DarkSky
MASSACHUSETTS

Massachusetts Outdoor Lighting Bylaw Template

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This document provides a model for developing a municipal bylaw or ordinance that governs outdoor lighting in rural and suburban communities. Mid-sized or larger cities may require additional content. It is written specifically for Massachusetts, but it can easily be adapted for use in additional states. Consider it a living document, with the intent of it being updated and modified periodically as both lighting technology and our knowledge of its impact evolves. It is adaptable in that the user may choose what is necessary for their community and what is politically possible.

This version of the bylaw template satisfies DarkSky International's criteria for Bronze Certification. It was written by: Tim Brothers (astrobrothers@gmail.com), Glenn Heinmiller (glenn@lampartners.com), and Kelly Beatty (kbeatty@darkskymass.org).

Instructions for Use:

- *Italicized* words are terms defined in Section 7, Definitions.
- Wording in *[Blue + Italicized font]* are instructions intended for the user, including why a topic is being addressed, and, when applicable, optional requirements or choices. This commentary will assist advocates and municipal staff members draft appropriate language.
- Narrative in **<bold brackets>** requires the insertion of an appropriate name, term, value, or date depending on local conditions.

Massachusetts Regulation Guidance Note (General vs. Zoning Bylaws):
While this text is organized as a general municipal bylaw requiring a simple majority vote at Town Meeting (under M.G.L. c. 40, § 21), communities may prefer to integrate these rules into their local zoning bylaws (under M.G.L. c. 40A). We strongly advise making this determination at the outset of the drafting process. Adopting these regulations under zoning requires compliance with the strict procedural mandates of M.G.L. c. 40A, § 5, which include formal Planning Board reviews, public notifications, and a two-thirds (2/3) supermajority vote — requirements that will alter your adoption timeline and community outreach strategy.

Furthermore, choosing the zoning path means pre-existing lighting is legally protected under M.G.L. c. 40A, §6. Consequently, communities opting for a zoning framework may not use the Amortization Option 2 in Section 3.3 as it is legally unenforceable under Massachusetts zoning law. Municipalities should consult closely with their town counsel to review the final draft and ensure proper formatting and compliance before initiating either legislative process.

Outdoor Lighting <Bylaw/Ordinance/Code> for <Municipality>, Massachusetts

1. Authority

This **<Bylaw/Ordinance/Code>** is adopted by the **<Town/City>** of **<Municipality>** 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 **<Municipality>**.

2. Purpose

[A bylaw or ordinance for outdoor lighting should first establish its purpose and intent. This information is important for future decision makers who may be faced with requests for revisions, and for adjudicators resolving legal disputes. Although a preamble and background narrative are not usually accepted as code or bylaw, they are an effective way to incorporate background and intent. Recitals must be factual, not general, and kept to a minimum.]

The **<City/Town>** of **<Municipality>** hereby finds and determines that the welfare and enjoyment of **<Municipality>** are associated with its **<rural/historic/natural>** character, including its nighttime ambience. It is recognized that *light pollution* is a *nuisance* to the residents of **<Municipality>** as it can negatively impact- human health and contributes to the loss of their night- sky heritage. Outdoor lighting that complies with the requirements of this **<Bylaw/Ordinance/Code>** will:

2.1. Minimize *light pollution* resulting from the use of outdoor lighting, especially blue light, which can cause negative effects on human health, road visibility, nocturnal organisms including birds, fish, turtles, bats, pollinators and other insects, and reduces agricultural yields;
2.2. Minimize *light trespass*, which negatively affects the enjoyment of property and disrupts the natural circadian rhythm of humans, wildlife and agriculture;
2.3. Control *glare* to support safe navigation for motorists, bicyclists, and pedestrians at night, as well as increasing **<Municipality>**'s safety and security;
2.4. Minimize *skyglow*, to preserve **<Municipality>** residents' ability to see the stars against a dark sky;
2.5. Provide adequate light for safe performance of outdoor tasks at night;
2.6. Promote efficient lighting to conserve energy, thereby reducing atmospheric carbon emissions and costs to the residents of **<Municipality>**.
2.7. Enhance the general well-being of the residents of **<Municipality>,** as well as the use and enjoyment of their property.

