

**FOR THE CONTROL OF LIGHT POLLUTION
SCHEDULE “B” TO ZONING BYLAW 8200**

TERMINOLOGY

For purposes of these standards the following terminology applies:

Outdoor Light Fixtures • means outdoor artificial illuminating devices, installed or portable, used for flood lighting , general illumination or advertisement. Such devices shall include, but are not limited to, search, spot, floor, and area lighting for:

- (a) buildings and structures
- (b) recreational facilities
- (c) parking areas
- (d) landscape illumination
- (e) outdoor advertising displays, billboards, signs
- (f) public & private streets, and
- (g) walkways

Fully Shielded • means outdoor light fixtures shielded or constructed so that light rays emitted by the fixture are projected below the horizontal plane passing through the lowest point on the fixture from which light is emitted.

Partially Shielded • means shielded so that the lower edge of the shield is at or below the centre line of the light source or lamp so as to minimize the light transmission above the horizontal plane, so that at least ninety percent (90%) of the emitted light projects below the horizontal plane as evidenced by the manufacturer’s photometric data.

Unshielded • means fixtures lacking any means to restrict the emitted light to below the horizontal plane.

Average Maintained Horizontal/Vertical Illuminance • means a standard of measurement employed by the Illuminating Engineering Society of North America to calculate the average density of luminous flux incident on a surface when measured at different locations on the surface affected by the lamp.

APPLICATION

1. These standards apply to all developments other than single family, and two-family dwellings and agricultural uses in rural areas.
2. All plans for building and/or Development Permits noted in Section 1 submitted to the Municipality for projects located within 5 km of the Dominion Astrophysical Observatory shall include the following:
 - a) Location and type of all exterior lights including internally or externally illuminated signs.
 - b) Catalogue descriptions and specifications of lights to be used including lamp types and table or large scale plots showing the photometric distributions from the nadir to the zenith in the vertical plane.
 - c) Tables or plots of the calculated horizontal illumination levels on the illuminated portion of the applicant’s property or the calculated mean horizontal illuminance for the illuminated portion of the property.

- d) Tables or plots of the calculated vertical illumination levels on the specially illuminated wall or the calculated mean vertical illuminance for these walls.
- e) Descriptions or provisions, if any, to reduce the illumination from “operational” or “security” levels after 2300 hours or the close of business, whichever is later. This does not apply to residential developments.
- f) Certification that the building does not contain any architectural features, eg. skylights that will allow an unusual amount of light to escape to the sky from the interior of the building, or, description of the steps that have been taken to prevent light escaping directly ie;, without reflection, to the sky through such architectural features.
- g) Applicants to provide information indicating the lighting plan has been considered and approved by the Dominion Astrophysical Observatory.

Note: The foregoing information is not necessary for projects that are located outside of the 5 km radius of the Dominion Astrophysical Observatory, however, all outdoor lighting fixtures shall comply with the shielding requirements contained in Section II and Table “A” of these standards.

LIGHTING STANDARDS

I WAVELENGTH DISTRIBUTION OF RADIANT ENERGY

1. Except as noted in Section 1(2) & 1(3), the wavelength distribution of light emitted by all outdoor light fixtures shall minimize interference with the Dominion Astrophysical Observatory and comply with the specifications contained in Note #1. The effect of this regulation is to prohibit the use of luminaries which emit excessive blue light with emission lines.

Note #1:

- a) less than 5 percent of the total emergent flux between the wavelengths of 330 and 950 nanometres (nm) shall be at wavelengths less than 440 nm.
 - b) less than 20 percent of the total emergent flux between the wavelengths of 330 and 950 nm shall be at wavelengths less than 540 nm.
 - c) less than 15 percent of the total emergent flux between 330 and 950 nm shall be at wavelengths greater than 640 nm, except that no restrictions shall apply to this range if the radiant energy distribution of the lamp is a smooth continuum without emission lines anywhere in the wave length range 330 - 950 nm.
2. The use of Metal Halide, Mercury Vapour, and Quartz outdoor lighting is prohibited within 5 km of the Dominion Astrophysical Observatory except as provided in Section 1(3) & 1(4).
 3. The restrictions in this section, except for the prohibition of Metal Halide lights, shall not apply to lights that illuminate areas used for the outdoor display of merchandise for sale and private outdoor recreation areas.
 4. All outdoor lighting for advertising signs shall comply with the Municipal Sign Bylaw.

