

1. Work Session Agenda

Documents:

[2019-09-17 Planning Commission WS Agenda.pdf](#)

2. Meeting Materials

Documents:

[2019-09-17 Parking Handicap 2017 ORS.pdf](#)
[2019-09-17 Simple Trespass Light Example.pdf](#)
[2019-09-17 Trespass Lighting Examples.pdf](#)
[2019-09-17 Trespass Ordinance Example.pdf](#)
[Model Lighting Ordinance.pdf](#)



CITY OF YACHATS

PLANNING COMMISSION MEETING

441 Hwy 101 N., Yachats Commons, Room 1

Tuesday, September 17, 2019: 2:00 pm

WORK SESSION AGENDA

- I. Lighting Ordinance Discussion
- II. Lighting Flier
- III. Accessible Parking (Handicap)

Commission meets the third Tuesday of each month.

Next scheduled meeting: Oct 15, 2019 at 3:00pm.

This meeting is open to the public and all interested persons are invited to attend. This meeting will be audio taped. All items to be considered by the Commission must be submitted to City Hall no later than one week prior to the meeting. Minutes of all public meetings are available for review at City Hall, or on the City website at www.yachatsoregon.org.

In accordance with ORS 192.630, City of Yachats will make a good faith effort to provide accommodations for any person desiring to attend a public meeting, if the request is made at least 48 hours in advance of the meeting time. The meeting room is physically accessible to persons with mobility devices; a sign language or foreign language interpreter may be available, with advance notice.

Call City Hall at 541-547-3565 or Oregon Relay 1-800-735-2900 (TDD).

Posted: Sept 12, 2019

2017 ORS 447.233¹

Accessible parking space requirements

(1) The Director of the Department of Consumer and Business Services shall include in the state building code, as defined in ORS [455.010 \(Definitions for ORS chapter 455\)](#) , a requirement that the number of accessible parking spaces specified in subsection (2) of this section be provided for affected buildings subject to the state building code and that the spaces be signed as required by subsection (2) of this section. Spaces may also be marked in a manner specified in the state building code.

(2) (a) The number of accessible parking spaces shall be:

Required	Required
Minimum Number of Total Parking Spaces In Lot	Minimum Number of Van "Wheelchair User Accessible Spaces Only" Spaces
1 to 25	1 - 1
26 to 50	2 - 1
51 to 75	3 - 1
76 to 100	4 - 1
101 to 150	5 - 1
151 to 200	6 - 1
201 to 300	7 - 1
301 to 400	8 - 1
401 to 500	9 - 2
501 to 1,000	2% of total - 1 in every 8 accessible spaces or portion thereof
1,001 and over	20 plus 1 for each - 1 in every 8 100 over 1,000 accessible spaces or portion thereof

(b) In addition, one in every eight accessible spaces, but not less than one, shall be van accessible. Where five or more parking spaces are designated accessible, any space that is designated as van accessible shall be reserved for wheelchair users. A van accessible parking space shall be at least nine feet wide and shall have an adjacent access aisle that is at least eight feet wide.

(c) Accessible parking spaces shall be at least nine feet wide and shall have an adjacent access aisle that is at least six feet wide.

(d) The access aisle shall be located on the passenger side of the parking space except that two adjacent accessible parking spaces may share a common access aisle.

(e) A sign shall be posted for each accessible parking space. The sign shall be clearly visible to a person parking in the space, shall be marked with the International Symbol

of Access and shall indicate that the spaces are reserved for persons with disabled person parking permits. A van accessible parking space shall have an additional sign marked "Van Accessible" mounted below the sign. A van accessible parking space reserved for wheelchair users shall have a sign that includes the words "Wheelchair User Only."

(f) Accessible parking spaces and signs shall be designed in compliance with the standards set forth by the Oregon Transportation Commission in consultation with the Oregon Disabilities Commission.

(3) No ramp or obstacle may extend into the parking space or the aisle, and curb cuts and ramps may not be situated in such a way that they could be blocked by a legally parked vehicle.

(4) Parking spaces required by this section shall be maintained so as to meet the requirements of this section at all times and to meet the standards established by the state building code.

(5) The director is authorized to inspect parking spaces and facilities and buildings subject to the provisions of this section, and to do whatever is necessary to enforce the requirements, including the maintenance requirements, of this section. Municipalities and counties may administer and enforce the requirements of this section in the manner provided under ORS [**455.148 \(Comprehensive municipal building inspection programs\)**](#) or [**455.150 \(Selective municipal building inspection programs\)**](#) for administration and enforcement of specialty codes. All plans for parking spaces subject to the provisions of this section must be approved by the director prior to the creation of the spaces.

(6) Requirements adopted under this section do not apply to long-term parking facilities at the Portland International Airport.

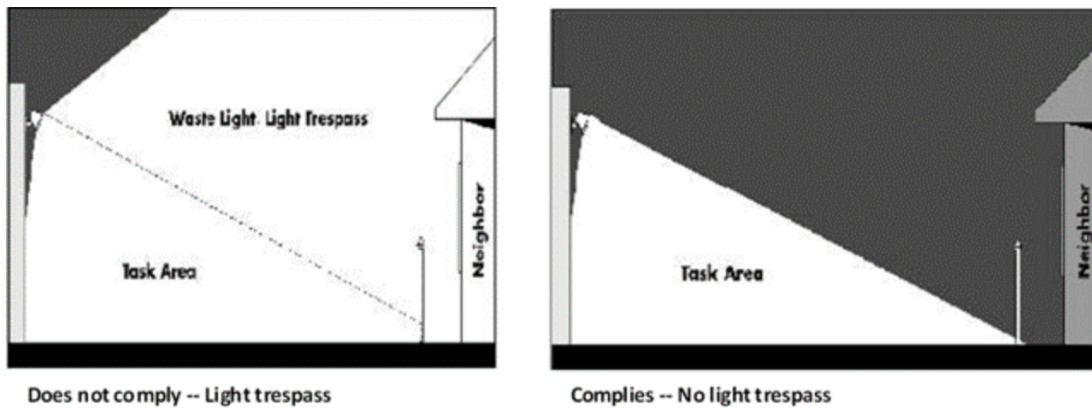
(7) Any reported violation of this section shall be investigated by the administrative authority. The administrative authority shall make a final decision and order correction, if necessary, within 30 days of notification. Any aggrieved person may appeal within 30 days of the decision by the administrative authority to the appropriate municipal appeals board or, at the option of the local jurisdiction, directly to the Building Codes Structures Board established under ORS [**455.132 \(Building Codes Structures Board\)**](#). The appeal shall be acted upon within 60 days of filing. The decision of the municipal appeals board may be appealed to the board. The board shall act on the appeal within 60 days of filing. All appeals to the board shall be filed in accordance with ORS [**455.690 \(Appeal to advisory boards\)**](#).

Trespass Light: Spill light that because of quantitative, directional, or spectral causes light level at the property line that is greater than as allowed in Table X of this code.

D. Light Trespass Standards.

1. Light Trespass. Maximum lighting levels at property lines generally shall not increase lighting level more than 10.75 lumens/square meter 10 feet beyond the property line, as illustrated in Figure 12.50.240-A:

Figure 12.50.240-A:
Examples of Light Trespass



EXAMPLES OF REGULATIONS AROUND TRESPASS LIGHTING

Table 3. Limits on light trespass for different environmental zones		
Zone	Recommended Uses or Areas	Zoning Considerations
LZ-0	Lighting Zone 0 should be applied to areas in which permanent lighting is not expected and when used, is limited in the amount of lighting and the period of operation. LZ-0 typically includes undeveloped areas of open space, wilderness parks and preserves, areas near astronomical observatories, or any other area where the protection of a dark environment is critical. Special review should be required for any permanent lighting in this zone. Some rural communities may choose to adopt LZ-0 for residential areas.	Recommended default zone for wilderness areas, parks and preserves, and undeveloped rural areas. Includes protected wildlife areas and corridors.
LZ-1	Lighting Zone 1 pertains to areas that desire low ambient lighting levels. These typically include single and two family residential communities, rural town centers, business parks, and other commercial or industrial/ storage areas typically with limited nighttime activity. May also include the developed areas in parks and other natural settings.	Recommended default zone for rural and low density residential areas. Includes residential single or two family; agricultural zone districts; rural residential zone districts; business parks; open space include preserves in developed areas.
LZ-2	Lighting Zone 2 pertains to areas with moderate ambient lighting levels. These typically include multifamily residential uses, institutional residential uses, schools, churches, hospitals, hotels/motels, commercial and/or businesses areas with evening activities embedded in predominately residential areas, neighborhood serving recreational and playing fields and/or mixed use development with a predominance of residential uses. Can be used to accommodate a district of outdoor sales or industry in an area otherwise zoned LZ-1.	Recommended default zone for light commercial business districts and high density or mixed use residential districts. Includes neighborhood business districts; churches, schools and neighborhood recreation facilities; and light industrial zoning with modest nighttime uses or lighting requirements.
LZ-3	Lighting Zone 3 pertains to areas with moderately high lighting levels. These typically include commercial corridors, high intensity suburban commercial areas, town centers, mixed use areas, industrial uses and shipping and rail yards with high nighttime activity, high use recreational and playing fields, regional shopping malls, car dealerships, gas stations, and other nighttime active exterior retail areas.	Recommended default zone for large cities' business district. Includes business zone districts; commercial mixed use; and heavy industrial and/or manufacturing zone districts.

Environmental zone	Light into windows, vertical illuminance (lux)	
	Before curfew	After curfew
E1	2	1*
E2	5	1
E3	10	2
E4	25	5

Source: ILE 2000

* Acceptable from public road lighting installations only

Light trespass occurs when illumination from one area unintentionally spills into another (often from one parcel of property to adjacent ones). Lighting ordinances should address this important issue; an effective method is to set specific limits to allowable trespass (usually in foot-candles or lux, measured with a calibrated light meter, operated facing in the direction of the neighboring light source, and held at a standard eye level or range of elevations). Trespass level limits should be set particularly low when dealing with spillage into residential areas.

Light Generation per Area

Even with well-designed light fixtures, which put the light they generate into the areas which they are meant to illuminate, there will be light spillage from any illuminated property, just from reflection from illuminated surfaces. To regulate the overall brilliance of a parcel, an effective method is to limit the amount of light generated per net area of land.

One effective method is to specify limits of light generation in *lumens per net acre*, where the lumens is the total initial output of all the fixtures' lamps on a parcel, and the developable area of the parcel is measured in acres (or fractions thereof). The total initial lumens output of any given lamp is supplied by manufacturers as a matter of standard. This computation is an easy one in the design permit stage for an installation; on existing installations, review of the specific lamps in use will be needed.

EXAMPLE LANGUAGE

At 10 feet (3.0 m) beyond the property line the vertical light at 5' above grade level shall not exceed 0.10 fc, except at drive entrances to the site. Average illumination of hardscape shall be between 0.5 and 1.5 fc. No point on the site shall exceed 10.0 fc horizontal at grade level. All site fixtures with lamps over 50W to have cutoff optics. Limit total site uplight to 5% based on initial lamp lumens.

A. Lighting allowance. Outdoor lighting shall not exceed the lighting allowance within the 2008 Building Energy Efficient Standards for Lighting Zone 2 of 0.045 watts per square foot and comply with the lighting trespass regulations in subsection B below;

B. Light trespass. Outdoor lighting shall not cause light trespass. The following is considered light trespass:

1. Over 0.5 foot-candles where the zoning on the adjacent parcel is a residential, open space, or agricultural zone, or public right-of-way; or
2. Over 1.0 foot-candles where the zoning on the adjacent parcel is any other zone besides residential, open space or agricultural.