3. Applicability

3.1. Priority of Provisions. In case of conflict between any of the provisions of this **<Bylaw/Ordinance/Code>** or any other **<Municipality>** regulation, the most restrictive shall apply.
3.2. New Lighting. All exterior lighting being installed, altered, or replaced in **<Municipality>** after the effective date of this **<Bylaw/Ordinance/Code>** shall be in conformance with the requirements established by this **<Bylaw/Ordinance/Code>** and any other applicable **<Bylaw/Ordinance/Code>**.
3.3. Existing Lighting. All outdoor *luminaires* that were lawfully installed prior to the effective date of this **<Bylaw/Ordinance/Code>**, but that do not comply with the requirements of this **<Bylaw/Ordinance/Code>**, shall be considered legal and repairable but non-conforming. All non-conforming *luminaires* may continue to be used and maintained after the adoption of this **<Bylaw/Ordinance/Code>**, … *[Choose one of the two options below]*

***[Option 1:** nuisance determination only, otherwise all existing lighting is "grandfathered"]*
….but shall be brought into compliance with the requirements of the **<Bylaw/Ordinance/Code>** if a determination is made by the **<Municipal Employee>** that the *luminaire* constitutes a hazard to public safety or otherwise constitutes a *nuisance*.

***[Option 2:** Amortization option, no "grandfathering", all non-exempt lighting must comply after XX years]*
…..but shall be brought into compliance with the requirements of the **<Bylaw/Ordinance/Code>** upon the first to occur of any of the following:

3.3.1. A determination by the **<Municipal Employee>** that the *luminaire* constitutes a hazard to public safety or otherwise constitutes a *nuisance*.

3.3.2. The date is **<4/5/6/7/8/9 or 10>** years after the effective date of this **<Bylaw/Ordinance/Code>**.

4. Requirements

4.1. Shielding. Unless exempted elsewhere in this **<Bylaw/Ordinance/Code>**, all exterior *luminaires* with initial *lumens* exceeding 800 *lumens* shall be *zero uplight.*
[800 lumens is approximately the output of a 60-watt incandescent light bulb or a 9-watt LED light bulb.

Exceptions to the Shielding requirement:

1. *Luminaires* that are part of a historical registration site.
2. *Luminaires* that are approved by the municipality for use in commercial, central business, and entertainment corridors and have a *BUG Rating System* U rating of no greater than U2.
3. *Floodlight luminaires* installed on *Residential* properties that are controlled by a motion sensor, which extinguishes the light when no activity is detected.
4. *Festoon String Lighting* where no individual light emits more than 50 *lumens*, and the whole string no more than 25 *lumens* per foot.

4.2. Light Output**.**

4.2.1. The output of any luminaire installed on a *Residential* property shall not exceed fifteen hundred (1,500) *lumens*. The output of any *luminaire* on a nonresidential property shall not exceed five-thousand (5,000) *lumens*, except as otherwise permitted by this **<Bylaw/Ordinance/Code>**.

4.2.2. *Illuminance* on *Non-residential* properties and public rights of way shall not exceed the values recommended by the *Illuminating Engineering Society (IES)* for the specific application by more than 50%, unless in the judgment of the **<Municipal Employee>** there are extenuating circumstances related to safety or security that justify an exemption.

4.3. Nuisance. No exterior *luminaire* installed within **<Municipality>** shall create a lighting *nuisance* in the form of *light trespass* or *glare*.

4.3.1. Light trespass. The maximum vertical *illuminance* at a property line that is adjacent to a residential property shall not exceed 0.3 *footcandles* when measured 15 ft. inside the property/easement line or at the dwelling façade, whichever distance is closest to the property/easement line. The

maximum vertical *illuminance* at a property line that is adjacent to a federal or state wilderness, legally recognized natural conservation area, or other areas designated for environmental protection shall not exceed 0.03 *foot-candles*. The **<Municipal Employee/Board>** may grant exceptions due to extenuating circumstances related to safety and security.

4.3.2. Glare. *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 **<Municipal Employee>** through a site visit and a visual inspection.

[The lighting industry recognizes that glare is a common problem with high-output outdoor luminaires because it can induce discomfort or even temporary disability. However, lighting professionals have not yet established a quantitative method for defining or measuring glare, so any determination that it constitutes a hazard to public safety will necessarily be qualitative.]

4.4. Color temperature. The *correlated color temperature (CCT)*, of the light emitted by the luminaires shall not exceed 2700 K unless introduced as part of a façade or landscape lighting scheme used exclusively for the decorative illumination through color of certain building façade, landscape features or holiday lighting. If a *luminaire* with a *CCT* of 2700 K or lower is unavailable, then a *luminaire* with a *CCT* of 3000 K may be used. Exceptions may be made for color temperatures higher than 3000K if a public safety need demonstrated and supported by cited documentation. *[Blue-rich light (>3000 K) scatters far more in the atmosphere than warmer light, which will lead to more skyglow.. This veil of sky glow reduces the visibility of stars within the natural nighttime sky, and the increased illumination may disrupt biological and ecological health. 2700 K is a commonly available color temperature, especially in residential lighting.]*

4.5. Outdoor accent lighting. In addition to the requirements of 4.1 ,4.2, 4.3, and 4.4, the lighting of landscaping, monuments, plaques, flagpoles, landscape features and building facades, shall be focused directly at the target so that the *luminaire* does not create a *nuisance*, and shall be designed and installed so that the *luminaire* points downward toward the target where possible, and emits no more light than is necessary for the task. Any lighting that is specifically and only for the lighting of walkways, paths, and stairs, for safety, is not considered outdoor accent lighting.

