

MUNICIPALITY OF THE DISTRICT OF ARGYLE

BY-LAW # 42

OUTDOOR ILLUMINATION & LIGHT POLLUTION

1. SHORT TITLE

This By-Law is entitled the “Municipality of Argyle’s Outdoor Light Pollution By-Law”.

2. PURPOSE

The Purpose is to establish terms for reducing light pollution and glare, enhancing the well-being of the community and to preserve the designated dark sky certification that exists in portions of our municipality. This purpose is supported by Section 172(1) d of the Nova Scotia Municipal Government Act.

3. DEFINITIONS

For the purposes of this By-Law, terms used shall be defined as follows:

Architectural lighting means illumination for building design and function and is also known as lighting design.

Argyle means the Municipality of the District of Argyle.

Building accent lighting means lighting of building structures, landscape features statues and similar items for the purpose of decoration, ornamentation, creation of visual hierarchy or other purpose unrelated to safety, business operation or essential lighting function.

Correlated Colour Temperature (CCT) is the apparent colour of the emitted light with reference to the temperature of a hot surface that appears the same colour.

Starlight Designation Area (SDA) is an area designated by the International Starlight Foundation as a certified starlight reserve, spanning outside the boundaries of the Municipality of Argyle.

Dimmed means the act of becoming less bright or distinct

Direct Light means light emitted directly from the lamp, off the reflector or luminaire.

Fixture means the assembly that houses the lamp or lamps and can include all or some of the following parts: a housing, a mounting bracket or pole socket.

Flood or Spotlight means any light fixture or lamp that incorporates a reflector or a refractor to concentrate the light output into a directed beam in a particular direction.

Full-Cut-Off Fixture (FCO) means a luminaire or light fixture that; by design of the housing, does not allow any light dispersion or direct glare to shine above a horizontal plane from the base of the

fixture where light is emitted and limits the emission of light in the zone from 80-90-degrees from to less than 10% of the total light output from the luminaire, and must be installed in a horizontal position as designed. These fixtures produce very little glare or stray light due to the exposure of the bulb light source because the source is recessed or shielded.

Glare means light emitting from a luminaire with an intensity great enough to reduce a viewer's ability to see, and in extreme cases causing momentary blindness.

Grandfathered Luminaires means luminaires not conforming to this code that were in effect prior to the passage of this by-law.

Height of Luminaire means the height of a luminaire as calculated by the vertical distance from the ground directly below the centerline of the luminaire to the lowest direct-light-emitting part of the luminaire.

IESNA means the Illumination Engineers Society of North America, which is the standards committee for responsible outdoor lighting. This is an organization that recommends lighting levels and lighting fixtures.

Illuminance is a measure of the amount of light that reflects off a surface as a result of illumination by a light source.

Indirect Light means direct light that has been reflected or has scattered off other surfaces.

Lamp means the component of a luminaire that produces the actual light.

Light Pollution means the shining of light upwards into the sky above the horizontal plane of the light fixture, or lighting that interferes with the ability to see the night sky caused by any of light trespass; excess of glare; excess of direct light; excess of reflected light; light from inadequately shielded luminaires.

Light Trespass means the light from a luminaire that shines beyond the boundaries of the property on which the luminaire is located.

Low wattage lights means lights with a lower carbon emission and reduced need for energy output or electricity. Low wattage lights are typically in the 3-to-15-watt range.

Lumen means a unit of luminous flux equal to the light emitted in a unit solid angle by a uniform point source. The table in Appendix 1 shows the approximate conversion between power consumption and (watts) and luminance (lumens)

Luminaire means a complete lighting system, including a lamp or lamps and a fixture.

Luminance is a measure of the amount of light emitted by the luminaire in units of lumens.

Lux means a measure of luminance per unit area used in IESNA standard measurements i.e. one lux equates to one lumen per square meter.

Nadir is the point on the ground directly below the luminaire

Outdoor Light Fixtures means outdoor artificial illuminating devices, installed or portable, used for flood lighting, general illumination, or advertisement.

Pole Spacing Ratio means the ratio of the inter-pole distance per effective height of lamp on the pole.

Sharp-Cut-Off Fixture (ShCO) means a luminaire or light fixture that; by design of the housing, does not allow any light dispersion or direct glare to shine above a horizontal plane from the base of the fixture where light is emitted and limits the emission of light in the zone from 80-90-degrees from to less than 1% of the total light output from the luminaire, and must be installed in a horizontal position as designed. These fixtures produce no glare or stray light due to the exposure of the bulb light source because the source is recessed or shielded.