- C. Shielding. All outdoor lighting shall be fully shielded.
- D. Maximum height. The maximum height for outdoor lighting shall be as follows, measured from finished grade to the top of the fixture, unless noted otherwise in Section 22.44.560:

APPENDIX A - Reference Illumination Levels

Condition	Illumination Levels* (lux)**
Clear night sky (no Moon)	0.000 05
Clear Urban Sky with Light Pollution Twilight	0.015
Overcast Urban Sky with Light Pollution Full Moon	0.1
Urban Road Artificial Illumination	0.15
Open Urban Parking Lot	0.26 max. (0.1 typical) 3-4***
Car Dealership Lot	11-22
Full Sunlight	130,000

* Clarity of the atmosphere is highly variable over hours and days. These values are presented to provide only a rough guide to approximate illumination levels.

Intensity in different conditions

Illuminance	Example
120,000 lux	Brightest sunlight
111,000 lux	Bright sunlight
109,870 lux	AM 1.5 global solar spectrum sunlight
20,000 lux	Shade illuminated by entire clear blue sky , midday
1,000 - 2,000 lux	Typical overcast day, midday
<200 lux	Extreme of thickest storm clouds, midday
400 lux	Sunrise or sunset on a clear day (ambient illumination)
40 lux	Fully overcast, sunset/sunrise
<1 lux	Extreme of thickest storm clouds, sunset/rise

For comparison, nighttime illuminance levels are:

Illuminance	Example
<1 lux	Moonlight , ^[3] clear night sky
0.25 lux	A full Moon , clear night sky ^{[4][5]}
0.01 lux	A quarter Moon , clear night sky
0.002 lux	Starlight , clear moonless night sky, including airglow ^[4]

0.0002 lux	Starlight, clear moonless night sky, excluding airglow ^[4]
0.00014 lux	Venus at brightest, ^[4] clear night sky
0.0001 lux	Starlight, overcast moonless night sky ^[4]

US Green Building Council

Table 2. Allowable ~~light trespass~~ and uplight, by lighting zone

Lighting zone	Maximum horizontal and vertical illuminance (fc) at site boundary	Maximum horizontal and vertical illuminance (fc) at specified distance beyond site boundary	Maximum horizontal and vertical illuminance (lux) at specified distance beyond site boundary	Maximum percentage of fixture lumens emitted above 90° or higher from nadir (straight down)
LZ0	0	0 at 0 ft.	0 at 0 mm	0%
LZ1	0.01	.01 at 0 ft.	.01 at 3 mm	0%
LZ2*	0.10	.02 at 10 ft.	.2 at 3 m	1%
LZ3*	0.20	.05 at 15 ft.	.5 at 4.5 m	2%
LZ4*	0.60	.05 at 15 ft.	.5 at 4.5 m	5%
fc = footcandle. * In LZ2, LZ3, and LZ4, for project boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the project boundary.				

Table 3. Allowable lighting power densities, by lighting zone

	Lighting zone				
	LZ0	LZ1	LZ2	LZ3	LZ4
All exterior improved areas (except those listed below)	0.04 W/sf (0.43 w/sq. m)	0.04 W/sf (0.43 w/sq. m)	0.06 W/sf (0.64 w/sq. m)	0.10 W/sf (1.07 w/sq.m)	0.13 W/sf (1.39 w/sq. m)
Walkways	0.7 W/lf (2.3 W/m)	0.7 W/lf (2.3 W/m)	0.7 W/lf (2.3 W/m)	0.8 W/lf (2.6 W/m)	1.0 W/lf (3.2 W/m)
Landscaping	No allowance	0.04 W/sf (0.43 W/sq.m)	0.05 W/sf (0.53 W/sq.m)	0.05 W/sf (0.53 W/sq.m)	0.05 W/sf (0.53 W/sq.m)
Entrance door (per linear foot of doorway)	20W/lf (66 W/m)	20W/lf (66 W/m)	20W/lf (66 W/m)	30W/lf (100 W/m)	30W/lf (100 W/m)
Entry canopy	0.25 W/sf (2.7 W/sq.m)	0.25 W/sf (2.7 W/sq.m)	0.25 W/sf (2.7 W/sq.m)	0.40 W/sf (4.3 W/sq.m)	0.40 W/sf (4.3 W/sq.m)
Illuminated building façade	No allowance	No allowance	2.5W/lf (8.2 W/m)	3.75W/lf (12.3 W/m)	5.0W/lf (16.4 W/m)

sf = square feet; lf = linear feet; sq.m = square meters.

Note: The total exterior lighting power density allowance for all shared exterior applications is the sum of the specified allowances for individual illuminated areas. The following lighting is exempted when its controls meet the above requirements and are independent of the controls for nonexempt lighting:

ORDINANCE #2169

ORDINANCE AMENDING AND SUPPLEMENTING CHAPTER 21 OF THE COMPREHENSIVE LAND DEVELOPMENT ORDINANCE OF THE TOWNSHIP OF OCEAN

BE IT ORDAINED by the Township Council of the Township of Ocean, County of Monmouth, State of New Jersey that Article IV is hereby amended and supplemented as follows:

ADD:

21-46A Outdoor Lighting

21-46A.1 PURPOSE

The purpose of this Chapter is to regulate *outdoor lighting* in a manner which encourages the conservation of energy, improves or maintains the nighttime visual environment, prevents and/or eliminates misdirected or excessive artificial *light*, *light trespass* and/or unnecessary sky glow and protects the health, safety, security and welfare of Township residents and the general public.

21-46A.2 SCOPE AND APPLICABILITY

The regulations and standards contained in this Chapter apply to (1) *outdoor lighting* upon any property for which site plan review and approval is required; (2) the alteration to and/or the changing of *outdoor lighting* upon any *property* not occupied by exactly one single-family, detached dwelling; and (3) the replacement of any outdoor *light fixture* made subsequent to the adoption of this Chapter. *Outdoor lighting* shall be considered an accessory use within the Township.

21-46A.3 SEVERABILITY

If any provision of this Chapter or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions of this Chapter, and to this end, the provisions of this Chapter are declared to be severable.

21-46A.4 DEFINITIONS

The following words and terms, when used within this Chapter, shall have the following meanings:

Artificial Light Source: a man-made thing or object from which *light* originates (ex: an electrically-powered *lamp*)

Candela: (formerly, "candle") the "SI" unit of *luminous intensity*; one *candela* describes a *luminous intensity* of one *lumen* per *steradian*

Cutoff Luminaire: an *IESNA* classification describing a *luminaire* that emits at least 97.5% of its *light* output below vertical angles of 90° from *nadir* at the lowest *light*-emitting point of its *light source* and not more than 10% of its *light* output above angles greater than 80 degrees from *nadir* at the lowest point of its *light source*

Developed Property: real *property* which has been altered from its natural state by the lawful addition of improvements such as buildings, structures, impervious area, etc.

Downward-Aimed Light Fixture: a *light fixture* aimed no higher than sixty (60) degrees above *nadir* from the lowest *light*-emitting point of its *light source*;

Energy: the ability to do work

Externally Illuminated Sign: a sign any face of which is illuminated by one or more *artificial light sources* located between the reader and the sign face and directed toward the sign face

Floodlight: an unshielded *artificial light source* or *lamp* designed to produce relatively uniform *illumination* across a broad area

Footcandle: (abbreviated “fc”) a unit of measurement of *illuminance*; 1 *footcandle* equals 1 *lumen* per square foot of area)

Full Cutoff Luminaire: an *IESNA* classification describing a *luminaire* that emits 0% of its *light* output above angles greater than 90 degrees from *nadir* at the lowest *light*-emitting point of its *light source* and not more than 10% of its *light* output above angles greater than 80 degrees from *nadir* at the lowest point of its *light source*

Fully Shielded Luminaire: a *luminaire* that emits no direct uplight (i.e., 100% of its *light* output is below a vertical angle of 90° from *nadir* at the lowest *light*-emitting point of the *light source*)

Glare: *illuminance* within the visual field of a human eye which is sufficiently greater than the intensity of *illuminance* to which the eye is adapted that it causes annoyance, discomfort, reduced vision and/or momentary blindness

Horizontal Illuminance: the measure, in *footcandles*, of the total amount of *visible light* incident upon (i.e. illuminating) a point within a horizontal surface taken through the sensor of a light meter held horizontally upon the point. Within this Ordinance, standards for “*horizontal illuminance*” levels shall be interpreted as “*horizontal illuminance* measured at ground level” unless specifically stated otherwise.

IESNA: abbreviation for “Illuminating Engineering Society of North America” (also known as “IES”) which has a membership consisting of architects, engineers, designers, educators, students, contractors, manufacturers, and scientists and which provides technical guidelines, standards, professional journals, and educational training forums related to the practice of *lighting*

Illumination: (see “*Lighting*”)

Illuminance: the total amount (density) of *visible light* incident upon (i.e. illuminating) a point of a surface from all directions above the surface measured in *footcandles* (note: the “surface” may be a part, or all, of a physical object or an imaginary plane)

Initial Light Output: the *light* output of a lamp, in *lumens*, after 100 hours of seasoning

Intensity: (see “*Luminous Intensity*”)

Internally Illuminated Sign: a sign any face of which is opaque and illuminated by one or more *artificial light sources* enclosed entirely within the sign cabinet and not directly visible from any point outside of the sign cabinet.

International System of Units: (abbreviated “SI”) the modern form of the metric system

Lamp: a radiant *light source*; the replaceable, electrically-powered *light source* of a *light fixture*

Light: (see “*Visible Light*”)

Lighting: the deliberate utilization of one or more *artificial light sources* to achieve an aesthetic or intended effect

Lighting Power: (see “*Power*”)

Light Fixture: an electrically powered *lighting* device consisting of a *lamp*, a *lamp* holder, an electrical ballast (if necessary), and the means for connecting the device to an electrical *power* source.

Light Output: (see “Initial Light Output”)

Light Source: a thing or object from which *light* originates (note: an object that reflects *light* originating from a different object is not a *light source*)

Light Spillage: *light* projected onto a *property* from an *artificial light source* not located upon that *property*

Light Trespass: *light spillage* not compliant with the requirements of this Chapter

Lumen: (abbreviated “lm”) a unit of measurement of *luminous flux* (i.e., of the total amount of *light* emitted in all directions per unit time) within the *International System of Units*

Luminaire: a self-contained *lighting* system component containing a *light fixture* and, as necessary, an outer shell or housing, a mirror or reflector, an aperture, a lens or refractor and a mounting bracket or pole socket; within this Chapter, the term “luminaire” shall refer to *outdoor lighting luminaires* unless otherwise stated

Luminous Flux: the perceived rate of flow of *light* from a *lamp* or *light source*; measurements of *luminous flux* reflect the variability in sensitivities of the human eye to different wavelengths of *light*

Luminous Intensity: the total *luminous flux* within a given *solid angle*, in units of *candelas*, or *lumens per steradian*

Mounting Height: the distance, measured along the *nadir*, between the lowest *light*-emitting point of the *light source* within a *luminaire* or *light fixture* and the ground surface below

Nadir: the nadir at a particular point is the local vertically downward direction from that point (i.e., the nadir at a point is directed from that point along the line of force of the earth’s gravity)

Outdoor Lighting: the *lighting* of areas exterior to the walls of enclosed buildings and/or within structures having open or partially open walls such as canopies, porte cocheres, pavilions, gazebos, etc.

