

## Chapter 11. LIGHTING

### 11.1 Purpose and Intent

The purpose of this Chapter is to control light spillage and glare so as not to adversely affect motorists, pedestrians, and land uses of adjacent properties. Lighting intensities should be controlled to assure that excessive light spillage and glare are not directed at adjacent properties, neighboring areas, and motorists.

Levels of illumination to achieve a certain function or desired effect should also reduce or eliminate the hazardous aspects and nuisance of glare and light spillage. All exterior lighting, with the exception of street lighting, that is used around buildings, recreation areas, parking lots and signs, shall be designed to protect against the spillage of light to adjacent properties. Footcandles (FC) are always maintained unless specified otherwise.

### 11.2 Outdoor Lighting Standards

All outdoor lighting shall conform to the following standards:

- A. Outdoor lighting shall not shine directly into the yard or into the windows of an adjacent residence. In cases of elevated and non-elevated commercial sites that adjoin residential property, non-perimeter pole locations, fixture shielding and/or other prescriptive measures may be required as directed by the Administrator to reduce light trespass and glare.
- B. Outdoor lighting shall be designed in coordination with the landscaping plan (Section 16.8), located outside of landscaping islands, located as far from large shade trees as the landscaping plan will allow, and mounted at heights no greater than 18 feet above grade for pedestrian lights or 37 feet above grade for street or parking area lights.
- C. Pedestrian lights (those mounted at a height no greater than 18 feet above grade) are exempt from Section 11.2(D) and Section 11.2(E) below. These fixtures shall provide for uniform lighting distribution to produce minimal shadows, shall not exceed 9,500 lumens, shall be capped with a solid top to limit uplight and may be non-cutoff fixtures to provide adequate vertical illumination for safety and security.
- D. All outdoor lighting fixtures other than pedestrian lights and flood/spot lights that use a lamp or lamps at a total of more than 2,000 lumens shall be full-cutoff fixtures. Light sources may be located within the perimeter landscaped area and along pedestrian walkways providing Section 11.2(F) is met.
- E. Where permitted, any non full-cutoff outdoor lighting other than pedestrian lights, flood/spot lights that use a lamp or lamps rated at a total of 2,000 lumens or more shall be coated with an internal white frosting inside the outer lamp envelope to reduce glare.
- F. All outdoor lighting fixtures shall be designed and located such that the maximum light level shall be 0.5 maintained FC at any commercial to residential or group care facility property line. Any parking area lighting fixture within 200 feet of a commercial to residential or group care facility property line must also be shielded to reduce glare and light trespass. Parking area lighting fixtures within 25 feet of any

public street right-of-way or a commercial to residential/group care facility property line must be a forward throw fixtures (type IV light distribution as defined by IESNA). High intensity lighting fixtures that produce excessive glare are not allowed. See Section 11.3 for additional light level information.

**G.** Wall-mounted fixtures on buildings may be used at entrances to a building to light unsafe areas. They are not intended to provide general building or site lighting. Wall-mounted fixtures shall be fully shielded or full-cutoff to direct the light downward so the light source (lamp) is not visible from off-site. Low luminosity lamps (2,000 lumens or lower) are required unless justified otherwise through the planning approval process.

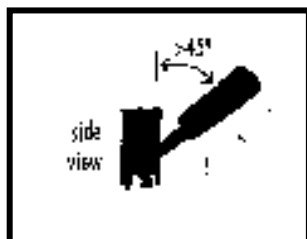
**H. Accent Lighting - Building, Landscaping and Signs:**

1. Accent lighting should be integrated with the architectural character of the building and must be approved through the planning approval process.
2. Low luminosity lamps (2,000 lumens or lower) are required unless justified otherwise through the planning approval process.
3. To avoid glare and light trespass, only cutoff or full-cutoff fixtures shall be used.
4. Shielding of fixtures must be added unless it is demonstrated as not needed due to the type of control of the distribution of light from the fixture(s) used.
5. Lighting fixtures used to illuminate outdoor advertising signs shall be mounted on the top of the sign structure whenever possible.

**I.** Flood/spot lights are prohibited unless they meet the following criteria:

1. All flood/spot lights shall be installed such that the fixture shall be aimed down at least 45 degrees from vertical.
2. Flood/spot lights shall be positioned such that any such fixture located within 50 feet of a public right-of-way is mounted and aimed perpendicular to the right-of-way, with a side-to-side horizontal aiming tolerance not to exceed 15 degrees from perpendicular to the right-of-way.
3. Flood/spot lights shall not be aimed at residential property.
4. Shields shall be added as needed for conformity to this Section.

