



New Jersey Light Pollution Study Commission's Report

Submitted April 1996 to the Governor  
and the Legislature

State of New Jersey  
Christine Todd Whitman, Governor

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## SUMMARY

As provided by law, the New Jersey Light Pollution Study Commission (LPSC) has met over the past several months, and this report is the result of these meetings. The report defines Light Pollution and makes twelve specific recommendations to ameliorate the Light Pollution problem; each recommendation is supported by one or more statements of needed action. A survey of known governmental mandates for outdoor lighting is included, as are references and a brief treatment of the basis for the recommendations.

The causes of Light Pollution are many and the effects can be glare, energy waste, light trespass (nuisance light) and sky glow.

The recommendations in this report are intended to reduce Light Pollution and its adverse effects. These recommendations will result in improved lighting conditions for safety and for reduced energy consumption, and will also serve as a means to help preserve the environment.

The twelve recommendations treat these subjects:

1. Role of IESNA guidelines
2. Luminaries for use in roadway and area lighting
3. Misdirected (misaimed) architectural and sign lighting
4. Turning off (or reducing) exterior lighting
5. Billboard lighting: aiming and approach
6. Site improvement provisions
7. Designated "dark areas"
8. Light-conserving materials and construction
9. Public awareness
10. Training of professionals
11. Ordinance guidelines for use by local municipalities
12. State exemplary lighting installations

*[Most recommendations are tied to New Jersey State "action" directives.]*

## INTRODUCTION

Public Law 1993, Chapter 82, approved March 17, 1993, established a Light Pollution Study Commission (LPSC) to study the problem of Light Pollution, the potential for monetary savings if more appropriate and efficient types of outdoor lighting are selected, as well as other benefits that would occur if Light Pollution is lessened, and steps taken in other jurisdictions to address this issue and their potential applicability in this State, and to recommend any legislative, administrative, or other actions that may be taken to ameliorate the problem. (See Appendix A for copy of PL 1993, Chapter 82)

The LPSC consisted of 13 members: representatives from the Departments of Commerce, Energy and Economic Development, Community Affairs, Transportation, and Environmental Protection, five members of the public - one representing the lighting industry, one an astronomer with experience in the study of Light Pollution, one representing the business community, one representing environmental organizations, and one a municipal law enforcement official; one member representing the New Jersey Section of the Illuminating Engineering Society; and three members representing the public electric utility industry - specifically Public Service Electric and Gas, Atlantic Electric, and Jersey Central Power and Light. (See Appendix B for membership listing)

The first LPSC organizational meeting was held on June 16, 1995. The LPSC defined "Light Pollution" to include misdirected light, stray light, excess reflected light, light during hours when it is not needed, and light levels in excess of what is necessary for the task. A report, pursuant to the Act, was to be submitted within nine months of the organizational meeting date.

As noted in the summary, the causes of Light Pollution are many and the effects can be glare, energy waste, light trespass (nuisance light), and sky glow.

- Most glare can and should be prevented. Glare affects the ability of drivers to perceive objects or obstructions clearly. Particularly sensitive to this problem are elderly drivers.
- Energy is wasted when excessive levels of illuminances are used. Inefficient luminaires can spill unwanted light well outside of the intended target area.
- Light trespass may be viewed as an invasion of privacy. Most obtrusive lighting conditions can be avoided.
- Inappropriate use of outdoor lighting can deteriorate the natural nighttime environment, particularly in areas preserved for fauna and flora. In addition, sky glow reduces the ability to observe the starry night sky.

*[For a further understanding of the terminology utilized in this report refer to the IESNA Lighting Handbook listed in Appendix C.]*

The LPSC does, as the Legislature did, recognize Light Pollution as a problem and provides the recommendations and actions of this report to the Governor and the Legislature for their information and further consideration.

*[The following recommendations and action(s) are in no priority order and are not weighted in any manner or fashion.]*

### RECOMMENDATIONS and ACTIONS

1. Nationally recognized lighting recommendations for illuminance levels and uniformity ratios should be followed, such as contained in the Illuminating Engineering Society of North American (IESNA) Lighting Handbook.

Action(s):

- A. There should be established New Jersey site improvement standards or local ordinances which require this provision.
2. Roadway and area lighting should be designed to minimize misdirected and upward light from luminaires. The use of cutoff luminaires should be considered the first choice in design. Where the use of internal cutoff luminaires is not possible, the use of externally mounted shields to the luminaires may be substituted if feasible.

Action(s):

- A. All State of New Jersey and State of New Jersey funded projects should be required to conform to this practice.
- B. Utility companies, lighting installers, and others involved with lighting design should follow this recommendation.
3. Architectural and sign lighting should be designed to minimize light that does not illuminate the target area.

Action(s):

- A. All State of New Jersey and State of New Jersey funded projects should be required to conform to this recommendation.
- B. Planning boards should be encouraged to consider this recommendation in their site plan approval process.

4. Lighting of building exteriors should be minimized or eliminated during those hours when it is not needed. Lighting controls (such as timers, dimmers, motion sensing devices, and photosensors) should be encouraged.

Action(s):

- A. The State of New Jersey should evaluate the exterior lighting needs of its facilities and, where feasible, implement this recommendation as soon as possible.
- B. Establish these requirements by local ordinance or through site improvement standards.

5. Commercial billboard lighting should be aimed at the target area and installed in such a fashion that spill light is kept to a minimum.

Action(s):

- A. Require by local ordinances.

6. Municipal engineers and planners and all those involved with lighting aspects should be made aware of the concerns regarding Light Pollution and how it can be addressed through lighting design.

Action(s):

- A. Upon adoption of site improvement standards containing street and site lighting provisions, state training on site improvement provisions should include training material that recognizes Light Pollution concerns and how proper lighting design assists in its reduction.

7. Areas of New Jersey determined to be especially suitable for astronomical observations or which provide nocturnal benefits to flora and fauna should be considered for designation as "dark areas". *[A "dark area" is an area in which lighting is prohibited or limited in order to 1) address concerns regarding Light Pollution which impact the environmental and 2) restore a more natural view of the starry sky.]*

Action(s):

- A. Within twelve months of issuance of this report the State of New Jersey should "map" the State to identify these "dark areas".
  - B. The State of New Jersey should consider formulating a plan to retain or, where possible, reduce lighting levels in those parts of the "dark areas" which are under control of the State. County and municipal government should be encouraged to retain or reduce existing lighting levels in "dark areas" they own.
  - C. The State's plan should include surveying and evaluating the lighting in all the state parks forests, fish and wildlife management areas, and other State-owned rural lands.
  - D. The State's plan should also contain recommendations for encouraging businesses and homeowners in the privately-owned parts of the "dark areas" to comply with the recommendations of this report.
8. The use of materials and devices, such as reflectors, should be evaluated and considered in lieu of additional lighting. *[Even so, the IESNA Lighting Handbook recommendations should be followed; see Recommendation 1.]*

Action(s):

- A. The NJ Department of Transportation should continue to study and evaluate the use of such materials and devices on road surfaces, signs, etc., in lieu of additional lighting.

