

Table of Contents

Table of Contents	1
6. Outdoor Lighting	1
6.1 Changes in the 2016 Standards.....	1
6.1.1 Summary of Changes in the 2016 Standards.....	1
6.1.2 Prescriptive Changes.....	2
6.1.3 Additions and Alterations Changes	2
6.2 Overview.....	35
6.2.1 History and Background	46
6.2.2 Scope and Application	57
6.3 Mandatory Measures	810
6.3.1 Luminaire Cutoff Requirements	911
6.3.2 Controls for Outdoor Lighting.....	1720
6.3.3 Requirements for Lighting Control Functionality.....	2126
6.4 Prescriptive Measures	2532
6.4.1 Lighting Zones	2532
6.4.2 How to Determine the Lighting Zone for an Outdoor Lighting Project.....	2736
6.4.3 Examples for Defining Physical Boundaries.....	2837
6.4.4 Lighting Zone Adjustments by Local Jurisdictions.....	3039
6.4.5 Outdoor Lighting Power Compliance	3140
6.4.6 General Hardscape Lighting Power Allowance	3241
6.4.7 Additional Light Power Allowance by Applications	4251
6.4.8 Further Discussion about Additional Lighting Power Allowance for Specific Applications	4567
1.5 Alterations and Additions for Outdoor Lighting	5881
1.5.1 Outdoor Lighting Additions and Alterations – Mandatory and Lighting Power Density Requirements	Error! Bookmark not defined.82
1.5.2 Outdoor Lighting Alterations – Adding Outdoor Lighting to Existing Sites	Error! Bookmark not defined.85
6.6 Outdoor Lighting Compliance Documents.....	5988
6.6.1 Overview	5988
6.6.2 Compliance Documentation and Numbering Scheme.....	6089
6.6.3 Certificate of Installation Documents.....	71401
6.6.4 Certificate of Acceptance	72102

6. Outdoor Lighting	1
6.1 Summary of Changes in 2013 Standards.....	1
6.1.1 Mandatory Changes	1
6.1.2 Prescriptive Changes.....	21
6.1.3 Additions and Alterations Changes	2
Addition/Alteration.....	32
Compliance.....	32
6.2 Overview.....	32
6.2.1 History and Background	43
6.2.2 Scope and Application	54
6.3 Mandatory Measures	87
6.3.1 Minimum Luminaire Control.....	87
6.3.2 Luminaire Cutoff Zonal Lumen Limits	97
6.3.3 Controls for Outdoor Lighting.....	1813
6.3.4 Requirements for Lighting Control Functionality.....	2416
6.4 Prescriptive Measures	2818
6.4.1 Lighting Zones.....	2818
6.4.2 How to Determine the Lighting Zone for an Outdoor Lighting Project.....	3220
6.4.3 Examples for Defining Physical Boundaries.....	3321
6.4.4 Lighting Zone Adjustments by Local Jurisdictions.....	3522
6.4.5 Outdoor Lighting Power Compliance	3623
6.4.6 General Hardscape Lighting Power Allowance	3724
6.4.7 Additional Light Power Allowance by Applications	4430
6.4.8 Further Discussion about Additional Lighting Power Allowance for Specific Applications.....	5032
6.5 Alterations and Additions for Outdoor Lighting	6345
6.5.1 Outdoor Lighting Additions and Alterations — Mandatory and Lighting Power Density Requirements	6446
6.5.2 Outdoor Lighting Alterations — Adding Outdoor Lighting to Existing Sites	6648
6.6 Outdoor Lighting Compliance Documents.....	7051
6.6.1 Overview	7051
6.6.2 Submitting Compliance Documentation	7051
6.6.3 Varying Number of Rows per Document.....	7051
6.6.4 Compliance Documentation Numbering.....	7051
6.6.5 Certificate of Compliance Documents.....	7152
6.6.6 Instructions for Completing Certificates of Compliance.....	7152

6.6.7	Certificate of Installation Documents.....	<u>8263</u>
6.6.8	Instructions for Completing Certificates of Installation.....	<u>8363</u>
6.6.9	Certificate of Acceptance.....	<u>8364</u>

4.6. Outdoor Lighting

This chapter covers the Title 24 California Code of Regulations, Part 6 (the Energy Standards), requirements for nonresidential outdoor lighting design and installation, including controls. This ~~section~~ chapter applies to all outdoor lighting, whether attached to buildings, poles, structures or self-supporting; including but not limited to hardscape areas including parking lots, lighting for building entrances, sales and non-sales canopies; lighting for all outdoor sales areas; and lighting for building facades. It is addressed primarily to lighting designers, electrical engineers, and enforcement agency personnel responsible for lighting.

~~It is addressed primarily to lighting designers or electrical engineers and to enforcement agency personnel responsible for lighting and electrical plan checking and inspection. Chapter 5 addresses nonresidential indoor lighting applications requirements.~~

~~and Chapter 7 addresses sign lighting applications requirements.~~

6.1 Summary of Changes in 2013 Standards Overview

4.1.16.1.1 Significant Changes in the 2016 Energy Standards

- The values in Tables 140.7-A and 140.7-B of the Energy Standards have been modified to reflect the industry shift to LED lighting as the basis of design.
- Table 140.7-A and 140.7-B of the Energy Standards have an added column for Lighting Zone 0, which is the Lighting Zone designated specifically for undeveloped areas in parks and preserves, where no continuous lighting is intended.
- Table 1240.7-A has been modified to incorporate the new requirements of the recently revised Illuminating Energy Society of North America (IES) document RP-20-2014, Parking Lot Lighting Recommended Practice.
- ATM, tunnel, and bridge lighting are no longer listed as exemptions from the LPA calculations.
- The controls requirements have changed, expanding to include lighting in outdoor sales canopies and outdoor sales lots, which were previously exempted from occupancy-based dimming controls requirements.
- An increase of the maximum dimming permitted as part of an active motion-controlled lighting system from 80% to 90%

~~All luminaires rated for use with lamps greater than 150 watts shall comply with the uplight and glare maximum zonal lumen limits.~~

~~All outdoor lighting shall be controlled both by a photocontrol device and by an automatic scheduling control. This is a change from 2008, when only a photocontrol was required.~~

~~An astronomical time-switch control that automatically turns the lights off during daylight hours is allowed as an alternative to a photocontrol device. All outdoor lighting is required to be circuited and independently controlled from other electric loads.~~

~~Outdoor luminaires mounted less than 24 feet above the ground are required to have controls (motion sensors or other systems) that are capable of reducing the lighting power of each luminaire by at least 40 percent but not exceeding 80 percent. The luminaire must switch to its “on” state automatically when the space becomes occupied.~~

~~In addition to the photocontrol and automatic scheduling controls described above, outdoor sales frontage, outdoor sales lots, and outdoor sales canopy lighting, controls are required that offer part-night control or have motion sensing capability to automatically reduce the lighting power by at least 40 percent but not more than 80 percent, and ability to automatically turn the lighting to ‘occupied’ light level when the space becomes occupied.~~

~~For building façade, ornamental hardscape, and outdoor dining, the same additional controls are required as for outdoor sales areas (above), but a centralized time-based zone lighting control that reduces lighting power by at least 50 percent is allowed as an alternative.~~

1.4.26.1.2 Prescriptive Changes

The general hardscape power allowances have been updated for all Lighting Zones (LZ), including the new lighting zone (LZ0) 1, 3 and 4. The additional lighting power allowances for specific applications have been updated for bBuilding eEntrances and eExits, Vehicle Service Station Canopies, and Outdoor Dining ATM machine lighting and tTunnels are newly added to Table 140.7-B in the 2016 Standards update.

