WATERFRONT ADVISORY BOARD  
Agenda  
City Hall Council Chamber Monday, November 4, 2019, 5:30 PM

<table>
<thead>
<tr>
<th>Phillis Rosetti, Vice-Chair</th>
<th>Scott Gantt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Michael Engiles</td>
<td>Jim Baumstark</td>
</tr>
<tr>
<td>Lynn Marcum</td>
<td>Wayne Mozo</td>
</tr>
</tbody>
</table>

| Ken Brown, Liaison |

1. Call to Order –
2. Election of Chair –
3. Roll Call –
   Present:
   Staff:
4. Pledge of Allegiance –
5. Adoption of Agenda –
6. Approval of Minutes –
7. Presentations –
8. Citizen Input - (three (3) minutes) –
9. Unfinished Business –
   a. KBP Kiosks –
10. New Business –
   a. Non-Mechanized Power Pole Anchor and bell anchor grant program –
   b. Welcome Bags for Water Customers –
   c. Grass Clippings and Fertilizer Tips Flyer –
   d. Boater Brochures
   e. Next Agenda –
11. Citizen Input- (three (3) minutes) –
12. Board Member Reports/Comments –
   Jim Baumstark –
   Mike Engiles –
   Scott Gantt –
   Lynn Marcum –
   Wayne Mozo –
   Phillis Rosetti –
13. City Council Liaison Comments - Ken Brown –
14. Staff Comments –
15. Announcement of Next Meeting – December 2, 2019, at 5:30 p.m.
16. Adjournment –
Lisa Morris

From: Lora Klein <klein.lora@ymail.com>
Sent: Tuesday, October 29, 2019 6:28 AM
To: Lisa Morris
Subject: Waterfront Board

Lisa,

It has been a great experience for me over the last six years to have been part of a wonderful group that has allowed me to get involved and get to know great folks. I have seen several things accomplished and hope to see many more down the road.

My time as a board member must come to a close due to our house selling and closing in a few weeks. We have decided due to my husband's travel schedule to move closer to Tampa. I will keep my job here but since I will no longer be living in the county it is time to resign.

There are some great folks that have been added to the board who I think will bring to the table wonderful suggestions and ideas. I have worked with Philis and yourself for years and I will miss our conversations.

I thank everyone for letting me be a part of such a great experience.

Sincerely,

Lora Klein
Sent from my iPad
Minutes
City Hall Council Chamber Monday, October 7, 2019, 5:30 PM

Lora Klein, Chair
Michael Engiles
Lynn Marcum
Scott Gantt

Phillis Rosetti, Vice-Chair
Jim Baumstark
Wayne Mozo

Ken Brown, Liaison

1. Call to Order – Chair Klein called the meeting to order

2. Roll Call –
   Present: Lynn Marcum, Wayne Mozo, Scott Gantt, Mike Engiles, and Lora Klein,
   Staff: City Manager Ken Frink, Co-Staff Liaison Beth Perez, and Deputy Clerk Lisa Morris.

3. Pledge of Allegiance – All in attendance recited the pledge of allegiance.

4. Adoption of Agenda – Board member Engiles moved to adopt the agenda as amended (tabling items 9b and 9d until the next meeting); seconded by Board member Marcum. Motion carried 5-0.

5. Approval of Minutes – Board member Mozo moved to approve the minutes of the August 5, 2019 minutes; seconded by Board member Engiles. Motion carried 5-0.

6. Presentations – None

7. Citizen Input – (three (3) minutes) – None.

8. Unfinished Business –
   a. KBP Kiosks – Table to next meeting. Co-Liaison Perez discussed creating kayak, paddle trail. Ideas for the kiosks. Perez to email Engiles about
   b. Boater Brochures – Ensure it is digital. Ensure Manatee sanctuary should be on the brochure – say no swimming, no boating, and no paddle crafts. Educational component. The board discuss various component of the brochures.

9. New Business –
   a. Welcome bags for water customers ideas – Brief update.
   b. Grass Clippings and Fertilizer Tips Flyer – Tabled to next meeting.
   c. Three Sisters Update – Liaison Perez provided an update on things going on at 3SS. Saturday is open house at refuge 9-3.
   d. Non-Mechanized Power Pole Anchor and bell anchor grant program – Tabled to next meeting.
   e. Next Agenda –
      a. Follow-up on Kings Bay Kiosk
      b. Boater Brochures –
      c. Welcome bags for water customers

10. Citizen Input – (three (3) minutes) – City Manager Ken Frink addressed the board. Frink talked about Kings Bay. Frink discussed Ferguson and Roger Smith. Frink provided an update on 3SS, FCT approved the management agreement. Input from WAB what water infraction would be. Marcia Chesnicka, Bay Path Drive, interested in the pole anchor issue, provided information on pole anchoring. Suggested everyone say people should use a pole anchor.
City Manager Frink relayed information about a master plan for Kings Bay. City Manager Frink discussed anchoring Massullo.

11. Board Member Reports/Comments—
   
   Jim Baumstark - None.
   
   Mike Engiles - Board member Engiles reported on participated in Save water week. Discussed picking up boat motor, PVC pipe, crab traps, tires were removed from the water.
   
   Scott Gantt – None.
   
   Lora Klein – Chair Klein commented on how the water by her house is pretty blue, the eel grass growing.
   
   Lynn Marcum – Board member Marcum read 2 letters that she received. See attachments A & B.
   
   Presented the board with an ordinance about lighting see attachment C. City Manager discussed city’s response.
   
   Wayne Mozo – Board member Mozo discussed the lighting issue.
   
   Phillis Rosetti – None.

12. City Council Liaison Comments - Ken Brown – None.

13. Staff Comments – None.

14. Announcement of Next Meeting – November 4, 2019, at 5:30 p.m.

15. Adjournment – Board member Marcum moved to adjourn the meeting; Board member Mozo seconded the motion. 5-0.
175 NW Bay Path Drive  
Crystal River, FL 34428  
September 24, 2019  

Waterfront Advisory Board  
City Hall  
Crystal River, FL 34429  

Dear Board Members:  

Over the past few years business and residents around Kings Bay have been adding high-powered lights to their property. Light, like sound, travels easily across the water. The city addressed an earlier problem for us, but the issue keeps reoccurring. The most recent of these brilliant lights spotlight right into our bedrooms. Our councilman Pat Fitzpatrick is working on solving this problem with Duke Energy and the business involved, but in the meantime, we and our neighbors find our enjoyment of our homes compromised by these lights.  

These light installations can happen overnight, but then take months, if not years, to correct.  

We are grateful that, in installing the River Walk, the City heard the residents, and chose subtle lights that add to rather than distract from the beauty of our bay. We wish businesses would do the same.  

We would request that the Waterfront Board help the city establish a clear policy to protect our investments, the quality of life, and the charm of where we live.  

We invite any member of the board to visit us to see how lights can affect residents in their homes.  

Sincerely yours,  
Joseph Chesnicka  

Marcia Chesnicka
Subject: Lighting on Kings Bay

From: tedflanagan <tedflanagan@bellsouth.net>

To: <marcummiller@yahoo.com>

Date: Sep 24 at 6:22 PM

177NW Bay Path Drive
Crystal River, FL 34428. 09/24/2019

Waterfront Advisory Board
City Hall
Crystal River, FL 34429

Dear Sirs,

Both my wife and I, along with other members of the
Condos on Kings Bay are extremely perturbed by recent
events on the Bay, in that very powerful lights have been
installed across from our condominiums.
These lights are on all night long, and shine directly into
our bedrooms. This of course is very unsatisfactory, and we
would be pleased if this can be addressed with some
urgency.
As a compromise, maybe these lights can be adjusted on
their timers, to extinguish at 11pm?

