

IESALC Conference - Wilmington 2011

New Guidance Material for Airport Lighting IES Handbook 10th edition



2011-IESALC
Wilmington, NC

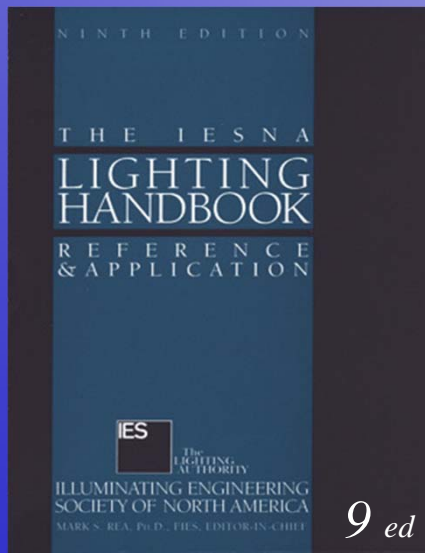
By Richard Larivée, ing., P. Eng.

Avia Rupta Solutions Inc.

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GOAL

Compare IES handbook
9th edition version to
the new 10th edition version
for aviation related topics



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AGENDA

- Who is IES?
- Handbook format and section for aviation
 - 9th edition (2000)
 - 10th edition (2011)
- Conclusion

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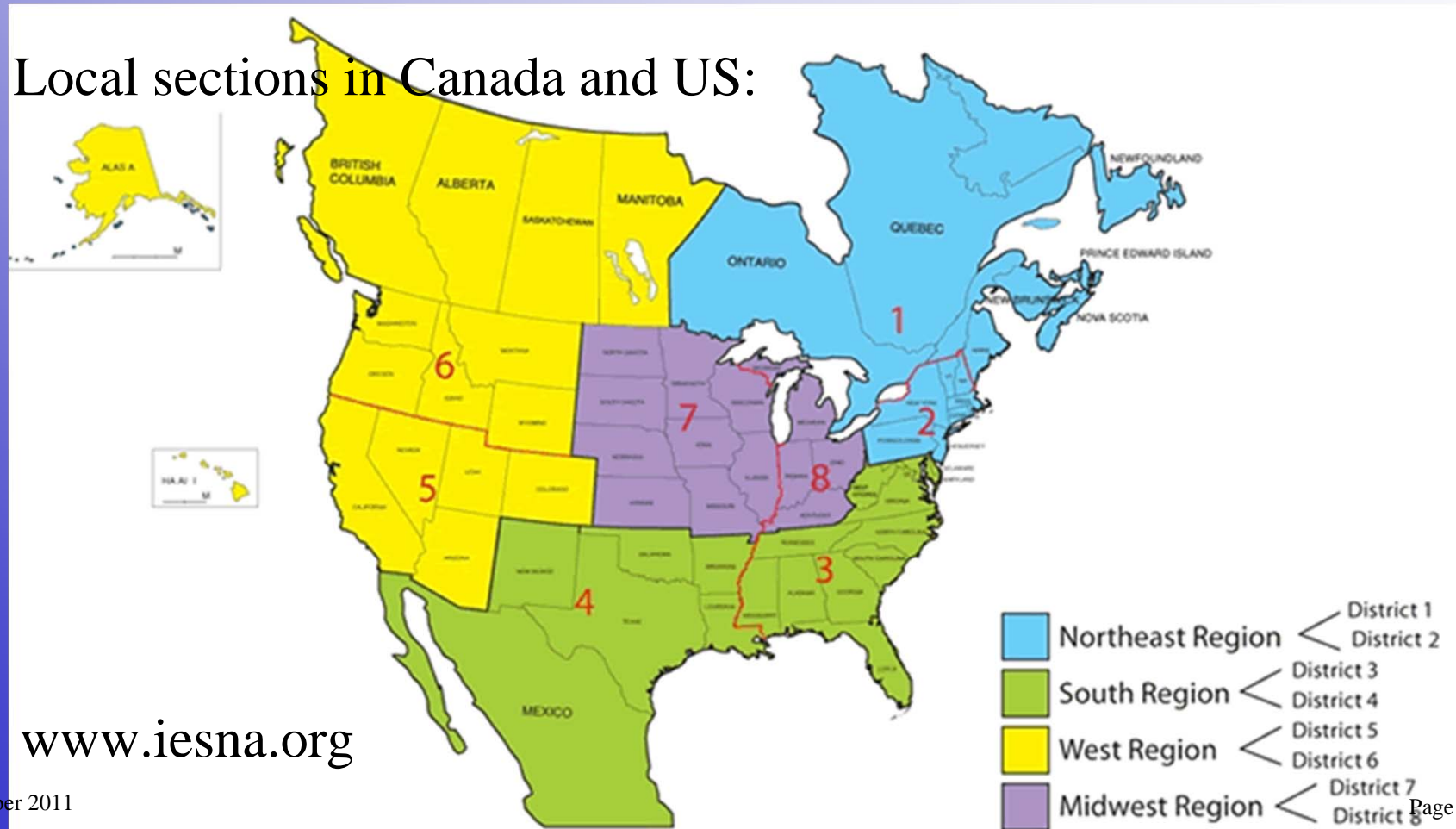
Who is IES?