6.1.3 Additions and Alterations Changes

RESERVED. Revised language for this Section shall be released at a later date.

1.1.3 Additions and Alterations Changes

~~For alterations that do not increase connected lighting load, and in which 10 percent or more and less than 50 percent of the luminaires in a lighting application listed in Table 140.7-A or 140.7-B, only the altered luminaires are required to meet the applicable controls requirements of Sections 130.0, 130.2, and 130.4. The entire system is not required to meet Section 140.7, and LPD calculations are not required for the affected luminaires.~~

~~For alterations that replace more than 50 percent of the luminaires in a lighting application listed in Table 140.7-A or 140.7-B, all of the lighting in that application shall meet the applicable controls requirements of Sections 130.0, 130.2, 130.4, and 140.7.~~

~~Alterations that increase the connected lighting load in a lighting application listed in Table 140.7-A or 140.7-B require that the entire system in the application zone meet all the applicable requirements of Sections 130.0, 130.2, 130.4, and 140.7.~~

Table 6-1- Addition and Alteration Compliance

<u>Addition/Alteration</u>	<u>Compliance</u>
<p>If an addition or alteration of any number of luminaires increases the connected <u>lighting load</u>...</p>	<p>The <u>entire system</u> in the lighting application is required to meet requirements listed in Section 130.0, 130.2, 130.4, and 140.7 <u>added or altered luminaires shall meet the requirements of Section 130.2(c), and 140.7 for general hardscape lighting or specific lighting applications.</u></p>
<p>If an addition or alteration replaces between 10 and 50 percent of the luminaires in an application and the connected load does not increase....</p>	<p>Only the altered luminaires are required to meet the requirements listed in</p>
<p>If an addition or alteration replaces more than 50 percent of the luminaires in an application...</p>	<p>All of the lighting in that application is required to meet the requirements listed in Section 130.0, 130.2, 130.4, and 140.7.</p>
<p>1.1.4</p>	

1.26.2 Overview History and Scope

The ~~Outdoor Lighting Standards~~ outdoor lighting requirements within the Energy Standards conserve energy, reduce winter peak electric demand, and are both technically feasible and cost effective. They set minimum control requirements, maximum allowable power levels, minimum efficacy requirements, and cutoff (uplight and glare) zonal lumen limits for large luminaires.

The lighting power allowances are based on current Illuminating Engineering Society of North America (IES) recommendations for the quantity and design parameters of illumination, current industry practices, and efficient sources and equipment that are readily available. Data indicates that the IES recommendations provide more than adequate illumination, ~~because~~ based on a 2002 baseline survey of outdoor lighting

practice in California that showed that the majority of establishments are illuminated outdoor lighting illuminates at substantially lower levels than IES recommendations.¹

Outdoor lighting is addressed in this chapter. Lighting in unconditioned buildings (including parking garages) is addressed in Chapter 5.

The Standards The Energy Standards do not allow trade-offs between outdoor lighting power allowances and indoor lighting, sign lighting, HVAC, building envelope, or water heating [(§140.1 and 140.7(a))].

Lighting in unconditioned buildings (including parking garages) is addressed in Chapter 5.

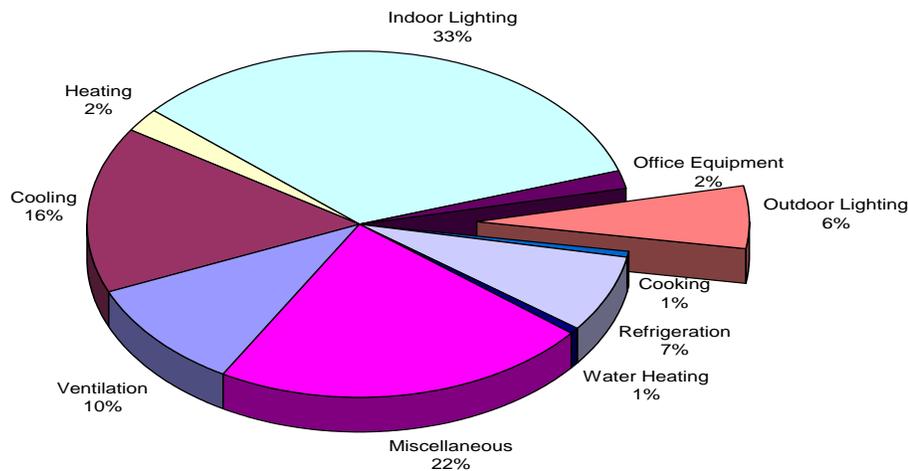


Figure 6-1 — Energy Consumption by End-Use

Source: California Commercial End Use Survey, March 2006

4.2.16.2.1 History and Background

In response to the 2000 electricity crisis, the legislature charged the Energy Commission to develop Outdoor Lighting Standards that are both technologically feasible and cost-effective. The intent of the legislature was that the Energy Standards would provide ongoing reliability to the electricity system and reduce energy consumption.

Regulations for lighting have been on the books in California since 1977, but have only addressed indoor lighting through control requirements and maximum allowable lighting power. In 2005 Standards the scope was expanded to include outdoor lighting applications as well as indoor applications in unconditioned buildings.

The 2013 Outdoor Lighting Standards evolved over a three-year period through an open, public process. The Energy Commission encouraged all interested persons to participate in a series of public hearings and workshops through which the Energy Commission

¹Integrated Energy Systems Productivity and Building Science, Outdoor Lighting Baseline Assessment, New Buildings Institute, August 12, 2002

~~gathered information and viewed presentations on energy efficiency possibilities from a variety of perspectives. The Energy Commission hired a consulting team that included a number of nationally recognized outdoor lighting experts to assist in the development of the Standards. The Energy Commission also solicited ideas, proposals, and comments from a number of interested parties.~~

~~The allowed lighting power densities for outdoor lighting are structured according to a “layered” approach. Outdoor lighting power densities are structured using a layered lighting approach. With the layered approach, the first layer of allowed lighting power is general hardscape for the entire site. After that layer of the allowed lighting power has been determined for this first layer, additional layers of lighting power are allowed for specific applications when they occur on the site. For example, the total allowed power for a sales lot with frontage is determined by layering the General Hardscape, Outdoor Ssales Lot and Outdoor Ssales Lot Ffrontage allowances, with certain specific restrictions associated with the location of the power used for frontage and sales lot lighting.~~

1.2.26.2.2 Scope and Application

~~The outdoor lighting applications that are addressed by the Standards~~The Energy Standards are shown in the first two columns of ~~Table 6-1Table 6-2Table 6-2~~. The first column is general site illumination applications, which allow trade-offs within the outdoor portion only. The second column is specific outdoor lighting applications, which do not allow trade-offs, and are considered “use it or lose it”. The lighting applications in the third column are not regulated. The Energy Standards include control requirements as well as limits on installed lighting power.

All section (§) and Table references in this Chapter refer to sections and Tables contained in Title 24 California Code of Regulations, Part 6, also known as the Energy Standards or California Energy Code.

A. Trade-offs

~~The Standards~~The Energy Standards do not allow trade-offs between outdoor lighting power allowances and indoor lighting, sign lighting, HVAC, building envelope, or water heating [(§140.7(a)].

There is only one type of trade-off permitted for outdoor lighting power. Allowed lighting power determined according to §140.7(d)-1 for general hardscape lighting may be traded to specific applications in §140.7(d)-2, provided the luminaires used to determine the illuminated area are installed as designed. This means that if luminaires used to determine the total illuminated area are removed from the design, resulting in a smaller illuminated area, then the general hardscape lighting power allowance must also be reduced accordingly.

