1. Agenda

   Documents:

   PLANNING_COMMISSION_AGENDA_-_OCTOBER_18__2016.PDF

2. Meeting Materials

   Documents:

   10-18-16_WILSONVILLE_REQUIREMENTS.PDF
   10-18-16_MODEL_LIGHTING_ORDINANCE.PDF
   10-18-16_SISTERS_REQUIREMENTS.PDF
   10-18-16_DUNDEE_REQUIREMENTS.PDF

CITY OF YACHATS

PLANNING COMMISSION MEETING

441 Hwy 101 N., Yachats Commons, Room 1

Tuesday, October 18, 2016 at 3:00pm

AGENDA

I. Meeting called to order
II. Announcements and Correspondence
II. Minutes
   A. Regular Meeting and Work Session – Sept. 20, 2016
III. Citizen's Concerns
IV. Public Hearings
V. Planner's Report – Larry Lewis
VI. New Business
VII. Other Business
   A. From the Commission
   B. From Staff

Commission meets the third Tuesday of each month. Next scheduled meeting: Nov. 15, 2016 at 3pm

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 Hines 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) two days in advance.

Posted: Oct. 14, 2016

WILSONVILLE, OR.

ORDINANCE NO. 649

AN ORDINANCE OF THE CITY OF WILSONVILLE AMENDING CHAPTER 4 OF THE WILSONVILLE CODE (WC) TO ADD A NEW CHAPTER, SECTION 4.199 - OUTDOOR LIGHTING, REGULATING OUTDOOR LIGHTING IN COMMERCIAL, INDUSTRIAL, PUBLIC FACILITY AND MULTI-FAMILY DEVELOPMENTS, AMENDING WC 4.001 – DEFINITIONS AND CREATING LIGHTING OVERLAY ZONES AND ADOPTING A LIGHTING OVERLAY ZONE MAP.

WHEREAS, the City's Development Review Boards (DRB) desire to provide consistent direction to applicant's regarding the amounts, types and adequacy of outdoor lighting in different land uses; and

WHEREAS, this concern manifested itself in the form of a formal request from the DRB to the City Council and the Planning Commission to create legislation that would result in clear and concise criteria to guide the installation of outdoor lighting; and

WHEREAS, the City Council responded in 2005-06 as part of the Goal setting process stating "*adopt exterior lighting standards for new development*" as a supporting action to Council Goal #1 that was to "*Improve livability and safety of Wilsonville*"; and

WHEREAS, the Ordinance is intended to allow businesses to be treated equally in the land use review process, not allowing businesses of a similar nature to obtain different light levels; and

WHEREAS, development of outdoor lighting standards will guide the installation of exterior lights in new commercial, industrial, public **facility** and multi-family housing projects as well as major additions and modifications as defined by the Ordinance; and

WHEREAS, one of the main goals of the Ordinance are to permit all necessary and reasonable uses of outdoor lighting while reducing wasted energy and light pollution; and

WHEREAS, the Ordinance will promote sustainability by having the net effect of using energy more efficiently, resulting in potential cost savings to property owners and reductions in energy consumption over time; and

WHEREAS, light pollution is a broad term describing the undesirable side effects of outdoor lighting; and

WHEREAS, the most negative effects of outdoor lighting include:

- *Artificial sky glow*, the illumination of clouds and airborne particles, causing the sky to glow and preventing enjoyment of the night sky, astronomy and star gazing;
- *Light trespass*, the unwanted illumination caused by light from neighboring properties;
- *Glare,* when lighting causes discomfort or visual disability, potentially causing safety issues for pedestrians, bicyclists and the motoring public;
- *Circadian Interruption,* when lighting causes unwanted changes in the circadian cycles of living organisms;
- Impacts to flora and fauna, particularly those causing changes in habitat or behavior.

WHEREAS, the Ordinance is intended to allow reasonable uses of outdoor lighting for nighttime safety, utility, security, productivity, enjoyment and commerce; and

WHEREAS, the Ordinance will minimize glare, particularly in and around public rights-of-way; and reduce visual discomfort and improve visual acuity over large areas by avoiding "light islands" and "spotlighting" that result in reduced visual perception in areas adjacent to either the source of the glare or the area illuminated by the glare; and

WHEREAS, the Ordinance will minimize light trespass, so that each owner of property does not cause unreasonable light spillover to other property; and

WHEREAS, the Ordinance will assist to curtail the degradation of the nighttime environment and the night sky and is designed to minimize the negative effects of outdoor lighting, and promote good lighting practices which supports community livability; and

WHEREAS, good outdoor lighting will protect the natural environment, including wildlife, from the damaging effects of night lighting from human sources; and

WHEREAS, to date, there have been 13 Planning Commission work sessions on this topic (October 12, 2005; June 14, 2006; October 11, 2006; October 23, 2006; November 8, 2006; February 14, 2007; March 14, 2007; April 11, 2007; September 12, 2007; October 10, 2007; November 14, 2007; January 9, 2008 and February 13, 2008), two of which were joint work sessions with the DRB, one which included a tour of existing projects; and

WHEREAS, the City Council conducted a worksession on this matter on March 3, 2008; and

WHEREAS, after conducting a duly noticed public hearing on March 12, 2008 and soliciting public input, which there was none, the Planning Commission forwarded a unanimous recommendation of approval of the Outdoor Lighting Ordinance to the City Council; and

NOW, THEREFORE, THE CITY OF WILSONVILLE ORDAINS AS FOLLOWS:

Section 1. The Wilsonville Planning and Land Development Ordinance (Chapter 4 of the Wilsonville Code), Section 4.001 Definitions, is hereby amended by adding the following definitions:

24. Artificial Sky Glow. The brightening of the night sky attributable to human made sources of light.

44. Building Official. The person holding the position of Building Official of the City of Wilsonville.

46. Candela. The unit of luminous intensity of a lighting source emitted in a given direction.

47. Canopy. A roof-like covering over an area, in or under which a lighting fixture is mounted.

55. Common Residential Areas.

- Areas shared in common by residents of buildings with three or more dwelling units, (i.e. common open space, play areas, trash receptacle areas, "common property" under a subdivision or partition declaration); and
- Three or more open off-street stripped parking spaces, either abutting or within 10 feet of each other and not separated by a wall or other physical barrier between the two parking spaces, designated or set aside for use by the three or more dwelling units, regardless of whether the parking space is assigned for exclusive use of each dwelling unit or non-exclusively used by three or more dwelling units, and are either commonly owned or were developed for the purpose of serving the parking needs of "multiple dwellings" or multiple attached single-family dwellings, as defined in the Development Code.

72. Curfew. A time each night after which certain electric illumination must be turned off or reduced in intensity.

95. Façade. The exterior wall or elevation of a building.

110. Foot Candle. The density of luminous flux (lumens) incident at a point on a surface having an area of one square foot.

114. Glare. Light that causes visual discomfort or disability, and the wattage and/or light distribution is excessive for the purposes for which the illumination is necessary.

118. Hardscape Permanent improvements to a site, including but not limited to, parking lots, driveways, streets, plazas, sidewalks, walkways, bikeways, abutments, stairs, ramps, and architectural features, such as fountains and sculptures.

126. House Side Shield. For fully shielded luminaires only, an internal shield designed and installed by the luminaire manufacturer that significantly attenuates candlepower in the back photometric hemisphere at all angles greater than 30 degrees relative to nadir.

128. IESNA. The Illuminating Engineering Society of North America (see www.iesna.com).

135. Landscape Lighting. Luminaires attached to structures, mounted on poles or otherwise, or at grade (luminaire not to exceed 3 feet above grade) and used solely for landscape rather than area lighting.