- Illuminating Engineering Society of North America (IES)
- The recognized technical authority for illumination
- Founded in 1906
- Base in New York
- Various technical committees;
Aviation,
Roadway,
Sports,
Industrial...
- Almost 8,000 members
- IESALC is a subcommittee of it

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Who is IES?

- Local sections in Canada and US:



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Actual Subcommittees for Aviation Lighting

Aviation Lighting

Aviation Lighting Awards (S)

Aviation Lighting Government Contacts (S)

Aviation Lighting General Aviation Lighting Subcommittee (S)

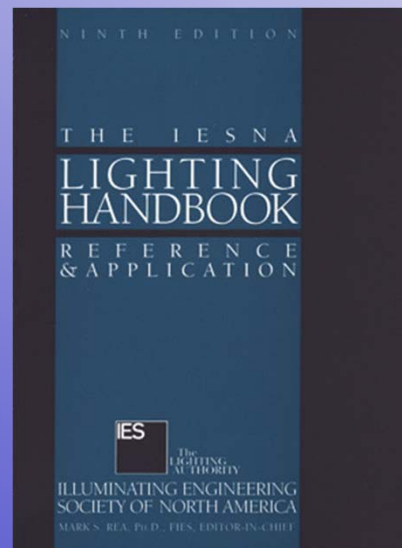
Aviation Lighting Recommend Practices (S)

Airport Service Area Lighting (S)

From www.iesna.org

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IES handbook



9th edition



10th edition

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Main Sections

9th edition

- The Science of Lighting
- Lighting Engineering
- Quality of Visual Environment
- Lighting Applications
- Special Topics



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10th edition

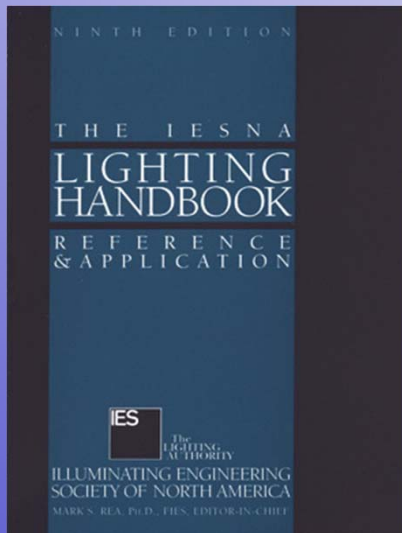
- Framework
- Design
- Applications



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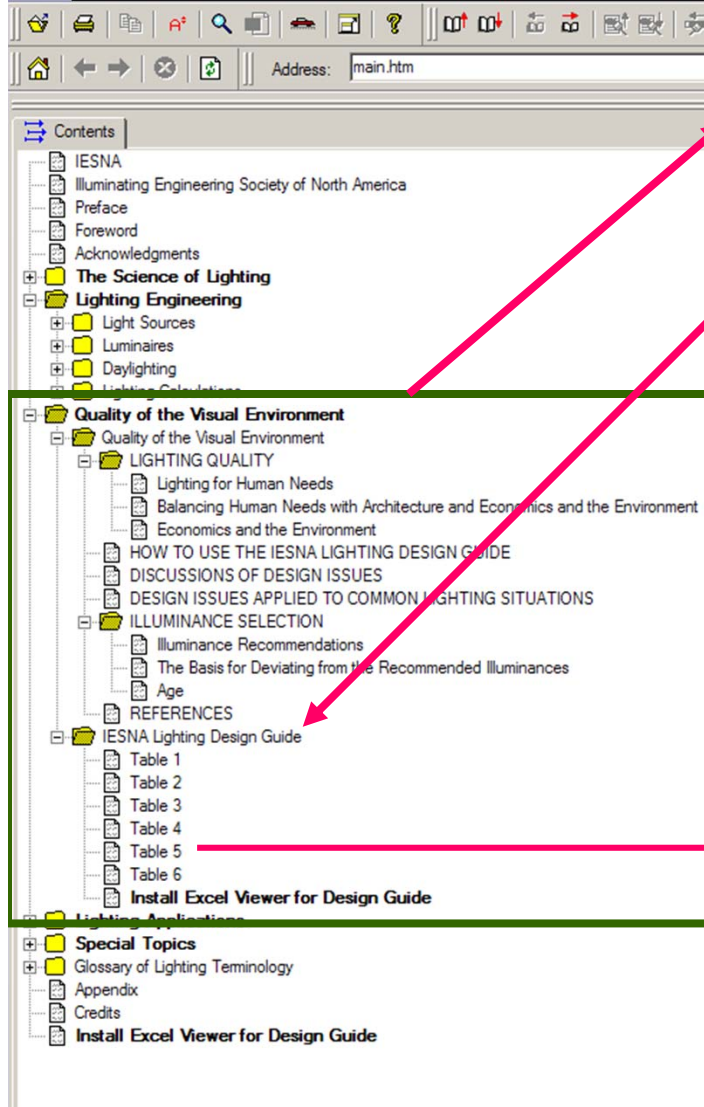
IES handbook 9th edition



