000516

CITY OF GAINESVILLE

Department of Community Development

TO: City Plan Board

DATE: March 15, 2001

FROM: Planning Staff

SUBJECT: 147TCH-00PB

At the January 18, 2001 Plan Board meeting, the Board continued the above referenced petition with the recommendation that the Gainesville Police Department be contacted on safety issues and staff review the concept of an adjacent use matrix for lighting. In addition to the staff report, attached is a memo dated February 2, 2001 from Officer Elizabeth Ham of the Gainesville Police Department with recommendations and comments related to Petition 147TCH-00PB. Also attached is an adjacent use light trespass matrix for the Board's consideration.

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CITY OF GAINESVILLE

Gainesville Police Department

TO: Kathy Winburn
Senior Planner

DATE: February 2, 2001

FROM: Officer Elizabeth Ham
Gainesville Police Department

SUBJECT: Proposed Land Development Code changes related to lighting

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I have reviewed the proposed Land Development Code changes related to lighting. I am opposed to the idea of having less than 3 to 5 footcandles of lighting in areas that are not restricted for public use. My supportive data comes from the *IACLEA's Recommended Crime Prevention and Campus Protection Practices for Colleges and Universities*, which was adopted in 1996, and is the standard that the University of Florida currently uses. Page 6, which is attached to this document, clearly outlines the minimum standards of lighting levels in areas of public access. The document states that in areas of restricted access, the footcandles minimum can be lowered.

In my opinion, based on crime patterns in Gainesville, I cannot justify a proposal that establishes lower levels of lighting than those used by the University of Florida. The University caters to pedestrians, who as opposed to bicyclists or motorists, are the greatest targets for victimization during nighttime hours. I would not recommend that the City offer anything less.

Further, due to the mechanics of the eye, continuity of light is perhaps equally as important as the lighting level. In this way, establishing minimum and maximum standards is good; however, I would not go with any more than a 4:1 ratio at the horizontal. I think the proposal recommends a 6:1 ratio. To identify an individual, the facial illuminance must be at least one-fourth the background. This is important for convenience stores and other high-risk businesses.

Finally, the methodology of the lighting survey provided with the proposal is inaccurate. The surveyors acknowledged this in their opening paragraph, so I will not pursue it. I will say however, that while the numbers found are inaccurate, they do present a usefulness. Anyone who believes that less than 3 to 5 footcandles is adequate lighting may journey to survey locations after 9:00 PM. Using lighting as their only measurement, I pose two questions "Do you feel safe?" and "Would your family feel safe here?" My point is that the perception of safety is perhaps equally as important as

established safety measures when venturing out at night. The public will typically not patronize stores that make them feel *unsafe*.

While I do recognize the need for limitations, I think there should be guidelines established. There are locations in the City where lighting is excessive. However, there are also locations in the City where lighting is less than effective. For example, I don't believe that a 3 to 5 footcandles minimum is adequate for high-risk areas, like ATM locations, banks that are open after hours, convenience stores, etc. Florida State Statute 812.173 (1)(c) requires that convenience stores have at least 2 footcandles illumination at 18 inches above the surface.

In closing, I would remind you that the Gainesville Police Department can not provide you with a certified expert opinion on lighting. We can only provide comments related to crime patterns and steps necessary to minimize the risk of crime. You should consider the opinion of a lighting security expert before making amendments to the Land Development Code. To aid in this endeavor, I have included a letter and proposed recommendation from the IESNA Security Lighting Committee. Ted Ake, who is a senior consultant for this group, was one of my CPTED course instructors. I think you will find his information helpful.

Exterior Lighting

12.1 A verifiable system of reporting lighting malfunctions should be developed. The reporting system should include a formalized weekly inspection as well as a method of reporting lighting malfunctions as they are discovered.

12.2 At least once per year, during a time when vegetation is at its greatest growth, a comprehensive inspection of campus grounds should be conducted to identify areas where lighting improvements are indicated. Priority should be afforded to areas near student residences and frequented locations on and off campus, as well as the routes in between.

12.3. A system of lighting fixture identification should be developed. The identification system should enable anyone to easily report a malfunctioning fixture to the physical plant or maintenance department.

12.4 Exterior security lighting should be controlled by automatic devices (preferably by photocell). Operable publicly accessible corridor switches should be removed.

12.5 A campus wide standard regarding illumination levels required for given situations should be developed around the following recommended minimums (average maintained horizontal):

a. Parking Lots: 3 - 5 footcandles (depending upon location)

b. General Parking Structures: 5 - 8 footcandles (depending upon location)

c. Walking Surfaces: 3 footcandles

d. Bike Parking Areas: 3 footcandles

e. Building Entryways: 5 footcandles

These levels may be subject to reduction in a specific circumstance where after hours use is restricted. For example, lighting in an enclosed parking area may be reduced or extinguished if pedestrian access can be restricted. Meet or exceed IES standards for those situations not noted above.

12.6 Exterior security lighting relying solely on bollard-type fixtures should be avoided.

13.0 Safe Landscapes

13.1 The institution should develop a program to evaluate the installation and maintenance of landscaping materials and should work toward the goal of providing safe pathways throughout the campus using the following guidelines:

a. there are clear views (unimpeded by landscape elements) above ground level along the path;

b. the path can be seen by people in cars and buses, or on bicycles in the street;

c. windows in adjacent buildings allow users to see the path from inside the building, and allow the pedestrian to see activity in the building;

d. nearby open spaces include informal or formal activities, so others are nearby to view the path;

e. appropriate lighting has been provided in areas of pedestrian travel;

f. the path is clearly defined by paving, fences, lighting, signs or other elements that direct pedestrian movement along a specific route.

13.2 The institution should adopt a standard for plant materials growing in close proximity to any walking surface, including well defined informal pathways. The standard should include a prohibition against plant materials exceeding 2 feet in height unless such materials are reasonably transparent and trees with limbs below six feet in height in proximity to these walking surfaces.

13.3 Trees should be trimmed if they provide easy access to buildings by climbing.

Plant materials should not interfere with lighting.

February 8, 2001

Officer Elizabeth Ham
Gainesville Police Department
721 NW 6th St.
Gainesville, FL 32601

Dear Officer Ham:

It was great hearing from you. I believe the enclosed material will assist you in working with those planning to write the parking lot lighting ordinance.

I received permission from David Salmon, Chair of the IESNA Security Lighting Committee to send you pages 38 - 45 of the Draft of RP10 (Recommended Practice) before its final approval and publication. Note the disclaimer on each page. You may find a few typos etc. but the copy and illuminance data is firm. This is confirmed by pages 21 and 22 of Chapter 29 of the IESNA Lighting Handbook.

Most of the information you will require is in section **8.2.4 Lighting for Parking Facilities (Lots and Garages).** This sets the *Minimum* (my emphasis) on the pavement at 30 lux (3 footcandles) average maintained and the same amount on vertical surfaces at 5' above the pavement. (LUX is the metric term for illuminance. 10 Lux= 1 footcandle) This is, of course, twice the *maximum* suggested by the proposed ordinance. The recommendation also includes a 4:1 average to minimum uniformity.

The importance of the word 'minimum' cannot be overlooked. Our eyes are automatically drawn to the brightest area in the field of view. In addition our feeling of security generally increases in areas with more light. Thus the appearance of an area may look dark if it is adjacent to a lighter area. Each parking lot must, therefore be designed with the surrounding areas in mind. A lot near a brightly lighted shopping mall will require more lighting than in a residential neighborhood, but never less than 3 footcandles.

The 3 ft-c (footcandle) 'average' means that a representative group of readings taken at pavement level will average at least 3 ft-c. These readings should include the perimeter, under and between poles etc. so that the entire parking lot would be included.