Thanking you in advance

Edward and Joyce Flanagan
K. Light Shielding and Distribution
All street lighting shall have no light emitted above 90 degrees.

Exception: Ornamental street lighting for specific districts or projects shall be permitted by special permit only, and shall meet the requirements of Table H below without the need for external field-added modifications.

Table H - Uplight Control Requirements for Ornamental Street Lights - by Special Permit Only

<table>
<thead>
<tr>
<th>Lighting Zone</th>
<th>Maximum Uplight Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>L2-2</td>
<td>U-1</td>
</tr>
<tr>
<td>L2-3</td>
<td>U-2</td>
</tr>
<tr>
<td>L2-4</td>
<td>U-3</td>
</tr>
<tr>
<td>L2-5</td>
<td>U-4</td>
</tr>
</tbody>
</table>
The User Notes
The User Notes are intended to clarify the sections of the MLO for the various audiences who will use it: lighting designers, city officials, engineers, citizen groups, and others. Every effort has been made to keep the language technically accurate and clear, but since different disciplines may use the same term in different ways, or have different interpretations, some guidance may be helpful. While these Notes are not a full tutorial on modern lighting design, it is hoped that the Notes will help facilitate the dialogue necessary to adopt the MLO.

Background
The problem of light pollution first became an issue in the 1970s when astronomers identified the degradation of the night sky due to the increase in lighting associated with development and growth. As more impacts to the environment by lighting have been identified, an international “dark sky” movement is advocating for the precautionary approach to outdoor lighting design.

Many communities have passed anti-light pollution laws and ordinances. However, there is little or no agreement among these laws, and they vary considerably in language, technical quality, and intelligency. This is confusing for designers, engineers, and code officials. The lack of a common basis prevents the development of standards, educational programs, and other means of achieving the goal of effective lighting control.

This MLO will allow communities to drastically reduce light pollution and glare and lower excessive light levels. The recommended practices of the IES can be met using readily available, reasonable priced lighting equipment. However, many conventional lighting practices will no longer be permitted, or will require special permits.

This Model Lighting Ordinance (MLO) is the result of extensive efforts by the International Dark Sky Association (IDA) and the Illuminating Engineering Society of North America (IES) to develop a model ordinance to guide communities in adopting a modern approach to outdoor lighting. This MLO can be used by communities to adopt a lighting ordinance that is consistent with modern lighting practices and standards. The MLO includes language that is intended to clarify and simplify the adoption process, while still allowing communities to tailor the ordinance to their specific needs.

C. Scope
All invest lighting not governed by regulations of federal, state or other superceding jurisdiction.

EXCEPTION: lighting systems mounted less than 10.5 feet above street level and having less than 1000 initial lumens each.

D. Master Lighting Plan
The Authority shall develop a Master Lighting Plan based on the American Association of State Highway and Transportation Officials (AASHTO) Roadway Lighting Design Guide GL-4, 2005, Chapter 3. Such plan shall include, but not be limited to, the Adoption of Lighting Zones and:

1. Goals of street lighting in the jurisdiction by Lighting Zone
2. Assessment of safety and security issues in the jurisdiction by Lighting Zone
3. Environmentally judicious use of resources by Lighting Zone
4. Energy use and efficiency by Lighting Zone
5. Curfews to reduce or extinguish lighting when no longer needed by Lighting Zone

E. Warranting
The Authority shall establish a warranting process to determine whether lighting is required. Such warranting process shall not assume the need for any lighting nor for continuous lighting unless conditions warrant the need. Lighting shall only be installed where warranted.
This section was added since the first public review. It is designed to work closely with the proposed revision to ANSI/IES RP-8 Standard Practice for Roadway and Street Lighting.

Street and roadway lighting is one of the world’s largest sources of artificial skylight. Many adopting agencies will recognize that the MLO will make privately owned lighting more efficient and environmentally responsible than their street lighting systems. However, the process of designing street lighting often requires more precise lighting calculations, applying the MLO directly to street lighting is not advised. Using existing standards of street lighting is recommended, particularly IES RP-8 and AASHO standards.

Until a new recommended practice for street lighting can be developed, this section can serve to present most of the use of street lighting systems without setting specific requirements for the amount of light, uniformity of light, or other performance factors. Adopting agencies should include these basic improvements to street lighting along with regulations to private lighting.

Lighting streets with “period” ornamental luminaires that echo the look of a time when the light source was a gas flame can cause glare if high-lumen lamps are used. Such ornamental street lights should not exceed a RUG rating of 1.7. If additional illumination and/or uniformity is desired, the ornamental fixtures should be supplemented by higher mounted fully shielded luminaires, as illustrated in RP-33-99.

Few street lighting warranting processes exist. The adopting agency needs to decide whether a complex warranting system is required, or if a simple one using posted speed, presence of pedestrians, or other practical considerations is sufficient.

Adoption of this ordinance should follow the established development, review, and approval processes of the adopting authority. If no such processes are in place, this ordinance may be adopted as a new independent section of the Municipal Code.

The MLO is probably best adopted as an "overlay zoning" ordinance. This means that it overlays, but is different from, land-use zoning. It can be added to or integrated into existing ordinances or codes and cross-referenced to other applicable codes and ordinances such as the electrical code, the sign code, planning ordinances, etc.

The MLO may best be managed by assigning it to planning officials and using existing administrative structures.

Because of the diverse community and lighting needs across large areas, this MLO is not intended for adoption as a state, provincial or national ordinance. Regional coordination is encouraged. Light pollution knows no boundaries, and the effects of polluting light persist as far as 200 kilometers (about 120 miles) from the source. One large city could adopt the MLO and dramatically affect a region, but adoption in suburbs and small towns must be part of a regional effort to achieve significant improvements in the overall quality of the night sky.

Adopting agencies should also consider that the MLO, like all other modern codes, is designed to evolve over time. Lighting technology will change, and MLO changes will be needed every few years. On-going renewal cycles are strongly recommended as any part of an adopting ordinance.
The purpose of this Ordinance is to provide regulations for outdoor lighting that will:

a. Permit the use of outdoor lighting that does not exceed the minimum levels specified in IECC recommended practices for nighttime safety, utility, security, productivity, enjoyment, and commerce.

b. Minimize adverse effects of lighting such as light trespass and obtrusive light.

c. Minimize light pollution, reduce sky glow and improve the nighttime environment for astronomy.

d. Help protect the natural environment from the adverse effects of light pollution from gas or electric sources.

e. Conserve energy and resources to the greatest extent possible.

II. LIGHTING ZONES - Ordinance Text

The Lighting Zones shall determine the limitations for lighting as specified in this ordinance. The Lighting Zones shall be as follows:

LZ 1: No ambient lighting

Areas where the natural environment will be seriously and adversely affected by lighting. Impacts include disturbing the biological cycles of flora and fauna and/or detracting from human enjoyment and appreciation of the natural environment. Human activity is subordinate in importance to nature. The vision of human residents and users is adapted to the darkness, and they expect to see little or no lighting. When not needed, lighting should be extinguished.
However, if an adjacent use could be adversely impacted by allowable lighting, the adopting authority may require that a particular site meet the requirements for a lower lighting zone. For example, the authority could specify lighting Zone 1 or 2 requirements if a commercial development were adjacent to a residence, hospital or open space, or to any land assigned to a lower zone.