Explore

- Quality of Visual Environment
- Lighting Applications

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Quality of the Visual Environment

IESNA Lighting Design Guide

Divided by the following sections:

- I. Interior
- II. Industrial
- III. Outdoor
- IV. Sports and Recreation
- V. Transportation (table V)
- VI. Emergency, Safety, and Security

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Table V

23 criteria

Appearance

Colour

Glare

Flicker

Light distribution

...

Illuminance H

Illuminance V



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V. TRANSPORTATION ^(a) LOCATIONS AND TASKS		Very Important	Important	Somewhat important	Blank = Not important or not applicable
	Design Issues				
	Appearance of Space and Luminaires Color Appearance (and Color Contrast) Daylighting Integration and Control Direct Glare Flicker (and Strobe) Light Distribution on Surfaces Light Distribution on Task Plane (Uniformity) Luminances of Room Surfaces Modeling of Faces or Objects Point(s) of Interest Reflected Glare Shadows Source/Task/Eye Geometry Sparkle/Desirable Reflected Highlights Surface Characteristics System Control and Flexibility Special Considerations Notes on Special Considerations Illuminance (Horizontal) Category or Value (lux) (e) Illuminance (Vertical) Category or Value (lux) (e) Notes on Illuminance — see end of section				
Aircraft					Ch. 23
Passenger compartment					
General					
Reading (at seat)					
Airports					Ch. 23
Hangar apron					
Terminal building apron					
Parking area					
Loading area					
Buses (See Road Conveyances)					Ch. 23
Rail Conveyances					Ch. 23
Boarding or exiting					
Fare box (rapid transit train)					
Vestibule (commuter and intercity trains)					
Aisles					
Advertising cards (rapid transit and commuter trains)					
Back-lighted advertising cards (rapid transit and commuter trains) 860 cd/m ² (80 cd/ft ²) average maximum.					
V. TRANSPORTATION ^(a) LOCATIONS AND TASKS		Very Important	Important	Somewhat important	Blank = Not important or not applicable

Classification

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Orientation and simple visual tasks. Visual performance is largely unimportant. These tasks are found in public spaces where reading and visual inspection are only occasionally performed. Higher levels are recommended for tasks where visual performance is occasionally important.

A	Public spaces	30 lx (3 fc)
B	Simple orientation for short visits	50 lx (5 fc)
C	Working spaces where simple visual tasks are performed	100 lx (10 fc)

Common visual tasks. Visual performance is important. These tasks are found in commercial, industrial and residential applications. Recommended illuminance levels differ because of the characteristics of the visual task being illuminated. Higher levels are recommended for visual tasks with critical elements of low contrast or small size.

D	Performance of visual tasks of high contrast and large size	300 lx (30 fc)
E	Performance of visual tasks of high contrast and small size, or visual tasks of low contrast and large size	500 lx (50 fc)
F	Performance of visual tasks of low contrast and small size	1000 lx (100 fc)

Special visual tasks. Visual performance is of critical importance. These tasks are very specialized, including those with very small or very low contrast critical elements. Recommended illuminance levels should be achieved with supplementary task lighting. Higher recommended levels are often achieved by moving the light source closer to the task.

G	Performance of visual tasks near threshold	3000 to 10,000 lx (300 to 1000 fc)
---	--------------------------------------------	---------------------------------------

* Expected accuracy in illuminance calculations are given in Chapter 9, Lighting Calculations. To account for both uncertainty in photometric measurements and uncertainty in space reflections, measured illuminances should be with $\pm 10\%$ of the recommended value. It should be noted, however, that the final illuminance may deviate from these recommended values due to other lighting design criteria.

