

Apron Lighting Impacts on Airport Lighting Environment



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IES – RP-37-20

Illuminating Engineering Society (IES)

Recommended practice for apron lighting to improve safety for pilots, air traffic controllers, and ground crews

- 1 Horizontal average 2 foot-candles at grade and vertical average of 2 foot-candles 6.5' (2m) above grade to not exceed 4:1 uniformity
- 2 Glare control
 - < 25,000 candela at the taxiway
 - < 1,500 candela at the control tower
- 3 Evaluate mounting heights to achieve horizontal and vertical light levels (minimum mounting height of 2x the pilot's eyes)
- 4 For retrofits, must evaluate limitations and need to achieve light levels, uniformity and glare control

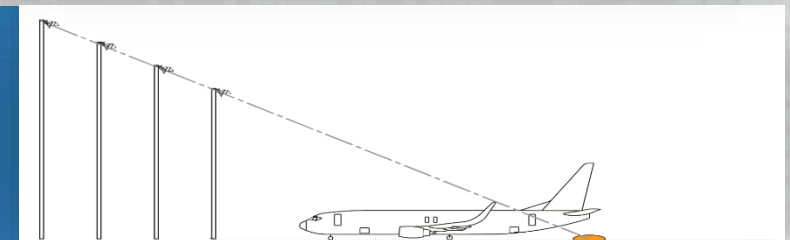
Light Levels



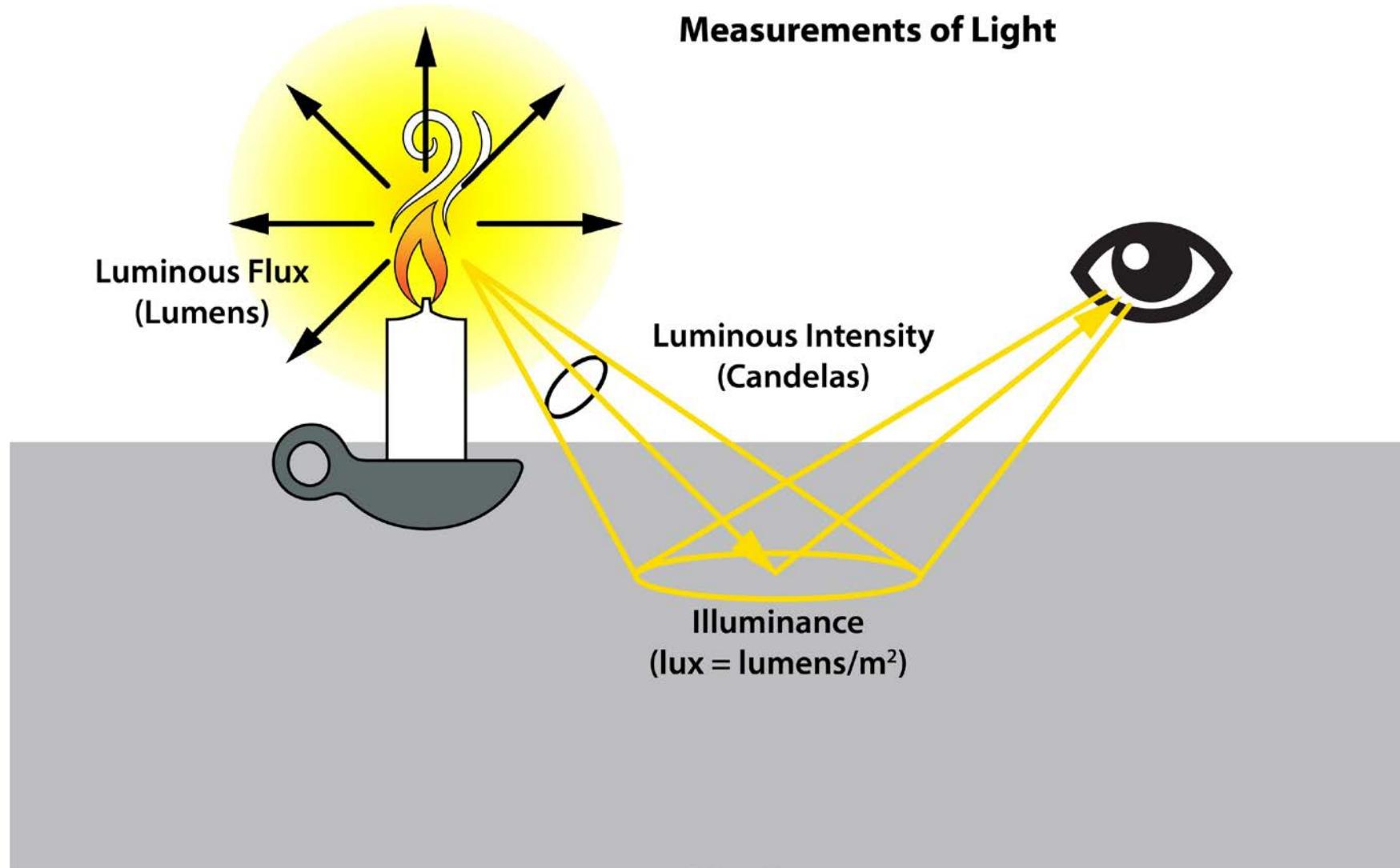
Glare Control



Mounting Heights



Lighting Metrics?



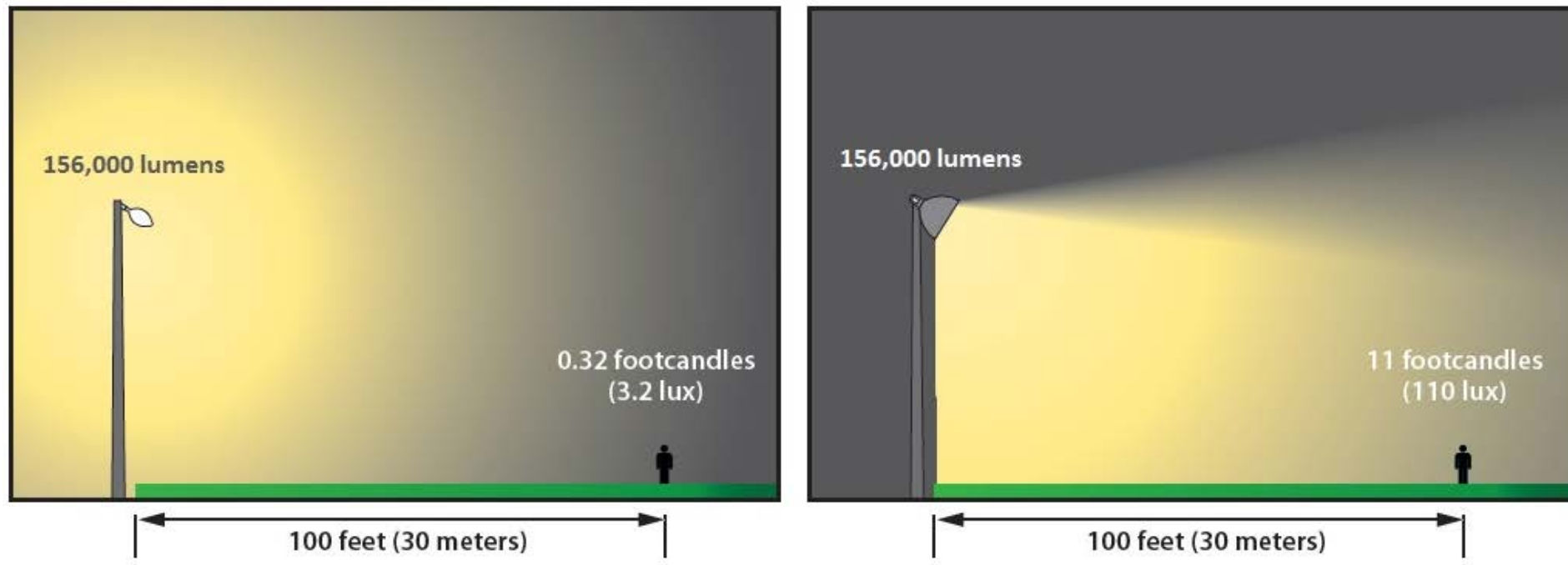
Light Levels

2 fc (avg.)/4:1 (avg/min)