The term "Maintained" means that lamp output deterioration and dirt collection in the fixtures must be included in the design calculations. As you know, the amount of light (lumens) from all light sources is reduced as the lamp ages; and, over time, dirt and bugs will reduce the output of the luminaires. Maintenance factors, therefore take into account theses losses. Thus the initial readings should always be higher than design level. When the system reaches the design level, the lamps should be replaced and the luminaires cleaned.

The uniformity ratio of 4:1 means that no reading should be less than 1/4 of the average. Thus if the overall average was 4 ft-c., the lowest reading should not be less than 1 ft-c. This degree of uniformity is to prevent extreme readings which cause the eyes to continually attempt to adjust as a driver or pedestrian moves through the area.

The purpose of the vertical readings at 5' above the pavement is for facial identification of other pedestrians in the area. Specifically it provides sufficient illumination to give the observer time to take defensive action should the observed appears hostile.

One of the concerns which must be addressed is not lighting already in place but plans and specifications for proposed installations. Any good outdoor lighting equipment manufacturer should be happy to provide complete footcandle plots, both horizontal on the pavement and vertical at 5 feet as a part of its submittal.

As you may know, I have retired from Hubbell Lighting but have been retained as a Consultant. As such, I am not always in my Hubbell office, but can usually be reached at home. If you have any questions, please call me at either office (540) 381-2580 or home (540) 951-0472.

If I can be any further help, just let me know.

Best regards,

Theodore (Ted) Ake. LC. Consultant. Member IESNA Security Lighting Committee
1711 Plank Drive
Blacksburg, VA. 24060

all areas beyond 50-feet extending to 60-feet from the face of the ATM.

- When the unit is within 10-feet of the corner of the building, illuminance should extend at least 40-feet down the side of the building to an average minimum levels of 20 feet (2 footcandles.)
- Installation of lamps should be redundant to the degree that loss of a single lamp will not reduce illuminance below the minimums specified above.
- Lighting should not produce glare and or lighting trespass.
- Illuminance at the machine and the surrounding area should provide good to excellent definition of facial features for CCTV cameras if installed.
- Customer should have an unobstructed view from the face of the unit out to a distance of 30 feet
- Luminaries should be tamper resistant.
- Potential hiding places should be eliminated within the measured area. Security mirrors, and back lighting can aid this requirement.

Interior Installations

- Lighting should be designed to permit an uninhibited view from both the interior looking out and the interior view in by passers-by without glare.

8.2.3 Office & Other Buildings

8.2.4 Lighting for Parking Facilities (Lots and Garages)

Techniques for lighting parking lots garages are available in IESNA RP-20-99, Lighting for

Parking Facilities.[23] Walkways are discussed in IESNA DG-5-94, Lighting for Walkways and Class 1 Bikeways.[24] *When security is an issue*, the recommended average maintained security illuminance for open parking facilities should be no less than 30 lx (3.0 fc) on the pavement with equal vertical averages at 1.5 m (5ft) above the ground. A uniformity ratio of 4:1, *average to minimum* should be maintained. Sidewalks, footpaths, and grounds around or supporting open parking lots should be illuminated to an average minimum of 6 lx (0.6 fc), with a uniformity ratio of 4:1, *average to minimum*. Vertical illuminance should also be at least 6 lx (0.6 fc) at 1.5 m (5 ft) above the ground.

Garages & Covered Parking Spaces:

The security threat to unescorted people and property in covered parking garages can be very high. Isolated floors, numerous places to hide, and a lack of the difficulty of providing effective surveillance, and escape routes cause this condition. Recommended average maintained illuminances for covered parking facilities is 60 lx (6.0 fc) on the pavement, with equal values measured at 1.5 m (5ft), and a uniformity ratio of 4:1, *average to minimum*. These illuminances should be maintained whenever access is allowed to the parking areas. Back-up generators or battery-operated lighting is necessary in parking areas, stairwell, elevator, and exit ramps. Where people gather, such, as at elevators and stairs, lighting should be increased in a 30-foot radius from the gathering point, to 50 lux [5.0 fc] with an average to minimum ratio of 4:1. All exits should be marked with illuminated *exit* signs.

[23] IESNA Roadway Lighting Committee: Recommended Practice RP-20-99, Lighting for Parking Facilities 1999.
[24] IESNA Roadway Lighting Subcommittee for Off Roadway Facilities. DG-5-94, Recommended Lighting for

Perimeter (boundary) lighting should allow detection of those who loiter outside the site and, those who are entering or exiting the site. Interior lighting should allow safe movement and easy detection of hazards and threats.

Entrance and exits should be lighted for eye adaptation when going from the structure into the street or vice versa. This is called transitional lighting. Lighting should overlap to reduce shadows. Light control is important. Electronic sensors to adjust the entry illumination from higher levels during daylight to lower levels after dark should be considered.

Reflective material should be used for wall signs. Location signs (level and bay) are useful on columns that face the aisles. Letter, number, and color should indicate floor locations. The background of such signs should be the floor color. Candy striped columns, black and yellow, are useful to highlight drive paths. All of these safety features will aid pedestrians locate exits and vehicles faster, while reducing exposure to criminal hazards.

8.2.4 Parking Lots for Public Parks

Where increased or continued crime against persons is reasonably foreseeable in parks and public spaces, the recommended average maintained horizontal illuminance for open parking facilities in or adjacent to parks should be no less than 30 lux [3.0 fc] on pavement with equal levels at 1.5 m [5 ft], and an average to minimum uniformity ratio of 6:1.

8.2.5 Supermarkets & Major Retail Outlets

In 1998 the Food Marketing Institute, the food industry's trade association representing 40,000 supermarkets across the United States and Canada published a study titled Consumer Trends in the Food Industry. Consumers ranked their personal safety as *very important* while at the same time indicating supermarkets were *doing a poor job* in this area. Many supermarkets today are high volume operations, well in excess of 100,000 square feet offering a vast array of services, and attracting thousands of customers a day. Many operate 24-hours a day and parking lots for these facilities are enormous. Forty percent of crime in retail facilities occurs in the parking lots where customers and employees are most vulnerable. Proper illumination is a critical component of the overall security plan for most 24-hour retailers.

When Security is an issue there should be an average maintained illuminance of 30 lux (3.0 fc) on the pavement with a uniformity ratio of 4:1 *average to minimum* in the parking area (including areas used by employees). Vertical illuminance should be 30 lux (3.0 fc) 1.5 meters (5ft) above the ground. For stores operating in the early morning hours or 24-hours-a-day, additional illumination should be provided in the parking area closest to the store outside the main entrance where customers will be parking during these low activity hours. Illuminance in this area should be an average of 50 lux (5.0 fc) on the pavement with a uniformity ratio of 4:1 *average to minimum.* The size of the area should be determined based on projected customer count during these hours.

Roadways and rear areas of the store should be illuminated based on RP-8-00 Roadway Lighting and RP-20-99. If *security is an issue*, illuminance in the area of delivery docks, outdoor trash compactors and recycling bins in the back of the store must be an average of 30 lux (3.0 fc) on

the pavement with a uniformity ratio of 6:1 average to minimum. This will provide adequate security lighting for delivery personnel as well as employees needing to work or move about in these areas.

8.2.6 *Fast Food* Restaurants

Many *fast food restaurants* are 24-hour or late night operations, with a high priority on patron and employee security. Fast food security effectiveness results from proper site planning, quality illumination, staff training, and integration of layers of security. Critical among these security features is security lighting. Areas most affected are the customer drive-thru area, general parking areas, and refuse disposal area.

The customer is most prone to attack in the drive-thru lane, particularly when patrons are transacting business at the payment or order window. Their attention is on the tendering of payment, collecting purchased food, or receiving change. Attacker(s) typically approaches the patron between the building and the left rear of the automobile. Building and lighting designs that allow the window-service personnel to view the driver's side of cars are a major deterrent to this type of crime. The best designs provide a setback from the window-service area to the rear of the building, and a side window from which the store's personnel can view the area.

