

Outdoor Lighting Bylaw for Pepperell, Massachusetts

1. Authority

- 1.1. This Bylaw is adopted by the Town of Pepperell pursuant to its authority under M.G.L. Chapter 40, Section 21, as reasonable and necessary for the protection of the health and welfare of the residents of the Town of Pepperell.

2. Purpose

The Town of Pepperell hereby finds and determines that the welfare and enjoyment of Pepperell is associated with its rural character, including its nighttime ambience. It is recognized that *light pollution*, defined as an adverse and/or obtrusive effect of the use of outdoor light at night, is a nuisance to the residents of Pepperell as it negatively impacts human health and contributes to the loss of our night-sky heritage.

The purpose of the outdoor lighting standards in this Bylaw is to ensure that each lighting device, including signs and building facades on properties, will not result in *light trespass* or excessive *glare*, will comply with the applicable Town of Pepperell regulations, will be dark-sky compliant, and will provide adequate safety, energy efficiency and security for nighttime business and industrial operations. The goal of this Bylaw is to recognize the benefits of outdoor lighting and provide clear guidelines for its installation. Appropriately regulated and properly installed outdoor lighting will maintain the Town's rural character and contribute to the safety and welfare of the residents of the Town.

Note: Italicized terms are defined in Appendix A.

3. Requirements

The following requirements (3.1- 3.9) are applicable to all outdoor lighting in the Town of Pepperell

- 3.1. Existing lighting. All outdoor lighting fixtures that were lawfully installed prior to the effective date of this Bylaw, but that do not comply with the requirements of this Bylaw, are declared to be legal non-conforming *luminaires*. **All legal non-conforming luminaires can continue to be used and maintained after the adoption of this Bylaw, but shall be brought into compliance with the requirements of the Bylaw upon the first to occur of any of the following:**
 - 3.1.1. A determination by the Building Inspector or Building Inspector that the luminaire constitutes a hazard to public safety or otherwise constitutes a lighting nuisance;
 - 3.1.2. A certificate of occupancy is requested for a property which has, prior thereto, not been used or occupied for at least six (6) months; or
 - 3.1.3. The replacement of any nonconforming *luminaire* with a new *luminaire*, except replacement of only lamps or bulbs.
- 3.2. New lighting. All exterior lighting installed in Pepperell after the effective date of this Bylaw shall be in conformance with the requirements established by this Bylaw and any other applicable bylaws of the Town. All new exterior lighting installed, replaced or moved the Town of Pepperell shall emit no direct light above a horizontal plane through the lowest direct emitting part of the *luminaire*.

- 3.3. Skyglow. No new permanent exterior lighting shall change the overall brightness or color of the night sky in any part of the Town of Pepperell. The effect of the lighting in both on and off states may be verified with photographs or by use of a calibrated light meter.
- 3.4. Shielding. Unless exempted elsewhere in this Bylaw, all exterior *luminaires* and/or *lamps* with initial *lumens* exceeding 800 *lumens* shall be *fully shielded*. See Figures 1 and 2 for examples of *fully shielded* and unshielded *luminaires*.
 - 3.4.1. Maximum allowed amounts of unshielded lighting. On no parcel of property shall the amount of allowed unshielded lighting exceed, in the aggregate, 2000 *lumens*.
 - 3.4.2. Floodlights are exempt from shielding requirements, but must be pointed at least 45 degrees downward so as to eliminate light pollution onto an adjacent property.
- 3.5. Nuisance. No exterior *luminaire* installed within the Town of Pepperell shall create a lighting nuisance in the form of *light trespass*, *glare* or *skyglow*.
- 3.6. Spectrum management. The emission of light by all *luminaires*, *lamps* and bulbs shall be controlled for spectral output (color appearance) according to the following specifications found on the product or its packaging:
 - 3.6.1. The *correlated color temperature (CCT)*, measured in Kelvin (K), of the light shall not exceed 2700 K. The warmest possible color temperature (lowest Kelvin value) should be chosen. If a 2700 K or lower product is unavailable, a 3000 K product may be used except as otherwise required in this Bylaw.
- 3.7. Outdoor accent lighting. Lighting of landscaping, monuments, plaques, flagpoles and similar installations shall be focused directly at the target so that the *lamp* is not visible from abutting streets or abutting lots.
- 3.8. Lighting Plans. All applications for a building permit for construction that will include exterior lighting shall include lighting plans showing location, type, height, *correlated color temperature (CCT)*, *lumen* output, *BUG rating* (if applicable), shielding description, and the number of all proposed *luminaires*. The applicant shall provide sufficient information to verify that lighting conforms to the provisions of this Bylaw. The Building Inspector or Building Inspector's designee shall have the authority to request additional information in order to confirm compliance with the provisions of this Bylaw.
- 3.9. Priority of Bylaw Provisions. In case of conflict between any of the provisions of this Bylaw, the most restrictive shall apply.