Allowed lighting power for specific applications shall not be traded between specific applications, or to hardscape lighting in §140.7(d)-1. This means that for each and every specific application, the allowed lighting power is the smaller of the allowed power determined for that specific application according to §140.7(d)2, or the actual installed lighting power that is used in that specific application. These additional power allowances are “use it or lose it” allowances.

Table 6-12 – Scope of the Outdoor Lighting Requirements

Lighting Applications Covered		Lighting Applications Not Regulated (only as detailed in §140.7)
General Hardscape (trade-offs permitted)	Specific Applications (trade-offs not permitted)	
The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), <u>bridge(s)</u> , <u>tunnel(s)</u> and other improved area(s) that are illuminated.	Canopies: Sales and Non-sales Drive-Up Windows Emergency Vehicle Facilities <u>Building Entrances or Exits</u> <u>Building Facades</u> Guard Stations <u>Hardscape Ornamental Lighting</u> Outdoor Dining Primary Entrances for Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities <u>Outdoor Sales Frontage and Lots</u> Special Security Lighting for Retail Parking and Pedestrian Hardscape Student Pick-up/Drop-off zone Vehicle Service Station: Canopies, Hardscape, and Uncovered Fuel Dispenser <u>ATM Machine Lighting</u>	Temporary Required & regulated by FAA Required & regulated by the Coast Guard. For public streets, roadways, highways, and traffic signage lighting, and occurring in the public right-of-way For sports and athletic fields, and children’s playground For industrial sites For ATM required by law For public monuments Signs regulated by §130.3 and §140.8 For tunnels, bridges, stairs, wheelchair elevator lifts For ramps that are other than parking garage ramps Landscape lighting For themes and special effects <u>in theme parks</u> For <u>outdoor</u> theatrical and other outdoor live performances For qualified historic buildings
Other outdoor lighting applications that are not included in Standards Tables 140.7-A or 140.7-B are assumed to be not regulated by these Standards. This includes decorative gas lighting and emergency lighting powered by an emergency source as defined by the California Electrical Code. The text in the above list of lighting applications that are not regulated has been shortened for brevity. Please see Section 6.1.2 B below for details about lighting applications not regulated.		

B. Outdoor Lighting Applications Not Regulated by §140.7

When a luminaire is installed only to illuminate one or more of the following applications, the lighting power for that luminaire shall be exempt from §140.7(a). The Energy Standards clarify that at least 50 percent of the light from the luminaire must fall within an application to qualify as being installed for that application.

- Temporary outdoor lighting.
 Temporary Lighting is defined in §100.1 as a lighting installation with plug-in connections that does not persist beyond 60 consecutive days or more than 120 days per year.
- Lighting required and regulated by the Federal Aviation Administration and the Coast Guard.
- Lighting for public streets, roadways, highways, and traffic signage lighting, including lighting for driveway entrances occurring in the public right-of-way.
- Lighting for sports and athletic fields, and children’s playground.

- Lighting for industrial sites, including but not limited to, rail yards, maritime shipyards and docks, piers and marinas, chemical and petroleum processing plants, and aviation facilities.
- ~~Lighting specifically for Automated Teller Machines as required by California Financial Code Section 13040, or required by law through a local ordinance.~~
- Lighting of public monuments.
- Lighting of signs. Signs shall meet the requirements of §130.3 and 140.8.
- Lighting of tunnels, bridges, stairs, wheelchair elevator lifts for American with Disabilities Act (ADA) compliance, and ramps that are other than parking garage ramps.
- Landscape lighting.

Landscape lighting is defined in §100.1 as lighting that is recessed into or mounted on the ground, paving, or raised deck, which is mounted less than 42 inches above grade or mounted onto trees or trellises, and that is intended to be aimed only at landscape features. Lighting installed for a purpose other than landscape, such as walkway lighting, shall not be considered exempt landscape lighting if only incidental lighting from the walkway luminaires happens to spill onto the landscape.

- In theme parks: outdoor lighting only for themes and special effects. However, all non-theme lighting, such as area lighting for a parking lot, shall not be considered theme lighting, even if the area luminaires are mounted on the same poles as the theme lighting.
- Lighting for outdoor theatrical and other outdoor live performances, provided that these lighting systems are additions to area lighting systems and are controlled by a multi-scene or theatrical cross-fade control station accessible only to authorized operators.
- Outdoor lighting systems for qualified historic buildings, as defined in the California Historic Building Code (Title 24, Part 8), if they consist solely of historic lighting components or replicas of historic lighting components. If lighting systems for qualified historic buildings contain some historic lighting components or replicas of historic components, combined with other lighting components, only those historic or historic replica components are exempt. All other outdoor lighting systems for qualified historic buildings shall comply with §140.7.

1.36.3 Mandatory Measures

The mandatory features and devices must be included in all outdoor lighting projects when they are applicable. These features have been proven to be cost-effective over a wide range of outdoor lighting applications.

Mandatory measures for outdoor lighting and signs are specified in §110.9, §130.0, and §130.2. These are similar to the mandatory measures for indoor lighting. Even if the design has errors and has specified incorrect features and devices, the installer is responsible to meet all of the applicable requirements that he or she installs. The installer is also required to sign the appropriate Installation Certificate to verify correct installation.

1.3.16.3.1 ~~Minimum Luminaire Control~~ Outdoor Incandescent Lighting

~~§130.2(a)~~

All outdoor incandescent luminaires with ~~incandescent lamps~~ rated over 100 W must be controlled by a motion sensor. The ability or intent to use a lower wattage is not relevant to the labelled wattage of the luminaire, which is the ultimate determining factor.

Example 6-1 Motion Sensors for Incandescent Lamps

Question

I am installing outdoor luminaires with screw-based sockets and I intend to use 60W incandescent lamps. The luminaire has a label on it that indicates that the maximum rated wattage is 75 watts. Am I required to put these luminaires on motion sensors?

Answer

It depends on the maximum relamping rated wattage of the luminaires, not on the wattage of the lamps that are used for incandescent luminaires with screw-based sockets. If the maximum relamping rated wattage of a screw-based luminaire as listed on a permanent factory-installed label is less than or equal to 100 W, then motion sensors are not required. However, if the maximum relamping rated wattage of the luminaire, as listed on permanent factory-installed labels is more than 100 W, or if the luminaire is not labeled, then motion sensors are required. This luminaire is rated below 100 watts, and therefore is not required to be connected to a motion sensor.

Example 6-2 Motion Sensors for Incandescent Lamps

Question

I am installing outdoor luminaires with screw-based sockets and I intend to use 60W incandescent lamps. There are three lamps per luminaire, and the rated lamp wattage per socket is 75 watts. Am I required to put these luminaires on motion sensors?

Answer

For incandescent luminaires with screw-based sockets it depends on the maximum relamping rated wattage of the luminaires, not on the wattage of the lamps that are used. If the maximum combined relamping rated wattage of a screw-based luminaire as listed on a permanent factory-installed label is less than or equal to 100 W, then motion sensors are not required. However, this luminaire has three lamps rated for a combined wattage of 225 watts, therefore motion sensors are required.

1.3.26.3.2 Luminaire Cutoff Zonal Lumen Limits Requirements

§130.2(b)

All outdoor luminaires rated for use with lamps greater than 150 lamp watts must comply with Backlight, Uplight, and Glare (collectively referred to as "BUG") requirements as follows:

1. There are no Backlight requirements in Part 6;
2. Maximum zonal lumens for Uplight shall be in accordance with Table 6.3-A; and
3. Maximum zonal lumens for Glare shall be in accordance with Table 6.3-B.