Optical Basics

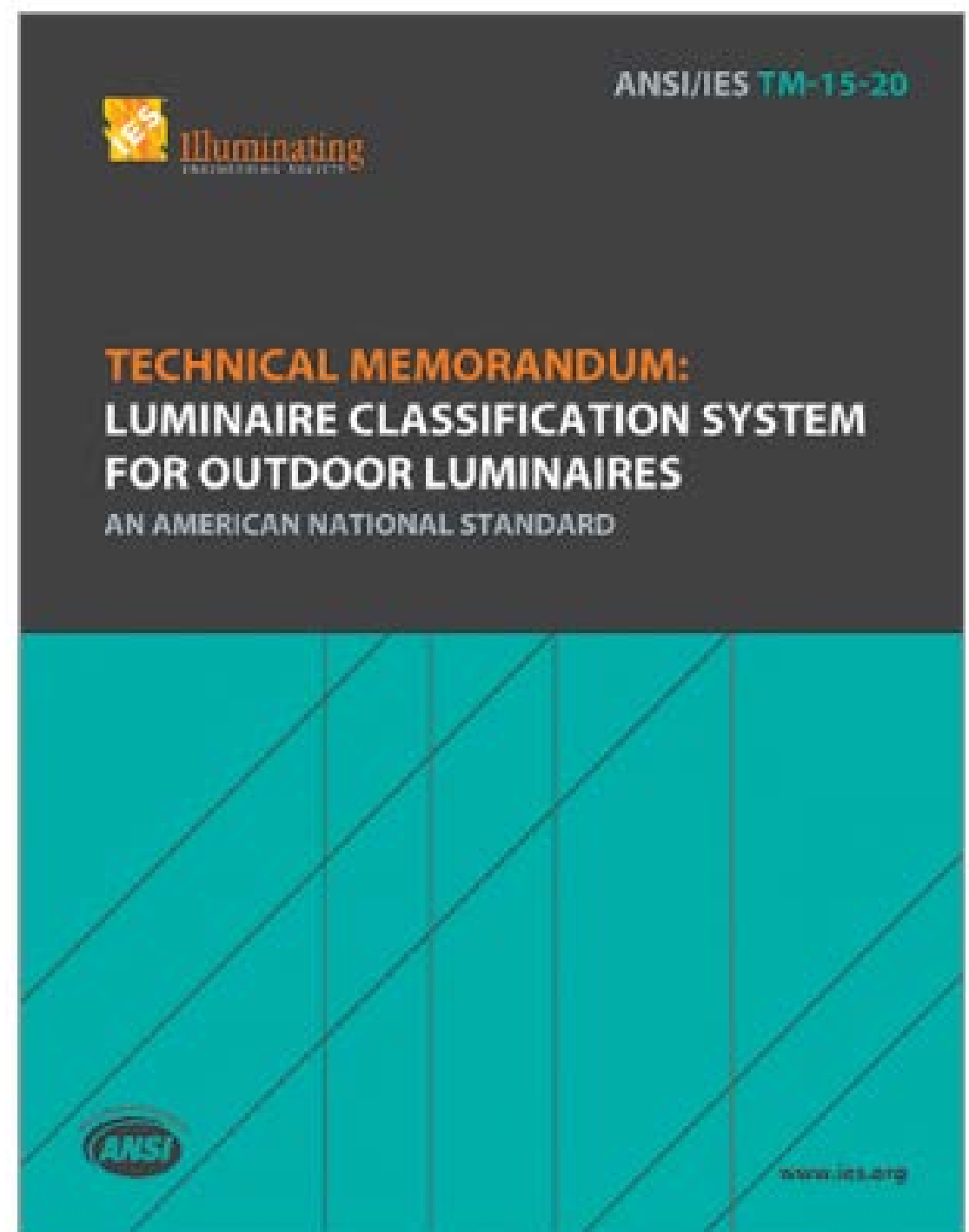
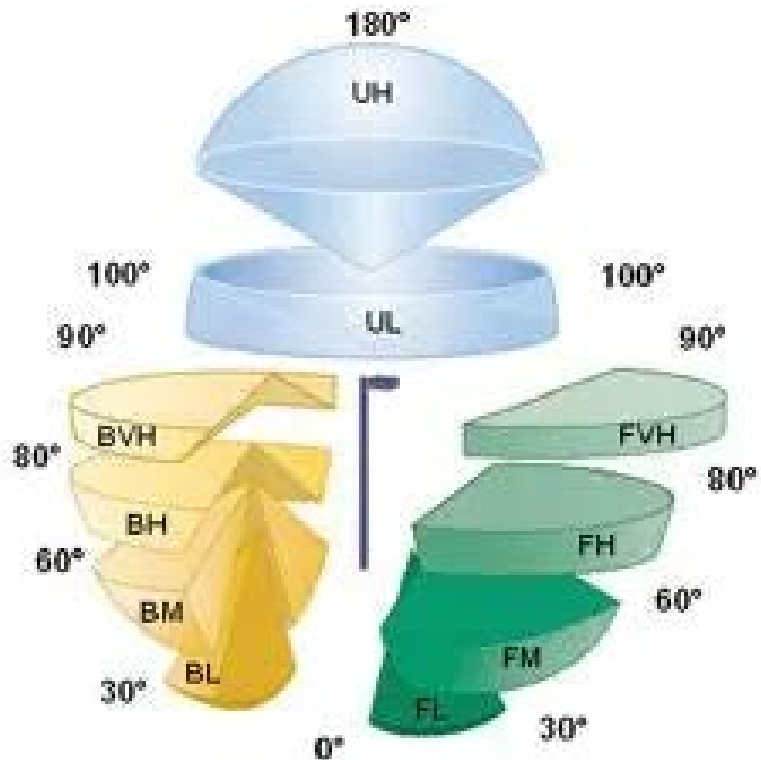
It is not enough to look solely at how many lumens are leaving the luminaire...