Insert Figure ____ [as presented in Security Lighting Section of Handbook].

Lighting which is mounted on the building, above the side-window allows good observation by the employee; however glare for the patrons in their cars should be avoided. The recommended

average maintained illuminance for the area within 30 ft of the drive up window(s) is 60 lx (6.0 fc) on the pavement, and equal illuminance levels at 1.5 meters [5 ft] above the ground, with a uniformity ratio of 3:1, average to minimum. General parking areas, sidewalks, footpaths, play areas, and areas adjacent to the structure, should be illuminated to a minimum of 30 lx (3.0 fc), at grade with an equal value measured vertically 1.5 meters (5 ft) above grade, and an average to minimum uniformity ratio of 4:1.

Most municipalities and franchised operators require refuse disposal areas to be enclosed. Such statutory requirements increase the security risk to employees using these storage facilities. Simply lighting this area is not effective alone, and the design of the facility or written procedures needs to address critical security concerns after hours.

8.2.7 Convenience Stores & Gas Stations

Convenience stores and gas stations often operate around-the clock. Extended hours of operation, ease of access and egress, readily availability of money and alcoholic beverages, and proximity to major thoroughfares make these types of retail outlets susceptible to violent crime. *When security is an issue* the average recommended maintained horizontal illuminance is 60 lx (6.0 fc) on the pavement, with equal values at 1.5 meters [5 ft] above ground level. These recommended values apply to storefront entrance and sidewalk areas, gasoline pumps and islands, air and water stations, telephones, and other customer use areas. The average-to-minimum illuminance uniformity ratio should be 4:1. Surrounding, adjacent, or internal sidewalks, footpaths, refuse disposal area(s), and grounds should be illuminated to an average maintained level of 30 lx (3.0 fc) at ground level, with equal values at 1.5 meters [5 ft] above

ground level, with a uniformity ratio of less than 4:1, average to minimum.

Vertical illuminances will improve the visibility of outdoor areas to people inside the store provided the luminance of objects exceeds the luminance of the reflections on the inside of the windows. Ambient lighting within the store should be at least 100 lux [10.0 fc]. Store employees and customers should always have a clear view of the outside area from within the store, and especially from behind the clerk's counter. Lighting and construction must eliminate a condition where windows act as a mirror, making it difficult for clerks to view the lot and pump areas. Tilting or treating store window glass can also avoid this condition. Covering windows with opaque sales promotion posters that block the view of the outside areas should be discouraged. Clerks should also be clearly visible to outside customers.

8.2.8 Parks and Public Areas

Parks and public areas by their very nature are open to the public, often creatively or naturally landscaped with thick vegetation, and are difficult to patrol and protect. As with any other area where criminal activity is likely, lighting systems should enable decisions to be made at a distance [at least 30 feet], by illuminating potential hiding places, movement paths, and escape or movement routes. Locations where loitering, and criminal attacks are likely should be illuminated to an average of 10 lx (1.0 fc) at ground level to a height above ground of 1.5 meters [5 ft], with an average to minimum ratio of 3:1. Planners need to consider the following issues when designing lighting and other security components for parks open at night:

- Prior history of crime in the park and surrounding areas
- Social conditions and citizen participation

- Local cultural values
- Traffic patterns and access
- Patrol frequency
- Light pollution and light trespass

Park trails and walkways should be illuminated to an average of 6 lx (0.6 fc) at ground level to a height above ground of 1.5 meters [5 ft], with an average to minimum uniformity ratio of 6:1. These illumination requirements should be maintained along the length of the trail, and on all sides out to a distance of 5 m (15 ft). Where trails are situated in woods, landscape areas, or even broken terrain, lighting designers should also consider aesthetics issues in the lighting design.[25]

8.2.9 Residential Parking Areas

Parking structures, or open parking areas, should be lighted according to RP-20-99, and 8.2.4 of this document, *when security is an issue.* Additionally, the following guidelines are provided for single family and multi-family residences.

8.2.10 Single Family Residence

Most often, illumination of exterior doors is for the identification of callers, safety, and for more routine tasks such as finding keys quickly and locating lock keyways. Light from luminaries installed on both exterior sides of the door aid in face recognition, when a caller signals their presence. If the luminaries are ceiling mounted, they should not be located directly above or

[25] Moyer, J.L. 1992. The Landscape Lighting Book. New York: John Wiley.

147TCH-00PB
March 15, 2001

The following options could be included under General Performance Standards, Section 30-345(a):

Option 1:

Adjacent Use Light Trespass Matrix

Adjacent Designated Use

Proposed Activity	Single-family/ Two Family	Multi-family	Mobile Home Park	Office, Education	Commercial/ Mixed use	Industry/ Mixed use
Single-family/ Two-family	0.5	0.5	0.5	1.0	1.0	1.0
Multi-family	0.5	0.5	0.5	1.0	1.0	1.0
Mobile Home	0.5	0.5	0.5	1.0	1.0	1.0
Office, education, religious assembly	0.5	0.5	0.5	1.0	1.0	1.0
Commercial, mixed- use	0.5	0.5	0.5	1.0	1.0	1.0
Industrial	0.5	0.5	0.5	1.0	1.0	1.0

* Light levels are maximum allowable footcandles at 25 feet from the property line, measured perpendicularly from the light source. Roadway lighting on public streets is exempt from these provisions.

Option 2: Add the following sentence to Section 30-345(a):

Any development adjacent to a residential use shall not exhibit light trespass of more than 0.5 footcandles measured perpendicularly from the light source at a distance of 25 feet from the property line. Roadway lighting on public streets is exempt from light trespass requirements.

CITY OF GAINESVILLE ---------- INTER-OFFICE COMMUNICATION

Item No. 1

To: City Plan Board **Date:** March 15, 2001

From: Planning Staff

Subject: Petition 147TCH-00PB. Amend the City of Gainesville Land Development Code related to lighting in terms of site plan submittal requirements, glare, light trespass, light fixture mounting height, illumination levels and specific requirements for gasoline service stations.

Recommendation

Planning staff recommends approval of this petition.

Explanation:

This report addresses proposed Land Development Code revisions related to lighting in terms of glare, light trespass, light fixture mounting height, illumination levels and lighting plan submittal requirements.

A growing number of cities are becoming less tolerant of intrusive light which creates glare and unwanted illumination on neighboring properties (Consulting-Specifying Engineer, July 1999). By reducing glare, roadway safety and overall security can be improved. According to the International Dark Sky Association, a non-profit group which advocates and educates about quality nighttime lighting, by enforcing effective lighting, energy waste, clutter, obtrusive light spillage and unnecessary sky glow can be avoided. Recently, lighting intensity has also become an issue in the City of Gainesville, particularly in relation to the lighting of parking lots, gas stations and light trespass onto adjacent properties. Section 30-330 of the Land Development Code presently allows parking lots to be lighted provided that a maximum intensity of five footcandles is not exceeded, that lighting does not create a nuisance across lot lines, and that minimum Illuminating Engineering Society of North America (IES) standards are adhered to. The Code also regulates lighting under Section 30-345(9), General performance standards, related to glare, indicating that lighting cannot exceed a maximum intensity of 25 footcandles at ground level (though horizontal footcandles have no relationship to glare), and that it must be hooded or shielded so that no glare creates a nuisance to adjacent property. Chapter 14 of the Code of Ordinances also regulates lighting for convenience stores, indicating that a minimum average maintained illuminance of 2 footcandles with a uniformity ratio (average to minimum) of no more than 5:1 be maintained.

