

RULES and REGULATIONS

for

OUTDOOR ILLUMINATION

EFFECTIVE DATE:

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PREFACE

Recently, problems with light pollution have created a greater sense of urgency for change, due to increased understanding about the severe impacts on the environment and human health. Extensive efforts of the Illuminating Engineering Society of North America (IES), in consultation with various advocacy groups for responsible lighting, have resulted in a set of standards that:

- dramatically reduce the level of light pollution and
- can be met using readily available, reasonably priced lighting equipment

First, is the use of lighting zones (LZ-0 to LZ-3) which the Planning Board has assigned to the Zoning Districts in Southborough as follows:

- LZ-0: Conservation and Research, Scientific & Professional
- LZ-1: Residential A and Residential B
- LZ-2: Business Village
- LZ-3: Business Highway, Industrial, and Industrial Park

Second, is the use of the IES B.U.G. rating system (backlight, uplight, glare) for luminaires. This rating system provides more effective control of unwanted light and avoids individual evaluation of a fixture's photometric properties. Importantly, the B.U.G. ratings will inherently limit the use of luminaires that would be restricted such as barn lights, non-shielded wall-packs, and flood or parking lighting that are not appropriately aimed downward (as B.U.G. standards include the lamp angle to the horizontal). This system also inherently prevents light trespass onto other properties, however special attention will be paid to those areas where abutting properties have dramatically different lighting zone ratings (e.g. Industrial LZ-3 abutting Residential A LZ-1) where additional light scatter can impact trespass requirements.

Lighting plans will be reviewed using International Dark-Sky Association IDA guidance and IES recommended hardscape method (or prescriptive method) for evaluating the total initial lumens (for the entire site) against the total allowed initial lumens per site (based on the lumen per square foot allowances according to lighting zone) to assess compliance. The hardscape method provides a simple process for assessing the total lighting for a site; supported by deep analysis through the utilization of B.U.G. standards as well as complete reporting of all site luminaire photometric properties. This process allows a more effective review of lighting plans for the overall site at an initial level of scrutiny.

Total Site Lumen Limit

The total installed initial luminaire lumens of all outdoor lighting shall not exceed the total site lumen limit. The total site lumen limit shall be determined using the hardscape area and table below. For sites with existing lighting, existing lighting shall be included in the calculation of total installed lumens. The total installed initial luminaire lumens are calculated as the sum of the initial luminaire lumens for all luminaires; both existing and proposed.

For luminaires with relative photometry per IES, it is calculated as the sum of the initial lamp lumens for all lamps within an individual luminaire, multiplied by the luminaire efficiency. If the efficiency is not known for a residential luminaire, assume 70%. For luminaires with absolute photometry per IES LM-79, it is the total luminaire lumens. The lumen rating of a luminaire assumes the lamp or luminaire is new and has not depreciated in light output.

Table 1: Allowed Total Initial Lumens Per Site for Outdoor Lighting by Hardscape Area

LZ-0	LZ-1	LZ-2	LZ-3
Conservation and Research, Scientific & Professional	Residential A and Residential B	Business Village	Business Highway and Industrial and Industrial Park
0.5 lumens per SF of hardscape	1.25 lumens per SF of hardscape	2.5 lumens per SF of hardscape	5.0 lumens per SF of hardscape

Limits to Off Site Impact

There shall be no light trespass by a luminaire beyond the property boundaries of the lot on which it is located, except as within a street right-of-way for which there shall be no limit.

For property lines shared between two disparate lighting zones, special attention will be paid to the degree of indirect light cast onto adjacent properties and will be considered part of the backlighting requirement. Large surfaces such as the sides of buildings and other potentially reflective surfaces which may scatter inward-facing light outward beyond the property line must be managed to prevent such trespass. Examples include alteration of the surface coating, color, and/or placement of these structures to prevent scatter or manage the direction of scatter to avoid light trespass.

LED Correlated Color and Output

All proposed LED lighting shall have a correlated color temperature (CCT) $\leq 3000\text{K}$, with $S/P < 1.2$. except where regulations for outdoor field lighting applies.

Existing Non-Conforming Replacements

When non-conforming fixtures or luminaires require replacement **for any reason** (including but not limited to broken, end of life, and vandalism), those fixtures shall be replaced in compliance with Section 174-12.1 Outdoor Illumination bylaw. Buildings and lots with clusters of more than 10 fixtures (e.g. parking lots, landscapes, large scale building illumination) shall **all** be brought into compliance when the majority of the luminaires ($>50\%$) have reached the end of their life.

Residential Properties

For residential properties including multiple residential properties not having common areas, all outdoor luminaires shall be fully shielded and shall not exceed the allowed lumen output in Table 2, row 2. All residential landscape lighting shall comply with Table 3 and shall not be aimed into adjacent properties.

Exceptions

1. One partly shielded or unshielded luminaire at the main entry, not exceeding the allowed lumen output in Table 2 Row 1.
2. Any other partly shielded or unshielded luminaires not exceeding the allowed lumen output in Table 2 Row 3.
3. Low voltage landscape lighting aimed away from adjacent properties and not exceeding the allowed lumen output in Table 2 Row 4.
4. Shielded directional flood lighting aimed so that direct glare is not visible from adjacent properties and not exceeding the allowed lumen output in Table 2 Row 5.
5. Open flame gas lamps.
6. Lighting installed with a vacancy sensor, where the sensor extinguishes the lights no more than 15 minutes after the area is vacated.

Table 2: Lighting Limits – Residential

	LZ-0	LZ-1	LZ-2
Row 1 Maximum Allowed Luminaire Lumens* for Unshielded Main Entry Luminaire-	not allowed	420 lumens	630 lumens
Row 2 Maximum Allowed Luminaire Lumens* for each Fully Shielded Luminaire	630 lumens	1260 lumens	1260 lumens
Row 3 Maximum Allowed Luminaire Lumens* for each Unshielded Luminaire excluding main entry	not allowed	315 lumens	315 lumens
Row 4 Maximum Allowed Luminaire Lumens* for each Landscape Lighting	not allowed	150 lumens	1050 lumens
Row 5 Maximum Allowed Luminaire Lumens* for each Shielded Directional Flood Lighting	not allowed	700 lumens	1260 lumens
Row 6 Maximum Allowed Luminaire Lumens* for each Low Voltage Landscape Lighting	not allowed	50 lumens	525 lumens

*Luminaire lumens =Initial lamp lumens for a lamp multiplied (x) by the number of lamps in the luminaire

Non-Residential Properties

A luminaire may be used if it is rated for the lighting zone of the site or lower in Backlight number. Luminaires equipped with adjustable mounting devices permitting alteration of luminaire aiming in the field shall not be permitted. To be considered 'ideally oriented', the luminaire must be mounted with the backlight portion of the light output oriented perpendicular and towards the property line of concern.

