

Understanding Glare, Not All Sports Lighting Fixtures Are Created Equal



This digital photo shows four different sports lighting fixtures aimed at same point on the field, demonstrating differences in the control of glare.

Aiming, wattage, supply voltage and other aspects of the demonstration were verified by a DMD staff member to ensure an honest comparison. All of these fixtures are currently available and installed on sports fields.

Note the glare produced as captured by the photo and the level of development for each fixture as described below (the unlabelled light in the foreground is a low wattage parking lot light).



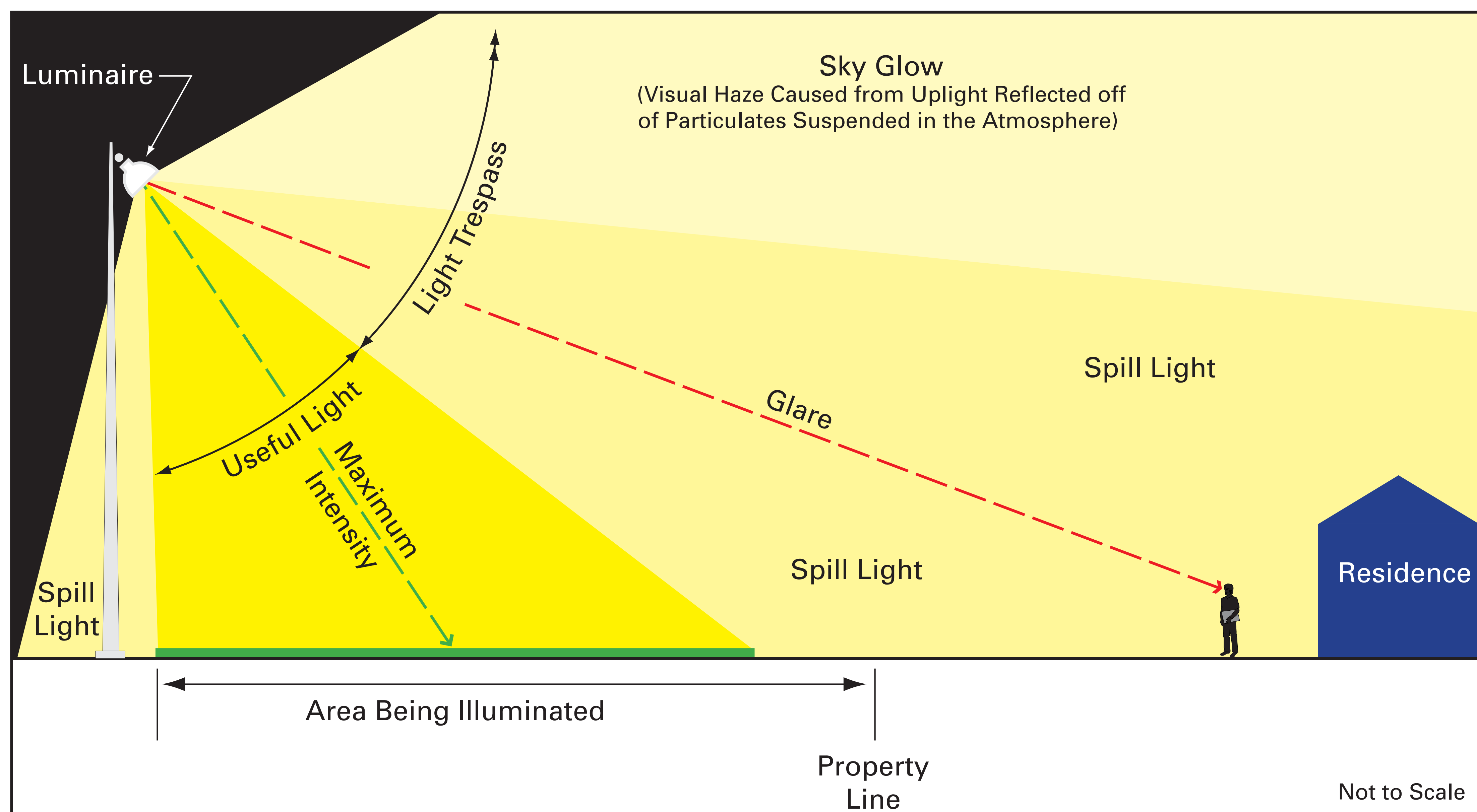
5th Generation Fixture
(1/3 Reduction in Glare
over 4th Generation)

Evolution of Light Control



Understanding Obtrusive Light Terminology

The three components of obtrusive light include glare, spill light and sky glow. In a lighting design each obtrusive light component is considered separately.