Lighting zones are best implemented as an overlay to the established zoning especially in communities where a variety of zone districts exist within a defined area or along an arterial street. Where zone districts are cohesive, it may be possible to assign lighting zones to established land use zoning. It is recommended that the lighting zone includes churches, schools, parks, and other uses embedded within residential communities.

### LIGHTING ZONES (cont.) - Ordinance Text

<table>
<thead>
<tr>
<th>Zone</th>
<th>Recommended Uses or Areas</th>
<th>Zoning Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ-1</td>
<td>Low ambient lighting Areas where lighting might adversely affect flora and fauna or disturb the character of the area. The vision of human residents and users is adapted to low light levels. Lighting may be used for safety and convenience but it is not necessarily uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.</td>
<td></td>
</tr>
<tr>
<td>LZ-2</td>
<td>Moderate ambient lighting Areas of human activity where the vision of human residents and users is adapted to modest light levels. Lighting may typically be used for safety and convenience but it is not necessarily uniform or continuous. After curfew, lighting may be extinguished or reduced as activity levels decline.</td>
<td></td>
</tr>
<tr>
<td>LZ-3</td>
<td>Moderately high ambient lighting Areas of human activity where the vision of human residents and users is adapted to moderately high light levels. Lighting is generally desired for safety, security and/or convenience and it is often uniform and/or continuous. After curfew, lighting may be extinguished or reduced in most areas as activity levels decline.</td>
<td></td>
</tr>
<tr>
<td>LZ-4</td>
<td>High ambient lighting Areas of human activity where the vision of human residents and users is adapted to high light levels. Lighting is generally considered necessary for safety, security and/or convenience and it is mostly uniform and/or continuous. After curfew, lighting may be extinguished or reduced in some areas as activity levels decline.</td>
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</tbody>
</table>

**Ornamental Street Lighting**
- A luminaire intended for illuminating streets that serves a decorative function in addition to providing optics that effectively deliver street lighting. It has a historical period appearance or decorative appearance, and has the following design characteristics:
  - designed to mount on a pole using an arm, pendant, or vertical fixture;
  - opaque or translucent top and/or sides;
  - an optical aperture that is either open or enclosed with a flat, sag or drop lens;
  - mounted in a fixed position; and
  - with a photometric output measured using Type C photometry per IESNA LM-79-08.

**Outdoor Lighting**
- Lighting equipment installed within the property line and outside the building envelope, whether attached to poles, building structures, the earth, or any other location, and any associated lighting control equipment.

**Partly shielded luminaire**
- A luminaire with opaque top and translucent or perforated sides, designed to emit most light downward.

**Pedestrian Hardwaste**
- Stone, brick, concrete, asphalt or other similar finished surfaces intended primarily for walking, such as sidewalks and medians.

**Photoelectric Switch**
- A control device employing a photoelectric or photovoltaic to detect daylight and automatically switch lights off when sufficient daylight is available.

**Property line**
- The edge of the legally defined extent of privately owned property.
### X. Definitions - Ordinance Text

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td><strong>Lumen</strong></td>
<td>The horizontal spacing of poles is often measured in units of &quot;mounting height.&quot; Examples: &quot;The luminaires can be spaced up to 4 mounting heights apart.&quot;</td>
</tr>
<tr>
<td><strong>Lux</strong></td>
<td>The SI unit of illumination. One lux is one lumen per square meter. 1 Lux is a unit of incident illumination approximately equal to 1/10 (footcandle).</td>
</tr>
<tr>
<td><strong>Mounting height</strong></td>
<td>The height of the photometric center of a luminous above grade level.</td>
</tr>
<tr>
<td><strong>New lighting</strong></td>
<td>Lighting for areas not previously illuminated, newly installed lighting of any type except for replacement lighting or lighting repairs.</td>
</tr>
<tr>
<td><strong>Object</strong></td>
<td>A permanent structure located on a site. Objects may include statues or artwork, porches or canopies, outbuildings, etc.</td>
</tr>
<tr>
<td><strong>Object Height</strong></td>
<td>The highest point of an object, but shall not include statuary or similar structures.</td>
</tr>
<tr>
<td><strong>Ornamental lighting</strong></td>
<td>Lighting that does not impair the function and safety of an area but is purely decorative, or used to illuminate architecture and/or landscaping, and installed for aesthetic effect.</td>
</tr>
</tbody>
</table>

### B. Lighting Zones (cont.) - User’s Guide

<table>
<thead>
<tr>
<th>Zone</th>
<th>Recommended Use or Areas</th>
<th>Zoning Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>LZ-2</td>
<td>Recommended default zone for low commercial business districts and high density or trend setting residential neighborhoods. Includes neighborhood business districts; churches, schools and neighborhood recreation facilities; and light industrial zoning with modest nighttime usage or lighting requirements.</td>
<td></td>
</tr>
<tr>
<td>LZ-3</td>
<td>Recommended default zone for large cities' business districts. Includes business zone districts; commercial mixed use; and heavy industrial and/or manufacturing zones.</td>
<td></td>
</tr>
<tr>
<td>LZ-4</td>
<td>Not a default zone. Includes high intensity business or industrial zones.</td>
<td></td>
</tr>
</tbody>
</table>

*Not a default zone.*
X. DEFINITIONS

A. Conformance with All Applicable Codes

Any outdoor lighting shall be installed in conformance with the provisions of this Ordinance, applicable Electrical and Energy Codes, and applicable sections of the Building Code.

B. Applicability

Except as described below, all outdoor lighting installed after the date of effect of this Ordinance shall comply with these requirements. This includes, but is not limited to, new lighting, replacement lighting, or any solar lighting whether attached to structures, poles, the earth, or any other location, including lighting installed by any third party.

Exemptions from Title (B.) The following are not regulated by this Ordinance:

- Lighting within public right-of-way or easement for the principal purpose of illuminating streets or roads.
- Lighting for public monuments and statues.
- Lighting for signs, including seasonal holiday lighting.
- Repairs to existing lighting systems not exceeding 25% of total installed luminaires.
- All outdoor lighting shall be installed in conformance with the provisions of this Ordinance, applicable Electrical and Energy Codes, and applicable sections of the Building Code.

D. Exceptions to Title (B.)

- Lighting for public monuments and statues.
- Lighting for signs, including seasonal holiday lighting.
- Repairs to existing lighting systems not exceeding 25% of total installed luminaires.

E. User's Guide

A sign lighting ordinance is strongly recommended if not already in place. It should carefully limit lighting to prevent overspill from being used to circumvent lighting ordinances.
X. DEFINITIONS

**Hardscape Perimeter**: The perimeter measured in linear feet is used to calculate the Total Site Lumens Limit in the Performance Method. Refer to Hardscape definition.

**IDA**: International Dark-Sky Association.

**IESNA**: Illuminating Engineering Society of North America.

**Impervious Material**: Sealed to severely restrict water entry and movement.

**Industry Standard Lighting Software**: Lighting software that calculates point-by-point illuminance that includes reflected light using either ray-tracing or radiosity methods.