- 7 illuminance categories A to G
- Form in 3 sets of visual tasks



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(figure 10-10)

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V. TRANSPORTATION ^(a)	Very Important	Important	Somewhat important	Blank = Not important or not applicable	
LOCATIONS AND TASKS	Design Issues	Appearance of Space and Luminaires Color Appearance (and Color Contrast) Daylighting Integration and Control Direct Glare Flicker (and Strobe) Light Distribution on Surfaces Light Distribution on Task Plane (Uniformity) Luminances of Room Surfaces Modeling of Faces or Objects Point(s) of Interest Reflected Glare	Source/Task/Eye Geometry Sparkle/Desirable Reflected Highlights Surface Characteristics System Control and Flexibility	Special Considerations Notes on Special Considerations Illuminance (Horizontal) Category or Value (lux) ^(b) Illuminance (Vertical) Category or Value (lux) ^(b) Notes on Illuminance — see end of section	Reference Chapter(s)
Aircraft					Ch. 23
Passenger compartment					
General				A	A
Reading (at seat)				D	
Airports					Ch. 23
Hangar apron				10	3
Terminal building apron				5	2
Parking area				20	5
Loading area					
Buses (See Road Conveyances)					Ch. 23
Rail Conveyances					Ch. 23
Boarding or exiting				A	A
Fare box (rapid transit train)				B	A
Vestibule (commuter and intercity trains)				A	A
Aisles				A	A

Airport Terminal was cover

Very Important	Important	Somewhat important	Blank = Not important or not applicable
Color Appearance (and Color Contrast)			
Daylighting Integration and Control			
Direct Glare			
Flicker (and Strobe)			
Light Distribution on Surfaces			
Light Distribution on Task Plane (Uniformity)			
Luminances of Room Surfaces			
Modeling of Faces or Objects			
Point(s) of Interest			
Reflected Glare			
Source/Task/Eye Geometry			
Sparkle/Desirable Reflected Highlights			
Surface Characteristics			
System Control and Flexibility			
Special Considerations			
Notes on Special Considerations			
Illuminance (Horizontal)			
Category or Value (lux) ^(b)			
Illuminance (Vertical)			
Category or Value (lux) ^(b)			
Notes on Illuminance — see end of section			
Reference Chapter(s)			



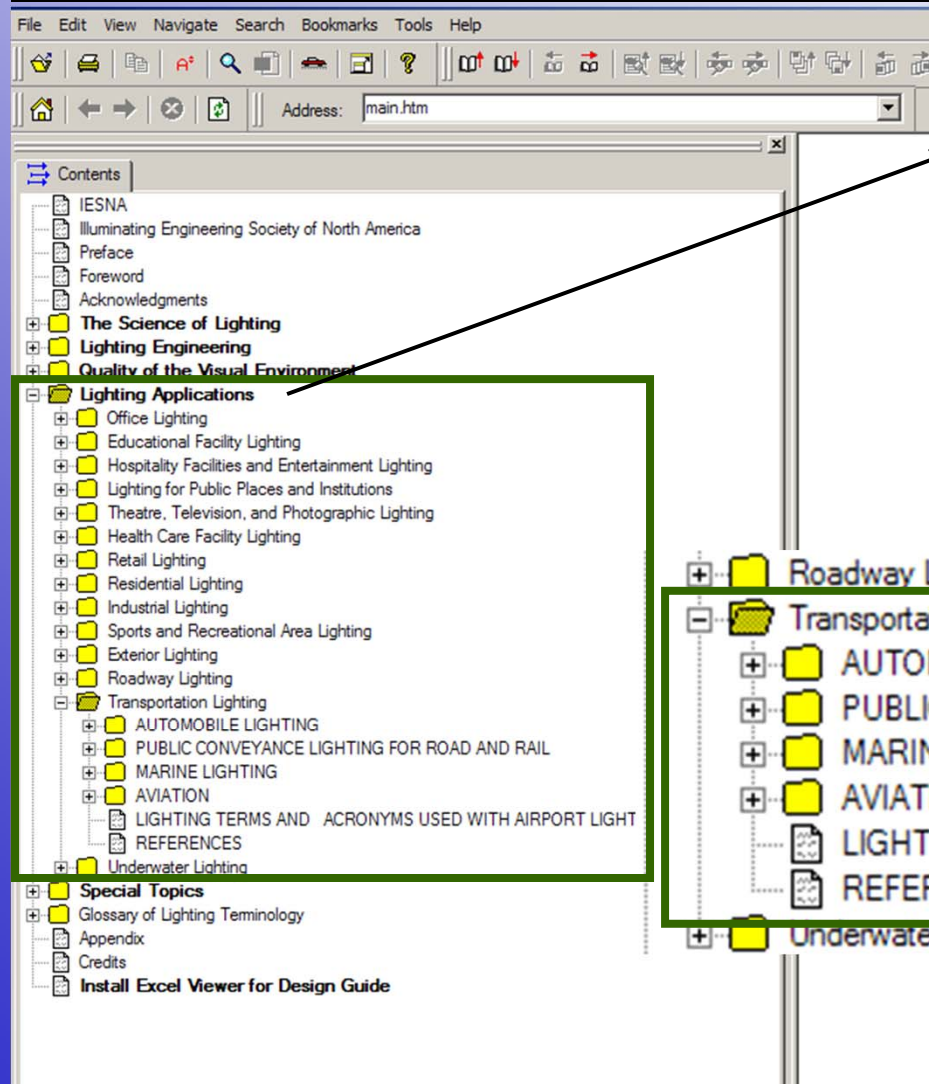
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Transportation Terminals
Waiting room and lounge
Ticket counters
Baggage checking
Rest rooms
Concourse
Boarding area