9. The general public should be provided information about Light Pollution and how to minimize it. This can be accomplished through general instruction in schools, manufacturers' literature, company flyers, State programs, or other mechanisms.

Action(s):

- A. State agency or agencies or other governmental authorities are to develop and disseminate information regarding Light Pollution in accordance with recommendations of this report. As an example: The New Jersey State Museum should further emphasize sky glow concerns and ways to reduce Light Pollution during presentation at the planetarium and provide an educational display.
10. Training and educational opportunities should be made available to lighting professionals, contractors, installers, inspectors and others, with respect to Light Pollution.

Action(s):

- A. Educational institutions should offer course material on Light Pollution.
11. Local municipalities should be provided with a set of guidelines to use as a starting point in developing standards and ordinances to reduce Light Pollution.

Action(s):

- A. The State of New Jersey should fund the development (by a professional organization knowledgeable in Light Pollution concerns, such as the IESNA) of a set of such guidelines. This funding should be provided within the next 12 months.
12. The State of New Jersey should provide exemplary lighting installations ("demonstration projects") to serve as working models of good lighting practice with respect to Light Pollution concerns.

Action(s):

- A. The State of New Jersey shall select one or more State or State-sponsored facilities and roadways to serve as examples of responsible area lighting, street lighting, architectural lighting, sign lighting, and billboard lighting, and shall suitably equip and light those facilities.
- B. The State of New Jersey shall advertise the existence of these model installations.

### BASIS FOR RECOMMENDATIONS

The LPSC reviewed recommendations contained in the IESNA Lighting Handbook relating to the use of outdoor lighting and Light Pollution, ordinances and other state, county and municipal regulatory documents relating to outdoor lighting practice, the New Jersey Department of Transportation's Lighting Design Policy (January 1996), speaker presentations, and other documents and articles relating to Light Pollution. (See "References" section)

As mentioned above, a review of governmental agencies controls on outdoor lighting practice was made. Of the 26 governing units cited, two are states (California and Maine), three are counties, and 21 are local cities/municipalities. Over two-thirds of the locales are in Arizona, California, Maine, and Wisconsin. Over half of the government mandates cite light trespass (nuisance lighting) as a target of the mandate, with a third citing energy conservation and a third citing astronomy concerns. Nearly all of the mandates regulate the shielding of light sources, about half place some restriction on the times at which certain sources can be used, and one-third are tied to IESNA recommended illuminance levels. The survey data are summarized in Appendix C, which also includes the 26 individual data sheets.

## REFERENCES

- A. IESNA Lighting Handbook (8th Edition), Illuminating Engineering Society of North America, New York, NY, 1993.
- B. ANSI/IESNA RP-8, 1983 American National Standard Practice for Roadway Lighting, Illuminating Engineering Society of North America, New York, NY.
- C. Value of Public Roadway Lighting, (IESNA Committee on Roadway Lighting) IESNA CP-31-1989.
- D. An Information Guide for Roadway Lighting, The American Association of State Highway and Transportation Officials (AASHTO), 1984.
- E. New Jersey Department of Transportation's Lighting Design Policy (January 1996).
- F. "The if, why and what of street lighting and street crime: A review", P.R. Boyce and Gutkowski, Lighting Research Technology, RPI, Troy, New York, 1994.
- G. "Light Pollution, the Neglected Problem", John Batinsey, (Eatontown Environmental Commission), New Jersey Municipalities, May, 1995.
- H. International Dark-Sky Association Information Sheets 12, 24, 29, 35, 42, 51, 54, 63 and 76, (Tucson, AZ).
- I. "Not in my Window!", Ronald P. Lewis, Lighting Design + Applications, July, 1989.
- J. "Light Trespass: Problems and Directions", Ian Lewin, Lighting Design + Applications, June, 1992.
- K. Visual Performance Data for 156 Normal Observers of Various Ages, Blackwell, O.M. and Blackwell, H.R., J. Illuminating Engineering Society 1:3-13, 1971
- L. Disability Glare-A State of the Art Report, Vos, J.J., CIE Journal, 3:39-53, (1984).
- M. Speaker Presentations
  - John Batinsey - Eatontown Lighting Survey
  - Earl Print - Philips Lighting Company
  - R. Zolnowski - NJ DOT's Lighting Design Policy
  - Sgt. Ted J. Kammer, Jr. - NJ Crime Prevention
  - Edward Zamengo - JCP&L
  - J.A. Bryson - Highway Safety
  - Alen Gest - Holophane Lighting

## CHAPTER 82

## AN ACT establishing a Light Pollution Study Commission.

BE IT ENACTED by the Senate and General Assembly of the State of New Jersey:

1. The Legislature finds that excessive and misdirected outdoor lighting, "light pollution," is a consequence of not using outdoor lighting only where necessary, when necessary, and of the type most efficient and cost-effective for the task; that controlling light pollution will result in astronomical cost savings due to the decrease in energy requirements; that light pollution, particularly from improperly shielded street lights, is a serious safety hazard to motorists; that the unchecked growth of light pollution in recent years has unnecessarily deprived most residents of the beauty of the starry night sky, while also potentially having serious effects on nocturnal fauna and flora; that while the lighting of streets, businesses, and residences is desirable and necessary for security, it is not desirable or necessary to have lights shining directly and often dangerously into the eyes of motorists, or uselessly and wastefully into the air and off into space; that in several other states, large cities such as San Diego, San Jose, and Phoenix have adopted certain anti-light pollution measures with wide public support which are saving those jurisdictions millions of dollars per year; and that it is therefore appropriate to form a panel of experts to study the problem of light pollution and to advise the Legislature as to its severity, and to recommend legislative or administrative measures to alleviate the problem and to realize substantial savings of energy and money, while restoring and protecting the beauty of the night sky.

2. a. There is created the Light Pollution Study Commission, which shall consist of 13 members appointed as follows: the Commissioners of the Departments of Commerce, Energy and Economic Development, Community Affairs, Transportation, and Environmental Protection, or their designated representatives, who shall serve ex officio; five members of the public to be appointed by the Governor with the advice and consent of the Senate; one member representing the New Jersey Chapter of the Illuminating Engineering Society; and three members representing the public electric utility industry. Of the public members, one shall represent the lighting industry; one shall be an astronomer with experience in the study of light pollution; one shall represent the business community; one shall represent environmental organi-

zations; and one shall be a municipal law enforcement official. Of the electric utility members, one shall represent Public Service Electric and Gas, one shall represent Atlantic Electric, and one shall represent Jersey Central Power and Light.

b. Vacancies in the appointed membership of the commission shall be filled in the same manner as the original appointments were made.

c. Members of the commission shall serve without compensation, but shall be entitled to reimbursement for actual expenses necessarily incurred in carrying out their duties as members of the commission, within the limits of monies appropriated or otherwise made available to the commission.

d. Appointments to the commission shall be made and qualified within 60 days after the effective date of this act.

