

## **Lighting Bylaw**

### Article VI General Regulations – Section 6200 Landscaping, Screening and Outdoor Lighting

#### 6204 Lighting

Outdoor lighting from any source, including sign illumination, shall be continuous white light installed in such manner or shielded so as to cast no direct beam on a public way, pedestrian way, or on adjacent property or cause a glare or reflection that may constitute a traffic hazard or a nuisance. Uplighting of landscaping, the operation of search lights for advertising purposes, and the use of building floodlighting (except for floodlighting used on public safety buildings) are prohibited.

1. To prevent unnecessary sky glow and other glare, particularly **but not limited to** that interfering with astronomical research, all outdoor lighting fixtures shall be shielded from above so **that as to prevent direct glare from the light source from interfering with the vision of motorists or pedestrians passing in the street or streets abutting the premises and as to prevent direct glare from the light source from lighting neighboring properties, particularly residences.**
  - a. all illumination is restricted to an area 15 degrees below the horizontal, and
  - b. except for street lights, direct rays from the light source are confined to the property boundaries.
2. High pressure sodium lamps shall not be used.
3. Customary holiday lighting and lamps of low luminosity and low intensity serving primarily as markers or as low level illumination for entrances and exits or similar use need not be shielded. Requirements for shielding, filtering and type of light need not be met for emergency lighting required by a public agency in the performance of its duties.
4. Outdoor lighting shall be of substantially minimum intensity needed at the particular time; parking area lighting, in particular, shall be reduced or eliminated outside business hours. Materials, such as blacktop, which reflect a relatively small fraction of incident light, shall be the surface preferred for lighted areas.
5. The mounting height of lighting fixtures shall not exceed 30 feet above the ground plane.
6. **All artificial lights used to illuminate tennis or paddle tennis courts, swimming and wading pools and other private recreation areas shall be extinguished not later than 11:00 p.m.**

#### 6205 Exemption

Any lighting fixture in existence on June 8, 1976, shall be exempt from these conditions.

#### 6300 Signs

##### 6301 Purpose

The purposes of this section of the Zoning Bylaw are to promote the public health, safety, and welfare of users of Boxborough's streets, roads, and highways; to prevent visual distractions and obstructions from signs which can create traffic hazards; to enhance the visual quality of signage; to provide for adequate identification of the occupants and/or use of the premises; and to limit indiscriminate advertising.

##### 6302 Administration

No sign shall be erected, displayed, altered, or enlarged until an application has been filed and a permit for such an action has been issued. All applications for signs shall include a scale drawing specifying dimensions, materials, illumination, letter sizes, colors, support systems and location on land or buildings, with all relevant measurements. Whenever a sign is proposed for a residential subdivision or on a building requiring site plan approval, the sign location, size, and illumination shall be approved by the Planning Board prior to the issuance of a sign permit by the Inspector of Buildings. Unless otherwise specified, sign permits shall be issued by the Inspector of Buildings if it is determined that the sign complies with all applicable sections of this Bylaw and the State Building Code, Article 14.

### 6303 General Requirements

3) Sign Illumination. Any illuminated sign shall employ only white light of constant intensity and shall conform with Section 6200 of this Bylaw. No sign shall be illuminated for more than 30 minutes before opening or after the closing of any store or business. Internally lit signs are discouraged in Industrial-Commercial, Business and Office Park Districts and are prohibited in the Agricultural-Residential and the Town Center District.

4) Except as otherwise provided herein, illumination for any SIGN shall be provided through a stationary external light source, with the light projected downward from above. In no case shall the illumination of a SIGN cause blinding or otherwise obstruct the safe vision of any traffic participant anywhere. SIGN illumination through an external source shall always be white or off-white.