...It is about the ability to APPLY the lumens!

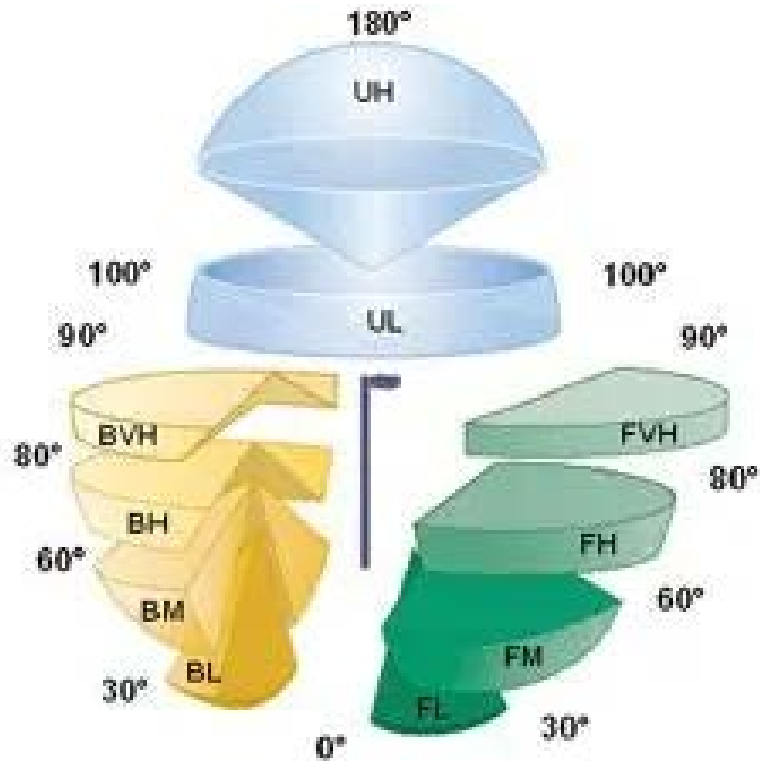
TM-15-20

- Luminaire Classification System for Outdoor Luminaires
- Metric is based on Zonal Lumens
- The distribution of light (lumens) based on the optical design.



TM-15-20 – Annex A

- Backlight, Uplight, and Glare (BUG) Ratings



Example: B2-U2-G3

Table 2-1. Backlight Ratings

Secondary Solid Angle	B0	B1	B2	B3	B4	B5
BH	110	500	1000	2500	5000	>5000
BM	220	1000	2500	5000	8500	>8500
BL	110	500	1000	2500	5000	>5000

Table 2-2. Uplight Ratings

Secondary Solid Angle	U0	U1	U2	U3	U4	U5
UH	0	10	50	500	1000	>1000
UL	0	10	50	500	1000	>1000

Table 2-3. Glare Ratings for Asymmetrical Luminaire Types (I, II, III, IV)

Secondary Solid Angle	G0	G1	G2	G3	G4	G5
FVH	10	100	225	500	750	>750
BVH	10	100	225	500	750	>750
FH	660	1800	5000	7500	12000	>12000
BH	110	500	1000	2500	5000	>5000

Table 2-4. Glare Ratings for Symmetrical Luminaire Types (V and VS)

Secondary Solid Angle	G0	G1	G2	G3	G4	G5
FVH	10	100	225	500	750	>750
BVH	10	100	225	500	750	>750
FH	660	1800	5000	7500	12000	>12000
BH	660	1800	5000	7500	12000	>12000

Applying Lumens and Addressing Glare

Current guidelines (i.e. TM-15) utilize zonal lumens to determine the glare from a luminaire...