**Lamp**

A generic term for a source of optical radiation (i.e. "light"), often called a "bulb" or "tube". Examples include incandescent, fluorescent, high-intensity discharge (HID) lamps, and low pressure sodium (LPS) lamps, as well as light-emitting diode (LED) modules and arrays.

**Landscape Lighting**: Lighting of trees, shrubs, or other plant material as well as ponds and other landscape features.

**LED**: Light Emitting Diode.

**Light Pollution**: Any adverse effect of artificial light including but not limited to, glare, light trespass, sky-glow, energy waste, compromised safety and security, and impacts on the nocturnal environment.

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**LIGHTING CONTROLS - User's Guide**

This section requires all outdoor lighting to have lighting controls that permit operation when sufficient daylight is available, and to include the capability, either through circuiting, dimming or alternating sources, to be able to reduce lighting without necessarily turning all lighting off.

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**III. GENERAL REQUIREMENTS (cont.)**

e. Temporary lighting for theatrical, television, performance areas and construction sites;

f. Underwater lighting in swimming pools and other water features;

g. Temporary lighting and seasonal lighting provided that individual lamps are less than 10 watts and 70 lumens;

b. Lighting that is only used under emergency conditions;

l. In lighting zones 2, 3 and 4, low voltage landscape lighting controlled by an automatic device that is set to turn the lights off at one hour after the site is closed to the public or at a time established by the authority.

**Exceptions to III (b)**: All lighting shall follow provisions in this ordinance; however, any special requirements for lighting listed in a) and b) below shall take precedence.

a. Lighting specified or identified in a specific use permit;

b. Lighting required by federal, state, territorial, commonwealth or provincial laws or regulations.

**C. Lighting Control Requirements**

1. Automatic Switching Requirements

   Controls shall be provided that automatically extinguish all outdoor lighting when sufficient daylight is available using a control device or system such as a photosensitive switch, astronomical time switch or equivalent functions from a programmable lighting controller; building automation system or lighting energy management system, all with battery or similar backup power or device.
The intent is to reduce or eliminate lighting after a certain time. Benefits include reduced environmental impact, longer hours of improved astronomy, energy savings, and improved sleeping conditions for residents. Additionally, some police departments have indicated that post-curfew light reductions make drive-by patrolling easier because it allows them to see further into and through areas.

The authority shall determine the time of curfew and the amount of lighting reduction based on the character, norms, and values of the community.

Typically, curfews go into effect one hour after the close of business. Restaurants, bars, and major entertainment facilities such as sports stadiums may require the curfew to go into effect two hours after the close of business. The authority may elect to have no curfew for facilities with shift workers and 24-hour operations, or to extend the curfew time to meet specific needs. The MLO can be modified to address these concerns.

Areas without street lights or with very low ambient light levels should consider turning off all non-emergency lighting at curfew while commercial or urban areas may prefer a reduction in lighting levels. A reduction of at least 30% is recommended for most areas.

**Exemptions to III(C)(1) 2. Automatic Lighting Controls are not required for the following:**
- Lighting under canopies.
- Lighting for tunnels, parking garages, garage entrances, and similar conditions.

**Exceptions to III(C)(2) 3. Lighting reductions are not required for any of the following:**
- With the exception of Landscape lighting, lighting for residential properties including multiple residential properties not having common areas.
- Code required lighting for steps, stairs, walkways, and building entrances.
- When in the opinion of the Authority, lighting levels must be maintained.
- Movie anti-raid lighting.
- Lighting governed by special use permit in which times of operation are specifically identified.
- Businesses that operate on a 24-hour basis.

**Examples of Fully Shielded Luminaires**

**DEFINITIONS**

- Emergency conditions: Generally, lighting that is only energized during an emergency; lighting fed from a backup power source; or lighting for illuminating the path of egress solely during a fire or other emergency situation, or, lighting for security purposes used solely during an alarm.

- Footcandle: The unit of measurement expressing the quantity of light received on a surface. One footcandle is the illuminance produced by a candle on a surface one foot square from a distance of one foot.

- Forward Light: For an exterior luminaire, luminous emitted in the quarter sphere below horizontal and in the direction of the intended orientation of the luminaire.

- Fully Shielded Luminaire: A luminaire constructed and installed in such a manner that all light emitted by the luminaire, either directly from the lamp or a diffusing element, or indirectly by reflection or re-direction from any part of the luminaire, is projected below the horizontal plane through the luminaire's specified light-casting part.

- Glare: Lighting causing the eye directly from luminaires or indirectly from reflective surfaces that causes visual discomfort or reduced visibility.

- Hardscapes: Permanent hard surface improvements to the site including parking lots, drives, entrances, curbs, medians, walkways and non-vegetated landscaping that is 10 feet or less in width. Materials may include concrete, asphalt, stone, gravel, etc.

- Hardscapes Area: The area measured in square feet of all hardscapes. It is used to calculate the Total Site Lumens Limit in both the Prescriptive Method and Performance Method. Refer to Hardscapes definition.
Definitions are typically generally added to any code when new code sections are added. The definitions are legally required and play a significant role in the interpretation of the ordinance and code.

Most city attorneys will not accept references to outside sources regardless of credibility, such as the IES Handbook. Thus as a general rule, a definition for an unfamiliar term (e.g. breezeway) must be added by the adopting ordinance.

When adopting or integrating the MLO definitions, be sure to retire conflicting technical terminology. In particular, the latest IES Luminaires Classification System as defined in IES TM-15-07 is likely to need attention.

### X. Definitions - Ordinance Text

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Absolute Photometry</td>
<td>Photometric measurements (usually of a solid-state luminaire) that directly measures the footprint of the luminaire. Reference Standard IES LM-79</td>
</tr>
<tr>
<td>Architectural Lighting</td>
<td>Lighting designed to reveal architectural forms, shapes and forms and for which lighting for any other purpose is incidental.</td>
</tr>
<tr>
<td>Authority</td>
<td>The adopting municipality, agency or other governing body.</td>
</tr>
<tr>
<td>Astronomical Time Switch</td>
<td>An automatic lighting control device that switches outdoor lighting relative to time of solar day with time of year correction.</td>
</tr>
<tr>
<td>Backlight</td>
<td>For an exterior luminaire, lumens emitted in the quarter sphere below horizontal and in the opposite direction of the intended orientation of the luminaire. For luminaires with symmetric distribution, backlight will be the same as front light.</td>
</tr>
<tr>
<td>BUG</td>
<td>A luminaires classification system that classifies backlit (B), uplit (U) and glare (G).</td>
</tr>
<tr>
<td>Canopy</td>
<td>A covered, unconditioned structure with at least one side open for pedestrian and/or vehicular access. (An unconditioned structure is one that may be open to the elements and has no heat or air conditioning.)</td>
</tr>
<tr>
<td>Common Outdoor Area</td>
<td>One or more of the following: a parking lot; a parking structure or covered vehicular access; a common entrance or public space shared by all occupants of the facilities.</td>
</tr>
<tr>
<td>Curfew</td>
<td>A time defined by the authority when outdoor lighting is reduced or extinguished.</td>
</tr>
</tbody>
</table>

This section addresses non-residential lighting and multi-family residences having common spaces, such as lobbies, interior corridors or parking. Its intent is to:

- Limit the amount of light that can be used
- Minimize glare by controlling the amount of light that tends to create glare
- Minimize sky glow by controlling the amount of uplight
- Minimize the amount of off-site impacts or light trespass

This MLO provides two methods for determining compliance. The prescriptive method contains precise and easily verifiable requirements for luminaire light output and fixture design that limit glare, uplight, light trespass and the amount of light that can be used. The performance method allows greater flexibility and creativity in meeting the intent of the ordinance. Note that both the prescriptive and the performance method limit the amount of light that can be used, but do not control how the lighting is to be used.