Glare. Obtrusive light that hinders or bothers the human eye. Glare is the result of light emitted from a source that is in sharp contrast to its surroundings.

Disability Glare. The presence of an amount of glare so significant as to prevent adequate vision. The presence of disability glare means that other objects in one's field of vision are obscured.

Discomfort Glare. The presence of a sufficient amount of glare to cause discomfort. While the individual may experience a sense of discomfort, this level of glare does not obscure his or her vision.

Nuisance Glare. The presence of a sufficient amount of glare as to be bothersome but does not prevent vision or lead to discomfort.

Spill Light. Illuminance falling beyond the area being illuminated. Sampling spill light with a calibrated light meter is the only accepted method of measuring and defining levels of light trespass for any community, and is quantifiable.

Sky Glow. The visible haze or glow of light seen above a lighting installation that reduces the ability to view the darkened nighttime sky. The source of sky glow is a combination of light emitted upwards from a light source and reflected light cast upwards from the surface being illuminated reflecting off particles suspended in the atmosphere.

Note: Glare, spill light and sky glow impacts are only present when an outdoor facility is illuminated at night. Once the lighting is turned off, the impacts of obtrusive light are no longer present.



Understanding Typical Lighting Levels

The eye adapts to different light levels making it possible to see in a wide range of illuminated conditions