138. Light Source (or Lamp): The actual bulb or lamp that emits the light.

139. Light Trespass. Spill light that because of quantitative, directional, or spectral content causes light level at the property line that is greater than as provided on Table 4 of this Code.

141. Lighting System. One or more luminaires, together with associated wires, conduits and poles that constitute the illumination system on the parcel.

142. Lighting Zones. Specific allowances and limitations for lighting systems and fixtures as specified in this Ordinance.

155. Lumen. The unit of luminous flux: a measure of the amount of light emitted by a lamp.

156. Luminaire (or "Light Fixture"). A complete lighting unit consisting of one or more electric lamps, the lamp holder, reflector, lens, ballast, and/or other components and accessories.

157. Luminance. The amount of light emitted in a given direction from a surface by the light source or by reflection from a surface. The unit is candela per square meter.

158. Luminous Flux. A measure of the total light output from a source, the unit being the lumen.

173. Mounting Height. The vertical distance between the lowest part of the luminaire and the ground surface directly below the luminaire.

174. Multi-family housing. For purposes of this ordinance, multi-family housing is defined as a building or structure that contains three or more dwelling units used, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that are occupied for living purposes, apartment houses, condominiums, congregate residences, townhouses and similar non-transient dwellings.

175. Nadir. The downward direction; exactly vertical, directly below a luminaire.

190. Obtrusive Light. Glare and light trespass.

198. Ornamental or Accent Lighting. Outdoor lighting that is installed mainly or entirely for its decorative effect or to accent an object or a feature, rather than as an aid to visibility.

215. Photometric Test Report. A report by an independent testing laboratory or one certified by the National Institute of Standards and Technology (NIST) describing the candela distribution, shielding type, luminance, and other characteristics of a specific luminaire.

260. Shielding.

- Directional. A luminaire designed to be aimed or pointed.
- Fully Shielded. A luminaire emitting no more than 0.5 percent of its luminous flux above the horizontal plane, including any luminaire rated "full cut off" according to IESNA RP-8-01.
- Shielded. A luminaire emitting no more than 2 percent of its total luminous flux above the horizontal plane, including any luminaire rated "cutoff" according to IESNA RP-8-01.
- Partly Shielded. A luminaire emitting no more than 10 percent of its total luminous flux above the horizontal plane, including any luminaire rated "semi-cutoff" according to IESNA RP-8-01.
- Unshielded. A luminaire that may emit its flux in any direction.

297. Temporary Lighting. Lighting installed with temporary wiring and operated for less than 120 days in any calendar year.

Section 2: The Wilsonville Planning and Land Development Ordinance (Chapter 4 of the WC), is hereby amended by adding a new Section 4.199 as follows:

Section 4.199 OUTDOOR LIGHTING

Section 4.199.10	Outdoor Lighting In General.
Section 4.199.20	Applicability.
Section 4.199.30	Lighting Zones.
Section 4.199.40	Lighting Systems Standards for Approval.
Section 4.199.50	Submittal Requirements.
Section 4.199.60	Major Additions or Modifications.

Section 4.199.10. Outdoor Lighting In General.

(.01) Purpose: The purpose of this Code is to provide regulations for outdoor lighting that will:

A. Permit reasonable uses of outdoor lighting for nighttime safety, utility, security, productivity, enjoyment and commerce.

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

C. Minimize glare, particularly in and around public rights-of-way; and reduce visual discomfort and improve visual acuity over large areas by avoiding "light islands" and "spotlighting" that result in reduced visual perception in areas adjacent to either the source of the glare or the area illuminated by the glare.

D. Minimize light trespass, so that each owner of property does not cause unreasonable light spillover to other property.

E. Curtail the degradation of the nighttime environment and the night sky.

F. Preserve the dark night sky for astronomy and enjoyment.

G. Protect the natural environment, including wildlife, from the damaging effects of night lighting from human sources.

(.02) Purpose Statement as Guidelines: Declaration of purpose statements are guidelines and not approval criteria in the application of WC Section 4.199.

Section 4.199.20. Applicability:

(.01) This Ordinance is applicable to:

A. Installation of new exterior lighting systems in public **facility**, commercial, industrial and multi-family housing projects with common areas.

B. Major additions or modifications (as defined in this Section) to existing exterior lighting systems in public **facility**, commercial, industrial and multi-family housing projects with common areas.

(.02) Exemption. The following luminaires and lighting systems are EXEMPT from these requirements:

A. Interior lighting.

B. Internally illuminated signs.

C. Externally illuminated signs.

D. Temporary lighting for theatrical, television, and performance areas.

E. Lighting in swimming pools and other water features governed by Article 680 of the National Electrical Code.

F. Building Code required exit path lighting.

G. Lighting specifically for stairs and ramps.

H. Temporary and seasonal lighting provided that individual lamps are 10 watts or less.

I. Lighting required and/or regulated by the City (i.e. construction related activities), Federal Aviation Administration, U.S. Coast Guard or other Federal or State agency.

J. Single-family residential lighting.

K. Code Required Signs.

L. American flag.

M. Landscape lighting.

N. Lights approved by the City through an Administrative Review Temporary Use Permit process.

O. Public street lights.

P. ATM security lighting.

Section 4.199.30. Lighting Overlay Zones.

(.01) The designated Lighting Zone as indicated on the Lighting Overlay Zone Map for a commercial, industrial, multi-family or public **facility** parcel or project shall determine the limitations for lighting systems and fixtures as specified in this Ordinance.

A. Property may contain more than one lighting zone depending on site conditions and natural resource characteristics.

(.02) The Lighting Zones shall be:

A. LZ 0. Critical dark environments, sensitive wildlife areas and parks. This zone shall not be applied to areas zoned commercial, industrial, residential or agricultural.

B. LZ 1. Developed areas in City and State parks, recreation areas, SROZ wetland and wildlife habitat areas; developed areas in natural settings; sensitive night environments; and rural areas. This zone is intended to be the default condition for rural areas within the City.

C. LZ 2. Low-density suburban neighborhoods and suburban commercial districts, industrial parks and districts. This zone is intended to be the default condition for the majority of the City.

D. LZ 3. Medium to high-density suburban neighborhoods and districts, major shopping and commercial districts **as depicted on the Lighting Overlay Zone Map.**

E. LZ 4. Reserved for limited applications with special lighting requirements. This zone is appropriate for users who have unique site or operating circumstances that warrant additional light. This zone shall not be applied to residential or agricultural areas.

(.03) Modification of Lighting Zones.

A. The City Council may modify the designated Lighting Zones of one or more parcels if the City Council finds that the original Lighting Zone was in error, a change in circumstances has occurred warranting the change since the designation was established or the purposes of this section are better served.

B. The Development Review Board (DRB) may modify the designated Lighting Zones as part of the Stage II, Site Design Review Process if the DRB finds that the original Lighting Zone was in error, or a change in circumstances has occurred warranting the change since the designation was established or the purposes of this section are better served.

C. This ordinance establishes a Lighting Overlay Zone Map. The Planning Division shall maintain the current Lighting Overlay Zone Map.

Section 4.199.40. Lighting Systems Standards for Approval.

(.01) Non-Residential Uses and Common Residential Areas.