Power: the rate at which energy is utilized used by a device to produce useful work (also called input power or active power); in lighting, it is the system input power (in watts) for a *lamp* / ballast combination

Property: a tract of land depicted upon the Municipal Tax Map as one or more lots and which is assessed as a single tax parcel by the Municipal Tax Assessor

Searchlight: An aimable *light fixture* designed for outdoor use containing an *artificial light source* having a *power* rating in excess of 500 watts and reflectors designed to produce a narrowly conical, *high intensity light* beam visible for a relatively long distance but generally unsuitable for *illumination* of streets, driveways, parking fields, pedestrian paths, flags, architectural features, site improvements, etc.

Shielded Lamp: (see “Shielded Light Source)

Shielded Light Source: a *light source* which is positioned and/or equipped with *light shielding* devices so that it is not directly visible to any person distant 10 feet or more from the *light source*, or from any point upon or outside of the *property* boundary.

Shielding: the blocking of an electromagnetic field with a metallic substance in a manner that reduces electromagnetic waves radiated; electronic components, wires, lamps, and similar devices can all be shielded

Solid Angle: a conical volume of space defined by a point (the vertex of the solid angle), a sphere centered upon the vertex point, an area segment upon the surface of the sphere and the collection of rays which begin at the center point of the sphere and which pass through the points of the perimeter of the area segment upon the surface of the sphere

Spotlight: an unshielded *artificial light source* or *lamp* designed to produce a narrow, well-directed beam of *light* upon a small area

Steradian: (abbreviated “sr”) a unit of measure of a *solid angle* the value of which can be determined by placing a sphere so that its center point is upon the vertex of the solid angle and dividing the area measure of the surface area segment of the sphere which subtends the angle by the square of the radius of the sphere (note that this quantity is not dependent upon the shape of the subtending area segment but only upon the measure of the segment area)

Temporary Lighting: Temporary *lighting* is *outdoor lighting* which does not conform to the provisions of this Chapter and which will not be used for longer than a period of thirty (30) consecutive days; temporary *lighting* is intended for uses which, by their nature, are of limited duration such as holiday decorations, civic events, or construction projects; (note: applications for Temporary Lighting Permits shall be reviewed and permitted on a case-by-case basis)

Undeveloped Property: real *property* which is not *developed property*

Uniformity: a term utilized to describe the variation of *illuminance* upon a given plane where variation is expressed as either the numerical ratio of the minimum level of *illuminance* to the maximum level of *illuminance* or the numerical ratio of the minimum level of *illuminance* to the average (i.e., arithmetic mean) level of *illuminance*

Vertical Illuminance: the measure, in *footcandles*, of the total amount of *visible light* incident upon (i.e. illuminating) a point of a vertical surface taken through the sensor of a *light meter* held vertically at the point

Visible Light: electromagnetic radiation which is detectable by a typical human eye

21-46A.5 PROHIBITED OUTDOOR LIGHTING

The following are prohibited as, or as the result of, *outdoor lighting*:

- A. The installation of *outdoor lighting* improvements upon, and/or the *illumination* of, vacant or undeveloped property unless the installation has obtained all required construction permits and is being accomplished in accordance with an approved site plan and/or the requirements of this Chapter
- B. *Temporary lighting* except as permitted by Special Lighting Permit
- C. *Lighting* not specifically permitted by this Chapter
- D. *Luminaires* having drop-type or sagging lenses
- E. *Spotlights* utilized as a means of *outdoor lighting* at times other than during periods of emergency or power outage
- F. Architectural *luminaires* not equipped with full cut-off optics
- G. Exposed strip *lighting* used to illuminate building facades or outline buildings
- H. Neon tubing except as allowed as a means of *illumination* for signage
- I. Any *light* that may be confused with, or construed as, a traffic control device
- J. Laser, flashing, pulsing, and / or rotating *lights* and/or *light sources* except when utilized within emergency or traffic control lighting
- K. *Searchlights* except as permitted by Special Lighting Permit
- L. Tower *lighting* unless required by the Federal Aviation Administration
- M. *Glare*
- N. *Light Trespass*

21-46A.6 STANDARDS FOR OUTDOOR LIGHTING

No person shall install any new, or replacement, *outdoor lighting* that fails to meet the requirements of this Chapter.

A. White Light Source Required: White *light sources* including, without limitation, metal halide, fluorescent, or induction *lamps*, but excluding incandescent and halogen *lamps*, shall

be required for any outdoor *light fixture* having a *lamp* output exceeding two thousand four hundred initial *lumens* and which illuminates a driveway, parking lot, circulation drive, pedestrian area, architectural or landscape feature, flag, or other outdoor object.

B. Use of High Pressure Sodium Lamps: *Full cutoff luminaires* having high pressure sodium *lamps* with *initial lamp outputs* not exceeding sixteen thousand *lumens*, may be utilized to illuminate outdoor storage and /or similar use areas which areas are not accessible to the general public and for which the need for good color rendition is not essential to the safety and security of the area(s).

C. General Requirements

1. All outdoor parking areas, driveways, pedestrian ways and walks, entrances and yard areas shall be illuminated using *full cut-off luminaires* except if/as otherwise permitted herein.
2. Outdoor *light* poles and/or *luminaires* upon properties other than those zoned for or containing exactly one single family dwelling shall be no closer than 7 feet to side and rear lot lines and no closer than 22 feet to a front lot line except that in no case shall a light pole and/or luminaire be located within 25 feet of a residentially-zoned or residentially-used property.
3. *Outdoor lighting* in all non-residential land use zones shall be directed toward, and confined to, ground areas of walks, driveways, parking lots and lawns. *Illuminance* levels of *light spillage* shall not exceed 0.25 footcandles at any *property* boundary line except that *light spillage* upon any residentially-zoned or residentially-used *property* shall not exceed 0.06 *footcandles*.
4. Parking lot *illuminance* levels on all non-residentially developed properties containing 4 or more parking lot *luminaires* must be reduced by at least 50% of full operational levels within 30 minutes after the close of business provided, however, that a minimum level of *horizontal illuminance* of 0.20 fc shall be maintained within such parking areas at all times.
5. Maximum allowable *mounting heights* for outdoor *light fixtures* shall be as follows:
 - a. sixteen (16) feet when the *light fixture* is located upon a non-residentially used site which is either (a) adjacent to or directly across a street from a property zoned for, or containing, exactly one single family residence; or, (b) located within, or within seventy five (75) feet of, a single-family residential land use zone;
 - b. twenty-four (24) feet when the *light fixture* is located upon a non-residential site smaller than two (2) acres in total area and which is not subject to "a" above and the *light fixture* or mounting pole is within fifteen (15) feet of a boundary line of the site;
 - c. twenty-eight (28) feet when the *light fixture* is located upon a non-residential site which is not subject to "a" above and the *light fixture* or mounting pole is located farther than fifteen (15) feet from a boundary line of the site;
 - d. thirty-six (36) feet when the *light fixture* is located upon a non-residential site larger than two (2) acres in total area and which is not subject to "a" above and the *light fixture* or mounting pole is located farther than twenty five (25) feet from a boundary line of the site;
 - e. forty (40) feet when the *light fixture* is located upon a non-residential site larger than six (6) acres in total area and which is not subject to "a" above and the *light fixture* or mounting pole is located farther than twenty five (25) feet from a boundary line of the site;

6. Foundations and/or structural support of outdoor lighting installations shall be stable for onsite soil conditions and anticipated wind and ice loads. The upper portion of any light pole foundation which projects, vertically, above finished grade shall be sized no larger than necessary to adequately support the light pole assembly and accommodate its mounting hardware, regardless of the design size of its subsurface component(s).

Where a pole-mounted site light will be installed directly within a parking field, or within three feet (3') of the edge of a head-in parking stall, its foundation shall be of reinforced concrete and shall extend, vertically, a minimum of thirty six inches (36") above adjacent finished grade. Mounting pole length shall be as required to elevate the mounted light fixture(s) to design mounting height(s).

All permanently exposed concrete surfaces of light pole foundations shall be finished with a rubbed finish as follows: (a) remove form; (b) patch holes, depressions, voids, and honeycombs by chipping away coarse or broken material until a dense uniform surface of concrete exposing solid coarse aggregate is obtained, saturating surfaces of deficient areas with water, filling with a stiff mortar and finishing the surface of the mortar with a wooden float before initial set takes place; (c) rub exposed concrete surfaces with a wetted wooden block or a medium coarse carborundum stone, using a small amount of mortar on its face (note: do not use the carborundum stone until the concrete has hardened to the state where the sand grinds rather than ravel or rolls); (d) continue rubbing until form marks, projections, and irregularities have been removed, voids are filled, and a uniform surface of paste produced by the rubbing has been obtained; (e) after the paste has dried, obtain the final finish by rubbing with a fine carborundum stone and water until the entire surface is of a smooth texture and uniform color.

D. Outdoor Lighting Types / Standards for Outdoor Illumination:

1. Multi-Family Residential Parking Areas (including circulation drives, parking fields, pedestrian ways)

- a. minimum level of *horizontal illuminance*: 0.6 fc
- b. maximum level of *horizontal illuminance*: 6.0 fc
- c. minimum maintained average *horizontal illuminance*: 1.0 fc
- d. maximum maintained average *horizontal illuminance*: 3.0 fc
- e. average-to-minimum *uniformity* ratio ≤ 4
- f. maximum-to-minimum *uniformity* ratio ≤ 10

2. Non Residential Parking Areas (including circulation driveways, parking fields, pedestrian ways)

- a. minimum level of horizontal illuminance: 0.6 fc
- b. maximum level of horizontal illuminance: 10.0 fc
- c. minimum maintained average horizontal illuminance: 1.5 fc
- d. maximum maintained average horizontal illuminance: 3.5 fc
- e. average-to-minimum uniformity ratio ≤ 5
- f. maximum-to-minimum uniformity ratio ≤ 12

3. Merchandise Display / Sales Areas: These areas include outdoor areas where active nighttime sales activity occurs and where accurate color perception of merchandise by customers is required. To qualify as a display/sales area, one of the following specific uses must occur on the lot: automobile sales, boat sales, tractor sales, building supply sales, gardening or nursery sales, assembly lots, swap meets.

- a. minimum level of *horizontal illuminance*: 2.0 fc
- b. maximum level of *horizontal illuminance*: 30.0 fc
- c. minimum maintained average *horizontal illuminance*: 10 fc
- d. maximum maintained average *horizontal illuminance*: 20 fc
- e. average-to-minimum *uniformity* ratio ≤ 4
- f. maximum-to-minimum *uniformity* ratio ≤ 10

4. Canopy Lighting: All canopy *light fixtures* shall be recessed into the lower surface of the canopy, shall be *full cutoff* types and shall utilize flat lenses and/or diffusers that do not extend below the plane of the lower horizontal canopy surface. No edge of the canopy shall be considered to be a *light source* shield.