All luminaires shall have BUG rating (IES TM-15) reported and shall be installed according to the following tables:

Table 3a: Maximum Allowable Backlight.

	LZ-0	LZ-1	LZ-2	LZ-3
Allowed Backlight Rating*				
Greater than 2 mounting heights from property line	B1	B3	B4	B5
1 to less than 2 mounting heights from property line, and ideally oriented**	B1	B2	B3	B4
0.5 to 1 mounting heights from property line and ideally oriented**	B0	B1	B2	B3
Less than 0.5 mounting height to property line and properly oriented**	B0	B0	B0	B1

Table 3b: Maximum Allowable Uplight. A luminaire may be used if it is rated for the lighting zone of the site or lower in Uplight number.

	LZ-0	LZ-1	LZ-2	LZ-3
Allowed Uplight Rating	U0	U1	U2	U3
Allowed % light emission above 90° for street or area lighting	0%	0%	0%	0%

Table 3c: Maximum Allowable Glare. A luminaire may be used if it is rated for the lighting zone of the site or lower in Glare number.

	LZ-0	LZ-1	LZ-2	LZ-3
Allowed Glare Rating	G0	G1	G2	G3
Any luminaire not ideally oriented*** with 1 to less than 2 mounting heights to any property line of concern	G0	G0	G1	G1
Any luminaire not ideally oriented*** with 0.5 to 1 mounting heights to any property line of concern	G0	G0	G0	G1
Any luminaire not ideally oriented*** with less than 0.5 mounting heights to any property line of concern	G0	G0	G0	G0

Any luminaire that cannot be mounted with its backlight perpendicular to any property line within 2X the mounting heights of the luminaire location shall meet the reduced Allowed Glare Rating in Table 3c.

Outdoor Sports Illumination

Measured on-field illuminance values appropriate for the application per IESNA RP-6-15 Sports and Recreational Area Lighting [6-15 Sports and Recreational Area Lighting criteria](#) (or equivalent CIE guidance) together with modeled initial illuminance targets.

As the IES TM-15-11 Luminaire Classification System for Outdoor Lighting is not appropriate for sports lighting, a modified approach to controlling backlight, uplight, and glare is applied with the following metrics:

1. Backlight – Directionality and application efficiency will be addressed indirectly through two methods that quantify off-site performance, one using the design luminance and another using measured illuminance. Backlight criteria will be difficult to meet without sufficient and appropriate setback of sports fields from the property line.
 - a. Total designed lumens not contained within the area encompassing the field perimeter and an area immediately adjacent to that area that has a 33 foot (10 meter) offset. As modeled, no more than 15% of the total lumens may be outside of this region.
 - b. Measured spill illuminance values, as measured with the light meter aimed in the direction of the brightest reading, shall not exceed criteria for the respective Environmental Zone (Table 1 below) nor shall it exceed the maximum initial spill illuminance values as modeled and specified in the design process. These measurements

shall be taken a distance equal to 150' beyond the edge of the field. Measurements should be conducted with and without the facility lighting operating so that the sports facility lighting can be isolated from other natural and artificial light sources.

Table 4 – Allowable Spill Illuminance To Control Backlight

Lighting zones	Spill Illuminance at Setback
LZ1- LZ3	$\leq 0.20 \text{ ft-c} / \leq \text{lux}$

2. Uplight – All luminaires must be designed such as to not to emit direct light above the horizon, unless required for the activity (i.e. aerial sports) being played. In those cases, only 8% of the total (directly) applied lumens as modeled may be in this zone. For modeling purposes, a horizontal ceiling grid shall be placed 5 feet (1.5 meters) above the top of the tallest pole, extending out to 150 feet (45 meters) beyond the edge of the field to determine compliance. Installation shall not deviate from the design.
3. Glare – Modeled luminous intensity from any luminaire for any viewing angle at 5' above grade level, at a distance equal to 150' beyond the edge of the field shall not exceed 1000 candela (absolute). Luminaires shall not emit more than 250 lumens in the “Very High” glare zone, ranging from 80° to 90° above nadir. This shall be verified through a luminaire photometric report and aiming summary report and visual inspection, or through an equivalent software application and visual inspection.¹

The lighting system shall achieve a minimum Application Efficiency of 70 lumens per watt, calculated per the following formula (or the metric equivalent):

$$\frac{\text{*Target Area Sq. Footage} \times \text{Avg. Maintained Design ft-c}}{\text{Total System Watts}} = \text{Applied Lumens/Watts}$$

***Target Area** is defined as the total grid area for the sports field and/or sports court as defined by the IES LM-5-04 IESNA Guide for Photometric Measurements of Area and Sports Lighting Installments (or CIE equivalent guidance).

4. Color – Luminaire Correlated Color Temperature (CCT) may not exceed 5700°K, as defined by ANSI C78.377. Luminaire CCT must be determined through empirical measurements as defined by IESNA LM-79 (or CIE equivalent) and performed by a laboratory appropriately accredited by NVLAP.
5. Controls – Provide advanced controls and documentation for the following:
 - a. Automatic and/or remote-control system via smartphone apps, or direct remote communication to the company facility responsible for handling the lighting controls, to enforce shut-off at locally established curfew time, not to be later than 10:00 PM (2200 hrs.).
 - b. On-site manual and/or remote-control system shall also be provided to allow for the lights to be turned on or off at will (before curfew) to assure that only active sports fields are lighted.

- c. Provide readily accessible controls to implement uniform and variable adaptive illumination levels for different task lighting needs on field, e.g. IES class of play, competition athletics, band practice, striping, mowing, sports practice, etc. Adaptive dimming shall be possible across the range of 25% to 100% of full illumination.
- d. A formal policy defining the appropriate level of illumination necessary for the specific activities and curfew times must be established and enforced.

6. Other Lighting – The installed field lighting is not to be used for illuminating other area tasks. For example, if parking and concession areas lighting is desired, those areas shall be illuminated by separate luminaires and systems not associated with sports field illuminance needs. Other outdoor lighting at the site must, at a minimum, meet the lighting standards and lighting codes established in zoning bylaw Section 174.12.1 Outdoor Illumination, and must meet the standards set forth in the IDA Model Lighting

ENFORCEMENT

Violations of this Bylaw shall be subject to the provisions of the Town of Southborough Article III entitled “Use Regulations” Section 174-24 thereof entitled “Enforcement; procedures; violations and penalties.”