In 1993, a petition (26TCH-93PB) was approved by the City Commission to amend the Land Development Code, deleting the requirement for a minimum of 1.5 footcandles at pavement level for residential complexes. Staff's recommendation was that this was an excessive minimum lighting standard, based on IES standards.

Recommended text changes to the Land Development Code are provided in Exhibit A and discussed below. The changes proposed include more specific and enforceable

standards to regulate glare and light trespass. It should be noted that enforcing the proposed standards will require the purchase of a light meter and may have an impact on the City's Code Enforcement Division.

Site plan submittal requirements:

The City of Gainesville Land Development Code has recently been amended to require a lighting plan for new development applications, illustrating how the lighting systems function in relationship to landscaping, signage, adjacent developments, pedestrian and vehicle circulation. The code, however, does not specify the type of information needed in a lighting plan to determine compliance with Section 30-330 and Section 30-345. In the past, a *statement* which indicated that a development would meet the City of Gainesville lighting standards was typically all that was provided on development plans. Therefore, plans were approved without specifications for the type, intensity and amount of light trespass, resulting in excess lighting problems being reported at certain locations. Staff recommends that Section 30-160(d) of the Land Development Code be amended to require a lighting plan certified by a registered architect, engineer, or certified lighting professional to include specific elements such as level of illumination, uniformity ratio, vertical cut-off angle, height and type of lights.

Glare:

According to the International Dark Sky Association (IDSA Information Sheet 93, July 1999), utilizing cut-off (shielded) light fixtures will help prevent glare, the worst form of light pollution. The Illumination Engineering Society of America (IES) identifies three levels of glare: blinding, disability and discomfort. Even discomfort glare, the lowest of the three glare levels, should be avoided. It may cause fatigue, which may result in driver error, says the IES. When a building's exterior parking lot lighting is more than 20 times the road's lighting level, an individual can be blinded for a few seconds while the eye adapts to the change in brightness (Consulting-Specifying Engineer- July 1999).

To ensure that glare is minimized, staff is recommending that all lighting fixtures serving parking lots and exterior building lighting be IES classification full cut-off fixtures (there is no light distribution above 90 degrees nadir with cut-off type luminaires- see Exhibit C). The purpose of this is to significantly reduce glare, since non-cut-off fixtures often result in glare being present within a drivers field of view. When steps are taken to reduce glare through control of high-angle brightness, steps must be taken to provide adequate uniformity, which may require the use of a greater number of fixtures.

Light Trespass

The increasing desire to light exterior areas, for the perceived purposes of safety and attracting customer attention, has resulted in an increasing number of complaints when light spills over property lines, illuminating adjacent grounds or buildings in an objectionable manner. The IDSA recommends that exterior lighting originating on a property be limited to a maximum of .5 horizontal footcandles (HFC) at a distance of 25 feet beyond the property lines. According to the IDSA, this specification will allow the controlled placement of lighting poles and luminaires adjacent to the property lines. With many outdoor luminaires, it is difficult to comply with low level footcandle requirements at the property line. As an example: a typical 250- watt high pressure sodium (hps) luminaire at the property line would emit about 5 HFC below the light fixture, but it could be shielded so that there is no more than 0.5 HFC at 25 feet from the property line. Research has indicated that an ordinance demanding zero light trespass is unachievable because some light will always bounce off the property, even in the best-case scenario.

Staff recommends that light trespass onto adjacent properties not exceed 1 footcandle at a distance of 25 feet beyond the property line, directly perpendicular to the light source.

Staff recommends that the maximum luminaire height for parking lot lighting fixtures be 30 feet, except as regulated by an adopted special area plan or other applicable regulations. The IDSA indicates that this height allows the use of a variety of luminaires in an energy efficient manner, however, exceptions should be made for such uses as sports lighting installations or other high mounting height installations.

Illumination levels:

The standard used for the intensity of lighting of parking facilities has often been based on nationally recognized IES recommendations, as contained in the Illuminating Engineering Society of North America Lighting Handbook. According to "Zoning News" (October 1995), no national standards for outdoor lighting exist in the U.S. The IES now establishes two levels of lighting recommendations for parking lots: "Basic" and "Enhanced Security", as follows:

Maintained Illuminance for Parking Lots

Horizontal Illuminance	Basic	Enhanced Security
Minimum	0.2 fc	0.5 fc
Average	1.0 fc	2.5 fc
Uniformity Ratios		
Average to Minimum	5:1	5:1
Maximum to Minimum	20:1	15:1

(example: an average to minimum uniformity ratio of 5:1 requires that the average footcandle installation be no greater than five times the minimum level, or conversely, the minimum can be no less than five times the average. Also, an average level of footcandles does not mean the average calculated value between the highest and lowest readings, but the average of all readings over the entire plane.)

The new IES illuminance levels are said to provide a safe level of light, without wasting energy. The IES indicates that the Enhanced Security illuminance recommendations will more than adequately provide for facial identification in high crime areas. According to the IDSA (Information Sheet #93, April 1999), increasing the illuminance above these recommended values is not likely to increase safety or security. IDSA states that variance requests for higher levels will generally be for "retail" reasons and should not be granted unless proven to be necessary, with an average illuminance not to exceed 3.6 footcandles. The Land Development Code already has a variance procedure for lighting intensity, per Section 30-345, and staff recommends that the procedure stay in place, and apply only to increases for the security of critical areas or permitted outdoor land uses. The variance procedure as proposed would not apply to light trespass, glare, or parking lot lighting standards.

Staff recommends that Section 30-330 (a)(4) be amended to require parking lot lighting to not exceed the IES recommendations for enhanced security.

A disturbing new trend seen in some national chain convenience stores and gas stations has been to ratchet up the light level under the canopy to very high levels (10,000 times as much illumination as that provided by a full moon) in an effort to attract customers and

provide a "safer more secure" environment (IDSA Information Sheet #139, July 1998). This results in unsafe situations, as drivers try to blindly navigate their vehicles for a few seconds onto much darker streets (or onto much brighter aprons) while their eyes readapt, and often forget to turn their vehicle lights on. This is an especially dangerous problem for elderly drivers due to changes in the interior of the eye which occur with aging. The high intensity of lighting at some service stations has also been evidenced in Gainesville recently.

According to a Gainesville Regional Utilities representative (based on a memo dated December 15, 1998 from Meg Niederhofer, City Arborist to Tom Saunders, Community Development Director) "under gas station canopies, the illumination is 4 to 8 metal halide lamps that put 100 footcandles of light on top of cars and 80 footcandles on the pavement. The canopies come with lighting fixtures, and they are becoming very popular with gas station owners, because research shows that they result in more gas sales. Car lots are at the 150 footcandle level. Some recent lot lighting is between those two." These illumination levels are considered "visual pollution" by some and can contribute to hazardous driving conditions due to direct glare.

Staff reviewed standards for the lighting of gas stations as recommended by the IESNA (based on a consensus of opinion of the IESNA Outdoor Environmental Lighting Committee) and the Vermont Outdoor Lighting Study (March 1996). The IESNA recommends the following average maintained illuminance levels of the following described areas for service stations or gas pumps with "light" surroundings:

approach: 2.0 footcandles
driveway: 2.0 footcandles
pump island: 10.0 footcandles
service areas: 3.0 footcandles

(Source: IESNA RP-33-99 Lighting for Exterior Environments)

The other alternative, which is provided in staff's recommendation and indicated below, is to adopt the following standards, which are based on proposed exterior lighting regulations for the City of Burlington, Vermont, as provided in the Vermont Outdoor Lighting Study, March 1996, and to include the IES recommended illumination levels for pump islands.

1. Lighting levels on gasoline station aprons and under canopies shall be adequate to facilitate the activities taking place in such locations. Lighting in such areas shall not be used to attract attention to the business. Signs allowed by Article IX shall be used for that purpose.