The following requirements (3.10 - 3.14) are applicable ONLY to non-residential lighting.

- 3.10. After-hours operation. For all non-residential uses, all exterior lighting shall be extinguished between one (1) hour of closing or by 11 P.M. whichever is earlier, and within one half hour before sunrise. Exceptions shall apply for:
 - 3.10.1. Retail businesses serving the public.
 - 3.10.2. Lighting the purpose of which is to facilitate safety and security along roadways, driveways, walkways, parking lots and building entrances. This includes lighting used to prevent accidents, as well as protect buildings and property stored outdoors so as to not interfere with the essential functions of municipal and public works sites.
 - 3.10.2.1. To preserve the natural nighttime environment and minimize energy waste, said lighting shall be turned off or dimmed when not in use for safety and security purposes. If lighting is controlled by a motion sensor, it must have an on-time of no more than 10 minutes per activation, and the motion detector

shall be adjusted so that normal movement of vehicles and traffic along a street or public right of way shall not cause its activation.

- 3.11. Streetlights and other elevated lighting. This section applies to Town-owned, Town-installed and all other non-residential lighting installed at least 8 feet above the intended area of illumination. Said lighting shall conform to the following requirements:
- 3.11.1. Using the *BUG rating*, as provided by the manufacturer, a *luminaire* should be selected with the lowest possible number, ideally 0 or 1. Values of 3 or above are expressly prohibited.
 - 3.11.2. Effort should be made to source lighting with a CCT lower than the maximum permitted value of 2700 K.
 - 3.11.3. If a municipal or utility company lighting project is proposed that involves the retrofit or replacement of streetlights or the addition of more than ten (10) elevated *luminaires* with at least 2000 initial *lumens*, then the Select Board or its designee must seek public comment prior to installation so as to help mitigate unforeseen negative impact. Specifically, for streetlights, as part of the public comment process the project proponent must provide a demonstration installation of at least three (3) *luminaire* options.

3.11.4. Elevated Lighting Maximum Mounting Height:

Fixture type:	Maximum height of <i>Luminaire</i> or <i>lamp</i> from intended area of illumination (feet):
Streetlights and roadway	25
Parking area	16
Walls, building surfaces	12

- 3.12. Allowed illuminance values. *Illuminance* resulting from all non-residential lighting installations shall conform to the relevant edition of the recommended practices of the *IES* current at the time of installation.
- 3.13. Illuminated Signs. The following restrictions shall apply:
 - 3.13.1. Externally illuminated signs shall only be lit from the top of the sign, with *fully shielded luminaires* designed and installed to prevent light from spilling beyond the physical edges of the sign.
 - 3.13.2. Internally illuminated signs. Internally illuminated panels shall be opaque and only the lettering and logo shall appear to be illuminated.
- 3.14. Service Station Canopies. All *luminaires* mounted or recessed into the lower surface of motor vehicle service station canopies shall be *fully shielded* and utilize only flat lenses or windows.
 - 3.14.1. Apart from signs identifying the brand on the canopy fascia of a motor vehicle service station, no other fascia lighting is allowed including eyebrow lighting, banding or other similar elements attached to the fascia.