Uniformity Ratio of Lighting means the average level of illumination in relation to the lowest level of illumination for a given area.

Wall Pack Light Fixture means flood light fixtures on exterior walls of buildings.

3. PURPOSE AND BACKGROUND

- (1) This By-Law provides for the regulation of Outdoor Illumination and Control Light Pollution to ensure responsible lighting, light pollution abatement and the conservation of the night sky environment.
- (2) Section 172 of the Municipal Government Act provides municipalities with the authority to make bylaws for municipal purposes respecting 172 1(d) – “*nuisances, activities and things that, in the opinion of the Council, may be or may cause nuisances, including noise, weeds, burning, odours, fumes and vibrations...*”
- (3) Excessive and inappropriate outdoor illumination may, if done improperly, be considered a public nuisance to others, to animals and hinder the enjoyment of our external environment. Properly designed light fixtures do not emit undesirable illuminating light into the night sky and thus protect the nighttime environment.
- (4) Argyle Council seeks therefore, to enact a bylaw respecting the regulation and control of outdoor illumination, and control light trespass, as well as to ensure the ongoing astronomical importance of our Dark Sky Designation for tourism and environmental purposes.

4. REGULATIONS

- (1) Any person installing an outdoor lighting fixture shall be required to use FCO or ShCO fixtures, as identified in Appendix 1 attached hereto and forming part of this By-law.

- (2) Outdoor lighting fixtures shall include but are not limited to lights for: buildings and structures, including canopies and overhangs; recreational areas; parking lot lighting; landscape lighting; billboards and signs; public and private street lighting; display and service area lighting; public and private walkway lighting; rural barn lights; residential yard lights; and outdoor lighting for all residential, waterfront, commercial, industrial, institutional uses not otherwise specified.
- (3) All new municipal outdoor street lighting must be FCO fixtures installed in accordance with IESNA standards or ShCO fixtures. Any existing grandfathered partially cut-off street lighting shall be replaced by FCO or ShCO fixtures when luminaire replacement is required. Luminaires shall be permitted to be dimmed where and when appropriate. The maximum luminance of the luminaire design requirements for both new and grandfathered street lighting shall be 600 lumens for Residential properties.
- (4) All new wall-mounted commercial lighting shall be FCO or ShCO fixtures.
- (5) All existing grandfathered wall-mounted lights shall be encouraged to adhere to the requirements of Section 4(2) and 4(3) above. Property owners whose structures are furnished with unshielded wall-packs shall be encouraged to shield such fixtures.
- (6) All architectural lighting and building accent lighting shall be mounted such that the accent light is aimed down. There shall be no glare emanating from the fixture in accordance with fully shielded design.
- (7) The use of low wattage lights for decoration purposes such as Christmas lighting and temporary property ornamentation shall be exempt from Section 4 (7).
- (8) All artificial lighting for yards and parking areas shall be arranged to eliminate light trespass. Light trespass may be reported the Argyle's Bylaw Enforcement Officer for problem resolution.
- (9) Applications may be made to Argyle to obtain advice for proper shielding in the form of visors, rotational adjustments, etc. to street lighting that cause light trespass. Examples are provided in Appendix 1.
- (10) Outdoor advertising signs, and light fixtures used to illuminate signs or billboards shall minimize light pollution by being mounted on top of the sign facing down, must utilize full cut-off fixtures and must be in compliance with other sections of this By-law. Examples are provided in Appendix 4.
- (11) Any light source permitted by this By-law may be used for lighting of outdoor public or private recreational facilities, such as, but not limited to, soccer fields, baseball and softball fields, tennis courts, or show areas, provided all the following conditions are met:

- a. All fixtures used for event lighting shall be FCO or ShCO fixtures or be designed or provided with shielding capable of providing FCO or ShCO shielding, to minimize up-light, light trespass and glare.
- b. A facilities lighting shall be turned off when not in use.