3. The Light Pollution Study Commission shall hold an organizational meeting within 30 days of the appointment and qualification of the full membership of the commission, and shall elect a chairperson from among its public members and a secretary, who need not be a member of the commission.

4. It shall be the duty of the Light Pollution Study Commission to study the problem of light pollution, the potential for monetary savings if more appropriate and efficient types of outdoor lighting are selected, as well as other benefits that would accrue if light pollution is lessened, and steps taken in other jurisdictions to address this issue and their potential applicability in this State, and to recommend any legislative, administrative, or other actions that may be taken to ameliorate the problem.

5. The Light Pollution Study Commission shall be entitled to call upon the assistance of the officers and employees of any State, county or municipal department, board, bureau, commission or agency as it may require and as may be made available to it to conduct its work, and may incur such expenses as it may deem necessary, and as may be within the limit of any funds appropriated or otherwise made available to it, to fulfill its responsibilities pursuant to this act.

6. The Light Pollution Study Commission, within nine months of its first organizational meeting, shall submit to the Governor and the Legislature a report setting forth the results of its study.

Upon submittal of its report, the commission shall expire.

7. This act shall take effect immediately.

Approved March 1993.

Appendix B

LPSC Membership List

**William Barnshaw**  
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**\*LPSC Chairperson**

LPSC Membership List - Continued

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Appendix C

Summary of Outdoor Lighting Mandates

STATE	CITY/ COUNTY	TYPE OF MANDATE	PURPOSE	AFFECTED LIGHTING	SPECIAL FEATURES
AZ	Flagstaff	outdoor lighting code	light pollution, light trespass, energy conserv., astronomy	outdoor	LPS promoted, lumen restrictions, time restrictions, shielding restrictions, timers required
AZ	Maricopa County	ordinance	energy conserv., astronomy	outdoor	LPS promoted, lumen restrictions, time restrictions, shielding restrictions, timers required
AZ	Tempe	ordinance	astronomy	outdoor (some incandescent exceptions)	LPS promoted, time restrictions, shielding restrictions, timers required
AZ	Tucson & Pima Counties	ordinance	energy conserv., astronomy	outdoor (some lower wattage exceptions)	LPS promoted, time restrictions, shielding restrictions, timers required, ties to IESNA
CA	(Statewide)	Act	glare control	outdoor lighting, impacting driving vision	lumen restrictions
CA	Concord	draft roadway standard	roadway, light trespass	roadways	ties to IESNA
CA	Martinez	roadway standard	roadway, light trespass		ties to IESNA
CA	Riverside	ordinance	light trespass, astronomy	outdoor	LPS promoted, lumen restrictions, time restrictions, shielding restrictions, timers required

Summary of Outdoor Lighting Mandates - Continued

STATE	CITY/ COUNTY	TYPE OF MANDATE	PURPOSE	AFFECTED LIGHTING	SPECIAL FEATURES
CA	San Diego	regulations	light pollution, light trespass, astronomy	outdoor (devices above 4050 lumens)	LPS promoted, time restrictions, shielding restrictions, timers required, ties to IESNA
CA	San Diego	ordinance	astronomy	outdoor (some lower wattage exceptions)	LPS promoted, time restrictions, shielding restrictions, timers required
CA	Vista	draft ordinance	energy conserv., glare control, light trespass	outdoor (limitations unclear)	LPS promoted, time restrictions, shielding restrictions, timers required
CO	Boulder	draft ordinance	outdoor illuminance	outdoor (some lower lumen exceptions)	time restrictions, shielding restrictions
CO	Aspen	building code exterior lighting			
CT	Greenwich	ordinance	light levels, light trespass	outdoor (except roadway)	shielding restrictions
ME	(statewide)	Act	glare control, light trespass	State-funded outdoor lighting	shielding restrictions, ties to DOT and IESNA
ME	Kennebunk port	ordinance	energy conserv., glare control, light trespass, aesthetics	outdoor	shielding restriction, light source restrictions
ME	Portland	code-exterior lighting		exterior (some lower wattage exceptions)	shielding restrictions
ME	Gardner	standards	light trespass, aesthetics	outdoor non- residential	

Summary of Outdoor Lighting Mandates - Continued

ME	Lincoln	draft ordinance	glare control, light trespass	outdoor	
NJ	Eatontown	ordinance	light pollution, light trespass, energy conserv., glare control	outdoor (devices above 1800 lumens)	shielding restrictions, ties to IESNA
NY	Pittsford	building code		Illuminated awnings, signs, sports facilities, churches, agriculture	shielding restrictions, time restrictions, ties to IESNA
OR	Deschutes county	ordinance	light trespass, aesthetics	outdoor (devices above 1800 lumens)	shielding restrictions, time restrictions, ties to IESNA
WI	Madison	proposed ordinance	energy conserv. light trespass	outdoor (except roadway)	shielding restrictions, time restrictions, ties to IESNA
WI	Milwaukee	ordinance	light trespass	outdoor lighting which impinges on residential properties	shielding restrictions
WI	Williams Bay	ordiance	astronomy	outdoor (except certain residential)	lumen restrictions, time restrictions, shielding restrictions
WI	Brookfield	ordinance		light trespass, off-street parking	shielding restrictions

LPS = Low Pressure Sodium Lamps

IESNA= Illuminating Engineering Society of North America

LOCATION	FLAGSTAFF, AZ OUTDOOR LIGHTING CODE
1 Purpose	Minimize LP, light trespass, conserve energy while maintaining night security, utility & productivity and curtail degradation of night time visual environment.
5 Astronomy Zones	Zones I, II & III
7 Light Fixture	Outdoor electrically powered illuminating devices (all types including signs) of 4050 lumens or greater.
12 Shielding	FULLY SHIELDED- All light projected below horizontal. PARTIALLY SHIELDED - More than "0", but less than 10% above horizontal.
16 Light Trespass	All light fixtures except street lights shall be located, aimed or shielded to minimize light trespass across property boundaries (does not exclude single family & duplex).
20 Street Lights	
21 Meet IES	
22 Cutoff	Yes
23 Lamp	LPS
26 Illuminance	Zone I 25,000 lumens
27 Regulated	" II 50,000 "
28	" III 100,000 "
29	(Special restrictions for non-LPS, sports, residen.)
30 Uses: Parking	LPS only, full shield
32 Auto/Sales	Full shield, off at 9 PM or closing
34 Arch/Deco	Unshielded/part shielded, 5500 lumens per acre. Off at 11 PM or closing (Zone I, 9 PM)
36 Sports	Full shield, except when interferes with use. Off at 11 PM or conclusion (Zone I, 9 PM)
38 Promotional	Search lights, lasers not permitted except for emergencies, etc.
40 Signs: External	Such signs subject to same requirements as with other outdoor lighting (full shielding).
43 Internal	Background opaque or darker than lettering.
46 Timers Required	Yes
47 Residential	Single family/duplex exempt from shielding if 4720 lumens or below per family.
49 Submit evidence of Yes,	
50 Compliance	
51 Other Comments	
52	
53	
54	
55	

