Lighting

10.1 PURPOSE AND APPLICABILITY

10.1.1 PURPOSE

The standards set forth in this section are designed to focus on the actual physical effects of lighting, as well as the effect that lighting may have on the surrounding neighborhood. It is the intent of this section to:

A. Minimize light pollution, such as glare and light trespass.

B. Conserve energy and resources.

C. Maintain night-time safety and utility.

D. Improve the night-time visual environment.

10.1.2 APPLICABILITY

Unless otherwise specified, this section shall apply to all development in the Town of Wake Forest which requires an application and/or UDO approval as specified in this ordinance. This includes, but is not limited to, changes of use, building expansions/reconstruction and parking area expansions for existing development according to the provisions in Section 13.1. The notable exception shall be any Planned Unit Development District, which may create its own lighting standards through the PUD Concept Plan.

10.1.3 NONCONFORMING LIGHTING

Any nonconforming lighting fixture lawfully in place or approved by the town prior to the adoption of this ordinance shall be exempt from these requirements. Routine maintenance, including changing the lamp, ballast, starter, photo control, lens, and other required components, is permitted for all existing fixtures. At the time that a nonconforming fixture, which was installed prior to the adoption of this ordinance, is replaced, moved, upgraded, or otherwise changed, the fixture must be replaced by a fixture that is in compliance with this ordinance and the NC Energy Code.

10.2 PROHIBITIONS AND EXEMPTIONS

10.2.1 PROHIBITIONS

The following lighting types shall be prohibited within the jurisdiction of the Town of Wake Forest:

A. The use of laser source light or any similar high intensity light for outdoor advertising or entertainment is prohibited.

B. The operation of searchlights for advertising purposes is prohibited.

C. Site lighting that may be confused with warning, emergency, or traffic signals is prohibited.

D. Lights that flash, move, revolve, rotate, scintillate, blink, flicker, vary in intensity or color, or use intermittent electrical pulsation are prohibited.

E. Awnings and canopies used for building accents over doors, windows, and etc. shall not be internally lit (i.e. from underneath or behind) so as to visually turn a translucent material into an internally illuminated material. Lighting may be installed under canopies that light the sidewalk, or downlights onto the architectural features of a building.

10.2.2 EXEMPTIONS

The following exemptions shall be granted from the requirements of this section:

A. Luminaires used for public-roadway illumination may be installed at a maximum height of 37 feet and may be positioned at that height up to the edge of any bordering property.

B. All temporary emergency lighting needed by the Police or Fire Departments or other emergency services, as well as all vehicular luminaires, shall be exempt from the requirements of this ordinance.

C. All hazard warning luminaires required by Federal regulatory agencies are exempt from the requirements of this article, except that all luminaires used must be red and must be shown to be as close as possible to the federally required minimum lumen output requirement for the specific task.

D. Individual residential lighting that is not part of a site plan or subdivision plan for street or other common or public area outdoor lighting.

E. Lighting associated with holiday, festival or other temporary uses permitted in Section 4.7.

F. Lighting of public art that has been permitted or otherwise approved by the town.

G. Other Municipal or State lighting installed for the benefit of public health, safety, and welfare.

H. All fixtures installed or temporarily used by public agencies, their agents, or contractors for the purpose of illuminating public streets.

I. Lighting of US and North Carolina State Flags provided the flag standard does not exceed the maximum permitted building height for that district.

10.3 DESIGN STANDARDS

10.3.1 GENERAL DESIGN STANDARDS

A. Background spaces such as parking lots and driveways shall be illuminated as unobtrusively as possible to meet the functional needs of safe circulation and of protecting people and property.

B. Foreground spaces, such as building entrances and plaza seating areas, shall utilize lighting that defines, highlights, or enhances the space without glare.

C. The style of light standards and fixtures shall be consistent with the style and character of architecture proposed on the site.

D. Light poles and fixtures shall be of a matte or low-gloss grey, black, dark earthen, or bronze finish, unless permission is granted by the Administrator for a special color scheme or theme.

