

ARTICLE 27. To see if the Town will vote to adopt the following as a General Bylaw, in the following form, to be inserted as Chapter 108 of the Town Code:

CHAPTER 108 Outdoor Lighting

§108-1. Purpose

This Bylaw recognizes that the welfare and enjoyment of Chelmsford are associated with its character, including its nighttime ambience. Therefore this Bylaw seeks to (1) provide adequate, well-designed lighting for the safety and security for all Chelmsford residents and for the safe performance of outdoor tasks at night; (2) control *glare* to ensure safe navigation for motorists, bicyclists, and pedestrians at night; (3) protect residents from *light trespass*, which negatively affects the enjoyment of property; (4) minimize *light pollution* to the greatest extent possible, especially blue light, which can cause negative effects on human health and nocturnal organisms; (5) minimize *skyglow*, to preserve Chelmsford residents' ability to see the stars against a dark sky; and (6) promote efficient lighting to conserve energy and thus reduce atmospheric carbon emissions.

§108-2. Definitions and Figures

BUG rating system: A lighting classification system (IES TM-15-20 standard or its successor) by the Illuminating Engineering Society (IES) and DarkSky International to describe the light-pollution contributions from outdoor luminaires, including for street and parking-lot lighting. Each letter is attached to a number ranging from 0 (ideal) to 5 (unacceptable). **B** describes backlight that often contributes to *light trespass*. **U** describes upright, which contributes to skyglow, which limits a person's ability to see the stars. **G** describes glare, which makes it difficult for people to see and thus makes roadways more dangerous and security lighting less effective.

Café lighting: A string of multiple lights hung between two points and used to decorate outdoor spaces in ways and at times not associated with holidays. Also known as party lighting or festoon lighting.

Correlated color temperature (CCT): A specification of the color appearance of the light emitted by a light source, measured in Kelvin (K). CCT values are typically provided in lighting-manufacturer data sheets. For example, high-pressure-sodium (HPS) streetlights are approximately 2000 K and "warm-white" lamps are typically 2700 K.

Environmentally sensitive area: Light-sensitive areas that include: any land subject to a conservation restriction, legally recognized wetlands, agricultural land, or any land that contains threatened or endangered-species habitats.

Foot-candle: A measurement of *illuminance*, which is the intensity of light incident on a surface. One (1) foot-candle (fc) is defined as enough light to uniformly illuminate one square foot (1 ft²) with one (1) lumen. One foot-candle corresponds to 10.764 lux (lx), which is the SI (International System of Units) unit of illuminance.

Fully shielded: An outdoor *luminaire* constructed so that, in its installed position, all of the light emitted by the *luminaire* is projected below the horizontal plane that passes through the lowest light emitting part of the *luminaire*. See Figure 1.

Glare: Intense and harsh light emitted by a *luminaire* that reduces visibility and creates visual discomfort and/or momentary visual impairment. *Discomfort Glare* causes a nuisance due to overly bright light sources in the field of view. *Disability Glare* causes interference in the visual process and impairs the viewer's vision.

Holiday lighting: Decorative lighting temporarily installed on or near homes, businesses, and public spaces to celebrate holidays and seasonal events.

Illuminance: The intensity of light incident on a surface, often measured on horizontal or vertical surfaces in foot-candles (fc or lumens/ft²). Example: the full Moon illuminates the ground with an *illuminance* of 0.01 fc.

IES: Illuminating Engineering Society, the recognized authoritative body on the science and application of lighting, which publishes and promotes recommended practices for a variety of specific lighting applications.

Lamp: The bulb or other light-emitting portion of a *luminaire*, not inclusive of any reflective or refractive optics used to direct light.

Light pollution: An adverse and/or obtrusive effect of the use of outdoor light at night.

Light trespass: Light emitted by a *luminaire* or from an adjacent reflective surface that shines beyond the property boundary on which the *luminaire* is installed.

Lumen: A unit of luminous flux; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela (the SI unit of luminous intensity).

Luminaire: A complete lighting assembly, consisting of a lamp or lamps, housing, optic(s), and other structural elements, but not including any mounting pole or surface.

Luminance: The amount of light that passes through, is emitted by, or reflected from a particular area, and falls within a specified solid angle. The SI unit of luminance is candela per square meter (cd/m²), also known as a nit.