Non-Residential

Applicants for major or minor site plan approval must provide a comprehensive photometric plan within their plan set, per Code of the Town of Southborough, Chapter 174 Zoning, Section 174-10. The manufacturer's specification sheet may be used to establish the lumen level of a luminaire, correlated color temperature (CCT) and, if required, to verify the use of fully shielded fixture design. (Please reference this document and the Outdoor Illumination bylaw for more details.) Once approved by the Planning Board, the Building Department will monitor the project to ensure compliance. After the structure is built the Planning Board/Department must receive as built plan. The Planning Board/Department reserves the right to inspect the development upon completion in coordination with the Building Commissioner, developer, and property owner.

Residential

Property owners are encouraged to resolve lighting disputes between one another. The International Dark-Sky Association (IDA) provides a useful set of practical actions for neighbors to seek resolution, which include:

- Make friends, not enemies. Your neighbors probably don't even realize their lighting is bothersome.
- Stay positive and don't argue. Be tactful and understanding about your neighbor's right to light their property.
- Suggest alternatives to their current fixture. Ask them to move the light, shield it, or add a motion sensor so it's activated only when needed. Offer to help get this done.
- Be informative. Talking to your neighbor is a great opportunity to be an advocate for good lighting. There are many reasons to use dark sky friendly lighting. Read up on the issues regarding light pollution. IDA also has a number of educational resources that can be useful.

- It's useful to know the local costs of electricity (cents per KWH) and the local lighting control ordinances. This information is available on most city websites, from your regional utility company and on your utility bill.
- You may also want to compile a list of local businesses or homes in the neighborhood with good quality lighting as an example of effective security measures that are dark sky friendly.
- Having a list of shielded light fixtures to provide as alternatives to your neighbor's current lighting is also recommended. Use the IDA's Fixture Seal of Approval database to find dark sky friendly fixtures and devices.
- Don't dismiss their need to feel safe. Remember that home is a place where everyone wants to feel relaxed and safe.
- Explain that light trespass is a form of light pollution, but we strongly advise that you don't threaten legal action. The idea of a lawsuit can create bad feelings among the whole neighborhood.
- Remember that everyone wants the same thing: a chance to relax in his or her own environment. Work together to create an atmosphere that benefits the community
- Write a letter. You may find it useful to put your thoughts on paper. The IDA have provided a Sample Letter to Your Neighbor to get you started.

If resolution is not viable, then, the owner of any lot or property who believes their neighbor is in violation of the Outdoor Illumination bylaw should complete the required building department complaint form, [found here](#). The individual logging the complaint shall have the burden of proof of violation by demonstrating that the existing luminaire is out of compliance with the standards established in the Outdoor Illumination bylaw.

Supporting evidence could include:

- a. Pictures taken from the property showing the fixture's light trespass
- b. A measured reading taken from a lighting app downloaded on a phone or other mobile device

The Building Department will be required to address the formal complaint and contacting both homeowners regarding the concern. Additionally, a site visit for visual observation of the lighting in question may be arranged with one or both of the homeowners. A letter indicating that there is or is not a violation will be issued regarding the complaint.

Appendix

Definitions	
Architectural Lighting	Lighting designed to reveal architectural beauty, shape and/or form and for which lighting for any other purpose is incidental.
Authority	The adopting municipality, agency or other governing body.
Backlight	For an exterior luminaire, lumens emitted in the quarter sphere below horizontal and in the opposite direction of the intended orientation of the luminaire. For luminaires with symmetric distribution, backlight will be the same as front light.
BUG	A luminaire classification system that classifies backlight (B), uplight (U) and glare (G).
Common Outdoor Areas	One or more of the following: a parking lot; a parking structure or covered vehicular entrance; a common entrance or public space shared by all occupants of the domiciles.
Curfew	A time defined by the authority when outdoor lighting is reduced or extinguished.
Emergency conditions	Generally, lighting that is only energized during an emergency; lighting fed from a backup power source; or lighting for illuminating the path of egress solely during a fire or other emergency situation; or, lighting for security purposes used solely during an alarm.
Footcandle	The unit of measure expressing the quantity of light received on a surface. One footcandle is the illuminance produced by a candle on a surface one-foot square from a distance of one foot.
Forward Light	For an exterior luminaire, lumens emitted in the quarter sphere below horizontal and in the direction of the intended orientation of the luminaire.
Fully Shielded Luminaire	A luminaire constructed and installed in such a manner that all light emitted by the luminaire, either directly from the lamp or a diffusing element, or indirectly by reflection or refraction from any part of the luminaire, is projected below the horizontal plane through the luminaire's lowest light-emitting part.
Glare	Lighting entering the eye directly from luminaires or indirectly from reflective surfaces that causes visual discomfort or reduced visibility.

<i>Hardscape</i>	Permanent hardscape improvements to the site including parking lots, drives, entrances, curbs, ramps, stairs, steps, medians, walkways and non-vegetated landscaping that is 10 feet or less in width. Materials may include concrete, asphalt, stone, gravel, etc.
<i>Hardscape Area</i>	The area measured in square feet of all hard-scape. It is used to calculate the Total Site Lumen Limit in both the Prescriptive Method and Performance Methods. Refer to Hardscape definition.
<i>Hardscape Perimeter</i>	The perimeter measured in linear feet is used to calculate the Total Site Lumen Limit in the Performance Method. Refer to Hardscape definition.
<i>IDA</i>	International Dark-Sky Association.
<i>IESNA</i>	Illuminating Engineering Society of North America.
<i>Lamp</i>	A generic term for a source of optical radiation (i.e. "light"), often called a "bulb" or "tube". Examples include incandescent, fluorescent, high-intensity discharge (HID) lamps, and low-pressure sodium (LPS) lamps, as well as light-emitting diode (LED) modules and arrays.
<i>Landscape Lighting</i>	Lighting of trees, shrubs, or other plant material as well as ponds and other landscape features.
<i>LED</i>	Light Emitting Diode.
<i>Light Pollution</i>	Any adverse effect of artificial light including, but not limited to, glare, light trespass, sky-glow, energy waste, compromised safety and security, and impacts on the nocturnal environment.
<i>Light Trespass</i>	Light that falls beyond the property it is intended to illuminate.
<i>Lighting</i>	"Electric" or "man-made" or "artificial" lighting. See "lighting equipment".
<i>Lighting Equipment</i>	Equipment specifically intended to provide gas or electric illumination, including but not limited to, lamp(s), luminaire(s), ballast(s), poles, posts, lens(s), and related structures, electrical wiring, and other necessary or auxiliary components.
<i>Lighting Zone</i>	An overlay zoning system establishing legal limits for lighting for particular parcels, areas, or districts in a community.
<i>Low Voltage Landscape Lighting</i>	Landscape lighting powered at less than 15 volts and limited to luminaires having a rated initial luminaire lumen output of 525 lumens or less.