5. PROHIBITIONS

- (1) The use of laser source light or any similar high intensity light for outdoor advertising or entertainment purposes is prohibited.
- (2) The operation of searchlights for advertising or entertainment purposes is prohibited.
- (3) Electrical illumination of outdoor advertising off-site signs along roadways is prohibited after business hours.
- (4) The correlated color temperature of the light source shall not be more than 3000 K.
- (5) Outdoor illuminated signs of any sort within a Nature Conservation Area or the Designated Dark Sky Reserve,

6. EXEMPTIONS

- (1) This By-law does not apply to any related provincial or federal policies or regulations related to lighting buildings, structures, or waterways, including but not limited to, authorities under NAV Canada, Canada Coast Guard, Transport Canada and Industry Canada, or to any other Provincial or Federal Government owned or operated facilities.
- (2) Fish or similar processing plants where lighting security is strictly regulated to comply with food safety or other export regulations are exempt from this By-law. Those organizations outside the SDA shall be encouraged to modify their lighting practices to meet the requirements of the By-law provided it does not breach any regulations aforementioned.
- (3) Temporary events may be exempt, provided that a person submits a written request on a form prepared by Argyle for a temporary exemption to the requirements imposed in this By-law. The request for lighting exemption for temporary events shall contain the following information:
 - a. Specific exemption requested (i.e., Searchlights)
 - b. Type and use of exterior light involved.
 - c. Date of the event.
 - d. Duration of time for requested exemption.

- e. Proposed location of exterior light.
- f. Physical size of exterior light.

7. GRANDFATHERING OF NON-CONFORMING LUMINAIRES

- (1) All luminaires and luminous advertising signs lawfully in place prior to the date of passing of this By-law shall be temporarily grandfathered. Any luminaire that replaces, modifies or moves a grandfathered luminaire shall be required to meet the provisions of this By-law.
- (2) Existing luminaires which are determined by the Bylaw Enforcement Officer to direct light toward streets or parking lots and cause glare to motorists or cyclists and therefore deemed to be a public safety concern, shall be either shielded or re-directed within 90 days of notification to the owner, regardless of grandfathering status, in accordance with sections 308 and 309 of the Municipal Government Act.
- (3) All non-conforming Grandfathered luminaires shall be made compliant to the regulations of this By-law by August 31, 2026.
- (4) All owners of the non-complying luminaires and luminous advertising may receive promotional material to assist them in complying with the regulations of this By-law on or before August 31, 2026.

8. NEW OUTDOOR LIGHTING DEVELOPMENTS

- (1) The applicant for a development permit shall submit to the Building Official as part of the application for the permit, evidence that the proposed work will comply with this By-law. The submission shall contain, but shall not necessarily be limited to the following:
 - a. Plans indicating the location of lighting on the premises, and the type of illuminating devices, fixtures, lamps, supports, reflectors and other devices.
 - b. Description of the illuminating devices, correlated color temperature, fixtures, lamps, supports, reflectors and other devices and the description may include catalogue cuts by manufacturers and drawings.
 - c. Photometric data, such as that furnished by manufacturers, or similar documentation showing the illumination levels and total light in the 80-90 degrees from nadir zone.
- (2) The above required plans, descriptions and data shall be sufficiently complete to enable the By-law Enforcement Officer to readily determine compliance with the provisions of this By-law. If the information is deemed to comply with the provisions of the By-law, a permit will be issued by the Bylaw Enforcement Officer, as part of the approval process of a building permit. If such plans, descriptions and data are not sufficient to allow the Officer to determine compliance by reason of the nature or configuration of the installation(s)

proposed, the applicant shall consult with the Bylaw Enforcement Officer to find an acceptable solution.

- (3) Should it be necessary for any outdoor fixture, or the light source therein to be changed after the permit has been issued, a change request must be submitted directly to the Bylaw Enforcement Officer for approval, together with adequate information to enable the Bylaw Enforcement Officer to ensure the provisions of this By-law are met, prior to implementing the installation.

9. INSPECTION OF PREMISES

- (1) The By-law Enforcement Officer may enter on land at any reasonable time for the purpose of carrying out an inspection to determine whether the provisions of this By-law are in compliance and to enforce and carry out the provisions of this By-law or any direction or order issued pursuant to the Municipal Government Act, Section 172 1(d), Section 266, Section 267 or this By-law.
- (2) For the purposes of an inspection under 9(1):
 - a. Require the production for inspection of documents or things relevant to the inspection.
 - b. Inspect and remove documents or things relevant to the inspection for the purpose of making copies or extracts.
 - c. Require information from any person concerning a matter related to the inspection; and
 - d. Alone or in conjunction with a person possessing special or expert knowledge, make examinations or take tests, samples, or photographs necessary for the purposes of the inspection.
 - e. Any requirement of the inspection shall be copied and provided to the person at their request, with redactions for protection of privacy where necessary.
- (3) No person shall hinder or obstruct, or attempt to hinder or obstruct, municipal staff who is exercising a power or performing a duty under this By-law. The same shall apply to any person asked to accompany the Bylaw Enforcement Officer who possesses special or expert knowledge.

