

## 4.0

### OUTDOOR LIGHTING

#### Definitions

Footcandle - The standard used to specify the measured intensity of lighting.

Glare - The discomfort or impairment of vision experienced when parts of the visual field are excessively bright in relation to general surroundings.

Disability Glare - Glare which impairs the ability to see detail without necessarily causing visual discomfort.

Discomfort Glare - Glare which causes visual discomfort without necessarily impairing the ability to see detail.

Direct Glare - Glare caused when excessive bright light sources in the visual field are seen directly, e.g.: lamps which are inadequately shielded.

Reflected Glare - A term used to describe various visual effects, such as reduction of contrast, discomfort or distraction, produced by reflection of light sources or other bright areas in glossy or semi-matt surfaces.

Illuminance - (Unit: Lux) The luminous flux density at a surface i.e., the luminous flux incident per unit area. (This quantity was formerly known as the "illumination value" or "illumination level".) One Lux is equal to one lumen per square metre. One footcandle is equal to one lumen per square foot. One footcandle = 10.76 Lux. Vertical illuminance is measured at 1.5 metres above ground level.

Lumination Level - The minimum level of illumination for the specified area measured on a horizontal plane.

Luminance - The physical measure of stimulus which produces the sensation of luminosity (brightness) in terms of the intensity of the light emitted in a given direction (usually towards the observer) by unit area of a self-luminous or transmitting or reflecting surface. It is measured by the luminous intensity of the light emitted or reflected in a given direction from a surface element divided by the area of the element in the same direction. The SI unit is the candela per square metre (cd/sq.m.)

#### Standards

Effective outdoor lighting improves visibility, increases safety, provides security and enhances the City's night-time environment. Improperly installed lighting can be extraordinarily powerful and create problems of excessive glare, light trespass, high energy use and skyward light pollution.

This lighting standard recognizes the benefits of outdoor lighting and provides clear guidelines to help maintain and compliment the City of Kitchener's character and contribute to the safety and security of its citizens and visitors. It is intended to reduce the problems associated with improperly designed and installed outdoor lighting.

##### Design Criteria - Glare Control:

Glare is excessive brightness that causes discomfort or impairment of vision. Outdoor lighting must be aimed, located, designed, fitted and maintained so as not to present a hazard to drivers, pedestrians or adjacent users by impairing their visibility or create a nuisance by projecting or reflecting objectionable light onto neighbouring properties. All outdoor lighting equipment and fixtures shall be properly shielded and directed downward. Lighting sources are not to be visible from adjacent properties or on-site residential units. Glare control must be achieved through the use of cutoff fixtures, shields and the appropriate application of the fixture mounting height, wattage, aiming angle and fixture placement.

##### Design Criteria - Light Pollution, Night Sky Controls:

Light pollution is considered undesirable and many people feel that it reduces the enjoyment of the night sky. Effective lighting systems must be designed to eliminate direct and indirect skyward lighting. The City of Kitchener requires the use of **full cutoff luminaries that direct no light above the horizontal plane.** Shields, hoods and other devices to redirect light should be used. Flat lenses rather than sag or drop lenses are required.

##### Design Criteria - Light Trespass:

Light trespass is the unnecessary illumination of adjacent property. The City of Kitchener requires that the illumination levels at all property lines not exceed

0.5 footcandles. Lighting complaints are frequently due to nuisance glare or excessive brightness in the normal field of vision even though there may be no measurable light at ground level, there is the complaint that, “light is shining in my window.” Such concerns can be addressed by containing light within the design area and carefully selecting, locating and mounting well-shielded luminaires.

## Design Criteria - Illuminance:

Illuminance determines the amount of light incident on a surface, measured in lux or footcandles. Illuminance levels provide an effective method of measuring the performance of a lighting design. Illuminance uniformity is measured by the ratios Maximum to Minimum and Average to Minimum. These ratios provide a measure of the consistency of lighting across a site and provide assurance that the illuminance is within a range that the human eye can properly discern all objects in its field of view.

The following charts indicate the required illuminance levels and uniformity ratios for various types of use.