5) The following types of SIGNS with internal or quasi-internal illumination shall be permitted, provided that they comply with all applicable standards of the previous section. The word "opaque" as used in the following Sub-Sections shall mean that the opaque object shall appear black when the sign is lit at night.

a) NEON or LED SIGNS, such signage shall not be illuminated longer than 30 minutes before opening of after closing of the store or business.

b) Opaque INDIVIDUAL LETTER SIGNS or symbols, back-lit with a white and concealed light source, thereby creating an effect by which the letters or symbols are silhouetted against a wall illuminated by said light source.

c) SIGNS featuring individual letters or symbols which are cut out from an opaque facing and back-lit with a white and concealed light source, thereby creating an effect by which the facing, from which the letters or symbols are cut out, is silhouetted against a wall illuminated by said light source.

d) Back-lit AWNING SIGNS with the light source internal or concealed from public view.

e) INDIVIDUAL LETTER SIGNS with translucent letter faces, internally illuminated with a soft-glow light source; or SIGNS with an opaque SIGN face with cutout translucent letter surfaces which are internally illuminated with a soft-glow light source.

8) The DISPLAY AREA of an illuminated SIGN shall not exceed an average illuminance of 50 foot-candles measured directly on the surface of the SIGN.

9) Where possible, the light fixtures used for SIGN illumination should be classified as "energy efficient", as defined by the power utility company serving the LOT.

#### 6304 Prohibited Signs

(2) No sign shall contain or be lighted by, any moving, flashing or animated lights, or visible moving parts excepting portions of signs that may indicate the time of day, or the outdoor temperature for information of the general public.

#### 6305 Exemptions

The following signs shall not require a sign permit.

4) Temporary non-illuminated political signs.

7) Signs associated with an agricultural use as defined in MGL c.40A, §3, offering for sale produce and other products, provided the following:

f) The sign is not illuminated or inflatable.

11) Temporary signs associated with a retail business, provided the following:

g) The sign is not illuminated or inflatable and does not have any moving parts.

#### 6306 Signs Permitted in Residential Districts shall include:

4) One non-illuminated subdivision identification sign per street entrance provided that the sign shall not exceed ten (10) square feet in area per side.

Outdoor Lighting Regulations for Special Permit – Developments and redevelopments requiring a Special Permit or an amendment thereof, shall comply with the standards for outdoor lighting and may require additional review/recommendation as deemed necessary by the Planning Board.

#### ADD DEFINITIONS

- CANOPY - an opaque ceiling over installed lighting.
- CUTOFF (CO) – A LUMINAIRE light distribution, specified by the IESNA, where the intensity in candela per 1000 LAMP lumens does not numerically exceed 25
- (2.5%) at a vertical angle of 90 degrees above nadir, and 100 (10%) at a vertical angle of 80 degrees above nadir. Nadir is the point directly vertically below the LUMINAIRE. A FULL CUTOFF (FCO) LUMINAIRE is also a CUTOFF LUMINAIRE.
- DIRECT LIGHT – Light emitted directly from the LAMP, from the reflector or reflector diffuser, or through the refractor or diffuser lens of a LUMINAIRE.
- FOOT CANDLE (fc) – Unit of ILLUMINANCE; One lumen per square foot.

