CITY OF GAINESVILLE
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FLORIDA

POLICE DEPARTMENT
Inter-Office Communication

Date: 01/27/14

To: Community Development Committee

From: Sgt. Jaime Kurnick #497

Subject: CPTED Lighting Recommendations

The Crime Prevention Through Environmental Design Committee (CPTED) at the Gainesville Police Department recommends the use of lighting in areas that are traveled by pedestrians and vehicles. There are several important components of lighting which include uniformity of lighting, placement of lighting, and the type of lighting used.

Uniformity of lighting: Lighting should be uniformly spread to reduce contrast between shadows and illuminated areas. It is of the most vital importance to have no dark spots where the lighting lapses to provide a constant illumination of an area for safety.

Placement of lighting: The lights should be placed where the light overlaps each other to provide the uniformity of light. Lights should no be placed within 25-30 feet of any trees or shrubs which obstruct the light at the time of placement or in the future. A common problem with lighting is that the trees mature and totally encompass the light which renders them obsolete in as few as 5 years. When the light is encompassed in the tree, it affects the uniformity of light and potentially creates a safety hazard. If the lights are designed for pedestrian lighting, the design of the lights should be furnished to light pedestrian paths such as lighted bollards or poles that are lower to the ground around 15feet in height. The taller poles are meant for roadways and large scale parking lots.

Types of lighting: In our training to be CPTED practitioners, the type of lighting that is highly recommended is referred to as white light source which includes metal halide fixtures and LED fixtures. LED fixtures are the most energy efficient which produce the same lighting as other fixtures with a lower foot candle reading to reduce light trespass issues. These fixtures provide a light which does not distort colors. Other lighting sources (such as high pressure sodium) produce a yellow hue which can often distort colors which can prove to be problematic when it comes to identification of criminals during investigations. Other types of lighting have been commonly used by the City of Gainesville and they are effective also (high pressure sodium, metal halide).

An example of a LED project in the City Of Gainesville:

The Department Of Public Works has installed LED light fixtures along SE 1st street from SE 1st Avenue to SE 2nd Place in front of the Harry's Restaurant and the Hampton Inn. The lighting in this area is a white light source which provides more than adequate lighting to that area. The Average light meter reading for this area exceeds our recommended standards and provides an inviting atmosphere. Other Cities throughout the nation are utilizing LED lights for their infrastructure and have completed studies on their effectiveness. I have included a study from Raleigh, North Carolina and the City of Tampa – Site Lighting Standards to accompany this document.

Ordinance Modification Recommendations: The CPTED Committee's recommendations are to include that a photometric plan be included for all buildings, even if it is just indicated daytime use. With daylight savings time, it stays dark longer and gets dark sooner which would typically create a safety risk for individuals entering or leaving a building. There should be no daytime exemption from lighting because most of all newly constructed structures have lighting on the walls of the building and in the parking areas. The building might also be created without a purpose at night and it later may be used in the evening hours.

A standard of lighting which is called foot candles or lumens should be used to create a standard of uniformity for the lighting. I have included the City of Tampa's lighting ordinance which was proposed from a CPTED perspective. The ordinance recommends a certain foot candle measurement for different property types. This would be a great document to assist in the establishment of a standard for foot candles for different projects. (see attached table)

Also in the ordinance, pole heights are addressed for pedestrian areas and parking lots (15 feet-pedestrian walkways, 30 feet- Parking lots). The ordinance has a description of light types which are the acceptable types per their ordinance to include: incandescent, fluorescent, metal haylide, or color corrected high pressure sodium lights. At the creation of this ordinance, LED was a brand new technology so it was not included. We would recommend adding that as well.

We would recommend following the guidelines previous established by the City of Tampa for the lighting ordinance modifications. They encompass all the CPTED principals which are followed worldwide. This would help develop the City of Gainesville's infrastructure by implementing CPTED principals to make it a safe place to visit and live.

LED Street Lighting Test Project Report
April 13, 2009

Progress Energy Carolinas (PEC) installed nine LED test fixtures in October, 2008 on the 100 block of East Davie Street in downtown Raleigh in front of the Two Progress Plaza building and other businesses on this block. Two 200-watt and seven 250-watt high pressure sodium (HPS) street light fixtures were removed and nine 167-watt LEDway™ fixtures from BETA Lighting were installed on a one-for-one replacement basis using the existing pole locations and mounting height. Since the installation, PEC has observed the fixtures for proper operation. Light level (footcandle) readings were taken with the HPS and the LED fixtures and a point-by-point footcandle calculation has been prepared for the LED system.

