



Airport Tarmac Lighting Guide



Originally written by: Lighting Analysts, Inc.
Lighting design and software consultants



Preface

The original Airport Design Guide was written by Lighting Analysts in 1996, as a complement to the Illuminating Engineering Society of North America RP-14, which is no longer in print. However, the principles set forth in RP-14 are still considered sound design practices. Every lighting professional knows that tangible numbers are dependent upon the distances involved and areas to be illuminated. Without precise guidelines for the calculations of illuminance quantities, we have no basis upon which to make concrete comparisons between competitive lighting systems. Thus, there remains a need to develop a practical, yet minimal, lighting performance plan in accordance with sound design practices against which to measure the performance of all proposed lighting systems.



The design specification guidelines presented in this Airport Tarmac Lighting Guide are closely patterned after the ideas set forth by RP-14 with reference to lighted spaces and required illuminance levels. Lighting systems measuring up to the specifications developed herein will satisfy all expectations of sound design practices and produce results of illuminance exceeding all previously known lighting criteria.

By providing specifiable illuminance quantities at specific critical distances with relation to the illuminated aircraft containment area during the design process, we promote direct comparison of different luminaire types on an “apples-to-apples” basis. This solidifies the lighting specification and further promotes the selection of a properly designed lighting system.





The Bow-LX Luminaire by Visionaire

The Bow-LX Luminaire by Visionaire offers excellent performance for the subject task of ramp lighting. This performance, in concert with the superior glare control afforded by Superior Visionaire optics, allow the specification to be easily met using the Bow-LX LED Luminaire in a variety of poles spacing configurations.

The most cost effective tarmac lighting solution is typically provided by the use of either the BLX-6-192LC at 325W, 430W, or 614W models. The relative maintained output of the source will dictate the number of luminaires to be employed per pole.

The new Bow-LX LED Luminaire from Visionaire combines unique contemporary design with the latest LED technology and provides optimum lighting and energy savings over traditional lighting systems. The 4, 6 or 8 independent die-cast light engines allow use of up to 1000 mA drivers for maximum lumen output of over 65,000. The dedicated heat sink for each LED array maximizes its thermal management characteristics; allowing for long life of the LEDs and maximum light output.



An adjustable knuckle-mount system allows for up to 90 degrees of vertical adjustment, for maximum flexibility or aiming of the LEDs, to put the light in just the right place as needed; or choose a rounded extruded aluminum Bolt-On Arm. Choose from six distribution patterns for maximum utilization of the high output of the LED light engines.

The Bow-LX LED series leads the way with its innovative design and adjustable mounting style. This is an LED outdoor lighting series that will provide value for many years to come; serving a multitude of markets that have not been addressed during the recent introduction of LED lighting.



The new Bow-LX LED Luminaire

Where does the Bow-LX Luminaire fit in?

The Bow-LX Luminaire by Visionaire seems to lend itself naturally to the task of airport tarmac lighting. The optical characteristics of this luminaire produce a light distribution pattern exhibiting excellent projection while simultaneously providing excellent light distribution between poles and required cutoff. Optics of this luminaire are ideal for minimizing offending glare to oncoming aircraft, yet provide a high standard of visibility within the aircraft containment corridor. A conventional floodlight will not possess all of these attributes in one beam pattern thus requiring a mixture of luminaires that have different beam patterns to achieve the desired illuminance criteria. The past approach to apron design proved to be "spotty," complicated installation, and reduced the flexibility of the lighting system. Now, the unique Bow-LX luminaire places Visionaire in the pilot's seat and sets rigorous standards that outshine HID and other LED luminaires.



Lighting System

Apron luminaires shall be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron. The arrangement and positioning of luminaires should be such that an aircraft stand receives light from two or more directions to minimize shadows.

The spectral distribution of apron luminaires shall be such that the colours used for aircraft marking connected with routine servicing, and for surface an obstacle marking, can be correctly identified.

In real application, aircraft position and size may vary along with pole spacing, pole height (ranging from 60 feet to 150 feet), as well as horizontal plane width and depth of the tarmac.

Pole Placement and Height

The selection of pole height and location is of great importance in the design of any lighting system. However, the importance of these metrics in the design of an apron lighting installation is absolutely paramount. Poor pole placement will result in shadows and inadequate visibility for some aircraft service locations, and in turn, directly affect the question of safety. Poles of insufficient height will increase the potential for offending glare to approaching aircraft as well as the control tower, due to the need for excessive luminaire uptilt.

