lighting Reduction Requirements

The Authority shall establish curfew time(s) after which total outdoor lighting lumens shall be reduced by at least 30% or extinguished.

Exceptions to III.(C.) 2. Lighting reductions are not required for any of the following:

- With the exception of landscape lighting, lighting for residential properties including multiple residential properties not having common areas.
- When the outdoor lighting consists of only one luminaire.
- Code required lighting for steps, stairs, walkways, and building entrances.
- When in the opinion of the Authority, lighting levels must be maintained.
- Motion activated lighting.
- Lighting governed by special use permit in which times of operation are specifically identified.
- Businesses that operate on a 24 hour basis.

5 | Maintenance

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Fixture Requirements

Lamp life requirements

- A minimum lamp life of 12,000 hours is required for all lamps on site.

Sealed fixtures

- All fixtures should be sealed and gasketed to prevent dust and bugs from accumulating and reducing the overall light output of the fixtures
- All exterior fixtures are to have an IP rating of at least IP56

Accessible fixtures

- Fixtures are to be placed within easy access for maintenance teams. No fixture should be more than 30 feet from reach.

Replaceable LED lamp modules

- All LED fixtures are to have replaceable LED modules to aide in replacement and maintenance. LED modules should be back cataloged so that replacement lamps can be provided in the same color and light output of the original module.

Approval process

- Samples of all new fixtures are to be provided and reviewed by maintenance team.
- Fixtures are to be easily maintained and serviced.
- Fixtures and replacement parts should be available within the local region.

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6 | Appendix

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International Dark Sky Association Practical Guide

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Glossary / Index

Color Rendering Index (CRI): **Page: 15, 17, 30**

A quantitative measure of the ability of a light source to reproduce the colors of various objects faithfully in comparison with an ideal or natural light source.

Cutoff Rating: **Page: 30, 32-41**

Cutoff Rating is a classification system used by IESNA to rate the amount of light emitted from a luminaire in unwanted directions. Intensity at or above 90° (horizontal) no more than 2.5% of lamp lumens, and no more than 10% of lamp lumens at or above 80°.

Dark Sky : **Page: 25, 54, 63**

Dark Sky is to reduce the effects of unnatural lighting on the environment and to cut down on energy usage.

Efficacy: **Page: 18, 30**

Efficacy is a ratio of lumens per watt, as a ratio of the amount of light, measured by lumens, produced by a lamp to the amount of power it consumed, measured in watts.

Footcandle (fc): **Page: 23, 32-42, 54**

Footcandle is a non- SI unit of illuminance or light intensity. It is defined as the amount of illumination the inside surface of a 1- foot radius sphere would be receiving if there were a uniform point source of on candela in the exact center of the sphere.

Full Cutoff : **Page: 30, 32-41**

Zero intensity at or above horizontal (90° above nadir) and limited to a value not exceeding 10% of lamp lumens at or above 80°.

Glare: **Page: 15-17, 24, 32-41, 53-54**

Glare is difficulty seeing in the presence of bright light. It occurs in two ways: luminance is too high or luminance ratios are too high.

Illuminance: **Page: 16, 32-42, 53, 54**

Illuminance is the incident luminous flux density on a differential element of surface located at a point and oriented in a particular direction, expressed in lumens per unit area.

Illuminating Engineering Society of North America (IESNA): Page: 23, 29, 44, 53, 54

IESNA is the recognized technical authority on illumination.

IP Rating: **Page: 59**

IP Rating classifies and rates the degrees of protection provided against the intrusion of solid objects (including body parts like hands and fingers), dust, accidental contact, and water in mechanical casings and with electrical enclosures

Light Type Distribution: Exterior light fixture classification system to describe the generic output patterns of light fixtures: Page: 24, 30, 32-36

TYPE I

The type I distribution is ideal for narrow walkways or bike paths. It's intended to be located at or near the center of the pathway, approximately two mounting heights in width.

TYPE II

The type II distribution is ideal for wider walkways, entrance roadways, bike paths and other long and narrow lighting applications. Intended to be located near the side of a roadway, approximately 1.75 mounting heights in width.

TYPE III

The type III distribution is ideal for roadway, general parking, and other area lighting applications. Intended to be located near the side of the area, approximately 2.75 mounting heights in width.

TYPE IV

The type IV distribution is especially suited for wall mounting applications and for illuminating the perimeter of parking areas. Intended to be located near the side of the area, which is over 2.75 mounting heights in width. It produces a semicircular distribution with essentially the same candlepower at lateral angles from 270 to 0 to 90 degrees.

TYPE V

The type V distribution is ideal for general parking and area lighting applications. Intended to be located at or near the center of an intersection or in a large area, since it has no beams but produces a circular distribution with essentially the same candlepower at all lateral angles.

Lumen: **Page: 17, 18, 30, 37, 53, 55, 56**

Lumen is the SI derived unit of luminous flux, a measure of the total "amount" of visible light emitted by a source.

Uniformity Ratio: **Page: 15, 16, 23, 24, 29, 32-37, 41**

Uniformity is the maximum illumination level to minimum illumination level/ average illumination level to minimum illumination level.

Defined Lighting Zone

Table 26.4 | Nighttime Outdoor Lighting Zone Definitions

Zone	Outdoor Lighting Situation	Definition
LZ4	High Ambient Lighting	Areas of human activity where the vision of human residents and users is adapted to high light levels. Lighting is generally considered necessary for safety, security and/or convenience and it is mostly uniform and/or continuous. After curfew, lighting may be extinguished or reduced in some areas as activity levels decline.
LZ3	Moderately High Ambient Lighting	Areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security and/or convenience and it is often uniform and/or continuous. After curfew, lighting may be extinguished or reduced in most areas as activity levels decline.
LZ2	Moderate Ambient Lighting	Areas of human activity where the vision of human residents and users is adapted to moderate light levels. Lighting may typically be used for safety and convenience but it is not necessarily uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.
LZ1	Low Ambient Lighting	Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety and convenience but it is not necessarily uniform or continuous. After curfew, most lighting should be extinguished or reduced as activity levels decline.
LZ0	No Ambient Lighting	Areas where the natural environment will be seriously and adversely affected by lighting. Impacts include disturbing the biological cycles of flora and fauna and/or detracting from human enjoyment and appreciation of the natural environment. Human activity is subordinate in importance to nature. The vision of human residents and users is adapted to the darkness, and they expect to see little or no lighting. When not needed, lighting should be extinguished.

