

## **City of Gainesville Standard Practice for Public Lighting**

### **1.0 PURPOSE**

The Roadway Lighting Committee of the Illuminating Engineering Society (IES) of North America states “The principal purpose of roadway lighting is to provide quick, accurate, and comfortable seeing at night. These qualities of seeing may safeguard, facilitate, and encourage vehicular and pedestrian traffic.”

### **1.1 OBJECTIVE**

The primary objective of this Standard Practice for Roadway Lighting is to serve as the foundation for the design of fixed lighting systems for roadways within the Gainesville city limits. Upon adoption, this standard will define recommended and authorized lighting levels to be used in the design of new roadway lighting systems. This standard is not intended to be applied to existing lighting systems until such systems are redesigned.

### **1.2 GOALS**

1. Promote the safety of pedestrian, bicyclist, and automobile driver interaction.
2. Preserve and enhance an attractive and desirable urban environment for residents within neighborhoods and along collector and arterial roads.
3. Promote and maintain the vitality and attractiveness of public spaces and business districts within the City.
4. Preserve and enhance the tree canopy and urban forest.
5. Promote energy conservation and maximize the benefit of public lighting expense.
6. Solicit community involvement in the assessment of lighting needs, requirements, and practices within the City.
7. Develop and promote a public notification process to inform citizens of proposed or pending lighting projects.
8. Establish lighting standards of good quality and reasonable levels of illumination.

### **2.0 TECHNICAL REQUIREMENTS**

The execution of a standard lighting practice is dependent upon: roadway classifications, pavement classification, roadway illumination factors, and roadway illumination standards.

## 2.1 TYPES OF LIGHTING SYSTEMS

1. Street lighting: lighting designed in accordance with IES standards to provide illumination of that portion of the street used by vehicular traffic.
2. Pedestrian lighting: lower level lighting intended to illuminate the pedestrian walkway that generally runs parallel to that portion of the street used by vehicular traffic.
3. Dual lighting: a lighting system designed, to the maximum extent possible, to meet the needs of both the street lighting and pedestrian lighting systems.
4. Walkways and Class I bikeways lighting: lighting for corridors that are designated for the “exclusive use” of pedestrians and cyclists, and are removed from vehicular traffic conflicts. Lighting systems for these types of facilities shall be in accordance with the IESNA Document DG-5-94 entitled “Recommended Lighting for Walkways and Class 1 Bikeways”.

## 2.2 ROADWAY CLASSIFICATIONS

Determination of roadway classification (major, collector, and local) and sub classification (commercial, intermediate, and residential) will be consistent with the roadway classifications and sub classifications defined by the Illuminating Engineering Society (IES). The Public Works Department will be responsible for determining a roadway’s classification, to the maximum extent possible determinations shall be consistent with the Florida Department of Transportation’s Functional Classification.

1. The following descriptions of roadway classification will be used:
  - a) **Major Road:** Commonly referred to as “Arterial” roadways. These streets are designed as routes, which generally serve and interconnect the major centers of activity in the urban area. As defined in F.S.334.03: “a route providing service which is relatively continuous and of relatively high traffic volume, long average trip length, high operating speed, and high mobility importance.” Within the municipal limits, all state highways, and most county roads, are classified as arterial streets.
  - b) **Collector Road:** As defined in F.S. 334.03: “a route providing service which is of relatively moderate average traffic volume, moderately average trip length, and moderately average operating speed. Such a route also collects and distributes traffic between local roads or arterial roads and serves as a linkage between land access and mobility needs.”
  - c) **Local Road:** As defined in F.S. 334.03: “a route providing service which is of relatively low average traffic volume, short average trip length or minimal through-traffic movements, and highland access for abutting property.”