10. VIOLATIONS AND PENALTIES

- (1) The purpose of the bylaw is primarily educational, not punitive. There are, however, certain practices that will promote compliance with lighting regulations. Education shall be a key toll in promoting compliance.

(2) Proactive enforcement procedures will include providing a copy of the lighting regulations to every contractor at the time they consult Argyle to obtain a building permit. Another effective tool is a requirement that the builder or developer acknowledge in writing that they are familiar with the lighting requirements and shall submit a lighting plan for approval.

(3) Submission of the lighting plan shall be required as a precondition to approval of any development undertaken in Argyle. The submitted lighting plan shall include the location and rating for each luminaire in accordance with the recommended levels in this bylaw.

(4) the following penalties shall apply to all noncompliant landowners:

(a) The first disciplinary action shall be a verbal warning by the Bylaw Enforcement Officer or his/her designate, along with suggested methods to bring the offending luminaire(s) into compliance with this Bylaw.

(b) A written warning outlining the non-compliant luminaire as well as methods to bring the luminaire into compliance (no sooner than 30 days after the verbal warning). Service of the warning shall be deemed served by sending the order in registered or first-class mail, by posting service on the property, or by personal service.

(c) If the landowner does not take measure to bring the offending luminaire(s) into compliance with this bylaw after an additional 45 days after issue of written warning by the Bylaw Enforcement Officer or his/her designate. This action is considered the first offense and shall result in a fine of no less than three hundred dollars (\$300) and no more than one thousand dollars (\$1,000). The fine shall be issued to each non-compliant premise under the authority of the Bylaw Enforcement Officer of Argyle. The amount of the fine shall be influenced by the severity of the offense, at the sole judgement of the Bylaw Enforcement Officer.

(d) Any removal, repair, alteration or change of lighting ordered by the Bylaw Enforcement Officer shall be led by the owner at the owners expense, notwithstanding the section 10 (e) below.

(e) If the offending luminaire(s) are not replaced or modified to comply with this Bylaw 45 days after the issuance of the monetary fine outlined in Section C above, Argyle shall be entitled to fine for a second offence of no less than five hundred dollars (\$500) and not more than two thousand dollars (\$2,000). Argyle shall also be entitled to, at this time frame, deactivate the luminaire(s) or replace them at the cost of the holder of the land deed in addition to the monetary fine issued in Section C.

(f) The costs incurred by the municipality in 10 (e) above shall include interest on non-payment on the part of the owner, at the same interest rate charged on municipal taxes, as set by Municipal Council from time to time.

11. SEVERABILITY

- (1) Should any part, section, subsection, or portion of this By-law be repealed or declared by a Court of competent jurisdiction to be illegal, the same shall not affect the validity of the By-law as a Whole or in part thereof, except for that which was declared to be invalid.

12 PROVINCIAL AND FEDERAL REGULATIONS

- (1) The provisions and regulations of this Bylaw shall not supersede Provincial or Federal regulations. In case of conflict the Federal and Provincial regulations shall apply in that order.

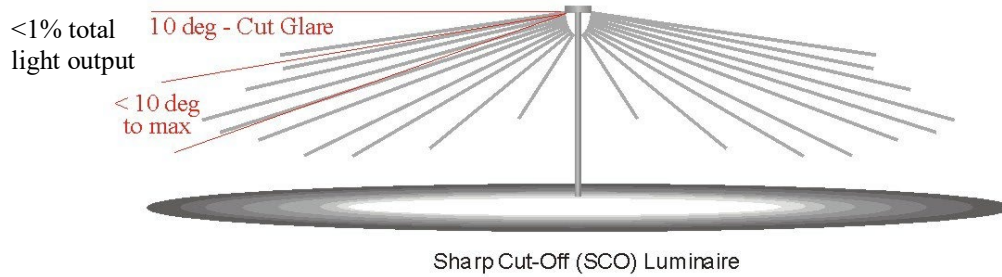
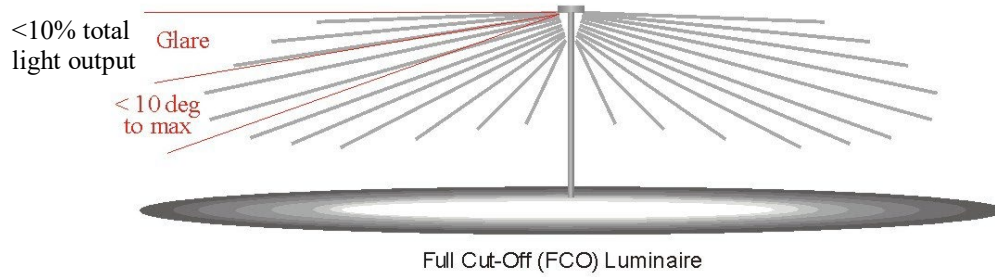
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Chief Administrative Officer's Annotation for Official By-Law Book