- FULL CUTOFF (FCO) – A LUMINAIRE light distribution, specified by the IESNA, where zero candela intensity occurs at an angle of 90 degrees above nadir, and at all greater angles from nadir. Additionally, the candela per 1000 LAMP lumens does not numerically exceed 100 (10%) at a vertical angle of 80 degrees above nadir. Nadir is the point directly vertically below the LUMINAIRE. A FCO LUMINAIRE is FULLY SHIELDED.
- FULLY SHIELDED – Constructed in such a manner that no light emitted by the fixture, either directly from the LAMP or a diffusing element, or indirectly by reflection or refraction from any part of the LUMINAIRE, is projected above a horizontal plane passing through the lowest direct-light-emitting part of the LUMINAIRE (Figure 1). BUILDING CANOPIES, overhangs, roof eaves and similar types of construction shall not be considered as the means for providing the FULLY SHIELDED light cut-off characteristic. This shall be achieved by the LUMINAIRE itself (Figure 5).
- GLARE – The sensation of visual discomfort or loss in visual performance and visibility produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted.
- INDIRECT LIGHT – DIRECT LIGHT that has been reflected off the surface of any permanently constructed object other than the source LUMINAIRE.
- IESNA or IES – Illuminating Engineering Society of North America. A professional association of lighting engineers and lighting manufacturers generally recognized as the definitive source for illumination recommendations in the United States. An IES photometric file is defined by IESNA standards.
- ILLUMINANCE – The luminous flux incident per unit area, expressed in FOOT CANDLE (one LUMEN per square foot). Horizontal or vertical ILLUMINANCE is that measured with a photometer cell mounted horizontally or vertically.
- LAMP – The light source component of a LUMINAIRE that produces the actual light.
- LIGHT EMITTING DIODE (LED) - Any LUMINAIRE composed on an array of LEDs, typically a bank of 30, 60 or 90, used as a light source.
- LIGHT TRESPASS – DIRECT or INDIRECT LIGHT produced by an artificial light source and which shines outside the boundaries of the LOT containing the LUMINAIRE.
- LUMINAIRE – A complete OUTDOOR LIGHTING unit or fixture including 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 supply, but not including a pole on which the LUMINAIRE may be mounted.
- OUTDOOR LIGHTING – The night-time illumination of an outside area or object by a LUMINAIRE located outdoors. LUMINAIRES under a CANOPY are considered outdoor lights and are regulated by this Bylaw.
- OUTDOOR SALES AREA – A static display of goods for sale at night, such as automobile sales lots, landscaping and nursery businesses, outdoor construction materials sales lots, and outdoor activity areas such as miniature golf, family fun centers, and permanent swap meets. An OUTDOOR SALES AREA location is not covered by CANOPIES or other STRUCTURES.
- SHIELDED – A LUMINAIRE employing a shield to prevent GLARE. The LUMINAIRE shall have a generally downward distribution of light and must have a top shield to minimize upward light.
- STREETLIGHTS – LUMINAIRES installed within a STREET and intended primarily for the illumination of the STREET.

- UP-LIGHTING – DIRECT LIGHT illumination distributed above a 90 degree horizontal plane through the lowest DIRECT LIGHT emitting part of the LUMINAIRE.

Figures and Tables

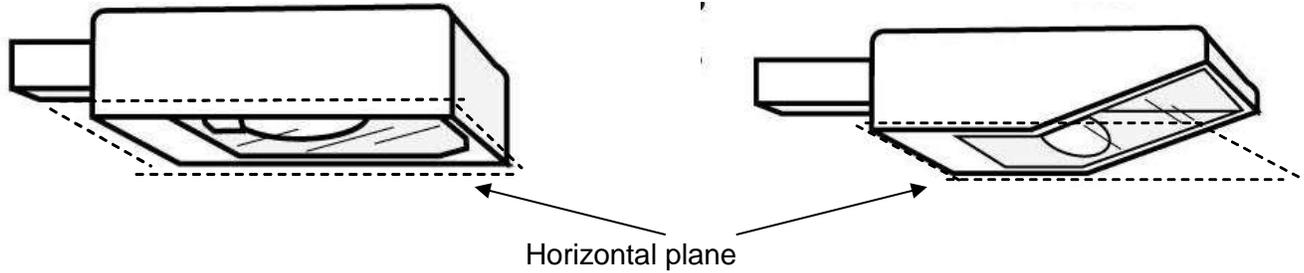
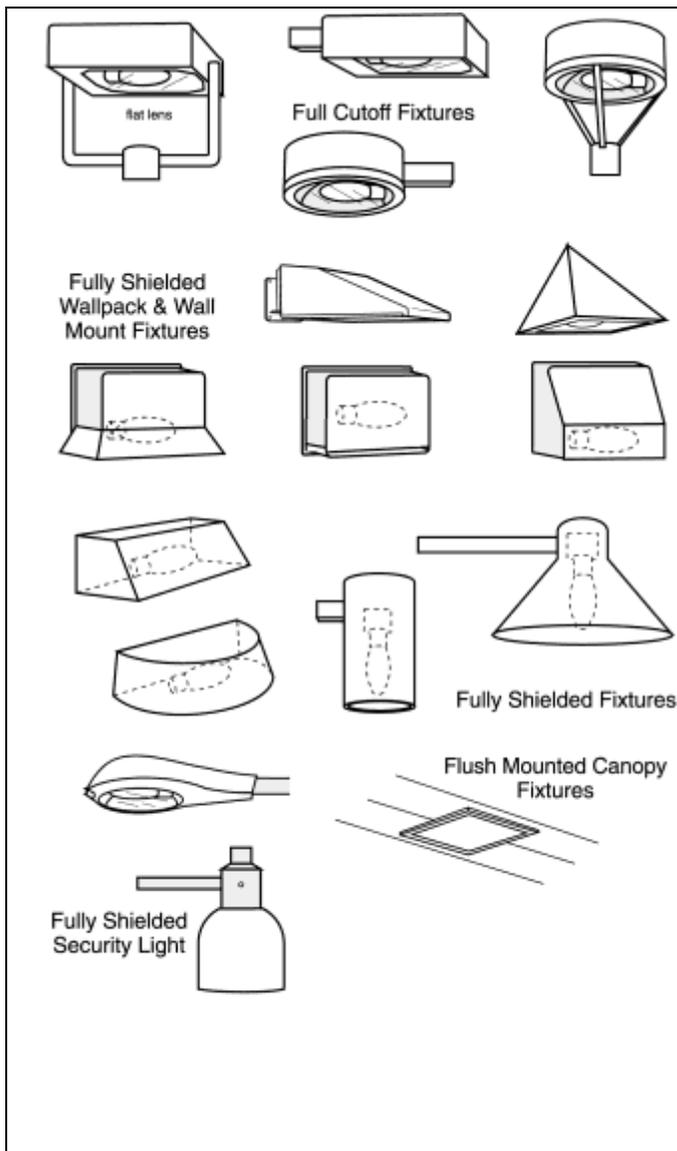