...there is a ONE Committee Task Group currently reviewing TM-15 on this issue.

Photometry based metrics (zonal lumens) is not a good indicator of the Application based experience (glare).

In General, If you eliminate LED source visibility within your field of view, You can expect low levels of glare from an applied luminaire.

“There’s
an APP
for
THAT!”



Light Control and Efficiency

Fixtures with poor light control waste light by allowing it to go off the apron into the surrounding area and create light pollution.



What is glare?



What is glare?

- You know it when you experience it.
- The IES has been trying to answer this question for 116 years!
- DGONE Committee is currently addressing the question.
- What are the appropriate thresholds?
- How do you predict it and measure it, to be able to design to it?

If you can see
sources from
30,000', What
is it like at
ground level?



Light Control

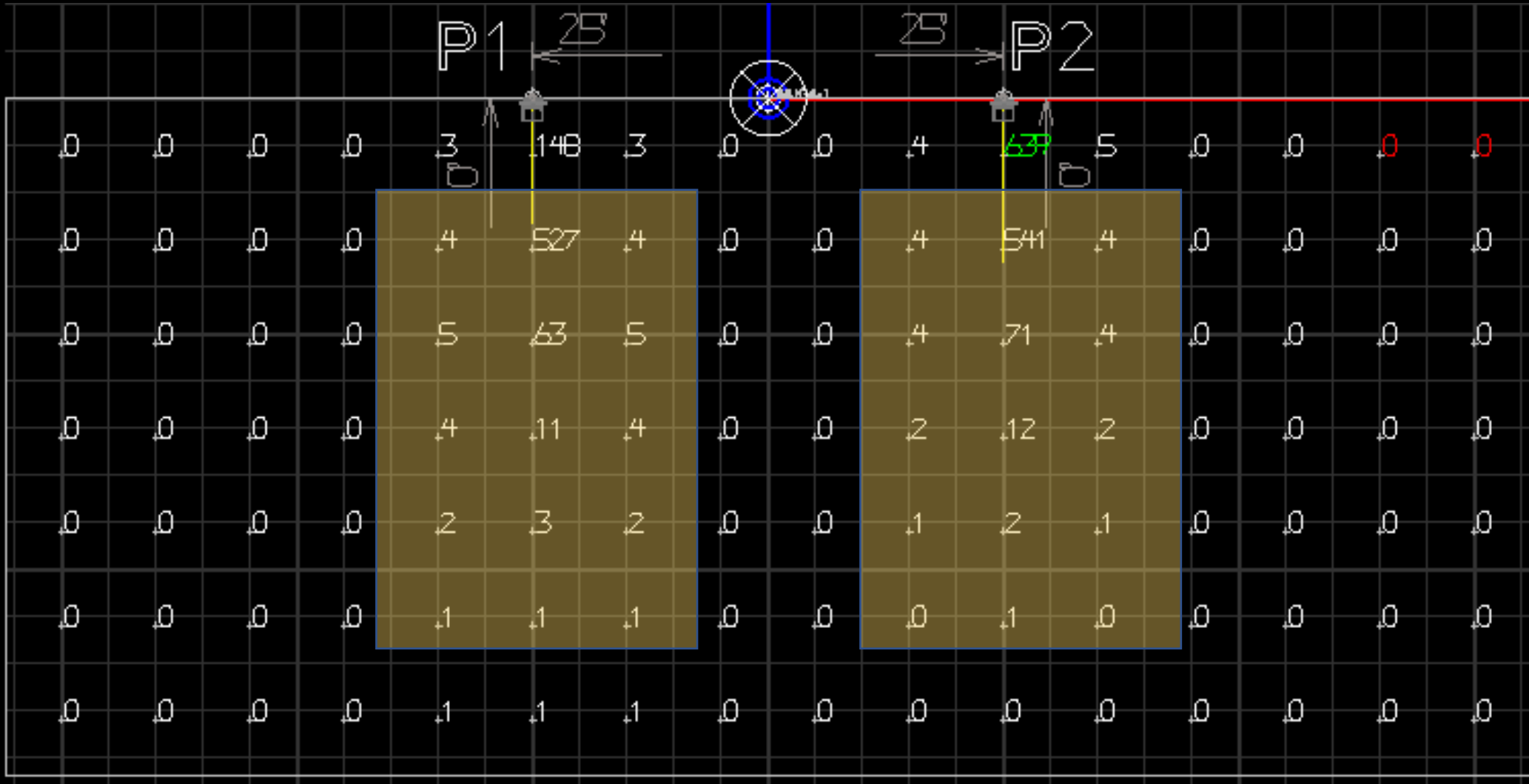


P1 @ 25° (down from Hor.)