LOCATION	MARICOPA COUNTY, AZ ORDINANCE
1 Purpose	Control illuminating devices which have a detrimental effect on astronomy. Encourage good lighting practices, conserve energy, increase safety, utility, security & productivity.
5 Astronomy Zones	
7 Light Fixture	All electrical outdoor lighting.
12 Shielding	FULLY SHIELDED - projected below horizontal plane. PARTIALLY SHIELDED - reads same as IES cutoff definition.
16 Light Trespass	Lighting shall be placed so as to reflect (cast) light away from adjoining rural or residential zoning districts.
20 Street Lights	
21 Meet IES	
22 Cutoff	
23 Lamp	LPS
26 Illuminance	
27 Regulated	
30 Uses: Parking	LPS (shielding not required)
32 Auto/Sales	Shielded, off at 11 PM
34 Arch/Deco	Unshielded Illumination prohibited except 150 W incandescent or LPS.
36 Sports	All other than LPS shielded. Off at 11 PM or conclusion.
38 Promotional	Prohibited after 11 PM.
40 Signs: External	No more than 4 fixtures, maximum 40,000 lumens and no more than 1017 spill lumens. Off at midnight.
43 Internal	
46 Timers Required	Yes
47 Residential	
49 Submit evidence of	
50 Compliance	Yes
51 Other Comments	
52	
53	
54	
55	

LOCATION	City of Tempe, AZ LIGHTING ORDINANCE
1 Purpose	Restrict illuminating devices emitting undesirable rays into night sky and detrimental effects on astronomical observations.
5 Astronomy Zones	
7 Light Fixture	All electrical lighting except with incandescent lamps of 100 watts or less.
12 Shielding	Shielded fully - light rays emitted by fixture directly from lamp or indirectly from fixture projected below horizontal plane.
16 Light Trespass	Lighting shall be directed down and screened away from adjacent properties & streets.
20 Street Lights	
21 Meet IES	
22 Cutoff	Downtown ornamental street lights exempt.
23 Lamp	LPS only (does not require shielding).
26 Illuminance	
27 Regulated	
30 Uses: Parking	Meet IES minimum illuminance. Height to not exceed 16 feet.
32 Auto/Sales	Shielded
34 Arch/Deco	Unshielded fixtures prohibited.
36 Sports	No shielding for LPS. Other requires full shielding Off at 11 PM or conclusion.
38 Promotional	Temporary
40 Signs: External	Fixtures shall be mounted on top. Off at 11 PM.
43 Internal	
46 Timers Required	Yes
47 Residential	
49 Submit evidence of	Yes
50 Compliance	
51 Other Comments	

LOCATION	Tucson & Pima County, AZ OUTDOOR LIGHTING CONTROL ORDINANCE	
1 Purpose	Provide standards to not unreasonable interfere with astronomy, conserve energy without decreasing safety, utility, security & productivity, while enhancing nighttime enjoyment of property.	
5 Astronomy Zones	Areas A & B	
7 Light Fixture	All electrical lighting except with incandescent lamp of 160 watts or less or any other light source of 50 watts or less.	
12 Shielding	FULLY SHIELDED - no light above horizontal plane. PARTIALLY SHIELDED - no more than 10% of light above horizontal plane.	
16 Light Trespass	Recreation - minimize up light, spill light &	
20 Street Lights	Meet IES Yes	
22 Cutoff	LPS preferred (partial shield). HPS with full shield allowed only on arterial/collector streets 100 feet in right of way width.	
23 Lamp		
26 Illuminance	Regulated	
27 Regulated		
30 Uses: Parking	LPS _ partial shield, HPS - full shield.	
32 Auto/Sales	MH, HPS - full shield. Off at 11 PM.	
34 Arch/Deco	LPS - partial shield, HPS - full shield	
36 Sports	Full shield or sharp cutoff capacity. Off at 11 PM or conclusion.	
38 Promotional	Lasers prohibited above horizon. Searchlights prohibited Area A. Off at 10 PM Area B.	
40 Signs: External	Top mounted & shielded only. No off site Area A. Area B off site shut off at 11 PM.	
43 Internal	Require dark backgrounds. No curfew.	
46 Timers Required	Yes	
47 Residential		
49 Submit evidence of	Compliance	
50 Compliance	Yes	
51 Other Comments	For after security, LPS & HPS only	
52		
53		
54		
55		

LOCATION State of California Vehicle Code.

1 Purpose Prevent light from impairing driver's vision.  
2  
3  
4  
5 Astronomy Zones  
6  
7 Light Fixture No person shall place or maintain or display, upon or  
8 in view of any highway, any light of any color of such  
9 brilliance as to impair the vision of drivers upon the  
10 highway. A light source shall be considered vision  
11 impairing when its brilliance exceeds the values listed  
12 Shielding below.  
13  
14 The brightness reading of an objectionable light source  
15 shall be measured with a 1 1/2-degree photoelectric  
16 Light Trespass brightness meter placed at the driver's point of view.  
17 the maximum measured brightness of the light source  
18 within 10 degrees from the driver's normal line of  
19 sight shall not be more than 1,000 times the minimum  
20 Street Lights brightness in the driver's field of view, except that  
21 Meet IES when the minimum measured brightness in the field of  
22 Cutoff view is 10 foot-lamberts or less, the measured  
23 Lamp brightness of the light source in foot-lambert shall not  
24 exceed 500 plus 100 times the angle, in degrees, between  
25 the driver's line of sight and the light source.  
26 Illuminance  
27 Regulated  
28  
29  
30 Uses: Parking  
31  
32 Auto/Sales  
33  
34 Arch/Deco  
35  
36 Sports  
37  
38 Promotional  
39  
40 Signs: External  
41  
42  
43 Internal  
44  
45  
46 Timers Required  
47 Residential  
48  
49 Submit evidence of  
50 Compliance  
51 Other Comments  
52  
53  
54  
55

LOCATION	CITY OF CONCORD, CA (DRAFT ROADWAY LIGHTING STANDARD)
1 Purpose	(Roadway Lighting Standard)
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	
8	
9	
10	
11	
12 Shielding	
13	
14	
15	
16 Light Trespass	No more than 0.10 Horizontal fc into adjacent private property & no more than 0.001 Horizontal at 20 feet.
17	
18	
19	
20 Street Lights	
21 Meet IES	Yes (Illuminance & Uniformity ratios)
22 Cutoff	Yes
23 Lamp	HPS
24	Pole height 30 feet. Locate no closer than 30 feet from trees.
25	
26 Illuminance	
27 Regulated	
28	
29	
30 Uses: Parking	
31	
32 Auto/Sales	
33	
34 Arch/Deco	
35	
36 Sports	
37	
38 Promotional	
39	
40 Signs: External	
41	
42	
43 Internal	
44	
45	
46 Timers Required	
47 Residential	
48	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
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## LOCATION