E. No outdoor pole lighting fixture shall be located within any required landscape buffer yard or street yard, except for those lighting encroachments permitted by Section 4.3.4.

F. Unique areas or neighborhoods within the jurisdiction, such as but not limited to any locally designated municipal historic district, any National Register historic district, and downtown Wake Forest, may have additional design standards for lighting.

G. Light sources must be compatible with the light produced by surrounding uses and must produce an unobtrusive degree of brightness in both illumination levels and color temperature.

H. Natural areas and natural features shall be protected from light spillage from off-site sources.

I. All exterior lighting, on or off a building, shall be either amber or white in color (per the district lighting standards in chart 10.3.2.A), with the exception of low-light output (800 lumens or lower) landscaping or other decorative lighting, signage lighting, or customer entrance or service area lights aiming down and installed under a canopy or similar roof structure.

10.3.2 DISTRICT LIGHTING STANDARDS IN FOOTCANDLES (FC)

A. Maximum lighting levels shall adhere to the standards in the chart below. All numerical values in the chart below represent measurements in footcandles.

	OS, RD, GR3, GR5	GR10, UR, RMX	NMX, RA-HC, UMX, NB, ICD	HB, LI, HI
Light Trespass Off Property	0.1	0.3	0.8	1
Display/Canopy Areas	8	12	20	20
Parking Areas	4	4	6	6
All Other On-Site Lighting	4	6	10	10

1. The values in the preceding chart for "All Other On-Site Lighting" and "Display/Canopy Areas" shall represent the maximum point of illuminance measured at grade in footcandles.

a. Exception: Outdoor display lots for vehicle sales and leasing may exceed 20 foot-candles if outdoor white lighting is cut off, leaving only security lighting that is amber in color (a temperature rating equal to or less than 2,700 Kelvin), after closing or 11:00 p.m., whichever comes earlier.

2. The values of the preceding chart for the "Light Trespass Off Property" shall represent the maximum point of illuminance as measure at the propery line in footcandles.

a. Exception: In the case of buildings closer than 10 feet to the property line using only wall packs, light trespass may be greater than one foot-candle as long as the wall packs are fully shielded to direct the light downward, have a light output of 1,600 lumens or lower, and the light source (lamp) is not visible from off-site.

3. The values of the preceding chart for "Parking Areas" shall represent the average point of horizontal illuminance measured in footcandles, provided that in all districts the maximum uniformity ratio shall be 4:1 minimum to average.

10.3.3 CONTROL OF GLARE – LUMINAIRE DESIGN FACTORS

A. Pole light fixtures shall have a flat lens oriented horizontally or have shields installed on each side of the fixture to hide the lens.

B. Any luminaire shall be a full-cutoff type fixture.

C. Any luminaire shall be mounted at a height equal to or less than 30 feet above finished grade.

D. The maximum mounting height of all outdoor lighting with a 90 or less degree cut-off fixture shall be 30 feet. The maximum mounting height of all outdoor lighting without a full 90 degree or less cut-off fixture shall be 16 feet. Poles may be mounted on a concrete pier of no more than 3 feet in height.

E. Poles shall be matte or low-gloss finish to minimize glare from the light source.

F. Other than floodlights, flood lamps, and spotlights all outdoor lighting fixtures of more than 2,000 lumens shall be full-cutoff type fixtures. Any fixture that is not full-cut off shall be a directional fixture (such as flood lights) and may be used provided they shall be aimed and fully shielded to prevent light spillage.

G. Exceptions to Paragraphs A through F above:

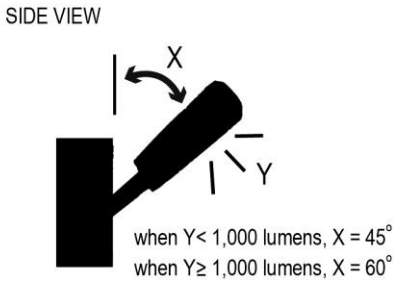
1. Non-cutoff decorative post-mounted fixtures equipped with a solid top and mounted 18 feet or less above ground and other non-cutoff dusk to dawn utility type fixtures mounted 25 feet or less may be used. The maximum initial lumens generated by each fixture shall not exceed 9500 initial lamp lumens.