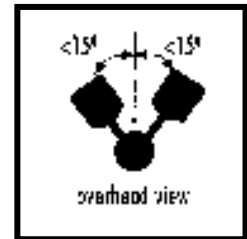
*Fixture Angle*



*Fixture Aim*



*Fixture Spread*



**J. Vehicular Canopies and Gas Station/Convenience Store Aprons:**

Areas under a vehicular canopy and the approach to the canopy shall have an average horizontal illumination as specified in the table in Section 11.3 (B) “Other Outdoor Areas” and as measured at ground level. Lighting under vehicular canopies shall be designed so as not to create glare off site. Acceptable methods include one or more of the following:

1. Recessed fixture incorporating a lens cover that is either recessed or flush with the bottom surface of the vehicular canopy.
2. Surface mounted fixture incorporating a flat lens that provides a fully shielded light distribution.
3. Other method approved by the Administrator.
4. Lights shall not be mounted on the top or sides (facia) of the canopy, and the sides of the canopy shall not be externally illuminated.



- K. Canopies used for building accents over doors, windows, etc. shall not be internally lit (i.e. from underneath or behind the canopy).
- L. No flickering, rotating, flashing lights or search lights shall be permitted.
- M. Gas powered lighting may be used for decorative purpose only and are not used to satisfy the requirements of the Section.
- N. Neon, argon or similar tubes shall not be used as a source of lighting except as provided for signs in Chapter 12.

**11.3 Design Procedures**

The maximum permitted points of illumination shall be measured from ground level in accordance to the standards expressed in this Chapter. The following standards shall be required of all exterior lighting with the exception of public street lighting which is exempt.

The quantity of fixtures to be provided shall be based upon the desired level of uniform illumination as established by the following table and current standards of the IESNA. Fixture locations should be chosen to minimize the hazard of glare and to minimize conflicts with the landscaping plan as stated in Section 11.2(B).

The level of illumination shall be based upon the primary activity in each area to be lighted as outlined below.

**A. Open Parking Facilities**

For lighted parking lots, the minimum light level shall be no less than 0.2 FC. All light levels are measured at ground level. The minimum light level requirements vary depending on the use/task classification. The specified minimum FC value above 0.2 FC as outlined in the following table means that the lowest light level point or location in the parking lot must not exceed the minimum stated FC value in the table (i.e. 0.9 FC for large shopping centers). An average to minimum uniformity ratio of 4:1 means that the average FC to minimum FC ratio cannot be worse (higher) than 4:1. See the following table:

<b>Light Levels for Open Outdoor Parking Facilities*</b>		
<b>Use/Task</b>	<b>Maintained Footcandles</b>	<b>Uniformity Avg/Min</b>
<b>(a) Parking, residential, multi-family</b> <ul style="list-style-type: none"> <li>• Low to medium vehicular/pedestrian activity</li> </ul>	Range from 0.2 FC Min to 0.7 FC Min	4:1
<b>(b) Parking, industrial/commercial/institutional/municipal</b> <ul style="list-style-type: none"> <li>• High activity, i.e. large shopping centers/fast food facilities, major athletic/civic cultural events</li> </ul>	0.9 FC Min	4:1
<ul style="list-style-type: none"> <li>• Medium/low activity, i.e. community shopping, office parks, hospitals, commuter lots, cultural/civic/ recreational events, residential neighborhood shopping, industrial employee parking, schools, church parking</li> </ul>	Range from 0.2 FC Min to 0.7 FC Min	4:1

\* Source: IESNA 8<sup>th</sup> Edition Lighting Handbook with modifications

Notes: 1. Illumination levels are horizontal on the task, e.g. at grade or area surface.

2. Uniformity ratios dictate that average illuminance values shall not exceed minimum values by more than the product of the minimum value and the specified ratio. For example, for commercial parking medium/ low activity, the average footcandles shall not be in excess of 2.8 (0.7 x 4).

3. The Administrator shall be responsible for determining the activity level of a development. Applicants may appeal this decision to the Land Use Review Board.