CITY OF MARTINEZ, CA  
ROADWAY LIGHTING STANDARD

1 Purpose (Roadway lighting standard)

2

3

4

5 Astronomy Zones

6

7 Light Fixture

8

9

10

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12 Shielding

13

14

15

16 Light Trespass Luminares located adjacent to residential fitted  
17 with factory installed house-side shield to  
18 light trespass.  
19

20 Street Lights

21 Meet IES Yes

22 Cutoff Yes

23 Lamp HPS

24 Pole height between 25 & 35 feet. Locate no closer  
25 than 30 feet from trees.

26 Illuminance

27 Regulated

28

29

30 Uses: Parking

31

32 Auto/Sales

33

34 Arch/Deco

35

36 Sports

37

38 Promotional

39

40 Signs: External

41

42

43 Internal

44

45

46 Timers Required

47 Residential

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49 Submit evidence of

50 Compliance

51 Other Comments

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LOCATION	COUNTY OF RIVERSIDE, CA ORDINANCE
1 Purpose	Restrict light fixtures which have a detrimental effect on astronomy.
2	
3	
4	
5 Astronomy Zones	Zone A, 15 miles from Palomar Observatory
6	" B, beyond 15 miles, less than 45 miles
7 Light Fixture	All Electric outdoor lighting
8	Class I - Color rendition important
9	" II - Roadway, parking, security.
10	" III - Building facade, landscape, etc.
11	
12 Shielding	FULLY SHIELDED - All light rays projected below horizontal plane. PARTIALLY SHIELDED - 90% below horizontal plane.
13	
14	
15	
16 Light Trespass	Use fully shielded, if feasible or partially shielded & must be focused to minimize spill light into night sky & onto adjacent properties.
17	
18	
19	
20 Street Lights	Arterial - LPS 22,500 lumens or HPS 22,000 lumens
21	Residential - LPS 8000 lumens or HPS 9500 lumens
22	Zone A, LPS only. Zone B, LPS, or other fully shielded
23	
24	
25	
26 Illuminance	Zone A, non LPS lamps cannot exceed 4050 lumens &
27 Regulated	limited to 8100 lumens per acre.
28	
29	
30 Uses: Parking	Zone A, only LPS. Zone B, If other than LPS, limited to 4050 lumens. All zones fully shielded.
31	
32 Auto/Sales	Zone A, LPS. Other above 4050 lumens prohibited.
33	Zone B, other allowed if fully shielded.
34 Arch/Deco	Zone A, prohibited. Zone B, LPS or other below 4050 lumens.
35	
36 Sports	Zone A, LPS or other if below 4050 & shielded.
37	Zone B, LPS or other if shielded.
38 Promotional	Searchlights for advertising prohibited in Zones A & B.
39	
40 Signs: External	Top mounted only & off at midnight, or closing.
41	
42	
43 Internal	Off at midnight.
44	
45	
46 Timers Required	Yes
47 Residential	No lumen restriction on single family residential if using LPS.
48	
49 Submit evidence of	
50 Compliance	Yes
51 Other Comments	Too complicated for non astronomy areas.
52	
53	
54	
55	

LOCATION	CITY OF San Diego, CA OUTDOOR LIGHTING REGULATIONS	
1 Purpose	Regulate outdoor lighting to reduce LP which causes detrimental effect on the environment, astronomical research, enjoyment of night sky or causes glare or unnecessary illumination of adjacent property.	
2		
3		
4		
5 Astronomy Zones		
6		
7 Light Fixture	All outdoor electrical illuminating devices above 4050 lumens.	
8		
9		
10		
11		
12 Shielding	Method of construction which causes light emitted to be projected below an imaginary horizontal plane passing through the fixture.	
13		
14		
15		
16 Light Trespass	The illumination of adjacent premises by spill light shall not exceed 0.02 fc, horizontal or vertical feet inside adjacent property.	
17		
18		
19		
20 Street Lights		
21 Meet IES	Yes	
22 Cutoff	Yes	
23 Lamp	LPS	
24		
25		
26 Illuminance	Use minimum amount of light to meet the lighting criteria.	
27 Regulated		
28		
29		
30 Uses: Parking	LPS, shielded	
31		
32 Auto/Sales	Shielded, minimum amount of light necessary, off at 11 PM.	
33		
34 Arch/Deco	Shielded, where feasible, off at 11 PM.	
35		
36 Sports	Shielded, where feasible, off at 11 PM or conclusion.	
37		
38 Promotional	Off at 11 PM.	
39		
40 Signs: External	On premises, off at 11 PM or closing. Off premises, off at 12 PM.	
41		
42		
43 Internal	Same	
44		
45		
46 Timers Required	Yes	
47 Residential		
48		
49 Submit evidence of	Yes	
50 Compliance		
51 Other Comments		
52		
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LOCATION	COUNTY OF SAN DIEGO, CA ORDINANCE
1 Purpose	Restrict outdoor light fixtures emitting undesirable light rays into night sky, which have a detrimental effect on astronomy.
5 Astronomy Zones	Zone A - 15 mile radius Palomar observatory " B - Beyond A, inside county.
7 Light Fixture	All outdoor electric illuminating devices except incandescent of 150 watt or less per fixture, or fluorescent of 20 watt or less per fixture.
12 Shielding	FULLY SHIELDED - Light rays projected below the horizontal plane of lowest point. PARTIALLY SHIELDED Shield is at or below center of lamp so as to minimize light emissions above horizontal plane.
16 Light Trespass	
20 Street Lights	
Meet IES	
Cutoff	Full or part
Lamp	LPS
26 Illuminance	
Regulated	
30 Uses: Parking	LPS only, full or part shield.
Auto/Sales	Other than LPS, full shield. Off at 11 PM.
Arch/Deco	Other than LPS, full shield. Off at 11 PM.
Sports	Full shield, off at 11 PM or conclusion.
Promotional	Searchlights, off at 11 PM.
40 Signs: External	Billboard, off at 12 midnight.
	Other off premises, off at 11 PM
	On Premises, off at 11 PM or closing.
Internal	Off at 11 PM, or closing (on premises).
46 Timers Required	Yes
47 Residential	
49 Submit evidence of Yes	
50 Compliance	
51 Other Comments	Shielding of externally illuminated signs, not clear.

