LEED ND: Built Project | v3 - LEED 2009

Light pollution reduction

GIBc17 | Possible 1 point

Glossary

Intent

To minimize light trespass from project sites, reduce sky-glow to increase night sky access, improve nighttime visibility through glare reduction, and reduce adverse effects on wildlife environments.

Requirements

“Shared areas” of a project are spaces and facilities dedicated to common use (publicly or privately owned).

In residential areas, at least 50% of the external luminaires must have fixture-integrated lighting controls that use motion sensors to reduce light levels by at least 50% when no activity has been detected for 15 minutes.

AND

In all shared areas, install automatic controls that turn off exterior lighting when sufficient daylight is available and when the lighting is not required during nighttime hours; these lights must meet the total exterior lighting power allowance requirements in Table 3.

AND

Document which lighting zone or zones (Table 1) describe the project, and for all shared areas, follow the requirements in Table 2. If two or more different zones border the project, use the most stringent uplight requirements, and use light trespass requirements for the adjacent zone. Roadway lighting that is part of the project must meet the requirements for the appropriate zone.

For illuminance generated from a single luminaire placed at the intersection of a private vehicular driveway and public roadway accessing the site, project teams may use the centerline of the public roadway as the site boundary for a length of two times the driveway width centered at the centerline of the driveway when complying with the trespass requirements.

Compliance with the light trespass requirements may alternatively be met by using only luminaires that comply with Table 4 ratings for backlight and glare.

AND

Stipulate covenants, conditions, and restrictions (CC&R) or other binding documents to require continued adherence to the requirements.

Table 1. Lighting zones

Zone	Definition
LZ0	Undeveloped areas within national parks, state parks, forest land and rural areas and sites immediately adjacent to areas officially recognized as ecologically sensitive by the local zoning authority.
LZ1	Developed areas within national parks, state parks, forest land and rural areas.
LZ2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use, and residential mixed-use areas.
LZ3	All other areas not included in LZ0, LZ1, LZ2, or LZ4 (including commercial-industrial and high-density residential).
LZ4	High-activity commercial districts in major metropolitan areas (as designated by local jurisdiction, such as local zoning authority).

Table 2. Allowable light trespass and uplight, by lighting zone

Lighting zone	Maximum horizontal and vertical illuminance (fc) at site boundary	Maximum horizontal and vertical illuminance (fc) at specified distance beyond site boundary	Maximum horizontal and vertical illuminance (lux) at specified distance beyond site boundary	Maximum percentage of fixture lumens emitted above 90º or higher from nadir (straight down)
LZ0	0	0 at 0 ft.	0 at 0 mm	0%
LZ1	0.01	.01 at 0 ft.	.01 at 3 mm	0%
LZ2*	0.10	.02 at 10 ft.	.2 at 3 m	1%
LZ3*	0.20	.05 at 15 ft.	.5 at 4.5 m	2%
LZ4*	0.60	.05 at 15 ft.	.5 at 4.5 m	5%

fc = footcandle.
* In LZ2, LZ3, and LZ4, for project boundaries that abut public rights-of-way, light trespass requirements may be met relative to the curb line instead of the project boundary.

Table 3. Allowable lighting power densities, by lighting zone

	Lighting zone			

	LZ0	LZ1	LZ2	LZ3	LZ4
All exterior improved areas (except those listed below)	0.04 W/sf (0.43 w/sq. m)	0.04 W/sf (0.43 w/sq. m)	0.06 W/sf (0.64 w/sq. m)	0.10 W/sf (1.07 w/sq.m)	0.13 W/sf (1.39 w/sq. m)
Walkways	0.7 W/lf (2.3 W/m)	0.7 W/lf (2.3 W/m)	0.7 W/lf (2.3 W/m)	0.8 W/lf (2.6 W/m)	1.0 W/lf (3.2 W/m)
Landscaping	No allowance	0.04 W/sf (0.43 W/sq.m)	0.05 W/sf (0.53 W/sq.m)	0.05 W/sf (0.53 W/sq.m)	0.05 W/sf (0.53 W/sq.m)
Entrance door (per linear foot of doorway)	20W/lf (66 W/m)	20W/lf (66 W/m)	20W/lf (66 W/m)	30W/lf (100 W/m)	30W/lf (100 W/m)
Entry canopy	0.25 W/sf (2.7 W/sq.m)	0.25 W/sf (2.7 W/sq.m)	0.25 W/sf (2.7 W/sq.m)	0.40 W/sf (4.3 W/sq.m)	0.40 W/sf (4.3 W/sq.m)
Illuminated building façade	No allowance	No allowance	2.5W/lf (8.2 W/m)	3.75W/lf (12.3 W/m)	5.0W/lf (16.4 W/m)

sf = square feet; lf = linear feet; sq.m = square meters.
Note: The total exterior lighting power density allowance for all shared exterior applications is the sum of the specified allowances for individual illuminated areas. The following lighting is exempted when its controls meet the above requirements and are independent of the controls for nonexempt lighting:
a. Specialized signal, directional, and marker lighting associated with transportation.
b. Advertising and directional signage.
c. Lighting integral to equipment or instrumentation and installed by its manufacturer.
d. Lighting for theatrical purposes, including performance, stage, film, and video.
e. Lighting for athletic playing fields.
f. Temporary lighting (installed for no more than 30 days and then removed for at least 30 days).
g. Lighting for industrial production, material handling, transportation sites, and associated storage areas.
h. Theme elements in theme or amusement parks.
i. Lighting to highlight features of public monuments and registered historic buildings or landmark structures.

Alternative method for meeting light trespass requirements in Table 2

A luminaire may be used if it is rated as follows according to the lighting zone of the site. If the luminaire is installed in other than the intended manner, the rating must account for the actual photometric geometry. An exception applies if at least 98% of a luminaire's emitted lumens are intercepted by man-made structures within the project. In either case, luminaires equipped with adjustable mounting devices permitting alteration of luminaire aiming in the field are not permitted.

Table 4. Allowable backlight and glare, by lighting zone

	Lighting zone				
Backlight luminaire rating	LZ0	LZ1	LZ2	LZ3	LZ4
> 2 mounting heights from property line	B0	B1	B2	B3	B4
1 to 2 mounting heights from property line and properly oriented*	B0	B1	B2	B3	B3
0.5 to 1 mounting height to property line and properly oriented*	B0	B0	B1	B2	B2
< 0.5 mounting height to property line adjacent to street and properly oriented*	B0	B0	B1	B2	B2
< 0.5 mounting height to property line and properly oriented*	B0	B0	B0	B1	B2
Glare luminaire rating	G0	G1	G2	G3	G4

* The luminaire must be mounted with backlight toward the property line.
Note: Backlight and glare ratings are defined based on specific lumen limits for IESNA TM-15-07 solid angles, Addendum A.

[1]The requirement to use ASHRAE Addenda is unique to this credit and does not obligate Project teams to use ASHRAE approved addenda for other credits.

[2] To be LZ4, the area must be so designated by an organizations with local jurisdiction, such as the local zoning authority.