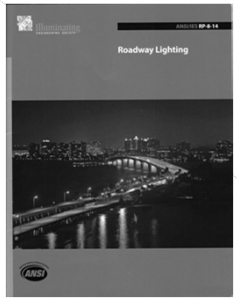
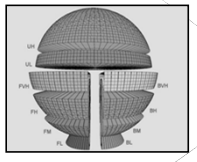


ANSI / IES RP-8-14 Roadway Lighting (and other topics)

Appendix 1 of Roadway Training Manuals



AGENDA

- Introduction
- Classification Definitions
- Design Criteria
- Bikeways and Walkways
- Design Considerations
- Other stuff
  - Cutoff classifications
  - LCS & BUG

Purpose of RP-8

"To serve as the basis for design of fixed lighting for roadways, adjacent bikeways, and pedestrian ways."

Purposes of Roadway Lighting

- Reduce Accidents
- Enhance Pedestrian Safety
- Facilitate Traffic Flow
- Promote Public Use

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"Roadway" Classifications

Pedestrians and cyclists not likely to be present.

- **Freeway**: controlled access.
  - Type A: Complex & high volume, as in major cities
  - Type B: All others w/ controlled access
- **Expressway**: Partially controlled access

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"Street" Classifications

Pedestrians and cyclists likely to be present to some degree.

- **Major**: Principal network for through traffic flow
- **Collector**: Connections between Major & Local roads
- **Local**: Direct access to residential, commercial, industrial properties

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"Pedestrian Conflict" Classifications

- High
  - Typical: downtown retail areas
- Medium
  - Typical: downtown office areas, neighborhood shopping
- Low
  - Typical : suburban single family streets

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Pavement Classifications

- **R1** - Portland Cement Concrete
- **R2** – Asphalt, min. 60% gravel (or with 10-15% artificial brightener), diffuse and specular
- **R3** – Asphalt, with dark aggregates, rough texture, slightly specular
- **R4** – Asphalt, very smooth texture, mostly specular

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Design Criteria

- Luminance for straight roads
- Illuminance for hilly or curving roads
- Small Target Visibility (STV): may be used as a “tie breaker.” (No criteria given, but higher values are better.)

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Veiling Luminance

- The “veiling” effect produced by bright sources or areas in the visual field
- Results in decreased visual performance and visibility
- A luminance that is superimposed on the retinal image, which reduces its contrast
- Calculated specific to the Observer’s position and line of sight
- Considered: luminaire brightness *and* background luminance

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Luminance

- Calculation of “how bright” the road appears to drivers
- Reflected light

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Illuminance

- Calculates the amount of light incident on the road
- Apply a multiplier to Luminance to get Illuminance value; based on R-Table

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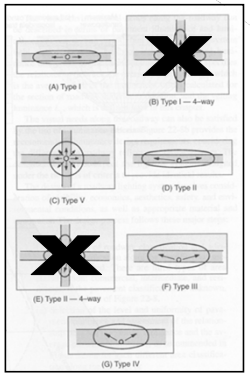
Luminaire Classifications

Lateral and Longitudinal distribution types, describing the shape or pattern of light on the ground from a luminaire:

- Lateral (across road) light distribution:
  - Types I - V and VS
- Longitudinal (along road) light distribution:
  - Short, Medium or Long

IES Lateral Distribution Types



Name	Description of illuminance distribution
Type I	Narrow, symmetric illuminance pattern
Type II	Slightly wider illuminance pattern than Type I
Type III	Wide illuminance pattern
Type IV	Widest illuminance pattern
Type V	Symmetrical circular illuminance pattern
Type VS	Symmetrical, nearly square illuminance pattern

Images courtesy of IES Handbook, 9th Edition

IES Lateral Distribution Types

Lateral (across road) light distribution: ½-max candela trace

- **Type I** – Up to 1 mtg ht in front of and behind luminaire
- **Type II** – 1.0 - 1.75 mtg hts in front of lum'r
- **Type III** – 1.75 - 2.75 mtg hts in front of lum'r
- **Type IV** – >2.75 mtg hts in front of lum'r
- **Type V** – Symmetric all around
- **Type VS** – Symmetric, but more of a square distribution pattern

IES Lateral Distribution Types

Officially based on the **lateral** (across-road, forward) reach of the **1/2-max** candela trace.