LOCATION	CITY OF VISTA, CA DRAFT OF ORDINANCE
1 Purpose	Reduce consumption of electric energy. Restrict lighting that generates excessive glare. Minimize LP of night sky and illumination of adjacent properties in a manner detrimental to public health, safety and welfare.
5 Astronomy Zones	
7 Light Fixture	
12 Shielding	Shielding - light projected below imaginary horizontal plane passing through lowest point of luminaire.
16 Light Trespass	
20 Street Lights	
21 Meet IES	
22 Cutoff	Yes
23 Lamp	LPS
26 Illuminance	
27 Regulated	Be limited to amount of light necessary for designated purpose using minimum amount of light
30 Uses: Parking	LPS only, shielded. On when in use, otherwise off at 11 PM.
32 Auto/Sales	Shielded, off at 11 PM.
34 Arch/Deco	Fully shielded & directed towards earths surface.
36 Sports	Shielded, off at 11 PM or conclusion.
38 Promotional	
40 Signs: External	Fully shielded & directed towards earths surface.
43 Internal	
46 Timers Required	Yes
47 Residential	
49 Submit evidence of	
50 Compliance	
51 Other Comments	Yes

## LOCATION

CITY OF BOULDER, CO  
DRAFT OF OUTDOOR LIGHT ORDINANCE

1	Purpose	Outdoor illuminance
2		
3		
4		
5	Astronomy Zones	
6		
7	Light Fixture	All exterior luminaires except 100 watt
8		incandescent or equivalent not exceeding 2000
9		lumens.
10		All exterior luminaires shall be IES cutoff type.
11		
12	Shielding	
13		
14		
15		
16	Light Trespass	No outdoor illumination can produce glare that
17		could interfere with the safe movement of motor
18		vehicles on public thoroughfares, nor can the light
19		source be visible at the property line.
20	Street Lights	
21	Meet IES	
22	Cutoff	Yes
23	Lamp	
24		
25		
26	Illuminance	Maximum illumination listed in appendix H outdoor
27	Regulated	illuminance values (IES, but not furnished).
28		
29		
30	Uses: Parking	Cutoff. Reduce to 1 fc after closing.
31		
32	Auto/Sales	Cutoff. After 10 PM or closing, max average of 5 fc within 20 feet of building or loading docks, the rest of building 1 fc.
33	Arch/Deco	
34		
35		
36	Sports	Cutoff type, off at 10 PM or conclusion.
37		
38	Promotional	No search lights, blinking, flashing lights.
39		
40	Signs: External	Illuminate from above sign.
41		
42		
43	Internal	
44		
45		
46	Timers Required	
47	Residential	
48		
49	Submit evidence of	
50	Compliance	
51	Other Comments	
52		
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LOCATION	ASPEN, CO BUILDING CODE - EXTERIOR LIGHTING
1 Purpose	Exterior lighting regulations
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	
8	
9	
10	
11	
12 Shielding	Light shall be baffled to provide specific directional control toward a surface.
13	
14	
15	
16 Light Trespass	
17	
18	
19	
20 Street Lights	Primary vehicular intersections, light intensities 0.5 to 1.0 fc (see above shielding) 20 to 25 feet high.
21	
22	
23	
24	
25	
26 Illuminance	High activity pedestrian zones, 20 feet high, 1.0 to 2.0 fc.
27 Regulated	Secondary pedestrian zones & vehicular access drive- ways may be lit with bollard type lighting to 4 feet, light intensity of 0.1 to 0.5 fc.
28	
29	
30 Uses: Parking	Overhead 12 to 15 feet, light intensities of 0.1 to 0.5 fc.
31	
32	
33	
34 Arch/Deco	
35	
36	
37 Sports	
38	
39 Promotional	
40	
41 Signs: External	Meet Pitkin County sign code.
42	
43	
44 Internal	
45	
46 Timers Required	
47 Residential	
48	
49 Submit evidence of Yes	
50 Compliance	
51 Other Comments	Very limited, difficult to understand.
52	
53	
54	
55	

LOCATION	GREENWICH, CT LIGHTING ORDINANCE
1 Purpose	Reduce to reasonable limits, trespass of artificial lighting except street lighting.
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	All luminaires
8	
9	
10	
11	
12 Shielding	Exterior lights designed so that filaments, light sources or lenses are shielded with opaque material and not be visible at property lines except as follows: 1. Adjacent to business, light source
13	
14	
15	
16 Light Trespass	not be visible greater than 5 feet above ground. 2. Adjacent to residential, light source shall not be visible at ground level or above. 3. Unshielded may be used if not objectional because of distribution characteristics (sports or directed at body of water)
17	
18	
19	
20	
21	
22	
23	When all interior, exterior & sign lighting is fully lighted, intensity shall not exceed 0.3 fc at any point along property line unless shielded by opaque fencing. Interior lighting that exceeds this standard may be reduced by curtains, drapes, blinds, louvers, shields or other device in a fixed position at all times.
24	
25	
26 Illuminance	
27 Regulated	
28	
29	
30 Uses: Parking	Shielded & meet trespass requirements.
31	
32 Auto/Sales	
33	
34 Arch/Deco	Any type of lighting directed upward at such that neither buildings, trees or site surface is lighted, is prohibited in all zones.
35	
36 Sports	Some unshielded is not objectionable.
37	
38 Promotional Search lights, etc., prohibited.	
39	
40 Signs: External	
41	
42	
43 Internal	
44	
45	
46 Timers Required	
47 Residential	
48	
49 Submit evidence of Yes	
50 Compliance	
51 Other Comments	
52	
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LOCATION	STATE OF MAINE ACT TO IMPROVE OUTDOOR LIGHTING
1 Purpose	An Act to improve outdoor lighting for State funded outdoor lighting.
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	Assembly that holds lamp, housing, mounting bracket ballast, reflector and a refractor lens with rated output greater than 1800 lumens.
8	
9	
10	
11	
12 Shielding	FULL CUTOFF - Luminaire that allows no direct light emissions above horizontal plane through lower light emitting part.
13	
14	
15	
16 Light Trespass	Ensure that consideration is given to minimizing glare and light trespass.
17	
18	
19	
20 Street Lights	(All State roadway lighting)
21 Meet IES	
22 Cutoff	Yes
23 Lamp	
24	
25	
26 Illuminance	Maximum illuminance can not exceed minimum
27 Regulated	illuminance recommended by IES or Federal
28	
29	
30 Uses: Parking	
31	
32 <del>Auto/Sales</del>	
33	
34 Arch/Deco	
35	
36 Sports	
37	
38 <del>Promotional</del>	
39	
40 Signs: External	
41	
42	
43 Internal	
44	
45	
46 Timers Required	
47 Residential	
48	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
52	
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LOCATION	TOWN OF KENNEBUNKPORT, ME OUTDOOR LIGHTING ORDINANCE
1 Purpose	Reduce problem created by improperly designed or installed outdoor lighting. Eliminate glare, minimize light trespass, help reduce energy and maintain & compliment the Towns character.
5 Astronomy Zones	
7 Light Fixture	Luminaire with lamps of more than 1800 lumens and flood or spot light fixtures with lamps of more than 900 lumens.
12 Shielding	Luminaire shall not emit any direct light above a horizontal plane through lowest direct light emitting part.
16 Light Trespass	
20 Street Lights	
21 Meet IES	No
22 Cutoff	yes, Radial wave/Admirals hat type
23 Lamp	Arterial roads 100 watt HPS, local roads 50 watt HPS. 25 feet high
26 Illuminance	
27 Regulated	
30 Uses: Parking	Max height 25 feet.
32 Auto/Sales	
34 Arch/Deco	
36 Sports	
38 Promotional	
40 Signs: External	
43 Internal	
46 Timers Required	
47 Residential	
49 Submit evidence of	
50 Compliance	Yes
51 Other Comments	50 watt white sodium type lamp, 1800 lumens, instead of 50 watt HPS, will be used in future for street lights.

