

## Chapter 15.22

### Outdoor Lighting

**Section 15.22.010 Short Title.** This Ordinance may be cited as the “Outdoor Lighting Ordinance” of the City of Cambridge (the “City”).

**Section 15.22.020 Purpose.** The purpose of this Outdoor Lighting Ordinance is to regulate outdoor lighting, as defined in this Ordinance, in the City, the intent being to permit an amount of outdoor lighting that is appropriate to allow for the safe use and enjoyment of outdoor areas, while also mitigating potential nuisance in the form of light trespass and glare to abutters and the public at large, reducing light pollution, and promoting energy conservation.

**Section 15.22.030 Definitions.**

- A. **Architectural lighting** means lighting designed to reveal architectural beauty, shape and/or form and for which lighting for any other purpose is secondary.
- B. **Building envelope** means the separator between the interior and exterior of a building. Components of the envelope are typically: walls, floors, roofs, fenestrations and doors.
- C. **Correlated color temperature (“CCT”)** means a specification of the color appearance of the light emitted by a lamp, relating its color to the color of light from a reference source when heated to a particular temperature, measured in Kelvin (K).
- D. **Emergency lighting** means lighting that is only activated during an emergency; for instance, 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.
- E. **Fully shielded light fixture** means a light fixture constructed, installed, and maintained in such a manner that all light emitted by the light fixture, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the light fixture, is projected below the horizontal plane through the light fixture's lowest light-emitting part.
- F. **Glare** means lighting entering the eye directly from luminaires or indirectly from reflective surfaces that causes visual discomfort or reduced visibility.
- G. **High Intensity Discharge (“HID”)** means a discharge lamp where the emitted energy (light) is produced by the passage of an electric current through a gas. HID includes mercury, metal halide, and high pressure sodium (“HPS”) lamps.

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Carol Lynn Alpert 10/26/2015 8:36 PM  
**Comment [1]:** The Pattern Lighting Handbook makes the point that poorly maintained lights frequently fall out of performance or prescriptive specifications. The Zoning Ordinance includes the term "maintained" in 6.46.

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**Comment [2]:** If the argument for keeping in this definition and that of Low Pressure Sodium is that these terms are mentioned in another definition, then definitions must also be provided for Light Emitting Diodes, Kelvin, illuminance, footcandle, monochromatic, and several other terms.

H. **Lamp** means a source of optical radiation, often called a “bulb” or “tube,” such as incandescent, fluorescent lamps, high-intensity discharge (“HID”) lamps, and low pressure sodium (“LPS”) lamps, as well as light-emitting diode (“LED”) modules and arrays.

I. **Landscape lighting** means lighting of trees, shrubs, or other plant material as well as ponds and other landscape features. **Lighting which is positioned and aimed to illuminate foliage, yards, gardens, sculptures, driveways, walkways, patios, decks, and other exterior areas.**

J. **Light bulb.** See “Lamp.”

K. **Light fixture** (see “Luminaire”) means a complete lighting unit consisting of one or more light bulbs together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power supply. Sometimes this includes ballasts or drivers, and photocells. For the purpose of this Ordinance, light fixture shall be synonymous with luminaire.

L. **Light trespass** means lighting that falls beyond the boundaries of the property it is intended to illuminate.

M. **Lighting** means electric, man-made, or artificial lighting. See lighting equipment.

N. **Lighting equipment** means equipment specifically intended to provide gas or electric illumination, including but not limited to, lamp(s), luminaire(s), ballast(s), poles, posts, lens(es), electrical wiring, and related structures or other necessary or auxiliary components.

O. **Lighting plan** means a site plan depicting the property lines of all properties for which lighting is proposed, the location and specification of all exterior light fixtures to be installed within the property, their lumen values, mounting heights, shielding and directionality, controls and the location of all adjacent streets, the **positions and** uses of abutting properties and properties located directly across a street, any relevant project site conditions, vertical illuminance calculations **at the property boundaries**, and any additional information required to demonstrate compliance with applicable standards.