Date of First Reading	
Date of Advertisement of Notice of Intent to Consider	
Date of Second Reading	
Date of Advertisement of Passage of By-Law	
Date of Mailing to Minister a Certified Copy of By-Law	
Effective Date of By-Law	
I certify that this Outdoor Light Pollution By-Law #42 was adopted by Council and published as indicated above.	
_____	_____
Warden	Date
_____	_____
Chief Administrative Officer	Date

APPENDIX 1
TO OUTDOOR LIGHTING POLLUTION BY-LAW 42

Full Cut-off and Sharp Cut-off Definition

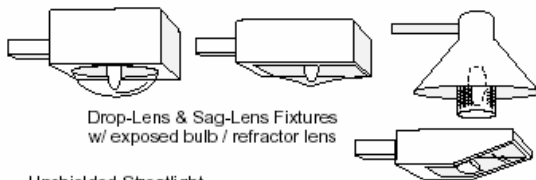
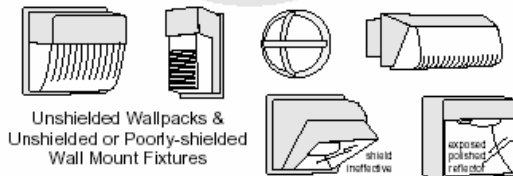
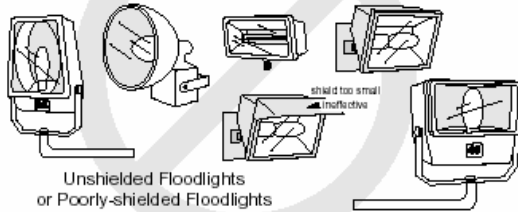


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Examples of Acceptable / Unacceptable Lighting Fixtures

Unacceptable / Discouraged

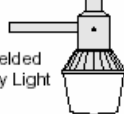
Fixtures that produce glare and light trespass



Unshielded Streetlight



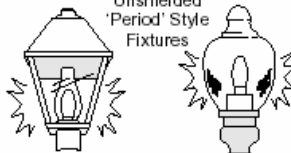
Unshielded Security Light



Unshielded PAR Floodlights



Unshielded 'Period' Style Fixtures

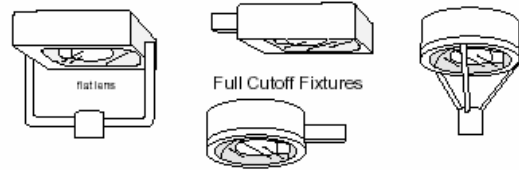


Drop-Lens Canopy Fixtures

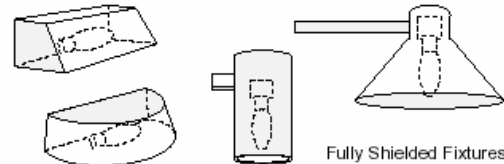
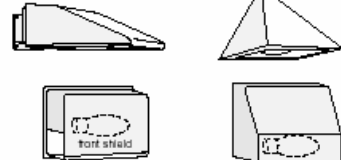


Acceptable

Fixtures that shield the light source to minimize glare and light trespass and to facilitate better vision at night



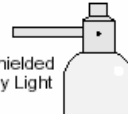
Fully Shielded Wallpack & Wall Mount Fixtures