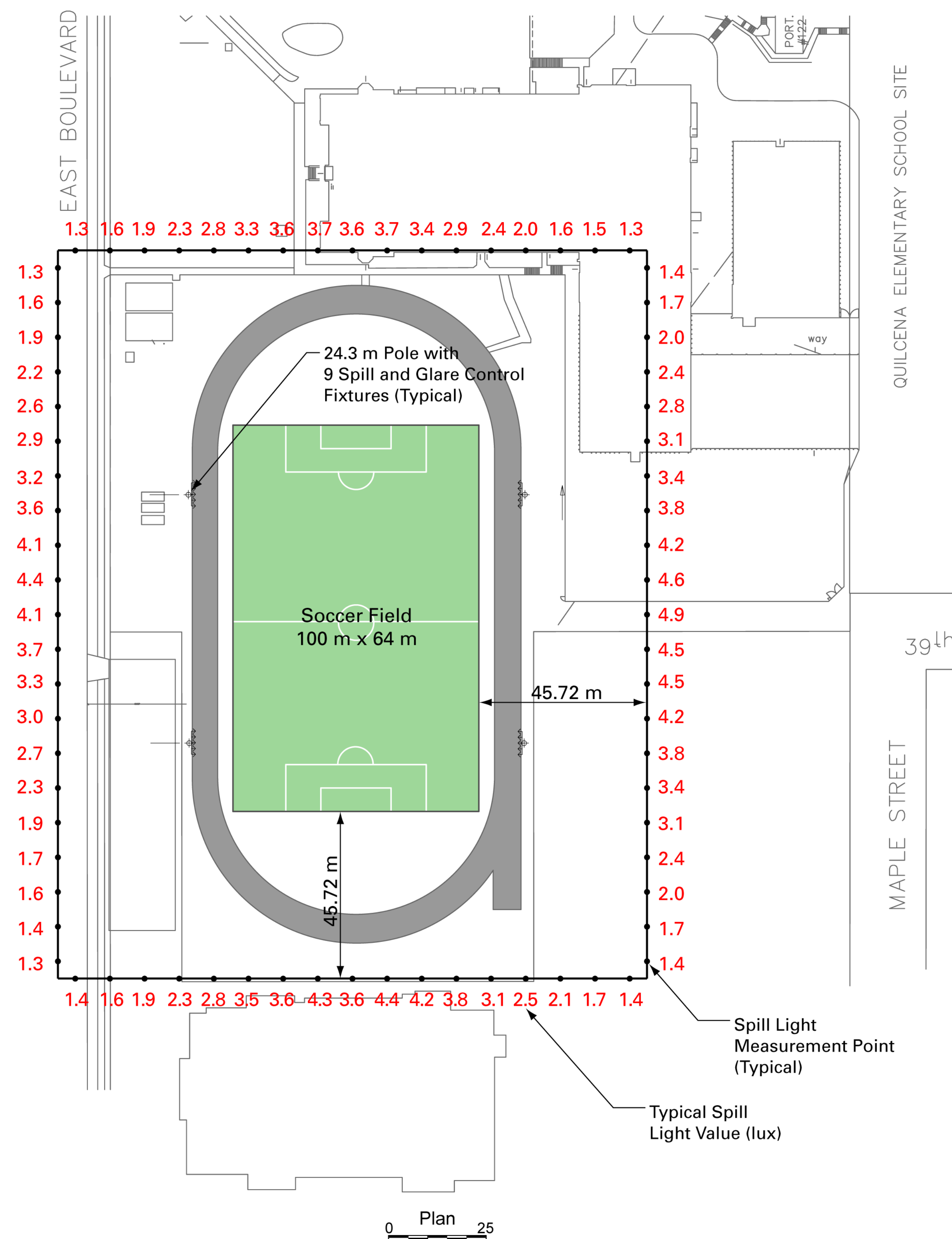
Description	Lux Levels
Sunny Day Outdoors	50,000 lux
Overcast Day Surrey, British Columbia (May 2004)	5,000 lux
Illuminated College Football Stadium Lighted for TV	1500 lux
Illuminated Office Space	500 lux to 800 lux
Illuminated Local Soccer Field	300 lux
Illuminated Golf Driving Range (at 200 yards)	100 lux
Typical Illuminated Parking Lot Lighting	20-30 lux
Typical Street Lighting (Measured directly under luminaire)	45- 50 lux
Moonlight Falling on a Surface	1 lux

Convert lux to foot candles (fc) by dividing by 10.



Point Grey Artificial Turf Field (300 lux)