2. All metal halide, mercury vapor, fluorescent, and other white-colored light source lamps used in non-cutoff fixtures (excluding flood lights) shall be coated with an internal white frosting inside the outer lamp envelope.

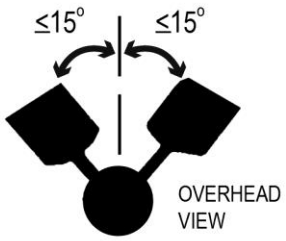
10.3.4 SECURITY LIGHTING

A. Unshielded flood lights and spotlights, installed for security and activated by motion sensor, are permitted. These unshielded lights must be mounted and aimed in a manner that minimizes up-lighting and light trespass.

B. All floodlights shall be installed such that the fixture shall be aimed down at least 45 degrees from vertical. All flood or spot lamps emitting 1,000 or more lumens shall be aimed at least 60 degrees down from vertical or shielded such that the main beam from the light source is not visible from adjacent properties or the public street right-of-way.



C. Flood lights and display lights shall be positioned such that any such fixture located within 50 feet of a public street 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.



10.3.5 LANDSCAPE LIGHTING

Landscape and decorative lighting using incandescent lighting with a light output of 800 lumens or less is permitted, provided that the light is installed and aimed to prevent lighting build up and light trespass and shielded to prevent view from the public right of way.

10.3.6 OUTDOOR RECREATIONAL LIGHTING

Because of their unique requirements for nighttime visibility and their limited hours of operation, ball fields, basketball courts, tennis courts, outdoor performance areas and similar recreational uses are exempt from the exterior lighting standards provided above. However, these uses shall adhere to the requirements below.

A. Outdoor recreational lighting shall not exceed a maximum permitted post height of 80 feet. The Administrator may set a shorter maximum pole height if the specific recreational use does not require the taller pole.

B. Lights shall be shielded and positioned so as not to shine onto adjacent roadways or properties.

C. All fixtures shall be fully shielded or be designed or provided with Manufacturer's Glare Control Package, so as to minimize up-light, spill-light, and glare.

D. Fixtures shall be designed and aimed so that their beams fall within the primary playing area and the immediate surroundings, so that off-site direct illumination is significantly restricted. The maximum permitted illumination at the property or right-of-way line shall not exceed 2 foot-candles and all lights, except for any amber color (a temperature rating equal to or less than 2,700 Kelvin) security lights, shall be cut off after use.

10.3.7 STREET LIGHTING

Street lighting shall be placed on all streets to allow for the safe use of streets by both cars and pedestrians. All street lighting shall be placed in accordance with the following minimum design standards:

A. Street Light Spacing: Minimum average street light spacing shall be adequate to protect the public safety in the district in which the development is located according to the standards of the Wake forest Public Works Department.

B. Roadway Illumination Requirements: The roadway illumination requirements shall be enforced according to the Town Street Classifications in Section 6.7.2 as outlined in the table below adapted from the most recent edition of the Illumination Engineering Society of North America, "Lighting Handbook."

	Boulevard	Avenue	Commercial Street	Residential Street	Lane
Minimum Average Maintained Illuminance	.8 footcandles	.8 footcandles	.6 footcandles	.3 footcandles	.3 footcandles
Uniformity Ratio*	3 to 1	3 to 1	3.5 to 1	6 to 1	6 to 1

* *Uniformity Ratio is the average maintained illuminance (in footcandles) of the roadway design area divided by the lowest value for illuminance (in footcandles) at any point in the area.*

C. Lighting shall be placed at all street intersections and is preferred at street curves.

D. Pedestrian-scaled street lighting (no taller than 18 feet) shall be required in the NMX, RA-HC, UMX, NB, and ICD districts, using decorative fixtures of a similar character to those existing in these districts (see images at right).