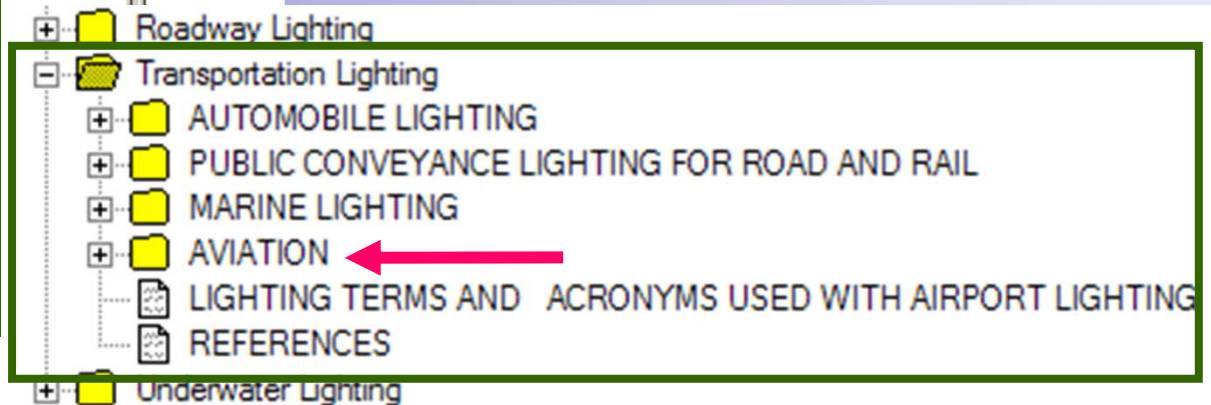
Notes:

(a) Design issues are listed for room or space. Refer to specific task under Reading or Graphic Design and Materials.

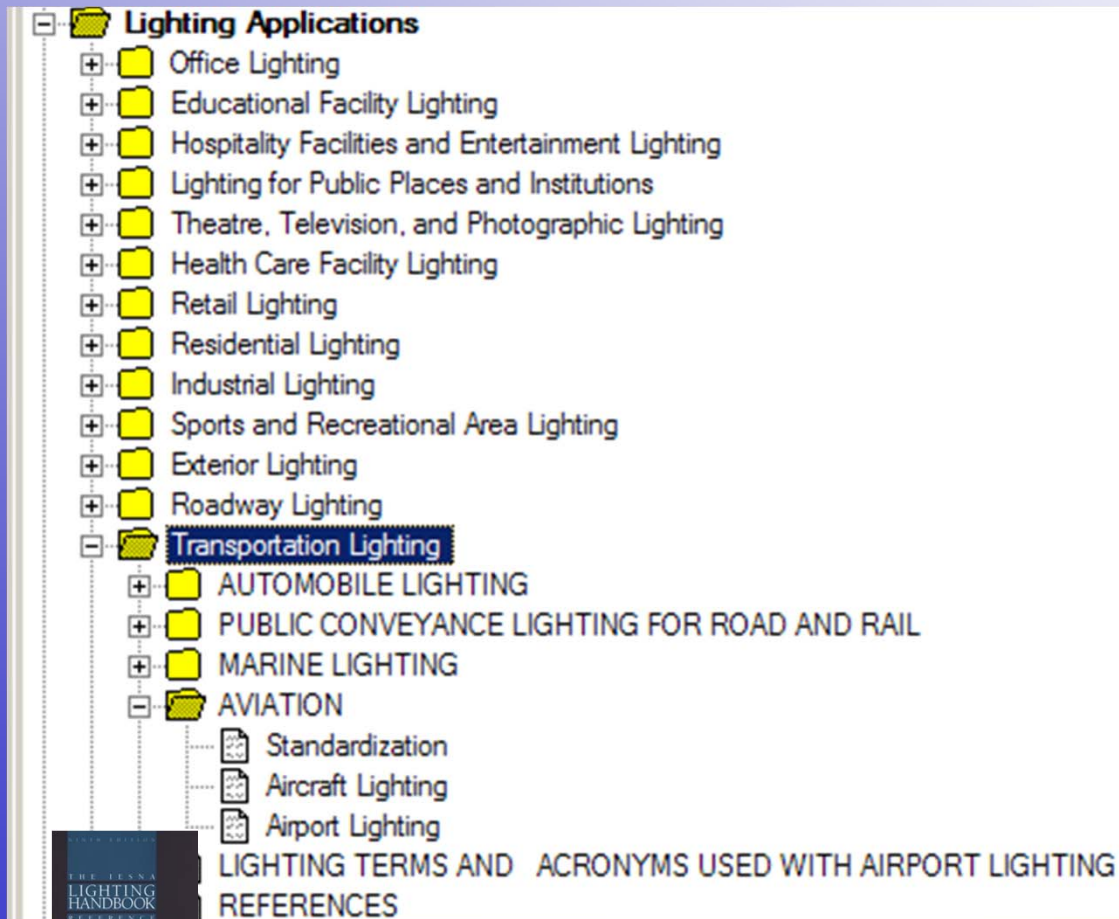
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Lighting Applications