Before and after photos of the lighting on Davie Street:

BEFORE (HPS)

AFTER (LED)

Technical findings:

- 51% footcandle reduction measured at selected points on the street with LED lighting
- 8% footcandle reduction measured at selected points on the sidewalks with LED lighting
- 43% footcandle reduction as calculated on the entire street with LED lighting
- 42% wattage reduction with LED lighting
- Uniformity (average to minimum) improved per calculations with LED lighting

100 Block of E. Davie Street with LED Lighting
Raleigh, NC

Lighting specifications:

- Each LED fixture is equipped with 60 LEDs and driven at 700 milliamps
- Current fixture cost: HPS fixture ~ $70 each; LED fixture ~ $485 each
- Billing for these test fixtures remained at the HPS rate for the City of Raleigh in lieu of having a filed rate tariff to recover the cost of the fixture. The N.C. Utilities Commission was made aware of this special billing treatment while the LED fixtures were under evaluation.

Progress Energy's observations to date:

- Visibility (to the eye) on Davie Street has improved.
- No operations problems have been observed to date with the LED fixtures.
- The installation of fixtures by linemen was easy with linemen commenting that the fixtures were lighter, more balanced and easy to install.
- The grounding wire added by Progress Energy linemen helped the fixture to meet National Electric Safety Code requirements. Feedback was provided directly to Beta for this improvement.
- The surge protection device (MOV Class C) added by Beta is a necessary protection device for the electronics in the fixture.

Progress Energy's conclusions:

- The Beta LEDway™ fixture is a viable fixture substitute for HPS cobra head fixtures. It is manufactured to utility grade fixture standards with tool-less entry.

- Progress Energy will test a more expensive photocontrol that has been designed for use with LED fixtures. It ignores stray LED light and is in line with the anticipated life of the LEDway™ fixture, light source, and driver. The objective is to reduce maintenance trips due to the extended light source life.

- While the LED light source anticipates less maintenance trips over its life, the industry has no long term maintenance experience with the performance of LED streetlights on an electrical distribution system. As with any fixture, maintenance will still be required for wires, brackets, knockdowns, adjustments, periodic cleaning, animal damage, pole maintenance, and potentially earlier fixture replacement (12 – 15 years) vs. today's replacement cycle of 20-25 years.

- Color improvements with a blue-white light and improved uniformity causes the overall visibility on Davie Street to improve for this application of LED fixtures on the existing pole spacings and mounting heights even though 43% less footcandles are present on the roadway.

- Improvement in visibility with LED lighting is currently under study by the lighting industry to assess whether and to what degree lower footcandle requirements are warranted. There is not industry consensus to date on this LED lighting standard. Without a revision of the existing industry standards there will likely be an adverse impact on the cost of LED lighting for DOT and other roads due to additional poles/light fixtures required to meet current adopted standards. Progress Energy and many others are working with the Illuminating Engineering Society to address this issue.

- Progress Energy should begin development of a tariff rate to offer an LED street lighting alternative to municipalities (using the approved LEDway™ product or an approved equivalent).

Prepared by: Robert L. Henderson, LC, CLEP

City of Tampa- Site Lighting Standards

Sec. I- Non-residential site lighting.

A. Definitions.

(1) "Exterior lighting" shall be defined as illumination emanating from any source, including walkways, marquees, and hallways exposed toward the property line.

(2) "IESNA"- Illuminating Engineering Society of North America

(3) "LLF"- lost lighting factor

(4) "One foot-candle" shall be defined as the amount of illumination provided by one lumen uniformly distributed on one square foot of surface.

(5) "Uniformity" refers to the evenness of the distribution of light on the surface. Uniformity standards have been established by the IESNA.

(6) "CPTED" The abbreviation referring to Crime Prevention Through Environmental Design. This unit of the Tampa Police Department helps to reduce crime, improve neighborhoods and business environments and improve the quality of life of its citizens by utilizing the CPTED principle *"the proper design and effective use of the built environment can lead to a reduction in the incidence and fear of crime and improvement in the quality of life."*

B. General provisions. Non-residential and multiple family buildings and projects, including their out parcels, shall be designed to provide safe, convenient, and efficient lighting for pedestrians and vehicles. Lighting shall be designed in a consistent and coordinated manner for the entire site. The fundamentals of CPTED are encouraged to be utilized in all principles of lighting occurring within the City of Tampa. The lighting and lighting fixtures shall be integrated and designed so as to enhance the visual impact of the project on the community/ neighborhood and/or should be designed to blend into the surrounding landscape. Lighting design and installation shall ensure that lighting accomplishes on-site lighting needs without intrusion on adjacent properties.

C. Applicability.

(1) *New development.* These regulations shall apply to all new non-residential or multiple family development. A site lighting plan shall be required to demonstrate compliance with these regulations to be submitted at time of permitting.

(2) *Expansion and remodeling.* These regulations shall apply to any expansion or remodeling of existing non-residential or multiple family developments that exceed 50 percent of the structures' assessed valuation as per the Property Appraisers Office. A site lighting plan shall be required to demonstrate compliance with these regulations, and shall be submitted with the appropriate documents for permitting. Assessed valuation shall be determined by reference to the official property tax assessment rolls of the year the structure(s) is to be remodeled.