A. All outdoor lighting shall comply with either the Prescriptive Option or the Performance Option below.

B. Prescriptive Option. If the lighting is to comply with this Prescriptive Option, the installed lighting shall meet all of the following requirements according to the designated Lighting Zone.

a. The maximum luminaire lamp wattage and shielding shall comply with Table 1.

b. The total lighting power for the site shall be less than or equal to the allowed lighting power. The allowed lighting power shall be determined according to Table 2.

c. The maximum pole or mounting height shall be consistent with Table 3.

d. Each luminaire shall be set back from all property lines at least 3 times the mounting height of the luminaire:

i. Exception 1: If the subject property abuts a property with the same base and lighting zone, no setback from the common lot lines is required.

ii. Exception 2: If the subject property abuts a property which is zoned (base and lighting) other than the subject parcel, the luminaire shall be setback three times the mounting height of the luminaire, measured from the abutting parcel's setback line. (Any variance or waiver to the abutting property's setback shall not be considered in the distance calculation).

iii. Exception 3: If the luminaire is used for the purpose of street, parking lot or public utility easement illumination and is located less than 3 mounting heights from the property line, the luminaire shall include a house side shield to protect adjoining property.

iv. Exception 4: If the subject property includes an exterior column, wall or abutment within 25 feet of the property line, a luminaire partly shielded or better and not exceeding 60 lamp watts may be mounted onto the exterior column, wall or abutment or under or within an overhang or canopy attached thereto.

v. Exception 5: Lighting adjacent to SROZ areas shall be set back 3 times the mounting height of the luminaire, or shall employ a house side shield to protect the natural resource area.

C. Performance Option. If the lighting is to comply with the Performance Option, the proposed lighting design shall be submitted by the applicant for approval by the City meeting all of the following:

a. The weighted average percentage of direct uplight lumens shall be less than the allowed amount per Table 4.

b. The maximum light level at any property line shall be less than the values in Table 4, as evidenced by a complete photometric analysis including horizontal illuminance of the site and vertical illuminance on the plane facing the site up to the mounting height of the luminaire mounted highest above grade. The Building Official or designee may accept a photometric test report, demonstration or sample, or other satisfactory confirmation that the luminaire meets the shielding requirements **of Table 1**. Luminaires shall not be mounted so as to permit aiming or use in any way other than the manner maintaining the shielding classification required herein:

   i. Exception 1. If the property line abuts a public right-of-way, including a sidewalk or street, the analysis may be performed across the street at the adjacent property line to the right-of-way.

   ii. Exception 2. If, in the opinion of the Building Official or designee, compliance is impractical due to unique site circumstances such as lot size or shape, topography, or size or shape of building, which are circumstances not typical of the general conditions of the surrounding area. The Building Official may impose conditions of approval to avoid light trespass to the maximum extent possible and minimize any additional negative impacts resulting to abutting and adjacent parcels, as well as public rights-of-way, based on best lighting practices and available lighting technology.

c. The maximum pole or mounting height shall comply with Table 3.

D. Curfew. All prescriptive or performance based exterior lighting systems shall be controlled by automatic device(s) or system(s) that:

a) Initiate operation at dusk and either extinguish lighting one hour after close or at the curfew times according to Table 5; or

b) Reduce lighting intensity one hour after close or at the curfew time to not more than 50% of the requirements set forth in Table 2 unless waived by the DRB due to special circumstances; and

c) Extinguish or reduce lighting consistent with a) and b) above on Holidays.

The following are exceptions to curfew:

i. Exception 1: Building Code required lighting.

ii. Exception 2: Lighting for pedestrian ramps, steps and stairs.

iii. Exception 3: Businesses that operate continuously or periodically after curfew.

(.02) Special Permit for Specific Lighting Fixtures and Systems and When Exceeding Lighting Requirements.

A. This section is intended to apply to situations where more than normal foot candles are required due to a unique circumstance or use or where it is absolutely

essential to perform the proposed activities after dark. All special permits shall be reviewed by the DRB.

B. Upon issuance of a special permit by the Development Review Board (DRB), lighting systems not complying with the technical requirements of this Ordinance may be installed, maintained, and replaced for lighting that exceeds the maximums permitted by this Ordinance. This section is intended to be applied to uses such as sports lighting systems including but not limited to, sport fields and stadiums, such as baseball and football field lighting, tennis court lighting, swimming pool area lighting and prisons; other very intense lighting defined as having a light source exceeding 200,000 lumens or an intensity in any direction of more than 2,000,000 candelas; building façade lighting of portions of buildings over two stories high; and public monuments.

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

1. Is within Lighting Zone 3 or above.
2. Has been designed to minimize obtrusive light and artificial sky glow, supported by a signed statement from a registered civil or electrical engineer describing the mitigation measures. Such statement shall be accompanied by calculations indicating the light trespass levels (horizontal and vertical at ground level) at the property line.
3. Will not create excessive glare, sky glow, or light trespass beyond that which can be reasonably expected by application of best lighting practices, and available technology.
4. Provides appropriate lighting curfew hours based on the use and the surrounding areas.

D. The DRB may impose conditions of approval to mitigate any negative impacts resulting to the abutting parcel, based on best lighting practices and available lighting technology.

E. The City may charge a review fee and may, at the Building Official's option, employ the services of a qualified professional civil or electrical engineer to review such submittals and the cost thereof shall be an additional fee charged to the applicant.

Section 4.199.50. Submittal Requirements.

(.01) Applicants shall submit the following information as part of DRB review or administrative review of new commercial, industrial, multi-family or public **facility** projects:

A. A statement regarding which of the lighting methods will be utilized, prescriptive or performance, and a map depicting the lighting zone(s) for the property.

B. A site lighting plan that clearly indicates intended lighting by type and location. For adjustable luminaires, the aiming angles or coordinates shall be shown.

C. **For each luminaire type,** ~~D~~drawings, **cut sheets** or other documents containing specifications for the intended lighting including but not limited to, luminaire description, mounting, mounting height, lamp type and manufacturer, lamp watts, ballast, optical system/distribution, and accessories such as shields.

~~D. For each luminaire type, a manufacturer's cut sheet matching the specifications above.~~

~~E.~~**D.** Calculations of allowed lighting power and actual lighting power demonstrating compliance with power limits. ~~Such calculations shall indicate the Lighting Zone.~~

~~F.~~**E.** Lighting plans shall be coordinated with landscaping plans so that pole lights and trees are not placed in conflict with one another. The location of lights shall be shown on the landscape plan. Generally, pole lights should not be placed within one pole length of landscape and parking lot trees.

~~G.~~**F.** Applicants shall identify the hours of lighting curfew.

~~H. All lighting plans shall be prepared by a qualified licensed engineer.~~

(.02) **In addition to the above submittal requirements,** Applicants using the Prescriptive Method shall submit the following information as part of the permit set plan review:

A. A site lighting plan (items 1 A-~~G~~ **F**, above) which indicates for each luminaire the 3 mounting height line to demonstrate compliance with the setback requirements. For luminaires mounted within 3 mounting heights of the property line the compliance exception or special shielding requirements shall be clearly indicated.

(.03) **In addition to the above submittal requirements,** Applicants using the Performance Method shall submit the following information as part of the permit set plan review:

A. Site plan showing horizontal isocandle lines, or the output of a point-by-point computer calculation of the horizontal illumination of the site, showing property lines and light levels immediately off of the subject property.

B. For each side of the property, the output of a point-by-point vertical footcandle calculation showing illumination in the vertical plane at the property line from grade to at least 10 feet higher than the height of the tallest pole.

C. Lighting plans shall be prepared by a qualified licensed engineer.

(.04) **In addition to the above applicable submittal requirements,** Applicants for Special Permits shall submit ~~all of the applicable items above and~~ the following to the DRB for review:

A. Tabulation of International Engineering Society of North America (IESNA) lighting recommendations for each task including area illuminated, recommended illumination level, actual maintained illumination level, and luminaires used specifically to achieve the indicated criteria.