2. The following description of roadway sub-classification will be used:
  - a) **Commercial Area:** Densely developed business area outside, as well as within, the central part of the municipality. Nighttime vehicular and/or pedestrian traffic within such areas would be characterized as relatively heavy.
  - b) **Intermediate Area:** Developed area outside, as well as within, the central part of the municipality comprised of libraries, community recreation centers, large apartment complexes, industrial buildings, or neighborhood retail stores, etc. Nighttime vehicular and/or pedestrian traffic within such areas would be characterized as moderate to moderately heavy.
  - c) **Residential Area:** Developed area comprised of residential developments, or a mixture of residential and small commercial developments. This definition includes areas of single-family homes, town houses, small apartment buildings, and conservation areas. Nighttime vehicular and/or pedestrian traffic within such areas would be characterized as light.
3. Lighting requirements for a roadway of a single classification will differ among commercial, intermediate (mixed use), and residential segments of that roadway. Proper sub classification of a roadway will be largely dependent upon the zoning of the properties, which abut the roadways(s) under consideration. Such a review will help determine the appropriate lighting levels based on standardized recommendations. Operating practice may demand that the irregularities in zoning, conflicts in zoning, or repeated changes in zoning within a roadway segment will not absolutely impact the classification of a roadway segment. A smoothing technique (or generalization) may be utilized to insure that changes in lighting levels are gradual, not abrupt. Such practice will normally be done in a manner, which will distribute the effects of smoothing or generalizing away from residential areas.

### **2.3 PAVEMENT CLASSIFICATION**

The proper application of a roadway lighting standard is dependent upon the classification (standardized description) of the pavement's reflectance characteristics. The City's roadways will be classified as R2/R3 (as defined within the IES standards) unless otherwise determined by the City's Public Work Department.

### **2.4 ROADWAY ILLUMINATION FACTORS**

There are four (4) important illumination factors to be considered in the proper design of a new roadway lighting system:

1. Average maintained illumination of the roadway (measured in foot-candles). The desired or target quantity of illumination for a roadway is based upon roadway classification and sub classification.

2. Ratio of the average maintained illumination to the minimum maintained illumination of the roadway. This ratio is a measure of illumination quality. A low ratio is an indication that the roadway illumination is relatively “even” or uniform in appearance. Therefore, a lighting system designed to attain a low ratio will promote superior night vision and reduce fatigue.
3. Ratio of the maximum maintained illumination to the minimum maintained illumination of the roadway. This ratio is also a measure of illumination quality. A low ratio is an indication that both visual hot spots (intense illumination) and dark spots (negligible illumination) have been minimized. Therefore, a lighting system designed to attain a relatively low ratio will reduce the need for reflex vision adaptation resulting from extreme variations of illumination.
4. Glare is the sensation produced by luminance (light) greater than that to which the eyes have adapted. Therefore, a lighting system designed to minimize glare will improve night vision by reducing fatigue and distraction. Glare will be controlled by the careful selection of lamp fixture and installation practice.

## 2.5 ROADWAY ILLUMINATION STANDARDS

The 1984 American Association of State Highway and Transportation Officials (AASHTO) Streetlighting Guidelines will be used to establish maximum standard illumination levels for major and collector roadways. The AASHTO Guidelines will be augmented by IES standards with regard to light quality criteria. The “AASHTO” guidelines are rooted in “IES” standards.

**Table 1**

Roadway Class	Sub Class	Average Foot-candles	Max/Min Ratio	Ave./Min Ratio
Major	Commercial	1.6	10:1	3:1
	Intermediate	1.2	10:1	3:1
	Residential	0.8	12:1	3:1
Collector	Commercial	1.1	10:1	4:1
	Intermediate	0.8	12:1	4:1
	Residential	0.6	12:1	4:1
Local	Commercial	0.8	20:1	6:1
	Intermediate	0.7	20:1	6:1
	Residential*	0.4	20:1	6:1

\* optional selection only

All street lighting systems shall be designed based upon the above criteria, except systems designed for local residential roadways which will comply with those standards outlined in Section 2.6.

