

DIVISION 16 – ELECTRICAL

Section 16530 - Site Lighting

Introduction

When designing site lighting for the University two areas of major concern arise. The first and most prominent is that of safety for the students and faculty members. Since many times students need to be out and around the facility at late hours it is important to provide lighting such that they can see well enough to feel safe when they are traveling from one building to another. The expected design intent is to increase nighttime visibility using better lighting techniques as opposed to the use of more or brighter lighting.

To the maximum extent possible follow the DarkSky International Principles for Responsible Outdoor Lighting:

1. USEFUL – Use light only if it is needed.
2. TARGETED – Direct Light so it falls only where it is intended.
3. LOW LEVEL – Light should be no brighter than necessary.
4. CONTROLLED – Use controls such as timers or motion detectors to ensure that light is available when it is needed, dimmed when possible, and turned off when not needed. For sports or field lighting consider interconnecting with the campus CatCard system so authorized users can present their card to a reader, enter their pin, and have the lights turn on until a present time such as 10pm. Many areas will need lighting for safety; these would be prime areas for a dimming strategy.
5. WARM-COLORED – Use warmer color lights as much as possible.

The second area of concern is to minimize site lighting to limit light pollution, which has a negative impact on observatories in the area.

Lighting design shall use the following codes and standards:

- 2018 IBC, Chapter 10 Means of Egress, Section 1204 Lighting
- NFPA 70, Chapters 1, 2, and 3.
- Dark Sky Society- IES, Recommended Practices, (RP-33-99): Lighting for Exterior Environments; and (RP-20): Parking Lots.

*** For work within Pima County/ City of Tucson, 2012 City of Tucson/ Pima County Outdoor Lighting Code (use area E3)*** For other areas verify local codes.

As a part of the design we expect to see details of both bollard and light pole foundations. Foundation designs shall be sealed by a Structural Engineer.

All outdoor lighting shall be full cut off, 3,500k LED. The installation of 4,000k LED is allowed provided the fixture output will depreciate to 3,500k within one year. Must provide statement of conformance from fixture manufacturer(s) to use this allowance.

Light fixtures should be located in such a manner that they can be easily maintained using standard equipment. All exterior building light fixtures and poles shall be readily accessible and not restricted by other site improvements.

The design should be made in a manner such that is both energy efficient and cost effective as well as meeting the requirements for the local regulations. Bollard lights are preferred, wall mounted lights for area illumination are not allowed. Phosphor-converted amber (PC amber) LED or equivalent.

The design should be flexible for both the field installation for expansion and for maintenance.

Where large areas are involved provide handholes for maintenance use to trouble shoot the underground wiring when needed, and to allow for easier expansion if required in the future.

As part of the first design submission provide cut sheets and point to point design calculations for all site lighting. Campus is divided into acres for the purpose of outside lighting design, the center line North to South is the campus mall, the East side reference is the West side of Campbell Avenue. Map reference 32.23196, -110.94412. No acre shall exceed 350,000 lumens of fixture emissions. Building entrances, sidewalks, and paths of travel shall be illuminated to 5fc, all parking areas, pick up, and drop off locations shall be illuminated to 10fc. High risk areas shall be illuminated to 10fc. Event areas can exceed these levels for just the event; athletic areas, such as the stadium, may exceed these levels just during times of use of the facilities.

Site lighting design on the perimeter of campus and at off-campus locations shall ensure that light does not trespass beyond University owned property.

Part 1 - General

- Provide submittals on all fixtures, including poles, bases, and ballasts at the Schematic Design Phase.
- Pole foundations are required for all lighting poles. These shall be engineered concrete foundations, engineered by a structural engineer, registered in the State of Arizona. All lighting poles in drive lanes shall have a minimum 30" above grade bases.
- All metal parts of lighting systems shall be bonded to pole UFER and equipment ground. This includes the steel lids on concrete pull boxes.
- Pole foundations shall be grounded with 20 ft. of bare #2 copper wire buried below the concrete foundation. No ground rod shall be installed at pole location.

Part 2 - Products

- Provide high quality products which are both architectural in nature and have an efficient lighting design.
- Phosphor-converted amber (PC amber) LED or equivalent.
- Use enough fixtures to provide adequate light especially in exterior corridors or areas between buildings to allow proper levels for personnel safety.
- Where available match fixtures in surrounding areas to be able to allow some continuity with the lighting in a general area.
- Light poles need to be designed for a minimum of a 100 mph wind loading. (80 mph+ 1.3 gust factor)
- All pole mounted fixtures shall be fused and shall be breakaway type.
- Pole mounted fixtures shall have fuses in base of pole with handhole access.

Part 3 - Execution

- Include requirements for aligning light fixtures, light poles, and bollards to be both level and uniform in layout and light distribution.

End of Section 16530