



Illuminating
ENGINEERING SOCIETY



JOINT IDA-IES

**MODEL
LIGHTING
ORDINANCE**

Lite

(DRAFT)

Joint IDA-IESNA Model Outdoor Lighting Ordinance (MLO) Lite

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I. Preamble

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

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

II. Lighting Zones

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

LZ-1 or Rural

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.

LZ-2 or Suburban

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.

LZ-3 or Urban

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.

III. General Requirements

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 street lighting 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.
- 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.

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.

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

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 with this section.

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 are calculated as the sum of the initial luminaire lumens for all luminaires.

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.

V. Residential Lighting

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 D, row 2.

Exceptions:

1. One partly shielded or unshielded luminaire at the main entry, not exceeding the lumen output in Table D - row 1.
2. Any other partly shielded or unshielded luminaires not exceeding the allowed lumen output in Table D - row 3.
3. Low voltage landscape lighting aimed away from adjacent properties and not exceeding the allowed lumen output in Table D - 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 D - 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 D.
2. Shall not be aimed onto adjacent properties.

VI. Lighting By Special Permit Only

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.
- b. Employs lighting controls to reduce lighting at a Project Specific Curfew ("Curfew") time to be established in the Permit.

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

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:

- a) 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.
- b) 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 And Penalties

(RESERVED)

IX. Tables

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).

Rural	Suburban	Urban
490 lumens per space	630 lumens per space	840 lumens per 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.

Rural	Suburban	Urban
1.0 lumens per SF of hardscape*	2.0 lumens per SF of hardscape*	3.0 lumens per SF of hardscape*
*Maximum 50,000 lumens per acre	*Maximum 100,000 lumens per acre	*Maximum 150,000 lumens per acre

Table B. Allowed lumens per square foot

	Rural	Suburban	Urban
Base allowance of lumens per SF of hardscape	1.0	2.0	3.0
Additional allowances for sales and service facilities. No more than two additional allowances per site; use it or lose it.			
Maximum lumens per acre with add. allowances	75,000	150,000	225,000
Outdoor Sales Lots. This allowance is lumens per square foot of un- covered 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.	4 lumens per square foot	8 lumens per square foot	12 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	800 per linear foot	1,200 per linear foot
Drive Up Windows. In order to use this allowance, luminaires must be within 20 feet horizontal distance of the center of the window.	2,000 lumens per drive-up window	4,000 lumens per drive-up window	6,000 lumens per drive-up window
Vehicle Service Station. This allowance is lumens per installed fuel pump.	4,000 lumens per pump	8,000 lumens per pump	12,000 lumens per pump

Table C. Maximum allowable 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 U and G. Luminaires equipped with adjustable mounting devices permitting alteration of luminaire aiming in the field shall not be permitted.

TABLE C-1	Rural	Suburban	Urban
Allowed uplight rating	U0	U1	U2
Allowed uplight rating for street or area lighting	U0	U0	U0

TABLE C-2	Rural	Suburban	Urban
Allowed glare rating	G0	G1	G2

Table D. Residential lighting limits

	Rural	Suburban	Urban
Row 1 Maximum allowed luminaire lumens* for unshielded luminaires at one entry only	420	630	630
Row 2 Maximum allowed luminaire lumens* for each fully shielded luminaire	1,260	1,260	1,260
Row 3 Maximum allowed luminaire lumens* for each unshielded luminaire excluding main entry	315	315	315
Row 4 Maximum allowed luminaire lumens* for each landscape lighting	Not allowed	1,050	2,100
Row 5 Maximum allowed luminaire lumens* for each shielded directional flood lighting	Not allowed	1,260	2,100

* Luminaire lumens equal initial lamp lumens for a lamp, multiplied by the number of lamps in the luminaire

X. Definitions

Absolute Photometry	Photometric measurements (usually of a solid-state luminaire) that directly measures the footprint of the luminaire. Reference Standard IES LM-79
Architectural Lighting	Lighting designed to reveal architectural beauty, shape and/or form and for which lighting for any other purpose is incidental.
Authority	The adopting municipality, agency or other governing body.
Astronomic Time Switch	An automatic lighting control device that switches outdoor lighting relative to time of solar day with time of year correction.
Backlight	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.
BUG	A luminaire classification system that classifies backlight (B), uplight (U) and glare (G).
Canopy	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.)
Common Outdoor Areas	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.
Curfew	A time defined by the authority when outdoor lighting is reduced or extinguished.
Emergency conditions	Generally, lighting that is only energized during an emergency; lighting fed