P. **Light pollution** means adverse effects of lighting, as defined in this Ordinance, including, but, not limited to, glare, light trespass, sky glow, energy waste, compromised safety and security, and impacts on the nocturnal environment.

Q. **Lighting Zone (“LZ”)** means an overlay zoning system establishing legal limits for lighting for particular parcels, areas, or districts in a community.

R. **Low-Pressure Sodium (“LPS”)** means a discharge lamp where the light is produced by radiation from sodium vapor at a relatively low partial pressure (about 0.001 torr). LPS is a “tube source” and is monochromatic light.

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Carol Lynn Alpert 10/26/2015 8:40 PM  
**Comment [3]:** This definition makes no sense in an urban environment, and needs greater precision, especially when adding back into the Prescriptive standards a row about landscape lighting. (When I suggested this change in the 9/22 draft it was that the description is adequate in the Prescriptive Standards, but it is not.)

Carol Lynn Alpert 10/26/2015 1:00 PM  
**Comment [4]:** This definition makes much more sense and allows us to delete the too lenient prescriptive row about parking areas and go back to the MLO standards for landscape lighting.

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**Comment [5]:** It is not clear how this is different from "light fixture" or "luminaire."

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**Comment [6]:** Light Pollution is the common term, not "lighting pollution."

Carol Lynn Alpert 10/26/2015 1:13 PM  
**Comment [7]:** It is not defined anywhere else in this ordinance and shouldn't be referred to this way, because THIS IS the definition.

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**Comment [8]:** See comment on HID definition.

- S. **Lumen** means the unit of measure used to quantify the amount of light produced by a lamp or emitted from a luminaire or light fixture (as distinct from “watt” or other measure of a lamp’s power consumption).
- T. **Luminaire**, (See “Light Fixture”) means a complete lighting fixture, consisting of a lamp, or lamps and ballast(s) (when applicable), together with the parts designed to distribute the light from the fixture (i.e., reflector, lens, diffuser), to position and protect the fixture, and to connect the fixture to the power supply.
- U. **Lux** means the unit of measure used to quantify illuminance, the intensity of visible light hitting or passing through an area. The SI unit of illuminance. One lux equals one lumen per square meter and is approximately equal to 1/10 of a footcandle. (One lux equals approximately 1 footcandle.)
- V. **New lighting** means lighting for areas not previously illuminated, or newly installed lighting of any type, except for replacement lighting or lighting repairs.
- W. **Outdoor or exterior lighting** means lighting equipment installed within the property line and outside the building envelope of a subject property, whether attached to poles, building structures, the earth, or any other location, and any associated lighting control equipment.
- X. **Partly shielded light fixture** means a light fixture with opaque top and translucent or perforated sides, designed to emit most light downward.
- Add definition for "Public ways"
- Y. **Replacement lighting** means lighting installed in order to replace existing lighting
- Z. **Seasonal lighting** means temporary holiday lighting in use for not longer than a four week period in any calendar year. seasonal lighting as defined in Article 7, Section 7.20 of the Cambridge Zoning Ordinance.
- AA. **Shielded directional light fixture** means a light fixture that includes an adjustable mounting device allowing aiming in more than one direction and that also contains a shield, hood, cowl, louver, or baffle to reduce direct view of the lamp.
- Add definition for "Significant rehabilitation" as used in the Performance standards
- BB. **Sky glow** means the brightening of the nighttime sky that results from scattering and reflection of artificial light by moisture and dust particles in the atmosphere, caused by light directed or reflected upwards or sideways, and which reduces ability to view the night sky.
- CC. **Temporary lighting** means lighting not covered under an electrical permit issued by the City’s Inspectional Services Department and installed and operated for periods up to 30 days, and thereafter, completely removed and not operated again for a period of at least 60 days. Additional restrictions may apply in zoning districts specified in Article 7, Section 7.20 of the Cambridge Zoning Ordinance.