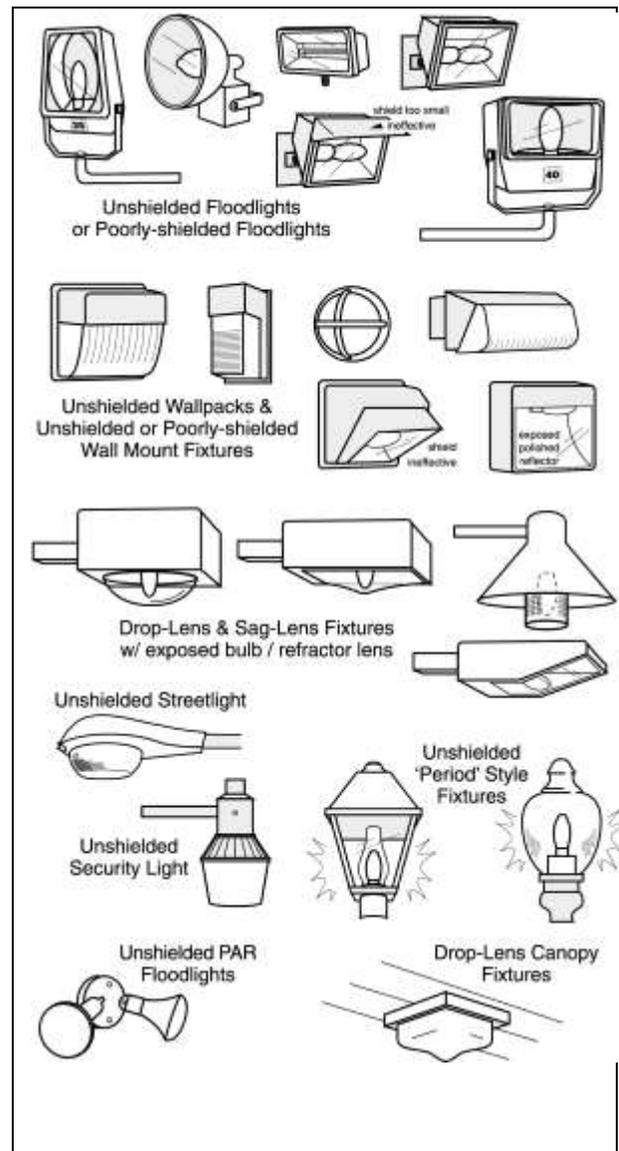
Figure 1A. FULLY SHIELDED. No light emitted above a horizontal plane through the lowest DIRECT-LIGHT-EMITTING part of LUMINAIRE.

Figure 1B. Not FULLY SHIELDED. Light is emitted above a horizontal plane through the lowest DIRECT-LIGHT-EMITTING part of LUMINAIRE.