Most outdoor lighting projects that do not involve a lighting professional will use the prescriptive method, because it is simple and does not require engineering expertise.

For the prescriptive method, the initial luminaire lumen allowances defined in Table A (Parking Space Method) or B (Handicap Area Method) will provide basic lighting (parking lot and lighting at doors and/or sensitive security areas) that is consistent with the selected lighting zone. The prescriptive method is intended to provide a safe lighting environment while reducing glare and other adverse offsite impacts. The Per Parking Area Method is applicable in small rural towns and is a simple method for small retail "moon and pop" operations without drive lane access and where the parking lot is immediately adjacent to the road. A jurisdiction may...
also allow a prescriptive method for classes of sites, such as car dealerships, gas stations, or other common use areas.

Note that the values are for initial luminaire lumens, not footcandles on the target (parking lot, sidewalk, etc). Variables such as the efficiency of the luminaire, dispersion, and lamp wear can affect the actual amount of light so the lumens per square foot allowance is not equal to footcandles on the site. By specifying initial luminaire lumens value, it is easier for officials to verify that the requirement is being met. Initial luminaire lumens are available from photometric data. Each initial luminaire lumens calculation should be supplied on the submittal form.

Solid state luminaires, such as LEDs, do not have initial lamp lumens, only initial luminaire lumens (absolute photometry). Other luminaires tested with relative photometry will have initial luminaire lumens which can be calculated by multiplying initial lamp lumens by the luminaire efficiency. In this example, three types of luminaires are used to light a parking area and building entry in a light commercial area. Two of these luminaires use metal halide lamps: 70 watt wall mounted area lights and 250 watt pole mounted area lights. For these, the Initial Luminaire Lumen is equal to the initial lamp lumens multiplied by the luminaire efficiency. These values are entered into the compliance chart. The lumen value for the building mounted LED luminaires is equal to the lumens exiting the luminaire. Therefore, the value already represents the Initial Luminaire Lumens and no luminaire efficiency is needed. The total luminaire lumens for the site is equal to 247,340.

The allowable lumens are based on the lighting zone and the total hard scape area. Referencing Table G, the allowed lumens are 2,500 for L2. Multiplying this by the total hard scape square footage gives a value of 250,000 lumens allowed. Because this value is greater than the value calculated for the site, the project complies. Listed below is an example on a typical compliance worksheet for the Prescriptive Method.
In this example, three types of luminaires are used to light a parking area and building entry in a light commercial area. Two of these three luminaires use metal halide lamps: 70 watt wall mounted area lights and 150 watt pole mounted area lights. For these, the initial luminaire lumens is equal to the initial lamp lumens multiplied by the luminaire efficiency. These values are entered into the compliance chart. The lumens value for the building mounted LED luminaires is equal to the lumens exiting the luminaire. Therefore, the value already represents the initial Luminaire lumens and no luminaire efficiency is needed. The total luminaire lumens for the site is equal to 247,840. The allowable lumens are based on the lighting zone and the total landscape area. Referencing Table B, the allowed lumens are 2.5/ft² for L22. Multiplying this by the total landscape square footage gives a value of 250,000 lumens allowed. Because this value is greater than the value calculated for the site, the project complies.
model lighting ordinance - text

prescriptive method (cont.) - user's guide

limits to on-site impacts

the prescriptive method of the MLO restricts uplighting, including upward light emitted by decorative luminaires. A jurisdiction may choose to preserve some types of lighting, including lighting of monuments or historic structures. In this case, the adopting jurisdiction should exempt or otherwise regulate these types of lighting carefully so that it does not inadvertently allow glare or offensive lighting systems.

offsite effects of light pollution include glare, light trespass, sky glow, and impacts on the nocturnal environment. All of these are functions of the fixture or luminaire design and installation. This document replaces the previous luminaire classification terminology of full cutoff, semi cutoff, and cutoff because those classifications were not as effective in controlling offsite impacts as with the new IESNA luminaire classification system as described in TM-35-37.

a traditional method of defining light trespass is to identify a maximum light level at or near the property line. However, this method does not address offensive light that is not directed toward the ground, or the intensity of glazing light shining into adjacent windows. The requirements defined in Table C limit the amount of light in all quadrants that is directed toward or above the property line. The Backlight/Uplight/ Glare (BUG) rating will help limit both light trespass and glare.

(a detailed explanation of the BUG system is provided in the section on Table C)

the limits for light distribution established in Table C (for the BUG rating system) prevent or severely limit all direct upward light. A small amount of uplight reflected by snow, light-colored pavement or a luminaire's supporting arms is inevitable and is not limited by the prescriptive method of this ordinance.

4. non-residential lighting (cont.) - ordinance text

prescriptive method

2. limits to off site impacts

All luminaires shall be rated and installed according to Table C.

3. light shielding for parking lot illumination

All parking lot lighting shall have no light emitted above 90 degrees.

exceptions:

a) ornamental parking lighting shall be permitted by special permit only, and shall meet the requirements of Table C-1 for Backlight, Table C-2 for Uplight, and Table C-3 for Glare, without the need for external field-added modifications.

4. tables (cont.) - ordinance text

Table C - Performance Method Additional Initial Lumen Allowances (cont.)

<table>
<thead>
<tr>
<th>Lighting Application</th>
<th>L1.0</th>
<th>L1.1</th>
<th>L1.2</th>
<th>L1.3</th>
<th>L2.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume Service Station Changes</td>
<td>0</td>
<td>850</td>
<td>1350</td>
<td>3050</td>
<td>3050</td>
</tr>
<tr>
<td>Additional Lumen Allowances for Outdoor Sales facility only</td>
<td>0</td>
<td>450</td>
<td>5100</td>
<td>1350</td>
<td>3050</td>
</tr>
<tr>
<td>Outdoor Sales Let. This allowance is limited to 10% of the service area for uplight and 5% of the sales area for ambient light.</td>
<td>0</td>
<td>1000</td>
<td>1350</td>
<td>3050</td>
<td>3050</td>
</tr>
<tr>
<td>Outdoor Sales Permits. This allowance is for use of the retail sales area (maximum adjusted to the principal viewing location and not amended for viewing height). A corner area for may include the adjacent area provided that a different principal viewing location exists for each side. In order to use this allowance, luminaires may be located within 20% of the sales area.</td>
<td>0</td>
<td>1000</td>
<td>1350</td>
<td>3050</td>
<td>3050</td>
</tr>
</tbody>
</table>
The allowable light levels for these uses defined in Table E may be used to set a prescriptive lighting allowance for these uses in each lighting zone. It should be noted that the lighting allowance defined in Table E is only applicable for the area defined for that use and cannot be transferred to another area of the site. For some uses, such as outdoor sales, the jurisdiction is encouraged to define a percentage of the total landscape area that is eligible for the additional lighting allowance. For example, a set percentage of a car dealership's lot may be considered a display area and receive the additional lighting allowance where the remainder of the lot would be considered storage, visitor parking, etc., and cannot exceed the base light levels defined in Table A.