## 2.6 LOCAL RESIDENTIAL ROADWAY DESIGN STANDARD

Standard lighting practice along local residential roadways will not adhere to AASHTO guidelines (or IES standards) for economic reasons. Given that neighborhoods and their needs differ from one to another, the following guidelines will apply:

1. **Standard Lighting System:** standard lighting fixtures will be installed at critical areas of the roadway (potential area of conflict) such as: intersections, high volume driveway connections, curves, and cul-de-sacs. Mid-block light fixtures will be installed to “fill in” the roadway. Generally, lights are installed every 200 to 300 feet.
2. **Minimum Lighting Option:** standard lighting fixtures will be installed at critical areas of the roadway (potential area of conflict) such as: intersections, high volume driveway connections, curves, and cul-de-sacs.
3. **Maximum Lighting Option:** standard lighting fixtures will be installed in such a manner and quantity to attain the recommended AASHTO (IES) lighting guidelines specified in Table 1 above. This option may be exercised only if standard fixtures are to be installed (without exception).

## 2.7 DESIGN DEVIATIONS

It is not always possible to satisfy all the elements of a properly designed lighting system due to physical and material limitations. This is particularly true in retrofit situations. A “best fit” approach will be taken to best satisfy all applicable requirements. Priority will be given to those elements that promote quality illumination. Minor deviations from the illumination values and quality standards should be expected and accepted. **Good engineering practice shall be exercised in order to minimize all such deviations.**

## 3.0 STANDARD MATERIALS

### 3.1 LAMPS

The standard lamp used on all roadways within the City will continue to be high-pressure sodium (hps).

**Advantage:** This type of lamp is very energy efficient, relatively long lived, and it emits a relatively consistent light output (measured in lumens) throughout its rated life.

**Disadvantage:** Emits light predominately in the yellow/orange range of the light spectrum which results in limited color rendition.

**Exceptions:** In order to clearly delineate the Central City District (CCD), a special interest area, metal halide lamps will continue to be used for street lighting purposes and mercury vapor lamps will continue to be used for pedestrian lighting purposes.

### 3.2 FIXTURES

The standard fixture (or lamp housing) used for all new and replacement lighting projects along major, collector, and local roadways will be of a “cutoff” design.

**Advantages:** This type of fixture directs the lamp’s output downward towards the roadway thereby: (a) minimizing glare and (b) promoting maximum efficiency.

**Disadvantages:** May require a closer placement of fixtures to adhere to specific lighting standards. There may be an erroneous perception of less light due to the reduction or absence of glare.

**Exceptions:** Established neighborhoods differ from one to another, therefore, non-cutoff “area” lights, though not recommended, may continue to be installed along local roadways provided that:

1. Infill light: An existing lighting system is to be merely augmented (not a total system redesign). A simple majority of the property owners immediately adjacent to the proposed light must request a fixture similar to the style existing within the neighborhood.
2. Total system redesign: A simple majority of the neighborhood property owners must request fixtures similar to the style existing within the neighborhood.

### 3.3 STRUCTURES

The standard structures (or poles) used for roadway illumination will be either treated wood or concrete poles. The determination as to which structure is used is dependent upon the following factors:

1. Compatibility with existing utility structures
2. Aesthetics
3. Contribution in aid of construction (FDOT, etc.)
4. Budgetary constraints

Based upon the selection criteria outlined above, the following application guidelines will be used with regard to the selection of structures **dedicated to street lighting:**

1. Concrete poles will continue to be used along some major, collector, and local roadways. A strong public preference for dark colored poles has been registered. GRU will continue its review of potentially cost effective and more aesthetically pleasing alternatives to the standard wood pole.

2. Wooden poles will continue to be used along some major, collector, and local roadways. Wood poles will continue to be the typical structure along local residential roadways. GRU will continue its review of potentially cost effective and more aesthetically pleasing alternatives to the standard wood pole.
3. The occasional use of more attractive non-standard poles (dark colored aggregate cement or steel poles, possibly fluted, octagonal, or hexagonal in shape) may be warranted along highly visible major, collector, or local roadways, and/or other areas of special interest. See section 5.0.