4.5.1 All such lighting, except for the lighting of the Flag of the United States, shall be turned off at 10:00 p.m. or within one (1) hour of a business or building's closing time, whichever occurs later.

[Optional requirement 4.5.2 further limits output of Outdoor Accent Lighting. The additional complexity and stringency of this option is not typically needed, but may be appropriate where excessive landscape and facade lighting is a specific problem.]

4.5.2 *[Optional]* Outdoor accent lighting shall be limited to luminaires with output not exceeding two hundred and fifty (250) *lumens* and shall not exceed, in total, two thousand (2,000) *lumens* for *Residential* properties and four-thousand (4,000) *lumens* for *Non-residential* properties.

4.6. Streetlights. This section applies to streetlighting installed within a public right of way. In addition to the requirements of 4.1, 4.2, 4.3, 4.4 each such luminaire shall conform to the following additional requirements:

4.6.1. The luminaire as installed must not exceed the *BUG rating* (as provided by the

manufacturer) of B1, U0, and G2. Exceptions to this requirement may be granted by the **<Planning Board or appropriate alternative>**for installation of decorative or historically designed streetlighting.

4.6.2. If **<Municipality>** or a utility company proposes the installation of streetlighting that involves the replacement or addition of more than ten (10) *luminaires* emitting at least 2000 *lumens* per *luminaire*, then the **municipality** must seek public comment prior to installation so as to mitigate unforeseen negative impacts. Specifically, as part of the public-comment process, the project proponent must provide a demonstration installation of at least three (3) *luminaire* options and include at least one option with a *CCT* of less than 2700 K.

4.8 Lighting Plans.

All applications for a building permit for construction that includes exterior lighting shall include lighting plans showing the location, mounting height, *correlated color temperature (CCT)*, *lumen* output, *BUG rating* (if applicable), and shielding description of all proposed *luminaire*s. Additionally for *Non-Residential* property, the lighting plan must include the proposed schedule of use for the lighting controls, and a photometric calculation plan that demonstrates compliance with the light level requirements in 4.2.2. The **<Municipal Employee/Board>** shall have the authority to request additional information in order to confirm compliance with the provisions of this **<Bylaw/Ordinance/Code>**.

5. Exemptions

The following are exempt from compliance with all provisions of this **<Bylaw/Ordinance/Code>**, except as noted:

5.1. Emergency lighting, only for as long as emergency conditions so identified by public-safety or other municipal personnel continue to exist. This includes the activities of law enforcement, fire and other emergency services.

5.2. 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.

5.3. Any form of lighting whose use is mandated or otherwise governed by any legal jurisdiction with broader authority to that of **<Municipality>**.

5.4. Temporary lighting for events sponsored by **<Municipality>** or for which a license or other approval has been issued, such as concerts, fairs, and festivals.

5.5. Outdoor lighting that is portable, temporary, decorative, and used in connection with holidays and traditions. *[Optional additional clause to restrict period of use]* if it is used beginning no more than six (6) weeks prior to the holiday and ending no more than two (2) weeks following the holiday are unshielded.

5.6. *[5.6 Option 1]* Lighting of athletic fields on *non-residential* properties, provided that the lighting is turned off within one (1) hour after the end of play or 10 p.m., whichever occurs later.

5.6. *[5.6 Option 2, exempts athletic field lighting only if it meets DarkSky Sports Lighting requirements. Note that this is not a simple requirement, so be careful about adopting. How will it be verified that the lighting meets the requirements? What is the enforcement and verification method?]* Lighting of athletic fields on *non-residential* properties provided that the lighting of the athletic field meets the requirements of the most recent version of DarkSky International's Outdoor Sports Lighting Guidelines and is turned off within one (1)

hour after the end of play or by <**10 p.m.>**, whichever occurs sooner.

6. Enforcement

6.1. Administrative guidance. The **<Municipal Employee>** is authorized to promulgate one or more interpretive documents to aid in the administration and enforcement of this **<Bylaw/Ordinance/Code>**. The owner of any lot or property on which a *luminaire* subject to this **<Bylaw/Ordinance/Code>** is located or proposed to be located shall have the burden of demonstrating that the existing or proposed luminaire complies with the standards established by this **<Bylaw/Ordinance/Code>**. 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 *zero uplight* 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. The owner of any lot or property on which a *luminaire* or sign subject to this **<Bylaw/Ordinance/Code>** is located or proposed to be located shall have the burden of demonstrating that the proposed *luminaire* or sign complies with the standards established by this **<Bylaw/Ordinance/Code>**. A site visit at night by the **<Municipal Employee>** for purposes of a visual observation and/or photograph may be required to determine compliance.
[For general bylaws, the Town has total freedom to designate any municipal department or official to administer the bylaw. Note that your municipality might already have a separate regulation with requirements specifically for signs, and that regulation might include requirements for illuminated signs. If so, care must be taken to not conflict with existing regulations - speaking with town counsel or your planning board early on in the process will help you navigate such conflicts. Zoning bylaws must be administered and enforced by a designated Zoning Enforcement Officer (typically the local Building Commissioner or Inspector). Violations must go through a formal appeal process to the local Zoning Board of Appeals (ZBA) before anyone can take the matter to court.]