**Table E - Performance Method Additional Initial Lumens Allowances (cont.)**

<table>
<thead>
<tr>
<th>Lighting Application</th>
<th>L2.0</th>
<th>L2.1</th>
<th>L2.2</th>
<th>L2.3</th>
<th>L2.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Up Windows, this allowance is based per window, in order to be considered, must be within 25 feet of the center of the window.</td>
<td>3</td>
<td>1,500 lumens per drive-up window</td>
<td>3,000 lumens per drive-up window</td>
<td>3,000 lumens per drive-up window</td>
<td>3,000 lumens per drive-up window</td>
</tr>
<tr>
<td>Addtiona dominance for Service Streets only.</td>
<td>40 SF</td>
<td>80 SF</td>
<td>160 SF</td>
<td>240 SF</td>
<td>320 SF</td>
</tr>
</tbody>
</table>

**DEPARTS TO OFFSET IMPACTS**

A seemingly non-compliant fixture, such as a post-top translucent awning luminaire, may in certain cases meet the BUG ratings, as long as it has proper interior baffling within the awning globe. However, the BUG ratings in Table C will limit the use of the following types of luminaires in all lighting zones:

- Barn Lights
- Non-Shielded Wall Packs
- Floodlights or lights set aimed downward
E. Performance Method

1. Total Site Lumen Limit

The total installed initial lumens of all lighting systems on the site shall not exceed the allowed total initial site lumens. The allowed total initial site lumens shall be determined using Tables D and E. Per site with existing lighting, existing lighting shall be included in the calculation of total installed lumens.

The total installed initial luminaire lumens of all is calculated as the sum of the initial luminaire lumens for all luminaires.

The first step in the Performance Method regulates overlighting by establishing the Total Initial Site Luminous (Table D) that are allowed.

Allowances include the summation of the following (Table D):
1) Initial lumen allowance per site
2) Per area (SF) of hardcape

Table E allows additional lumens for unique site conditions. Examples of allowances include:
1) Per building entrance/exit
2) Per length (linear feet) of Outdoor Sales Frontage Perimeter
3) Per area (SF) of Vehicle Service Station Canopy
4) Plus more...

The Site Total Initial Site Lumens allowed are a combination of allowances from Table D and Table E.

<table>
<thead>
<tr>
<th>Table D - Performance Method Allowed Total Initial Site Luminous</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lighting Zone</strong></td>
</tr>
<tr>
<td>Allowed Lumina Per SF</td>
</tr>
<tr>
<td>Allowed Base Lumina Per Site</td>
</tr>
</tbody>
</table>

Table E - Performance Method Additional Initial Lumininaire Lumens

<table>
<thead>
<tr>
<th>Lighting Application</th>
<th><strong>LZ 0</strong></th>
<th><strong>LZ 1</strong></th>
<th><strong>LZ 2</strong></th>
<th><strong>LZ 3</strong></th>
<th><strong>LZ 4</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Building Entrance or Exit</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Building Parking</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Building Pedestrian</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Building Fireplug</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Note: All are and distance measurements in plan view unless otherwise noted.
In general, a higher BUG rating means more light is allowed in solid angles, and the rating increases with the lighting zone. However, a higher B (backlight) rating simply indicates that the luminaire directs a significant portion of light behind the pole, so B ratings are designated based on the location of the luminaire with respect to the property line. A high B rating luminaire maximizes the spread of light, and is effective and efficient when used far from the property line. When luminaires are located near the property line, a lower B rating will prevent unwanted light from interfering with neighboring properties.

At the 90-180 degree ranges:
- Zone 0 allows no light above 90 degrees.
- Zone 1 allows only 1000 lumens in the UI and UL zones, 2000 lumens total in the complete upper hemisphere (This is roughly equivalent to a 5 W incandescent lamp).
- Zone 2 allows only 500 lumens in the UI and UL zones, 1500 lumens total (less than a 25W incandescent lamp).
- Zone 3 allows only 500 lumens in the UI and UL zones, 1000 lumens total (about the output of a 75W incandescent bulb).
- Zone 4 allows only 1000 lumens in the UI and UL zones, 2000 lumens total (about the output of a 100W incandescent bulb).

**Table C-3 Maximum Allowable Glare (BUG) Ratings - Continued**

<table>
<thead>
<tr>
<th>TABLE C-3</th>
<th>Lighting Zone 1</th>
<th>Lighting Zone 2</th>
<th>Lighting Zone 3</th>
<th>Lighting Zone 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allowed Glare Rating</td>
<td>G0</td>
<td>G1</td>
<td>G2</td>
<td>G3</td>
</tr>
<tr>
<td>Any luminaire not already oriented* with less than 2.5 monitoring heights to an eye height of 5 feet above grade</td>
<td>G0</td>
<td>G0</td>
<td>G1</td>
<td>G2</td>
</tr>
<tr>
<td>Any luminaire not already oriented* with less than 5 monitoring heights to an eye height of 10 feet above grade</td>
<td>G0</td>
<td>G0</td>
<td>G0</td>
<td>G2</td>
</tr>
<tr>
<td>Any luminaire not already oriented* with less than 10 monitoring heights to an eye height of 15 feet above grade</td>
<td>G0</td>
<td>G0</td>
<td>G0</td>
<td>G1</td>
</tr>
<tr>
<td>Any luminaire not already oriented* with less than 20 monitoring heights to an eye height of 25 feet above grade</td>
<td>G0</td>
<td>G0</td>
<td>G0</td>
<td>G1</td>
</tr>
</tbody>
</table>

***Any luminaire that cannot be oriented with its backlight perpendicular to any property line within 2X the monitoring height of the luminaire location shall meet the reduced Allowed Glare Rating in Table C-3.***

The second step in the Performance Method is to determine if the proposed luminaires are producing off site impacts such as glare, sky glow, and light trespass. One may either use Option A which are the Maximum Allowable BUG Ratings in Table C, or Option B through computer lighting calculations show compliance with Maximum Vertical Illuminance at any point in the plane of the property line in Table C. Option B will be required for all non-residential luminaires that:
- do not have a BUG rating,
- exceed the BUG ratings, or
- have adjustable mountings.

For the performance method, Option B (2) requires photometric calculations for the site perimeter, to a height of no less than 33 feet (10 meters) above the tallest luminaire. Vertical Illuminance at eye height (5 feet above grade) will give values that can be used to verify compliance by comparing actual site conditions to the photometric plan submitted during review.

Note that the MLO specifies 'total initial luminaire lumens' as a measurement in addition to footcandles/lux. The footcandle (lux) is equal to one lumen per square meter. Lux is the metric unit and is equal to one lumen per square meter.

**The Design Compliance Test:**

1. All luminaires shall be rated and installed using either Option A or Option B. Only one option may be used per permit application.

   - **Option A:** All luminaires shall be rated and installed according to Table C.
   - **Option B:** The entire outdoor lighting design shall be analyzed using industry standard lighting software including inter-reflections in the following manner:
     1. Input data shall describe the lighting system including luminaires, mounting heights, aiming directions, and employing photometric data tested in accordance with IES guidelines. Buildings or other physical objects on the site within three object heights of the property line must be included in the calculations.
     2. Analysis shall utilize an enclosure comprised of calculation planes with zero reflectances values around the perimeter of the site. The top of the enclosure shall be no less than 25 feet (10 meters) above the tallest luminaire. Calculations shall include total lumens upon the inside surfaces of the box top and vertical sides and maximum vertical illuminance (footcandles and/or lux) on the sides of the enclosure.