2. Remote areas: Areas on the apron outside of the gasoline pump islands used for parking or vehicle storage, shall be illuminated in accordance with the requirements for parking areas as set forth in Section 30-340 (a) (4).

3. Areas around pump islands: Areas within 6 feet of a pump island and/or under canopy shall be illuminated so that the average horizontal illuminance is at least 1.0 footcandle and no more than an average of 10 footcandles. The uniformity ratio (ratio of average to minimum illuminance) shall be no greater than 6:1.

4. Fixtures: Light fixtures mounted on or under canopies shall be IES cutoff classification only or recessed so that the lens cover is flush with the bottom

surface (ceiling) of the canopy.

5. Alternatives: As an alternative (or supplement) to direct illumination, indirect lighting (where light is aimed at the bottom of the canopy and reflects back down) may be used. Indirect lighting fixtures must be aimed and/or shielded so that direct illumination is focused exclusively on the underside of the canopy.

6. Lights prohibited. Lights shall not be mounted on the top or sides of the canopy when not part of an approved sign permit, and the sides (fascias) of the canopy shall not be illuminated.

The following summarizes the proposed changes compared to the existing lighting regulations for gas stations currently in the Land Development Code.

Gasoline station lighting:

current requirements: none, other than existing code requirements for lighting, allowing 25 footcandles under pump island canopies.

proposed requirements: See Exhibit A, page 2, proposed Section 30-393 (e).

Standards of other communities:

A review of development standards of other communities indicated that some set a maximum illumination standard and some do not allow any spill-over light onto adjacent properties. Examples of lighting standards set by other communities are provided in Exhibit B.

The proposed land development code amendments are provided in Exhibit A.

Staff conducted field research of lighting levels at various locations in Gainesville. The results of this research are provided in Exhibit D.

Respectfully submitted,

Ralph Hilliard

Ralph Hilliard
Planning Manager

147TCH-00PB
March 15, 2001

EXHIBIT A

Proposed amendments to the Land Development Code related to lighting:

1. Amend Section 30-160(d) *Preliminary development plan*. Each preliminary development plan shall include the following:

(33) A photometric plan. ~~lighting plan which illustrates how the lighting systems function in relationship to landscaping, signage, adjacent developments, pedestrian and vehicular circulation.~~ For all development plans requiring development plan review by a reviewing board, the plan shall be certified by a registered architect or engineer, or lighting professional holding a current LC (Lighting Certification) from the National Council on Qualifications for the Lighting Profession (NCQLP), as providing illumination in accordance with the applicable standards set forth in Sections 30-330 (a) (4) and Section 30-345 (9) and (10). For development plans requiring staff review only, the city manager or designee shall determine whether such a lighting plan shall be provided. Plans shall indicate the location, height and types of lights (manufacturer's catalog cut, including make and model number and glare reduction/control devices), footcandle grid to demonstrate level of intensity/uniformity, uniformity ratio, lamp wattage, shades, deflectors, beam direction, luminous area for each source of light and a statement of the proposed hours when the luminaires will be on and when they will be extinguished.

2. Amend Section 30-330 (a) (4) Lighting. All off-street parking facilities shall be lighted after dark throughout the hours for which they are in use by the public. Such lighting shall be designed to maintain an average horizontal illuminance not to exceed 2.5 footcandles, and a minimum horizontal illuminance of .5 ~~not exceed an intensity of five~~ footcandles. The uniformity ratio (ratio of average to minimum illuminance) shall be no greater than 5:1, and the maximum to minimum uniformity ratio shall be no greater than 15:1. The minimum vertical illuminance shall be .5 footcandles. Multiple-family dwellings must provide parking area lighting sufficient to light the area for pedestrians entering and exiting the parking area. All multiple-family residential and non-residential development must at a minimum meet the standards listed in the "IES Lighting Handbook: Recommend Maintained Illuminances for Open and Covered Parking Facilities" for pedestrian safety. ~~Sources of light, including bulbs and tubes and all reflecting surfaces, shall be hooded or shielded so as not to create a nuisance across lot lines.~~ All lighting fixtures serving parking lots shall be full cut-off fixtures as defined by IES. ~~Lighting shall be located on site plans~~ A lighting plan shall be provided in compliance with Section 30-160 (d). Parking lot lighting locations shall not be in conflict with required trees or any existing trees intended to remain on the property. The maximum height of fixtures shall not exceed 30 feet, except as regulated by an adopted special area plan or other applicable regulations.

3. Amend Section 30-345. General Performance Standards:

(9) ~~Glare~~ Lighting. Lighting found to create a public nuisance, as determined by the City Manager or designee, may be ordered removed or altered at any time. Any light installation which provides for re-aiming of the fixture shall be aimed in compliance with this section. The installation of any new luminaire or relocation of any luminaire shall meet the applicable requirements of the land development code for the particular installation. Such installation shall require a development plan amendment to include, at a minimum, certification by a registered engineer indicating that the lighting installation meets code requirements.

a. light trespass and glare. Any light trespass onto adjacent properties shall not exceed 1.0 horizontal footcandle at a distance of 25 feet beyond the property line, directly perpendicular to the light source. Directional luminaires such as floodlights, spotlights, sign lights and area lights shall be so installed and aimed that they illuminate only the task and do not shine directly onto neighboring properties, roadways, or distribute excessive light skyward. Building façade lighting, sports lighting and other applications using floodlights shall have glare shielding (external or internal shields) to prevent light trespass and light pollution ~~) All lighting shall be so hooded or shielded as to reflect the light in such a manner that no illumination source or glare creates a nuisance to any adjoining property or unreasonably interferes with the lawful use and enjoyment of any adjoining property. Such lighting shall not under any circumstances exceed a maximum intensity of twenty-five (25) footcandles at ground level. The maximum lighting intensity may be increased by the city plan board through site plan review, or the board of adjustment by special exception if site plan review is not required, provided that the applicant establishes that such an increase is reasonably required for security purposes for the use or the activity in question, that the increased intensity will not result in a nuisance to adjoining properties, does not interfere with the lawful use and enjoyment of property, that necessary screening will be erected or exists to reduce the impact of the increased intensity on adjoining properties.~~

b. exterior lighting: lighting which is provided for the security of critical areas such as building entrances, stairways, ramps and main walkways or for a permitted outdoor use of land (such as ball parks) shall not under any circumstances exceed a maximum average maintained illumination of twenty-five (25) footcandles at ground level, and uniformity ratio of 6:1. Exterior wall-mounted lighting shall be full cut-off fixtures. The maximum lighting intensity permitted for the security of critical areas as described above, for permitted outdoor land uses, or pole heights other than those located in off-street parking facilities, may be increased by the appropriate reviewing board through site plan review, or the board of adjustment by obtaining a variance if site plan review is not required, provided that the applicant establishes that such an increase is reasonably required for security purposes for the use or for conducting the permitted outdoor use, that the increased intensity will not result in a nuisance to adjoining properties, does not interfere

with the lawful use and enjoyment of property, and that necessary screening will be erected or exists to reduce the impact of the increased intensity on adjoining properties.

c. outdoor recreational lighting: lighting levels for outdoor recreational uses shall be designed to not exceed the targeted maintained illuminance values as recommended by the Illuminating Engineering Society of North America (IES). Lighting installations for outdoor recreational uses (including pole heights) shall be designed in accordance with IES standards, as outlined in report number RP-6-88, or any update thereto.

d. the maximum height of light fixtures, except as otherwise regulated by this section, shall not exceed 30 feet.

4. Amend Section 30-393. Gasoline and Alternative Fuel Service Stations, including gasoline stations in conjunction with a convenience store.

(e). Lighting. The requirements for lighting are as follows:

1. Lighting shall not be used to attract attention to the business. Signs allowed by Article IX shall be used for that purpose.