- a. minimum level of *horizontal illuminance*: 5.0 fc
- b. maximum level of *horizontal illuminance*: 35.0 fc
- c. minimum maintained average *horizontal illuminance*: 10 fc
- d. maximum maintained average *horizontal illuminance*: 20 fc
- e. average-to-minimum *uniformity* ratio ≤ 4
- f. maximum-to-minimum *uniformity* ratio ≤ 8

5. Architectural Luminaires: Historic, period, or pole-mounted decorative *light fixtures* or *luminaires* may be used provided:

1. they are *full cut-off* type units with *shielded light sources*;
2. *mounting heights* are no greater than 16 feet;
3. no *light fixture* or *luminaire* shall have a *light source* with an *initial light output* greater than 17,600 *lumens*; and,
4. all other requirements of this Chapter are met.

6. Architectural Lighting of Building Facades

- a. *Lighting* may be used only to accentuate architectural or aesthetic elements of a building facade, not to illuminate the entire exterior façade of a building.
- b. Upward aimed *lighting* shall not exceed 4,000 *lumens* per architectural or aesthetic façade element, shall be aimed no higher than 135 degrees above *nadir* at the lowest *light-emitting* point of the *light source*, shall utilize only *shielded light sources* and shall be mounted as flush to the wall as is physically possible.
- c. *Lighting* exceeding 4,000 mean *lumens* per architectural or aesthetic façade element shall be aimed no higher than 45 degrees above *nadir* at the lowest

light-emitting point of the light source, shall utilize only *shielded light sources*, and shall be mounted as flush to the wall as is physically possible.

7. Illumination of the United States Flag: If displayed at night, the flag of the United States must be properly illuminated. Proper *illumination* means that the stars and stripes can be readily perceived from a reasonable distance. *Illumination* of the flag of the United States shall meet the following:

- a. only *shielded light sources* shall be utilized;
- b. the horizontal distance(s) between upwardly aimed *light fixtures* and the vertical plane of the flag shall not exceed 40% of the height of the highest point of the flag nor shall it be less than 15% of the height of the highest point of the flag unless it can be quantitatively demonstrated that a closer mounting of the *light fixture(s)* results in less sky illumination; and,
- c. the collective (i.e., summed) *initial light output(s)* of *light source(s)* dedicated solely to *illumination* of a United States Flag shall not exceed 12,000 *lumens* within residential land use zones or 22,000 *lumens* within non-residential land use zones.

8. Outdoor Lighting Within Residential Areas: Within any Municipal land use zone permitting detached, single-family dwellings, a *developed* residential *property* containing exactly one, detached, single family dwelling shall be permitted an area-dependent Total Outdoor *Light Output* in accordance with the following:

Total Outdoor Light Output (*lumens*) = 1,750 *lumens* + 210 *lumens* per 1,000 s.f. of total property area

where Total Outdoor Light Output is the sum of the *initial light outputs* of all outdoor *artificial light sources* upon the *property*, and,

- a. every *lamp* and/or *radiant light source* having an *initial light output* of 1,750 *lumens* or greater must be *shielded*;
- b. within the Allowable Total Outdoor Light Output permitted upon any *property* containing a detached, single-family residence, a maximum total of 4,720 *lumens* of unshielded *outdoor light* output shall be permitted provided no unshielded *lamp* or *radiant light source* is visible from a bedroom window of another residence;
- c. no permitted residential *spotlight* or *floodlight* shall be aimed higher than 45 degrees above *nadir* at the lowest *light-emitting point* of the *light source*;
- d. no *lamp* or *radiant light source* shall create *glare* as defined in this Chapter;
- e. no *lamp* or *radiant light source* shall be operated or directed so as to result in *light trespass* as defined in this Chapter; and,
- f. allowable Total Outdoor Light Output shall not exceed 20,000 *lumens*.

9. Illumination of Signage

- a. *Light sources* shall be used judiciously to illuminate signs and shall be directed only upon the sign area that they are intended to illuminate. Illuminated signs shall be designed, located, *shielded*, and directed so as to prevent the *glare* or *light trespass* from the *illumination*. All exposed conduit, wire, junction boxes and/or other hardware shall be concealed from public view.

- b. *Externally illuminated signs* must be illuminated by downward-aimed *light fixtures*. *Light sources* must be *shielded*. *Illumination* must, to the maximum extent physically possible, be directed upon the sign face area. The maximum allowed *lighting power* for an *externally illuminated sign* is 3.0 watts per square foot of sign face area to be illuminated.
- c. *Internally illuminated signs* are acceptable provided that, if the sign is located adjacent to or across a street from a single family land use zone or use, either (a) only the lettering and symbols on the sign shall be illuminated; or, (b) if the entire cabinet interior is illuminated, the background shall be a dark shade or color that minimizes glare, with the foreground (letters and symbols) being of a lighter or contrasting color. The maximum allowed *lighting power* for *internally illuminated signs* is 12 watts per square foot of sign face area to be illuminated. For double-faced signs, only the area of a single face may be utilized to determine the allowed *lighting power* except that for deep sign cabinets where the lamps are isolated by an opaque divider so that they illuminate only one sign face, or for irregularly shaped signs where the faces are not parallel and the lamps are shielded by an opaque divider so that they illuminate only one sign face, the total area of all of sign faces may be utilized to determine allowed *lighting power*.

21-46A.7 SITE LIGHTING AND ILLUMINATION PLAN

A Site *Lighting* and *Illumination* Plan shall be submitted in sufficient detail to evaluate its conformance with standards and requirements of this Chapter. The plan shall include the following:

- A. an accurate, scalable drawing of the site with all *outdoor light fixture* locations clearly depicted and accurately dimensioned relative to property boundaries, buildings, curb lines walks, etc.
- B. complete specifications for all *light fixtures* depicted upon the plan including, for each fixture type, its manufacturer, model, shape, dimensions, color(s), *lamp* type, wattage, rated *initial light output* in *lumens*, reflector and lens types, *illumination* distribution pattern, shielding, etc. (note: the plan shall depict or be accompanied by manufacturer's catalogue information, brochures, drawings, etc., for each fixture type specified)
- c. mounting pole shape(s), material(s), height(s), color(s), finish(s) and foundation details
- D. mounting heights, mounting detail(s), tilt angle(s), and orientation(s) for all *light fixtures*
- E. a photometric plan providing outdoor *horizontal illumination* levels, in *footcandles*, upon the points of a 10' x 10' calculation grid superposed upon pavement areas and pedestrian ways of the site as well as upon site boundaries
- F. a tabulation, or tabulations, demonstrating compliance of the plan with the "Standards for Outdoor Illumination", 21-46A.6D of this Chapter where sites having physically and/or functionally disjoint areas shall require a separate tabulation for each such area; and, illumination levels upon lawn/landscape areas and/or upon, or outside of, the boundary of the project shall not be included in determinations of tabulated values
- G. any and all supplemental, or other, information necessary to demonstrate adequacy of the design proposal as well as its compliance with the requirements of this Chapter including, without limit, product manufacturers catalogue information and/or specifications, strength/stability analyses of pole-mounted installations for anticipated wind and soil conditions, etc.

AMEND:

Article V, Section 21-55.3, Item f, as follows:

f. Lighting. All outdoor lighting within the Township of ocean, including that for off-street parking areas, and appurtenant drives and pedestrian ways shall conform with the requirements of Section 21-46A

Record of Vote	Councilman Garofalo	Councilwoman Schepiga	Councilman Siciliano	Councilman Evans	Mayor Larkin
Motion To Approve					
Motion to Second					
Approved					
Opposed					
Not Voting/Recuse					
Absent/Excused					

CERTIFICATION

*I hereby certify that this is a true copy of a Ordinance adopted by the Township of Ocean Governing Body at their meeting held on **April 11, 2011**.*

Vincent Buttiglieri, RMC/CMC
Township Clerk



Illuminating
ENGINEERING SOCIETY



JOINT IDA - IES

**MODEL
LIGHTING
ORDINANCE
(MLO)**

with USER'S GUIDE

June 15, 2011

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 can not be 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 problems 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 stringency. 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, reasonably 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). Among its features is the use of lighting zones (LZ0-4) which allow each governing body to vary the stringency of lighting restrictions according to the sensitivity of the area as well as accommodating community intent. In this way, communities can fine-tune the impact of the MLO without having to customize the MLO. The MLO also incorporates the Backlight-Uplight-Glare (BUG) rating system for luminaires, which provides more effective control of unwanted light.

Joint IDA-IESNA Model Outdoor Lighting Ordinance (MLO)

June 15, 2011

CONTENTS

I. Preamble.....	5
II. Lighting Zones.....	5
III. General Requirements for All Outdoor Lighting.....	8
IV. Requirements for Non-Residential Outdoor Lighting.....	11
V. Requirements for Residential Outdoor Lighting.....	19
VI. Lighting by Special Permit Only.....	20
VII. Existing Lighting.....	21
VIII. Enforcement and Penalties (Reserved).....	22
IX. Tables.....	23
X. Definitions.....	32
XI. (Optional) Street Lighting Ordinance.....	38

General Notes in Adopting this Model Ordinance

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.

MLO Development and Task Force Members

This Model Lighting Ordinance has been developed as a joint undertaking by the Illuminating Engineering Society and the International Dark-Sky Association.

The Joint Task Force responsible for developing the MLO include

IDA
Co-Chair: Jim Benya
Co-Chair: Nancy Clanton
Leslie Lipstein
Leo Smith
Michael Mutmanský

IES
Naomi Miller
Cheryl English
Denis Lavoie
Eric Gibson

John Walter representing the electric utility industry also contributed as a member of the Joint Task Force.

I. PREAMBLE - User's Guide

In general, the preamble is part of the ordinance but is typically not part of the code. It establishes the reasons why the municipality is undertaking these regulations.

Local governments may add other purposes to the Preamble including established local government environmental or energy goals that support the model lighting ordinance. The environmental impacts of outdoor lighting fall into two categories: carbon footprint (energy used in the life of a lighting product) and obtrusive light.

CARBON FOOTPRINT	OBTRUSIVE LIGHT
Cost & Impact of Mining the Materials Used	Impact on Humans
Energy Used in Production	Impact on the Environment
Energy Used during Product Life	
Disposal/Recycling Costs	

II. LIGHTING ZONES - User's Guide

Lighting zones reflect the base (or ambient) light levels desired by a community. The use of lighting zones (LZ) was originally developed by the International Commission on Illumination (CIE) and appeared first in the US in IES Recommended Practice for Exterior Environmental Lighting, RP-33-99.

It is recommended that lower lighting zone(s) be given preference when establishing zoning criteria. Selection of lighting zone or zones should be based not on existing conditions but rather on the type of lighting environments the jurisdiction seeks to achieve. For instance, new development on previously rural or undeveloped land may be zoned as LZ-1. Using lighting zones allows a great deal of flexibility and customization without the burden of excessive regulation. For example, a jurisdiction may choose to establish vertical lighting zones with the lighting zone at street level at a higher zone than the residential housing on upper levels.

I. PREAMBLE - Ordinance Text

The purpose of this Ordinance is to provide regulations for outdoor lighting that will:

- Permit the use of outdoor lighting that does not exceed the minimum levels specified in IES recommended practices for night-time safety, utility, security, productivity, enjoyment, and commerce.
- Minimize adverse offsite impacts of lighting such as light trespass, and obtrusive light.
- Curtail light pollution, reduce skyglow and improve the nighttime environment for astronomy.
- Help protect the natural environment from the adverse effects of night lighting from gas or electric sources.
- Conserve energy and resources to the greatest extent possible.

II. LIGHTING ZONES - Ordinance Text

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

LZ0: 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.