To ensure adequate visibility in the vicinity of each aircraft, avoid shadows, and minimize glare, poles should be located at the corners of each service location between aircraft.

In order to provide the necessary light distribution between projection for visibility at the tail of the aircraft, and avoid offending glare by maintaining luminaire uptilt within the design parameters for the optical systems, a typical minimum pole height of sixty (60) feet is required.

Illuminance Specification: Intent

The following suggested illuminance specification illustrates luminaire performance and glare control through the use of both minimum and maximum allowable illuminance levels. Minimum horizontal illuminance levels are specified in the vicinity of the tail of the aircraft while a maximum horizontal value is stated a short distance beyond. This type of specification dictates a well-illuminated service corridor while at the same time minimizing spill through luminaire

beam cutoff. Minimum vertical illuminance values are then specified along the length of the aircraft to further ensure good visibility for ground personnel. To finalize the requirements, maximum vertical values are mandated in a vertical plane in the area of the aircraft containment line. These maximum vertical values are calculated at specified distances above the tarmac to provide evidence of the lighting system cutoff and minimize glare to oncoming aircraft.



Common Practice

There are various light level specifications depending on the governing body by which one chooses to abide. Bright Solutions' goal is to meet the most stringent of specifications of the most demanding of the governing bodies, leaving no tarmac area at risk of insufficient lighting leading to mishap claims.

The governing bodies are as follows:
Various light level (values in Lux)

Organization	Apron	Cargo Loading	Aircraft Ops	Pedest. entr. aircraft area	Roadway	Dock	Uniformity	Vertical	Measured Height
ICAO - ANNEX sect. 5.3.23	20						4:1	20	2m.
IEALC	50	50	50	50		50	4:1	20	
Transport Canada T.P. 312	20						4:1	20	
FAA - table 4.1 AC 150/5360-13	54		1.6	22	16	108			36"
AFNOR EN12464 - TABLE 5.2	30/20								
Canada Labor Code - part VI	>20	>20	>20	>20		>20			
UK Civil Aviation - CAP 168	20						4:1		20

ICAO at 2m.

FAA at 1m. (36")

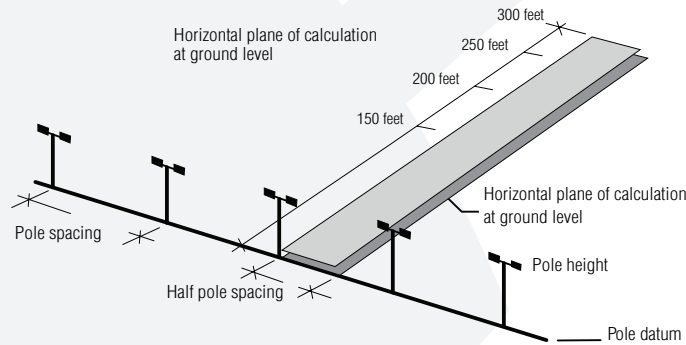


Horizontal Illuminance

Based on the most stringent of specifications noted above the calculated illuminance levels shall have a minimum maintained horizontal illuminance at ground level of:

- 50 lux average from pole to a distance of 200 feet
- 10 lux average at a distance of 250 feet (between poles)

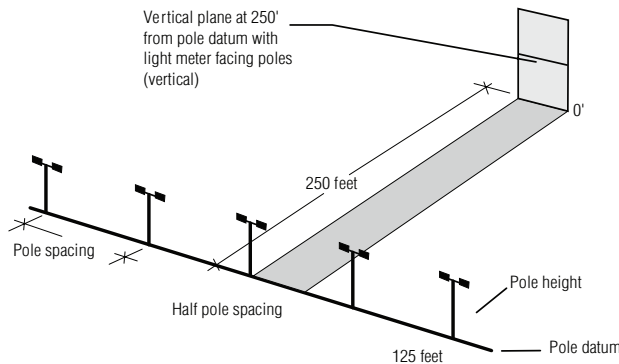
Horizontal Illuminance Calculation Guideline



Vertical Illuminance Calculation for Glare Consideration

In a similar manner to the horizontal plane calculations, the vertical test plane is located adjacent to the third pole in the five pole series and covers a distance equal to one half of one pole spacing. The plane is located a distance of 250 feet from the pole location datum and rises in elevation to 100 feet above the tarmac (AGL).

Vertical Illuminance Calculation for Glare Consideration



Due to Visionaire's continued efforts to improve our products, product specifications are subject to change without notice.