The design complies if:

   a) The total lumens on the inside surfaces of the virtual enclosure are less than 15% of the total site lumens limit and
   b) The maximum vertical illuminance on any vertical surface is less than the allowed maximum illuminance per Table F.
The application form will require information about the number of luminaires, the number of lamps in each luminaire, the initial luminaire lumen output for each luminaire and the initial luminaire output for each lamp (based on the wattage and type of lamp selected) as well as plans showing the site area measurements. This will allow the reviewer to verify that the luminaire output of all the luminaires does not exceed the allowance.

Field verification can be achieved by asking the applicant and/or owner to verify that the luminaire type, lamp type and wattages specified have been used. Also ask the applicant for photometric data for each luminaire, since the initial luminaire lumen and B-U-G ratings are stated on the photometric report.

However, if a jurisdiction requires additional on-site verification, it may also request a point-by-point photometric plan. While this will not be a true measure of compliance with the criteria of this Ordinance, comparing the actual measured levels on site to the photometric plan can be an indication whether or not the installed lighting varies from the approved design.

The three components of BUG ratings are based on IES TM-15-07 (revised):

- Backlight, which creates light that trespasses onto adjacent sites. The B rating takes into account the amount of light in the BL, BM, BH and BVH zones, which are in the direction of the luminaire opposite from the area intended to be lighted.
- Uplight, which causes artificial sky glow. Lower uplight (zone UL) causes the most sky glow and negatively affects professional and academic astronomy. Upper uplight (UL) not reflected off a surface is mostly energy waste. The U rating defines the amount of light into the upper hemisphere with greater concern for the light at or near the horizontal angle (UL).
- Glare, which can be annoying or visually disabling. The G rating takes into account the amount of frontlight in the FH and FVH zones as well as BH and BVH zones.

BUG ratings apply to the Lighting Zone of the property under consideration.
Work on the BUG system started in 2005 when the IES upgraded the roadway cutoff classification system. The original system, which included the ratings full cutoff, cutoff, semi-cutoff and non cutoff, had been designed as a rating system focused on brightness and glare control. However, with increasing demand for control of uplight and light trespass in addition to glare, IES realized that a more comprehensive system was needed. IES developed TM-15 Luminaires Classification System for Outdoor Luminaires.

As this is a relatively new rating system, and many people may not be familiar with it, more explanation is provided here to provide an understanding of how the rating system works. For example, some people are familiar with terms such as "full cutoff" and they may expect the MLO to include these terms. It will be very important that all groups recognize that these terms and concepts are inadequate for the complex task of controlling light pollution. It is recommended that the new rating system adapted in TM-15, as followed herein by the MLO, be used instead and exclusively.

BUG requires downlight only with low glare (better than full cut off) in lighting zones 3 and 4, but allows a minor amount of uplight in lighting zones 3 and 4. In lighting zones 3 and 4, the amount of allowed uplight is to be limited to the use of very well shielded luminaries that have a decorative drop lens or chimney so that dark sky friendly lighting can be installed in places that traditional appearing luminaires are required. BUG typically cannot be used for residential luminaires unless they have been photometrically tested. For non-photometrically rated residential luminaires, shielding description is used instead.

The lumen limits established for each lighting zone apply to all types of lighting within that zone. This includes, but is not limited to, specialty lighting, facade lighting, security lighting and the front row lighting for auto dealerships. BUG rating limits are defined for each luminare and include:

- Allowed Lumen Ratings
- Cutoff and Partially Cutoff
- Directional Uplighting
- Adjustable Mounting Devices
- Low Glare
- Light Sensing
- Light Efficiency
- Light Output

The Exceptions allow for typical lighting that might exceed the specified limits.

### Table 1 - Maximum Allowable Backlight, Uplight and Glare (BUG) Ratings

<table>
<thead>
<tr>
<th>Allowed Lumen Ratings</th>
<th>Cutoff</th>
<th>Partially Cutoff</th>
<th>Directional Uplighting</th>
<th>Adjustable Mounting Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to less than 3 m wound heights from property line</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
<td>B4</td>
</tr>
<tr>
<td>4.4 to 5.0 m wound heights from property line and ideally oriented**</td>
<td>B0</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
</tr>
<tr>
<td>Less than 5.0 m wound heights from property line and ideally oriented***</td>
<td>B0</td>
<td>B1</td>
<td>B2</td>
<td>B3</td>
</tr>
</tbody>
</table>

**For property lines that share public walkways, sidewalks, plazas, and parking lots, the property line may be considered to be 3 feet from the actual property line for purpose of determining compliance with this section. For property lines that share public walkways and public travel corridors, the property line may be considered to be the centerline of the public roadway or public travel corridor for the purpose of determining compliance with this section. NOTE: This adjustment is relative to Table 1 and 3 only and shall not be used to increase the lighting area of the site.

***To be considered 'ideally oriented,' the luminare must be mounted with the backlight portion of the light output oriented perpendicular and towards the property line of concern.

### Table B.2.2 - Comparison of efficacy by power (120 Volt Incandescent lamps)

<table>
<thead>
<tr>
<th>Output (Lumens)</th>
<th>Power (Watt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600</td>
<td>8.0 - 10.0</td>
</tr>
<tr>
<td>1200</td>
<td>15.0 - 22.0</td>
</tr>
<tr>
<td>1,700</td>
<td>23.0 - 28.0</td>
</tr>
</tbody>
</table>

### B. Requirements for Residential Lighting

1. Shall comply with Table G.
2. Shall not be aimed onto adjacent properties.
Table 2 - Lumen Allowances, in Addition to Base Allowance

<table>
<thead>
<tr>
<th>ZONE</th>
<th>L.0</th>
<th>L.2</th>
<th>L.2.1</th>
<th>L.2.2</th>
<th>L.2.3</th>
<th>L.2.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asst.</td>
<td>0</td>
<td>0</td>
<td>1,000</td>
<td>1,500</td>
<td>2,000</td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>3,000</td>
<td>4,000</td>
<td>5,000</td>
<td>6,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drive-Up Window</td>
<td>4,000</td>
<td>8,000</td>
<td>10,000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vehicle Service Station, Tissue</td>
<td>4,900</td>
<td>8,499</td>
<td>15,999</td>
<td>24,099</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Addison allowances for sales and service facilities.
No more than two additional allowances per site, use if or Less.

Outdoor Double-Windows. The floodlights in the flood light area are equal to the minimum floodlight and the floodlight for viewing length. A more site may include less than floodlight area provided that the additional area adjacent to the floodlight area is equal to the minimum floodlight area and the floodlight area for viewing length.

Drive Up Windows. In order to use this allowance, luminaires must be within 10 feet horizontal distance of the center of the window.

Vehicle Service Station. This allowance is based on certified fuel pump.
VIII. ENFORCEMENT & PENALTIES - Ordinance Text

1. Lighting by Special Permit Only - User's Guide

This section addresses types of lighting that are intrusive or complex in their impacts and need a higher level of scrutiny and/or site sensitivity.

It should be noted that safety could be compromised if lighting conforming to this ordinance is located adjacent to excessively bright and/or glaring lighting.

