

## SECTION 12 OUTDOOR LIGHTING

### 12.1 Objectives

Purpose and Intent The purpose of this by-law is to create standards for outdoor lighting so that its use does not unreasonably interfere with the reasonable use and enjoyment of property within Winchester. It is the intent of this section to encourage, through the regulation of the types, construction, installation and uses of outdoor electrically powered illuminating devices, lighting practices and systems which will (i) reduce light pollution, light trespass and glare in order to preserve and enhance the natural, scenic, and aesthetic qualities of Winchester, (ii) conserve energy and decrease lighting cost without decreasing nighttime safety, security, and productivity, and (iii) preserve the night sky as a natural resource to enhance nighttime enjoyment of property within Winchester.

### 12.2 Applicability, Terminology

12.2.1 The requirements of this section shall apply to the following zoning districts:

PRD, RB, BL, CBD, GBD, IL, SCI and RA

12.2.2 The requirements of this section shall not apply to the following:

- a. Municipal Lights. Municipal street lighting, lights that control traffic or other lighting for public safety on Town streets and ways.
- b. Fossil Fuel Light. All outdoor light fixtures producing light directly by the combustion of natural gas or other fossil fuels.
- c. Other Light Sources. All outdoor light fixtures using an incandescent lamp or lamps of 150 watts or less. All outdoor light fixtures using any non incandescent lamp or lamps of 50 total watts or less.
- d. Zoning districts RDA, RDB, RDC and RG.
- e. Temporary decorative lighting which may include colored lamps, such as holiday lighting.
- f. Houses of Worship.

12.2.3 Prohibited Light Sources. The following light sources are prohibited:

1. Neon Lights.
2. Mercury Vapor and Quartz Lamps

3. Searchlights. The operation of searchlights is prohibited.

#### 12.2.4 TERMINOLOGY

In addition to the terms defined in Section 9, Definitions, of this By-Law, the following words, which are technical terms applying to lighting, which are set forth below, shall have the meaning indicated below. Although set forth here for convenience, the terms shall have the same effect as if set forth in Section 9, Definitions.

**COLOR RENDERING INDEX (CRI) :** A measurement of the amount of color shift that objects undergo when lighted by a light source as compared with the color of those same objects when seen under a reference light source of comparable color temperature. CRI values generally range from 0 to 100, where 100 represents incandescent light.

**COLOR TEMPERATURE :** Color Temperature or Chromaticity refers to the color appearance of the light that comes from a light source, also referred to as Correlated Color Temperature (CCT). The apparent color of a light source is measured in degrees Kelvin or "K".

A low color temperature corresponds to 'Warm.' Incandescent lamps are in the range of 2700 degrees K.

'Cool' light comes from sources such as cool white fluorescent lamps operating at 4100 degrees K. Lights appear bluer above 4100 degrees K.

**CUTOFF ANGLE :** The angle formed by a line drawn from the direction of the direct light rays at the light source with respect to the vertical, beyond which no direct light is emitted.

**DIRECT LIGHT :** Light emitted from the lamp, off the reflector or reflector diffuser, or through the refractor or diffuser lens, of a luminaire.

**EFFICACY :** Efficacy is the rate at which a lamp is able to convert electrical power (watts) into light (lumens), expressed in terms of lumens per watt.

**FILTERED :** When referring to an outdoor light fixture means that the fixture is to be fitted with a glass, acrylic, or other translucent enclosure of the light source.

**FIXTURE :** The assembly that houses a lamp or lamps, and which may include a housing, a mounting bracket or pole socket, a lamp holder, a ballast, a reflector or mirror, and/or a refractor, lens, or diffuser lens.

**FULLY-SHIELDED LUMINAIRE :** A lamp and fixture assembly designed with a cutoff angle of 90 degrees, so that no direct light is emitted above a horizontal plane.

**GLARE :** Light emitted from a luminaire with an intensity great enough to produce annoyance, discomfort, or a reduction in a viewer's ability to see.

HEIGHT OF LUMINAIRE : The vertical distance from the finished grade of the ground directly below to the lowest direct light emitting part of the luminaire.

INDIRECT LIGHT : Direct light that has been reflected off other surfaces.

LAMP : The component of a luminaire that produces the actual light.

LIGHT TRESPASS : The shining of direct light produced by a luminaire beyond the boundaries of the lot or parcel on which it is located.

LUMEN : A measure of light energy generated by a light source. One foot candle is one lumen per square foot. For purposes of this By-Law, the lumen output shall be the initial lumen output of a lamp, as rated by the manufacturer.