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Aviation - chapter 23

Sections

- Aircraft Lighting
- Airport Lighting

Mainly referring to FAA AC

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Explore

➤ Applications – section 21 to 37

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LIGHTING FOR ART	21
LIGHTING FOR COMMON APPLICATIONS	22
LIGHTING FOR COURTS AND CORRECTIONAL FACILITIES	23
LIGHTING FOR EDUCATION	24
LIGHTING FOR EMERGENCY, SAFETY, AND SECURITY	25
LIGHTING FOR EXTERIORS	26
LIGHTING FOR HEALTH CARE	27
LIGHTING FOR HOSPITALITY AND ENTERTAINMENT	28
LIGHTING FOR LIBRARIES	29
LIGHTING FOR MANUFACTURING	30
LIGHTING FOR MISCELLANEOUS APPLICATIONS	31
LIGHTING FOR OFFICES	32
LIGHTING FOR RESIDENCES	33
LIGHTING FOR RETAIL	34
LIGHTING FOR SPORTS AND RECREATION	35
LIGHTING FOR TRANSPORT	36
LIGHTING FOR WORSHIP	37

Applications

- Increase from 14 to 16 chapters
- Elimination of airfield and aircraft lighting
- New representation and more explanation
- Factor to compensate aged of population
- Aviation is now in lighting for transport

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Lighting for Transport

Contents of a section

1. Project Type and Status
2. Application Types
3. Illuminance Criteria
4. Designing
5. References

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Criteria and Designs Resources

- Reference to other section for specific topics.
 - ✓ Color, control, day lighting, flicker, illuminance, systems integration ...

Table 36.1 | Transport Lighting Checklist

Topic
✓ Criteria and Design Resources
Acoustics
15.1.1.2 Accent Lighting
Table 12.2 Subjective Impressions
Table 15.2 Accent Illuminance Ratios
Table 22.2 Common Applications Illuminance Recommendations
Appearance
12.2 Spatial Factors
Color
12.5.6 Color Considerations
Controls
16 LIGHTING CONTROLS
Daylighting
14 DESIGNING DAYLIGHTING
Electric Lighting
15 DESIGNING ELECTRIC LIGHTING
Flicker
4.6 Flicker and Temporal Contrast Sensitivity
Glare
4.10.1 Discomfort Glare
4.10.2 Disability Glare
Illuminance
This Chapter Table 26.2
12.5.5.1 Applications and Tasks
Table 12.6 Default Illuminance Ratio Recommendations
Figure 12.22 Task Coverage Example
Light Distribution
12.3.2 Subjective Impressions
Luminance
12.5.2 Luminance
Table 12.5 Default Luminance Ratio Recommendations
Maintenance
15.4.4 Installation and Maintenance
Nighttime Outdoor Environment
Table 15.6 Nighttime Operational Strategies for Improved Outdoor Environmental Regard
Systems Integration
12.6 System Factors
Veiling Reflections
This Chapter Section 26.2.6
12.5.4 Veiling Reflections
Visual Tasks
This Chapter Section 26.2
This Chapter Table 26.2
Table 11.2 Programming Inventory Scope and Specific Examples
12.5.1 Visual Tasks
Table 12.3 Sample Visual Task Survey