### **3.4 STRUCTURE PLACEMENT**

The width of the right of way and /or roadway, fixture mounting height, structure setback requirements, fixture mounting arm length, and the lamp wattage all have an effect upon the physical placement and the number of lighting structures. The following installation practices will be used:

1. Alternate side lighting is required on all roadways comprised of four (4) or more travel lanes.
2. Alternate side lighting may be required on roadways comprised of three (3) lanes, dependent upon other design limitations.
3. A choice between alternate or single side lighting may be available along two (2) lane roadways and along some three (3)-lane roadways. On such roadways, regardless of classification, there may be compelling reasons to choose one alternative or the other. The least number of structures and fixtures required to meet the desired result should be installed.
4. Center lighting roadways with medians will be the preferred option when FDOT Design Standards can be met. The selection of this option may be further constrained by the number of turn lanes within the median area. A significant number of such lanes may preclude the regular placement of structures. Where feasible, the installation of double-armed frangible structures within the median may provide an attractive and cost effective street lighting alternative.

All lighting structures shall be placed within the public right-of-way (ROW) or easements. The placement of structures within sidewalks shall be avoided.

### **3.5 LIGHTING CONDUCTOR INSTALLATION**

In general, the following lighting conductor installation practices will be used:

1. The visual intrusiveness of overhead lighting conductors shall be reduced by using the following designs: minimize the number of road crossings, maximize the benefit of installations which parallel the roadway, make unavoidable crossings perpendicular to the roadway, and utilize off roadway (rear lot) energy sources where practical and available. Zig-zag connections along the roadway shall be avoided.
2. Conductors will be placed underground in conjunction with the installation of underground electric distribution facilities within new developments.
3. Conductors will be placed underground if such work is funded specifically by the General Government or any outside agency (FDOT, etc.). The City will actively seek grants and alternate funding sources to assist with the expenses of undergrounding utility lines.
4. The monthly rental rate(s) for structures which are physically limited to accept only underground conductors may include the capital cost of installation (material and civil infrastructure) required to construct the underground service to that structure.

### **4.0 MAINTENANCE**

In general, all public streetlights will be maintained once every five (5) years to insure maximum energy efficiency and proper operation. This preventative maintenance program will include revamping, cleaning, and the installation of a new photoelectric control.

GRU will establish and complete a phased program to replace all mercury vapor lamps with standard high-pressure sodium units within the next five (5) years. The sole exception to this program will be the pedestrian lights located within the CCD. This program will promote energy savings and a more uniform lighting system throughout the city.

### **5.0 SPECIAL LIGHTING DESIGN AREAS**

The City Commission may designate Special Lighting Design Area(s) (Special Area). A Special Area warrants lighting practices that deviate from the standards with respect to design, type of structure, type of fixture or level of illumination.



A Special Area shall be designated as one of the following:

**1. Special Commercial Areas**

Pedestrian lighting should be installed utilizing structures and fixtures of traditional or unique design. Such fixtures should be of low mounting height and may be used in conjunction with high massed metal halide “hockey puck” style lights. Special attention should be given to lighting pedestrian areas attractively. Structures and fixtures should be dark colored. Lighting conductors should be placed underground as funds permit.

**2. Historic Neighborhoods**

Pedestrian lighting should be installed utilizing structures and fixtures of traditional or unique design. Such fixtures should be of low mounting height and may be used in conjunction with more traditional hps streetlights. Special attention should be given to lighting pedestrian areas attractively. Structures and fixtures should be dark colored. Lighting conductors should be placed underground as funds permit.