~~D5 U0 G1~~

P2 @ 23° (down from Hor.)

B1-U0-G5

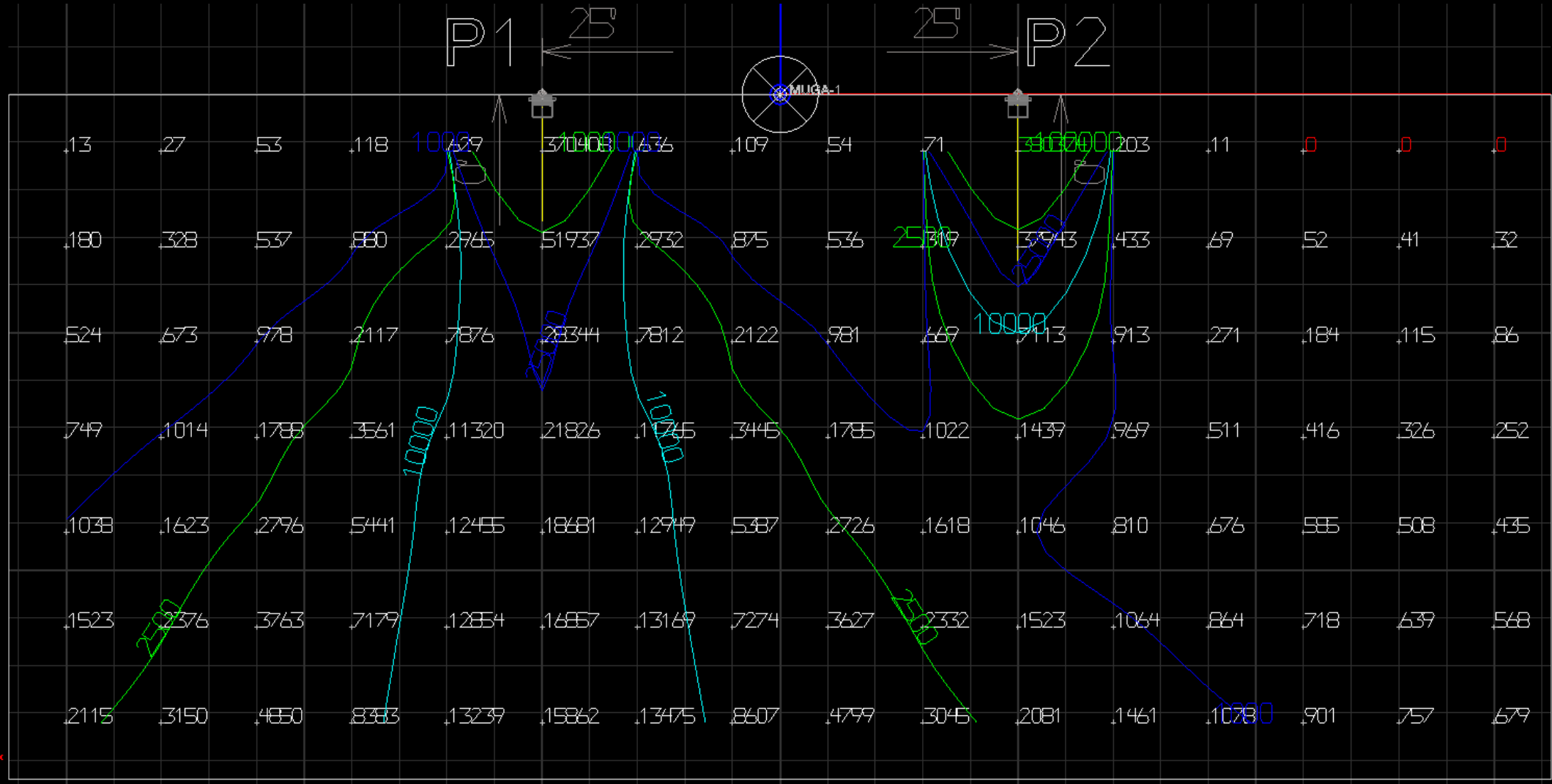


P1 @ 25° (down from Hor.)