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**Comment [12]:** Add definition for P ... [5]
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**Comment [13]:** circular definition. ... [6]
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**DD. Unshielded light fixture** means a light fixture capable of emitting light in ~~any~~ **multiple** directions.

**EE. Vertical illuminance** means illuminance measured or calculated in a plane perpendicular to the property boundary or property line of a subject property.

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**Comment [16]:** this is problematic, because even a bare light bulb has a shadow where it is connected to the socket.  
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**Section 15.22.040 Effective Date** This Ordinance shall take effect on three (3) months from the date of enactment.

**Section 15.22.050 General Requirements.**

**A. Conformance with all Applicable Codes.** Except as otherwise provided in this Ordinance, all outdoor lighting, as defined in this Ordinance, shall be installed in conformance with all applicable federal, state, and local laws, rules, and regulations, including, but not limited to, applicable sections of the Massachusetts Building Code, the Cambridge Zoning Ordinance, and the Cambridge Municipal Code.

**B. Applicability.** Except as set forth in this Ordinance, all outdoor lighting installed after the effective date of this Ordinance shall comply with the requirements of this Ordinance. 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 that receives an electrical permit from the City's Inspectional Services Department. Except as otherwise provided in this Ordinance, all outdoor lighting installed prior to the effective date of this Ordinance shall be altered or replaced so as to comply with these requirements within **five (5) years** of the effective date of this Ordinance.

**C. Replacement of Light Fixtures and Light Bulbs.** When any outdoor light fixture is replaced, the replacement light fixture shall comply with this Ordinance. Where a light bulb is replaced within an existing non-compliant light fixture, and the light fixture itself is not replaced or repaired aside from the replacement of the light bulb, the light fixture may remain provided that the replacement light bulb is compliant with the applicable initial lumen standards or vertical illuminance standards set forth in this Ordinance, and provided that the light fixture is not otherwise altered to be in greater non-compliance with the requirements of this Ordinance.

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**D. Interim Modifications.** Within six months of the effective date of this Ordinance, property owners shall make improvements where possible to eliminate or substantially ameliorate light trespass onto adjacent lots by: (1) replacing a light bulb within an existing light fixture to be in conformance with the lumen standards of this Ordinance, and/or (2) changing the direction of an existing fixture to be directed downward or away from abutting properties.

**E. Light Color.**

1. Correlated color temperature of any outdoor light source shall not exceed 3500 Kelvins.

F. **Prescriptive Standards.** Exterior lighting that meets the standards set forth in the table below shall be permitted in the City; however, if the development or significant rehabilitation of at least twenty-five thousand (25,000) square feet of Gross Floor Area occurs on a property in LZ3 or of at least ten-thousand 10,000 square feet of Gross Floor Area on a property in LZ2, after the effective date of this Ordinance, then that property shall be required to meet the Performance Standards set forth in this Ordinance. Any other lighting that does not meet the standards set forth in the table below may be permitted in the City only if it ~~voluntarily~~ meets the Performance Standards set forth in this Ordinance.

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Outdoor Lighting Category and Lighting Fixture Type	Maximum <del>z</del> Allowed Lumens Per Light Fixture	Maximum Height	Shielding and Direction
Unshielded or partly shielded light fixture <u>for entries or walkways, placed not less than 2 feet apart,</u>	315	12 feet above the surface of the area to be illuminated	Not applicable
<u>Unshielded or partly shielded low voltage landscape lighting fixtures placed not less than five feet apart.</u>	<u>525</u>	<u>8 feet above the surface to be illuminated.</u>	
Unshielded or partly shielded light fixtures located <u>in a main front entry area, placed not less than 3 feet apart.</u>	630	12 feet above the surface of the area to be illuminated	Not applicable

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Comment [17]: The term "initial lumens" is not defined and can be easily misinterpreted to mean 'when first installed.'