Lumen	The unit of measure used to quantify the amount of light produced by a lamp or emitted from a luminaire (as distinct from “watt,” a measure of power consumption).
Luminaire	The complete lighting unit (fixture), consisting of a lamp, or lamps and ballast(s) (when applicable), together with the parts designed to distribute the light (reflector, lens, diffuser), to position and protect the lamps, and to connect the lamps to the power supply.
Luminaire Lumens	For luminaires with relative photometry per IES, it is calculated as the sum of the initial lamp lumens for all lamps within an individual luminaire, multiplied by the luminaire efficiency. If the efficiency is not known for a residential luminaire, assume 70%. For luminaires with absolute photometry per IES LM-79, it is the total luminaire lumens. The lumen rating of a luminaire assumes the lamp or luminaire is new and has not depreciated in light output.
Lux	The SI unit of illuminance. One lux is one lumen per square meter. 1 Lux is a unit of incident illuminance approximately equal to 1/10 footcandle.
Mounting height	The height of the photometric center of a luminaire above grade level.
New lighting	Lighting for areas not previously illuminated; newly installed lighting of any type except for replacement lighting or lighting repairs.
Object	A permanent structure located on a site. Objects may include statues or artwork, garages or canopies, outbuildings, etc.
Object Height	The highest point of an entity, but shall not include antennas or similar structures.
Ornamental lighting	Lighting that does not impact the function and safety of an area but is purely decorative, or used to illuminate architecture and/or land- scaping, and installed for aesthetic effect.
Ornamental Street Lighting	A luminaire intended for illuminating streets that serves a decorative function in addition to providing optics that effectively deliver street lighting. It has a historical period appearance or decorative appearance, and has the following design characteristics: <ul style="list-style-type: none"> · designed to mount on a pole using an arm, pendant, or vertical tenon; · opaque or translucent top and/or sides; · an optical aperture that is either open or enclosed with a flat, sag or drop lens; · mounted in a fixed position; and · with its photometric output measured using Type C photometry per IESNA LM-75-01.
Outdoor Lighting	Lighting equipment installed within the property line and outside the building envelopes, whether attached to poles, building structures, the earth, or any other location; and any associated lighting control equipment.

Partly shielded luminaire	A luminaire with opaque top and translucent or perforated sides, designed to emit most light downward.
Property line	The edges of the legally-defined extent of privately owned property.
Repair(s)	The reconstruction or renewal of any part of an existing luminaire for the purpose of its on-going operation, other than relamping or replacement of components including capacitor, ballast or photocell. Note that retrofitting a luminaire with new lamp and/or ballast technology is not considered a repair and for the purposes of this ordinance the luminaire shall be treated as if new. "Repair" does not include normal relamping or replacement of components including capacitor, ballast or photocell.
Replacement Lighting	Lighting installed specifically to replace existing lighting that is sufficiently broken to be beyond repair.
Sales area	Uncovered area used for sales of retail goods and materials, including but not limited to automobiles, boats, tractors and other farm equipment, building supplies, and gardening and nursery products.
Seasonal lighting	Temporary lighting installed and operated in connection with holidays or traditions.
Sign	Advertising, directional or other outdoor promotional display of art, words and/or pictures.
Sky Glow	The brightening of the nighttime sky that results from scattering and reflection of artificial light by moisture and dust particles in the atmosphere. Skyglow is caused by light directed or reflected upwards or sideways and reduces one's ability to view the night sky
Temporary lighting	Lighting installed and operated for periods not to exceed 60 days, completely removed and not operated again for at least 30 days.
Time Switch	An automatic lighting control device that switches lights according to time of day.
Translucent	Allowing light to pass through, diffusing it so that objects beyond cannot be seen clearly (not transparent or clear).
Unshielded Luminaire	A luminaire capable of emitting light in any direction including downwards.
Uplight	For an exterior luminaire, flux radiated in the hemisphere at or above the horizontal plane.
Vertical Illuminance	Illuminance measured or calculated in a plane perpendicular to the site boundary or property line.

Excerpts from the Joint IDA – IES

International Dark-Sky Association – Illuminating Engineering Society

Model Lighting Ordinance (MLO) with User's Guide

June 15, 2011

A full version of this guidance is available for download at:
<https://www.ies.org/product/model-lighting-ordinance-mlo-with-users-guide/>

Lighting zones reflect the base (or ambient) light levels desired by a community. The use of lighting zones (LZ) was originally developed by the International Commission on Illumination (CIE) and appeared first in the US in IES Recommended Practice for Exterior Environmental Lighting, RP-33-99.

It is recommended that lower lighting zone(s) be given preference when establishing zoning criteria. Selection of lighting zone or zones should be based not on existing conditions but rather on the type of lighting environments the jurisdiction seeks to achieve. For instance, new development on previously rural or undeveloped land may be zoned as LZ-1. Using lighting zones allows a great deal of flexibility and customization without the burden of excessive regulation. For example, a jurisdiction may choose to establish vertical lighting zones with the lighting zone at street level at a higher zone than the residential housing on upper levels.

However, if an adjacent use could be adversely impacted by allowable lighting, the adopting authority may require that a particular site meet the requirements for a lower lighting zone. For example, the authority could specify Lighting Zone 1 or 2 requirements if a commercial development were adjacent to a residence, hospital or open space, or to any land assigned to a lower zone.

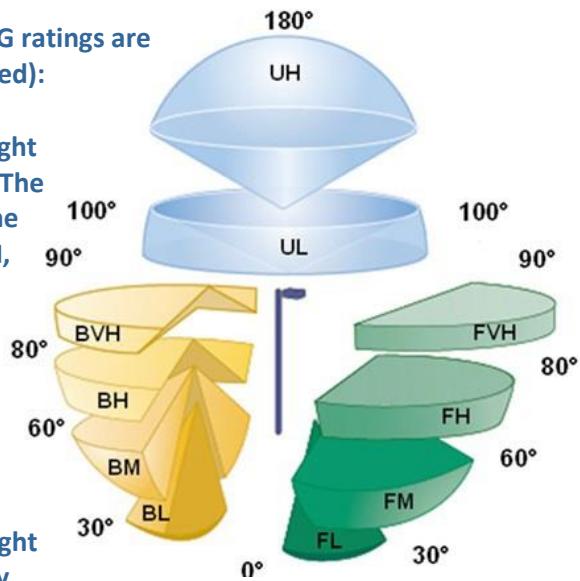
Lighting zones are best implemented as an overlay to the established zoning especially in communities where a variety of zone districts exists within a defined area or along an arterial street. Where zone districts are cohesive, it may be possible to assign lighting zones to established land use zoning. It is recommended that the lighting zone includes churches, schools, parks, and other uses embedded within residential communities.