B. Lighting plans shall be prepared by a qualified licensed engineer.

(.05) For all calculations, the following light loss factors shall be used unless an alternative is specifically approved by the City:

Metal halide	0.6
High pressure sodium	0.8
Compact fluorescent	0.7
Full size fluorescent	0.75
Incandescent	0.9
Halogen	0.95
Other	As approved

Section 4.199.60. Major Additions or Modifications to Pre-Existing Sites.

(01.) Major Additions. If a major addition occurs on a property, all of the luminaires on the site shall comply with the requirements of this Section. For purposes of this sub-section, the following are considered to be major additions:

A. Additions of 50 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 [effective date of this Ordinance].

B. Modification or replacement of 50 percent or more of the outdoor lighting luminaries' within a 5-year timeframe existing as of [effective date of this Ordinance].

Table 1: Maximum Wattage And Required Shielding

Lighting Zone	Fully Shielded	Shielded	Partly Shielded	Unshielded
LZ 0	55	None permitted	None permitted	None permitted
LZ 1	70	20	13	Low voltage landscape lighting 50 watts or less
LZ 2	100	35	39	Low voltage landscape lighting 50 watts or less
LZ 3	250	100	70	Landscape and facade lighting 100 watts or less; ornamental lighting on private streets of 39 watts and less
LZ 4	450	150	150	Landscape and facade lighting 250 watts or less; ornamental lights on private streets and lanterns 70 watts or less; marquee lighting not employing medium based lamps

Table 2: Allowed Lighting Power Density

(watts per square foot (w/ft²) unless otherwise noted)

Determine the allowed lighting power for each application by multiplying the area in plan by the allowed lighting power density for the application. Only one lighting power allowance can be claimed for an **allowed** area. The actual lighting power must be equal to or less than the sum of the allowed lighting power for all applications.

Lighting Application	Allowed Area	LZ 0	LZ 1	LZ 2	LZ 3	LZ 4
Hardscape	Paved area plus 5 feet of the perimeter of adjacent unpaved land. Includes planters and landscaped areas less than 10 feet wide that are enclosed by hardscape on at least three sides	0.03	0.05	0.07	0.09	0.20
Building entrances*	Per Door (stated values are watts, not watts per square foot).	13	18	26	32	70
Building entry, drive-up sales, and general use canopies	Drip line area under canopy.	Not allowed	0.10	0.20	0.40	0.70
Vehicle Service Station Canopy	Drip line area under canopy	Not allowed	0.30	0.60	1.20	2.40
Outdoor Sales, Service or Industrial Lot	Portion of uncovered hardscape used exclusively for display of vehicles or other merchandise for sale, for the service of vehicles, aircraft or watercraft, or for exterior manufacturing.	Not allowed	0.25	0.45	0.90	1.80
Ornamental Lighting	Entire site	Not allowed	Not allowed	0.010	0.020	0.04
Building Facade	**Square foot of illuminated facade**	**0.00**	**0.00**	**0.18**	**0.35**	**0.50**
Landscape Lighting	Landscaped area	Exempt	Exempt	Exempt	Exempt	Exempt
ATM Security Lighting	Within 5 feet of ATM facility	Exempt	Exempt	Exempt	Exempt	Exempt
Flagpole lighting	Illuminating flags on flagpole	Exempt	Exempt	Exempt	Exempt	Exempt

***In addition to area lighting, an additional allowance per door is permitted.**

Table 3: Maximum Lighting Mounting Height In Feet			
Lighting Zone	Lighting for private roads, driveways, parking, bus stops and other transit facilities	Lighting for walkways, bikeways, plazas and other pedestrian areas	All other lighting
LZ 0	20	8	4
LZ 1	25	12	4
LZ 2	40	18	8
LZ 3	40	18	16
LZ 4	Height limit to be determined by Special Use Permit Only		

Lighting mounted onto buildings or other structures shall not exceed a mounting height greater than 4 feet higher than the tallest part of the building or structure at the place where the lighting is installed, nor higher than 33.33 percent of the horizontal distance of the light from the nearest property line, whichever is less.

Table 4: Performance Method			
Lighting Zone	Maximum percentage of direct uplight lumens	Maximum Light Level at Property Line	
		Horizontal plane at grade (foot candles - fc)	Vertical plane facing the site in question, from grade to mounting height of highest mounted luminaire (foot candles – fc)
LZ 0	0	0.01 fc	0.02 fc
LZ 1	1%	0.05 fc	0.1 fc
LZ 2	5%	0.2 fc	0.4 fc
LZ 3	10%	0.4 fc	0.8 fc
LZ 4	20%	0.8 fc	1.6 fc

Table 5: Curfew	
Lighting Zone	Curfew Time
LZ 0	8:00 PM (2000 hours)

LZ 1	
LZ 2	10:00 PM (2200 hours)
LZ 3	Midnight (2400 hours)
LZ 4	

Section 3. Findings. In support of the foregoing changes, the City Council hereby adopts as findings of fact and conclusions of law the staff report on this matter dated April 28, 2008 attached hereto and incorporated herein as Exhibit A.

Section 4. The City Council hereby adopts the Lighting Overlay Zone Map contained in the above described staff report (Map dated 'May 2008').

Section 5. Severability: In the event any provisions of this Ordinance shall be held invalid or unenforceable by any court of competent jurisdiction, such holding shall not invalidate or render unenforceable any other provision hereof.

Section 6: The City Council hereby authorizes and directs the City Recorder to make any conforming changes necessary to amend Wilsonville Code in keeping with the adoption of these revisions.

SUBMITTED to the Wilsonville City Council and read for the first time at a regular meeting thereof on the 5th day of May, 2008, at the hour of 7:00 p.m. at the Wilsonville City Hall, 29799 SW Town Center Loop East, Wilsonville, Oregon, and scheduled for second reading on the 2nd day of June, 2008, commencing at the hour of 7:00 p.m. at the Wilsonville City Hall.

Sandra C. King

Sandra C. King, MMC, City Recorder

ENACTED by the City Council on the 2nd day of June, 2008, by the following votes:

YES: -5- NO: -0-

Sandra C. King

Sandra C. King, MMC, City Recorder

Illuminating
ENGINEERING SOCIETY

ida
INTERNATIONAL
DARK-SKY
ASSOCIATION

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

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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	IES
Co-Chair: Jim Benya	Naomi Miller
Co-Chair: Nancy Clanton	Cheryl English
Leslie Lipstein	Denis Lavoie
Leo Smith	Eric Gibson
Michael Mutmansky	

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/Recylcing 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:

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 - 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 residentialdistricts.** 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.

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.

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.

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 hard-scape 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			
Lamp Descriptions	*QTY*	*Initial Luminaire Lumens*	*Total*
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	
Site Description	Light Commercial
Lighting Zone	LZ-2
Hardscape Area (SF)	100,000
Allowed Lumens per SF of Hardscape (Table B)	2.5
Site Allowed Total Initial Lumens (lumens per SF X hardscape area)	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.

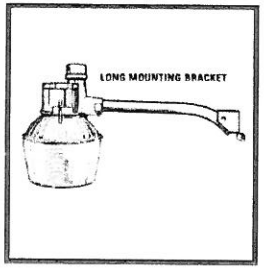
Exception:

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.

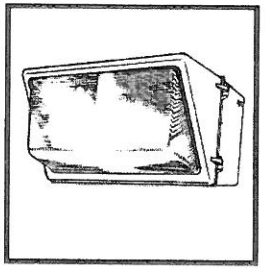
PRESCRIPTIVE METHOD (cont.) - User's Guide

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 uminaire, 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.