Defined Activity Zone

Table 22.4 | Indoor and Nighttime Outdoor Activity Level Definitions

Outdoor	**Outdoor activity levels during nighttime hours**	
• **High**	Areas with relatively high volumes of pedestrians and vehicles or solely people during dark hours. Activity level is relative to a locale's population, density of related applications, and general expected norms across the community. Typified by consistently high volumes or extreme swings of very high volumes over short time periods. Outdoor facilities typical of large population centers.	• Entertainment districts • Outdoor pools at family hotels and community recreation centers • Shopping districts and sports' venues • Transportation hubs • University campuses
• **Medium**	Areas with relatively moderate volumes of pedestrians and vehicles or solely people during dark hours. Activity level is relative to a locale's population, density of related applications, and general expected norms across the community. Typified by some amount of constant activity over extended periods. Outdoor facilities typical of small-to-moderate population centers.	• Civic and cultural districts • College campuses • Libraries • Office complexes • Outdoor pools at business hotels and community recreation centers • Recreation centers • Residential complexes • Small shopping areas or centers • Transit lines • Urban central and waterfront parks
• **Low**	Areas with relatively low-to-very-low volumes of pedestrians and vehicles or solely people during dark hours. Activity level is relative to a locale's population, density of related applications, and general expected norms across the community. Typified by little activity over extended periods. Outdoor facilities typical of suburban and rural population centers.	• Outdoor pools at resorts and spas • Residential neighborhoods • Small apartments • Small college campuses • Small commercial establishments

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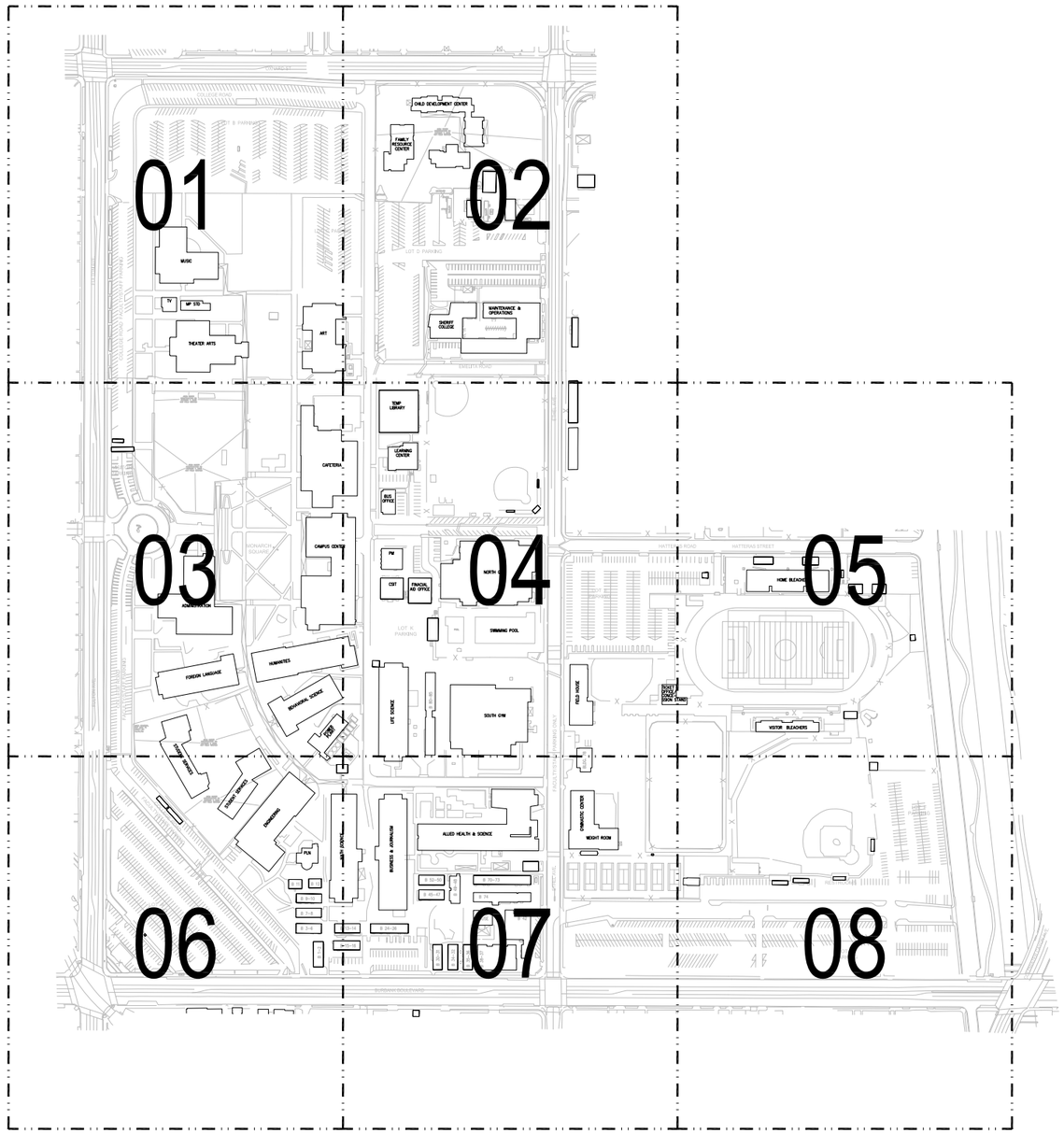
SHEET INDEX



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Project Title

EXTERIOR LIGHTING STUDY

Los Angeles Community College District
Los Angeles Valley College
5800 Fulton Avenue
Valley Glen, CA 91401

Revisions

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EXISTING LIGHTING PLAN KEY MAP

Sheet Number

E001

150' 75' 0' 150' 300'