2. *Remote areas*: Areas on the apron away from the gasoline pump islands, used for parking or vehicle storage, shall be illuminated in accordance with the requirements for parking areas set forth in Section 30-330 (a) (4).

3. *Areas around pump islands*: Areas within six (6) feet of a pump island and/or under canopies shall be designed to maintain a minimum average horizontal illuminance of at least 1.0 footcandle and a maximum average of no more than 10 footcandles. The uniformity ratio (ratio of average to minimum illuminance) shall be no greater than 6:1. The above shall be delineated on a photometric plan.

4. *Fixtures:* Light fixtures mounted on or under canopies shall be IES full cut-off classification only or recessed so that the lens cover is flush with the bottom surface (ceiling) of the canopy.

5. *Alternatives:* As an alternative (or supplement) to recessed lights, indirect lighting may be used where light is aimed at the underside of the canopy and reflected back down. In this case the light fixtures must be shielded so that all direct illumination is focused exclusively on the underside of the canopy.

6. *Lights Prohibited.* Lights shall not be mounted on the top or sides of the canopy when not part of an approved sign permit, and the sides (fascias) of the canopy shall not be illuminated, unless the illumination is part of a permitted sign.

7. The submittal requirements of Section 30-160(d) shall be met.

EXHIBIT B

Examples of Lighting Requirements for Other Communities and recommendations of the International Dark Sky Association:

Beverly Hills: lighting to be hooded or shielded so that no direct beams fall on public streets or other private property.

Albuquerque: location of lighting fixture together with its cut-off angle shall be such that it does not directly shine on any public ROW or any other residential premises. Shall not have an off-site luminance greater than 1,000 footlamberts; it shall not have an off-site luminance greater than 200 footlamberts measured from any private property in a residential district.

Coral Gables: Plans indicating the location, height, type of lights, level of illumination, shades, deflectors and beam direction shall be submitted to the Building and Zoning Department. Issue a permit if the proposed lighting will be deflected, shaded and focused away from adjacent properties and will not be a nuisance to adjacent properties. Any overspill lighting onto adjacent properties shall be designed so that any overspill lighting on adjacent property shall not exceed one-half (1/2) footcandle (vertical) and one-half (1/2) footcandle horizontal illumination on adjacent properties. An outdoor lighting installation shall not be placed in permanent use until a letter of compliance from a registered architect or engineer is provided stating that the installation has been field checked and meets the requirements as set forth above.

Ann Arbor: All exterior lighting devices shall be adequately shielded and screened so that no light will glare directly onto any public ROW or property principally used for residential purposes. Lighting devices shall be arranged and kept at a level so that the amount of light projected onto property principally used for residential purposes does not exceed 0.1 footcandle.

Pasadena: Outdoor parking area lighting: 18- foot height limit. In general, lighting fixtures used shall be designed to confine emitted light to the parking area, and the light source shall not be visible from outside of said area. max. avg. illumination at ground level shall be 3.0 footcandles and, except for park parking lots, shall not exceed 1.0 footcandles in an R district.

Cupertino, CA: All exterior lighting shall be a white type light, either metal halide or a comparable color corrected light, unless otherwise approved as part of a development plan. The light fixtures shall be oriented and designed to preclude any light and direct glare to adjacent residential properties. No direct off-site glare from a light source shall be visible above 3 feet at a public ROW. Parking lots, sidewalks and other areas accessible to pedestrians and autos shall be illuminated with a uniform and adequate intensity. Typical standards to achieve a uniform and adequate intensity are: the avg.

horizontal maintained illumination should be between 1 and 3 footcandles; and the avg. maximum to minimum ratio should be generally between 6 and 10:1. Critical areas such as stairways, ramps and main walkways may have a higher illumination.

Palm Beach Gardens, FL: off street parking facilities- if contains ten or more spaces, exterior lighting shall be provided at minimum average maintained horizontal footcandles (avg. on pavement) of 0.6 in the general parking and pedestrian area and 1.0 in the vehicle use area only, during the operation of the facility. Lighting shall be so arranged that the source of light does not shine directly into adjacent residential properties or into traffic on adjoining streets.

Vail, Colorado: developers must submit an outdoor lighting plan showing location, height above grade, type of illumination, source of lumens, and the luminous area for each source light which is proposed. Pole light can be 35 feet in commercial areas, eight in residential. In commercial areas, all light sources over 15 feet must have full cut-off shield.

Eatontown, NJ- at property line subject property illumination from light fixtures not to exceed 0.1 footcandles on residentially zoned property or 0.5 footcandles on business-zoned property, measured on vertical plane.

Juneau Alaska- 1.5 footcandles in parking lots, 3.0 in intersections; 0.2 in residential developments; and 1.0 along the perimeter of property lines.

Sunrise, FL- see attached

The International Dark Sky Association, a special interest group formed 13 years ago by an astronomer at the Kitt Peak Observatory, which advocates and educates about quality nighttime lighting, makes the following recommendations:

The association defines full cut-off fixtures as those fixtures which emit no light above the horizontal (no going up light), and indicates that with these fixtures there should also be not much light at angles greater than 75 degrees above the vertical, which causes glare.

The association defines direct glare as visual discomfort resulting from insufficiently shielded light sources in the field of view, and recommends that this term be used instead of glare, and that the limitation of observation of direct glare be regulated as follows: direct glare shall not be observable (outside the originating property limits) at an angle greater than 85 degree from the nadir of the vertical axis of the light source. The association indicates that there are many cut-off luminaries types that can meet this requirement easily, and other types can meet it with proper installation and shielding.

The association recommends that codes should limit the exterior lighting originating on a property to a maximum of 0.5 horizontal footcandles at a distance of 25 feet beyond the property line and indicates that a mounting height of 30 feet allows the use of a variety of luminaries, however, there, should be a provision for exceptions (like ball parks).

SUNRISE, FL

trailer combination. Such loading space shall also be accessible from the interior of any building it is intended to serve.

(d) Off-street loading spaces shall be provided and maintained in accordance with the following schedule:

(1) For each retail store, storage warehouse, wholesale establishment, industrial plant, factory, freight terminal, market, restaurant, funeral home, laundry, dry cleaning establishment or similar use which has an aggregate gross floor area of:

Less than 5,000 sq. ft.	Restaurant Only: One (1) Space
Over	*But Not Over*
5,000 sq. ft.	25,000 sq. ft.—One (1) space
25,000 sq. ft.	60,000 sq. ft.—Two (2) spaces
60,000 sq. ft.	120,000 sq. ft.—Three (3) spaces
120,000 sq. ft.	200,000 sq. ft.—Four (4) spaces
200,000 sq. ft.	290,000 sq. ft.—Five (5) spaces

290,000 sq. ft., for each additional 90,000 sq. ft. or fraction thereof—One (1) space.

(2) Motor vehicle sales establishments shall include an area to unload motor vehicles from motor vehicle carriers. This area shall:

a. Be a minimum of fifteen (15) feet wide and sixty (60) feet long;

b. Be served by circulation isles able to easily accommodate motor vehicle carriers without presenting conflicts with customer circulation; and

c. Be a minimum of one hundred (100) feet from any property in a residential district.

(3) For each auditorium, convention hall, exhibition hall, museum, hotel, office building, sports arena, stadium, hospital, community care facilities or similar use which has an aggregate gross floor area of:

Over 20,000 square feet but not over 40,000 square feet—One (1) space.

For each additional 40,000 square feet or fraction thereof—One (1) space.

(4) For any use not specifically mentioned in this section, the requirements for off-street loading for a use which is so mentioned and to which the unmentioned use is similar, shall apply.

(e) Off-street loading facilities supplied to meet the needs of one use shall not be considered as meeting off-street loading needs of any other use.