NOTE: Title 24, Part 11, Section 5.106.8 includes additional restrictions on backlight, uplight and glare that may apply.

TABLE 6.3-A Uplight Ratings (Maximum Zonal Lumens)

Secondary Solid Angle	Maximum Zonal Lumens per Outdoor Lighting Zone				
	LZ0	OLZ 1	OLZ 2	OLZ 3	OLZ 4
Uplight High (UH) 100 to 180 degrees	0	10	50	500	1,000
Uplight Low (UL) 90 to <100 degrees	0	10	50	500	1,000

TABLE 130.26.3-B Glare Ratings (Maximum Zonal Lumens)

Glare Rating for Asymmetrical Luminaire Types (Type 1, Type II, Type III, Type IV)					
Secondary Solid Angle	Maximum Zonal Lumens per Outdoor Lighting Zone				
	LZ 0	OLZ 1	OLZ 2	OLZ 3	OLZ 4
Forward Very High (FVH) 80 to 90 degrees	10	100	225	500	750
Backlight Very High (BVH) 80 to 90 degrees	10	100	225	500	750
Forward High (FH) 60 to <80 degrees	660	1,800	5,000	7,500	12,000
Backlight High (BH) 60 to <80 degrees	110	500	1,000	2,500	5,000
Glare Rating for Quadrilateral Symmetrical Luminaire Types (Type V, Type V Square)					
Secondary Solid Angle	Maximum Zonal Lumens per Outdoor Lighting Zone				
	LZ 0	OLZ 1	OLZ 2	OLZ 3	OLZ 4
Forward Very High (FVH) 80 to 90 degrees	10	100	225	500	750
Backlight Very High (BVH) 80 to 90 degrees	10	100	225	500	750
Forward High (FH) 60 to <80 degrees	660	1,800	5,000	7,500	12,000
Backlight High (BH) 60 to <80 degrees	660	1,800	5,000	7,500	12,000

Outdoor luminaires that use lamps or light sources rated greater than 150 W in the following areas are required to comply with uplight and glare zonal lumen limits specified in Tables 6.3-A and B:

- Hardscape areas, including parking lots and service stations hardscape
- Building entrances
- All sales and non-sales canopies
- Outdoor dining
- All outdoor sales areas

Uplight and glare zonal lumen limits are not considered for outdoor luminaires when they are used to illuminate the following:

- Signs-
- Lighting for building facades, public monuments, statues, and vertical surfaces of bridges-
- Lighting required by a health or life safety statute, ordinance, or regulation that may fail to meet the uplight and glare limits due to application limitations-
- Temporary outdoor lighting as defined by §100.1-
- Replacement of existing pole mounted luminaires in hardscape areas meeting all of the following conditions:
 - Where the existing luminaire does not meet the luminaire uplight and glare zonal lumen limits ~~in §130.2(b)~~; and
 - Spacing between existing poles is greater than 6 times the mounting height of the existing luminaires; and
 - Where no additional poles are being added to the site; and
 - Where new wiring to the luminaires is not being installed; and
 - Provided that the connected lighting power wattage is not increased.

~~The Illuminated Engineering Society of North America (IES) published (TM-15-11) the technical memorandum 'Luminaire Classification for Outdoor Luminaires' in 2011 (TM-15-11). This document defines three-dimensional regions of analysis for exterior luminaires and further establishes zonal lumen limits for these regions as part of a larger method of categorizing outdoor lighting equipment into Backlight, Uplight, and Glare components. Collectively, the three components are referred to as the BUG system.~~

The zonal lumen limits per secondary solid angles for uplight and glare are based upon the methodology found in TM-15. The Lighting Zone that the project is located in determines the maximum zonal lumens for both uplight and glare. There are no separate zonal lumen limits for the Backlight component in the Energy Standards Title 24, regardless of the lighting zone, because this component is intended for specific-property boundary conditions and is intended to help determine the suitability of specific products to mitigate light trespass, and is therefore outside the purview of Title 24.

To comply with this mandatory measure, the luminaire must not exceed the maximum zonal lumen limits for each secondary solid angle region (within both the Uplight and Glare component) per lighting zone. The zonal lumen values in a photometric test report

~~must include~~must include any tilt or other non-level mounting condition of the installed luminaire.

The BUG rating for luminaires may be determined with outdoor lighting software or by contacting the manufacturer. There is also software available to produce a BUG rating for a tilted luminaire condition (which is not a typical circumstance for most applications). Since the California BUG limits and calculation procedures match the IES, no deviation from the IES BUG rating is necessary.

~~Within the Uplight component, there are two secondary solid angles that have maximum zonal lumen limits. The two angles are designated as Uplight High (UH) and Uplight Low (UL). Both of the zonal lumen limits must be met in order for a luminaire to be in compliance.~~

Table 6-3 – Uplight Secondary Solid Angles

	<i>Secondary Solid Angle</i>
Uplight High (UH)	100-180 degrees
Uplight Low (UL)	>90 to 100 degrees

~~Within the Glare component, there are four secondary solid angles that have maximum zonal lumen limits. The four angles are designated as Forward Very High (FVH), Backlight Very High (BVH), Forward High (FH), and Backlight High (BH). **All four of the zonal lumen limits must be met in order for a luminaire to be in compliance.** Note that the BVH and BH angles are regulated within the glare component.~~

Table 6-4 – Glare Secondary Solid Angles

	<i>Secondary Solid Angle</i>
Forward Very High (FVH)	80 to 90 degrees
Backlight Very High (BVH)	80 to 90 degrees
Forward High (FH)	60 to <80 degrees
Backlight High (BH)	60 to <80 degrees

~~The maximum zonal lumen limits for glare are different for asymmetrical luminaires (such as Type I, Type II, Type III, and Type IV) than for quadrilateral symmetrical luminaires such as Type V and Type V Square. Refer to Figure 6-2 for a zonal lumen distribution illustration. The maximum zonal lumen limits for uplight are the same for both asymmetrical and quadrilateral symmetrical luminaires.~~

~~The uplight and glare values are specific for each luminaire/light source combination and orientation and therefore are not transferrable between different lamp wattage, light sources or geometric applications.~~

~~In order to determine if a luminaire meets the zonal lumen limits for both uplight and glare, a photometric file will need to be procured from the manufacturer for the specific wattage and mounting configuration. Using lighting calculation software, the photometric file will designate the absolute lumens in each of the secondary solid angles for uplight and glare. Alternatively, many manufacturers may provide a photometric report that provides the~~

relevant zonal lumen values for their luminaires. Using the designations in the software or on a luminaire photometric report, a comparison is made to the maximum zonal lumen limits listed in Table 130.2-A and 130.2-B for the lighting zone in which the luminaire is being installed. This comparison will need to be made for each luminaire type being proposed, at each wattage, and at every tilt angle of installation.