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2) Application Types

Administration

Baggage Claim and Service Office

Bus and Shuttle Pick-Up and Drop-off

Concourses

Gate Areas






















































Flight Information Screens

Passenger Pick-up and Drop-off

Security

Ticketing

Waiting Shelters

Applications and Tasks ¹	Notes	Recommended Maintained Illuminance Targets (lux) ^{3,4}										Uniformity Targets ⁶			Typical Area of Coverage ⁵			
		Horizontal (E _h) Targets					Vertical (E _v) Targets					Over Area of Coverage					Task Proper or Task Area	Room or Designated Area
		Visual Angles of Observers (years) while at least half are					Visual Angles of Observers (years) while at least half are											
		<25	25-65	>65			<25	25-65	>65			Max:Avg	Avg:Min	Max:Min				
		Category			Gauge	Category			Gauge									
ACCENTING	Accenting influences observers' overall brightness perceptions and provides visual relief. Accenting is also used for visual attraction and wayfinding. See 15.1.1.3 Accent Lighting. These are criteria for consideration in any application.																	
• Art	On artwork plane (typically vertical). See 21 LIGHTING FOR ART for preservation-worthy materials.								see Table 15.2			see 15.1.1.3						
• Feature Wall	On wall plane								see Table 15.2			see 15.1.1.3						
• Important Focal Point	On focal point plane			see Table 15.2					see Table 15.2			see 15.1.1.3						
• Perimeter	On wall plane								see Table 15.2			see 15.1.1.3						
ADMINISTRATION	See 22 LIGHTING FOR COMMON APPLICATIONS																	
AVIATION TERMINALS																		
• ATMs	E _h @3' AFF; E _v @4' AFF	O	100	200	400	Avg	M	50	100	200	Avg		3:1					
• Baggage																		
• Claim																		
• Bolt	E _h @3' AFF; E _v @5' AFF	O	100	200	400	Avg	M	50	100	200	Avg		3:1					
• Carts	E _h @3' AFF; E _v @4' AFF	M	50	100	200	Avg	K	25	50	100	Avg		3:1					
• Carousel	E _h @3' AFF; E _v @5' AFF	O	100	200	400	Avg	M	50	100	200	Avg		3:1					
• General	E _h @floor; E _v @5' AFF	M	50	100	200	Avg	K	25	50	100	Avg		3:1					
• Hotel Information Kiosk	E _h @3' AFF; E _v @4' AFF	O	100	200	400	Avg	M	50	100	200	Avg		3:1					
• Racks	E _h @3' AFF; E _v @5' AFF	M	50	100	200	Avg	O	100	200	400	Avg		3:1					
• Handling	Coordinate lighting with image sensing equipment requirements and/or security cameras.																	
• Automated	E _h and E _v @1' above conveyance	N	75	150	300	Avg	K	25	50	100	Avg		1.5:1					
• Manual	E _h and E _v @1' above conveyance	P	150	300	600	Avg	N	75	150	300	Avg		1.5:1					
• Service Office																		
• Agent Counter	E _h @3' AFF; E _v @5' AFF	P	150	300	600	Avg	M	50	100	200	Avg		3:1					
• Baggage Storage	E _h @3' AFF; E _v @5' AFF	Q	200	400	800	Avg	O	100	200	400	Avg		3:1					
• General	E _h @floor; E _v @5' AFF	K	25	50	100	Avg	H	10	20	40	Avg		3:1					
• Bus and Shuttle Pick-up/Drop-off																		
• Covered	At drop-off curbs and area under cover for intended queuing and drop-off and pick-up.																	
• High Activity ¹	Curbs typified by periods of high pedestrian and vehicular traffic; E _h @grade; E _v @5' AFG in directions of building ingress/egress																	
• LZ4		J	20	40	80	Avg	H	10	20	40	Avg	4:1	2:1					
• LZ3 (and LZ4 curfew)		I	15	30	60	Avg	G	7.5	15	30	Avg	4:1	2:1 (4:1)					
• LZ2 (and LZ3 curfew)		H	10	20	40	Avg	F	5	10	20	Avg	3:1	2:1 (4:1)					
• LZ1 (and LZ2 curfew)		G	7.5	15	30	Avg	E	4	8	16	Avg	3:1	2:1 (4:1)					
• LZ0 (and LZ1 curfew)	Control with motion sensors ³	F	5	10	20	Avg	D	3	6	12	Avg	2:1						
• Medium Activity ¹	Curbs typified by periods of medium pedestrian and vehicular traffic; E _h @grade; E _v @5' AFG in directions of building ingress/egress																	
• LZ4		H	10	20	40	Avg	F	5	10	20	Avg	4:1	2:1					
• LZ3 (and LZ4 curfew)		G	7.5	15	30	Avg	E	4	8	16	Avg	4:1	2:1 (4:1)					
• LZ2 (and LZ3 curfew)		F	5	10	20	Avg	D	3	6	12	Avg	3:1	2:1 (4:1)					
• LZ1 (and LZ2 curfew)		E	4	8	16	Avg	C	2	4	8	Avg	3:1	2:1 (4:1)					
• LZ0 (and LZ1 curfew)	Control with motion sensors ³	D	3	6	12	Avg	B	1	2	4	Avg	2:1						