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Fully shielded or shielded directional light fixture for entries, walkways.	1,050	12 feet above the surface of the area to be illuminated	<u>All light fixtures shall be located, aimed, and/or shielded so as to minimize light pollution and stray light trespassing across property boundaries of more than 2 vertical lux.</u> <del>Must be fully shielded or directed away from all properties that are abutting or located directly across a street</del>
<u>Fully shielded or shielded directional light fixtures and for architectural and landscape lighting .</u>	1,260	<u>None. [These could include carefully aimed uplighting or spotlighting]</u>	<u>All light fixtures shall be located, aimed, and shielded so as to minimize light pollution and light trespass across property boundaries of more than 2 vertical lux.</u>
Fully shielded or shielded directional light fixtures for parking areas, driveways, or outdoor loading bays.	1260 <u>(not to exceed 20 lux on any area of the surface being lit)</u>	14 feet above the surface of the parking area, driveway or loading bay	<u>All light fixtures shall be located, aimed, and shielded so as to minimize light pollution and light trespass across property boundaries of more than 5 vertical lux, and also conform to Zoning Ordinance Article 6.41 and 6.46 requirements</u>

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**Comment [18]:** requires definition

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**G. Performance Standards.** An outdoor lighting installation may only exceed the limitations set forth in the Prescriptive Standards in this Ordinance if the lighting complies with the Performance Standards in this Ordinance. As set forth above, if the development or significant rehabilitation of at least twenty-five thousand (25,000) square feet of Gross Floor Area occurs on a property in LZ3 or of at least ten-thousand 10,000 square feet of Gross Floor Area on a property in LZ2, occurs on a property after

the effective date of this Ordinance, then that property shall be required to meet the Performance Standards set forth below.

**1. Standards.**

The project must meet the requirements of the Light Pollution Reduction credit of the U.S. Green Building Council’s LEED v4 BD+C rating system.

- 2. Application Requirements.** In order to apply the Alternative Performance Standards, a lighting plan as defined in this Ordinance must be prepared by a registered architect or professional engineer licensed in the Commonwealth of Massachusetts, and submitted to the Inspectional Services Department with accompanying calculations certifying that the lighting depicted in the lighting plan shall conform to the Alternative Performance Standards set forth in this Ordinance. The Alternative Performance Standards shall not be applied unless such a lighting plan has been approved by the Commissioner of Inspectional Services or her/his designee.

**H. Exemptions from Applicability.**

1. Lighting within public ways for the principal purpose of illuminating public ways. No exemption shall apply to any lighting within a public way when the purpose of the luminaire or light fixture is to illuminate areas outside the public way, other than as provided in this Ordinance.
2. Lighting for public parks or public art that is commissioned, owned, or operated by a city, state, or federal entity, or that is required by the City, by special permit, or otherwise by law to be accessible to the general public, unless that lighting can be reasonably installed in a manner that conforms with this Ordinance.
3. ~~Lighting for public monuments, statuary, or the national flag.~~
4. Architectural lighting that has received a Certificate of Appropriateness from the Cambridge Historical Commission or neighborhood conservation district commission.
5. Architectural lighting of structures or buildings listed on the National Register of Historical Places.
6. Lighting solely for signs as regulated under Article 7 of the Cambridge Zoning Ordinance.

Carol Lynn Alpert 10/26/2015 8:42 PM  
**Comment [19]:** define public ways.

Carol Lynn Alpert 10/26/2015 2:39 PM  
**Comment [20]:** Clarify this sentence. It should include protection from public way lighting trespassing on private property.

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**Comment [21]:** There is no reason to totally throw up our hands about this - especially in regards to city owned and operated lighting.

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**Comment [22]:** With the new rows on the prescriptive table, lighting for these can comply with the ordinance. And if they are owned or operated by a state or federal entity they won't be covered anyway..