Nuisance: The unreasonable, unwarranted and/or unlawful use of outdoor lighting, which causes inconvenience, disruption of enjoyment, or damage to others, either to individuals and/or to the general public.

Skyglow: A measurable glow in the night sky deriving from an artificial source.

Wall sconce: A decorative *luminaire* affixed to a vertical exterior wall.

Walkway lighting: One or more outdoor *luminaires* installed adjacent to a walkway to provide wayfinding and safe movement for pedestrians and/or personal-mobility devices.

Figure 1: Example of a fully shielded *luminaire*. No light is emitted above horizontal.

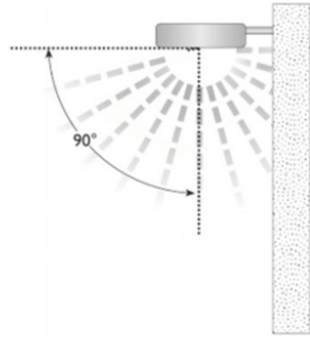


Figure 2: Fully-shielded lighting that is not causing light trespass, glare or skyglow for adjacent property. In the absence of a barrier between properties, the *luminaire* can simply be pointed more toward the ground to satisfy the requirements of the Bylaw.

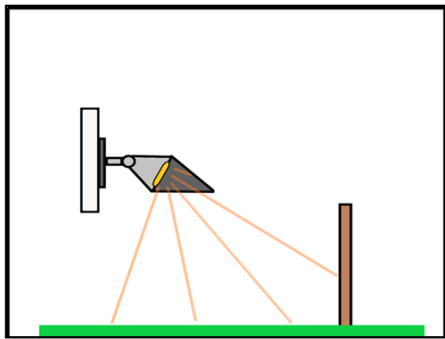


Figure 3: Examples of acceptable and unacceptable *luminaires* (lighting fixtures). The intent of this figure is to demonstrate that “acceptable” lighting eliminates or reduces glare by hiding the light emitting portion of the bulb or lamp, not that the general style of fixture is prohibited.



§108-3. Standards for Commercial and Industrial Properties and for Multi-family Dwellings

- 3.1 Scope and Applicability. This section applies to commercial and industrial properties, the common areas of condominium complexes and homeowner associations, and other properties with dwellings for more than two families.
- 3.2 Priority of Bylaw Provisions. In case of conflict between any of the provisions of this Bylaw or any other state or federal regulation, and if such state or federal regulation allows for more restrictive local regulation, the most restrictive shall apply.
- 3.3 New Lighting. All outdoor *luminaires* installed after the effective date of this Bylaw shall comply with the requirements established by this Bylaw.
- 3.4 Existing Lighting. All outdoor *luminaires* installed prior to the effective date of this Bylaw that do not comply with the requirements of this Bylaw are declared to be non-conforming. All non-conforming *luminaires* may continue to be used and maintained after the effective date of this Bylaw but shall be brought into compliance with the requirements herein within ten (10) years of the effective date of this Bylaw or upon the first to occur of any of the following:
 - 3.4.1 A determination by the Zoning Enforcement Officer (Section 9.1) that the *luminaire* or its installation constitutes a hazard to public safety or otherwise constitutes a *nuisance* (Section 5).
 - 3.4.2 The replacement of more than twenty-five percent (25%) of the existing system of *luminaires* intended to illuminate a specific area.
 - 3.4.3 Expansions exceeding twenty-five percent (25%) of the gross floor area, the number of dwelling units, or the number of parking spaces. This requirement may be reduced by permit issued by the Planning Board upon a simple majority finding that such reduction will not detract from the objectives of this bylaw.
- 3.5 Shielding.
 - 3.5.1 Unless exempted elsewhere in this Bylaw, all single-lamp outdoor *luminaires* exceeding two thousand (2,000 lumens) shall be *fully shielded*.
 - 3.5.2 Lighting of building façades, landscaping, monuments, plaques, flagpoles, and similar installations are exempted from the shielding requirements of this bylaw, but shall be focused directly at the target so that the light does not create a *nuisance*. It is the Town's preference that such lighting be turned off or dimmed between 12 a.m. and 6 a.m. or within one (1) hour of the posted closing time for that facility, whichever occurs later.
- 3.6 Light Output.
 - 3.6.1 The output of any outdoor *luminaire* installed at a height below twenty (20) feet shall not exceed five thousand (5,000) *lumens*, except as permitted in Section 3.6.2.
 - 3.6.2 An outdoor *luminaire* may exceed five thousand (5,000) *lumens* if its output does not exceed the ground-level *luminance* values recommended by the *Illuminating Engineering Society (IES)* for the specific application by more than fifty percent (50%).