(3) *Repair and maintenance.* These regulations shall apply to replacement of individual lighting fixtures in any non-residential or multiple family development.

D. Site lighting design requirements.

(1) *Fixture (luminaire)* The light source shall be completely concealed within an opaque housing and shall not be visible from any street right-of-way or adjacent properties. The light source shall be horizontal to the ground. A maximum fifteen (15) degree angle is permitted if the light source is not visible and the angled direction does not face a residential zoned district or property.

(2) *Fixture height limitations.*

(a.) Ten (10) feet in single-family, two-family, cluster, and agricultural zoned districts. Seventeen and one-half (17-1/2) feet shall be permitted for tennis court lighting.

(b.) Twenty-two and one-half (22-1/2) feet in multi-family residentially zoned districts.

(c.) Twenty (20) feet within that portion of commercial and industrially zoned districts located within fifty (50) feet of residentially zoned property and 35 (35) feet for those sites more than fifty (50) feet from residentially zoned property.

Lighting fixtures shall be a maximum of 30 feet in height within the parking lot and shall be a maximum of 15 feet in height within non-vehicular pedestrian areas.

(3) *Light source (lamp).* Only incandescent, florescent, metal halide, or color corrected high-pressure sodium may be used. The same light source type must be used for the same or similar types of lighting on any one site throughout any development.

(4) *Mounting.* Fixtures shall be mounted in such a manner that the cone of light is contained on-site and does not cross any property line of the site.

(5) *Limit lighting to periods of activity.* The use of sensor technologies, timers or other means to activate lighting during times when it will be needed are required.
(6) *Illumination levels.*

(a.) All site lighting shall be designed so that the level of illumination as measured in foot-candles at any one point meets the standards in the table below. Light levels shall utilize a .72 LLF.

TABLE INSET:

	Lighting Level (foot-candles)		
Type of Lighting	Minimum	Average	Maximum
Architectural lighting	0.0	1.0	5.0
Canopy area lighting	2.0	10.0	20.0
Multiple family parking lots and garages	0.2	1.0	8.0
Nonresidential and multiple family entrances	1.0	5.0	15.0
Nonresidential parking lots and garages	0.2	3.5	15.0
Storage areas (security lighting)	0.2	1.0	10.0
Vehicle sales and display	0.2	5.0	20.0
Walkways, landscape or decorative lighting	0.2	1.0	5.0

(b.) Minimum and maximum levels are measured on the pavement within the lighted area. Average level is the overall, generalized ambient light level, and is measured as a non-to-exceed value calculated using only the area of the site intended to receive illumination.

(c.) Lighting for automated teller machines shall be required to meet the standards of F.S. Statute 655.962.

(d) Lighting for "convenience business" shall be required to meet the standards of F.S. Statute 812.171.

(e.) *Excessive illumination.*

(1) Lightning within any lot that unnecessarily illuminates and substantially interferes with the use or enjoyment of any other adjoining lot is prohibited. Lighting unnecessarily illuminates another lot if it clearly exceeds the requirements of this section.
(2) All outdoor lighting shall be designed and located such that the maximum illumination measured in foot-candles at the property line does not exceed 0.2 on adjacent residential sites, and 0.8 on adjacent commercial sites and public rights-of-way.
(3) Lighting shall not be oriented so as to direct glare or excessive illumination onto streets in a manner that may distract or interfere with the vision of drivers on such streets.
(4) Fixtures used to accent architectural features, landscaping or art shall be located, aimed or shielded to minimize light spill into the night sky.
(5) Illumination using illuminated tubing or strings of lights that completely outline or define property lines, sales areas, roofs, doors, windows or similar area in a manner that is not primarily for safety purposes, as determined by the director of building, zoning and code enforcement, is prohibited. However, this shall not be construed to preclude holiday/seasonal light displays or art in public places as approved by the City prior to submission for permit.

(e) *Site lighting submission requirement:* Development shall submit a site plan with a point-by-point photometric grid superimposed over the site that clearly indicates the proposed site improvement lighting levels. A fixture legend indicating the fixture type and fixture mounting height shall be located on this drawing. Two (2) separate copies of the site lighting plan shall be submitted at the time of or before the final building or site development is submitted for permit. Submission shall be signed and sealed by the

engineer of record, and shall be made to the Commercial Development Services Division at the time of permit application.

(f) *Large scale project review:* The CPTED unit of the Police Department offers to developers of large scale projects a review for compliance with the principles of CPTED strategies to promote a safe public environment.

(f) *Construction Certification:* The engineer of record shall perform a field inspection of the final installation of the site lighting as indicated on the approved site lighting plan and shall certify that the installation conforms to the approved site photometric plan. This certification shall be submitted to the City of Tampa prior to the final certificate of occupancy is granted for the project.