

NC State University Design and Construction Guidelines

Division 26 Lighting

1.1 Purpose

- A. The following guideline provides information for various interior and exterior lighting designs for all non-classroom spaces. Classroom spaces are included as a separate guideline.

1.2 General Requirements

- A. Interior Lighting
 1. Follow recommendations and recommended lighting levels in the latest editions of the North Carolina Commercial Energy Code, the Illuminating Engineering Society of North America (IESNA), Energy Efficient Lighting Guidance Document for New Construction and Retrofits: The State of North Carolina (EELGD), and the lighting levels listed within this document. This document supercedes the others referenced, except when Code is more stringent.
 2. Design for 30 FC of general lighting for office work surfaces. Task lighting should be also be provided.
 - The use of incandescent, HID, and fluorescent lighting is not permitted, unless the lighting requirements cannot be fulfilled by an LED fixture.
 3. LED lights shall meet the following criteria:
 - Nationally recognized testing laboratory (NRTL) certified as recognized by EELGD
 - The most recent version of the Design Lights Consortium (DLC) certified
 - Dimmable to 10% or less
 - Correlated Color Temperature (CCT) of 4000K (nominal)
 - 4000K is the campus standard. CCT outside of this range shall be considered only in areas where there is a demonstrated architectural need.
 4. Occupancy sensors shall be dual-technology or ultrasonic whenever possible.
 - Occupancy/vacancy sensors shall turn off lights within a maximum of 30 minutes of last activity and shall be required in all spaces.
 5. Provide a minimum of one night-light in multi-fixture restrooms.
 6. Lighting fixtures in similar programmable spaces shall be of the same style and type.
 7. Each light switch and control shall be labeled with its corresponding electrical panel and breaker number. Labels shall be printed with black lettering on transparent background, no taller than 3/8 inch.
- B. A small renovation within an existing facility may use replacement-in-kind to match existing with the approval of NC State.

NC State University Design and Construction Guidelines

Division 26 Lighting

- C. Emergency Lighting
 - 1. All exit lights are to be the LED type.
 - 2. All emergency exit lighting shall be powered by batteries, unless the building emergency exit lighting is supported by generator power.

- D. Exterior Lighting – All lighting shall use LED luminaires and shall comply with the NC State Preferred Manufacturer’s List and bidding procedures.
 - 1. Design Standards for Pedestrian Areas - all campus paths, and the perimeter of courtyards and campus greens such as Mary Yarbrough Courtyard, Court of North Carolina, Scott Courtyard, University Plaza “The Brickyard,” and The Oval.
 - a) Average light levels shall be 1.0 foot-candle;
 - b) Uniformity of not more than 4:1;
 - c) No area less than 0.25 foot-candle;
 - 2. Design Standards for Campus Streets
 - a) Average light levels shall be 2.0 foot-candles;
 - b) Uniformity of not more than 5:1;
 - c) No area less than 0.40 foot-candle.
 - 3. Design Standards for Campus Parking Lots
 - a) Average light levels shall be 1.0 foot-candle;
 - b) Uniformity of not more than 3:1;
 - c) No area less than 0.30 foot-candle.
 - 4. Design Standards for Pole Bases
 - a) Pole bases shall be constructed using one of the following two options:
 - (1) Poured-in-place concrete – Poured in-place concrete bases shall have the following design parameters: Top of concrete 3” above grade; Chamfered edges; Conduit into bases shall be 90 degree rigid PVC or metal; Ground rod integral to the base; Bolt circle 9-14” in diameter depending on pole height; 3/4” diameter anchor bolts.
 - (2) Auger-type screw foundation – Auger-type bases shall have the following design parameters: 6” minimum hot dipped galvanized steel; 5’ long minimum; Hand hole approximately 18” below the pole anchor plate; bolt circle 9 - 14” in diameter depending on pole size; 3/4” diameter anchor bolts.
 - b) Pole bases shall be 2’ to 3’ beyond edge of pavement (sidewalk, streets, or parking surfaces) and in softscape. Placement in grassy areas shall be avoided or limited.
 - 5. All luminance intensity (candela) measurements shall be made on the horizontal plane with a certified light meter calibrated to NIST standards using traceable light sources. The calibration source shall be a color corrected CIE Illuminant A (2856 degrees Kelvin).
 - 6. Free standing bollard, cheek wall, step lights, or below grade fixtures are not acceptable, unless approved by NC State.

NC State University Design and Construction Guidelines

Division 26 Lighting

7. Correlated Color Temperature (CCT) of 4000K (nominal) lights are required.
8. Wall mounted lighting fixtures may be used in service areas where pole mounted lights are not possible. Fixtures shall be full cut off and of uniform design aesthetic.
9. Cast iron fluted poles and fixtures shall be salvaged for use by NC State.
10. Electrical components shall be a tray-mounted module that can be completely replaced by unplugging one connector and installing a new module.
11. Site lighting shall be connected on separate circuits and photocells or on a contactor installed on a building. Wiring shall be continuous between poles and contain no splices except at junction boxes located near the base of each pole. Conduits for lighting circuits shall be Schedule 40 PVC and continuous from pole to pole, hand hole, or junction vault. Conduit size shall be a minimum of 1" for single circuits or 2" minimum for multiple circuits. Each pole shall have a hand hole to provide access to wiring connections. Junction boxes shall be metal or composite material with the top labeled "ELECTRICAL."
12. The preferred system of exterior lighting controls is for every light fixture to have an integrated photocell. The photocell for the exterior lighting that is not mounted on poles shall be located not higher than 10 feet in an accessible exterior location for maintenance and in an area that receives adequate sunlight. Photocells shall be mounted in such a position that "light spill" from adjacent lights will not affect operation. Where photocells are not practical, timers shall be incorporated to control the operation of the lighting circuits.
13. Lighting poles shall be numbered. Each pole number shall be labeled on the pole with a permanent 1" x 8" aluminum label securely attached to the pole with adhesive 60" above the finished grade (+/- 6"). The numbering schedule shall be provided by NC State to coordinate with existing numbering methods.