- 3.6.3 An outdoor *luminaire* exceeding the lumen values in Sections 3.6.1 and 3.6.2 may be installed by permit issued by the Planning Board upon a simple majority finding that extenuating circumstances related to safety and security justify an exception.
- 3.7 Correlated color temperature. The *correlated color temperature (CCT)* of the light emitted by an outdoor *luminaire* shall not exceed 2700 K. An outdoor *luminaire* may exceed this CCT value by permit issued by the Planning Board upon a simple majority finding that extenuating circumstances related to safety and security justify an exception.
- 3.8 Height.
- 3.8.1 Scope and Applicability. This subsection applies only to luminaires used for illuminating outdoor areas such as parking lots, driveways, walkways, yards, or other ground surfaces, whether mounted on freestanding poles or on buildings, but it shall not apply to building-mounted luminaires intended primarily for entrance, porch, architectural, or decorative lighting.
- 3.8.2 The maximum mounting height of such luminaires shall not exceed twenty-five (25) feet. A maximum mounting height of thirty-five (35) feet may be allowed by permit issued by the Planning Board upon a simple majority finding that the increased height will not negatively impact abutting properties, particularly property used or zoned for residential purposes.

§108-4. Standards for Residential Properties

- 4.1 Scope and Applicability. This section applies to properties with single- and two-family residential dwellings, accessory dwelling units (ADUs), and individually-owned dwellings that are part of a condominium complex or homeowner association.
- 4.2 Priority of Bylaw Provisions. In case of conflict between any of the provisions of this Bylaw or any other state or federal regulation, and if such state or federal regulation allows for more restrictive local regulation, the most restrictive shall apply.
- 4.3 It is the Town's preference that the following standards for residential properties are met:
- 4.3.1 All single-lamp outdoor luminaires exceeding eight hundred (800) lumens and multiple-lamp outdoor luminaires exceeding two thousand (2,000 lumens) be fully shielded.
- 4.3.2 The output of any single- or multi-lamp outdoor *luminaire* not exceed four thousand (4,000) *lumens*.
- 4.3.3 The correlated color temperature (CCT) of the light emitted by an outdoor *luminaire* is recommended to not exceed 2700 K, or a maximum of 4000K if a 2700k *luminaire* is not available.

§108-5. Nuisance. No outdoor *luminaire* shall create a lighting *nuisance* in the form of excessive *light trespass* or *glare*, as defined below.

5.1 Light trespass.

5.1.1 The maximum vertical *illuminance* created by one or more outdoor *luminaires* shall not exceed 0.1 *foot-candle* when measured fifteen (15) feet inside the property line of an adjacent residential property or at the exterior wall of a dwelling on the adjacent property, whichever is closer to the outdoor *luminaire(s)*, at a point five (5) feet above grade.

5.1.2 The maximum vertical *illuminance* shall not exceed 0.05 *foot-candle* when measured at the property line of an *environmentally sensitive area*.

5.1.3 The Zoning Enforcement Officer may grant exceptions due to extenuating circumstances related to safety and security.

5.2 Glare. *Glare* is declared to be a lighting *nuisance* when it constitutes a hazard to public safety along a public way or exceeds the standards listed in 5.1.1.

5.3 A motion-activated *luminaire* that causes a *nuisance* but otherwise complies with this Bylaw is permitted as long as its output remains on for no more than 10 minutes, does not flicker intermittently, and is not triggered by right-of-way traffic in any form.

5.4 The determination of *light trespass* and/or *glare* will be made by the Zoning Enforcement Officer or another Town employee after a site visit and a visual inspection.

§108-6. Lighting in a Public Right of Way. For outdoor *luminaires* used for streetlighting or area lighting installed on poles or structures within a public right of way and whose output is two thousand (2,000) lumens or greater, each such luminaire shall conform to the following requirements:

6.1 The *luminaire* as installed must not exceed the *BUG rating* (as provided by the manufacturer) of B2, U0, and G2.

6.2 The luminaire may not be installed at heights greater than twenty-five (25) feet in residential zones or thirty-five (35) feet in commercial zones.