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7. Temporary Lighting for theatrical or television production or performance areas, if an electrical permit has been received from the City's Inspectional Services Department, and if the lighting is turned on for less than eight hours during a 24-hour period.
8. Temporary lighting for work areas at construction sites, if an electrical permit has been received from the City's Inspectional Services Department, and if reasonable protections are taken against light pollution and light trespass.
9. Underwater lighting in swimming pools and other water features.
10. Temporary lighting or seasonal lighting as defined in this Ordinance.
11. Lighting for hospital emergency departments, including associated helipads.
12. Lighting that is only used under emergency conditions.
13. Lighting required by federal, state, or local laws, rules or regulations, unless it can be reasonably made to comply with this Ordinance.

- Carol Lynn Alpert 10/26/2015 8:32 PM  
**Comment [23]:** Temporary lighting in this ordinance can last 30 days. Theatrical lighting is intense and should be short-term.
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**Section 15.22.060 Administrative Exemption.** The Commissioner of Inspectional Services shall have the authority to grant a partial or complete waiver of the requirements of this Ordinance where the property owner has submitted an Application for Administrative Exemption demonstrating that: 1) bringing the source of light for which the administrative exemption is sought into compliance with this Ordinance would constitute a demonstrably unreasonable hardship on the applicant, as balanced against the potential hardships on abutters and others affected by the lighting; or 2) bringing the source of light for which the administrative exemption is sought into compliance with this Ordinance would result in conditions that are detrimental to public health, safety, or welfare. The property owner seeking the administrative exemption shall file the Application for Administrative Exemption with the Inspectional Services Department demonstrating one of the two requirements for an administrative exemption listed above. The ISD shall give fair notice to abutters and others affected by the lighting and provide an opportunity for them to state their case. All decisions on administrative exemptions shall state the reasons clearly and be available as public records.

**Section 15.22.070 Enforcement.**

- A. Enforcement Officials.** The Commissioner of Inspectional Services or her/his designee shall be the authorized enforcement personnel charged with the enforcement of the provisions of this Ordinance, and will be given the necessary resources to do so, including light meters with .01 lux sensitivity and accuracy to .5 lux.
- B. Violations.** Authorized enforcement personnel may order and specify remedial actions to be taken by a violator of this Ordinance to achieve compliance, or issue citations, pursuant to G. L.

c. 40, § 21D, for violations of these provisions, assessing fines of three hundred dollars for each such violation. Each day such a violation continues shall constitute a separate offense. Additionally, any person found to be in violation of any of the provisions of this Ordinance may be prosecuted for a misdemeanor and upon conviction thereof shall be fined three hundred dollars for each such misdemeanor.

**C. Injunction.** As an additional remedy, any outdoor lighting installed or maintained in violation of any provision of this Ordinance may be subject to abatement summarily by a restraining order or injunction issued by a court of competent jurisdiction.

**D. Suspension or Revocation of Permit.** As an additional remedy, any enforcement official hereunder may summarily suspend, and after a hearing may revoke, any license or permit, including a building, demolition, or electrical permit

**Page 3: [1] Comment [9] Carol Lynn Alpert 10/26/15 8:41 PM**

no one knows what SI means. This rewrite is in alignment with the definition for lumen, above.

**Page 3: [2] Deleted Carol Lynn Alpert 10/26/15 1:23 PM**

. 1 Lux is a unit of incident illuminance

A.

**Page 3: [3] Comment [10] Carol Lynn Alpert 10/26/15 8:38 PM**

This is wrong. It's not needed, but it should say .1 footcandle.

**Page 3: [4] Comment [11] Carol Lynn Alpert 10/26/15 1:38 PM**

What if they are replacing 60% of the fixtures?

**Page 3: [5] Comment [12] Carol Lynn Alpert 10/26/15 1:52 PM**

Add definition for Public Way

**Page 3: [6] Comment [13] Carol Lynn Alpert 10/26/15 1:39 PM**

circular definition. At what point does replacement lighting become new lighting? Not clear.

**Page 3: [7] Comment [14] Carol Lynn Alpert 10/26/15 1:41 PM**

might as well just put it here.

**Page 3: [8] Comment [15] Carol Lynn Alpert 10/26/15 1:48 PM**

This would limit it to four rather than 6 months a year.