B0-U5-G5

P2 @ 23° (down from Hor.)

B1-U0-G5



D28

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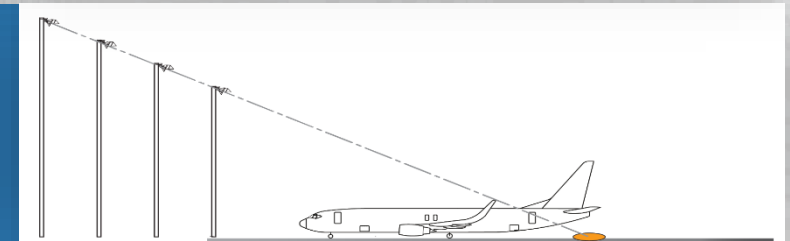
Light Levels



Glare Control



Mounting Heights



Design vs. Commissioning

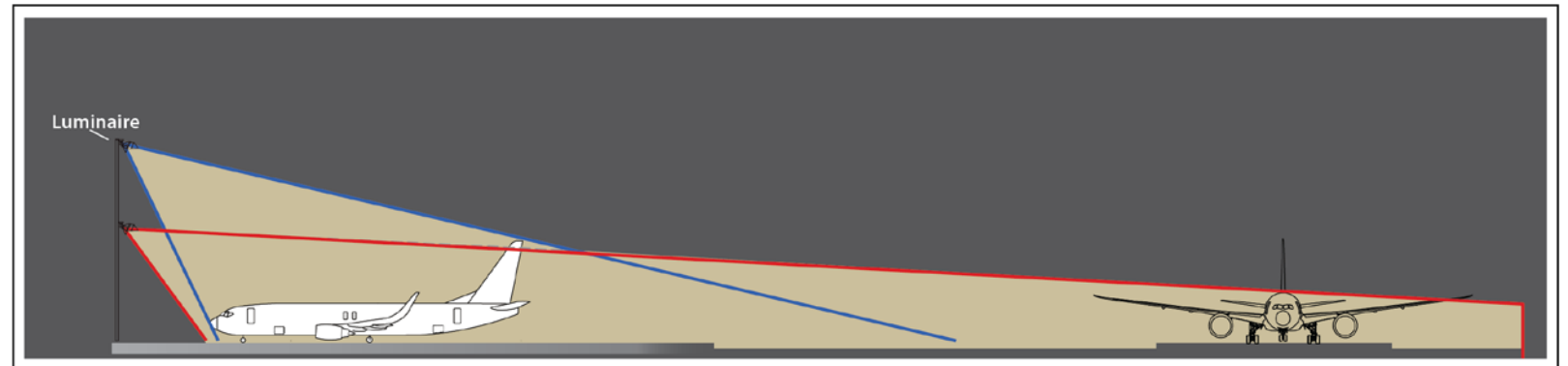
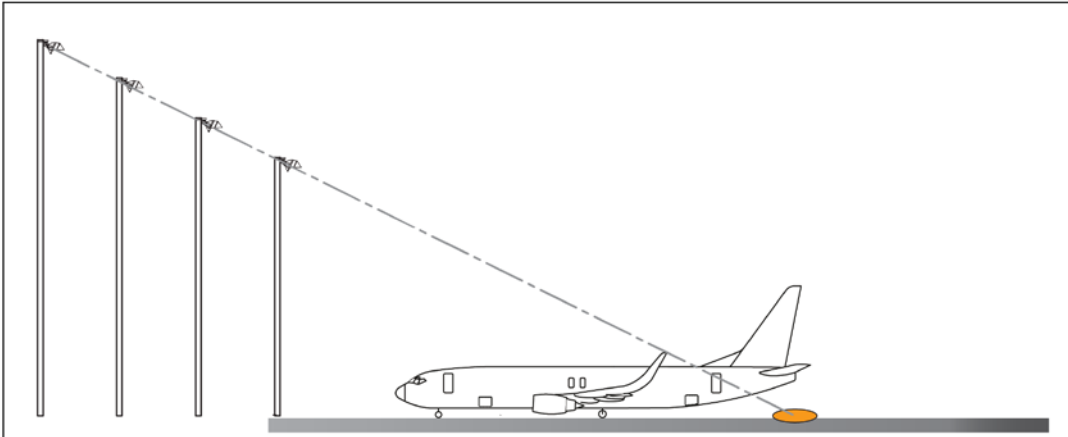
- How do you measure the predicted to assure you are meeting the criteria?
 - Illuminance: Illuminance (Light) meter
 - Candela: Luminous Intensity Meter