Full Cutoff Streetlight



Fully Shielded Security Light



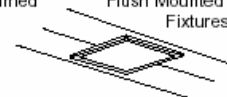
Fully Shielded 'Period' Style Fixtures



Shielded / Properly-aimed PAR Floodlights

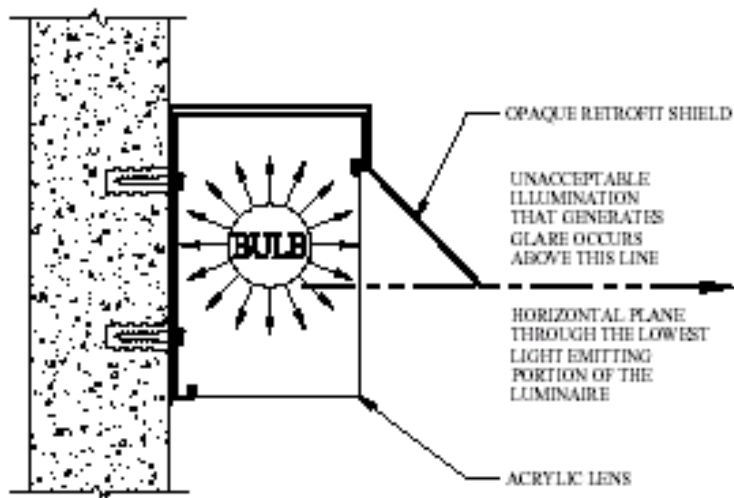


Flush Mounted Canopy Fixtures



ENR 40103

SHIELDING SOLUTIONS FOR EXISTING FIXTURES



TYPICAL WALLPACK LUMINAIRE USING OPAQUE SHIELD RETROFIT

Figure 1



Shielding Solution for existing Street lamp – Kanata Ontario - 2003

The following sources of illumination have been rated by preferential order for outdoor use:

Amber LED	1 - Recommended
<3000K CCT LED	2 - Recommended
High Pressure Sodium (HPS)	3 - Acceptable
>3000K CCT LED	4 - Requires enhanced better shielding
Fluorescent (CCT<3000K)	5 - Requires enhanced better shielding
Other HID Lamps	6
Incandescent	7 - Recommended for very low illumination

Notes:

HID sources include mercury vapor, metal halide, high-pressure sodium and low-pressure sodium. The benefits of HID sources are their high efficacy in lumens per watt and long lamp life (20,000 hours). HID is also a point source, which provides the opportunity for better light control. Light can be better directed where it is needed.

Most lamps on the market today can be categorized into three groups: LED, high intensity discharge (HID), fluorescent and incandescent. LED is solid state lighting. When designed and installed properly it can reduce energy consumption to significantly less than incandescent bulbs and vintage HID lamps. They allow "instant-on" and are easily dimmed. They are available in a range of CCT from <2000K to more than 6500K. The greater the CCT, the greater the emission of biologically harmful blue light

1. Amber LEDs emit no biologically harmful blue light. It resembles the colour of typical HPS lamps but provides about 2X the colour rendering of HPS.
2. 3000K LED resembles the colour of white incandescent light. About 10% (low) of its emitted light is biologically harmful. It provides 3-4X the colour rendering of typical HPS lamps
3. High Pressure Sodium (HPS) also HID, is used in the standard street light luminaire – accepted when fixture is a Full-Cut-Off Fixture. The CCT for HPS can vary but is typically ~2000K. HPS lamps emit about 10% (low) of its lights as harmful blue light
4. >3000K CCT lamps appear cool or cold white. They emit >>10% of their light as biologically harmful blue light. The relatively large amount of blue light also magnifies the impact of glare.
5. Fluorescent light – normally incandescent is preferred for the warmer white light and is accepted if shielded.
6. Other HID lights (Metal Halide) provide a "cool-cold" white light. and >>10% of their light are biologically harmful. They are used where cool white sources are requires such as retail lighting. These should be in totally enclosed luminaires with ShCO shielding to minimize their enhanced effect of glare.
7. Incandescent lights are accepted if they are low wattage and fully shielded. It should be noted that warm white natural lights are usually preferred over fluorescent lights. Note also that for outdoor applications, these are less efficient than HPS or LPS .Incandescent emits very little biologically harmful blue light

APPENDIX 2

TABLE 1

The following IESNA standards have been adapted for outdoor lighting and light levels in Mississippi Mills. These values serve as design guidelines when considering development of new outdoor lighting as well as standard criteria when measuring existing areas of outdoor illumination.

To save energy and reduce the amount of glare and light trespass, illumination levels should be closer to the lower levels in the range where possible.