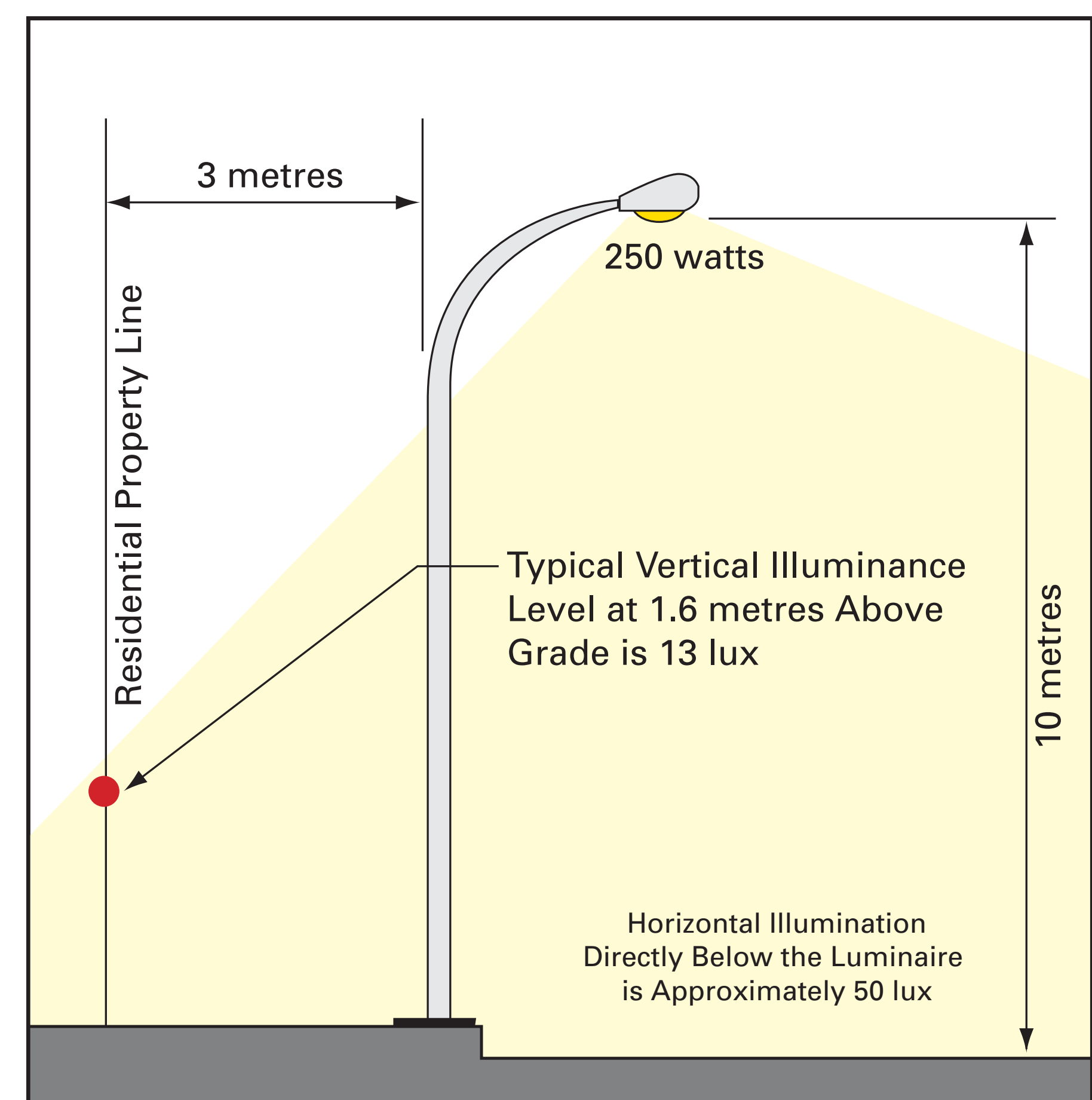
with 5th Generation Spill and Glare Control Fixtures



Note: 8 lux is the maximum recommended allowable vertical spill light for a Lighting Environmental Zone (LEZ) 3 which is typical for most of local neighborhoods.



