

ANSI/IES RP-37-20



Illuminating
ENGINEERING SOCIETY

RECOMMENDED PRACTICE:
LIGHTING AIRPORT
OUTDOOR ENVIRONMENTS
AN AMERICAN NATIONAL STANDARD



www.ies.org

ANSI/IES RP-37-20

**RECOMMENDED PRACTICE:
LIGHTING AIRPORT OUTDOOR ENVIRONMENTS
AN AMERICAN NATIONAL STANDARD**

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

**Prepared by:
The IES Aviation Lighting Committee**



Copyright 2020 by the Illuminating Engineering Society.

Approved by the IES Standards Committee November 22, 2019 as a Transaction of the Illuminating Engineering Society.

Approved February 7, 2020 as an American National Standard.

All rights reserved. No part of this publication may be reproduced in any form, in any electronic retrieval system or otherwise, without prior written permission of the IES.

Published by the Illuminating Engineering Society, 120 Wall Street, New York, New York 10005.

IES Standards are developed through committee consensus and produced by the IES Office in New York. Careful attention is given to style and accuracy. If any errors are noted in this document, they should be forwarded to Brian Liebel, Director Standards, at standards@ies.org or the above address for verification and correction. The IES welcomes and urges feedback and comments

Printed in the United States of America.

ISBN# 978-0-87995-070-5

DISCLAIMER

IES publications are developed through the consensus standards development process approved by the American National Standards Institute. This process brings together volunteers representing varied viewpoints and interests to achieve consensus on lighting recommendations. While the IES administers the process and establishes policies and procedures to promote fairness in the development of consensus, it makes no guaranty or warranty as to the accuracy or completeness of any information published herein.

The IES disclaims liability for any injury to persons or property or other damages of any nature whatsoever, whether special, indirect, consequential or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this document.

In issuing and making this document available, the IES is not undertaking to render professional or other services for or on behalf of any person or entity. Nor is the IES undertaking to perform any duty owed by any person or entity to someone else. Anyone using this document should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances.

The IES has no power, nor does it undertake, to police or enforce compliance with the contents of this document. Nor does the IES list, certify, test or inspect products, designs, or installations for compliance with this document. Any certification or statement of compliance with the requirements of this document shall not be attributable to the IES and is solely the responsibility of the certifier or maker of the statement.

AMERICAN NATIONAL STANDARD

Approval of an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria have been met by the standards developer.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

The use of American National Standards is completely voluntary; their existence does not in any respect preclude anyone, whether that person has approved the standards or not, from manufacturing, marketing, purchasing, or using products, processes, or procedures not conforming to the standards.

The American National Standards Institute does not develop standards and will in no circumstances give an interpretation to any American National Standard. Moreover, no person shall have the right or authority to issue an interpretation of an American National Standard in the name of the American National Standards Institute. Requests for interpretations should be addressed to the secretariat or sponsor whose name appears on the title page of this standard.

CAUTION NOTICE: This American National Standard may be revised at any time. The procedures of the American National Standards Institute require that action be taken to reaffirm, revise, or withdraw this standard no later than five years from the date of approval. Purchasers of American National Standards may receive current information on all standards by calling or writing the American National Standards Institute.

Prepared by the IES Aviation Lighting Committee

Richard Larivee, *Chair*
Mai Yeung, *Vice Chair*
Andrew Gibbs, *Secretary*

Members

R. J. Alexander	B. Chernish	H. Johnson
J. C. Beckman	J. T. Glavin	D. L. Stewart
J. Chapman	C. S. Johnson	C. A. Twibell

Advisory Members

E. Alf	C. M. Hunter	G. Reilly
--------	--------------	-----------

CONTENTS

Foreword	1
1.0 Introduction and Scope	1
1.1 Introduction.....	1
1.2 Scope	2
2.0 Characteristics of Airport Areas	2
2.1 Aprons: Commercial (Air Carrier), General Aviation, Cargo, Hangar	2
2.1.1 Aircraft Stand	4
2.1.2 Aircraft Parked Position	4
2.1.3 Aircraft Service Area.....	8
2.2 Other Airside Areas	8
2.2.1 De-icing/Anti-icing Facilities	8
2.2.2 Fuel Facilities.....	9
2.2.3 Ground Service Equipment Storage Areas.....	9
2.2.4 Engine Run-Up or Test Area	9
2.2.5 Other Facilities	9
2.3 Landside Areas	9
2.3.1 Departure and Arrival Areas	10
2.3.2 Walkways Between Parking Facility and Terminal.....	11
2.3.3 Surrounding Road Systems	11
2.3.4 Signage.....	12
2.3.5 Staffed Secure Access Point.....	12
2.3.6 Parking	12
2.4 Tunnel Lighting	13
2.5 Laser Sensitive Area	13
2.6 Other Lighting	14
3.0 Visual Issues	14
3.1 Control Tower Issues	15
3.2 Pilot Issues	16
3.2.1 Approaching the Airport	17
3.2.2 Rollout	17
3.2.3 Taxiing.....	17
3.2.4 Aircraft Parking	17
3.3 Vehicle-Pedestrian Conflicts.....	18
3.4 Security	18