(f) No area or facilities supplied to meet the required off-street parking facilities for a use shall be utilized for or be deemed to meet the requirements of this article for off-street loading facilities.

(g) Nothing in this section shall prevent the collective, joint or combined provision of off-street loading facilities for two (2) or more buildings or uses, provided that such off-street loading facilities are equal in size and capacity to the combined requirements of the several buildings or uses and are located and arranged so as to be usable thereby.

(Ord. No. 402, § 1, 11-27-90; Ord. No. 402-95-K, § 7, 10-24-95)

Sec. 16-108. Fire lane requirement.

In B-1, B-2, B-3, B-4, I-1 and CR districts four (4) foot striped fire lanes shall be provided as required by the fire department. There shall be no parking within a designated fire lane.

(Ord. No. 402, § 1, 11-27-90)

Cross reference—Fire prevention and protection, Ch. 6.

Sec. 16-109. Lighting requirements.

All off-street parking facilities shall be illuminated according to the standards contained herein. Open off-street parking facilities shall include the surface of open-to-the-sky parking spaces, driveways and accessways. Enclosed off-street parking facilities shall include multilevel parking garages and covered grade-level parking facilities.

(1) *Design requirements.*

a. Open parking lots and the walkways providing access thereto shall be provided with a maintained minimum of one and one-half (1.5) footcandles of light measured at grade level. The

maximum to minimum footcandle level shall not exceed a twelve to one (12:1) ratio.

b. Parking structures shall be provided with a maintained minimum of one and one-half (1.5) footcandles of light measured at floor level. The maximum to minimum footcandle level shall not exceed a twelve to one (12:1) ratio.

c. Automatic teller machines (ATMs) shall be provided with a maintained minimum of three (3) footcandles of light measured at grade level. Parking areas [that] serve the ATM must also meet the three (3) footcandle standard.

d. Higher maintained minimum footcandle levels are permitted as long as the maximum to minimum footcandle level does not exceed a twelve to one (12:1) ratio.

e. Overspill of lighting onto adjacent properties shall not exceed five tenths (0.5) footcandles measured on a vertical plane beginning three (3) feet above grade at the property line. Overspill in multi-family residential developments, shall not exceed five tenths (0.5) footcandles as stated above.

(2) *Operational requirements.*

a. Office buildings and retail centers shall operate open parking area lighting from dusk to dawn. One-half (½) light levels are permitted from midnight to dawn.

b. Multi-unit residential projects shall operate open parking area lighting from dusk to dawn.

c. Industrial sites and places of public assembly shall operate open parking area lighting from dusk to thirty (30) minutes after termination of scheduled night activities.

d. Parking structures shall operate lighting twenty-four (24) hours a day or dusk to dawn to maintain the lighting level as specified in paragraph (1)b. above.

e. Site lighting must be operational per the following criteria:

1. Retail, commercial and industrial uses—At issuance of first certificate of occupancy.

2. Residential uses—At twenty-five (25) percent of occupancy.

(3) *Compliance requirements.*

a. All site plans shall include a parking facility and roadway illumination plan. That plan shall be certified by a registered architect or registered engineer as providing illumination in accordance with the applicable minimum standards set forth in this section. Subsequent construction must comply with the approved lighting plan.

b. The lighting installation shall not be placed in permanent use until a letter of compliance from a registered professional engineer has been provided stating that the installation has been field checked and meets the requirements as stated above.

c. Along private rights-of-way adjacent to new development where inadequate or no lighting exists, developers shall be required to install street lights with a maintained minimum of six-tenths (.6) foot candles of light measured at grade level. Along public rights-of-way adjacent to new development where inadequate or no lighting exists, developers shall be required to install street lights per FPL Street and Area Lighting Design Standards and Florida Department of Transportation Roadway and Traffic Design Standards.

(4) *Ordinance enforcement.*

a. The city has the jurisdiction at various times to check existing parking lighting installations. The owner of the property shall maintain lighting fixtures in operating condition at all times.

If a notice to the property owner is issued, the owner shall have thirty (30) days to repair or replace defective parts and render the lighting fully operational.

(Ord. No. 402-K, § 1, 2-11-92; Ord. No. 402-95-G, § 4, 6-27-95)

Secs. 16-110—16-119. Reserved.

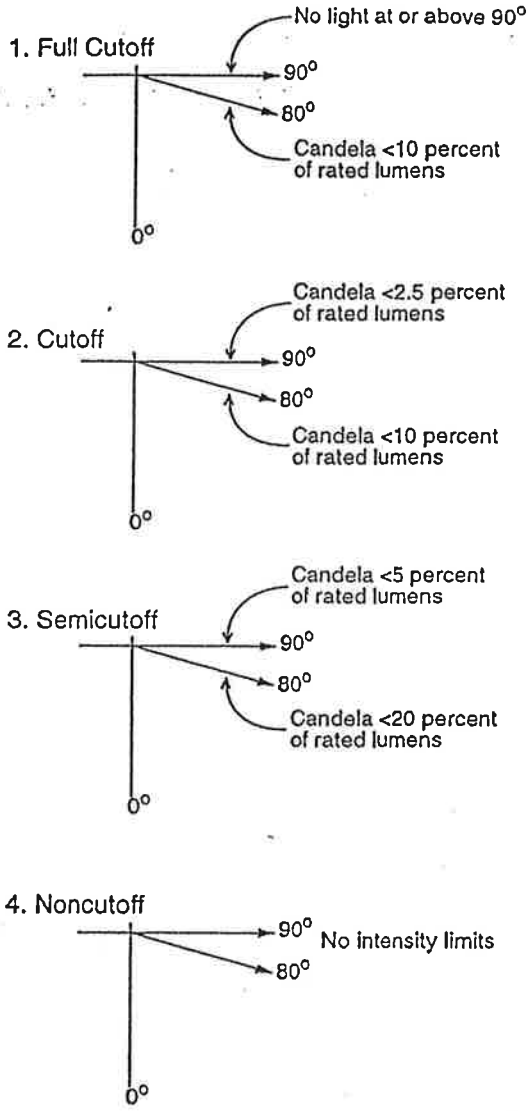

Figure 18. Standard roadway luminaires are available in four different cutoff classifications.

8.1 Pole-Mounted Luminaires

Pole-mounted luminaires are commonly used for roadway and parking lot lighting. These luminaires produce wide light intensity distributions, which permit extended pole spacing (see **Figure 21**). In most cases, the most important design criteria are minimum horizontal illuminance and uniform horizontal illuminance.

Luminaires with dropped-dish (ovate) refractors are commonly used in roadway applications. They are mounted on long arms off a vertical support pole. Based on appearance, they are referred to as "cobra head" luminaires. Poles for roadway lighting applications are usually mounted well back from the roadside to minimize opportunity for contact with oncoming traffic.

This optical system can cause glare that could be reduced by using cutoff or full cutoff luminaires. Cobra head luminaires with flat lenses are available for this purpose.

Parking lot lighting often uses cutoff luminaires with flat-bottomed lenses. These luminaires are mounted on short arms and can be arranged in single, twin, or quad configurations. Symmetric and asymmetric intensity distributions and mounting schemes are used to provide the necessary flexibility in pole placement for parking lots.

Small luminaires mounted on short poles are used to provide walkway and grounds lighting. Sometimes referred to as "post top" luminaires, they can satisfy both functional and aesthetic needs.