## Outdoor Parking Area Lighting Requirements for Residential, Industrial, Commercial and Institutional:

Measurement	Horizontal Illumination (footcandles)	Vertical Illumination (footcandles)
Minimum	0.5	0.5
Average	2.0	2.5
Maximum	7.5	10
Uniformity	Horizontal	Vertical
Maximum:Minimum	15:1	20:1
Average:Minimum	4:1	5:1

## Gas Stations:

Light levels for gas stations should be adequate to facilitate on-site activities without producing excessive

brightness. All light fixtures mounted on canopies must be recessed or flush with the bottom surface of the canopy. Areas away from the pumps used for parking or vehicle storage should be designed in accordance with the Outdoor Parking Area Lighting Requirements.

## Area Around the Pump and Under the Canopy:

Measurement	Horizontal Illumination (footcandles)
Minimum	5
Average	20
Maximum	25
Uniformity	
Maximum:Minimum	5:1
Average:Minimum	4:1

## Driveway and Laneways:

Measurement	Illumination (footcandles)
Average Horizontal	0.5 – min. 0.2
Average Vertical	0.5 – min. 0.2
Uniformity	
Maximum:Minimum	10:1

## Car Dealership Lighting:

Automobiles are typically placed on display adjacent to the roadway and lighting of this area should meet the needs of the business without producing excessive brightness. Lighting should not compromise motorists' visibility on the roadway or that of the customer viewing the merchandise. Fixtures should be placed between the property line the display area.

## Car Dealership Display Areas:

Measurement	Display Areas Adjacent to Public Right-of-Way	All Other Internal Display Areas
Maximum Horizontal Illumination (fc)	20	10
<b>Uniformity</b>		
Maximum:Minimum	5:1	10:1

## Landscape, Façade and Sign Lighting:

Vertical surface illumination and accent lighting can provide a sense of security and mitigate shadows and provide important aesthetic benefits. All building facades, landscaping and sign lighting should be designed to eliminate direct up lighting from reaching the sky and prevent glare onto neighbouring properties and roadways.

### Submission Requirements for Outdoor Lighting Plans:

For each site plan requiring the submission of an Outdoor Lighting Plan, all of the following must be included to be accepted for review:

- Location of all buildings, structures, property lines, parking, loading and amenity areas.
- Location of all lights, poles and transformer units.
- Illumination levels for all proposed fixtures illustrating ISO footcandle curves at a maximum interval of 0.50 footcandles.
- Power (in watts).
- Type of light source.
- Mounting height – Maximum of 5-8m for area lighting and 3-4m for pedestrian scale lighting.

Mounting height for wallpaks should also be noted and coordinated with Building Elevations.

- Manufacturer's catalogue information and detail of the fixture.
- Pole foundation details.
- Full cutoff details.
- Shielding methods (where applicable).
- Aiming direction and angle of light source.
- The identification of any light sources which would be visible from 1.5 m elevation (above ground level) at the property line.
- The following chart indicating illumination levels and uniformity ratios should be included as shown below:

<b>Illumination Level</b>		
Measurement	Horizontal Illumination (footcandles)	Vertical Illumination (footcandles)
Minimum		
Average		
Maximum		
<b>Uniformity Ratios</b>		
Measurement	Horizontal	Vertical
Maximum: Minimum		
Average: Minimum		

- For a final submission, five copies of the Outdoor Lighting Plan are required and folded to legal size or smaller
- The outdoor lighting design professionals are responsible for ensuring no additional outdoor lights are planned for the project or are illustrated on other drawings (such as electrical drawings)

showing wall pack lighting attached to the building).

- The following statement must be included on the Outdoor Lighting Plan and signed by the design professional responsible for the plan:

This drawing indicates all existing and proposed outdoor lighting fixtures for this development. The proposed lighting distribution pattern will not cause veiling luminance (disability glare) and there will be no significant encroachment of light (0.5 footcandles or greater) or objectionable glare upon any adjacent property. Visibility of the proposed light sources from any nearby residential sites has been minimized so as not to create a nuisance.

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Signature of Design Professional

Design Criteria - Design and Maintenance:

**All approved outdoor lighting is to be maintained for the life of the proposed development.**

- NOTE: Variations from the standards shown may be appropriate in some situations, provided that it can be demonstrated through the preparation of a comprehensive lighting design strategy having clear objectives and a demonstration of how the proposed design meets the intent of these design guidelines and the goals and objectives found in Part A of the Urban Design Manual.