**3. Gateway Streets**

These streets serve as an introduction to our City and deserve an impressive, yet cost effective treatment. Major attention should be given to installing attractive lighting and “street furniture”, particularly in areas with substantial nighttime pedestrian and bicycle activity. Structures and fixtures should be dark colored. Lighting conductors should be placed underground as funds permit.

**4. Greenway Corridor**

The “Greenway Corridors” are an important asset to the City. The roadways that traverse such areas deserve special treatment. Major consideration should be given to installing attractive lighting and “street furniture”, particularly in areas with substantial nighttime pedestrian and bicycle activity. Illumination levels associated with the local residential roadways are appropriate along these roadways. . Structures and fixtures should be dark colored. Lighting conductors should be placed underground as funds permit.

**5. High Bicycle and Pedestrian Use Areas**

Bicycle and pedestrian friendly lighting should be installed utilizing structures and fixtures of traditional or unique design. Fixtures should be of low mounting height and may be used in conjunction with more traditional hps streetlights. Special attention should be given to lighting pedestrian areas attractively. Structures and fixtures should be dark colored. Lighting conductors should be placed underground as funds permit.

## **5.1 PROCEDURES FOR DESIGNATING SPECIAL LIGHTING DESIGN AREA (S)**

The procedures for designating a Special Area are as follows:

1. All requests should be submitted to the City Manager for review and recommendation. A request may be submitted by a redevelopment board, neighborhood association, business association, or other appropriate group.
2. The City Manager will obtain input from appropriate staff (Public Works, Community development, Gainesville Regional Utilities, etc.). This review will address issues relating to the boundary of the area, planning implications, electrical system implications, compatibility with adjacent roadway lighting, funding etc.
3. The City Manager will make a recommendation to the City Commission.
4. Once approved by the City Commission, the Special Area boundaries will be identified on a map at the Public Works Department.
5. Any changes to the boundary require approval by the City Commission. Any such request must be submitted to the City Manager for review and recommendation.
6. Requests to remove a Special Area designation must be approved by the City Commission.

## **5.2 OPERATIONAL CONSIDERATIONS**

The operational considerations for Special Areas are as follows:

1. All public transportation lighting must be on public right-of-way or easement and/or on a city-owned facility.
2. All special lighting instruments require approval by the Public Works Department.
3. Special lighting plans that include lighting on a state and/or county road in a Special Area require approval of that agency.
4. Unanticipated issues that arise regarding design, cost, construction, etc. will be jointly resolved by the General Manager for Utilities and the City Manager.
5. If a private property owner, within a Special Area requests to use the same structures and fixtures associated with a special lighting plan, all costs will be the responsibility of that property owner and privately contracted out for installation.

### **5.3 FINANCIAL CONSIDERATIONS**

Typically, the use of special structures, fixtures and lamps results in higher installation, operation and maintenance costs than standard streetlighting. The entity responsible for incremental cost increases shall be determined as part of the City Commission approval of Special Area designation.

The General Manager for Utilities, or designee, will establish the financial schedule.

### **6.0 ROADWAY LIGHTING INSTALLATION PROCEDURES**

The procedures utilized for approving the installation of streetlights will be based on the classification of the roadway; local, collector, or major. The City of Gainesville's Official Roadway Map will be used to determine a roadway's classification.

1. Request for one (1) streetlight on a local street
  - a. A single streetlight may be requested by the residents/property owners that live adjacent to the proposed streetlight. If the City determines the streetlight meets the standards, the property owners immediately adjacent to the proposed streetlight will be given an opportunity to vote by mail. A majority of the property owners responding must vote yes in order for the streetlight to be installed. The ballot process will be conducted by the Public Works Department. The ballot will include the following information:
    - Description of proposed location
    - Date ballot must be returned
    - Approval/disapproval of installation
    - Comments
    - Name, address and phone number of the property owner voting

The property owners will be notified in writing of the ballot results.