LOCATION	CITY OF PORTLAND, ME EXTERIOR LIGHTING CODE
1 Purpose	Exterior lighting code amendment
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	
8	
9	All exterior lighting except incandescent lamps
10	other than floods or spots of 75 watts or less or
11	fluorescent lamps of 13 watts or less shall be
12 Shielding	shielded so that no direct light from the lamp is
13	visible beyond lot boundaries above a height of 4
14	feet.
15	
16 Light Trespass	
17	
18	
19	
20 Street Lights	
21 Meet IES	
22 Cutoff	
23 - Lamp	
24	
25	
26 Illuminance	
27 Regulated	
28	
29	
30 Uses: Parking	
31	
32 Auto/Sales	
33	
34 Arch/Deco	
35	
36 Sports	
37	
38 Promotional	
39	
40 Signs: External	
41	
42	
43 Internal	
44	
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46 Timers Required	
47 Residential	
48	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
52	
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LOCATION	GARDNER, ME STANDARDS
1 Purpose	Establish design criteria for all commercial, industrial & other non-residential uses to incorporate with Gardners characteristics as both an urban riverfront & rural community.
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	
8	
9	
10	
11	
12 Shielding	
13	
14	
15	
16 Light Trespass	No lighting shall be permitted to produce a strong dazzling light or reflection beyond lot lines onto neighboring properties. Light level at lot lines shall not exceed 0.2 fc measured at ground level.
17	
18	
19	
20 Street Lights	
21 Meet IES	
22 Cutoff	Max height 15 feet
23 Lamp	
24	
25	
26 Illuminance	
27 Regulated	
28	
29	
30 Uses: Parking	Max height 15 feet
31	
32 Auto/Sales	
33	
34 Arch/Deco	
35	
36 Sports	
37	
38 Promotional	
39	
40 Signs: External	
41	
42	
43 Internal	
44	
45	
46 Timers Required	
47 Residential	
48	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
52	
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LOCATION	LINCOLN, NE ORDINANCE DRAFT # 2
1 Purpose	Control nuisance (trespass) light on properties and or glare light emanating from off-roadway light sources impacting the functioning of human vision.
5 Astronomy Zones	
7 Light Fixture	
12 Shielding	
16 Light Trespass	1. Glare determinants: utilizing a one degree luminance foot-lambert meter calculate source brightness to background brightness & ambient light effect per ordinance formula. 2. Footcandle levels shall not exceed 0.3 horizontal or 0.7 vertical, measured at grade along property line.
20 Street Lights	
21 Meet IES	No (70% of IES recommendations on arterial.
22 Cutoff	Cutoff on arterial roads only.
23 Lamp	HPS
24	Arterial, continuous. Local, at intersections and mid street. Drop-down globe cobra heads
26 Illuminance	
27 Regulated	
30 Uses: Parking	
32 Auto/Sales	
34 Arch/Deco	
36 Sports	
38 Promotional	
40 Signs: External	
43 Internal	
46 Timers Required.	
47 Residential	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
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LOCATION	BOROUGH OF EATONTOWN, NJ OUTDOOR LIGHTING ORDINANCE
1 Purpose	Prevent misdirected or excessive artificial light, caused by inappropriate or misaligned light fixtures that produce glare, light trespass & or unnecessary sky glow, to discourage waste of electricity & to
5 Astronomy Zones	improve or maintain nighttime public safety, utility & security.
7 Light Fixture	Electric powered illuminating device of more than 1800 lumens.
12 Shielding	Cutoff optics that allows no direct light emissions above a vertical cutoff angle of 90° for street lights & 80° for all other lights, through the light fixtures lowest light emitting part.
16 Light Trespass	All light fixtures except street lights & 1 & 2 family dwellings shall be designed, installed & maintained to prevent light trespass. A. At property line, illuminance shall not exceed 0.1 fc for residential & 0.5 fc for business. B. Light fixtures shall be directed so that will be no direct light emissions offensively visible above 5 feet at property line.
21 Meet IES	Use IES recommendations as a guide.
22 Cutoff	Yes
23 Lamp	HPS
26 Illuminance	Street lights - Do not exceed IES.
27 Regulated	Parking lots - Mid & high activity, do not exceed IES average (must meet IES minimums). All other, do not exceed IES recommendations.
30 Uses: Parking	Cutoff. HPS or LPS
32 Auto/Sales	Cutoff
34 Arch/Deco	Cutoff, where feasible, or other direction control.
36 Sports	Cutoff, where feasible, or other direction control.
38 Promotional	Not to exceed 1 week from opening establishment.
40 Signs: External	Illuminate from above.
43 Internal	Not in ordinance, but policy to encourage darker background than lettering.
46 Timers Required	Yes
47 Residential	
49 Submit evidence of	Yes, including computer grid showing 10 foot
50 Compliance	illuminance readings. Average also required.
51 Other Comments	Ordinance requires outdoor lighting not necessary for security purposes shall be reduced, activated by motion sensors or turned off during non operating hours. (illuminated signs excluded)

LOCATION	TOWN OF PITTSFORD, NY BUILDING CODE
1 Purpose	Regulations applicable to illuminated awnings, signs recreational used, chuches and agriculture.
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	
8	
9	
10	
11	
12 Shielding	Lighting shall be guarded, shielded & required not project, disperse or display light in boundary lines of premises.
13	
14	
15	
16 Light Trespass	Outdoor light shall be designed to prevent glare or direct light onto adjacent property.
17	
18	
19	
20 Street Lights	
21 Meet IES	
22 Cutoff	
23 Lamp	
24	
25	
26 Illuminance	Signs in accord with IES recommendations.
27 Regulated	
28	
29	
30 Uses: Parking	
31	
32 Auto/Sales	
33	
34 Arch/Deco	
35	
36 Sports	500 feet from boundary of premises. Off at 10 PM.
37	
38 Promotional	No flashing, intermittent or interrupted type.
39	
40 Signs: External	Off at 11 PM (except enter & exit signs). Includes illuminated awnings.
41	
42	
43 Internal	
44	
45	
46 Timers Required	
47 Residential	
48	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
52	
53	
54	Except for security lighting or occasional special event lighting, off at 11 PM.
55	