II. LIGHTING ZONES (cont.) - User's Guide

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 exists 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.

Zone	Recommended Uses or Areas	Zoning Considerations
LZ-0	Lighting Zone 0 should be applied to areas in which permanent lighting is not expected and when used, is limited in the amount of lighting and the period of operation. LZ-0 typically includes undeveloped areas of open space, wilderness parks and preserves, areas near astronomical observatories, or any other area where the protection of a dark environment is critical. Special review should be required for any permanent lighting in this zone. Some rural communities may choose to adopt LZ-0 for residential areas.	Recommended default zone for wilderness areas, parks and preserves, and undeveloped rural areas. Includes protected wildlife areas and corridors.
LZ-1	Lighting Zone 1 pertains to areas that desire low ambient lighting levels. These typically include single and two family residential communities, rural town centers, business parks, and other commercial or industrial/storage areas typically with limited nighttime activity. May also include the developed areas in parks and other natural settings.	Recommended default zone for rural and low density residential areas. Includes residential single or two family; agricultural zone districts; rural residential zone districts; business parks; open space include preserves in developed areas.

II. LIGHTING ZONES (cont.) - Ordinance Text

LZ1: 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, most lighting should be extinguished or reduced as activity levels decline.

LZ2: Moderate ambient lighting

Areas of human activity where the vision of human residents and users is adapted to moderate 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.

LZ3: 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.

LZ4: 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.

II. LIGHTING ZONES (cont.) - User's Guide

Zone	Recommended Uses or Areas	Zoning Considerations
LZ-2	Lighting Zone 2 pertains to areas with moderate ambient lighting levels. These typically include multifamily residential uses, institutional residential uses, schools, churches, hospitals, hotels/motels, commercial and/or businesses areas with evening activities embedded in predominately residential areas, neighborhood serving recreational and playing fields and/or mixed use development with a predominance of residential uses. Can be used to accommodate a district of outdoor sales or industry in an area otherwise zoned LZ-1.	Recommended default zone for light commercial business districts and high density or mixed use residential districts. Includes neighborhood business districts; churches, schools and neighborhood recreation facilities; and light industrial zoning with modest nighttime uses or lighting requirements.
LZ-3	Lighting Zone 3 pertains to areas with moderately high lighting levels. These typically include commercial corridors, high intensity suburban commercial areas, town centers, mixed use areas, industrial uses and shipping and rail yards with high night time activity, high use recreational and playing fields, regional shopping malls, car dealerships, gas stations, and other nighttime active exterior retail areas.	Recommended default zone for large cities' business district. Includes business zone districts; commercial mixed use; and heavy industrial and/or manufacturing zone districts.
LZ-4	Lighting zone 4 pertains to areas of very high ambient lighting levels. LZ-4 should only be used for special cases and is not appropriate for most cities. LZ-4 may be used for extremely unusual installations such as high density entertainment districts, and heavy industrial uses.	Not a default zone. Includes high intensity business or industrial zone districts.

III. GENERAL REQUIREMENTS - User's Guide

This Section sets out the requirements that apply to all lighting, both residential and non-residential.

Each adopting jurisdiction should incorporate their existing standards as to when compliance with new regulations is required, when repair or remodeling triggers compliance and if the new ordinance will be retroactive to existing development. The Applicability section of this model ordinance should serve as a guide if the adopting jurisdiction does not have standards or policies in place. Likewise, the adopting jurisdiction should use their existing policies and definitions of what constitutes public monuments, and temporary and/or emergency lighting. Community attitudes and precedents should be taken into account in deciding to regulate seasonal holiday lighting.

EXEMPTIONS - User's Guide

This is standard language intended to prevent conflict of laws and to give the community the ability to set specific lighting requirements in special plans and under use permits. It can be amended to conform to similar language in other ordinances. For example, while public monuments, statuary, and flags should be lighted, the lighting also should be limited to avoid excess.

Lighting for streets, roads, and highways is usually regulated by a street lighting ordinance, and is not covered by this model ordinance. However, since street lighting can affect nearby areas, some recognition of its effect is appropriate. (See Section XI)

SIGN LIGHTING - User's Guide

A sign lighting ordinance is strongly recommended if not already in place. It should carefully limit lighting to prevent over-lighted signs from being used to circumvent lighting ordinances.

III. GENERAL REQUIREMENTS - Ordinance Text

A. *Conformance with All Applicable Codes*

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.

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 other lighting whether attached to structures, poles, the earth, or any other location, including lighting installed by any third party.

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

- a. Lighting within public right-of-way or easement for the principal purpose of illuminating streets or roads. No exemption shall apply to any lighting within the public right of way or easement when the purpose of the luminaire is to illuminate areas outside the public right of way or easement, unless regulated with a streetlighting ordinance.

Note to adopting agency: if using the street lighting ordinance (Section XI), this exemption should read as follows:

Lighting within the public right-of-way or easement for the principal purpose of illuminating roads and highways. No exemption shall apply to any street lighting and to any lighting within the public right of way or easement when the purpose of the luminaire is to illuminate areas outside of the public right of way or easement.

- b. Lighting for public monuments and statuary.
- c. Lighting solely for signs (lighting for signs is regulated by the Sign Ordinance).
- d. Repairs to existing luminaires not exceeding 25% of total installed luminaires.

III. GENERAL REQUIREMENTS (cont.) - Ordinance Text

- 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.
- h. Lighting that is only used under emergency conditions.
- i. 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 photoelectric switch, astronomic 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.

LIGHTING CONTROLS - User's Guide

This section requires all outdoor lighting to have lighting controls that prohibit 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.

CURFEW REQUIREMENTS - User's Guide

The intent is to reduce or eliminate lighting after a given 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 a site.

The authority should 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 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 those concerns.

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

III. GENERAL REQUIREMENTS (cont.) - Ordinance Text

Exceptions to III.(C.) 1. Automatic lighting controls are not required for the following:

- a. Lighting under canopies.
- b. Lighting for tunnels, parking garages, garage entrances, and similar conditions.

2. Automatic Lighting Reduction Requirements

The Authority shall establish curfew time(s) after which total outdoor lighting lumens shall be reduced by at least 30% or extinguished.

Exceptions to III.(C.) 2. Lighting reductions are not required for any of the following:

- a. With the exception of landscape lighting, lighting for residential properties including multiple residential properties not having common areas.
- b. When the outdoor lighting consists of only one luminaire.
- c. Code required lighting for steps, stairs, walkways, and building entrances.
- d. When in the opinion of the Authority, lighting levels must be maintained.
- e. Motion activated lighting.
- f. Lighting governed by special use permit in which times of operation are specifically identified.
- g. Businesses that operate on a 24 hour basis.

IV. NON-RESIDENTIAL LIGHTING - User's Guide

This section addresses non-residential lighting and multiple-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 (Hardscape 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 sky glow and other adverse offsite impacts. The Per Parking Space Method is applicable in small rural towns and is a simple method for small retail “mom and pop” operations without drive lane access and where the parking lot is immediately adjacent to the road. A jurisdiction may

IV. NON-RESIDENTIAL LIGHTING - Ordinance Text

For all non-residential properties, and for multiple residential properties of seven domiciles or more and having common outdoor areas, all outdoor lighting shall comply either with Part A or Part B of this section.

PRESCRIPTIVE METHOD - User's Guide

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 lumen values, 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 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 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 247,840.

The allowable lumens are based on the lighting zone and the total hardscape area. Referencing Table B, the allowed lumens are 2.5/SF for LZ2. Multiplying this by the total hardscape 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.

IV. NON-RESIDENTIAL LIGHTING (cont.) - Ordinance Text***A. Prescriptive Method***

An outdoor lighting installation complies with this section if it meets the requirements of subsections 1 and 2, below.

1. Total Site Lumen Limit

The total installed initial luminaire lumens of all outdoor lighting shall not exceed the total site lumen limit. The total site lumen limit shall be determined using either the Parking Space Method (Table A) or the Hardscape Area Method (Table B). Only one method shall be used per permit application, and for sites with existing lighting, existing lighting shall be included in the calculation of total installed lumens.

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

IV. NON-RESIDENTIAL LIGHTING (cont.) - User's Guide

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 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 247,840. The allowable lumens are based on the lighting zone and the total hardscape area. Referencing Table B, the allowed lumens are 2.5/SF for LZ2. Multiplying this by the total hardscape 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.

PRESCRIPTIVE METHOD EXAMPLE - COMPLIANCE CHART			
<i>Lamp Descriptions</i>	<i>QTY</i>	<i>Initial Luminaire Lumens</i>	<i>Total</i>
70 W Metal Halide	8	3,920	31,360
150 W Metal Halide	20	9,600	192,000
18 W LED	24	1,020	24,480
TOTAL INITIAL LUMINAIRE LUMENS			247,840
SITE ALLOWED TOTAL INITIAL LUMENS*			250,000
PROJECT IS COMPLIANT?			YES

* Listed below is the method of determining the allowed total initial lumen for non-residential outdoor lighting using the hardscape areamethod. (Table B).

SITE ALLOWED TOTAL INITIAL LUMENS	
<i>Site Description</i>	Light Commercial
<i>Lighting Zone</i>	LZ-2
<i>Hardscape Area (SF)</i>	100,000
<i>Allowed Lumens per SF of Hardscape (Table B)</i>	2.5
<i>Site Allowed Total Initial Lumens (lumens per SF X hardscape area)</i>	250,000

IV. NON-RESIDENTIAL LIGHTING (cont.) - Ordinance Text

PRESCRIPTIVE METHOD (cont.) - User's Guide**LIMITS TO OFFSITE 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 glaring 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 cut-off, semi cut-off, and cut-off because those classifications were not as effective in controlling offsite impacts as with the new IESNA luminaire classification system as described in TM-15-07.

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 glaring 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.

IV. 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

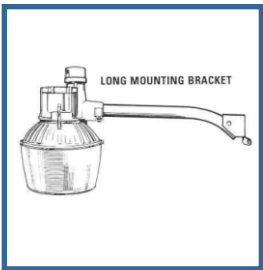
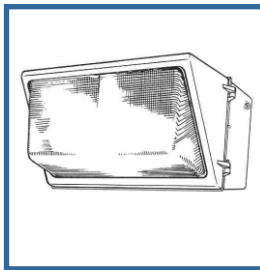
All parking lot lighting shall have no light emitted above 90 degrees.

Exception:

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.

PRESCRIPTIVE METHOD (cont.) - User's Guide**LIMITS TO OFFSITE IMPACTS**

A seemingly non-compliant fixture, such as a post-top translucent acorn luminaire, may in certain cases meet the BUG ratings, as long as it has proper interior baffling within the acorn 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 not aimed
downward****IV. NON-RESIDENTIAL LIGHTING (cont.) - Ordinance Text**

PERFORMANCE METHOD - User's Guide

The performance method is best for projects with complex lighting requirements or when the applicant wants or needs more flexibility in lighting design. The performance method is also used when any lighting designer plans to aim or direct any light fixture upward (above 90 degrees). An engineer or lighting professional generally will be required to design within the performance method. An adopting jurisdiction may also wish to hire an engineer or lighting professional to review and approve projects using this method and/or incorporate review of the performance method into special review procedures.

The Performance Method is also best for projects where higher lighting levels are required compared to typical area lighting. An example might be a car sales lot where more light might be required on the new cars than would be needed for a standard parking lot. Another example is a gas station canopy requiring more light than a building entrance canopy.