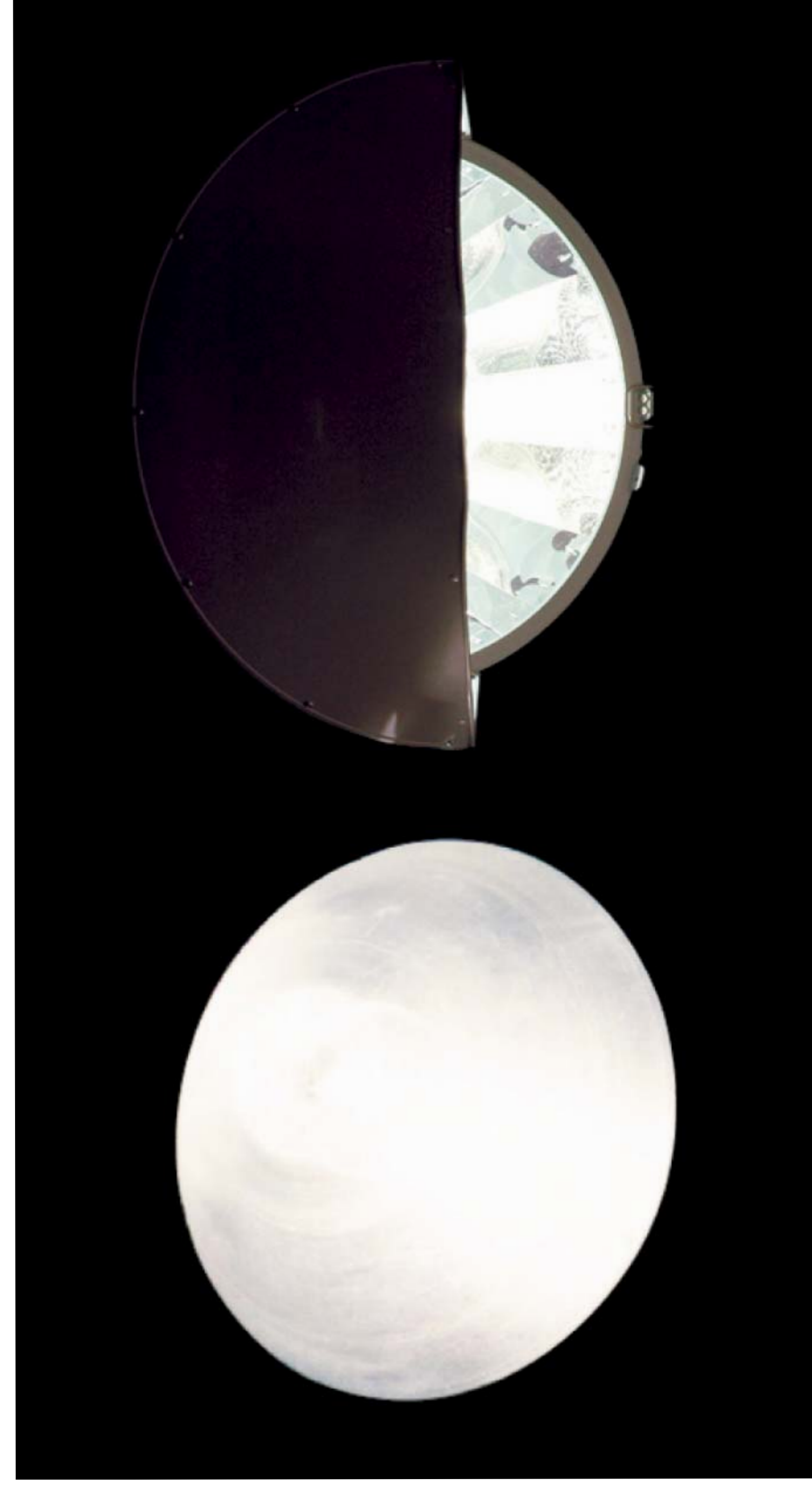
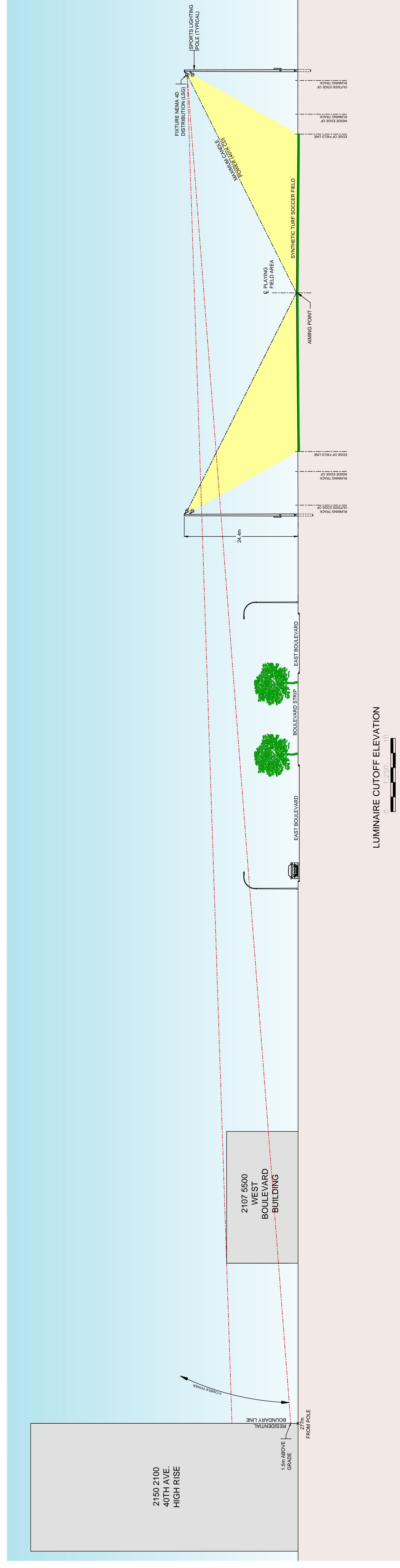
Urban soccer field with 4th generation spill and glare control fixtures illuminated to 300 lux. Photo taken approximately 50 metres from the edge of the field.