Zone	Recommended Uses or Areas	Zoning Considerations
LZ-0	Lighting Zone 0 should be applied to areas in which permanent lighting is not expected and when used, is limited in the amount of lighting and the period of operation. LZ-0 typically includes undeveloped areas of open space, wilderness parks and preserves, areas near astronomical observatories, or any other area where the protection of a dark environment is critical. Special review should be required for any permanent lighting in this zone. Some rural communities may choose to adopt LZ-0 for residential areas.	Recommended default zone for wilderness areas, parks and preserves, and undeveloped rural areas. Includes protected wildlife areas and corridors.
LZ-1	Lighting Zone 1 pertains to areas that desire low ambient lighting levels. These typically include single and two family residential communities, rural town centers, business parks, and other commercial or industrial/storage areas typically with limited nighttime activity. May also include the developed areas in parks and other natural settings.	Recommended default zone for rural and low density residential areas. Includes residential single or two family; agricultural zone districts; rural residential zone districts; business parks; open space include preserves in developed areas.

Zone	Recommended Uses or Areas	Zoning Considerations
LZ-2	Lighting Zone 2 pertains to areas with moderate ambient lighting levels. These typically include multifamily residential uses, institutional residential uses, schools, churches, hospitals, hotels/motels, commercial and/or businesses areas with evening activities embedded in predominately residential areas, neighborhood serving recreational and playing fields and/or mixed use development with a predominance of residential uses. Can be used to accommodate a district of outdoor sales or industry in an area otherwise zoned LZ-1.	Recommended default zone for light commercial business districts and high density or mixed use residential districts. Includes neighborhood business districts; churches, schools and neighborhood recreation facilities; and light industrial zoning with modest nighttime uses or lighting requirements.
LZ-3	Lighting Zone 3 pertains to areas with moderately high lighting levels. These typically include commercial corridors, high intensity suburban commercial areas, town centers, mixed use areas, industrial uses and shipping and rail yards with high night time activity, high use recreational and playing fields, regional shopping malls, car dealerships, gas stations, and other nighttime active exterior retail areas.	Recommended default zone for large cities' business district. Includes business zone districts; commercial mixed use; and heavy industrial and/or manufacturing zone districts.

The three components of BUG ratings are based on IES TM-15-07 (revised):

Backlight, which creates light trespass onto adjacent sites. The B rating takes into account the amount of light in the BL, BM, BH and BVH zones, which are in the direction of the luminaire OPPOSITE from the area intended to be lighted.



Uplight, which causes artificial sky glow. Lower uplight (zone UL) causes the most sky glow and negatively affects professional and academic astronomy. Upper uplight (UH) not reflected off a surface is mostly energy waste. The U rating defines the amount of light into the upper hemisphere with greater concern for the light at or near the horizontal angles (UL).

Glare, which can be annoying or visually disabling. The G rating takes into account the amount of frontlight in the FH and FVH zones as well as BH and BVH zones.

BUG ratings apply to the Lighting Zone of the property under consideration.

(Key: UH=Uplight High, UL=Uplight Low, BVH=Backlight Very High, BH=Backlight High, BM=Backlight Medium, BL=Backlight Low, FVH=Forward Light Very High, FH=Forward Light High, FM=Forward Light Medium, FL=Forward Light Low.)

In general, a higher BUG rating means more light is allowed in solid angles, and the rating increases with the lighting zone. However, a higher B (backlight) rating simply indicates that the luminaire directs a significant portion of light behind the pole, so B ratings are designated based on the location of the luminaire with respect to the property line. A high B rating luminaire maximizes the spread of light, and is effective and efficient when used far from the property line. When luminaires are located near the property line, a lower B rating will prevent unwanted light from interfering with neighboring properties.

At the 90-180 degree ranges:

- Zone 0 allows no light above 90 degrees.
- Zone 1 allows only 10 lumens in the UH and UL zones, 20 lumens total in the complete upper hemisphere. (This is roughly equivalent to a 5 W incandescent lamp).
- Zone 2 allows only 50 lumens in the UH and UL zones, 100 lumens total (less than a 25W incandescent lamp).
- Zone 3 allows only 500 lumens in the UH and UL zones, 1000 lumens total (about the output of a 75W incandescent bulb).

Non-Residential Lighting

In this example, three types of luminaires are used to light a parking area and building entry in a light commercial area. Two of these three luminaires use metal halide lamps: 70 watt wall mounted area lights and 150 watt pole mounted area lights. For these, the Initial Luminaire Lumens is equal to the initial lamp lumens multiplied by the luminaire efficiency. These values are entered into the compliance chart. The lumen value for the building mounted LED luminaires is equal to the lumens exiting the luminaire. Therefore, the value already represents the Initial Luminaire Lumens and no luminaire efficiency is needed. The total Luminaire Lumens for the site is equal to 247,840. The allowable lumens are based on the lighting zone and the total hardscape area. Referencing Table 1, the allowed lumens are 2.5/SF for LZ2. Multiplying this by the total hardscape square footage gives a value of 250,000 lumens allowed. Because this value is greater than the value calculated for the site, the project complies.

HARDSCAPE METHOD EXAMPLE - COMPLIANCE CHART			
<i>Lamp Descriptions</i>	<i>QTY</i>	<i>Initial Luminaire Lumens</i>	<i>Total</i>
70 W Metal Halide	8	3,920	31,360
150 W Metal Halide	20	9,600	192,000
18 W LED	24	1,020	24,480
TOTAL INITIAL LUMINAIRE LUMENS			247,840
SITE ALLOWED TOTAL INITIAL LUMENS*			250,000
PROJECT IS COMPLIANT?			YES

* Listed below is the method of determining the allowed total initial lumen for non-residential outdoor lighting using the hardscape method.

SITE ALLOWED TOTAL INITIAL LUMENS	
<i>Site Description</i>	Light Commercial
<i>Lighting Zone</i>	LZ-2
<i>Hardscape Area (SF)</i>	100,000
<i>Allowed Lumens per SF of Hardscape</i>	2.5
<i>Site Allowed Total Initial Lumens (lumens per SF X hardscape area)</i>	250,000



MRP LED

LED AreaLuminaire



Specifications

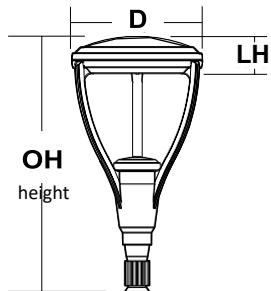
EPA: 1.125 ft²
(0.105 m²)

Luminaire Height: 6-3/8"
(16.2 cm)

Overall Height: 32"
(81.3 cm)

Diameter: 18"
(45.7 cm)

Weight (max): 37.5 lbs
(17 kg)



A+

Capable

options indicated
by this color background.

Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and system-level interoperability.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is A+ Certified when ordered with DTL® controls marked by a shaded background. DTL DLL equipped luminaires meet the A+ specification for luminaire to photocontrol interoperability¹
- This luminaire is part of an A+ Certified solution for ROAM® or XPoint™ Wireless control networks, providing out-of-the-box control compatibility with simple commissioning, when ordered with drivers and control options marked by a shaded background¹

To learn more about A+, visit www.acuitybrands.com/aplus.

1. See ordering tree for details.
2. A+ Certified Solutions for ROAM require the order of one ROAM node per luminaire. Sold Separately: [Link to Roam](#); [Link to DTL DLL](#)

Ordering Information

EXAMPLE: MRP LED 42C 700 40K SR5 MVOLT DDBXD

MRP LED		Drive current	Color temperature	Distribution	Voltage	Mounting	Shipped included	Shipped separately ³
Series	LEDs						(blank) Fits 4"OD round pole	MRPT30 3-1/2"tenon slipfitter
MRP LED	42C 42 LEDs (one engine)	350 350mA 530 530mA 700 700mA 1000 1000mA (1A)	30K 3000K 40K 4000K 50K 5000K	SR2 Type II SR3 Type SR4 Type IV SR5 Type V	MVOLT ¹ 277 ² 120 ² 347 ² 208 ² 480 ² 240 ²		Shipped separately ³	MRPT35 4"tenon slipfitter
							MRPT20 2-3/8" tenon slipfitter MRPT25 2-7/8" tenon slipfitter	MRPF3 3"OD round pole adapter MRPF5 5"OD round pole adapter ⁴
Control options				Other options		Finish (required)		
Shipped installed PER NEMA twist-lock receptacle only (control ordered separate) PER5 Five-wire receptacle only (control ordered separate) ⁵ PER7 Seven-wire receptacle only (control ordered separate) ⁵ BL30 Bi-level switched dimming, 30% ^{6,7} BL50 Bi-level switched dimming, 50% ^{6,7}				PNMTD3 Part night, dim till dawn ⁷	SF Single fuse (120, 277, 347V) ²	DDBXD Darkbronze	DDBTXD Textured dark bronze	
				PNMT5D3 Part night, dim 5 hrs ⁷	DF Double fuse (208, 240, 480V) ²	DBLXD Black	DBLBD Textured black	
				PNMT6D3 Part night, dim 6 hrs ⁷		DNAXD Natural aluminum	DNATXD Textured natural aluminum	
				PNMT7D3 Part night, dim 7 hrs ⁷		DWHXD White	DWHGXD Textured white	

Ordering Information

Accessories

Ordered and shipped separately.

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V) ⁸
DLL347F 1.5 CUL JU	Photocell - SSL twist-lock (347V) ⁸
DLL480F 1.5 CUL JU	Photocell - SSL twist-lock (480V) ⁸
DSHORTSBKU	Shorting cap ⁵
MRPT20DBXDU	2-3/8" tenon slipfitter (specify finish)
MRPT25DBXDU	2-7/8" tenon slipfitter (specify finish)
MRPT30DBXDU	3-1/2" tenon slipfitter (specify finish)
MRPT35DBXDU	4" tenon slipfitter (specify finish)
MRPF3DBBXDU	3" OD round pole adapter (specify finish)
MRPF5DBBXDU	5" OD round pole adapter (specify finish) ³

For more control options, visit [DTL](#) and [ROAM](#) online.

NOTES

- 1 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
- 2 Single fuse (SF) requires 120V, 277V or 347V. Double fuse (DF) requires 208V, 240V or 480V.
- 3 Also available as a separate accessory; see Accessories information at left.
- 4 Maximum pole wall thickness is 0.156".
- 5 If ROAM® node required, it must be ordered and shipped as a separate line item from Acuity Brands Controls.
- 6 Requires an additional switched line.
- 7 Dimming driver standard. Not available with 347V, 480V, SF, DF, PER5 or PER7.
- 8 Requires luminaire to be specified with PER option. Ordered and shipped as a separate line item.

Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

LEDs	Drive Current (mA)	System Watts	Dist. Type	30K					40K					50K				
				Lumens	B	U	G	LPW	Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
42C (42 LEDs)	530	75W	SR2	5,456	1	2	1	73	6,605	1	2	1	88	6,671	1	2	1	89
			SR3	5,436	1	1	1	72	6,581	1	1	2	88	6,647	1	1	2	89
			SR4	5,399	1	1	1	72	6,537	1	1	2	87	6,602	1	1	2	88
			SR5	5,748	3	1	3	77	6,959	3	1	3	83	7,029	3	1	3	94
	700	100W	SR2	6,630	1	2	1	66	8,026	2	2	2	80	8,106	2	2	2	81
			SR3	6,605	1	1	2	66	7,997	1	2	2	80	8,077	1	2	2	81
			SR4	6,561	1	1	2	66	7,943	1	2	2	79	8,022	1	2	2	80
			SR5	6,985	3	1	3	70	8,456	3	2	3	85	8,541	3	2	3	85
	1000	151W	SR2	8,165	2	2	2	54	9,885	2	2	2	65	9,983	2	2	2	66
			SR3	8,135	1	2	2	54	9,848	2	2	2	65	9,947	2	2	2	66
			SR4	8,080	2	2	2	54	9,782	2	2	2	65	9,880	2	2	2	65
			SR5	8,602	3	2	3	57	10,414	4	2	4	70	10,518	4	2	4	70

PER Table

Control	PER (3 wire)	PER5 (5 wire)			PER7 (7 wire)				
			Wire 4/Wire5		Wire 4/Wire5	Wire 6/Wire7			
Photocontrol Only (On/Off)			Wired to dimming leads on driver		Wired to dimming leads on driver	Wires Capped inside fixture			
ROAM			Wired to dimming leads on driver		Wired to dimming leads on driver	Wires Capped inside fixture			
ROAM with Motion (ROAM on/off only)			Wired to dimming leads on driver		Wired to dimming leads on driver	Wires Capped inside fixture			
Futureproof*			Wired to dimming leads on driver		Wired to dimming leads on driver	Wires Capped inside fixture			
Futureproof* with Motion			Wired to dimming leads on driver		Wired to dimming leads on driver	Wires Capped inside fixture			

Recommended

Not work

Alternative

*Futureproof means: Ability to change controls in the future.