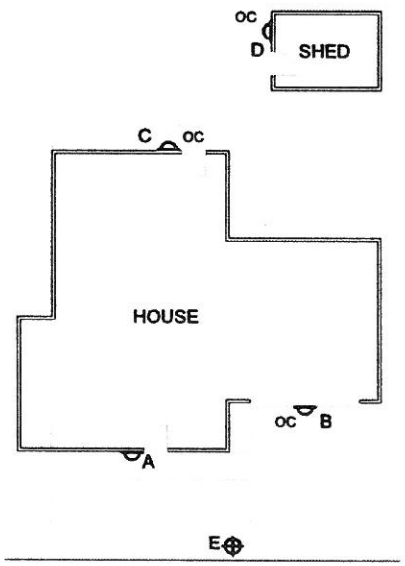
Exceptions

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 Luminiare 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 lumen 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 Cubs)

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:

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.

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 (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**

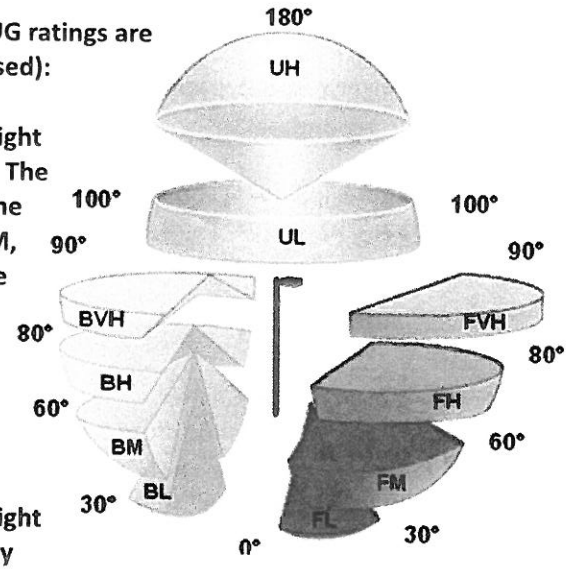
*For property lines that abut public walkways, bikeways, plazas, and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property 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 encourages 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 il-luminated 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

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.

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**

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.

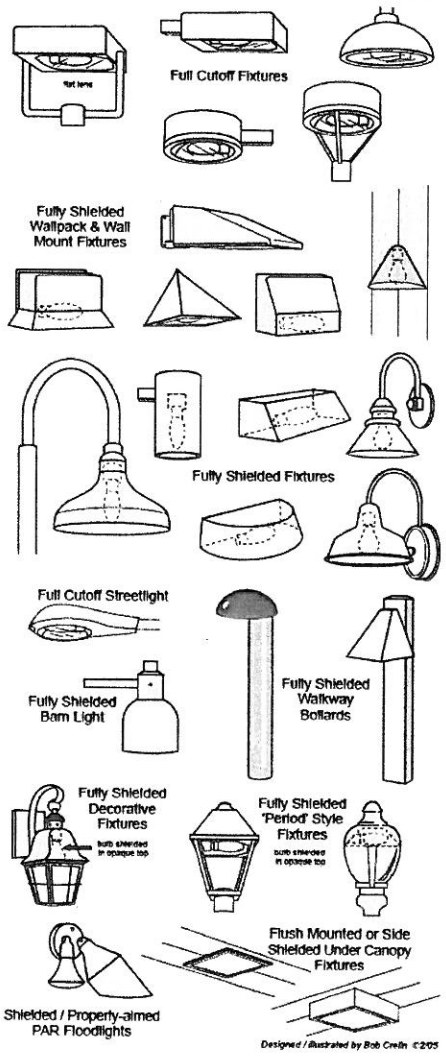
Most city attorneys will not accept references to outside sources regardless of credibility, such as the IES Handbook. Thus as a general rule, a definition for an unfamiliar term (e.g. lumens) must be added by the adopting ordinance.

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

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.

Examples of Fully Shielded Luminaires



X. DEFINITIONS - Ordinance Text

Emergency conditions	Generally, lighting that is only energized during an emergency; lighting fed from a backup power source; or lighting for illuminating the path of egress solely during a fire or other emergency situation; or, lighting for security purposes used solely during an alarm.
Footcandle	The unit of measure expressing the quantity oflight 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 in both the Prescriptive Method and Performance Methods. Refer to Hardscape definition.

X. DEFINITIONS - Ordinance Text

Hardscape Perimeter	The perimeter measured in linear feet is used to calculate the Total Site Lumen Limit in the Performance Method. Refer to Hardscape definition.
IDA	International Dark-Sky Association.
IESNA	Illuminating Engineering Society of North America.
Impervious Material	Sealed to severely restrict water entry and movement
Industry Standard Lighting Software	Lighting software that calculates point-by-point illuminance that includes reflected light using either ray-tracing or radiosity methods.
Lamp	A generic term for a source of optical radiation (i.e. "light"), often called a "bulb" or "tube". Examples include incandescent, fluorescent, high-intensity discharge (HID) lamps, and low pressure sodium (LPS) lamps, as well as light-emitting diode (LED) modules and arrays.
Landscape Lighting	Lighting of trees, shrubs, or other plant material as well as ponds and other landscape features.
LED	Light Emitting Diode.
Light Pollution	Any adverse effect of artificial light including, but not limited to, glare, light trespass, sky-glow, energy waste, compromised safety and security, and impacts on the nocturnal environment.

X. DEFINITIONS - Ordinance Text

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.
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.
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.

***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

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 footcandle.
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 land-scaping, and installed for aesthetic effect.

X. DEFINITIONS - Ordinance Text

Ornamental Street Lighting	A luminaire intended for illuminating streets that serves a decorative function in addition to providing optics that effectively deliver street lighting. It has a historical period appearance or decorative appearance, and has the following design characteristics: · designed to mount on a pole using an arm, pendant, or vertical 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.

X. DEFINITIONS - Ordinance Text

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 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.
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.

X. DEFINITIONS - Ordinance Text

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 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

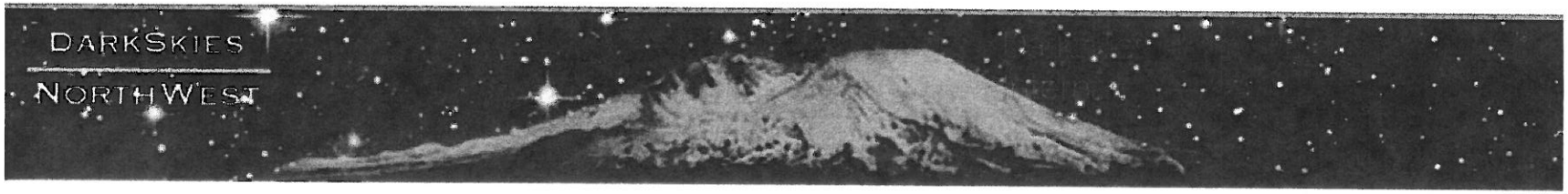
F. Light Shielding and Distribution

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



Northwest chapter of the International Dark-Sky Association http://darksky.org.

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08 Feb 2010

City of Sisters, Oregon

ORDINANCE NO. 251 H

AN ORDINANCE OF THE CITY OF SISTERS, OREGON, AMENDING CHAPTER 15.02 OF THE SISTERS MUNICIPAL CODE AS SET OUT IN ORDINANCE NO. 251, THE ZONING ORDINANCE OF THE CITY OF SISTERS, AND REPEALING ALL ORDINANCES OR PORTIONS OF ORDINANCES INCONSISTENT HEREWITH.