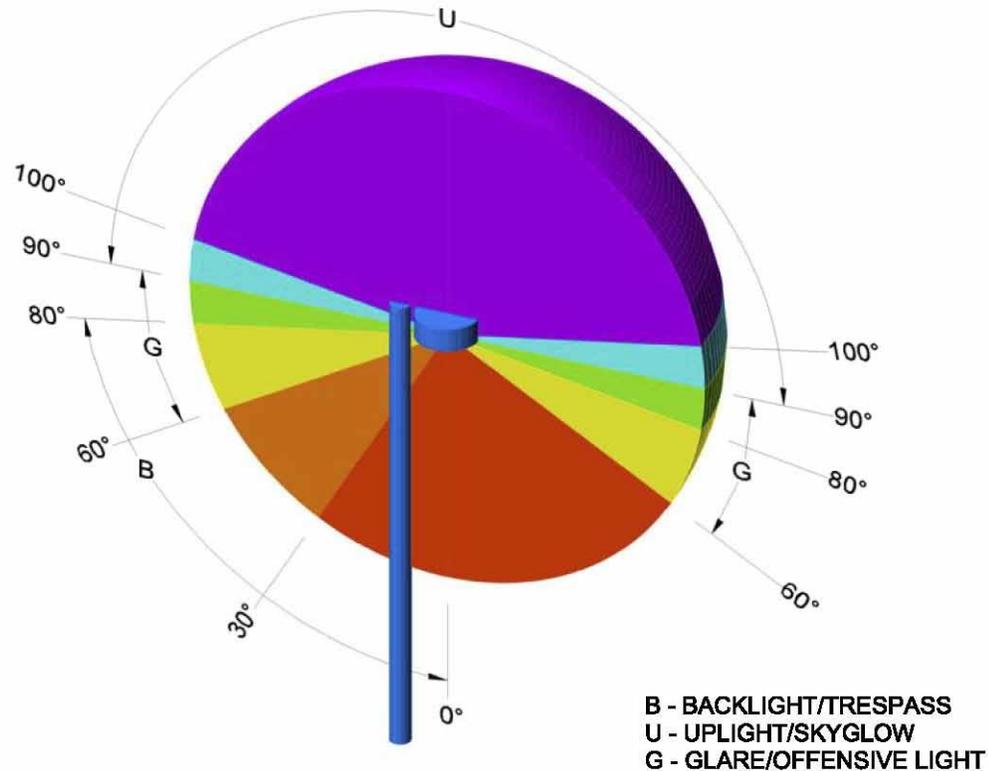
Table 6-5 – (Table 130.2 – A) Uplight Ratings (Maximum Zonal Lumens)

<i>Secondary Solid Angle</i>	<i>Maximum Zonal Lumens per Outdoor Lighting Zone</i>			
	<i>OLZ1</i>	<i>OLZ2</i>	<i>OLZ3</i>	<i>OLZ4</i>
<i>Uplight High (UH) 100 to 180 degrees</i>	40	50	500	1,000
<i>Uplight Low (UL) 90 to <100 degrees</i>	40	50	500	1,000

Table 6-6 (Table 130.2 – B) Glare Ratings (Maximum Zonal Lumens

<i>Glare Rating for Asymmetrical Luminaire Types (Type I, II, III, IV)</i>				
Secondary Solid Angle	Maximum Zonal Lumens per Outdoor Lighting Zone			
	OLZ1	OLZ2	OLZ3	OLZ4
Forward Very High (FVH) 80 to 90 degrees	100	225	500	750
Backlight Very High (BVH) 80 to 90 degrees	100	225	500	750
Forward High (FH) 60 to <80 degrees	1,800	5,000	7,500	12,000
Backlight High (BH) 60 to <80 degrees	500	1,000	2,500	5,000

<i>Glare Rating for Quadrilateral Luminaire Types (Type V, and V Square)</i>				
Secondary Solid Angle	Maximum Zonal Lumens per Outdoor Lighting Zone			
	OLZ1	OLZ2	OLZ3	OLZ4
Forward Very High (FVH) 80 to 90 degrees	100	225	500	750
Backlight Very High (BVH) 80 to 90 degrees	100	225	500	750
Forward High (FH) 60 to <80 degrees	1,800	5,000	7,500	12,000
Backlight High (BH) 60 to <80 degrees	1,800	5,000	7,500	12,000



BUG - Zonal Lumens Distribution

Figure 6-2—Outdoor Luminaire BUG Zone Regions

Example 6-2-3 Backlight Zonal Lumen Limits

Question

I am installing four 200W luminaires. What are the maximum zonal lumen limits for Backlight that I have to meet?

Answer

You will need to comply with the zonal lumen limits for each solid angle zone found within the Uplight and Glare components only (the U and G portions of the BUG rating). Note that within the Glare component, there are two solid angle zones that include some backwards propagating light portions. This is built into the zonal lumen limits, and if the U and G ratings meet the Lighting Zone, then no further consideration is necessary. Zonal lumen limits for these angles (Backlight Very High and Backlight High) are limited because they are a part of the Glare component.

Example 6-34 Obtaining Zonal Lumen Limits**Question**

How are luminaire zonal lumen limits obtained?

Answer

The zonal lumen values for a particular luminaire, lamping and orientation are obtained from the manufacturer or may be calculated from photometric data. In the Code, Tables 130.2-A and 130.2-B list the maximum zonal lumens allowed in each solid angle zone within the Uplight and Glare categories. If the zonal lumens in any solid angle zone is exceeded in each-any category, the uplight or glare rating moves into a higher outdoor lighting zone.

For instance, an example photometric report indicates the following for a Type III luminaire:

Uplight Zonal Lumens

UH: 135.4 UL: 74.9

Glare Zonal Lumens

FVH: 104.3 BVH: 65.2 FH: 1935.7 BH: 440.8

Referring to Table 130.2-A, the luminaire is only acceptable for use in LZ3 or higher because both the UH and UL zonal lumen values are below 500 lumens, but greater than 50 lumens.

Comparing the glare zonal lumen values to Table 130.2-B for Type III luminaires, this luminaire is only acceptable for use in LZ2 or higher. Even though there are some angles that are less than the maximum zonal lumen limits, the FVH value moves this luminaire up to LZ2.

The final result is the larger of the two ratings. Therefore, combining both Uplight (LZ2) and Glare (LZ3), this luminaire can only be used in LZ3 or higher applications.

Example 6-2224 Zonal Lumen Limits by Lighting Zone**Question**

Do Uplight and Glare zonal lumen limits vary in the regulations?

Answer

Yes, they vary depending on lighting zone. Outdoor Lighting Zone 1 has more stringent zonal lumen requirements than Outdoor Lighting Zone 2. Refer to Table 130.2-A and 130.2-B in the Code for the zonal lumen maximums for each particular Lighting Zone.

Example 6-3335 Zonal Lumen Limits for Luminaires in a Rail Yard**Question**

Am I required to meet the uplight and glare zonal lumen limits for luminaires in a rail yard?

Answer

No, only luminaires in areas such as hardscape areas, building entrances, canopies, or outdoor sales areas are required to meet the uplight and glare zonal lumen limits. However, in this example, the parking lot for the employees outside the rail yard must meet the uplight and glare zonal lumen limits.

Example 6-4446 Full Cut-Off Luminaires and Zonal Lumen Limits**Question**

Can full cut-off luminaires be used to meet the -zonal lumen limits of ~~the Standards~~ the Energy Standards?

Answer

Luminaires using light sources of 150W or greater, including full cut-off luminaires, must meet the Uplight zonal lumen limits in Table 130.2-A to meet the requirements of this section. Fully shielded luminaires have superior optics that can very effectively reduce or eliminate disability and discomfort glare, and other negative impacts of high intensity unshielded lighting. However, a traditional “full cut-off” style luminaire is not assured to meet the Uplight and Glare zonal lumen limits of Table 130.2-B, so verification will be required.

Example 6-5 Wallpacks and Zonal Lumen Limits**Question**

A new parking lot adjacent to a building is being ~~illuminated~~ designed to be illuminated by 250W wall packs mounted on the side of the building. Do these wall packs have to meet the zonal lumen limits? The wall packs are also illuminating the façade of the building, but their main purpose is for parking lot illumination.