4. Exemptions

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

- 4.1. Residential holiday, string, festoon, and similar decorative lighting.
- 4.2. Lighting required by law to be installed on motor vehicles.
- 4.3. Emergency lighting, only for as long as emergency conditions so identified by public safety personnel continue to exist. This includes the activities of law enforcement, fire and other emergency services.
- 4.4. Lighting employed during repairs of roads, utilities and similar infrastructure, including unshielded lighting, provided that such lighting is deployed, positioned and aimed such that the resulting *glare* is not directed beyond the work area.
- 4.5. Temporary lighting required to save life, limb or property from imminent peril, provided that use persists only during the hours of the peril.
- 4.6. Temporary lighting for events sponsored by the Town or for which a Town license or other approval has been issued, such as concerts, fairs, and festivals.
- 4.7. Municipal athletic fields are exempt from Shielding, Lighting Fixture Height and Spectrum management requirements, but are subject to all other provisions of this Bylaw.

5. Compliance

- 5.1. Administrative guidance. The Building Inspector is authorized to promulgate one or more interpretive documents to aid in the administration and enforcement of this Bylaw. The owner of any lot or property on which a *luminaire* or sign subject to this Bylaw is located or proposed to be located shall have the burden of demonstrating that the existing or proposed *luminaire* or sign complies with the standards established by this Bylaw. A site visit at night by the Building Inspector or the Building Inspector for purposes of a visual observation and/or photograph may be required to determine compliance. The manufacturer's specification sheet may be used to establish the *lumen* level of a *luminaire*, *CCT* and, if required, to verify the use of *fully shielded* fixture design. Illumination levels may be verified through the use of manufacturer's photometric data sheet(s) and/or photometric site drawing or through on-site calibrated light meter light level readings.
- 5.2. Violations. It shall be unlawful to install or operate any outdoor lighting *luminaire* in violation of any provision of this Bylaw. This Bylaw may be enforced by the Building Inspector and any Town police officer.
- 5.3. Relief and Penalties. The Building Inspector is authorized and empowered to institute and maintain, in the name of the Town, any and all enforcement proceedings seeking injunctive relief and any other appropriate remedy, including fines and penalties. Violation of this Bylaw shall be subject to a penalty of \$100.00. Each day that a violation exists shall be deemed a separate offense. This Bylaw may be enforced through the non-criminal disposition method as provided in M.G.L. c. 40, § 21D and/or an order to cease and desist until the violation is remedied.

7. Severability: If any part of this Bylaw is held to be unconstitutional or invalid, such decision shall not affect the remainder of this Bylaw. The town of Pepperell hereby declares the provisions of this Bylaw to be severable.

APPENDIX A
PEPPERELL OUTDOOR LIGHTING BYLAW DEFINITIONS AND FIGURES

DEFINITIONS

1. **BUG rating:** A simple lighting classification system (IES TM-15-20 standard or its successor) by the Illuminating Engineering Society (IES) and the International Dark-Sky Association (IDA) 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 uplight, which contributes to *Skyglow*, which limits a person's ability to see the stars. G represents *Glare* or "forward light," which makes it difficult for people to see and thus makes roadways more dangerous and security lighting less effective.
2. **Temperature (CCT):** A specification of the color appearance of the light emitted by a lamp, measured in Kelvin (K). CCT values are typically provided in lighting manufacturer data sheets. For example, high pressure sodium streetlights are approximately 2000 K and warm-white bulbs are 2700 K.
3. **Foot candle:** A measurement of light intensity. One foot-candle (fc) is defined as enough light to uniformly illuminate one square foot with one *Lumen* of light.
4. **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 Figures 1 and 2.
5. **Glare:** Intense and blinding light emitted by a lamp that reduces visibility and creates visual discomfort and/or momentary blindness. *Glare* is declared to be a lighting *Nuisance* when it constitutes a hazard to public safety along a public way or causes intense discomfort to occupants of adjacent properties. This determination will be made by the Building Inspector or Building Inspector's designee through a site visit and a visual inspection and/or night-time photograph.
6. **Illuminance:** Density of luminous flux (the rate of transfer of energy) incident on a surface, often measured in foot-candle (fc or *Lumens/ft²*). Example, Full Moon casts 0.01 fc.
7. **IES:** *Illuminating Engineering Society of North America*, a recognized authoritative body on the science and application of lighting that publishes and promotes recommended practices for a variety of specific lighting applications.
8. **Lamp:** The bulb or other light-emitting portion of a *Luminaire*, not inclusive of any reflective or refractive optics used to direct light.
9. **Light trespass:** Any light emitted by a *Luminaire* that shines directly or indirectly beyond the property on which the *Luminaire* is installed and increases the *Illuminance* above the original (natural) illumination level.
10. **Light Pollution:** an adverse and/or obtrusive effect of the use of outdoor light at night.
11. **Lumen:** Brightness or 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).
12. **Luminaire:** A complete lighting assembly, consisting of a lamp, housing, optic(s), and other structural elements, but not including any mounting pole or surface.
13. **Luminance:** The amount of light that passes through, is emitted, or reflected, from a particular area, and falls within a given solid angle. The SI (International System of Units) unit of *Luminance* is candela per square meter (cd/m²), also known as a *nit*.
14. **Skyglow:** A glow in the night sky deriving from an artificial source.