**B. Other Outdoor Areas**

Use	Maximum Illumination Allowed ( <i>Avg. Footcandles Maintained</i> )*
<b>VEHICULAR CANOPIES (Service Stations)**</b>	
Approach	10
Gas Pump Island	30
<b>BUILDING EXTERIORS</b>	3
<b>OUTDOOR DISPLAY AREAS (i.e. CAR LOTS)**</b>	
Merchandise (Lot)	30
Feature (Front Row)	5
<b>TRACTOR TRAILER STORAGE AREAS</b>	10
<b>PUBLIC ENTRANCES</b>	5
<b>EMPLOYEE OR OTHER ENTRANCE</b>	3
<b>VITAL LOCATIONS OR STRUCTURES</b>	6
<b>BUILDING SURROUNDINGS</b>	2

*\* Footcandles are for a “typical application” per IESNA 9<sup>th</sup> Edition Handbook. Adjustments may be required depending on specific circumstances and would require approval from the Administrator.*

*\*\* Source: IESNA RP-2-01*

**11.4 Outdoor Recreational Lighting**

Because of their unique requirements for nighttime visibility and limited hours of operation, the lighting of active recreation areas, such as ball fields and tennis courts, are not considered in this Chapter. However, lighting fixtures for such uses shall be mounted and aimed so that the illumination falls within the primary playing area and immediate surroundings and so that no direct light illumination is directed off site. Under all circumstances, lighting used for active recreational purposes shall not go beyond 11:00 p.m.

**11.5 Street Lighting Policy**

Street lighting shall be placed on all streets by the developer to allow for the safe use of streets by both cars and pedestrians. Developers requesting upgrades from the Town’s minimum street light specification of a fiberglass pole with a full cutoff cobra head fixture shall pay the Town up front the difference in the costs of maintenance for the desired fixture and pole covering a period of 10 years. Developers interested in pursuing this option should consult with the Administrator on the Town’s “Premium Lighting Policy”. All street lighting shall be placed in accordance with the following minimum design standards:

- A.** Minimum average street light spacing:
  1. Single Family Homes and Duplex lots (greater than 100 feet wide): 500 feet
  2. Single Family Homes and Duplex lots (less than 100 feet wide): 300 feet
  3. Multi-Family Uses: 150 feet
  4. All other uses: 300 feet

- B. Lumens for street lights:
  - 1. Local Streets: 9,500 lumens (100 watts)
  - 2. Collector Streets in Residential Areas: 16,000 lumens (150 watts)
  - 3. Collector Streets in Other Areas: 28,500 lumens (250 watts)
  - 4. Arterial Streets: 28,500 lumens (250 watts)
- C. Lighting shall be placed at street intersections and is preferred at street curves.
- D. Lighting shall be placed as far from street trees as the landscaping plan will allow.
- E. Although the primary purpose of street lighting is to provide adequate lighting for the roadway, street lighting should also promote pedestrian safety. Therefore, lighting should be placed in a manner to minimize the casting of shadows on sidewalks.
- F. All lighting shall utilize a full cut-off fixture, except where specified and authorized previously in this Chapter.
- G. Alleys are excluded from the spacing and placing requirements of this Chapter.

(Note: for additional information on the connectivity and circulation of streets, please refer to Chapter 9.)

## 11.6 Administration

### A. Measurement

Light level measurements shall be made at the property line of the property upon which the light to be measured is being generated. If measurement on private property is not possible or practical, light level measurements may be made at the boundary of the public street right-of-way that adjoins the property. Measurements shall be made at finished grade (ground level), with the light-registering portion of the meter held parallel to the ground and pointing upward. Lighting levels are to be measured in FCs with a direct-reading portable light meter. The meter sensor shall be mounted not more than six (6) inches above ground level in a horizontal position. The meter shall have cosine and color correction and have an accuracy tolerance of no greater than plus or minus five (5) percent. Measurements shall be taken with a light meter that has been calibrated within the last two (2) years.

### B. Lighting Plan

Any person submitting a site plan or applying for a building, electrical, or sign permit to install outdoor lighting fixtures shall submit evidence that the proposed work will comply with this Chapter. Please refer to Section 16.9 for lighting plan requirements.

### 11.7 Exemptions

- A. Lighting of the United States of America or State of North Carolina flags and other non-commercial flags expressing constitutionally protected speech.
- B. Circus, fair, carnival, or other similar civic/community events.
- C. Construction and emergency lighting are exempt from the provisions of this Chapter provided said lighting is temporary and is discontinued immediately upon completion of the construction work or abatement of the emergency necessitating said lighting.
- D. Underwater lighting used for illumination of swimming pools and fountains is exempt from shielding standards.
- E. Holiday decorations lighting (i.e. Christmas trees and lighting).

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