J5862

EXISTING EXTERIOR LUMINAIRE SCHEDULE

SYMBOL	TYPE	DESCRIPTION	TOTAL V-A	LAMPS NO.	LAMPS V-A	LAMPS TYPE	VOLTAGE	MTG.	MTG. HEIGHT	REMARKS
	L1	TRIPLE COBRA HEAD WITH DROPPED LENS AND STEEL POLE	1395	3	400	HPS	120	PO	40'	
	L2	QUADRUPLE COBRA HEAD WITH DROPPED LENS AND STEEL POLE	1860	4	400	HPS	120-480	PO	40'	
	L3	SINGLE COBRA HEAD WITH DROPPED LENS AND STEEL POLE	465	1	400	HPS	120	PO	25'	
	L4	SQUARE AREA LIGHTING FIXTURE WITH SEGMENTED OPTICS AND ALUMINUM POLE	126	1	100	MH	277	PO	12'	
	L5	POST TOP SHOE BOX WITH SEGMENTED OPTICS AND ALUMINUM POLE	465	1	400	HPS	277	PO	30'	
	L6	SQUARE AREA LIGHTING FIXTURE WITH SEGMENTED OPTICS AND ALUMINUM POLE	126	1	100	MH	277	PO	10'	
	L7	SQUARE CANOPY WITH DROPPED LENS	28	2	13	CFL	120	S	12'	
	L8	SQUARE CANOPY WITH DROPPED LENS	28	2	13	CFL	120	S	10'	
	L9	FLOOD LIGHT	100	1	100	PAR30	120	S	10'	
	L10	DOUBLE COBRA HEAD WITH DROPPED LENS AND CONCRETE POLE	590	2	250	HPS	120-208	PO	25'	
	L11	SINGLE COBRA HEAD WITH DROPPED LENS AND CONCRETE POLE	465	1	400	HPS	120-208	PO	25'	
	L12	SINGLE POST TOP SHOE BOX WITH SEGMENTED OPTICS AND STEEL POLE	465	1	400	HPS	208	PO	20'	
	L13	DOUBLE POST TOP SHOE BOX WITH SEGMENTED OPTICS AND STEEL POLE	930	2	400	HPS	208	PO	20'	
	L14	ROUND POST TOP WITH SEGMENTED OPTICS AND STEEL POLE	-	1	-	MH	-	PO	20'	
	L15	DOUBLE COBRA HEAD WITH DROPPED LENS	930	2	400	HPS	277	PO	35'	MOUNTED TO CELL PHONE TOWER
	L16	DOUBLE COBRA HEAD WITH DROPPED LENS AND STEEL POLE	930	2	400	HPS	277	PO	35'	
	L17	SINGLE COBRA HEAD WITH DROPPED LENS AND STEEL POLE	465	1	400	HPS	277	PO	30'	
	L18	WALL PACK	-	2	-	CFL	120	S	11'	
	L19	ARCHITECTURAL SURFACE MOUNTED FIXTURE	-	1	-	CFL	120	S	10'	
	L20	WALL PACK	28	1	26	CFL	120	S	10'	
	L21	WALL PACK	85-126	1	70-100	MH	120	S	12'	
	L22	WALL PACK	85-126	1	70-100	MH	120	S	13'	
	L23	WALL PACK	28	1	26	CFL	120	S	8'	
	L24	TRIPLE HEAD FLOOD LIGHT	300	3	100	PAR38	120	S	16'	
	L25	WALL PACK	85-126	1	70-100	MH	120	S	16'	
	L26	PENDANT MOUNT ROUND LENS FIXTURE	126	1	100	MH	120	P	13.5'	
	L27	ROOFTOP FLOOD LIGHT	465	1	400	HPS	120	S	30'	
	L28	SQUARE CANOPY WITH DROPPED LENS	56	2	26	CFL	120	S	23'	
	L29	WALL PACK	-	1	-	CFL	120	S	10.5'	
	L30	WALL PACK	205	1	175	MH	120	S	10'	
	L31	WALL PACK	60	1	60	INC	120	S	10'	
	L32	WALL PACK	180-205	1	150-175	HPS	120	S	10'	
	L33	ROOFTOP FLOOD LIGHT	465	1	400	MH	120	PO	16'	
	L34	ARCHITECTURAL SURFACE MOUNTED FIXTURE	-	1	-	CFL	120	S	15'	
	L35	DOUBLE COBRA HEAD WITH DROPPED LENS AND STEEL POLE	465	2	400	HPS	480	PO	40'	
	L36	DOUBLE HEAD FLOOD LIGHT	1000	2	500	HALOGEN	120	PO	30'	MOUNTED ON ROOFTOP
	L37	ROUND POST TOP WITH STEEL POLE	126-180	1	100-150	MH	277	PO	15'	
	L38	WALL PACK	28	1	26	CFL	120	S	8'	
	L39	POST TOP WITH FLAT LENS AND ALUMINUM POLE	126	1	100	MH	277	PO	12'	
	L40	SINGLE COBRA HEAD WITH DROPPED LENS AND CONCRETE POLE	465	1	400	HPS	480	PO	20'	
	L41	WALL PACK WITH CUTOFF SHIELD	300	1	250	MH	120	S	14'	
	L42	WALL PACK	180-205	1	150-175	MH	120	S	12'	
	L43	WALL PACK, CUTOFF TYPE	85	1	70	HPS	120	S	12'	
	L44	4'X4' SQUARE SEMI-RECESSED LENSED FIXTURE	265	8	32	T8	120	S	8'	
	L45	WALL PACK	180-205	1	150-175	MH	120	S	14'	
	L46	WALL PACK	28	1	26	CFL	120	S	8'	
	L47	ARCHITECTURAL UP-LIGHT	-	-	-	-	-	S	9.5'	
	L48	WALL PACK	126	1	100	MH	120	S	10'	
	L49	TRIPLE HEAD FLOOD LIGHT	300	3	100	PAR38	120	S	35'	ROOFTOP MOUNTED
	L50	1'X4' ENCLOSED LENSED	60	2	32	T8	120	S	11.5'	
	L51	6"X4' ENCLOSED LENSED	40	1	36	BIAX	120	S	11.5	
	L52	WALL PACK	85-126	1	70-100	MH	120	S	20'	
	L53	ARCHITECTURAL WALL PACK	36	1	32	CFL	120	S	8'	