LOCATION	DESCHUTES COUNTY, OR ORDINANCE
1 Purpose	Affirm the right to illuminate residential, commercial & public areas with light fixtures appropriate in a way that preserves rural and urban vistas & be confined to the property generated from.
5 Astronomy Zones	Also, the right to have well lighted roadways that cannot be confined to property generated from.
7 Light Fixture	All artificial illuminating devices above 1800 lumens.
12 Shielding	FULLY SHIELDED - means that light rays emitted by the fixture are projected below the horizontal plane. PARTIALLY SHIELDED - means at or below center line of light source or lamp to limit light emission above the horizontal plane to 10 % or less.
16 Light Trespass	DIRECTED SHIELDING - means shielding by design external application that directs light downward. limits direct line-of-light of a fixture's lamp the property upon which the fixture is installed.
20 Street Lights	
21 Meet IES	Arterial, yes. Local roads at intersections only.
22 Cutoff	Arterial roads, only.
23 Lamp	HPS, mostly
26 Illuminance	
27 Regulated	Historic areas, encourage minimum light for public safety.
30 Uses:	
Parking	All HPS/MH of 35 watts or greater must have directed shield.
Auto/Sales	Same
Arch/Deco	Same. Lighting of flags, top mounted only.
Sports	Same.
Promotional	Lasers above horizontal prohibited. Search lights after 11 PM prohibited.
40 Signs:	
External	Top mounted, shielded. Bottom mounted confined to area within 4 inches of outermost surface of sign.
Internal	
46 Timers Required	
47 Residential	Residential does not appear to be excluded.
49 Submit evidence of	
50 Compliance	
51 Other Comments	Recreation light fixtures conforming to code may operate at any time, otherwise off at 11 PM or conclusion.

LOCATION	CITY OF MADISON, WI PROPOSED LIGHTING ORDINANCE
1 Purpose	Encourage lighting practices & systems which will conserve energy while increasing night time safety, utility, security, productivity & prevent light trespass.
5 Astronomy Zones	
7 Light Fixture	Electrically powered illuminating device for all outdoor lighting uses except street lighting.
12 Shielding	Light source is concealed by fixture housing when the position of the observation is at less than above horizontal. No light is permitted at less than 4° above horizontal.
16 Light Trespass	Stray/spill light flowing onto adjacent property, which causes loss of enjoyment, comfort or repose of occupants, creating a nuisance. Offending light to be measured any point 10 feet inside adjacent lot line, not to exceed 0.5 fc, 4 feet above ground. Minimize spill light and glare into adjacent properties
20 Street Lights	
21 Meet IES	
22 Cutoff	
23 - Lamp	
26 Illuminance	Comply with IES parking lot illuminance recommendations. Also limits illuminance for outdoor merchandise uses.
27 Regulated	
30 Uses: Parking	If operating past 11 PM, use HPS or MH lamps. Extinguish or reduce 50%, 30 minutes after
32 Auto/Sales	
34 Arch/Deco	
36 Sports	
38 Promotional Off at 11 PM	
40 Signs: External	
43 Internal	
46 Timers Required	
47 Residential	
49 Submit evidence of	Yes, including plot plan, showing isolux curve or computer printout projecting illuminance levels
50 Compliance	
51 Other Comments	including adjacent properties (verification of any light trespass).

LOCATION	CITY OF MILWAUKEE, WI ORDINANCE
1 Purpose	Ordinance relating to nuisance lighting on residential properties causing loss of enjoyment, comfort or repose & use of such properties.
5 Astronomy Zones	
7 Light Fixture	Light source - a device (such as a lamp) which provides visible energy.
12 Shielding	(No detailed reference to shielding)
16 Light Trespass	Nuisance determined: 1. When spill light produces 0.2 Hfc or more at 4 feet from ground/floor of nearest habitable area 2. When light source has not been properly shielded, directed or controlled & there is a line of sight between the light source and area of such intensities as to cause discomfort or annoyance.
20 Street Lights	
21 Meet IES	
22 Cutoff 23 Lamp	
26 Illuminance 27 Regulated	
30 Uses: Parking	
32 Auto/Sales	
34 Arch/Deco	All subject to nuisance determinents.
36 Sports	
38 Promotional	Same for revolving/flashing lights operating between 6 PM & 7 AM.
40 Signs: External	
43 Internal	
46 Timers Required	
47 Residential	Light sources emitted from residential property are not excluded.
49 Submit evidence of	
50 Compliance	
51 Other Comments	Exemptions: 1. Lighting from public ways or areas for public benefit & there is no practical way to control or eliminate problem. 2. When there is no written complaint from a person directly affected by such lighting.

LOCATION	VILLAGE OF WILLIAMS BAY, WI ORDINANCE
1 Purpose	To aid Yerkes Observatory in its research to study & the furtherance of such public purpose.
5 Astronomy Zones	
7 Light Fixture	Shall include all types of lights designed to illuminate any object or area & shall include advertising signs, excluding private residential property with not more than 150 watt, incandescent lamp per individual light.
12 Shielding	Outdoor lighting shall be shielded that light flux at any point in the horizontal plane through the center of the light source or at any point above it shall not exceed 5% of the flux measured below the
16 Light Trespass	lamp.
20 Street Lights	
21 Meet IES	
22 Cutoff	Yes
23 Lamp	HPS not greater than 16,000 lumens per fixture.
26 Illuminance	
27 Regulated	
30 Uses: Parking	Shall be shielded
32 Auto/Sales	Shall be shielded
34 Arch/Deco	Not subject to shielding requirements if turned at midnight.
36 Sports	
38 Promotional Search lights prohibited.	
40 Signs: External	
43 Internal	Exempt from ordinance.
46 Timers Required	
47 Residential	
49 Submit evidence of	
50 Compliance	
51 Other Comments	
52	
53	
54	
55	

LOCATION	BROOKFIELD, WI ORDINANCE
1 Purpose	Regulate off-street parking illumination only.
2	
3	
4	
5 Astronomy Zones	
6	
7 Light Fixture	
8	
9	
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11	
12 Shielding	No more than one half of each fixtures maximum luminous intensity is allowed outside of exterior limits of the parking unless the illuminance is less than 0.5 fc. The total illumination level at exterior limits from all lighting shall not exceed 1 fc. HID fixtures mounted on building walls & canopies shall be shielded so that refracted light is not visible from a horizontal plane to neighboring residents & streets.
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16 Light Trespass	
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20 Street Lights	
21 Meet IES	
22 Cutoff	
23 - Lamp	
24	
25	
26 Illuminance	
27 Regulated	
28	
29	
30 Uses: Parking	Pole height shall not exceed roofline of building or 20 feet, whichever is less.
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35 Auto/Sales	
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41 Signs: External	
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46 Timers Required	
47 Residential	
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49 Submit evidence of	
50 Compliance	
51 Other Comments	Very limited, and difficult to understand.
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