The first step in the Performance Method regulates overlighting by establishing the Total Initial Site Lumens (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 hardscape

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.

IV. NON-RESIDENTIAL LIGHTING (cont.) - Ordinance Text

B. Performance Method

1. Total Site Lumen Limit

The total installed initial luminaire 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. For sites 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.

IV. NON-RESIDENTIAL LIGHTING (cont.) - User's Guide**LIMITS TO OFFSITE IMPACTS (cont.)**

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 F. Option B will be required for all non-residential luminaires that

- A) do not have BUG ratings, or
- B) exceed the BUG ratings,
- C) are not fully shielded, or
- D) 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 illuminances 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.

IV. NON-RESIDENTIAL LIGHTING (cont.) - Ordinance Text**PERFORMANCE METHOD****2. Limits to Off Site Impacts**

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 luminaire locations, 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 reflectance values around the perimeter of the site. The top of the enclosure shall be no less than 33 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 lumen limit; and
- b) The maximum vertical illuminance on any vertical surface is less than the allowed maximum illuminance per Table F.

DESIGN COMPLIANCE - User's Guide

The application form will require information about the number of luminaires, the number of lamps in each luminaire, the initial luminaire lumens for each luminaire and the initial lumen 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 lumen 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 lumens 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.

V. RESIDENTIAL LIGHTING - User's Guide

This section applies to single family home, duplexes, row houses, and low rise multi-family buildings of 6 dwelling units or less.

RESIDENTIAL LIGHTING EXCEPTIONS

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

Landscape Lighting - While not common in residential areas, it can cause light pollution and light trespass if it is not controlled.

Lighting controlled by Vacancy (Motion) Sensor - Reduces light pollution and light trespass and should be encouraged.

RESIDENTIAL LIGHTING EXAMPLE

In this example on the following page, five different luminaires are used on a residential property. Each luminaire must comply to meet the requirements. The site plan following shows luminaire types followed by a tabulation of each luminaire, whether or not it is fully shielded, lamp type, and initial luminaire lumens. If the luminaire lumens are not known, multiply the initial lamp lumens by the luminaire efficiency. If the efficiency is not known, multiply the initial lamp lumens by 0.7 as a reasonable assumption. The maximum allowable lumen values come from Table G, based on the shielding classification and location on the site. In this case, each luminaire complies with the requirements of Table G.

Comparison of efficacy by power
(120 Volt Incandescent lamps)

Output (Lumens)	Power (Watt)		
	Incan	CFL	LED
500	40	8 - 10	9
850	60	13 - 18	12 - 15
1,200	75	18 - 22	15
1,700	100	23 - 28	18

V. RESIDENTIAL LIGHTING - Ordinance Text

A. General Requirements

For residential properties including multiple residential properties not having common areas, all outdoor luminaires shall be fully shielded and shall not exceed the allowed lumen output in Table G, row 2.

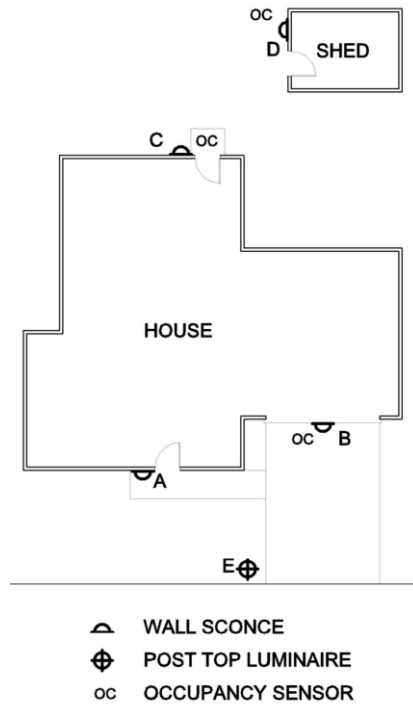
Exceptions

1. One partly shielded or unshielded luminaire at the main entry, not exceeding the allowed lumen output in Table G row 1.
2. Any other partly shielded or unshielded luminaires not exceeding the allowed lumen output in Table G row 3.
3. Low voltage landscape lighting aimed away from adjacent properties and not exceeding the allowed lumen output in Table G row 4.
4. Shielded directional flood lighting aimed so that direct glare is not visible from adjacent properties and not exceeding the allowed lumen output in Table G row 5.
5. Open flame gas lamps.
6. Lighting installed with a vacancy sensor, where the sensor extinguishes the lights no more than 15 minutes after the area is vacated.
7. Lighting exempt per Section III (B.).

B. Requirements for Residential Landscape Lighting

1. Shall comply with Table G.
2. Shall not be aimed onto adjacent properties.

V. RESIDENTIAL LIGHTING - User's Guide



Property Type: Residential Lighting Zone 1								
Luminaire Type	Location	Luminaire Description	Fully Shielded	Lamp Type	Initial Luminaire Lumens*	Maximum Allowed Initial Luminaire Lumens (Table G)	Controls	Compliant
A	Front Entry	Decorative wall sconce	No	9W CFL	420	420	None	Yes
B	Garage Door	Fully shielded wall pack	Yes	23W CFL	1050	1260	Occupancy Sensor	Yes
C	Back Entry	Decorative wall sconce	No	7W CFL	280	315	Occupancy Sensor	Yes
D	Shed Entry	Fully shielded wall pack	Yes	40W INC	343	1260	Occupancy Sensor	Yes
E	Driveway	Fully shielded post top	Yes	13W CFL	1260	1260	None	Yes

*Initial Luminaire Lumens are calculated by multiplying the total initial lamp lumens by the luminaire efficiency.
If the luminaire efficiency is not known, assume an efficiency of 70% and multiply the lamp lumens value by 0.7.

VI. 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 refusing 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.

SPORTS 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 1,500 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 500 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 500 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 smaller high schools, elementary and middle schools, and social events)

VI. LIGHTING BY SPECIAL PERMIT ONLY - Ordinance Text

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.
2. Aerial Lasers.
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 candelas.

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 stadiums.
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
6. Ornamental and architectural lighting of bridges, public monuments, statuary and public buildings.
7. Theme and amusement parks.
8. Correctional 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.

SPORTS FIELD LIGHTING

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 IES Recommended Practice for Sports and Recreational Area Lighting RP-6)

VII. EXISTING LIGHTING - User's Guide

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, this section of the MLO 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 initial 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 fixes” such as re-aiming or lowering lumen output of lamps. Where lighting is judged to be a safety hazard, immediate compliance can be required.

VI. LIGHTING BY SPECIAL PERMIT ONLY (cont.) - Ordinance Text

- b. Employs lighting controls to reduce lighting at a Project Specific Curfew (“Curfew”) time to be established in the Permit.
- c. Complies with the Performance Method after Curfew.

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 unwarranted 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:

VII. EXISTING LIGHTING (cont.) - Ordinance Text

Additions of 25 percent or more in terms of additional 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 as of the effective date of this Ordinance.

2. Minor Modifications, Additions, or New Lighting Fixtures for Non-residential and Multiple Dwellings

For non-residential and multiple dwellings, all additions, modifications, or replacement of more than 25 percent of outdoor lighting fixtures existing as of the effective date of this Ordinance shall require the submission of a complete inventory and site plan detailing all existing and any proposed new outdoor lighting.

Any new lighting shall meet the requirements of this Ordinance.

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 & PENALTIES - Ordinance Text

(Reserved)

VIII. ENFORCEMENT AND PENALTIES - User's Guide

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. Proactive 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 the he or she is familiar with the lighting requirements and will submit a lighting plan for approval.

VIII. ENFORCEMENT AND PENALTIES (cont.) - User's Guide

Submission of the Lighting Plan should be required as a precondition to any approvals. The Lighting Plan should include the location and BUG rating for each luminaire, specify whether compliance is by the performance or prescriptive method, and a worksheet to show that the luminaires and their BUG ratings are compliant.

IX. TABLES - User's Guide

The tables are to be reviewed periodically by a joint committee of the IES and IDA, 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.

VIII. ENFORCEMENT & PENALTIES - Ordinance Text**IX. TABLES - Ordinance Text****Table A - Allowed Total Initial Luminaire Lumens per Site for Non-residential Outdoor Lighting, Per Parking Space Method**

May only be applied to properties up to 10 parking spaces (including handicapped accessible spaces).

LZ-0	LZ-1	LZ-2	LZ-3	LZ-4
350 lms/space	490 lms/space	630 lms/space	840 lms/space	1,050 lms/space

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

May be used for any project. When lighting intersections of site drives and public streets or road, a total of 600 square feet for each intersection may be added to the actual site hardscape area to provide for intersection lighting.

LZ-0	LZ-1	LZ-2	LZ-3	LZ-4
Base Allowance				
0.5 lumens per SF of Hardscape	1.25 lumens per SF of Hardscape	2.5 lumens per SF of Hardscape	5.0 lumens per SF of Hardscape	7.5 lumens per SF of Hardscape

IX. TABLES - Ordinance Text

Table B - *Lumen Allowances, in Addition to Base Allowance*

	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Additional allowances for sales and service facilities. No more than two additional allowances per site, Use it or Lose it.					
Outdoor Sales Lots. This allowance is lumens per square foot of uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale, and may not include driveways, parking or other non sales areas. To use this allowance, luminaires must be within 2 mounting heights of sales lot area.	0	4 lumens per square foot	8 lumens per square foot	16 lumens per square foot	16 lumens per square foot
Outdoor Sales Frontage. This allowance is for lineal feet of sales frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. In order to use this allowance, luminaires must be located between the principal viewing location and the frontage outdoor sales area	0	0	1,000 per LF	1,500 per LF	2,000 per LF
Drive Up Windows. In order to use this allowance, luminaires must be within 20 feet horizontal distance of the center of the window.	0	2,000 lumens per drive-up window	4,000 lumens per drive-up window	8,000 lumens per drive-up window	8,000 lumens per drive-up window
Vehicle Service Station. This allowance is lumens per installed fuel pump.	0	4,000 lumens per pump (based on 5 fc horiz)	8,000 lumens per pump (based on 10 fc horiz)	16,000 lumens per pump (based on 20 fc horiz)	24,000 lumens per pump (based on 20 fc horiz)

IX. TABLES - TABLE C BUG RATING - User's Guide

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 *Luminaire Classification System for Outdoor Luminaires*.

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

BUG requires downlight only with low glare (better than full cut off) in lighting zones 0, 1 and 2, 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 enough to permit the use of very well shielded luminaires 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 tested 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, façade lighting, security lighting and the front row lighting for auto dealerships. BUG rating limits are defined for each luminaire and

IX. TABLES (cont.) - Ordinance Text**Table C - Maximum Allowable Backlight, Uplight and Glare (BUG) Ratings**

May be used for any project. A luminaire may be used if it is rated for the lighting zone of the site or lower in number for all ratings B, U and G. Luminaires equipped with adjustable mounting devices permitting alteration of luminaire aiming in the field shall not be permitted.

TABLE C-1	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Allowed Backlight Rating*					
Greater than 2 mounting heights from property line	B1	B3	B4	B5	B5
1 to less than 2 mounting heights from property line and ideally oriented**	B1	B2	B3	B4	B4
0.5 to 1 mounting heights from property line and ideally oriented**	B0	B1	B2	B3	B3
Less than 0.5 mounting height to property line and properly oriented**	B0	B0	B0	B1	B2

*For property lines that abut public walkways, bikeways, plazas, and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the center-line of the public roadway or public transit corridor for the purpose of determining compliance with this section. NOTE: This adjustment is relative to Table C-1 and C-3 only and shall not be used to increase the lighting area of the site.