EXISTING EXTERIOR LUMINAIRE SCHEDULE

SYMBOL	TYPE	DESCRIPTION	TOTAL V-A	LAMPS NO.	LAMPS V-A	LAMPS TYPE	VOLTAGE	MTG.	MTG. HEIGHT	REMARKS
	L54	CAN LIGHT FIXTURE	-	-	-	CFL	-	P	9'	
	L55	TRIPLE HEAD FLOOD LIGHT	300	3	100	PAR38	120	S	20'	MOUNTED ON ROOFTOP
	L56	HI-BAY	465	1	400	MH	120	P	16'	
	L57	WALL PACK		1	250-400	MH	120	S	16'	
	L58	WALL PACK		1	250-400	MH	120	S	6.5'	
	L59	ROUND ARCHITECTURAL WALL PACK	45	1	42	CFL	120	S	9'	
	L60	SQUARE LENSED LIGHT FIXTURE	-	1	-	-	-	S	6'	
	L61	INCANDESCENT FIXTURE	100	1	100	INC	120	S	10'	
	L62	WALL PACK	100	1	100	INC	120	S	8'	
	L63	WALL PACK	126	1	100	MH	120	S	9'	
	L64	CEILING MOUNTED LIGHT FIXTURE	100	1	100	INC	120	S	8'	
	L65	WALL PACK	205-300	1	175-250	MH	120	S	13'	
	L66	RECESSED LENSED DOWNLIGHT	28	1	26	CFL	120	R	12'	
	L67	RECESSED WALL LIGHT FIXTURE	20	1	18	CFL	120	R	1'	
	L68	RECESSED IN-GRADE UPLIGHT	-	1	-	CFL	-	R	-	
	L69	WALL PACK	185	1	70	HPS	120	S	12'	
	L70	WALL PACK	126	1	100	MH	120	S	14'	
	L71	WALL PACK	28	1	26	CFL	120	S	10'	

ABBREVIATIONS
C = CORNER
P = PENDANT
PO = POLE
R = RECESSED
S = SURFACE
ST = STANTION

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EXISTING LIGHTING FIXTURE SCHEDULE

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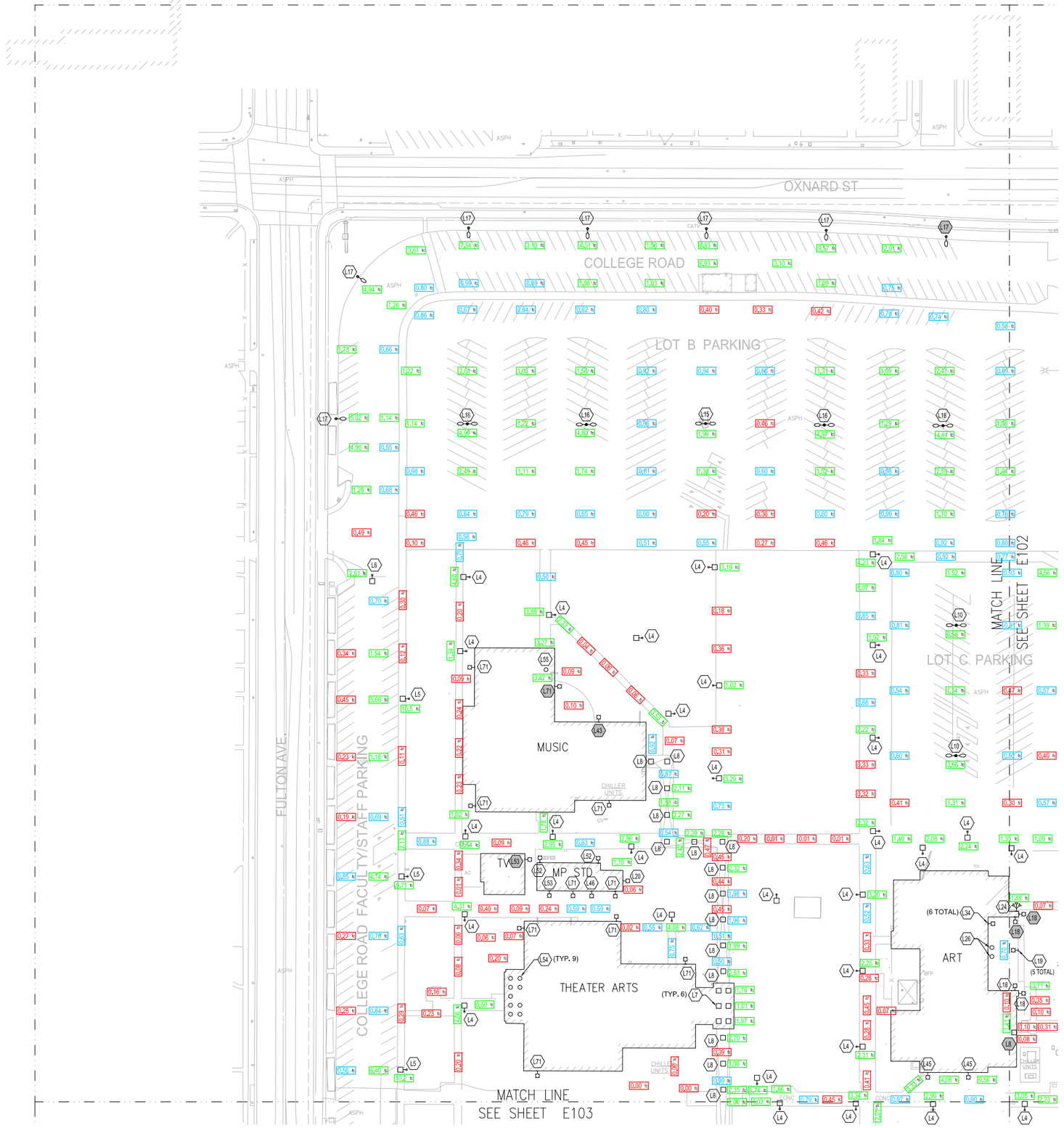

NOTES

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40' 20' 0' 40' 80'