6.2. Violations. It shall be unlawful to install or operate any outdoor lighting *Luminaire* in violation of any provision of this **<Bylaw/Ordinance/Code>**. This **<Bylaw/Ordinance/Code>** may be enforced by the **<Municipal Employee>**, any applicable Town board or any municipal public safety officer.

6.3. Relief and Penalties. The **<Municipal Employee>** is authorized and empowered to institute and maintain, in the name of the **<Municipality>**, any and all enforcement proceedings seeking injunctive relief and any other appropriate remedy, including fines and penalties. This **<Bylaw/Ordinance/Code>** 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.

6.4 The **<Municipal Employee>** charged with enforcing this code shall have the authority to grant partial waiver of specific requirements for up to one year if a property owner demonstrates that compliance creates unreasonable hardship, as balanced against the potential impacts of non-compliance, or results in conditions that are materially detrimental to health, safety or welfare.

7. Definitions

***BUG rating system*:** An industry standard lighting classification system defined in IES TM-15-20 Addendum A which quantifies the *light pollution* contributions from commercial *luminaires* used for streetlighting and lighting of *non-residential* properties.

Correlated Color Temperature (CCT): A specification of the color appearance of the light emitted by a white light source, measured in Kelvin (K). Low-CCT light sources emit much less short-wavelength "blue" light than equivalent output high-CCT sources do. CCT values are typically provided on product packaging or manufacturer data sheets

Festoon String Lights: A decorative lighting fixture consisting of evenly spaced bulbs along a cable which is suspended between poles or other structures.

Floodlight Luminaire: A luminaire that projects a high-intensity, wide beam of light and can be aimed to direct the beam in a specific direction. Due to the ability to adjust the aiming direction and the lack of shielding, floodlights are inherently not *zero uplight.*

Foot-candle: A standard measurement of *Illuminance*. One (1) foot-candle (fc) is defined as enough light to uniformly illuminate one square foot (1 ft^2) with one (1) *lumen*. For example, the full Moon casts 0.01 fc.

Glare: Intense and harsh light emitted by a luminaire that reduces visibility and creates visual discomfort and/or momentary visual impairment.

Illuminance: Density of luminous flux incident on a surface, often measured on horizontal or vertical surfaces in *foot-candles*.

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

Light pollution: Artificial light at night emitted into the outdoor environment that adversely affects humans, wildlife, ecosystems, or the natural visibility of the night sky.

Light trespass: Any light emitted by a luminaire that shines beyond the property on which the luminaire is installed and increases the *Illuminance* as measured at the lot line in *foot-candles*.

Lumen: A unit of the amount of light emitted by a light source defined as; the flux emitted within a unit solid angle by a point source with a uniform luminous intensity of one candela. Lumen values are typically provided on product packaging or lighting manufacturer data sheets.

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

Non-Residential: Properties that are not *Residential*
[If needed, the municipality could revise this definition to follow their specific zoning regulations and land use planning]

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

Residential: Properties that solely include detached single-family homes and/or multiple-family buildings not more than three stories in height above grade.

[If needed, the municipality could revise this definition to follow their specific zoning regulations and land use planning. If revising this definition, make sure you do not inadvertently apply the non-residential requirements to small multi-family buildings]

Zero Uplight: An installed Luminaire that does not have visible light source emission at or above a horizontal plane passing through the lowest light-emitting part of the Luminaire; or any Luminaire with a *BUG Rating System* U rating of no greater than U0.

8. Effective Date

The effective date of the adoption or amendment of this chapter shall be **<Date>**. If such adoption or amendment is subsequently disapproved, in whole or in part, by the Attorney General, this chapter as it would have read without the disapproved portion of the adoption or amendment so voted, shall be deemed to have continued in effect from the date stated above.

9. Severability

The provisions of this chapter are hereby declared to be severable and, if any provision or the application of such provision to any property, person or circumstance shall be determined to be invalid, such invalidity shall not be construed to affect the validity of any other provision hereof or the application of any provisions to any other property, person, or circumstances. The invalidity of any section or provision of this chapter shall not invalidate any other section or provision thereof.