II SHIELDING

1. Except as provided in Section II (2) all outdoor light fixtures shall be shielded in accordance with the requirements set out in Table A.
2. Advertising and identification signs consisting of glass tubes filled with neon, argon, and/or krypton or constructed of translucent materials and wholly illuminated from within do not require shielding.

III ILLUMINATION LEVELS

1. The average maintained horizontal illuminance shall not exceed 1.5 foot candles (16.5 lux) except as noted in Section III (3).
2. The average maintained illuminance shall be reduced to approximately 0.5 foot candles (5 lux) between 2300 hours, or the closure of the facility to the public, whichever is later, and sunrise. This shall be accomplished by automatic timing devices except in those cases where an irregular schedule of the facility or business makes this impractical.

Note: Timing provisions ensure that security light levels will be kept to the minimum level throughout the night. Automatic methods are preferred to manual methods as experience shows that manual methods do not always work due to the human factor - forgetfulness, poor communication between management and staff.

3. Illumination levels for areas used for the outdoor display of materials for sale shall not exceed the following levels.
 - (a) The average maintained horizontal illuminance shall not exceed 20 foot candles (215 lux).
 - (b) The average horizontal illuminance in a display area shall be reduced to 1.5 foot candles (16.5 lux) between 2300 hours or the closure of business, whichever is later, and sunrise.
4. The average maintained vertical illuminance of vertical surfaces illuminated for architectural decorative purposes shall not exceed 6 foot candles (65 lux).

Note: Higher illumination levels are allowed than for area lighting because most of the light will have to be reflected twice before it is directed upwards (assume lights facing downwards on a wall surface for example).

IV MOUNTING HEIGHT

1. The mounting height of exterior light fixtures shall not exceed the elevation of 229 metres geodetic datum which is the elevation of the bottom of the slit in the observatory dome of the Dominion Astrophysical Observatory.

V HOURS OF OPERATION OF ADVERTISING AND DECORATIVE LIGHTING

1. All architectural or decorative lighting shall be turned off between 2300 hours or the closure of the business or facility of the public, whichever is later, and sunrise. This shall be accomplished by automatic timing devices unless the irregular schedule of the business or facility makes this impractical.

VI SKYLIGHTS

1. Skylights and all windows or surfaces that are at an oblique angle to the vertical shall use tinted glass such that no more than 20 percent of the incident light will pass from the interior to the exterior of the building and no interior light shall be directly visible from the exterior of the building through the skylight.

TABLE 5

FIXTURE LAMP TYPE	SHIELDING REQUIREMENTS	
	Within 5 km radius of D.A.O.*	Outside 5 km radius of D.A.O.
	SHIELDED	SHIELDED
Low Pressure Sodium ¹	Partially	Partially
High Pressure Sodium	Fully	Fully
Metal Halide	Prohibited	Fully ^(2,4)
Mercury Vapor	Prohibited	Prohibited
Fluorescent	Fully ^(3,5)	Fully ^(3,5)
Quartz	Fully	Fully
Incandescent •Greater than 160W	None	None
Incandescent •160W or less	None	None
Glass Tubes filled with Neon, Argon, Krypton	None	None
*DOMINION ASTROPHYSICAL OBSERVATORY		

NOTES:

1. This is the preferred light source to minimize undesirable light emission into the night sky affecting astronomical observations.
2. Metal Halide lighting used primarily for display purposes shall not be used for security lighting after 2300 hours. Metal Halide lights shall be installed only in enclosed luminaries.
3. Outdoor advertising signs of the type constructed of translucent materials and wholly illuminated from within do not require shielding. Dark backgrounds with light lettering or symbols are preferred, to minimize detrimental effects. Unless conforming to the dark background preference, total lamp wattage per property shall be less than 41 watts within 5 km of the observatory.
4. Warm white and natural lamps are preferred to minimize detrimental effects.
5. Metal halide light fixtures shall include a glass, acrylic, or translucent enclosure of the light source (glass does not meet this requirement).
6. Quartz lamps shall not be considered an incandescent light source.