Roadway Lighting	Average Maintained Illuminance (lux)	Uniformity Ratio
Major Road	6 – 16	3:1
Collector Road	4 – 11	4:1
Local Road	3 – 8	6:1

Public Spaces and Usage Levels	Horizontal Illuminance (lux)	Uniformity Ratio
Community Shopping Centres Cultural, Civic or Recreational Events Office Parking Airports, Commuter Lots, etc. Residential Complex Parking Hospital Parking	6 – 24	4:1
Neighbourhood Shopping Industrial Employee Parking Educational Facilities Churches	2 – 8	4:1

APPENDIX 3

Light Output from Typical Bulbs for Comparison Purposes

(Compiled by the Royal Astronomical Society of Canada and the International Darksky Association)

Bulb Types	Lumens [∇]	Lux ^{∇∇} at 6 m	Lux ^{∇∇} at 2 m	Lux ^{∇∇} at 1 m
Incandescent*				
7 watt	60	0.13	1.2	4.8
15 watt	128	0.28	2.6	10.2
40 watt	342	0.8	6.8	27.2
60 watt	513	1.1	10.2	40.8
100 watt	855	1.9	17.0	68.0
Metal Halide (MH)				
70 watt	3,000	6.6	59.7	238.7
100 watt	5,800	12.8	115.4	461.6
High Pressure Sodium (HPS)				
35 watts	2025	4.5	40.3	161.1
50 watts	3600	8.0	71.6	286.5
70 watts	5450	12.1	108.4	433.7
100 watts	8550	18.9	170.1	680.4
Low Pressure Sodium (LPS)				
18 watts	1570	3.5	31.2	124.9
35 watts	4000	8.8	79.6	318.3
55 watts	6655	14.7	132.4	529.6
Compact Florescent (CF)				
9 watt (40 w equivalent)	550	1.2	10.9	43.8
13 watt (60 w equivalent)	850	1.9	17.9	71.6
LED**				
1 watt (White) ***	100	2.8	25	100
1 watt (amber) ***	75	2.	19	75
3 watt amber A19**	90	0.5	4.0	12
3 watt amber - PAR16**	90	1.8	16	50
7 watt amber - PAR30**	200	5.5	50	200
13 watt amber - PAR38**	400	11	100	400

Note: Fixture and bulb degradation before cleaning or replacement may decrease these to as low as 50%.

* The luminous efficiency of incandescent light is approximated as 1/10 that of HPS for photopic vision

** Supplied by IDA

*** Assumes a 1 steradian illumination angle and no external optics, typical for 2011

∇ Lumens is the total amount of light emitted in all directions (over 4π steradians)

∇∇ Lux is the amount of light illuminating a surface of one metre square

1 lux = 1 Lumen / (4π dist²) where distance is in metres

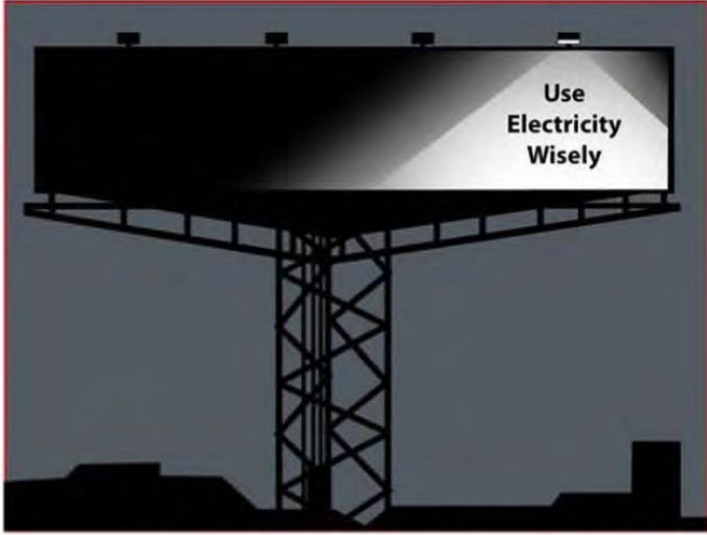
References:

IDA Information Sheet 4, Operating Data and Economics of Different Lamps, (08/96)

CAN/CSA-C653-94 (2000) - Performance Standard for Roadway Lighting Luminaires

Mesopic Street Lighting Demonstration, Lighting Research Centre, Jan. 31, 2008, (Renssear), Table 2, 5

APPENDIX 4
Illumination of Advertising Signs



Billboard illuminated from the top (permitted)



From the bottom (prohibited)

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