Answer

Yes, these 250W wall packs will have to meet the zonal lumen limits because their main purpose is for parking lot illumination. Luminaire mounting methods or locations do not necessarily determine the purpose of the illumination. Define the function of the luminaire by determining what the majority of the light is striking. In the case of a typical wallpack, 80% or more of the light is likely striking the parking lot or sidewalk in front of the building, and only 20% or less on the façade, so this will be required for verification of the zonal limits.

Each luminaire must be appropriately assigned to the function area that it is illuminating, whether it is mounted to a pole, building, or other structure. Only ~~wall packs~~ luminaires that are 150W or less are not required to meet the Uplight and Glare limits in the Standard.

Example 6-~~6668~~ Wallpacks and Zonal Lumen Limits**Question**

Can we use 250W, non-cut-off wall packs for building façade lighting?

Answer

-Even though façade lighting is exempt from the -zonal lumen limits, you cannot consider a traditional – wall pack installation as façade lighting because most of the light from these luminaires will not illuminate the façade to which they are attached. Most ‘wall pack’ style luminaires do not direct the majority of the light exiting the luminaire onto the façade. Only wall packs that are 150W or less are not required to meet the Uplight and Glare limits in the Standard.

Example 6-~~7779~~ Cut-Off Luminaires and Zonal Lumen Limits**Question**

If a cut-off or full cut-off luminaire is mounted at a tilt does it still meet the zonal lumen limits?

Answer

It depends. Luminaires that meet the zonal lumen limits when mounted at 90° to nadir may or may not comply with the -zonal lumen limits when they are mounted at a tilt. In order for a tilted luminaire to meet this requirement a photometric test report must be provided showing that the luminaire meets the -zonal lumen limits at the proposed tilt, or other non-level mounting condition. This can be provided by the manufacturer or calculated by various lighting calculation software products available in the industry. A test will be required for each unique tilt situation (as the tilt angle changes, the BUG rating will also change).

4.3.36.3.3 Controls for Outdoor Lighting

§130.2(c)

Via 130.2(c):

Outdoor lighting controls shall be installed that meet the following requirements as applicable.

Controls are not required for outdoor lighting ~~not permitted by~~ when a health or life safety statute, ordinance, or regulation to be turned OFF does not permit the lighting to be turned OFF, ~~and~~ Controls are also not required for lighting in for tunnels required to be illuminated 24 hours per day and 365 days per year.

A. Automatic Shutoff Controls

§130.2(c) 1

All installed outdoor lighting must be controlled by a photocontrol or outdoor astronomical time-switch controls that automatically turns off the outdoor lighting when daylight is available. ~~Additionally, outdoor lighting must be controlled by an automatic scheduling control.~~

B. Circuiting Independent Control

§130.2(c) 2

All installed outdoor lighting shall be ~~circuited and~~ independently controlled from other electrical loads to ensure that the lighting is properly controlled and timeclocks are not overridden to permit an external load that requires 24-hour power availability.

Example 6-~~888~~10 Circuited of Irrigation Controllers

Question

Can irrigation controllers be on the same circuit as lighting?

Answer

~~No, this is not allowed.~~ Yes, it is allowed but, if there is any outdoor lighting load on the circuit, the outdoor lighting load must be separately circuited-controlled from all other loads.

C. Mounting Specific Controls for Luminaires Mounted below 24 Feet

§130.2(c) 3

All installed outdoor lighting, where the bottom of the luminaire is mounted 24 feet or less above the ground, shall be controlled with automatic lighting controls that meet all of the following requirements:

A. Include motion sensors or other lighting control systems that automatically controls lighting in response to the area being vacated of occupants;

- B. Be capable of automatically reducing the lighting power of each luminaire by at least 40 percent but not exceeding 80-90 percent, or provide continuous dimming through a range that includes 40 percent through 80-90 percent.
- C. Employ auto-ON functionality when the area becomes occupied; and
- D. Ensure that no more than 1,500 watts of lighting power are controlled together.

~~All outdoor lighting, where the bottom of the luminaire is mounted 24 feet or less above the ground shall be controlled with automatic lighting controls that meet the following requirements:~~

- ~~• Shall be motion sensors or other lighting control systems that automatically controls lighting in response to the area being vacated of occupants.~~
- ~~• Shall be capable of automatically reducing the lighting power of each luminaire by at least 40 percent but not exceeding 80-90 percent, or provide continuous dimming through a range that includes 40 percent through 80-90 percent.~~
- ~~• Shall employ auto-ON functionality when the area becomes occupied.~~
- ~~• No more than 1,500 watts of lighting power shall be controlled together.~~

This requires that lower wattage lighting mounted on shorter poles, be controlled to dim back during the time that the space is 'open for business', but does not have occupants present. An example might be a plaza on an office building, or an outdoor retail space.

The lighting must also still have a time switch or other scheduling device so that the lighting will be extinguished during the after-hours period. These may be combined into a single intelligent device, but it may also be accomplished through the use of two separate control mechanisms.

The lighting controller and lighting equipment as a system must be capable of dimming the lighting back from full power to a reduced power level that represents at least a 40% reduction, and at most a 90% reduction. This requirement does not insist that every lamp be capable of this setback, but that the luminaire is capable. The intent is that the lighting maintain a reasonable uniformity compared to the original design rather than employing a 'checker board' approach to meet the power reduction requirement.

The 1500 watt limit is intended to keep the size of the lighting zones small enough to ensure that the lighting will be set back enough to make the lighting controls cost effective.

However, not all lighting must be controlled in this manner. For ~~the~~ the following applications, ~~the~~ motion controls requirements for outdoor ~~are not required to use controls for~~ luminaires mounted less than 24 feet above the ground ~~are not mandatory, as discussed in greater detail below in section D:-~~

- ~~• Lighting for Outdoor Sales Frontage, Outdoor Sales Lots, and Outdoor Sales Canopies~~
- ~~• Lighting for Building Facades, Ornamental Hardscape and Outdoor Dining~~
- Outdoor lighting which meets one of the following conditions: pole mounted luminaires with a maximum rated wattage of 75 watts, non-pole mounted luminaires with a maximum rated wattage of 30 watts each, or linear lighting with a maximum wattage of 4 watts per linear foot of luminaire.

D. Application Specific Controls

§130.2(c) 4 & §130.2(c) 5

~~For Outdoor Sales Frontage, Outdoor Sales Lots, and Outdoor Sales Canopies lighting,~~ an automatic lighting control shall be installed that meets the following requirements:

- A part-night outdoor lighting control as defined in Section 100.1, or to permit the lighting to be activated at sunset, and optionally be programmed to turned OFF at some point in the night after the business has closed,
- OR:
- Motion sensors capable of automatically reducing lighting power by at least 40 percent but not exceeding ~~80~~90 percent, and which have auto-ON functionality.

Note that Sales Frontage lighting does not typically have an area where a motion sensor can be employed to create a viable occupancy-based control. This is the primary reason that this area is exempted from §130.2(c)3, and this alternate approach be employed. This area is still required to meet requirements for Automatic Shutoff Controls, and Automatic Scheduling Controls.

For Building Façade, Ornamental Hardscape and Outdoor Dining ~~lighting applications~~, an automatic lighting control shall be installed that meets one or more of the following requirements.