WHEREAS, The City of Sisters has adopted a Zoning Ordinance, Ordinance No. 251, which is codified in the Sisters Municipal Code as Chapter 15.02; and

WHEREAS, the City of Sisters Planning Commission and City Council has determined that Chapter 15.02 of the Sisters Municipal Code as set out in Ordinance No. 251 must be modified in certain respects;

NOW, THEREFORE, THE CITY OF SISTERS ORDAINS AS FOLLOWS:

15.02.310 Supplementary Provisions Subsection 11. Outdoor Lighting shall be added to read as follows:

15.02.310.11 Outdoor Lighting.

A. Purpose. The purpose of this supplementary provision is to make the lighting used for residential, commercial and public areas appropriate to the need and to keep the light from shining offsite onto adjacent public rights of way or private properties. Further, it is to encourage, through regulation of type, kinds, construction, installation, and uses of outdoor electrically powered illuminating devices, lighting practices and systems to conserve energy without decreasing safety, utility, security, and productivity while enhancing nighttime enjoyment of property within the City.

B. Requirements for installation. Except as exempted by provisions of this ordinance, as of the date of adoption, the installation of outdoor lighting fixtures shall be subject to the provisions of this ordinance.

C. Shielding. All nonexempt outdoor lighting fixtures shall have directed shielding so as to prevent direct light from the fixture from shining beyond the property limits where the fixture is installed. This means that a person standing at the adjacent property line would not see the light emitting source.

D. Prohibitions.

(1). Laser Source Light. The use of laser source light or any similar high intensity light when projected beyond property lines is prohibited.

(2). Searchlights. The operation of searchlights for purposes other than public safety or emergencies is prohibited.

E. Exemptions.

(1). Nonconformance.

A. Outdoor light fixtures lawfully installed prior to and operable prior on the effective date of the requirements codified in this ordinance are exempt from all such requirements except as follows:

(a). All replacement of outdoor lighting fixtures, as of the date of adoption, shall be subject to the provision of this ordinance.

(b). Until a date five years after the date of the adoption of this ordinance.

B. Fossil Fuel Light. All outdoor light fixtures producing light directly by the combustion of natural gas or other fossil fuels are exempt from the requirements of this ordinance.

(2). Airport operations lighting and aircraft navigational beacons as established by the Federal Aviation Administration are exempt from these provisions. All other airport outdoor lighting must conform with this ordinance.

(3). Lights of less than 15 watts used for holiday decorations for no more than 45 days are exempt from the requirements of this ordinance.

(4). Carnivals and Fairs that require the use of temporary outdoor lighting fixtures are exempt except that permanent installations at dedicated sites must conform to the requirements of this ordinance.

(5). Lighting for U.S. flags properly displayed.

(6). Temporary exemptions to the requirements of this ordinance for up to five days per calendar year.

(7). Construction lighting necessary for an allowed use are exempt except that permanent installations at dedicated sites must conform to the requirements of this ordinance.

(8). Individual light fixtures with lamps of less than 40 watts.

Excerpt from Dundee's Public Works Design Standards.
For sample use only - may not be current standards.

DUNDEE, OR

PWDS APPENDIX H
Lighting Standards & Dark Sky/Outdoor Lighting Requirements

H.1 GENERAL

a. Improperly designed or installed luminaires may cause over lighting and uneven lighting patterns, resulting in light pollution and wasted resources, and can reduce the ability to see clearly at night, therefore creating a safety hazard, and

b. The people who live in and near Dundee value the natural environment, including the beauty, and visibility of the night sky, and desire to protect it as it adds to the rural character, quality of life and economic well being of the City.

c. The following Lighting Standards & Dark Sky/Outdoor Lighting Requirements will be cited routinely in the text as the "Standards."

d. Wherever specific supplementary standards are indicated (ie. IESNA _____), it shall be understood to mean the latest revision thereof.

e. In interpreting these Standards, it is understood that: (1) if the context so requires: (a) the singular pronoun shall be taken to mean and include the plural pronoun; (b) the masculine pronoun shall be taken to mean the feminine and the neuter pronoun; and (2) all captions used therein are intended solely for the convenience of reference and shall in no way limit any of the provisions of these Standards.

f. In the case of conflicts between the text of these construction standards and the standard details in the PWDS, or between the provisions of these standards and the PWDS, the more stringent as determined by the Building Inspector, City Administrator and/or Supervisor of Public Works shall apply.

H.2 DEFINITIONS AND TERMS

a. Unless specifically defined below, words or phrases used in these Standards shall be interpreted so as to give them the meaning they have in common usage and to give these Standards its most reasonable application.

1) Area light: A luminaire equipped with a lamp that produces over one thousand eight hundred (1,800) lumens. Area lights include, but are not limited to, streetlights, parking lot lights, yard lights, floodlight and walkway path lighting.

2) Average horizontal footcandle: The average level of illuminance for a given situation measured at ground level with the light meter placed parallel to the ground.

3) Building Official: The City of Dundee Building Official.

4) Canopy lighting: Commercial lighting fixtures typically used for service station or similar canopies.

5) Cut-off fixture: A fixture that provides a cutoff (shielding) of the emitted light.

6) Drop (Sag) lens: A light fixture which includes a reflector (mirror) or refractor (lens), which drops or sags below the fixture itself, producing light pollution and causing light to be directed above a 90 degree angle (see Lighting Appendix A).

7) Eighty-five (85) degree cut-off type of luminaries: Luminaires that do not allow light to escape above an eighty-five (85) degree angle measured from a vertical line from the center of the lamp extended to the ground (see Lighting Appendix B).

8) Exterior lighting: Temporary or permanent lighting that is installed, located or used in such a manner to cause light rays to shine outdoors. Luminaires that are indoors that are intended to light something outside is considered exterior lighting for the purpose of these Standards.

9) Flood light: A lamp that produces up to one thousand eight hundred (1,800) lumens with a beam spread greater than 110 degrees that is designed to flood an area with light.

10) Footcandle (fc): The American unit used to measure the total amount of light cast on a surface (illuminance). One footcandle is equivalent to the illuminance produced by a source of one candle at a distance of one foot. For example, the full moon produces .01 f.c as measured with a light meter. One footcandle, the British Unit, is approximately equal to ten (10) lux, the metric unit used to measure illuminance.

11) Full cut-off luminaries: A luminaire designed and installed where no light is emitted at or above a horizontal plane running through the lowest point on the luminaire lamp, reflector, refractor, or glass cover.

12) Fully shielded: A luminaire incorporating a solid barrier (the shield), which permits no light to escape through the barrier or shine above a horizontal plane through the luminaires' lowest lightemitting part.

13) Fully shielded spotlight: A fixture or lamp designed to light only a small area and having a beam spread of less than 110 degrees. The luminaire incorporates a solid barrier (the shield), which permits no light to escape through the barrier or shine above a horizontal plane through the luminaires lowest light-emitting part.

14) Illuminance: The amount of light falling on any point of a surface measured in footcandles /lux.

15) IESNA: Illuminating Engineering Society of North America (IES or IESNA). The professional society of lighting engineers.

16) IESNA Recommended Practices: The current publications of the IESNA setting forth illuminance levels.

17) Lamp: The generic term for an artificial light source, to be distinguished from the whole assembly (see Luminaire). Commonly referred to as "bulb".

18) Light: The form of radiant energy acting on the retina of the eye to make sight possible.

19) Light pollution: Artificial light emitted from a premises so as to be prejudicial to health, cause a safety hazard or create a nuisance.

20) Lighting: Any or all parts of a luminaire that function to produce light.

21) Lumen: The unit used to quantify the amount of light energy produced by a lamp at the lamp. Lumen output of most lamps is listed on the packaging. For example, a 60-watt incandescent lamp produces 900 lumens while a 55-watt low-pressure sodium lamp produces 8000 lumens.

22) Luminaire: A complete lighting unit, consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power. When used, includes ballasts and photocells. Commonly referred to as "fixture".