4.0	Design Criteria	19
4.1	Visibility Concerns	20
4.1.1	Horizontal Illuminance	20
4.1.2	Vertical Illuminance	20
4.1.3	Uniformity Ratio	20
4.1.4	Glare	20
4.1.5	Shadows	21
4.1.6	Appearance of Space and Luminaires	21
4.1.7	Color Appearance of Objects	21
4.1.8	Identification of Faces	21
4.1.9	Identification of Objects	21
4.1.10	Height and Position of Poles	21
4.1.11	Security and Safety	22
4.1.12	Emergency and Standby Power	22
4.1.13	Use of Specific Task Lighting	22
4.1.14	Light Loss Factors	22
4.2	Aviation Special Conditions	22
4.2.1	Lighting Near an Airport	22
4.2.2	Glare Control	23
4.2.3	Glare at Tower	24
4.2.4	Glare at Aircraft	24
4.3	Aprons: Commercial (Air Carrier), General Aviation, Cargo, Hangar	25
4.3.1	Aircraft Stand	26
4.3.2	Passenger Boarding and Deplaning	28
4.3.3	Loading and Unloading Baggage and Catering	29
4.3.4	Loading and Unloading at Cargo Facility	29
4.3.5	Other Aircraft Service Operations	29
4.3.6	Mechanical Checks and Preflight Inspections	29
4.3.7	Fueling Operations	29
4.4	Other Airside Areas	30
4.4.1	De-icing and Anti-icing Facilities	30
4.4.2	Fuel Facilities	30
4.4.3	Ground Service Equipment (GSE) Storage Areas	30
4.4.4	Engine Run-Up and Test Area	30
4.4.5	Other Facilities	31
4.5	Landside Areas	31
4.5.1	Departure and Arrival Areas	31
4.5.2	Walkways between Parking Facility and Terminal	31
4.5.3	Surrounding Roadways	31
4.5.4	Signage	31
4.5.5	Staffed Secure Access Point	31
4.5.6	Parking Areas	32
4.6	Tunnels	32
4.7	Other Lighting	32

5.0	Essential Safety and Security Lighting	33
6.0	Environmental Conditions	34
6.1	Light Pollution and Light Trespass	34
6.2	Boundary Limit Concepts	34
6.2.1	Lighting Ordinances	36
6.2.2	Outdoor Site-Lighting Performance (OSP)	36
6.2.3	Leadership in Energy and Environmental Design (LEED®)	36
6.3	Ecological Aspect	37
6.4	Sustainable Development	37
Annex A	– Illuminance Recommendations	37
Annex B	– Field Measurements and Performance Evaluations of Apron Lighting	41
Annex C	– Maintenance Considerations	44
Annex D	– Lighting Equipment	44
Annex E	– Glossary of Airport and Aviation Terms	47
Annex F	– Suggested Additional Reading	49
References		51

Foreword

This Foreword is not part of ANSI/IES RP-37-20. It is provided for informational purposes only.

This Recommended Practice (RP) does not provide general lighting information that is included in other IES documents. If the reader does not already have this information, it may be obtained as needed from the following IES Standards:

The Lighting Science Series:

- ANSI/IES LS-1-20, *Lighting Science: Nomenclature and Definitions for Illuminating Engineering*
- ANSI/IES LS-2-20, *Lighting Science: Concepts and Language of Lighting*
- ANSI/IES LS-3-20, *Lighting Science: Physics and Optics of Radiant Power*
- ANSI/IES LS-4-20, *Lighting Science: Measurement of Light – The Science of Photometry*
- ANSI/IES LS-5-20, *Lighting Science: Color*
- ANSI/IES LS-6-20, *Lighting Science: Calculation of Light and Its Effects*
- ANSI/IES LS-7-20, *Lighting Science: Vision – Eye and Brain*
- ANSI/IES LS-8-20, *Lighting Science: Vision – Perceptions and Performance*

The Lighting Practice Series:

- ANSI/IES LP-1-20, *Lighting Practice: Designing Quality Lighting for People and Buildings*
- ANSI/IES LP-2-20, *Lighting Practice: Designing Quality Lighting for People in Outdoor Environments*
- ANSI/IES LP-3-20, *Lighting Practice: Designing and Specifying Daylighting for Buildings*
- ANSI/IES LP-4-20, *Lighting Practice: Electric Light Sources – Properties, Selection, and Specification*
- ANSI/IES LP-6-20, *Lighting Practice: Lighting Control Systems – Properties, Selection, and Specification*
- ANSI/IES LP-7-20, *Lighting Practice: The Lighting Design and Construction Process*
- ANSI/IES LP-8-20, *Lighting Practice: The Commissioning Process Applied to Lighting and Control Systems*