- A part-night outdoor lighting control as defined in ~~section §~~100.1, or
- Motion sensors capable of automatically reducing lighting power by at least 40 percent but not exceeding ~~80~~90 percent, and which have auto-ON functionality, or
- ~~A centralized time-based zone lighting control capable of automatically reducing lighting power by at least 50 percent.~~
- ~~Note that outdoor wall mounted luminaires ‘wall packs’ where the bottom of the luminaire is mounted 24 feet or less above the ground must also be controlled by a motion sensor capable of shutting off between 40% and 80% of the load, as required by Section 130.2(c) 3.~~

These requirements essentially add part-night control and centralized lighting control options in addition to the occupancy-based control option. Some of these applications are done because occupancy-based control is not viable for these applications (façade and ornamental are examples of this), and others because it may be disturbing to the mood or the visual impact may be undesirable when lighting is changing. These areas are still required to employ the Automatic Shutoff Control from §130.2(c)1.

Note that outdoor wall mounted luminaires (often called ‘wallpacks’) where the bottom of the luminaire is mounted 24 feet or less above the ground must also be controlled by a motion sensor capable of shutting off between 40% and 90% of the load, as required by §130.2(c)-3. The point of including this is to direct the reader to the appropriate section for that luminaire type, as this is a common misapplication of the Code.

~~There are a number of options available to meet the requirements of this section. Automatic controls to reduce outdoor lighting by at least 40 percent but not exceeding 80 percent are required with all of these strategies. Following are a few examples:~~

- ~~Dimmable lighting systems can be used to meet the outdoor multi-level switching requirements. For HID luminaires, the high-low output approach (normally applied by switching capacitors in the ballast) capable of reducing the connected lighting power by 40 percent to 80 percent may be used. For HID and LED luminaires, stepped dimming is acceptable provided that steps are available within the 40~~

~~percent to 80 percent range. LED continuous dimming strategies are acceptable as long as their dimming capacity encompasses the 40 percent to 80 percent range.~~

- ~~• Equip the lighting systems with motion sensors and photoelectric switches. This option works well with fluorescent and LED sources. HID sources may employ the high-low strategy with motion sensors.~~
- ~~• Employ a part-night control system to set back the light level at a predetermined time after business hours.~~

Example 6-9 Mandatory Outdoor Requirements**Question**

What are the mandatory outdoor lighting requirements?

Answer

The mandatory outdoor lighting requirements include:

- Motion sensing for incandescent luminaires rated over 100 watts
- BUG Uplight and Glare zonal lumen limits for luminaires ratings greater than 150 watts unless excluded by the code.
- Automatic controls to turn lighting OFF when daylight is available
- Separate circuiting and independently controlled from other electrical loads by an automatic scheduling control
- Motion sensing devices for luminaires mounted below 24 feet above ground that automatically reduce the lighting power of each luminaire by at least 40 percent, but not greater than ~~80-90~~ percent, auto-ON functionality when the area becomes occupied and no more than 1,500 watts of lighting power ~~shall be controlled together with a single sensor on a single control zone.~~
- Outdoor Sales Frontage, ~~Outdoor Sales Lot, and Outdoor Sales Canopies~~ lighting shall have a part-night outdoor lighting control or motion sensors capable of automatically reducing lighting power by at least 40 percent but not exceeding ~~80-90~~ percent, ~~along with auto-ON functionality.~~
- Building Façade, Ornamental Hardscape, and Outdoor Dining shall have a part-night outdoor lighting control or motion sensors capable of automatically reducing lighting power by at least 40 percent but not exceeding ~~80-90~~ percent, ~~along with auto-ON functionality,~~ or a centralized time-based zone lighting control capable of automatically reducing lighting power by at least 50 percent.

All lighting controls must meet the requirements of §110.9.

1.3.46.3.4 Requirements for Lighting Control Functionality

§110.9(b)

All Installed Lighting Control Systems listed in §110.9(b) shall comply with the requirements listed below; and all components of the system considered together as installed shall meet all applicable requirements for the application for which they are installed as required in §130.0 through §130.5, §140.6 through §140.8, §141.0, and §150.0(k).

1. Time-Switch Lighting Controls

- A. **Automatic Time-Switch Controls** shall meet all requirements for Automatic Time Switch Control devices in the Title 20 Appliance Efficiency Regulations.
- B. **Astronomical Time-Switch Controls** shall meet all requirements for Astronomical Time-Switch Control devices in the Title 20 Appliance Efficiency Regulations.

- C. Multi-Level Astronomical Time-Switch Controls**, in addition to meeting all of the requirements for Astronomical Time-Switch Controls, shall include at least 2 separately programmable steps per zone.
- D. Outdoor Astronomical Time-Switch Controls**, in addition to meeting all of the requirements for Astronomical Time-Switch Controls, shall have setback functions that allow the lighting on each controlled channel to be switched or dimmed to lower levels. The set back functions shall be capable of being programmed by the user for at least one specific time of day.
- 2. Daylighting Controls**
- A. Automatic Daylight Controls** shall meet all requirements for Automatic Daylight Control devices in the Title 20 Appliance Efficiency Regulations.
- B. Photo Controls** shall meet all requirements for Photo Control devices in the Title 20 Appliance Efficiency Regulations.
- 3. Dimmers** shall meet all requirements for Dimmer Control devices in the Title 20 Appliance Efficiency Regulations.
- 4. Occupant Sensing Controls: Occupant, Motion, and Vacancy Sensor Controls** shall meet the following requirements:
- A. Occupant Sensors** shall meet all applicable requirements for Occupant Sensor Control devices in the Title 20 Appliance Efficiency Regulations.
- B. Motion Sensors** shall meet all applicable requirements for Motion Sensor Controls devices in the Title 20 Appliance Efficiency Regulations.
- C. Vacancy Sensors** shall meet all applicable requirements for Vacancy Sensor Controls devices in the Title 20 Appliance Efficiency Regulations.
- D. Partial-ON Sensors** shall meet all applicable requirements for partial on sensing devices in the Title 20 Appliance Efficiency Regulations.
- E. Partial-OFF Sensors** shall meet all applicable requirements for partial off sensing devices in the Title 20 Appliance Efficiency Regulations.
- F. All Occupant Sensing Control types** shall be programmed to turn OFF all or part of the lighting no longer than 20 minutes after the space is vacated of occupants, except as specified by §130.1(c)8.
- EXCEPTION to §110.9(b)4:** -Occupant Sensing Control systems may consist of a combination of single or multi-level Occupant, Motion, or Vacancy Sensor Controls, provided that components installed to comply with manual-on requirements shall not be capable of conversion by the user from manual-on to automatic-on functionality.
- 5. Part-Night Outdoor Lighting Controls**, as defined in §100.1, shall meet all of the following requirements:
- A. Have sunrise and sunset prediction accuracy within +/- 15 minutes and timekeeping accuracy within five minutes per year; and**
- B. Have the ability to setback or turn off lighting at night as required in §-130.2(c), by means of a programmable timeclock or motion sensing device; and**
- C. When controlled with a timeclock, shall be capable of being programmed to allow the setback or turning off of the lighting to occur from any time at night until any time in the morning, as determined by the user.**

Lighting control devices are required to have various types of functionality, depending on what type of control they are, and whether they are “devices” (consisting of a single component), or “systems” consisting of two or more components. Lighting control Devices are regulated by Title 20 California Code of Regulations the Appliance Standards (California Code of Regulations, Title 20), whereas lighting control systems are regulated by Title 24 Part 6, §110.9.