A Passenger's Perspective

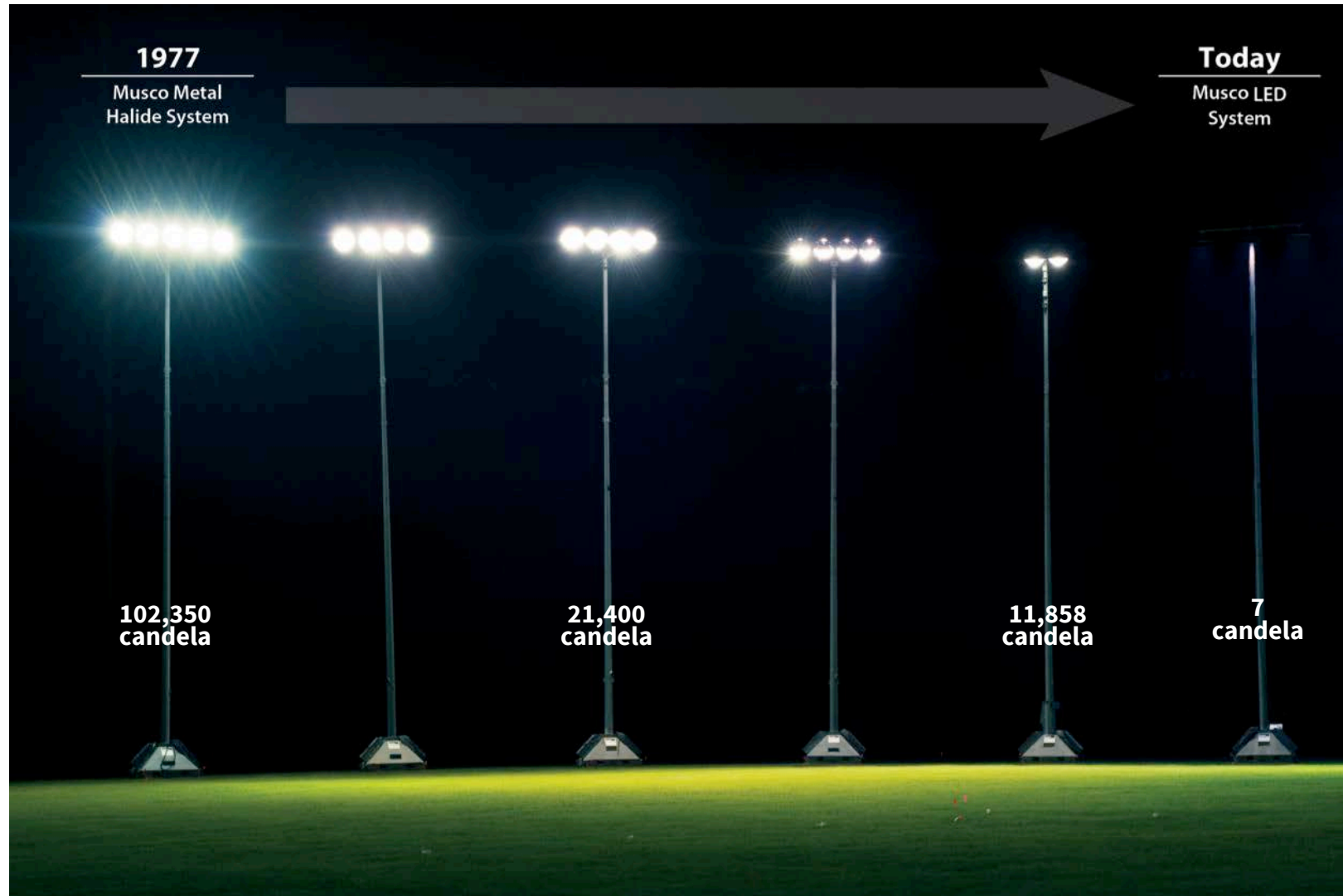


Mounting Heights

Proper fixture aiming angles ensure even light distribution across the apron and reduce light pollution



Creating light is easy, controlling it requires **innovation**



Same Mounting Heights
Same Aiming Angles

Different Optical Arrangements

Same Illumination Levels

Not All LED Luminaires are Created Equal



Phoenix Sky Harbor
Phoenix, Arizona

QUESTIONS?

We invite you to stop by Booth# 205



Detroit Metropolitan Wayne County Airport (DTW)
Detroit, Michigan