FIGURES

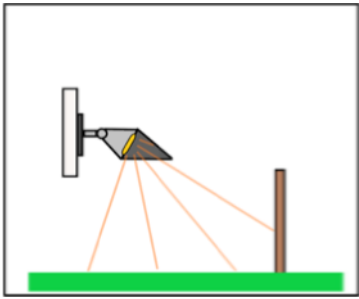


Figure 1: Fully shielded lighting that is not causing light trespass, glare or skyglow for adjacent property. In the absence of a barrier between properties, the luminaire can simply be pointed more towards the ground to satisfy the requirements of the Bylaw.

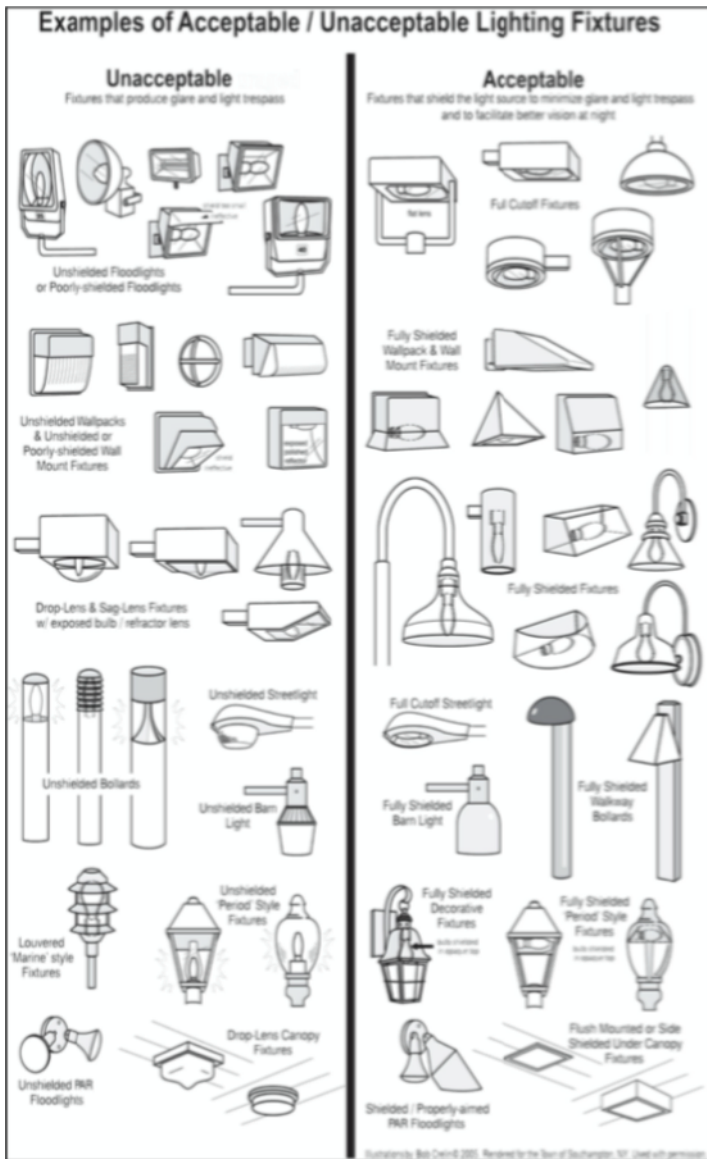


Figure 2: Examples of acceptable and unacceptable lighting fixtures / luminaires. The intent of this figure is to demonstrate that “acceptable” lighting eliminates or reduces glare by hiding the light emitting portion of the bulb or lamp, not that the general style of fixture is prohibited.