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

IX. TABLES - TABLE C BUG RATING (cont.) - User's Guide

are based on the internal and external design of the luminaire, its aiming, and the initial luminaire lumens of the specified luminaires. The BUG rating limits also take into consideration the distance the luminaire is installed from the property line in multiples of the mounting height (See Table C).

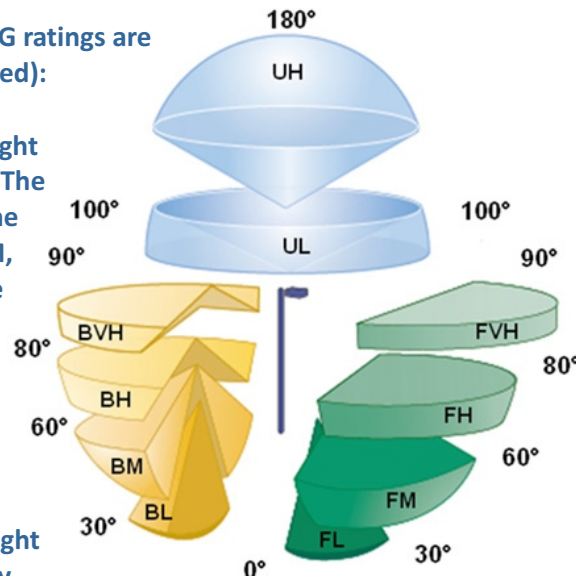
The three components of BUG ratings are based on IES TM-15-07 (revised):

Backlight, which creates light trespass 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 (UH) 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 angles (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.



IX. TABLES (cont.) - Ordinance Text

IX. TABLES - TABLE C BUG RATING (cont.) - User's Guide

(Key: UH=Uplight High, UL=Uplight Low, BVH=Backlight Very High, BH=Backlight High, BM=Backlight Medium, BL=Backlight Low, FVH=Forward Light Very High, FH=Forward Light High, FM=Forward Light Medium, FL=Forward Light Low.)

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 10 lumens in the UH and UL zones, 20 lumens total in the complete upper hemisphere. (This is roughly equivalent to a 5 W incandescent lamp).
- Zone 2 allows only 50 lumens in the UH and UL zones, 100 lumens total (less than a 25W incandescent lamp).
- Zone 3 allows only 500 lumens in the UH and UL zones, 1000 lumens total (about the output of a 75W incandescent bulb).
- Zone 4 allows only 1,000 lumens in the UH and UL zones, 2000 lumens total (about the output of a 100W incandescent bulb).

IX. TABLES (cont.) - Ordinance Text

Table C - 2 Maximum Allowable Uplight (BUG) Ratings - Continued

TABLE C-2	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Allowed Uplight Rating	U0	U1	U2	U3	U4
Allowed % light emission above 90° for street or Area lighting	0%	0%	0%	0%	0%

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

TABLE C-3	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Allowed Glare Rating	G0	G1	G2	G3	G4
Any luminaire not ideally oriented*** with 1 to less than 2 mounting heights to any property line of concern	G0	G0	G1	G1	G2
Any luminaire not ideally oriented*** with 0.5 to 1 mounting heights to any property line of concern	G0	G0	G0	G1	G1
Any luminaire not ideally oriented*** with less than 0.5 mounting heights to any property line of concern	G0	G0	G0	G0	G1

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

TABLE D EXAMPLE - PERFORMANCE METHOD - User's Guide

The first step in the Performance Method is to establish the Site Total Initial Site Lumens which regulates overlighting. The performance method allows layers of light depending on the complexity of the site.

Table D establishes the basic total initial site lumens allowed. These lumen allowances are added together for a total initial site lumen allowance. Allowances include:

- 1) Initial lumen allowance per site
- 2) Per area (SF) of hardscape

IX. TABLES (cont.) - Ordinance Text

Table D Performance Method Allowed Total Initial Site Lumens

May be used on any project.

Lighting Zone	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Allowed Lumens Per SF	0.5	1.25	2.5	5.0	7.5
Allowed Base Lumens Per Site	0	3,500	7,000	14,000	21,000

Table E Performance Method Additional Initial Luminaire Lumen Allowances. All of the following are “use it or lose it” allowances.

All area and distance measurements in plan view unless otherwise noted.

Lighting Application	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Additional Lumens Allowances for All Buildings except service stations and outdoor sales facilities. A MAXIMUM OF THREE (3) ALLOWANCES ARE PERMITTED. THESE ALLOWANCES ARE “USE IT OR LOSE IT”.					
Building Entrances or Exits. This allowance is per door. In order to use this allowance, luminaires must be within 20 feet of the door.	400	1,000	2,000	4,000	6,000
Building Facades. This allowance is lumens per unit area of building façade that are illuminated. To use this allowance, luminaires must be aimed at the façade and capable of illuminating it without obstruction.	0	0	8/SF	16/SF	24/SF

TABLE E PERFORMANCE METHOD - User's Guide

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 hardscape 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 EXAMPLE - PERFORMANCE METHOD - User's Guide**IX. TABLES (cont.) - Ordinance Text****Table E - Performance Method Additional Initial Lumen Allowances (cont.)**

Lighting Application	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Sales or Non-sales Canopies. This allowance is lumens per unit area for the total area within the drip line of the canopy. In order to qualify for this allowance, luminaires must be located under the canopy.	0	3/SF	6/SF	12/SF	18/SF
Guard Stations. This allowance is lumens per unit area of guardhouse plus 2000 sf per vehicle lane. In order to use this allowance, luminaires must be within 2 mounting heights of a vehicle lane or the guardhouse.	0	6/SF	12/SF	24/SF	36/SF
Outdoor Dining. This allowance is lumens per unit area for the total illuminated hardscape of outdoor dining. In order to use this allowance, luminaires must be within 2 mounting heights of the hardscape area of outdoor dining	0	1/SF	5/SF	10/SF	15/SF
Drive Up Windows. This allowance is lumens per window. In order to use this allowance, luminaires must be within 20 feet of the center of the window.	0	2,000 lumens per drive-up window	4,000 lumens per drive-up window	8,000 lumens per drive-up window	8,000 lumens per drive-up window
Additional Lumens Allowances for Service Stations only. Service stations may not use any other additional allowances.					
Vehicle Service Station Hardscape. This allowance is lumens per unit area for the total illuminated hardscape area less area of buildings, area under canopies, area off property, or areas obstructed by signs or structures. In order to use this allowance, luminaires must be illuminating the hardscape area and must not be within a building below a canopy, beyond property lines, or obstructed by a sign or other structure.	0	4/SF	8/SF	16/SF	24/SF

IX. TABLES (cont.) - Ordinance Text

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

Lighting Application	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Vehicle Service Station Canopies. This allowance is lumens per unit area for the total area within the drip line of the canopy. In order to use this allowance, luminaires must be located under the canopy.	0	8/SF	16/SF	32/SF	32/SF
Additional Lumens Allowances for Outdoor Sales facilities only. Outdoor Sales facilities may not use any other additional allowances. NOTICE: lighting permitted by these allowances shall employ controls extinguishing this lighting after a curfew time to be determined by the Authority.					
Outdoor Sales Lots. This allowance is lumens per square foot of uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale, and may not include driveways, parking or other non sales areas and shall not exceed 25% of the total hardscape area. To use this allowance, Luminaires must be within 2 mounting heights of the sales lot area.	0	4/SF	8/SF	12/SF	18/SF
Outdoor Sales Frontage. This allowance is for lineal feet of sales frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. In order to use this allowance, luminaires must be located between the principal viewing location and the frontage outdoor sales area.	0	0	1,000/LF	1,500/LF	2,000/LF

IX. TABLES (cont.) - Ordinance Text

Table F Maximum Vertical Illuminance at any point in the plane of the property line

Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
0.05 FC or 0.5 LUX	0.1 FC or 1.0 LUX	0.3 FC or 3.0 LUX	0.8 FC or 8.0 LUX	1.5 FC or 15.0 LUX

IX. TABLES (cont.) - Ordinance Text

Table G - Residential Lighting Limits

Lighting Application	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Row 1 Maximum Allowed Luminaire Lumens* for Unshielded Luminaires at one entry only	Not allowed	420 lumens	630 lumens	630 lumens	630 lumens
Row 2 Maximum Allowed Luminaire Lumens* for each Fully Shielded Luminaire	630 lumens	1,260 lumens	1,260 lumens	1,260 lumens	1,260 lumens
Row 3 Maximum Allowed Luminaire Lumens* for each Unshielded Luminaire excluding main entry	Not allowed	315 lumens	315 lumens	315 lumens	315 lumens
Row 4 Maximum Allowed Luminaire Lumens* for each Landscape Lighting	Not allowed	Not allowed	1,050 lumens	2,100 lumens	2,100 lumens
Row 5 Maximum Allowed Luminaire Lumens* for each Shielded Directional Flood Lighting	Not allowed	Not allowed	1,260 lumens	2,100 lumens	2,100 lumens
Row 6 Maximum Allowed Luminaire Lumens* for each Low Voltage Landscape Lighting	Not allowed	Not allowed	525 lumens	525 lumens	525 lumens

* Luminaire lumens equals Initial Lamp Lumens for a lamp, multiplied by the number of lamps in the luminaire

TABLE G RESIDENTIAL LIGHTING - User's Guide

Residential Light Levels

Most residential lighting has traditionally used incandescent lamps which are identified by their wattage. However, since new technologies provide more light for fewer watts, it is no longer possible to regulate residential lighting solely by providing a maximum wattage. Table G, therefore, lists maximum initial luminaire lumens only.

X. DEFINITIONS - User's Guide

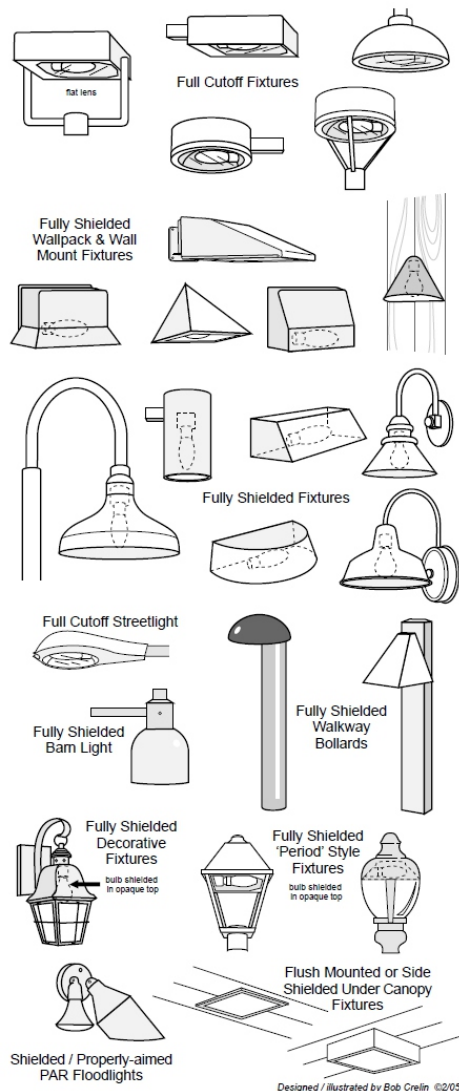
Definitions are typically generally added to any code when new code sections are added. The definitions are legally required and play a significant role in the interpretation of the ordinance and code.