23) Luminance: At a point and in an given direction, the luminous intensity of the given direction produced by an element of the surface surrounding the point divided by the area of the projection of the element on a plane perpendicular to the given direction. Units: Candelas per unit area. The luminance is the perceived brightness that we see the visual effect of the illuminance, reflected, emitted or transmitted from a surface.

24) Measurement:

1. Lamp output
    a. Total output: Measurement of total output is in lumens. This should be understood to be the initial lumens value for the lamp.
    b. Illuminance: Measurements of illuminance are expressed in initial footcandles.

c. In measuring illuminance, the light detector should be pointed directly at the light source or sources from ground level. The intervening light path should be free of obstruction.

25) Outdoor light fixture: An outdoor illuminating device, outdoor lighting or reflective surface, luminous tube, lamp or similar device, permanently installed or portable, used for illumination, decoration, or advertisement. Such devices shall include, but are not limited to lights used for:

1. parking lot lighting
2. roadway lighting
3. buildings and structures
4. recreational areas
5. landscape lighting
6. billboards and other signs
7. product display area lighting
8. building or structure decoration
9. building overhangs and open canopies

26) Nadir: The point exactly downward from a luminaire.

27) Partially shielded: A luminaire incorporating a translucent barrier concealing the lamp but allowing some light to pass through. A light fixture with a partial shield around the lamp on the top and or sides.

28) Recessed light: A luminaire, no part of which extends beyond the exterior plane of a structure or portion of a structure in which it is installed.

29) Replacement: Replacement of a pre-existing outdoor light fixture.

30) Shielded: A luminaire constructed so light is projected below a horizontal plane running through the lowest point of the fixture where light is emitted, the lamp is not visible from the elevation of the luminaire, and no light is emitted from its sides. Also considered a full cut-off fixture.

31) Skyglow: The overhead glow from light emitted sideways and upwards. Skyglow is caused by the reflection and scattering of light by dust, water vapor and other particles suspended in the atmosphere. Skyglow reduces one's ability to view the night sky.

32) Spotlight: A fixture or lamp designed to light only a small area and having a beam spread of less than 110 degrees.

33) Stray light: Emitted light that falls away from the area where it is needed or wanted.

34) Temporary lighting: Lighting that is intended to be used for a special event for seven days or less.

35) Uplighting: Fully shielded lighting that is directed in such a manner as to shine light rays above the horizontal plane.

H.3 OUTDOOR LIGHTING

a. Purpose: The purposes of the outdoor lighting standards are to:

1) Provide adequate light for safety and security;

2) Promote efficient and cost effective lighting and to conserve energy;

3) Minimize light pollution, glare, and nuisance light sources;

4) Consistently and evenly illuminate street area, while minimizing blind spots and shadows created by harsh light;

5) Prevent inappropriate, poorly designed or installed outdoor lighting;

6) Encourage quality lighting design, especially light fixture shielding;

7) Provide an environmentally sensitive nighttime environment that protects and reclaims the ability to view the night sky.

b. Scope: These Standards shall apply to all new single family residential, multifamily residential, commercial, industrial and public outdoor lighting. Nothing in these Standards shall apply to any residence existing at the time of the adoption of these Standards.

1) Conformance under Development or Building Permit: Compliance with the requirements of these Standards shall be required for all new or multi-family residential (triplex or larger), commercial, industrial and public development for which a development or building permit is required.

2) Replacement Fixtures: When an existing fixture (excluding replacement bulbs) is replaced in any multi-family residential, commercial, industrial or public development, the replacement fixture shall meet the requirements of these Standards.

3) Nonconforming Uses or Structures: If a nonconforming use or structure has been abandoned for more than twelve months, or if the nonconforming use of the structure changes, all outdoor lighting on the property must be brought into full

compliance before reoccupation or reuse.

4) Agency Compliance: All governmental agencies, federal state or county, which operate within the Dundee City Limits shall comply with the requirements of these Standards, except as otherwise provided by state or federal law.

a) Public Facilities: All exterior lighting fixtures at City owned facilities within the City of Dundee must be brought into compliance with these Standards within two years of adoption of these standards regardless of whether the lighting in question was already in place. This requirement does not apply to street lights owned by the City or utility.

b) Power Supplier and Lighting: No street light that lights the public right-of-way may be installed and energized without prior approval by the City Administrator or his/her designee, after the effective date of these Standards.

c. Design Standards: No person shall install any exterior lighting that fails to meet the requirements of these Standards:

1) Shielding and Orientation:

a) Shielding: Outdoor light fixtures shall be shielded or recessed, except as otherwise provided in these Standards.

b) Orientation: Outdoor light fixtures shall be directed downward, and away from adjacent residential properties and public rights-of-way, except as provided in these Standards.

2) Use of High Pressure Sodium Lamps: Full cut-off high pressure sodium lamps, not exceeding a maximum lumen rating of 16,000 lumens, may be used in outdoor storage areas and other similar areas not accessible to the general public.

3) Landscaping Lighting. Lighting not exceeding 100 watts or 1600 lumens may be directed at specific landscape features within the property boundaries of the site. Lighting shall be substantially confined to the intended plant(s) or other landscape features.

4) Upward Lighting: Upward lighting is permitted only if the light:

a) does not exceed 1600 lumens, or in the case of a flag pole, one luminaire not exceeding 3500 lumens;

b) except for a flag pole, is prevented from projecting into the sky by walls,

eaves, or overhands, and

c) is mounted as close as possible to the ground and to the feature lit.

5) Unshielded Lighting Activated by a Motion Sensor: Lighting not to exceed 1650 lumens may be left unshielded if;

a) The light will go on only when activated;

b) Goes off within five minutes of motion cessation; and

c) Is not be activated by any movement or activity located on adjacent property except by express permission of the adjacent property owners(s);

6) Free Standing "Lamp Post" Luminaries: Luminaires with light output greater than 60 watts (900 lumens) or clusters of lights with more than 3500 lumens must be fully shielded. Lamp post fixtures with light outputs less than 55 watts must be partially shielded.

7) Standards for Lights Within or Adjacent to Residential Zoning Districts, Residential Uses or Public Right-Of-Ways: Any light fixture (except public street lights or single family residential structure lights) in a residential zone or existing residential use areas, or within ten feet of a public right-of-way shall be:

a) Classified as a full cutoff IESNA Type II, III or IV light fixture [but not Type V]; and

b) Shielded on and aimed away from, the side closest to the nearest property line, residential structure, or public right-of-way.

8) Canopy Lighting: Lighting fixtures mounted under canopies shall be mounted downward and installed such that that bottom of the light fixture is recessed or mounted flush with the bottom surface of the canopy. A full cut off light fixture may project below the underside of a canopy. No lighting except that permitted by the sign ordinance shall be permitted on top or sides of a canopy.

9) Decorative Commercial Lighting: Decorative festoon type lights used in a commercial setting is permitted, limited to small individual bulbs on a string where spacing of bulbs is not closer than three inches and where output per bulb is no greater than 7 watts or 50 lumens. Blinking, flashing, moving, revolving, flickering, modulating, and chasing lights are permitted only during the seasonal period.

10) Area Lighting: All area lights shall be full cut-off luminaires. Area lights include

but are not limited to streetlights, parking lot lights, yard lights, floodlights, and walkway path lighting.

11) Full Cut Off Fixtures: Full cut off fixtures shall be installed in a horizontal position as designed. Sag lens lighting fixtures are not permitted.

12) Floodlighting: Floodlights with external shielding shall be angled provided that no light is directed above a twenty-five (25) degree angle measured from the vertical line from the center of the light extended to the ground, and only if the luminaire does not cause light pollution. Floodlights without directional shielding are not permitted.

13) Radio Towers: Lighting radio, communication and navigation towers that require lights shall have dual lighting capabilities. FAA requirements for tower lighting are applicable but should not be exceeded.