It is important that the authority set clear and reasonable guidelines for applying for a special lighting use permit, and establish rules and procedures for granting or denying them. They may differ from existing special use policies, in which case one or the other may be changed to achieve the overall goal of effective lighting without glare, sky glow, or light trespass.

SPORNS FIELD LIGHTING

For athletic and sports fields, the appropriate level of lighting will depend on the Class of Play and Facilities. Class of Play is divided into 4 categories, depending on the number of fixed spectator seats. (Competition play intended for nighttime TV broadcast may require higher lighting levels).

CLASS I: Competition play at facilities with 5,000 or more fixed spectator seats. (Professional, Colleges & Universities, some Semi-Professional & Large Sports Clubs)

CLASS II: Games at facilities with over 1,000 fixed spectator seats. (Smaller Universities and Colleges, some Semi-pro, large amateur leagues and high schools with large spectator facilities)

CLASS III: Games at facilities with over 1,000 fixed spectator seats. (Sports Clubs and amateur leagues, some high schools and large training professional training facilities with spectator sections)

CLASS IV: Competition or recreational play at facilities with 300 fixed spectator seats or less. (Class IV: Class of Play applies to games at which family and close friends of the players and staff are usually the majority of spectators. [Smaller amateur leagues, park and recreation department facilities, most Little Leagues, small high schools, elementary and middle schools, and social events])

A. High Intensity and Special Purpose Lighting

The following lighting systems are prohibited from being installed or used except by special use permit:

1. Temporary lighting in which any single luminaire exceeds 20,000 initial luminaire lumens or the total lighting load exceeds 160,000 lumens.
3. Searchlights.
4. Other very intense lighting defined as having a light source exceeding 200,000 initial luminaire lumens or an intensity in any direction of more than 2,000,000 candela.

B. Complex and Non-Conforming Uses

Upon special permit issued by the Authority, lighting not complying with the technical requirements of this ordinance but consistent with its intent may be installed for complex sites or uses or special uses including, but not limited to, the following applications:

1. Sports facilities, including but not limited to unconditioned rinks, open courts, fields, and mediums.
2. Construction lighting.
3. Lighting for industrial sites having special requirements, such as petrochemical manufacturing or storage, shipping piers, etc.
4. Parking structures.
5. Urban parks.
7. Theme and amusement parks.
8. Convocation facilities.

To obtain such a permit, applicants shall demonstrate that the proposed lighting installation:

a. Has sustained every reasonable effort to mitigate the effects of light on the environment and surrounding properties, supported by a signed statement describing the mitigation measures. Such statement shall be accompanied by the calculations required for the Performance Method.

CLASS VIII: Games at facilities with over 300 fixed spectator seats. (Sports Clubs and amateur leagues, some high schools and large training professional training facilities with spectator sections)

Table A - Allowed Total Initial Luminaires per Site for Non-residential Outdoor Lighting, Per Parking Space Method

May only be applied to properties up to 15 parking spaces (including handicapped accessible spaces).

<table>
<thead>
<tr>
<th>L7-0</th>
<th>L7-1</th>
<th>L7-2</th>
<th>L7-3</th>
<th>L7-4</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>450</td>
<td>600</td>
<td>840</td>
<td>1,250</td>
</tr>
</tbody>
</table>

The tables are to be reviewed periodically by a joint committee of the IES and IIA, and adjusted as standards and technology permit. If more research on the impacts of outdoor lighting shows the effects of light pollution to be a significant concern, then the values in the tables may be modified. Such changes will have no significant impact to the balance of the language of the Ordinance or Code.

Table B - Allowed Total Initial Lumens per Site for Non-residential Outdoor Lighting, Hardscape Area Method

May be used for any purpose, subject to the, limits of site drives and public streets or ways, a total of 900 square feet for each intersection and/or driveway.

<table>
<thead>
<tr>
<th>Base Allowance</th>
<th>3.0 lumens</th>
<th>3.3 lumens</th>
<th>3.5 lumens</th>
<th>5.0 lumens</th>
<th>7.5 lumens</th>
</tr>
</thead>
<tbody>
<tr>
<td>per SF of Hardscape</td>
<td>per SF of Hardscape</td>
<td>per SF of Hardspace</td>
<td>per SF of Hardspace</td>
<td>per SF of Hardspace</td>
<td></td>
</tr>
</tbody>
</table>
When Class of Play is above Class IV, a dual control should be installed to limit illumination to Class IV levels during practices where spectators are fewer than 500.

(See IEI Recommended Practice for Sports and Recreational Area Lighting RP-4)

Adoption of this section on existing lighting is strongly encouraged.

If the adopting jurisdiction has criteria in place that require a property to come into compliance with the current zoning ordinance, it is recommended that the criteria also be applied to bringing existing lighting into compliance. If there are no established criteria, the adoption of this Ordinance is recommended.

Amortization allows existing lighting to gradually and gracefully come into compliance. Substantial changes or additions to existing properties are considered the same as new construction, and must comply.

Most outdoor lighting can be fully depreciated once it is fully amortized, usually no longer than 10 years, if not sooner, from the date of installation. Some jurisdictions may prefer to require phase-out in a substantially shorter period. The Authority may also wish to require compliance much sooner for "easy fix" such as re-aiming or lowering lumens output of lamps. Where lighting is judged to be a safety hazard, immediate compliance can be required.

The Authority shall review each such application. A permit may be granted if, upon review, the Authority believes that the proposed lighting will not create unwanted glare, sky glow, or light trespass.

VII. EXISTING LIGHTING - Ordinance Text

Lighting installed prior to the effective date of this ordinance shall comply with the following.

A. Amortization

On or before [amortization date], all outdoor lighting shall comply with this Code.

B. New Uses or Structures, or Change of Use

Whenever there is a new use of a property (zoning or variance change) or the use on the property is changed, all outdoor lighting on the property shall be brought into compliance with this Ordinance before the new or changed use commences.

C. Additions or Alterations

1. Major Additions

If a major addition occurs on a property, lighting for the entire property shall comply with the requirements of this Code. For purposes of this section, the following are considered to be major additions:

Additions of 25 percent or more in terms of addition dwelling units, gross floor area, seating capacity, or parking spaces, either with a single addition or with cumulative additions after the effective date of this Ordinance;

Single or cumulative additions, modification or replacement of 25 percent or more of installed outdoor lighting luminaires existing at the effective date of this Ordinance.

2. Minor Modifications, Additions, or New Lighting Fixtures

For non-residential and multiple dwellings, all additions, modifications, or replacement of more than 25 percent of outdoor lighting fixtures existing at the effective date of this Ordinance shall comply with the requirements of this Ordinance before the new or changed use commences.

3. Resumption of Use after Abandonment

If a property with non-conforming lighting is abandoned for a period of six months or more, then all outdoor lighting shall be brought into compliance with this Ordinance before any further use of the property occurs.

VIII. ENFORCEMENT AND PENALTIES - Ordinance Text

Enforcement and penalties will vary by jurisdiction. There are, however, certain practices that will promote compliance with lighting regulations. Education is a key tool in promoting compliance. Preemptive enforcement procedures can include providing a copy of the lighting regulations to every contractor at the time they visit to obtain a building permit. Another effective tool is a requirement that the builder or developer acknowledge in writing that he or she is familiar with the lighting requirements and will submit a lighting plan for approval.