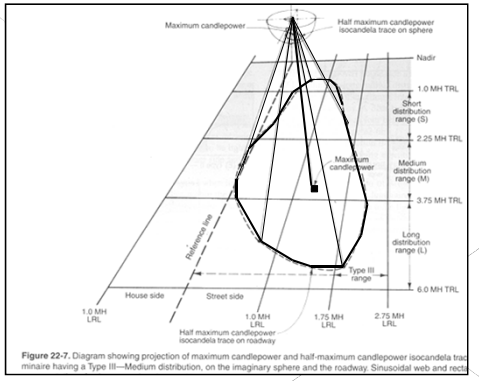


Fig. 22-7 courtesy of IES Handbook, 9th Edition

Longitudinal Range Distributions

Longitudinal Light Distribution (along the road)

- Short Range – max CP reaches between1.0 - 2.5 mtg hts
- Medium Range – max CP between 2.5 - 3.75 mtg hts
- Long Range – max CP between 3.75 - 6.0 mtg hts

S, M, L Range Distributions

Officially based on the **longitudinal** (along road) reach of the maximum candela value.

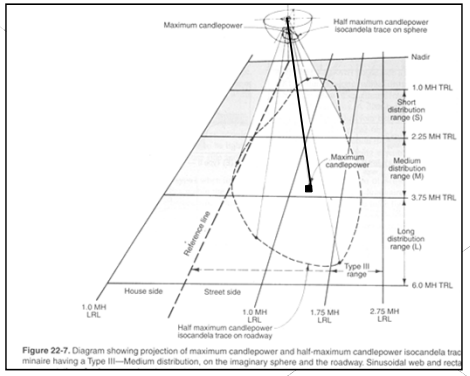
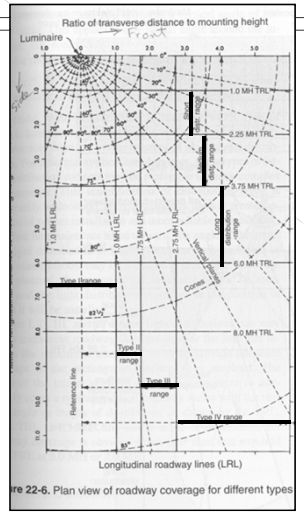


Fig. 22-7 courtesy of IES Handbook, 9th Edition



re 22-6. Plan view of roadway coverage for different types

Type and Range

- Combining IES Type and Range Distribution in one diagram
- **Result:** There can be **huge differences in performance** between luminaires of the same "Type."

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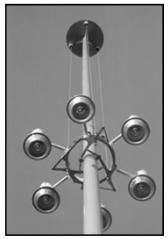
High-mast Lighting



- Greater than 20 meters (65.5 ft)
- RP-8 editions prior to 2000 allowed lower illuminance levels
- Current version of RP-8: no distinction between high-mast & conventional lighting recommendations

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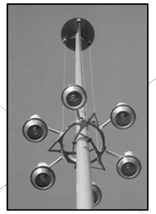
Design Considerations



❖ Appearance and Scale

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Design Considerations

❖ Integration with Non-Lighting Elements

❖ Vertical Surface Illumination

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Design Considerations

❖ Glare and Sky Glow

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Design Considerations

❖ Transitional Lighting

- Gradual decrease in lighting as driver leaves a lighted area.
- Permits adaptation.
- Per RP-8-14: Discretion of designer

Other Relevant Stuff (Not in RP-8-14)

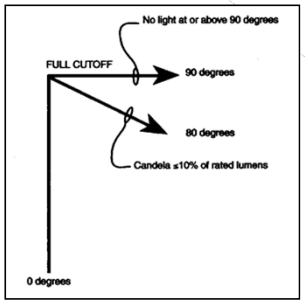
- Deprecated: Cutoff System
- Replacement: Luminaire Classification System (LCS) and BUG Ratings