6.3 Exceptions may be granted by the Department of Public Works for installation or replacement of existing decorative or historically designed streetlighting or when necessary to keep public ways safe and convenient for travel (G.L. c.84, s.1). All other requirements of this Bylaw will still apply.

6.4 If a utility company serving the Town or a private developer proposes the installation or replacement of ten (10) or more luminaires emitting at least two thousand (2000) lumens per luminaire, the project proponent must provide a demonstration installation of at least three (3) luminaire options and include at least one option with a correlated color temperature of less than 2700 K and at least one option with a BUG rating of 1/0/1. The Select Board will then seek public comment prior to the full installation to identify unforeseen negative impacts.

§108-7. Prohibitions

The use of searchlights, sky beams, or any outdoor *luminaire* that dynamically varies its output by intermittently fading, flashing, blinking, or rotating is prohibited, except for holiday lighting or as required by public-safety and public works personnel in temporary situations.

§108-8. Exemptions

The following are exempt from compliance with all provisions of this Bylaw, except as noted:

- 8.1 Temporary emergency lighting needed by the Police, Fire, and Public Works departments; Water District personnel; or other law-enforcement and emergency services, as well as all vehicle-mounted *luminaires*.
- 8.2 Lighting employed during repairs of roads, utilities, and similar infrastructure, including unshielded lighting, provided that such lighting is deployed, positioned, and aimed such that to the extent possible the resulting *glare* and *light trespass* do not extend beyond the work area.
- 8.3 Any form of lighting whose use is mandated or otherwise governed by any legal jurisdiction with broader authority than that of the Town of Chelmsford.
- 8.4 Temporary lighting for events sponsored by the Town of Chelmsford or for which a license or other approval has been issued, such as concerts, fairs, and festivals.
- 8.5 *Holiday lighting, walkway lighting, and café lighting*. However, it is the Town's preference that the outdoor *luminaires* used for these purposes be aimed so as to minimize *light trespass* on adjacent properties and be turned off between 12 a.m. and 6 a.m.
- 8.6 *Luminaires* used to illuminate athletic fields or recreational facilities shall, to the greatest extent possible, satisfy the on-field *illuminance* values in the latest version of [ANSI/IES RP-6, Recommended Practice: Lighting Sports and Recreational Areas](#). Further, such *luminaires* must be aimed so as to minimize *light trespass* on adjacent properties and must be turned off within one (1) hour after the end of play or by 10 p.m., whichever occurs later.

§108-9. Enforcement

- 9.1 Zoning Enforcement Officer. The requirements of this bylaw shall be enforced by the Town's Zoning Enforcement Officer or by another person appointed or engaged by the Town for this purpose.
- 9.2 Demonstration of Compliance. In the event an enforcement action is initiated, the owner of any lot, dwelling, commercial, or industrial property on which an outdoor *luminaire* subject to this Bylaw is located or proposed to be located shall have the burden of demonstrating that the existing or proposed outdoor *luminaire* complies with the requirements of this Bylaw.
- 9.3. Submission. The applicant for any permit or exception under this Bylaw shall submit evidence that the proposed work will comply with this Bylaw. Any costs associated with such proof of compliance will be paid by the applicant. The submission shall contain, but shall not necessarily be limited to, the following:
 - 9.3.1. Plans indicating the location on the premises of each outdoor luminaire, both existing and proposed.
 - 9.3.2. Description of all luminaires, fixtures, lamps, supports, reflectors, both existing and proposed. The description may include, but is not limited to, specification data and illustrations by manufacturers (including sections where required).
 - 9.3.3. Photometric data, such as that supplied by manufacturers, photometric site drawings, and/or on-site calibrated light meter light level readings.

9.4. Violations and Penalties. The Zoning Enforcement Officer may issue orders to enforce the terms of this bylaw, and may seek injunctive relief and utilize any other appropriate remedy to compel compliance, including the issuance of fines and penalties and the use of non-criminal disposition as provided in M.G.L. c. 40D, § 21D.

; or act in relation thereto.

SUBMITTED BY: **Kelly Beatty**
Planning Board