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EXISTING SITE LIGHTING PLAN

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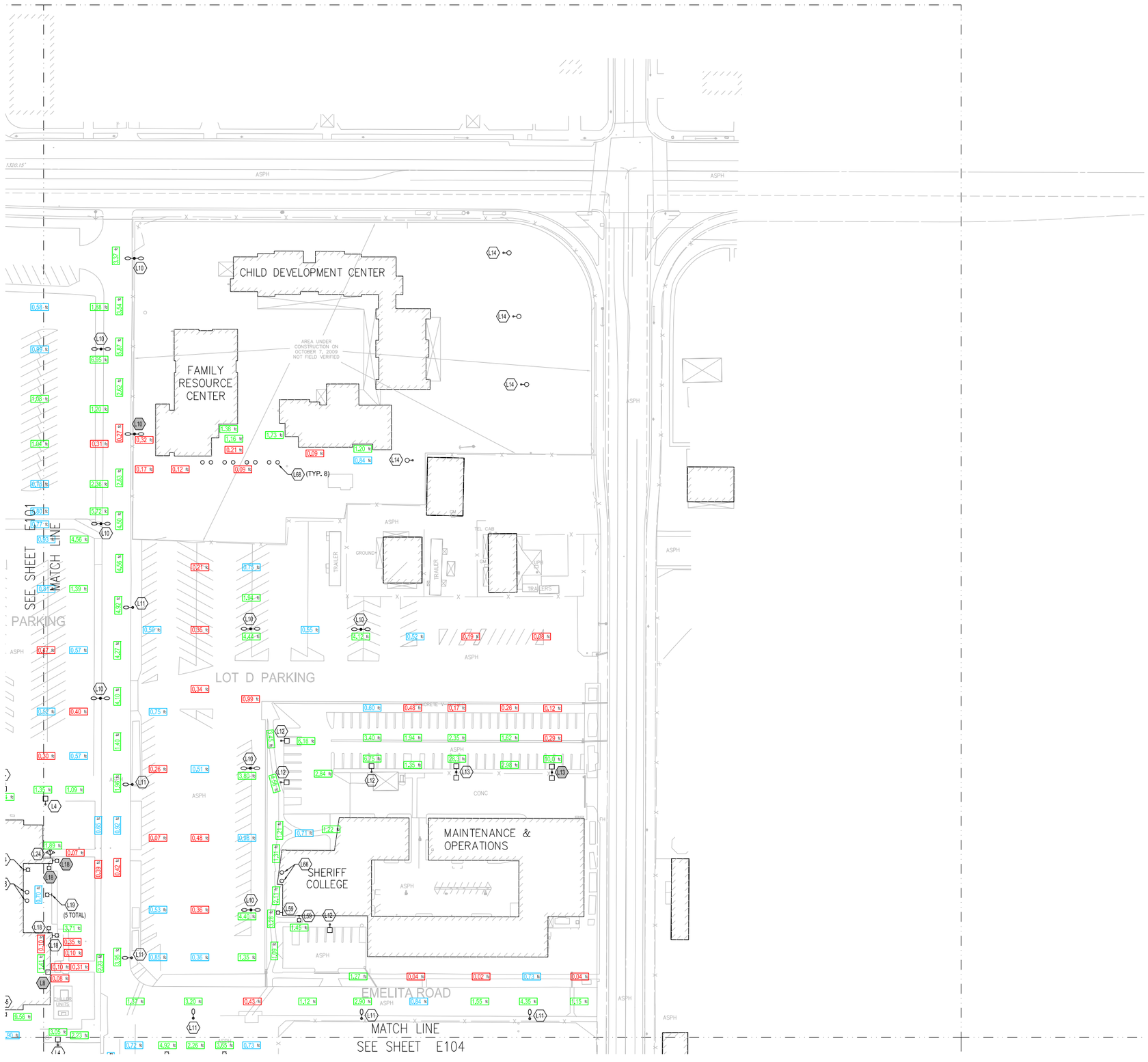

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EXISTING SITE LIGHTING PLAN

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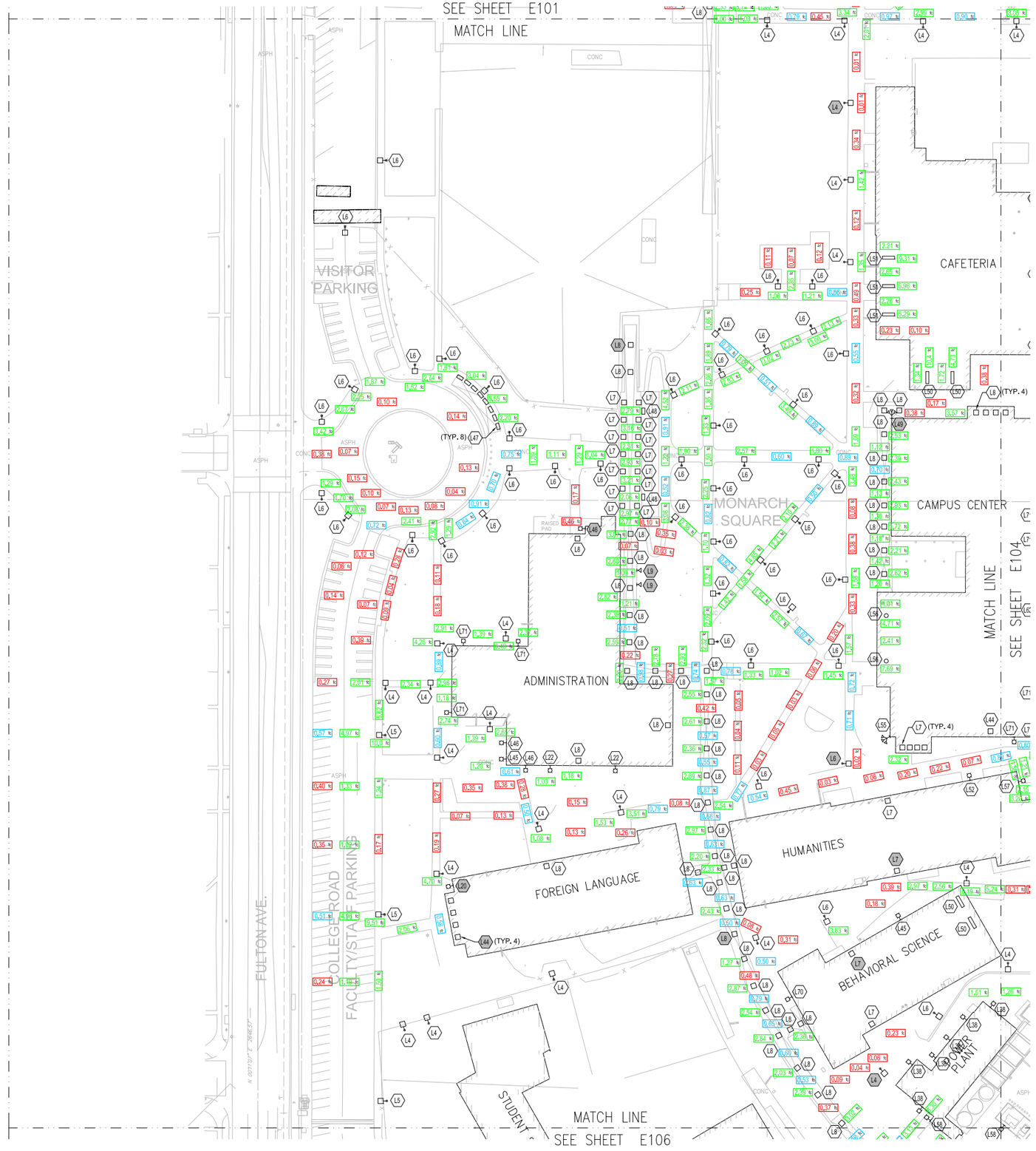