14) Maximum Light Standards: No person shall operate or install any device which produces light in excess of the levels specified in these Standards. In the event an applicant utilizes fixtures producing light at the highest level permitted for a specific use area, such lighting shall be confined to the particular use area.

15) Illuminance levels for parking lots, sidewalks, and other walkways affected by side-mounted building lights, and freestanding sidewalk lights and pathways shall not exceed illuminance levels listed in the most current IESNA Recommended Practices. [See References: IESNA RP-33-99 Lighting for Exterior Environments; ISENA RP-20-98 Lighting for Parking Facilities; IESNA DG 5-94 Recommended Lighting for Walkwalks and Class I Bikeways. See PGE Dark Sky Friendly Fixture Recommendations]

16) Streetlights shall be high-pressure sodium, unless otherwise determined that another type is more efficient. Streetlights along residential streets (excluding intersections) shall be limited to one hundred (100) watt high-pressure sodium (hps) fixtures. Street lights along nonresidential streets or at intersections shall be limited to one hundred fifty (150) watts hps fixtures, except that lights at major intersections on state highways shall be limited to two hundred fifty (250) watts hps. If a light type other than high-pressure sodium is permitted, then the output of the alternate light type shall not exceed the equivalent hps fixture. Illuminance levels shall conform with the most current IESNA RP-8-00 Roadway Lighting.

17) Streetlights used on residential streets (excluding intersections) may not exceed a nominal twenty five (25) feet in height. Streetlights used on collector streets or intersections may not exceed a nominal thirty (30) feet in height. Streetlights on other rights-of-way may exceed this 25 feet with the recommendation by the

Planning Commission, and only with a finding that exceeding 25 feet is necessary to protect the safety of the residents of Dundee.

18) Freestanding Area Luminaires: All freestanding area lights within a residential zone, except street lights, shall conform to the following pole height and distance to the property line requirements.

a) Height: The post must be at least six feet from the property line, and conform to the following height requirements:

Pole Height	Distance to Property Line
25'	16 feet
8'	15 feet
7'	12 feet
6'	9 feet
5'	6 feet

19) Parking lot light poles shall not exceed 25 feet in height. Seventeen (17) feet is the recommended standard.

20) Luminaires used for playing fields shall be exempt from the height restriction provided all other provisions of these Standards are met and the light is used only while the field is in use.

d. Prohibitions: The following types of outdoor lighting fixtures are prohibited in any new or replacement installation:

1) The installation of any mercury vapor light fixture or lamp for use as outdoor lighting is prohibited. This does not apply to any replacement bulbs for these fixtures.

2) Search lights, laser source lights or any similar high intensity light for outdoor advertising or entertainment is prohibited except in emergencies by police and fire personnel.

3) Low pressure sodium lamps.

4) Blinking, flashing, moving, revolving, flickering, changing intensity or color, and chase lighting, except light for temporary seasonal displays and light for public safety.

5) Any light fixture that may be confused with or construed as a traffic control device.

6) Upward lighting except as otherwise provide for in these Standards.

7) Drop (sag) lens lighting fixtures are not permitted.

e. Exceptions: These Standards shall not apply to the following types of exterior lighting:

1) Fossil Fuel Light: Fossil fuel light produced directly or indirectly by the combustion of a natural gas or other utility-type fossil fuels is exempt from the provisions of these Standards. All Fossil fuel lighting must include an opaque top so as to minimize skyglow.

2) Ornamental Lighting: Low wattage (24 volt or less) ornamental landscape lighting fixtures, and solar operated light fixtures having self-contained rechargeable batteries, where any single light fixture does not exceed 500 lumens.

3) Police, Fire Department & Public Works and Other Emergency Services Lighting: Vehicular lights and all temporary emergency lighting needed by the Fire and Police Departments, Public Works, or other emergency services shall be exempt from the requirements of these Standards.

4) Recreational Lighting: Luminaires used for sports facilities and playing fields shall be exempt from the height restriction provided all other provisions of these Standards are met and the light is used only while the field is in use. Illumination for outdoor recreation facilities should be shielded, or be so designed or provided with full cut-off capabilities, so as to minimize uplight, light pollution and glare.

5) Seasonal Lighting Displays: Seasonal lighting displays are allowed.

6) Single Family Residential: Existing single family residential uses are exempted from the requirements of these Standards. Permits for new single family residential structures or remodeling of single family residential structures are exempted from the requirements of these Standards.

7) Strings of Light: Strings of light, not exceeding a maximum of 50 lumens per lamp (equivalent of a seven watt C9 incandescent light bulb) on properties located in all residential zoning distraction or on properties that are used exclusively for residential uses shall be exempt from the requirements of this chapter. Decorative festoon type lights used in a commercial, limited to small individual bulbs on a string where spacing of bulbs is not closer than three inches and where output per bulb is no greater than 7 watts or 50 lumens.

H.4 PROCEDURES AND SUBMITTALS

a. Applications: All applications relating to new commercial, industrial or residential construction shall include an exterior lighting plan to be reviewed for compliance with these Standards. Change of use or change of occupancy for commercial or industrial property following an improvement or change of use will require an exterior lighting plan to to be reviewed for compliance with these Standards.

b. The Building Inspector and City Administrator (or his/her designee) shall review any new exterior lighting or any existing exterior lighting on subject property that is part of an application for design review, conditional use permit or planned unit development approval to determine whether the exterior lighting complies with the standards within the scope of these Standards.

c. Street lighting plans shall be reviewed and approved by the City Engineer and Public Works Supervisor in conjunction with the review of the street or public improvement plans with which the street lights are associated.

d. Lighting Plan Required: Any non-residential building permit application, conditional use permit, planned unit developments plan, subdivision approval plan, and applicable sign permit (in which outdoor lighting is proposed or required) shall include lighting plans showing location, type, height, wattage/lumen output, and illuminance levels in order to verify that lighting conforms to the provisions of these Standards. The lighting plan shall include:

1) A site plan showing the location of all building and building heights, parking, and pedestrian areas on the lot or parcel;

2) The location and height above grade of all proposed and existing light fixtures on the subject property;

3) The type, initial lumen rating and wattage of each lamp source;

4) The general style of the light fixture. This may include a copy of the manufactures catalog information sheet and IESNA photometric distribution type, including any shielding information such as house side shields, internal and/or external shields;

5) Control descriptions including type of controls (timer, motion sensor, time clock, etc) the light fixtures to be controlled by each type, and control schedule when required;

6) Aiming angles and diagrams if for sports lighting fixtures.

e. Final Inspection and Certification: Prior to the issuance of an occupancy permit, the applicant shall provide certification that the outdoor lighting as installed complies with these Standards and with the approved lighting plan. The certification may be completed by an architect, electrical engineer, electrical contractor, or lighting consultant licensed in the state of Oregon, or by the property owner for residential construction performed by the owner/occupant;

f. The City Administrator or his/her designee may certify that an applicant has met the requirements of these Standards by using designs, materials, or methods not specifically prohibited that result in equivalent reduction of light pollution and that meet the requirements of these Standards.

g. Equivalent Materials: The provisions of these Standards are not intended to prevent the use of any design, material or method of installation not specifically prohibited by this article provided any such alternate has been approved by the City Administrator or his/her designee. The City Administrator or his/her designee may approve any such alternate if the proposed design, materials or methods provide an equivalent method of satisfying the standards in these Standards.

h. A variance from the provision of these Standards may only be approved if the City finds that both of the following criteria apply.

1) Reasonable safety problems may result from lighting used in accordance with these Standards, and

2) there are occupational safety lighting requirements for activities or processes that occur outdoors that are required by another governmental agency.