2. Request for two (2) or more streetlights on a single local street
  - a. A request for two (2) or more streetlights on a single street may be submitted by the residents/property owners living on the street or by a City Agency/Board. If requested by the property owners/residents, it must be signed by at least 15% of the residents/property owners living on the street. The street segment shall be determined by the Public Works Director or designee.
  - b. If the City determines that some or all of the proposed streetlights are warranted, The property owners on the street or street segment will be given the opportunity to vote by mail. A majority of the property owners responding must vote yes in order for the streetlight to be installed. The ballot process will be conducted by the Public Works Department. The ballot will include the following information:

- Description of proposed location of streetlights
- Date ballot must be returned
- Approval/disapproval of installation of streetlights
- Comments
- Name, address and phone number of the property owner voting

The property owners will be notified in writing of the ballot results.

### 3. Streetlighting for safety issues

- a. The minimum lighting option as identified in Section 2.6 for installation of streetlights on local roadways (Section 2.5) states that streetlights should be installed at critical areas of the roadway (intersections, high volume driveways, curves, cul-de-sacs, dead-ends, etc.). If the Public Works Department determines that a streetlight is warranted at a critical location, the Public Works Director (or designee) may approve the streetlight installation after notifying the adjacent property owners in warrant.

### 4. Requests for neighborhood or subdivision streetlighting

A request for new streetlighting or modifications to existing lighting within a neighborhoods or subdivision may originate from the property owners/residents/neighborhood association, a City Agency or Board or GRU.

- a. Requests originating from the property owners/residents/neighborhood association.
  - Requests must be signed by at least 15% of the residents/property owners or a request may come from a recognized neighborhood association. If the City determines that streetlight improvements are warranted, the property owners will be given the opportunity to vote by mail. A majority of the property owners responding must vote yes in order for the streetlight to be installed. The ballot process will be conducted by the Public Works Department. The ballot will include the following information:
    - Drawing of proposed streetlight plan
    - Date ballot must be returned
    - Approval/disapproval of streetlight plan
    - Comments
    - Name, address and phone number of the property owner voting
  - The property owners will be notified in writing of the ballot results.

b. Requests made by GRU

- If in conjunction with construction of a new or upgraded electrical system, it is determined that a streetlighting system upgrade is warranted, the Public Works department will notify the property owners in the affected area. **Balloting process, in accordance with Section 6.0.4.a., will be required when there is a significant increase or decrease in the level of illumination or the number of streetlights.** The notification will include the following information:
  - Drawing of proposed streetlight plan
  - Letter describing scope and reason for project
  - Phone number of person/agency that may be contacted for information or registering concerns
  - Date of anticipated installation
  - Date by which concerns need to be registered
- The streetlighting system will be constructed to local residential roadway design standards as defined in Section 2.6.1.

5. Requests for streetlights on city collector and/or major roads

- a. Requests for streetlights may be made by the residents/property owners living along the roadway, the Public Works Department, City Agency or Board, GRU or the City Commission. The Public Works Department will mail a notice to the abutting property owners advising them of the streetlight project. Such notification shall be provided early in the design process to insure the opportunity for public input. The notification shall include information relating to the standard lighting practice in the City, standard material and lamp/fixture characteristics. The Public Works Department and GRU will work with individual property owners to solve any conflicts that may arise. However, conflict resolution will not jeopardize the integrity of the streetlight design.

6. Procedures for approving the installation of lighting systems on collector and arterial roads maintained by Alachua count and the FDOT.

- a. The procedures for installation of lighting systems along collector and arterial roadways that are maintained by Alachua County and FDOT are determined by that agency which has jurisdictional control. On Alachua County and FDOT projects, the City will submit a request to FDOT or Alachua County that the responsible agency consider:
- Installing a lighting system based upon the standards adopted herein by the City Commission;
  - Installing underground lighting conductors when such conductors are installed apart from other overhead electric distribution facilities;

- Installing non-standard (upgraded) lighting structures when such lighting is being installed apart from other overhead electric distribution facilities.