Vertical spill light from a typical street light



Point Grey Artificial Turf Field Spill Light and Glare Analysis



Old Technology

Proposed Fixture
(Front View)

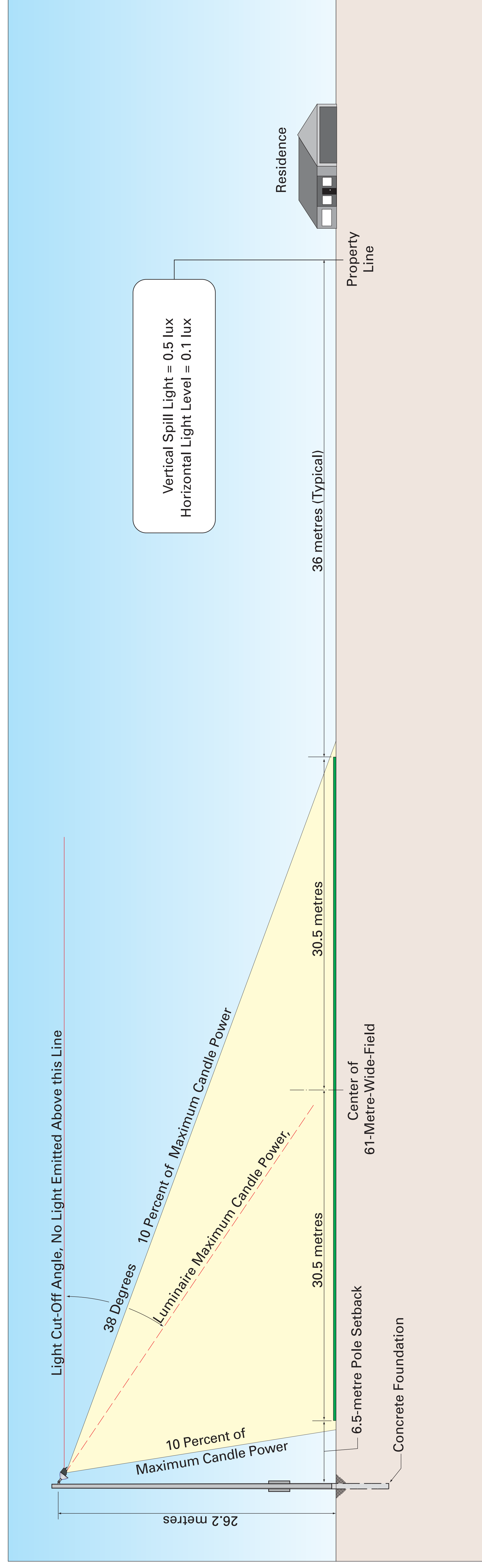
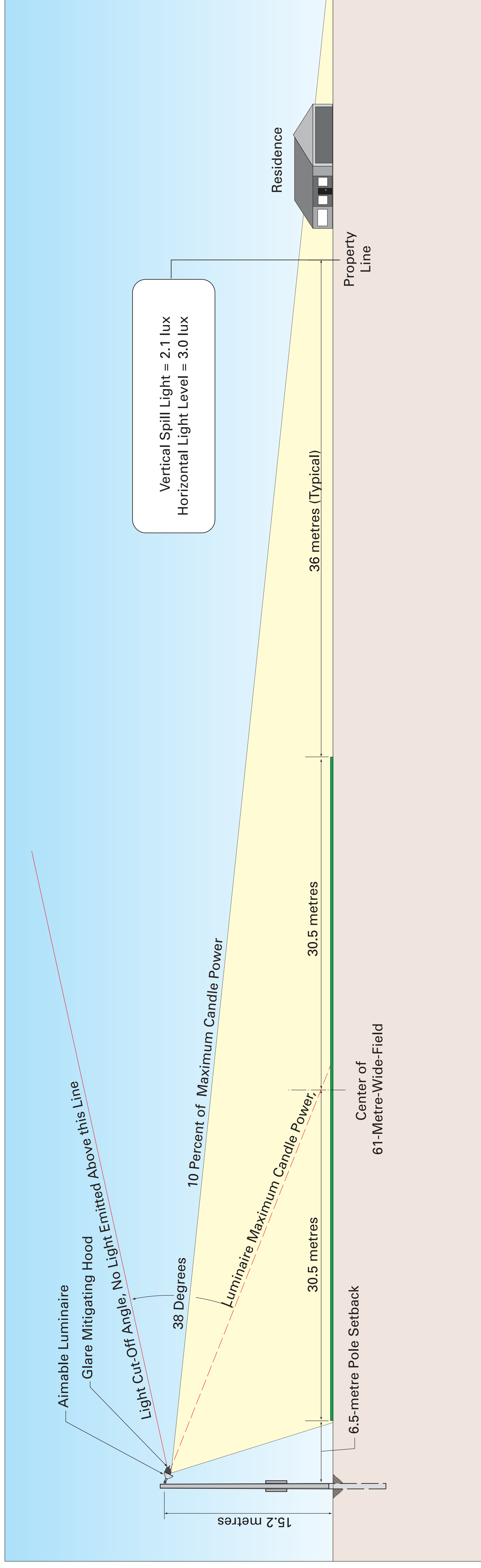