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. lumens) 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 Luminaire Classification System as defined in IES TM-15-07 is likely to need attention.

X. DEFINITIONS - Ordinance Text

<i>Absolute Photometry</i>	Photometric measurements (usually of a solid-state luminaire) that directly measures the footprint of the luminaire. Reference Standard IES LM-79
<i>Architectural Lighting</i>	Lighting designed to reveal architectural beauty, shape and/or form and for which lighting for any other purpose is incidental.
<i>Authority</i>	The adopting municipality, agency or other governing body.
<i>Astronomic Time Switch</i>	An automatic lighting control device that switches outdoor lighting relative to time of solar day with time of year correction.
<i>Backlight</i>	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.
<i>BUG</i>	A luminaire classification system that classifies backlight (B), uplight (U) and glare (G).
<i>Canopy</i>	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.)
<i>Common Outdoor Areas</i>	One or more of the following: a parking lot; a parking structure or covered vehicular entrance; a common entrance or public space shared by all occupants of the domiciles.
<i>Curfew</i>	A time defined by the authority when outdoor lighting is reduced or extinguished.

Examples of Fully Shielded Luminaires**X. DEFINITIONS - Ordinance Text**

<i>Emergency conditions</i>	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.
<i>Footcandle</i>	The unit of measure 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.
<i>Forward Light</i>	For an exterior luminaire, lumens emitted in the quarter sphere below horizontal and in the direction of the intended orientation of the luminaire.
<i>Fully Shielded Luminaire</i>	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 refraction from any part of the luminaire, is projected below the horizontal plane through the luminaire's lowest light-emitting part.
<i>Glare</i>	Lighting entering the eye directly from luminaires or indirectly from reflective surfaces that causes visual discomfort or reduced visibility.
<i>Hardscape</i>	Permanent hardscape improvements to the site including parking lots, drives, entrances, curbs, ramps, stairs, steps, medians, walkways and non-vegetated landscaping that is 10 feet or less in width. Materials may include concrete, asphalt, stone, gravel, etc.
<i>Hardscape Area</i>	The area measured in square feet of all hardscape. It is used to calculate the Total Site Lumen Limit in both the Prescriptive Method and Performance Methods. Refer to Hardscape definition.

X. DEFINITIONS - Ordinance Text

<i>Hardscape Perimeter</i>	The perimeter measured in linear feet is used to calculate the Total Site Lumen Limit in the Performance Method. Refer to Hardscape definition.
<i>IDA</i>	International Dark-Sky Association.
<i>IESNA</i>	Illuminating Engineering Society of North America.
<i>Impervious Material</i>	Sealed to severely restrict water entry and movement
<i>Industry Standard Lighting Software</i>	Lighting software that calculates point-by-point illuminance that includes reflected light using either ray-tracing or radiosity methods.
<i>Lamp</i>	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.
<i>Landscape Lighting</i>	Lighting of trees, shrubs, or other plant material as well as ponds and other landscape features.
<i>LED</i>	Light Emitting Diode.
<i>Light Pollution</i>	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.

X. DEFINITIONS - Ordinance Text

<i>Light Trespass</i>	Light that falls beyond the property it is intended to illuminate.
<i>Lighting</i>	“Electric” or “man-made” or “artificial” lighting. See “lighting equipment”.
<i>Lighting Equipment</i>	Equipment specifically intended to provide gas or electric illumination, including but not limited to, lamp(s), luminaire(s), ballast(s), poles, posts, lens(s), and related structures, electrical wiring, and other necessary or auxiliary components.
<i>Lighting Zone</i>	An overlay zoning system establishing legal limits for lighting for particular parcels, areas, or districts in a community.
<i>Lighting Equipment</i>	Equipment specifically intended to provide gas or electric illumination, including but not limited to, lamp(s), luminaire(s), ballast(s), poles, posts, lens(s), and related structures, electrical wiring, and other necessary or auxiliary components.
<i>Low Voltage Landscape Lighting</i>	Landscape lighting powered at less than 15 volts and limited to luminaires having a rated initial luminaire lumen output of 525 lumens or less.
<i>Lumen</i>	The unit of measure used to quantify the amount of light produced by a lamp or emitted from a luminaire (as distinct from “watt,” a measure of power consumption).
<i>Luminaire</i>	The complete lighting unit (fixture), consisting of a lamp, or lamps and ballast(s) (when applicable), together with the parts designed to distribute the light (reflector, lens, diffuser), to position and protect the lamps, and to connect the lamps to the power supply.

Mounting Height: The horizontal spacing of poles is often measured in units of “mounting height”. Example: “The luminaires can be spaced up to 4 mounting heights apart.”

X. DEFINITIONS - Ordinance Text

<i>Luminaire Lumens</i>	For luminaires with relative photometry per IES, it is calculated as the sum of the initial lamp lumens for all lamps within an individual luminaire, multiplied by the luminaire efficiency. If the efficiency is not known for a residential luminaire, assume 70%. For luminaires with absolute photometry per IES LM-79, it is the total luminaire lumens. The lumen rating of a luminaire assumes the lamp or luminaire is new and has not depreciated in light output.
<i>Lux</i>	The SI unit of illuminance. One lux is one lumen per square meter. 1 Lux is a unit of incident illuminance approximately equal to 1/10 footcandle.
<i>Mounting height</i>	The height of the photometric center of a luminaire above grade level.
<i>New lighting</i>	Lighting for areas not previously illuminated; newly installed lighting of any type except for replacement lighting or lighting repairs.
<i>Object</i>	A permanent structure located on a site. Objects may include statues or artwork, garages or canopies, outbuildings, etc.
<i>Object Height</i>	The highest point of an entity, but shall not include antennas or similar structures.
<i>Ornamental lighting</i>	Lighting that does not impact the function and safety of an area but is purely decorative, or used to illuminate architecture and/or landscaping, and installed for aesthetic effect.

X. DEFINITIONS - Ordinance Text

<i>Ornamental Street Lighting</i>	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 tenon; · 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 its photometric output measured using Type C photometry per IESNA LM-75-01.
<i>Outdoor Lighting</i>	Lighting equipment installed within the property line and outside the building envelopes, whether attached to poles, building structures, the earth, or any other location; and any associated lighting control equipment.
<i>Partly shielded luminaire</i>	A luminaire with opaque top and translucent or perforated sides, designed to emit most light downward.
<i>Pedestrian Hardscape</i>	Stone, brick, concrete, asphalt or other similar finished surfaces intended primarily for walking, such as sidewalks and pathways.
<i>Photoelectric Switch</i>	A control device employing a photocell or photodiode to detect daylight and automatically switch lights off when sufficient daylight is available.
<i>Property line</i>	The edges of the legally-defined extent of privately owned property.

X. DEFINITIONS - Ordinance Text

<i>Relative photometry</i>	Photometric measurements made of the lamp plus luminaire, and adjusted to allow for light loss due to reflection or absorption within the luminaire. Reference standard: IES LM-63.
<i>Repair(s)</i>	The reconstruction or renewal of any part of an existing luminaire for the purpose of its on-going operation, other than relamping or replacement of components including capacitor, ballast or photocell. Note that retrofitting a luminaire with new lamp and/or ballast technology is not considered a repair and for the purposes of this ordinance the luminaire shall be treated as if new. "Repair" does not include normal relamping or replacement of components including capacitor, ballast or photocell.
<i>Replacement Lighting</i>	Lighting installed specifically to replace existing lighting that is sufficiently broken to be beyond repair.
<i>Sales area</i>	Uncovered area used for sales of retail goods and materials, including but not limited to automobiles, boats, tractors and other farm equipment, building supplies, and gardening and nursery products.
<i>Seasonal lighting</i>	Temporary lighting installed and operated in connection with holidays or traditions.
<i>Shielded Directional Luminaire</i>	A luminaire that includes an adjustable mounting device allowing aiming in any direction and contains a shield, louver, or baffle to reduce direct view of the lamp.
<i>Sign</i>	Advertising, directional or other outdoor promotional display of art, words and/or pictures.

X. DEFINITIONS - Ordinance Text

<i>Sky Glow</i>	The brightening of the nighttime sky that results from scattering and reflection of artificial light by moisture and dust particles in the atmosphere. Skyglow is caused by light directed or reflected upwards or sideways and reduces one's ability to view the night sky.
<i>Temporary lighting</i>	Lighting installed and operated for periods not to exceed 60 days, completely removed and not operated again for at least 30 days.
<i>Third Party</i>	A party contracted to provide lighting, such as a utility company.
<i>Time Switch</i>	An automatic lighting control device that switches lights according to time of day.
<i>Translucent</i>	Allowing light to pass through, diffusing it so that objects beyond cannot be seen clearly (not transparent or clear).
<i>Unshielded Luminaire</i>	A luminaire capable of emitting light in any direction including downwards.
<i>Uplight</i>	For an exterior luminaire, flux radiated in the hemisphere at or above the horizontal plane.
<i>Vertical Illuminance</i>	Illuminance measured or calculated in a plane perpendicular to the site boundary or property line.

XI. OPTIONAL STREETLIGHT ORDINANCE - User's Guide

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 causes of artificial skyglow. Many adopting agencies will recognize that the MLO will make privately owned lighting more efficient and environmentally responsible than their street lighting systems. But because 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 AASHTO standards.

Until a new recommended practice for street lighting can be developed, this section can serve to prevent most of the uplight 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 evoke 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 BUG rating of G1. If additional illuminance 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 gauge whether a complex warranting systems is required, or if a simple one using posted speeds, presence of pedestrians, or other practical considerations is sufficient.

Examples of a current street lighting warranting system are included in the Transportation Association of Canada's Guide for the Design of Roadway Lighting 2006.

XI. OPTIONAL STREETLIGHT ORDINANCE - Ordinance Text

Note to the adopting authority: the intent of this section is that it only applies to streets and not to roadways or highways.

A. Preamble

The purpose of this Ordinance is to control the light pollution of street lighting, including all collectors, local streets, alleys, sidewalks and bike-ways, as defined by ANSI/IES RP-8 Standard Practice for Roadway and Street Lighting and in a manner consistent with the Model Lighting Ordinance.

B. Definitions

Roadway or Highway lighting is defined as lighting provided for freeways, expressways, limited access roadways, and roads on which pedestrians, cyclists, and parked vehicles are generally not present. The primary purpose of roadway or highway lighting is to help the motorist remain on the roadway and help with the detection of obstacles within and beyond the range of the vehicle's headlights.

Street lighting is defined as lighting provided for major, collector, and local roads where pedestrians and cyclists are generally present. The primary purpose of street lighting is to help the motorist identify obstacles, provide adequate visibility of pedestrians and cyclists, and assist in visual search tasks, both on and adjacent to the roadway.

Ornamental Street Lighting is defined as 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 tenon;
- 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 its photometric output measured using Type C photometry per IESNA LM-75-01.

XI. OPTIONAL STREETLIGHT ORDINANCE - Ordinance Text***C. Scope***

All street 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-6, October 2005, Chapter 2. 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 the 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.

XI. OPTIONAL STREETLIGHT ORDINANCE - Ordinance Text***F. 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**

Lighting Zone	Maximum Uplight Rating
LZ-0	U-0
LZ-1	U-1
LZ-2	U-2
LZ-3	U-3
LZ-4	U-4