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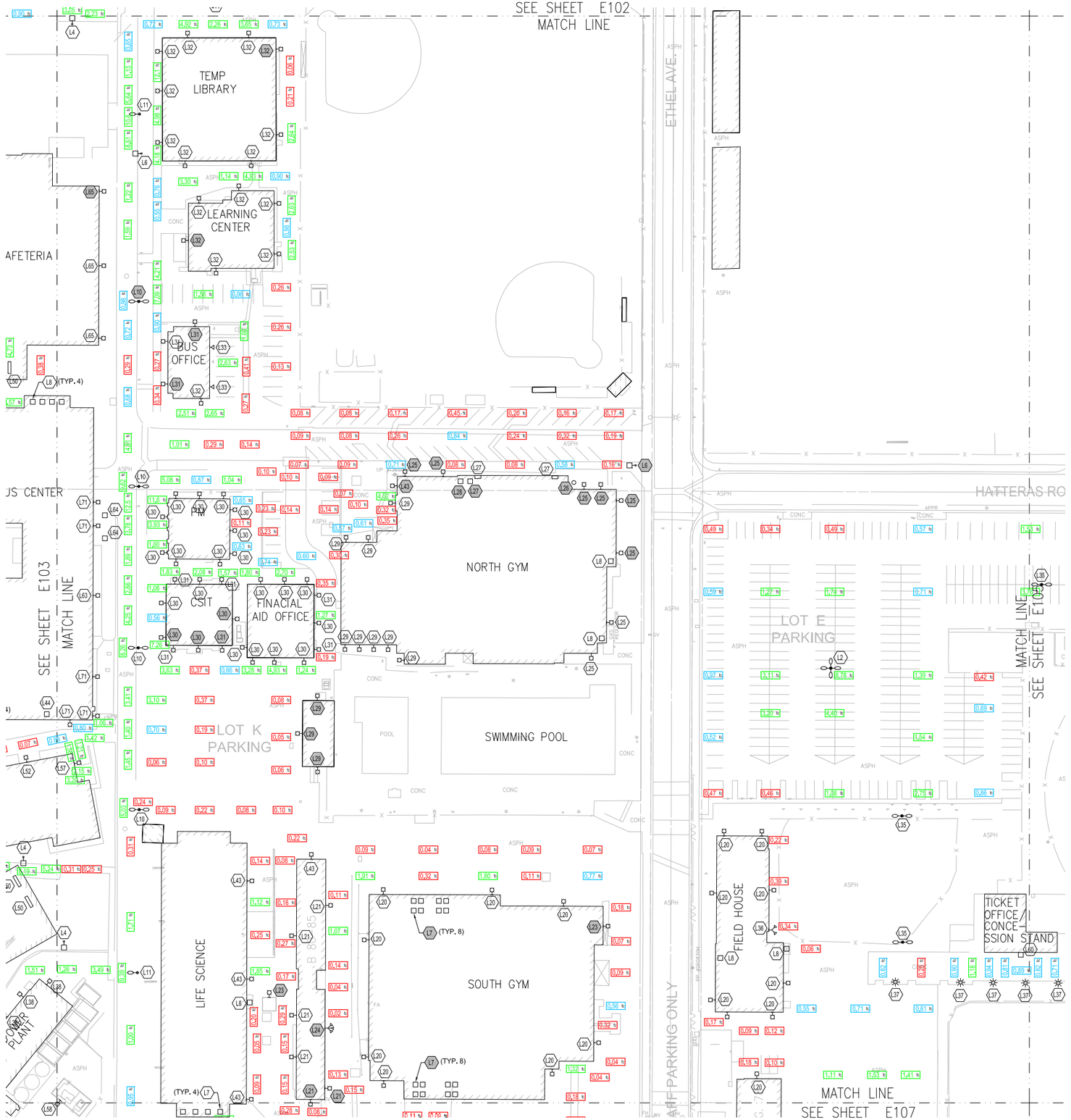