Proposed Fixture
(Side View)



How Pole Height Assists In Controlling Obtrusive Light Impacts

Taller poles can reduce impacts off site, including spill light, glare and sky glow.



Note: Comparison considers a single fixture, aimed as shown. Sports fields use banks of fixtures with cumulative increases in spill light and glare.





Meet the IESNA

**Illuminating Engineers Society
of North America**

- Founded in 1904 to “Advance knowledge and disseminate information for the improvement of the lighted environment for the benefit of Society.”
- Membership is primarily made up of engineers, manufacturers, and municipal and government staff that practice within the lighting industry.
- Includes established committees, such as the Roadway Lighting Committee and the Sports Lighting Committee, to advance knowledge and improve the practice of design in specific areas.
- Publishes Technical Memorandums (TMs) and Recommended Practices (RPs) that are used throughout North America as design standards and resources. Applicable publications for outdoor lighting include the following.

RP-8 Roadway Lighting

RP-20 Lighting Parking Facilities

RP-33 Lighting For Exterior Environments

TM-11 Light Trespass: Research, Results and Recommendations

TM-10 Addressing Obtrusive Light (Urban Sky Glow and Light Trespass) in Conjunction with Roadway Lighting

RP-19 Roadway Sign Lighting





Meet the IDA

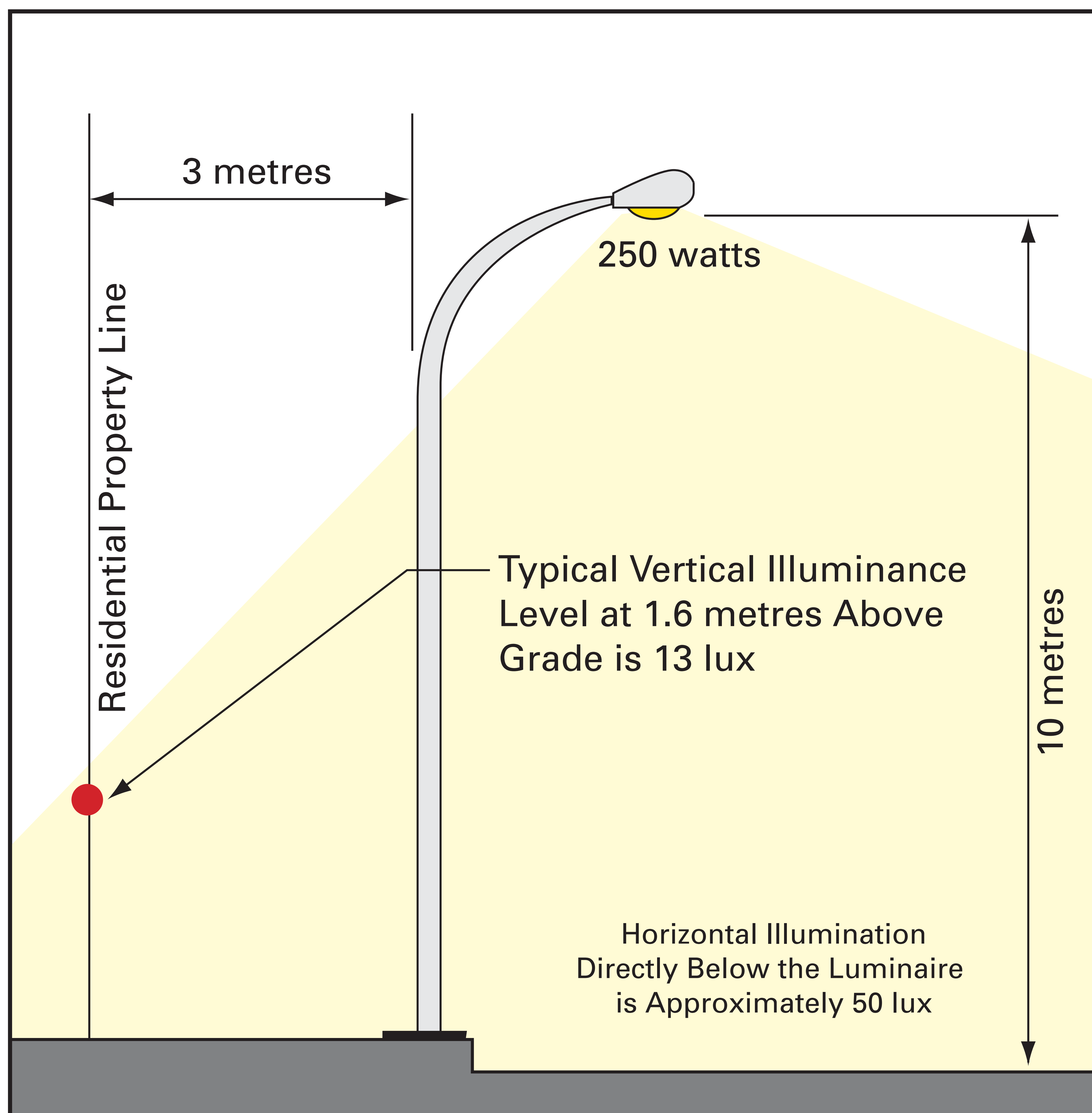
International Dark-Sky Association

- Founded as a nonprofit organization in 1988 to mitigate or eliminate the adverse impacts of lighting on views of the darkened nighttime sky. DMD agrees with the reduction of obtrusive light through good design.
- Currently the IDA has over 100,000 members worldwide with members in nearly every community in North America. The IDA is growing at a rate of approximately 200 new members per month.
- The IDA publishes a Lighting Code Handbook and a host of other materials focused on their narrow mission (stated above).
- The IDA has an extensive web site that makes their information available to professionals as well as those unqualified in lighting design. This has equipped community activists with quantities of information about lighting, some which is of questionable authority.
- IDA members are often politically involved, and have often aggressively pushed for the adoption of restrictive lighting ordinances. This has resulted in the development of many unrealistic lighting ordinances in North America based on the IDA goals rather than the judgement of practicing lighting designers and engineers.
- Because lighting issues are complex and require the artful application of theory to result in good design, DMD recommends that a qualified and knowledgeable professional engineering firm be retained to translate the goals of the IDA into reality for all lighting projects.



Comparing Spill Light Levels to a Known Situation

The spill light from an average street light (13 lux) at the residential boundary exceeds the spill light from most well-designed illuminated sports fields (8 lux)



Obtrusive Light Definitions

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