



Illuminating
ENGINEERING SOCIETY

RECOMMENDED PRACTICE: LIGHTING ROADWAY AND PARKING FACILITIES



ANSI/IES RP-8-22

**RECOMMENDED PRACTICE:
LIGHTING ROADWAY AND PARKING FACILITIES
AN AMERICAN NATIONAL STANDARD**

Publication of this Recommended Practice
has been approved by the IES.
Suggestions for revisions
should be directed to IES.

**Prepared by:
The Roadway Lighting Committee**



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Introduction to This Recommended Practice

This Recommended Practice is a compilation of lighting design techniques and criteria, all offered for quality roadway lighting solutions. Each chapter should not be taken in isolation but used as a whole for quality lighting design for roadways and other environments where vehicles are present, such as tunnels, intersections, and parking lots.

A lighting designer will often simplify the design criteria to lighting level and uniformity. However, impacts on visual quality go beyond these simple criteria and encompass minimizing glare and providing spectral contrast on pedestrians, hazards, and other vehicles. All design criteria are important in order to achieve these goals:

1. Improve motorist visual quality
2. Provide quality light and increased contrast for seeing hazards
3. Illuminate conflict areas
4. Minimize environmental impacts of light at night
5. Employ lighting systems that are easily maintained and minimize energy use

This document was prepared with the objective of providing lighting design guidance for most kinds of roadway and roadway-related applications. The recommendations contained in this document, however, may not reflect specific local factors or situations that are not typical and require special treatment. The contents of this Standard are based upon consensus of roadway lighting experts. It has no legislative authority unless adopted by an authority having jurisdiction. This Recommended Practice is not intended to establish a basis for civil liability.

This document is intended to be a single source of reference for roadway lighting; however, additional documents such as electric codes, transportation design guides and other codes and standards are often required design references.

History of the Document

This Recommended Practice is a compilation by the IES staff and the Roadway Lighting Committee's Special Task Group of efforts from several lighting organizations and authorities and was first published in 2018. This document updates the 2018 version.

The majority of the topics covered are from 12 previously separate roadway lighting documents of the Illuminating Engineering Society, along with the Transportation Association of Canada (TAC) *Guide for the Design of Roadway Lighting*, and the TAC *Roadway Lighting Efficiency & Power Reduction Guide*. During the review and compilation, the Roadway Lighting Committee revisited practices on design, installation and maintenance methods of roadway lighting systems. The team incorporated new or revised methodologies, design concepts and procedures, and included advancements in international research on lighting concepts.

In preparing this document the team sourced standards from around the world and applied the most applicable proven practices. It is important to note that new innovative design methods and products are being developed and will affect the future of roadway lighting. Some of these new design concepts and products are touched on in this document. Because much change is anticipated in the roadway design and technology, it is the responsibility of lighting designers and administrators to stay current with new technologies and concepts.

How to Use This Recommended Practice

This Recommended Practice may be used as a basis for the design and installation of roadway lighting and associated systems. This can be accomplished by selecting the appropriate sections and following the recommended procedures, including applying the recommended criteria. The document presents criteria that are recommendations derived through an American National Standards Institute (ANSI) consensus process. It may also be used as a basis for understanding roadway lighting design, as well as the underlying theories and criteria for reviewing designs.

Fundamental information upon which roadway lighting designs are based is provided in *Part 1 – Fundamentals*. This includes information on lighting theory, calculations, obtrusive light, the design process, system components, standards and codes, the use of computer software in roadway lighting design, and maintenance and operations.

Part 2 – Design applies the principles and information presented in Part 1 to specific circumstances that may benefit from roadway lighting. Lighted facilities may include roadways, interchanges, intersections, tunnels, and toll plazas. Off-roadway facilities are also included, such as pedestrian and bicycle pathways that are adjacent to the right of way, weigh scales, rest areas, and roadway signs.

Each chapter of *Part 2 – Design* is related to a particular type of roadway application and is arranged in a consistent fashion to allow the reader to easily assimilate new material. Design examples and, where applicable, step-by-step narratives are presented to assist the reader in understanding the design process.

In addition to the Table of Contents at the beginning of this document, each chapter has its own Table of Contents.

The annexes at the end of the document contain supplemental information of interest to lighting professionals.

A **Glossary** of roadway-related lighting terms follows the annexes.

References are provided at the end of each chapter and annex as applicable.

Part 1 – Fundamentals

Introduction to Roadway Lighting

Chapter 1

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Introduction to Roadway Lighting

Chapter 1

Driving at night is a necessity in our modern, 24-hour society. As a result, roadway lighting has also become a modern reality. The main purpose for lighting roadways and other transportation related facilities is to provide an enhanced visual environment for people to safely use the road system during hours of darkness. An enhanced visual environment reduces motor vehicle collisions and provides a safer environment for pedestrians, cyclists, and drivers.^{1,2,3} In providing some knowledge of what lies ahead on the road, lighting also provides a level of psychological comfort for those using roadways.

1.1 Why Light?

Collision statistics gathered throughout North America show that more than 50% of fatal collisions happen during nighttime hours. Even though an estimated 25% of travel takes place during these hours, the fatality rate is three times higher than during daytime hours. Properly designed roadway lighting aids in improving visibility of roadway features and helps the road user locate objects on the roadway as well as other vehicles, pedestrians, and cyclists. This results in increased safety for all.²

There is a consensus of statistics indicating that roadway lighting substantially decreases nighttime collision rates. Most important, the number of fatalities is reduced. Pedestrian fatalities account for approximately one quarter of all roadway related fatalities; hence, lighting of urban areas with large numbers of pedestrians is also important.^{4,5}

Lighting of roadways and other transportation facilities may have a number of benefits not directly related to driving. These include:

- **Personal security:** Although there is some controversy over whether lighting improves security, there is no question that individuals feel more secure when walking, cycling or driving in a well-lighted area. Though some studies have shown that adding luminaires or increasing light levels can reduce crime in a given area, the actual long-term benefits and community-wide impacts are unknown.⁶ By creating a safe feeling, lighting may draw people into an area, and increased pedestrian circulation will typically improve security. Social and economic factors of a given area, as well as police presence, will also have impacts on personal security. *Note:* For non-right-of-way areas where

security is of particular concern, the reader is referred to *IES G-1-22, Guide for Security Lighting for People, Property, and Critical Infrastructure*.

- **Economics:** Lighting may draw people into a commercial area by providing increased visibility of businesses and a sense of personal security, and may thereby lead to an increase in commerce. Decorative lighting can be used for the economic revitalization of an area by contributing to a “sense of place” or by supporting a community architectural or urban design theme. *Note:* The benefits listed above may not necessarily apply to residential roads where there is little or no pedestrian activity during the hours of darkness.
- **Aesthetics:** Lighting may draw attention to architecture and other aesthetic features such as streetscapes, monuments, or parks. These features can enhance the nighttime use of facilities and improve the experience of roadway users at adjacent locations.

This Recommended Practice is intended to recommend proper techniques to allow motorists, pedestrians and cyclists within the right of way to benefit from the value of lighting. If designed or installed improperly, the benefits of lighting may be reduced. Improper pole heights may lead to excessive spill light on adjacent properties. Poles placed within the clear zone without breakaway bases may pose safety concerns. Over-lighting may reduce visibility while consuming excessive amounts of energy.

1.2 Human Factors

The human factors associated with lighting, including