LUMINAIRE : A complete lighting system, including a lamp or lamps and a fixture.

SHIELDED : When referring to an outdoor light fixture means that the fixture allows no up-light.

UP-LIGHT : Means direct light emitted by an outdoor light fixture above a horizontal plane through the fixture's lowest light emitting part.

12.3 (Reserved)

12.4 (Reserved)

12.5 State Building Code

State Board of Building Regulations and Standards (the Massachusetts State Building Code): 780 CMR 1313.0, Lighting systems. Applicability. The Outdoor Lighting By-Law, Section 12, shall be administered in conformance with this code, to determine minimum standards. However, the express provisions contained in Section 12 shall govern in all respects.

12.6 Lighting Plan

12.6. 1 Wherever outside lighting is proposed, every application for a building permit, a special permit, a special permit with site plan review, a variance, or an electrical permit, shall be accompanied by a lighting plan which shall show:

- a. the location and type of any outdoor lighting luminaires, including the height of the luminaire;
- b. the luminaire manufacturer's specification data, including lumen output and photometric data showing cutoff angles;
- c. the type of lamp such as: metal halide, compact fluorescent, high pressure sodium with

color temperature (Kelvin) and CRI indicated;

d. a photometric plan showing the intensity of illumination at ground level, expressed in foot candles; and

e. that light trespass onto any street or abutting lot will not occur. This may be demonstrated by manufacturer's data, cross section drawings, or other means.

12.6.2 When an existing outdoor lighting installation is being modified, extended, expanded, or added to, the entire outdoor lighting installation on the lot shall be subject to the requirements of this section.

## 12.7 Control Of Glare And Light Trespass

12.7.1 All outdoor light fixtures subject to this by-law shall be shielded.

12.7.2 All outdoor light fixtures using a metal halide lamp or lamps shall be shielded and filtered. Filtering using quartz glass does not meet this requirement.

12.7.3 Any luminaire with a lamp or lamps rated at a total of more than 2000 lumens shall be of fully shielded design and shall not emit any direct light above a horizontal plane passing through the lowest part of the light emitting luminaire.

12.7.4 All luminaires, regardless of lumen rating, shall be equipped with whatever additional shielding, lenses, or cutoff devices are required to eliminate light trespass onto any street or abutting lot or parcel and to eliminate glare perceptible to persons on any street or abutting lot or parcel.

12.7.5 Paragraph 12.7.1, above, shall not apply to any luminaire intended solely to illuminate any freestanding sign or the walls of any building but such luminaire shall be shielded so that its direct light is confined to the surface of such sign or building.

12.7.6 All lamps subject to this by-law shall have a minimum color temperature of 2000 degrees K and a maximum color temperature of 3700 degrees K.

## 12.8 Lamps

12.8.1 Lamp types shall be selected within the allowable color temperature range of 2000 to 3700 degrees Kelvin, for optimum color rendering as measured by their color rendering index (CRI), as listed by the lamp manufacturer.

**EFFICACY:** The use of highly efficient lamp sources, in conformance with this by-law is encouraged.

## 12.9 Hours Of Operation

12.9.1 Outdoor lighting shall not be illuminated between 11 p.m. and 6 a.m. with the following exceptions:

- a. if the use is being operated, such as a business open to customers, or where employees are working or where an institution or place of public assembly is conducting an activity, normal illumination shall be allowed during the activity and for not more than one half hour after the activity ceases;
- b. low level lighting sufficient for the security of persons or property on the lot may be in operation between 11:00 p.m. and 6:00 a.m., provided the average illumination on the ground or on any vertical surface is not greater than 0.5 foot candles.

#### 12.10 Special Permits

In accordance with Section 3, the Board of Appeals, acting as the special permit granting authority, may grant a special permit modifying the requirements of this Section, provided it determines that such modification is consistent with the objectives set forth in paragraph 12. 1, in the following cases:

- a. where an applicant can demonstrate by means of a history of vandalism or other objective means, that an extraordinary need for security exists;
- b. where an applicant can show that conditions hazardous to the public, such as steep embankments or stairs, may exist in traveled ways or areas;
- c. where a minor change is proposed to an existing non-conforming lighting installation, such that it would be unreasonable to require replacement of the entire installation;
- d. where it can be demonstrated that for reasons of the geometry of a lot, building, or structure, complete shielding of direct light is technically unfeasible.