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E104

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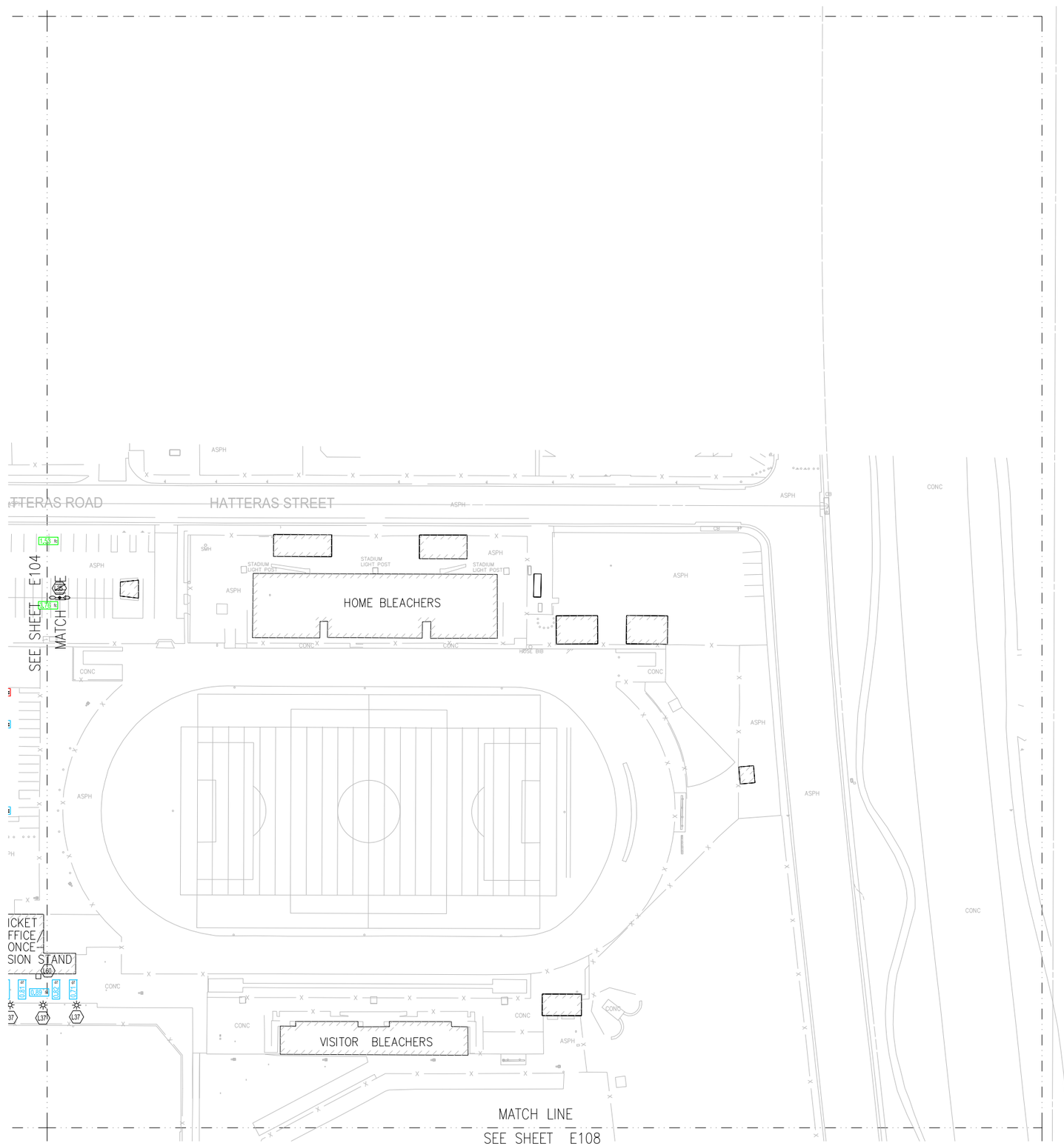

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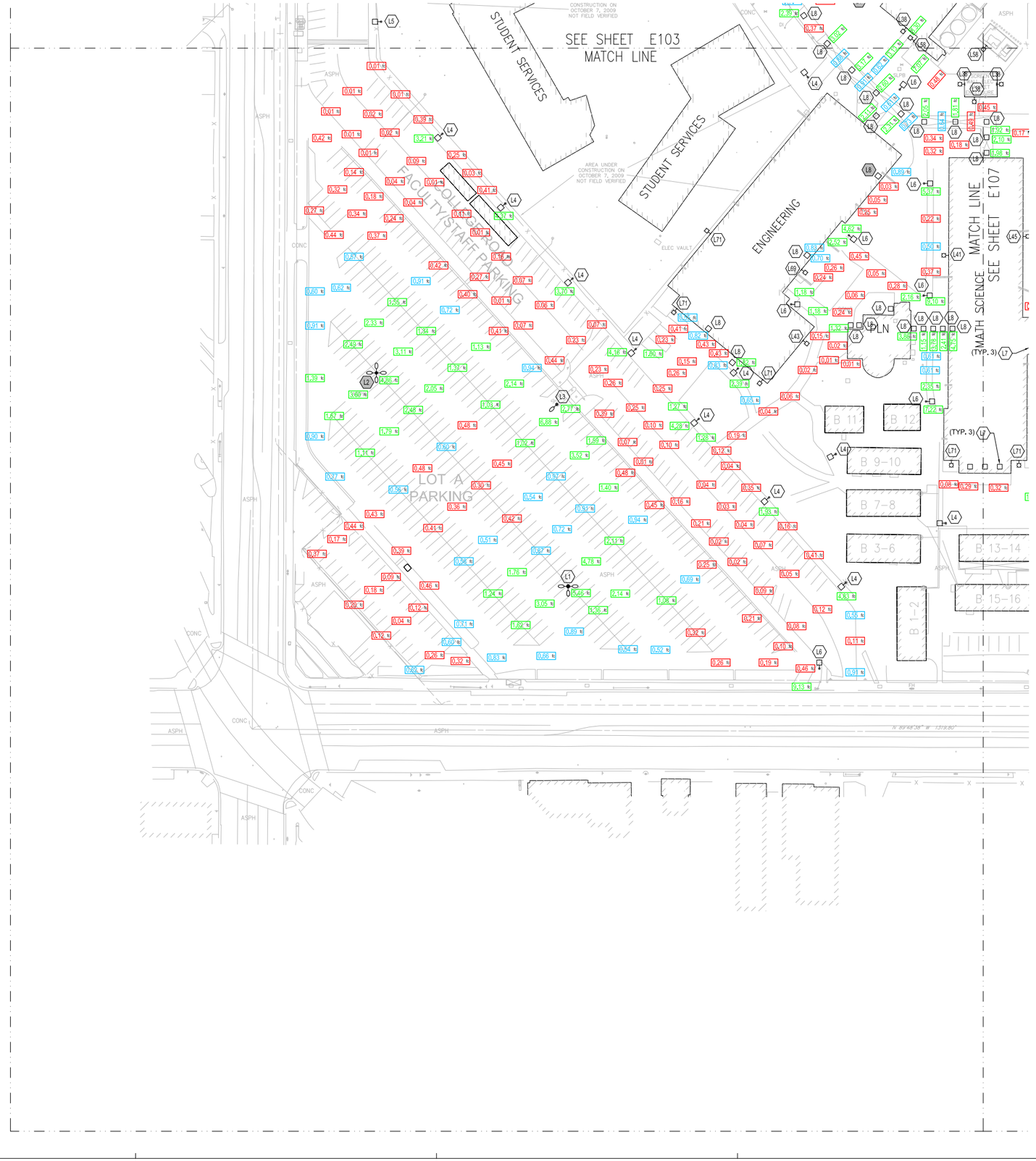