Deprecated: the Cutoff System

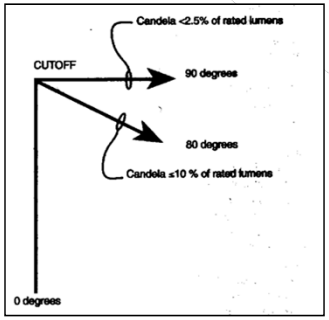
- Full Cutoff
- Cutoff
- Semi-Cutoff
- Non-Cutoff

Note: Now deprecated by the IES.
Replaced with the Luminaire Classification System (**LCS**)

Deprecated Classifications: Full Cutoff



Deprecated Classifications: Cutoff



Deprecated Classifications: Semi-Cutoff

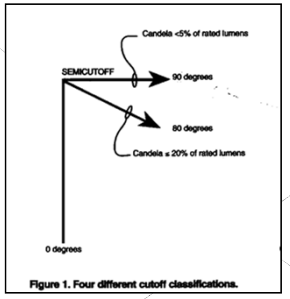


Figure 1. Four different cutoff classifications.

Deprecated Classifications: Non-Cutoff

Non-Cutoff:
No intensity limits

A Cutoff Summary Table

	Full Cutoff	Cutoff	Semi-Cutoff	Non-Cutoff
90°	Candelas = 0 at angles ≥ 90°	Candelas ≤ 2.5% total lamp lumens	Candelas ≤ 5% total lamp lumens	No limit
80°	Candelas ≤ 10% total lamp lumens	Candelas ≤ 10% total lamp lumens	Candelas ≤ 20% total lamp lumens	No limit

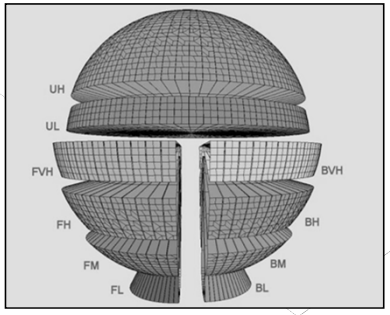
Replacement for Cutoff System:

Luminaire Classification System (LCS)

- Replaces the cutoff system
- Describes general distribution of light in 3 zones: Front, Back, and Uplight
  - Zones are further divided into subzones
- Allows designer to control unwanted light while selecting luminaires that will put light where it's needed
- Ref: IES TM-15-11

LCS

- Forward zones:
  - FL: 0-30 deg. vertical
  - FM: 30-60 deg. vert.
  - FH: 60-80 deg. vert.
  - FVH: 80-90 deg. vert.
- Back zones:
  - BL: 0-30 deg. vertical
  - BM: 30-60 deg. vert.
  - BH: 60-80 deg. vert.
  - BVH: 80-90 deg. vert.
- Uplight zones:
  - UL: 90-100 deg. vert.
  - UH: 100-180 deg. vert.

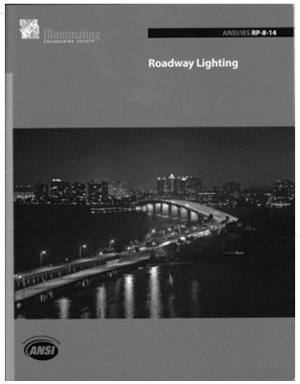


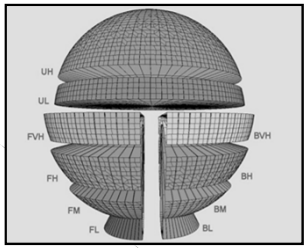
Ref. IES TM-15-11

BUG Ratings

- Categorizes luminaires according to the amount of **B**acklight, **U**plight and **G**lare that they have; calculated based on the number of lumens in the various LCS secondary zones.
- May be used to evaluate a luminaire's optical performance related to light trespass, sky glow, and high-angle brightness control.
- Each rating, B, U & G, has ranges numbered 0 – 5. Strictest: 0. Example, B4-U0-G1 would be an example of a complete luminaire BUG Rating.
- Ref. IES TM-15-11, Addendum A

QUESTIONS?





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