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient	Lumen Multiplier
0°C	32°F
10°C	50°F
20°C	68°F
25°C	77°F
30°C	86°F
40°C	104°F

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the **MRP-LED42C700** platform in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

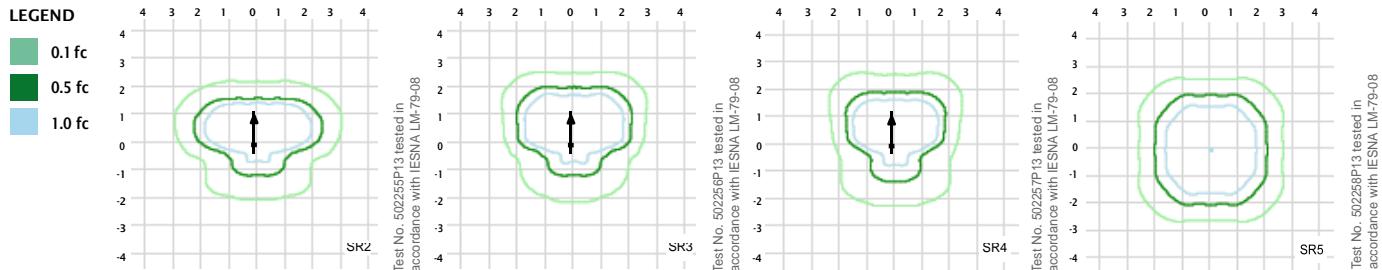
To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	1.0	0.96	0.92	0.85

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's [MRP-LED homepage](#).

Isofootcandle plots are considered to be representative of available optical distributions.



FEATURES & SPECIFICATIONS

INTENDED USE

Streets, walkways, parking lots and surrounding areas.

CONSTRUCTION

Single-piece die-cast aluminum housing with nominal wall thickness of .012". Die-cast top access doorframe has impact-resistant, tempered glass lens (3/16" thick). Doorframe is fully gasketed with one-piece tubular silicone.

FINISH

Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Standard Super Durable colors include dark bronze, black, natural aluminum and white. Available in textured and non-textured finishes.

OPTICS

Precision acrylic refractive optics for optimum light distribution through the flat glass lens. Light engines are available in standard 3000K (70 CRI) or optional 4000K (70 CRI) or 5000K (70 CRI) configurations.

ELECTRICAL

Light engine consists of 42 high-efficacy LEDs mounted to a metal-core circuit board and aluminum heat sink, ensuring optimal thermal management and long life. Class 1 electronic driver has a power factor >90%, THD <20%, and has an expected life of 100,000 hours with <1% failure rate. Easily-serviceable surge protection device meets a minimum Category C Low for operation (per ANSI/IEEE C62.41.2).

INSTALLATION

Standard post-top mounting configuration fits into a 4" OD open pole top (round pole only). Multiple options and accessories are available for other mounting needs.

LISTINGS

CSA certified to U.S. and Canadian standards. Luminaire is IP65 rated. Rated for -40°C minimum ambient. **U.S. Patent No.D556,357.**

WARRANTY

5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.



IDA-Criteria for Community-Friendly Outdoor Sports Lighting v1.0

1. Compliance with all applicable Codes and Standards (e.g. Underwriter Laboratories, CEC, National Building Codes with Local Amendments)
2. **Target Illumination** – Measured on-field illuminance values appropriate for the application per IESNA RP-6-15 Sports and Recreational Area Lighting criteria (or equivalent CIE guidance) together with modeled initial illuminance targets. Only IES Class III & IV level and State High School Lighting Recommendation illumination levels are eligible for the Award of Excellence. To limit over-lighting, the design may vary by no more than 10% above the average target illuminance levels for each Class.
3. As the IES TM-15-11 Luminaire Classification System for Outdoor Lighting is not appropriate for sports lighting, a modified approach to controlling backlight, uplight, and glare is applied with the following metrics:
 - A. **Backlight** – Directionality and application efficiency will be addressed indirectly through two methods that quantify off-site performance, one using the design luminance and another using measured illuminance. Backlight criteria will be difficult to meet without sufficient and appropriate setback of sports fields from the property line.
 - a. Total designed lumens not contained within the area encompassing the field perimeter and an area immediately adjacent to that area that has a 33 foot (10 meter) offset. As modeled, no more than 15% of the total lumens may be outside of this region.
 - b. Measured spill illuminance values, as measured with the light meter aimed in the direction of the brightest reading, shall not exceed criteria for the respective Environmental Zone (Table 1 below) nor shall it exceed the maximum initial spill illuminance values as modeled and specified in the design process. These measurements shall be taken a distance equal to 150' beyond the edge of the field. Measurements should be conducted with and without the facility lighting operating so that the sports facility lighting can be isolated from other natural and artificial light sources.

Table 1 – Allowable spill illuminance to control backlight

Lighting Zone		Spill Illuminance at Setback
Environmental Zone (IESNA RP-33-99)	MLO Lighting Zone (IDA Model Lighting Ordinance)	
E-2 to E-4	LZ-1 to LZ-4	≤0.20 ft-c / ≤2.0 lux

- B. **Uplight** – All luminaires must be designed such as to not to emit direct light above the horizon, unless required for the activity (i.e. aerial sports) being played. In those cases, only 8% of the total (directly) applied lumens as modeled may be in this zone. For modeling purposes, a horizontal ceiling grid shall be placed 5 feet (1.5 meters) above the top of the tallest pole, extending out to 150 feet (45 meters) beyond the edge of the field to determine compliance. Installation shall not deviate from the design.
- C. **Glare** – Modeled luminous intensity from any luminaire for any viewing angle at 5' above grade level, at a distance equal to 150' beyond the edge of the field shall not exceed 1000 candela (absolute). Luminaires shall not emit more than 250 lumens in the “Very High” glare zone, ranging from 80° to 90° above nadir. This shall be verified through a luminaire photometric report and aiming summary report and visual inspection, or through an equivalent software application and visual inspection.¹
- 4. **Lighting Zoning** – Community-Friendly Outdoor Sports Lighting will only be certified if located in environmental zones E2 through E4, or MLO lighting zone LZ1 through LZ4. Areas especially sensitive to lighting such as E1 or LZ0 are not appropriate for this award program.
- 5. **Application Efficiency** – The lighting system shall achieve a minimum Application Efficiency of 70 lumens per watt, calculated per the following formula (or the metric equivalent):

$$\frac{\text{Target area square footage} \times \text{Avg. Maintained Design ft-c}}{\text{Total System Watts}} = \text{Applied Lumens/watt}$$

“Target Area” is defined as the total grid area for the sports field and/or sports court as defined by the IES LM-5-04 IESNA Guide for Photometric Measurements of Area and Sports Lighting Installments (or CIE equivalent guidance).