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E106

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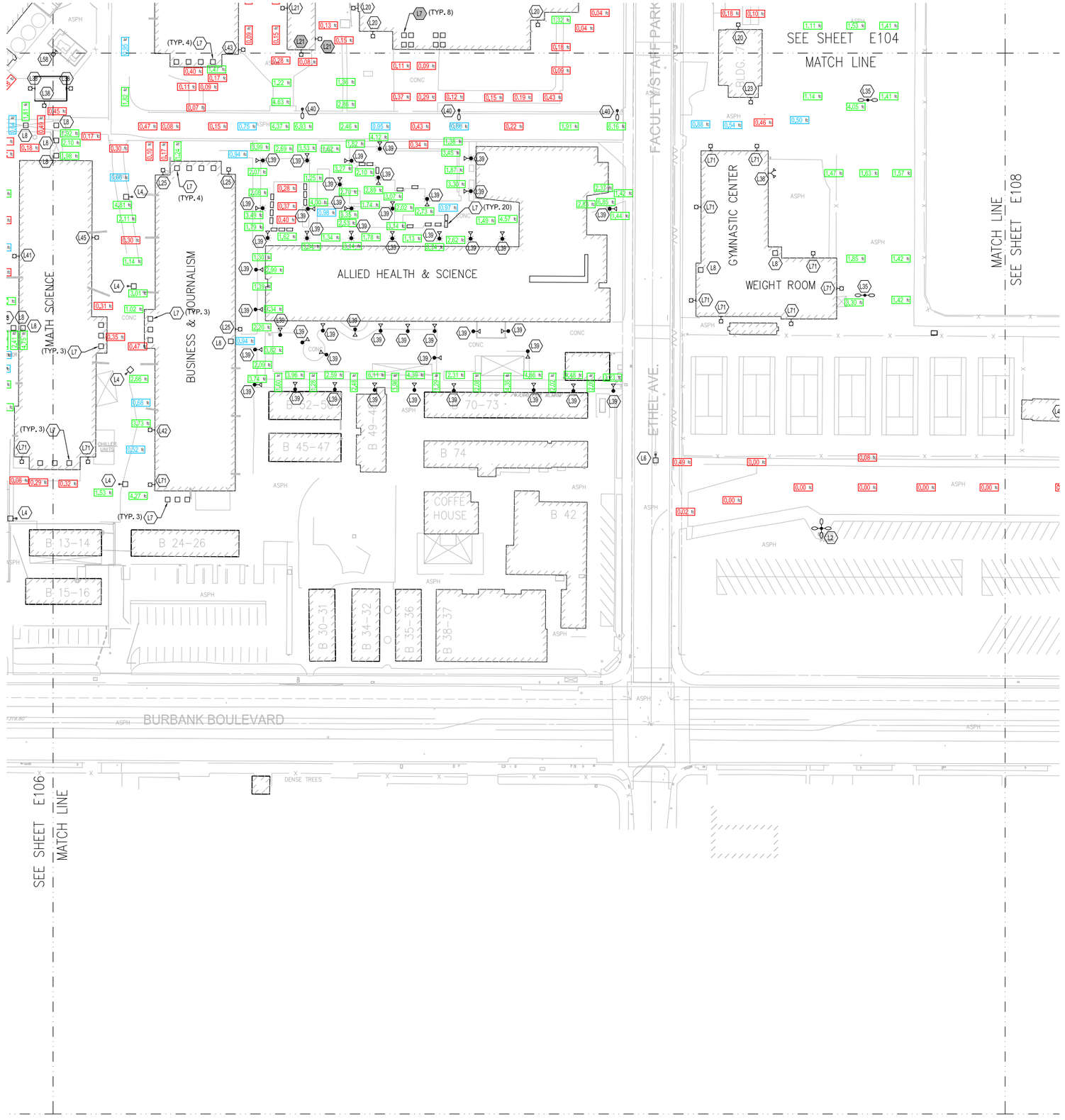

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Scale	1"=40'

Sheet Title

EXISTING SITE LIGHTING PLAN

Sheet Number

E107

J5862

NOTES

- XX — INDICATES LIGHT FIXTURE WAS OFF WHEN SURVEY WAS CONDUCTED.
- X.XXfc — INDICATES MEASUREMENT IS LESS THAN 0.50fc.
- X.XXfc — INDICATES MEASUREMENT IS BETWEEN 0.50–1.00fc.
- X.XXfc — INDICATES MEASUREMENT IS GREATER THAN 1.00fc.

40' 20' 0' 40' 80'

Designer

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Project Title

EXTERIOR LIGHTING STUDY

Los Angeles Community College District
Los Angeles Valley College
5800 Fulton Avenue
Valley Glen, CA 91401

Revisions

Number	Description	Date
	100% SUBMITTAL	03/18/11

Designed	JB
Drawn	JL
Checked	GJ
Approved	
Date	March 18, 2011
Submittal	100% SUBMITTAL
Scale	1"=40'

Sheet Title

EXISTING SITE LIGHTING PLAN

Sheet Number

E108

J5862