Applications and Tasks ¹	Notes	Recommended Maintained Illuminance Targets (lux) ^{3,4}									Uniformity Targets ⁵			Typical Area of Coverage ⁶
		Horizontal (E _h) Targets			Vertical (E _v) Targets			Over Area of Coverage						
		Visual Ages of Observers (years) where at least half are			Visual Ages of Observers (years) where at least half are			Max:Avg Avg:Min Max:Min						
		<25	25-65	>65	<25	25-65	>65							
ACCENTING	Accenting influences observers' overall brightness perceptions and provides visual relief. Accenting is also used for visual hierarchy for consideration in any application.													
• Art														
• Feature Wall														
• Important Focal Point														
• Perimeter														
ADMINISTRATION														
AVIATION TERMINAL														
• ATMs														
• Baggage														
• Claim														
• Bolt	E _h @3' AFF; E _v @5' AFF	O	100	200	400	Avg	M	50	100	200	Avg			
• Carts	E _h @3' AFF; E _v @4' AFF	M	50	100	200	Avg	K	25	50	100	Avg			
• Carousel	E _h @3' AFF; E _v @5' AFF	O	100	200	400	Avg	M	50	100	200	Avg			
• General	E _h @floor; E _v @5' AFF	M	50	100	200	Avg	K	25	50	100	Avg			
• Hotel Information Kiosk	E _h @3' AFF; E _h @4' AFF	O	100	200	400	Avg	M	50	100	200	Avg			
• Racks	E _h @3' AFF; E _v @5' AFF	M	50	100	200	Avg	O	100	200	400	Avg			
• Handling														
• Automated														
• Manual														
• Service Office														
• Agent Counter														
• Baggage Storage														
• General														
• Bus and Shuttle Pick-up/Drop-off														
• Covered														
• High Activity ¹														
• LZ4 ¹														
• LZ3 ¹ (and LZ4 curfew)														
• LZ2 ¹ (and LZ3 curfew)														
• LZ1 ¹ (and LZ2 curfew)														
• LZ0 ¹ (and LZ1 curfew)														
• Medium Activity ¹														
• Low Activity ¹														
• LZ4 ¹ (and LZ4 curfew)														
• LZ3 ¹ (and LZ3 curfew)														
• LZ2 ¹ (and LZ2 curfew)														
• LZ1 ¹ (and LZ1 curfew)														
• LZ0 ¹ (and LZ0 curfew)														
Control with motion sensors ³														

Recommended Maintained Horizontal (E_h) Targets

Visual Ages of Observers (years) where at least half are

<25	25-65	>65
-----	-------	-----

Vertical (E_v) Targets

Visual Ages of Observers (years) where at least half are

<25	25-65	>65
-----	-------	-----

Uniformity Targets⁵ Over Area of Coverage

Max:Avg	Avg:Min	Max:Min
---------	---------	---------

cited with sunburst icon  are candidates for any combination of daylighting and electric light

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Transport Illuminance Recommendations

ATM

Customs (Check-point Station, Queuing, Screening)

Elevators & escalators

VDT Screen and Keyboard

Food Courts

Immigration

Information Desks

Lounges

Moving Walkways

Stairs

Toilets

Train station - platform

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4) Designing

List of items to cover

+ Reference Economics Resources
and Energy Efficient resources

Lighting for exteriors

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Lighting Exteriors – section 26

Facades

Accenting

Building Entries

Parking Deck

Parking Lots

Pedestrian Ways and Bike Ways

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Conclusion

- All regions of US and Canada have an IES local section
 - New member are welcome – www.iesna.org
- 9th ed.(version 2000) have
 - All airfield lighting, mainly referring to FAA Advisory Circular
 - Terminal and outdoor information still usable
- 10th ed. cover new areas in terminal building
 - Wider possibility to adapt your application
 - Little overlap with future IES RP-37 and work integrated

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Thank you

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