¹ When commercial meters are widely available to measure luminous intensity in the field, these criteria will be amended to also require a measurement component for glare.

6. **Controls** – Provide advanced controls and documentation for the following:
 - a. Automatic and/or remote control system via smartphone apps, or direct remote communication to the company facility responsible for handling the lighting controls, to enforce shut-off at locally established curfew time, not to be later than 11:00PM (2300hrs).
 - b. On-site manual and/or remote control system shall also be provided to allow for the lights to be turned on or off at will (before curfew) to assure that only active sports fields are lighted.
 - c. Provide readily accessible controls to implement uniform and variable adaptive illumination levels for different task lighting needs on field, e.g. IES class of play, competition athletics, band practice, striping, mowing, sports practice, etc. Adaptive dimming shall be possible across the range of 25% to 100% of full illumination.²
 - d. A formal policy defining the appropriate level of illumination necessary for the specific activities and curfew times must be established and enforced. A copy of the policy will be included in the application for the Award of Excellence.
7. **Color** – Luminaire Correlated Color Temperature (CCT) may not exceed 5700°K, as defined by ANSI C78.377. Luminaire CCT must be determined through empirical measurements as defined by IESNA LM-79 (or CIE equivalent) and performed by a laboratory appropriately accredited by NVLAP. Installation shall be verified by measurement across the target area.³
8. **Other Lighting** – The installed field lighting is not to be used for illuminating other area tasks. For example, if parking and concession areas lighting is desired, those areas shall be illuminated by separate luminaires and systems not associated with sports field illuminance needs. Other outdoor lighting at the site must, at a minimum, meet the lighting standards and lighting codes established by the community, and must meet the standards set forth in the IDA Model Lighting Ordinance for the relevant lighting zones and tasks.

² IDA is developing guidance for the appropriate illumination levels for non-sports activities and tasks that often occur on playing fields.

³ Some variance in the measured CCT values are permitted, following the ANSI guidance.



Frequently Asked Questions

IDA-Criteria for Community-Friendly Outdoor Sports Lighting

1. Why is IDA creating criteria for IDA Community-Friendly Outdoor Sports Lighting? Aren't you simply "certifying" more light pollution?

Since 2007, IDA's Fixture Seal of Approval (FSA) Program has successfully evaluated roadway, wall pack and walkway luminaires that have been utilized in communities to promote the protection of the nighttime environment. Although successful, the FSA was neither developed nor intended to apply to athletic field lighting, due to the need that the facilities' luminaires had to be positioned above full cutoff orientations. This resulted in a number of issues and concerns in communities where general lighting practices were promoting dark skies, yet local sporting facilities – which were being lit with non-shielded luminaires – were exacerbating sky glow and light pollution.

To encourage the use of the best available technology for dark sky preservation, IDA has established Criteria for Community-Friendly Outdoor Sports Lighting that upholds the values that many communities seek in their public illuminated spaces. These criteria ensure that outdoor sports lighting design minimizes obtrusive light spill and glare into surrounding neighborhoods and natural areas, meets sustainability and climate-friendly goals, and reduces sky glow to the greatest extent practicable. By utilizing IDA's criteria, communities demonstrate and promote the vision for outdoor sports lighting that simultaneously meets the demanding task of illuminating night-time sports events while preserving night skies.

2. How will the IDA-Criteria for Community-Friendly Outdoor Sports Lighting protect my neighborhood from light pollution?

By adopting the IDA-Criteria for Community-Friendly Outdoor Sports Lighting, communities will:

- Minimize neighborhood lighting nuisance by greatly reducing spill and glare disruption.
- Manage high angle glare, thus dramatically decreasing off-site light trespass and sky glow.

- Mitigate neighborhood nuisance factors and sky glow which, in turn, provide benefits to the environment, the astronomy community, and others.
- Minimize lumen densities, which reduce energy consumption.

3. For what types of play field is the IDA-Criteria for Community-Friendly Outdoor Sports Lighting appropriate?

The criteria specify that only facilities used for soccer, baseball, tennis and other recreational activities typically associated with schools and community parks qualify for consideration.

4. Who should know about the IDA-Criteria for Community-Friendly Outdoor Sports Lighting?

To promote lighting that helps protect the nighttime environment, we recommend contacting city council members, community representatives, home owner associations, and parks and recreation authorities to encourage their use of the IDA-Criteria for Community-Friendly Outdoor Sports Lighting when designing or retrofitting playfields.

5. Why do the criteria utilize a maximum allowable correlated color temperature of 5700 kelvin (k) when IDA recommends 3000k for roadway and general area lighting?

IDA's recommendation for correlated color temperature values of outdoor lighting applications have been, and remain, 3000k maximum. Street and area lighting illuminances are established at levels to facilitate safe way-finding and hazard identification, while minimizing light trespass and the disruption of nocturnal habitats. By contrast, sports fields have high levels of human activity and ball speeds where visibility is essential, requiring the allowance for design professional and end user preferences of light sources of up to 5700k. Nonetheless, the use of advanced technologies combined with rigorous design standards, curfews, and variable output controls tailored to the need of the activity, sports lighting facilities **can** be constructed or retrofit to essentially eliminate light trespass and curtail sky glow, protect nocturnal habitat, moderate neighborhood nuisance glare, and support dark skies.

6. Can the IDA-Criteria for Community-Friendly Outdoor Sports Lighting be achieved with existing installations?

Light trespass limitations of the IDA-Criteria for Community-Friendly Outdoor Sports Lighting are stringent, and likely will not be met if older technologies and design

parameters are used, but holistic lighting modernizations of legacy applications are possible under this guidelines.

7. Does IDA intend to formally certify and recognize facilities that fully comply with the standards established in the criteria?

It is anticipated that in the next several months, IDA will establish a program that certifies outdoor facilities that fully comply with IDA-Criteria for Community-Friendly Outdoor Sports Lighting. We are currently developing software that will provide preliminary evaluations of facilities and that can be used to guide their design, or retrofit, so that they meet the program's strict standards. Once a field has been constructed, or retrofit, to these standards, IDA will conduct an on-site verification test to ensure that the facility still complies with the criteria and, if so, will be certified and recognized by IDA as compliant with IDA-Criteria for Community-Friendly Outdoor Sports Lighting.