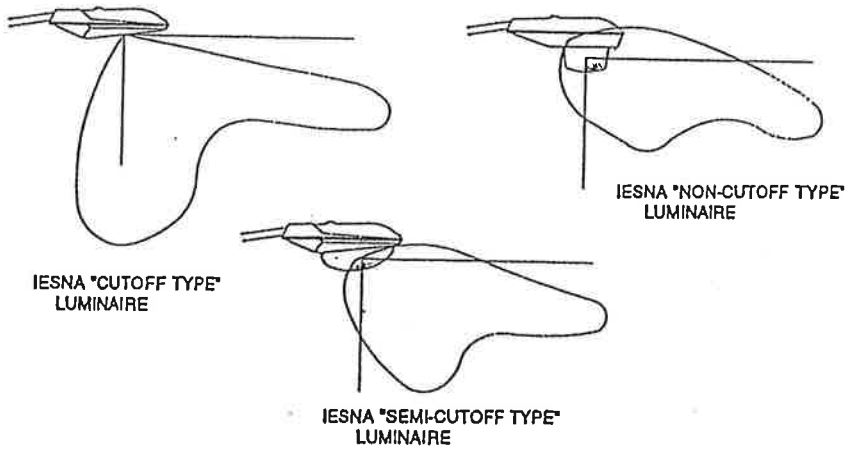

Figure 19. These computer simulations represent the light distribution patterns produced by three different types of cobra-head luminaires. Note: There is no light distribution above 90° in the cutoff-type luminaire. (Courtesy of Clanton and Associates, Inc.)

147TCH-00PB
January 18, 2001

Exhibit D

Survey of Lighting Levels at Several Locations in Gainesville

Note: The methodology for this survey, in most cases, involved taking a light level reading directly underneath a light fixture, and at a distance of 10 feet, 20 feet and 30 feet from the light source. In parking lots where lighting levels seemed less uniform, readings were also taken between light fixtures. Light level readings were then averaged. This survey should not be considered scientific and should be used for informational purposes only. True average footcandle readings can only be achieved by averaging all readings across an entire plane on a photometric plan.

Publix Shopping Center (N.W. 34th Street and W. University Avenue)

Average footcandles: **15** (readings: 37.3, 11.3, 7.39, 4.79)

Checkers (N.W. 34th Street and W. University Ave.)

Average footcandles: **26** (readings: 24.9, 23.4, 34, 45.5)

Office Depot/Applebees (N.W. 13th Street and N.W. 10th Ave.)

Average footcandles: **1.18** (readings: 3.14, 2.27, 1.59, .31, .29, .64, .033)

Eckerds (N.Main Street and N.W. 10th Ave.)

Average footcandles: **3.7** (readings: 4.54, 3.85, 3.46, 2.97)

Publix- Hunters Crossing (N.W. 43rd St. and N.W. 53rd Ave.)

Average footcandles: **2.9** (readings: 3.10, 3.32, 2.78, 2.62)

Home Depot (Tower Road)

Average footcandles: **1.9** (readings: 5.43, 2.14, 1.22, .58)

Amoco Station (S.W. 16th Ave. and S.W. 6th St.)

Average footcandles under canopy: **19.2** (readings: 19.4, 22.2, 16)

Gate Station (N.W. 13th St.)

Average footcandles under canopy: **34** (readings: 24, 35.9, 30.6, 46.6)

Villa Ravine Apartments (N.W. 16th Ave. and N.W. 13th St.)

Average footcandles: **1.83** (readings: 3.93, 1.34, .237)

V. OLD BUSINESS

1. **Petition 147TCH-00 PB** City of Gainesville. Amend the City of Gainesville Land Development Code related to lighting in terms of site plan submittal requirements, glare, light trespass, light fixture mounting height, illumination levels and specific requirements for gasoline service stations.

Ms. Kathy Winburn was recognized. Ms. Winburn explained that the board considered Petition 147TCH-00PB at their January meeting. She indicated that, at that time, the board requested input from the Police Department and a presentation by staff of an Adjacent Use Light Trespass Matrix for lighting. Ms. Winburn indicated that the requested information had been provided in the board's packets. She discussed the Police Department information and the Adjacent Use Matrix. She noted that roadway lighting was exempted from the provisions. Ms. Winburn offered to answer any questions from the board.

Mr. Pearce asked if the petition addressed the problem of roadway lighting trespassing onto residential property.

Ms. Winburn indicated that it did not address roadway lighting. She explained that the Public Works Department had standards for roadway lighting.

Mr. Pearce indicated that he had a problem with the exclusion of roadway lighting from the proposed regulation. He noted that in many traditional city neighborhoods, the houses were very close to the street. He indicated that he would like to see language added to address the issue.

Chair Fried pointed out that, if lighting was intrusive, it could be dealt with by GRU.

Mr. Pearce indicated that there should be a policy to protect property owners. He pointed out that there were a significant number of nuisance lighting situations at the present time. He noted that, while a person could file a complaint, he did not believe citizens should have to go through that process.

Dr. Fried pointed out that, while a certain level of lighting might be intrusive to one person, another person might wish that level for security.

Mr. Pearce noted that the proposal to amend Section 30-345 addressed light trespass and glare. He asked if those regulations would include roadway lighting.

Ms. Winburn indicated that it would be exempt. She explained that roadway lighting was not something that the Planning Department reviewed through the Land Development Code process. She noted that the section addressed flood lights and spot lights. She indicated that the board could make a recommendation that it apply to any lighting fixture.

Mr. Hilliard explained that other fixtures were addressed and that lighting was directed down.

Mr. Pearce, referring to the proposed language on fixtures (Section 30-398 4 (e) 4), indicated that he still had a problem with cut-off of light fixtures being set at 90 degrees. He pointed out that such an angle allowed a significant amount of light trespass, even at 30 feet. He suggested that the fixture should be recessed into a hood. He noted that some ordinances in other cities required that light not trespass onto other properties.

There was no public comment on the petition.

Ms. Myers made a motion to approve the petition.

Mr. Pearce requested that the motion be amended with regards to light fixtures. He suggested that language be added to state, "lighting devices shall be adequately shielded and screened so that no light will glare directly onto any public right-of-way or property principally used for residential purposes." He explained that the language was as stated from information provided on the Ann Arbor ordinance. Mr. Pearce indicated that he would also like to add some language that precluded roadway lighting from direct glare on residential property.

Chair Fried asked staff to comment on Mr. Pearce's amendments.

Ms. Winburn noted that the amendment on fixtures would only apply to gas station lighting for canopies.

Mr. Carter expressed a concern about safety at gas stations. He pointed out that many convenience stores were associated with gas stations.

Ms. Winburn explained that the minimum for convenience store parking lots was two foot-candles. She noted that the Code required two and a half for parking lots and no more than 10 foot candles under the canopy. She indicated that staff was not proposing anything less than that required by the state.

Ms. Myers pointed out that the restriction on roadway lighting would affect almost every neighborhood in Gainesville since most street lights did shine on residential properties.

Mr. Pearce indicated that it would be sufficient that lighting be shielded such that it did not shine directly on a specific setback.

Mr. Hilliard suggested that Mr. Pearce wished that roadway lighting not shine into a home.

Mr. Pearce agreed. He suggested a 20 foot setback for lighting. He restated his amendment to the motion that, "roadway lighting shall not cause direct glare onto residential dwellings."

Ms. Myers indicated that she could not agree to the amendment. She noted that she had such a shield and had to have it removed for security reasons.

Mr. Carter asked if existing businesses would have to comply with the ordinance.

Ms. Winburn explained that existing businesses would be grandfathered, however, if a light was changed, it would have to meet Code requirements.

Mr. Hilliard explained that there were regulations to deal with nuisance lighting. He pointed out language in Section 30-345 (3) 9.

Mr. Pearce indicated that he would remove the amendment on roadway lighting.

The board declined to support the amendment.

Motion By: Ms. Myers	Seconded By: Mr. Carter
Moved to: Approve Petition 147TCH-00 PB.	Upon Vote: Motion Carried 3 - 1 Yeas: Carter, Fried, Myers Nays: Pearce