	from a backup power source; or lighting for illuminating the path of egress solely during a fire or other emergency situation; or, lighting for security purposes used solely during an alarm.
Foot-candle (FC)	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.
Forward Light	For an exterior luminaire, lumens emitted in the quarter sphere below horizontal and in the direction of the intended orientation of the luminaire.
Fully Shielded Luminaire	A luminaire constructed and installed in such a manner that all light emitted by the luminaire, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the luminaire, is projected below the horizontal plane through the luminaire's lowest light-emitting part.
Glare	Lighting entering the eye directly from luminaires or indirectly from reflective surfaces that causes visual discomfort or reduced visibility.
Hardscape	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.
Hardscape Area	The area measured in square feet of all hardscape. It is used to calculate the Total Site Lumen Limit. Refer to Hardscape definition.
Hardscape Perimeter	The perimeter measured in linear feet is used to calculate the Total Site Lumen Limit. Refer to Hardscape definition.
IDA	International Dark-Sky Association.
IESNA	Illuminating Engineering Society of North America.
Impervious Material	Sealed to severely restrict water entry and movement.
Industry-Standard Lighting Software	Lighting software that calculates point-by-point illuminance that includes reflected light using either ray-tracing or radiosity methods.
Lamp	A generic term for a source of optical radiation (i.e. "light"), often called a "bulb" or "tube". Examples include incandescent, fluorescent, high-intensity discharge (HID) lamps, and low pressure sodium (LPS) lamps, as well as light-emitting diode (LED) modules and arrays.
Landscape Lighting	Lighting of trees, shrubs, or other plant material as well as ponds and other landscape features.
LED	Light-Emitting Diode.
Light Pollution	Any adverse effect of artificial light including, but not limited to, glare, light trespass, sky-glow, energy waste, compromised safety and security, and impacts on the nocturnal environment.
Light Trespass	Light that falls beyond the property it is intended to illuminate.
Lighting	"Electric" or "man-made" or "artificial" lighting. See "lighting equipment".
Lighting Equipment	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.
Lighting Zone	An overlay zoning system establishing legal limits for lighting for particular parcels, areas, or districts in a community.
Low-Voltage Landscape Lighting	Landscape lighting powered at less than 15 volts and limited to luminaires having a rated initial luminaire lumen output of 525 lumens or less.
Lumen	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).
Luminaire	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.
Luminaire Lumens	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.
Lux	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 foot-candle.
Mounting Height	The height of the photometric center of a luminaire above grade level.
New Lighting	Lighting for areas not previously illuminated; newly installed lighting of any type except for replacement lighting or lighting repairs.
Object	A permanent structure located on a site. Objects may include statues or artwork, garages or canopies, outbuildings, etc.
Object Height	The highest point of an entity, but shall not include antennas or similar structures.
Ornamental lighting	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.
Ornamental Street Lighting	A luminaire intended for illuminating streets that serves a decorative function in addition to providing optics that effectively deliver street lighting. It has a historical period appearance or decorative appearance, and has the following design characteristics: <ul style="list-style-type: none"> · 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.
Outdoor Lighting	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.
Partly Shielded Luminaire	A luminaire with opaque top and translucent or perforated sides, designed to emit most light downward.
Pedestrian Hardscape	Stone, brick, concrete, asphalt or other similar-finished surfaces intended primarily for walking, such as sidewalks and pathways.
Photoelectric Switch	A control device employing a photocell or photodiode to detect daylight and automatically switch lights off when sufficient daylight is available.
Property line	The edges of the legally-defined extent of privately owned property.
Relative Photometry	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.
Repair(s)	The reconstruction or renewal of any part of an existing luminaire for the

	purpose of its ongoing 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.
Replacement Lighting	Lighting installed specifically to replace existing lighting that is sufficiently broken to be beyond repair.
Sales area	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.
Seasonal Lighting	Temporary lighting installed and operated in connection with holidays or traditions.
Shielded Directional Luminaire	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.
Sign	Advertising, directional or other outdoor promotional display of art, words and/or pictures.
Sky Glow	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.
Temporary lighting	Lighting installed and operated for periods not to exceed 60 days, completely removed and not operated again for at least 30 days.
Third Party	A party contracted to provide lighting, such as a utility company.
Time Switch	An automatic lighting control device that switches lights according to time of day.
Translucent	Allowing light to pass through, diffusing it so that objects beyond cannot be seen clearly (not transparent or clear).
Unshielded Luminaire	A luminaire capable of emitting light in any direction including downwards.
Uplight	For an exterior luminaire, flux radiated in the hemisphere at or above the horizontal plane.
Vertical Illuminance	Illuminance measured or calculated in a plane perpendicular to the site boundary or property line.

XI. (Optional) Street Lighting Ordinance

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 bikeways, 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:

1. designed to mount on a pole using an arm, pendant, or vertical tenon;
2. opaque or translucent top and/or sides;
3. an optical aperture that is either open or enclosed with a flat, sag or drop lens;
4. mounted in a fixed position; and
5. with its photometric output measured using Type C photometry per IESNA LM-75-01.

C. Scope

All street lighting not governed by regulations of federal, state or other superseding jurisdiction.

EXCEPTION: lighting systems mounted less than 10.5 feet above street level and having less than 1,000 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.

F. Light Shielding and Distribution

All street lighting shall have no light emitted above 90 degrees.