E. Pedestrian-scaled lighting (no taller than 18 feet) shall be prioritized over automobile lighting in all districts. Lighting shall be placed in a manner to limit the casting of shadows on sidewalks.

F. All street lights shall utilize a cutoff fixture. Where buildings are close to the street (less than 15 feet from the right-of-way), full cutoff fixtures are required to limit glare and light spillage on upper levels.

G. Alleys are excluded from the spacing and lighting requirements of this section.

10.3.8 ADDITIONAL LIGHTING USE REGULATIONS FOR SPECIFIC AREAS

A. Building Façade Lighting

1. Floodlights, spotlights, or any other similar lighting shall not be used to illuminate buildings or other site features unless approved as an integral architectural element on the development plan.

2. On-site lighting may be used to accent architectural elements but not used to illuminate entire building(s).

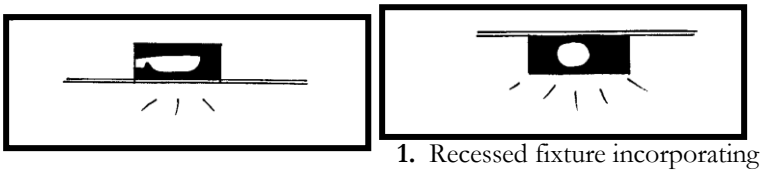
3. Where accent lighting is used, the maximum illumination on any vertical surface or angular roof surface shall not exceed 5.0 average maintained footcandles.

4. Building facade and accent lighting will not be approved unless the light fixtures are selected, located, aimed, and shielded so that light is directed only onto the intended target and spillover light is minimized.

5. Wall packs on buildings may be used at entrances to a building to light unsafe areas, but must be fully shielded to direct the light downward, must have a light output of 1,600 lumens or lower, and the light source shall not be visible from off-site.

B. Outdoor Display Areas: The mounting height of outdoor display area fixtures shall not exceed 30 feet above finished grade.

C. Lighting for Vehicular Canopies: 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. (See top right)

2. Surface mounted fixture incorporating a flat lens that provides a cutoff or shielded light distribution. (See bottom right)

3. Other methods approved by the Administrator.

10.4 ADMINISTRATION

10.4.1 LIGHT MEASUREMENT TECHNIQUE

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 of the complainant or at any other location on the property of the complainant. Measurements shall be made at finished grade (ground level), with the light-registering portion of the meter held parallel to the ground pointing up. The meter shall have cosine and color correction and have an accuracy tolerance of no greater than plus or minus 5%. Measurements shall be taken with a light meter that has been calibrated within the year. Light levels are specified, calculated and measured in footcandles (FC). Foot-candles (FC) can be calculated by dividing the lumens (L) by the distance squared (D2) (i.e. F = L / D2).

10.4.2 COMPLIANCE

A. Lighting plans required as part of a site construction plan shall include, at a minimum, the following information:

1. Point-by-point footcandle arrays in a printout format indicating the location and aiming of illuminating devices. The printout shall indicate compliance with the maximum maintained footcandles required by this ordinance.

2. Description of the illuminating devices, fixtures, lamps, supports, reflectors, poles, raised foundations and other devices (including but not limited to manufacturers or electric utility catalog specification sheets and/or drawings, and photometric report indicating fixture classification [cutoff fixture, wall pack, flood light, etc.]).

3. After installation of on-site lighting, a certification of compliance statement must be submitted to the Administrator prior to the issuance of a Certificate of Occupancy.

B. Subsequent phases of an entire development shall have a uniform design plan for lighting and fixtures. New phases must meet all requirements in effect at the time of obtaining a permit, but lighting plans must consider preexisting lighting in earlier phases, both in design and intensity of light.

This page intentionally left blank