Examples of FULLY SHIELDED LUMINAIRES



Examples of LUMINAIRES that are NOT FULLY SHIELDED



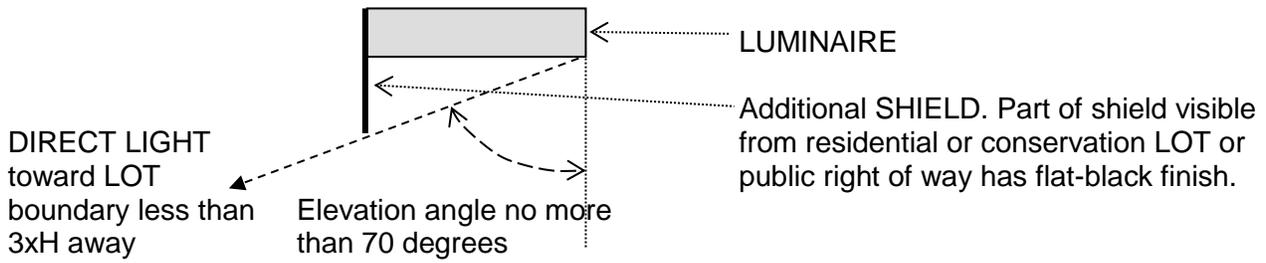


Figure 2. Any outdoor LUMINAIRE whose distance from the LOT boundary is less than three times its height shall be shielded so that all DIRECT LIGHT cast in the direction of residential or conservation LOTS and public rights-of-way is cut-off at an angle no more than 70 degrees measured from a vertical line directly below the LUMINAIRE.

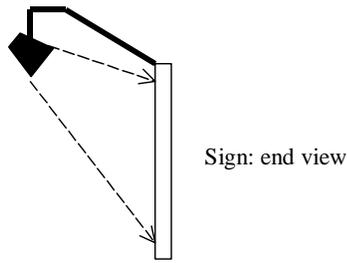


Figure 3. Lighting for externally illuminated signs shall be projected downward from above. The LUMINAIRE shall be SHIELDED and shall comply with Section 3.2 (Control of LIGHT TRESPASS and GLARE).

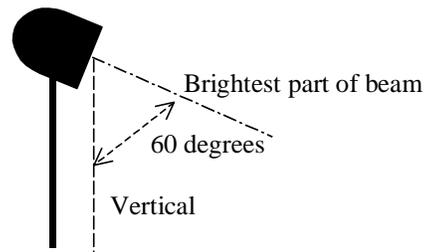


Figure 4. Illumination for outdoor recreational facilities shall be SHIELDED LUMINAIRES and shall be mounted at sufficient height and aimed so that the brightest part of the beam is elevated no more than 60 degrees above a point directly vertically below the LUMINAIRE

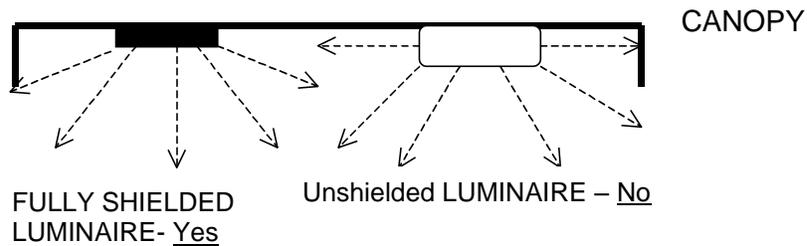


Figure 5. Building canopies, overhangs, roof eaves and similar types of construction shall not be considered as the means for providing the light cutoff. The cutoff characteristics shall be achieved by the LUMINAIRE itself.

Table 1. LUMINAIRES whose LAMP wattage exceeds the values in Column A of this table shall be SHIELDED. LUMINAIRES whose LAMP wattage exceeds the values in Column B of this table shall be FULLY SHIELDED.

Lamp type	A – SHIELDED	B – FULLY SHIELDED
Incandescent, Halogen	60 w	120 w
High Pressure Sodium, Metal Halide, Mercury Vapor, other HID	35 w	35 w
Fluorescent, Low Pressure Sodium	13 w	20 w
LED30 (<3000K)	-	70 W
LED60 (<3000K)	-	135 W
LED90 (<3000K)	-	205 W