- ANSI/IES LP-9-20, *Lighting Practice: Upgrading Lighting Systems in Commercial and Industrial Facilities*
- ANSI/IES LP-10-20, *Lighting Practice: Sustainable Lighting – An Introduction to the Environmental Impacts of Lighting*
- ANSI/IES LP-11-20, *Lighting Practice: Environmental Considerations for Outdoor Lighting*

1.0 Introduction and Scope

1.1 Introduction

ANSI/IES RP-37-20, *Recommended Practice: Outdoor Lighting for Airport Environments* is a guide for the planning and design of lighting systems in the entire airport outdoor environment. It has been prepared as a guide for the application of fixed outdoor lighting in and around the airport environment with respect to the airport's special requirements. These requirements include (but are not limited to):

- Height restrictions (such as obstructions affecting navigable airspace) as defined by the governing civil aviation authorities
- The ability to distinguish color of light for visual cues
- Prevention of light trespass that may interfere with the vision of pilots or air traffic control tower (ATCT) personnel
- Air traffic controllers' ability to see approaching aircraft and aircraft performing ground operations within the "aircraft movement area" without glare or direct or indirect light trespass
- Pilots' ability to detect runway lighting without glare or direct or indirect light trespass

ANSI/IES RP-37-20 provides guidance for dealing with the preceding considerations, while being cognizant of the need to provide an adequate and safe lighted environment for aircraft servicing and for pedestrian and vehicular movement in and around the airport environment.

This document is not intended to supersede any civil aviation regulations, government regulations,

occupational safety and health requirements, or the authority having jurisdiction.

Other IES standards provide recommendations and design guidelines for specific outdoor lighting applications. This document is not intended to supersede these other applicable IES RPs; rather, it is intended to supplement them to meet the specific needs of the airport environment.

This Recommended Practice (RP) is to be used in conjunction with appropriate energy codes and environmental sustainable design practices in use for the facility. Recommendations within the appropriate sections are included for basic information to provide guidance as to the key issues for consideration.

1.2 Scope

The purpose of this Recommended Practice is to provide recommendations for three airport-related applications:

- For airside applications: Provide for adequately lighted areas where parked aircraft are safely serviced, where aircraft crew and passengers safely board and deplane, and where cargo operations are conducted.
- For landside applications: Provide for adequately lighted departure and arrival areas, walkways to the terminal, secure staffed access points, and vehicle transaction areas for safety and security of pedestrians and vehicles.
- For adjacent development applications: Provide guidance for lighting in the vicinity of the airport (including areas outside the airport property line), while also taking into account the special needs of the airport environment, such as height restrictions and potential light interference with air traffic controller and/or pilot vision

ANSI/IES RP-37-20 does not provide guidance for aeronautical ground lighting systems, such as runway, taxiway and approach lighting, and is not intended to be used for lighting designs for heliports (refer to **Annex E – Glossary**). Nor does it provide recommendations for roads or parking facilities; these are covered in *ANSI/IES RP-8-18, Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting*.¹

Additional information pertaining to lighting outdoor environments may be found in *ANSI/IES LP-2-20, Lighting Practice: Designing Quality Lighting for People in Outdoor Environments*, in *ANSI/IES LP-10-20, Lighting Practice: Sustainable Lighting – An Introduction to the Environmental Impacts of Lighting*, and in *ANSI/IES LP-11-20, Lighting Practice: Environmental Considerations for Outdoor Lighting* (see **Foreword**).

2.0 Characteristics of Airport Areas

The characteristics of airport areas constitute general descriptions of areas that could be found on or adjacent to an airport. These areas are identified by the activities that require illumination. **Figure 2-1** shows various infrastructures and facilities inside the premises of an airport and in the surrounding area.

2.1 Aprons: Commercial (Air Carrier), General Aviation, Cargo, Hangar

In general, the apron comprises the area used for aircraft parking and aircraft support and servicing operations. Aircraft taxi on the apron as they arrive, and then depart from the aircraft stand. Verification of credentials and ID badges is required in this area. These areas have very heavy traffic and are congested with both personnel and equipment.

There are four types of aprons:

- *Commercial aprons*: Primarily used by scheduled air carriers for parking aircraft, boarding and deplaning passengers, loading and unloading luggage, and fueling the aircraft and vehicles servicing the aircraft; (refer to **Figure 2-2** for a general overview of a commercial apron)
- *General aviation aprons*: Typically used by private, business, and charter aircraft for parking aircraft, boarding and deplaning passengers, loading and unloading luggage, and fueling aircraft
- *Cargo aprons*: Used to park cargo aircraft, load and unload cargo, and fuel cargo aircraft
- *Hangar aprons*: Used to park aircraft temporarily as they are prepared to enter the hangar or temporarily as they are removed from the hangar; activities on