A. Self-contained lighting control devices are defined by the Energy Standards as unitary lighting control modules that require no additional components to be fully functional lighting controls. Most self-contained lighting controls are required to be certified by the manufacturer according to the Title 20 Appliance Efficiency Regulations; please see the Appliance Standards Manual for details of those requirements. The following lighting controls related to outdoor lighting control, are required to be certified to Title 20 as specified in Section 110.9(b):

1. Time-Switch Lighting Controls
 - ~~Automatic Time-Switch Controls~~
 - ~~Astronomical Time-Switch Controls~~
 - ~~Multi-Level Astronomical Time-Switch Controls~~
 - Outdoor Astronomical Time-Switch Controls
2. Daylighting Controls
 - ~~Automatic Daylight Controls~~
 - Photo Controls
3. ~~Dimmers~~
3. Occupant Sensing Controls
 - Motion Sensors
4. Part-Night Outdoor Lighting Control
 - ~~Occupant Sensors~~
 - ~~Motion Sensors~~
 - ~~Vacancy Sensors~~
 -

~~A part-night control device is not required to be certified to Title 20, but must meet the following requirements.~~

A Part-Night Outdoor Lighting Control is defined by ~~the Standards~~ the Energy Standards as a time or occupancy-based lighting control device or system that is programmed to reduce or turn off the lighting power to an outdoor luminaire for a portion of the night.

A part-night control device is not required to be certified to Title 20, but must meet the following requirements as specified in §Section-110.9(b)5. It must:

- a. Be able to accurately predict sunrise and sunset within +/- 15 minutes and timekeeping accuracy within five minutes per year; and

- b. Be able to setback or turn off lighting at night as required in §130.2(c), by means of a programmable timeclock or motion sensing device; and
- c. When the setback or turning off is controlled with a timeclock, shall be capable of being programmed to allow the setback or turning off of the lighting to occur from any time at night until any time in the morning, as determined by the user.

B. Lighting Control Systems are defined by the Energy Standards as requiring two or more components to be installed in the building to provide all of the functionality required to make up a fully functional and compliant lighting control. Lighting control systems are not required to be certified to Title 20, and may be installed for compliance with lighting control requirements in the Energy Standards providing they meet all of the following requirements:

1. A lighting control system shall comply with all requirements listed below; and all components of the system considered together as installed shall meet all applicable requirements for the lighting control application for which they are installed as required in Sections 130.0 through 130.5, Sections 140.6 through 140.8, §141.0, and §150(k).
2. For all lighting control systems, including Energy Management Control Systems (EMCS), an installation certificate shall be signed by the licensee of record in accordance with §130.4(b) and Nonresidential Appendix NA7
3. If there are indicator lights that are integral to a lighting control system, they shall consume no more than one watt of power per indicator light.
4. A lighting control system shall meet all of the requirements in the Title 20 Appliance Efficiency Regulations for the identical self-contained lighting control device it is installed to function as. For example, if a lighting control system is installed to comply with the requirements for an occupancy sensor, then the system shall comply with all of the requirements for an occupancy sensor in Title 20.
5. If the system is installed to function as a partial-on or partial-off occupant sensor, the installation may be made up of a combination of single or multi-level Occupant, Motion, or Vacancy Sensor Controls, provided that the components installed to comply with manual-on requirements shall not be capable of conversion by the user from manual-on to automatic-on functionality.

Example 6-10 Manufacturer Responsibility for Certified Controls**Question**

What is the responsibility of the manufacturer with regard to using lighting controls that are certified by the Energy Commission and listed in the Energy Commission directories?

Answer

It is the responsibility of the manufacturer to certify its specific controls and to present the data to the Energy Commission so that it can be listed in the Energy Commission directories.

Example 6-11 Designer Responsibility for Certified Controls**Question**

What is the responsibility of the designer with regard to using lighting controls that are certified by the Energy Commission and listed in the Energy Commission directories?

Answer

It is the responsibility of the designer to specify only lighting controls that have been listed certified and listed in the Energy Commission directories.

Example 6-12 Installer Responsibility for Certified Controls**Question**

What is the responsibility of the installer with regard to using lighting controls that are certified by the Energy Commission and listed in the Energy Commission directories?

Answer

It is the responsibility of the installer to install only controls that are certified by the Energy Commission and listed in the Energy Commission directories. It is also the responsibility of the installer to sign the Installation Certificate.

1.46.4 Prescriptive Measures**1.4.16.4.1 Lighting Zones**

§10-114

The basic premise of the Energy Standards is to base the outdoor lighting power that is allowed on how bright the surrounding conditions are. The Energy Standards contain lighting power allowances for newly installed equipment and specific alterations that are dependent on which Lighting Zone the project is located.

A. Outdoor Lighting Zones

The technical basis for the differences in outdoor lighting zones described by the Illuminating Engineering Society of North America (IES) is that the eyes adapt to darker surrounding conditions and less light is required to properly see; when the surrounding conditions get brighter, more light is needed to see. The least power is allowed in Lighting Zone 1 and increasingly more power is allowed in Lighting Zones 2, 3, and 4. Lighting Zone 0 is intended for undeveloped spaces in parks and wildlife preserves and there are very low ambient illumination. Providing greater power than is needed potentially leads to debilitating glare and an increasing spiral of brightness as over-bright projects become the surrounding conditions for future projects causing future projects to unnecessarily require greater power resulting in wasted energy.

For outdoor lighting design recommended practice documents, the IES has directed the various committees to incorporate the Lighting Zone concept into the design criteria. However, in 2014, the IES published a new Recommended Practice for Parking Facilities. In this document, the Lighting Zone concept has been effectively disregarded by establishing a single design criteria for Lighting Zones 1-4. As a result, the new Lighting Zone allowances for General Hardscape do not increment upward in the same manner as previous versions of the Code.

The Energy Commission defines the boundaries of Outdoor Lighting Zones based on the 2010 U.S. Census Bureau boundaries for urban and rural areas as well as the legal

boundaries of wilderness and park areas (see Standards Table 10-114-A). By default, government designated parks, recreation areas and wildlife preserves are Lighting Zone 0 and Lighting Zone 1. Lighting Zone 0 areas are undeveloped areas of government designated parks, recreation areas, and wildlife preserves; Lighting Zone 1 are developed portions of government designated parks, recreation areas and wildlife preserves.; rural Rural areas are Lighting Zone 2; and urban areas are Lighting Zone 3. Lighting Zone 4 is a special use district that may be created by a local government through application to the CEC Energy Commission.

Table 6-2327 – Standards Table 10-114-A Lighting Zone Characteristics and Rules for Amendments by Local Jurisdictions

Zone	Ambient Illumination	State wide Default Location	Moving Up to Higher Zones	Moving Down to Lower Zones
LZ1	Dark	Government designated parks, recreation areas, and wildlife preserves. Those that are wholly contained within a higher lighting zone may be considered by the local government as part of that lighting zone.	A government designated park, recreation area, wildlife preserve, or portions thereof, can be designated as LZ2 or LZ3 if they are contained within such a zone.	Not applicable.
LZ2	Low	Rural areas, as defined by the 2010 U.S. Census.	Special districts within a default LZ2 zone may be designated as LZ3 or LZ4 by a local jurisdiction. Examples include special commercial districts or areas with special security considerations located within a rural area.	Special districts and government designated parks within a default LZ2 zone maybe designated as LZ1 by the local jurisdiction for lower illumination standards, without any size limits.
LZ3	Medium	Urban areas, as defined by the 2010 U.S. Census.	Special districts within a default LZ3 may be designated as a LZ4 by local jurisdiction for high intensity nighttime use, such as entertainment or commercial districts or areas with special security considerations requiring very high light levels.	Special districts and government designated parks within a default LZ3 zone may be designated as LZ1 or LZ2 by the local jurisdiction, without any size limits.
LZ4	High	None	Not applicable.	Not applicable.

The options allowed under §10-114 are as follows:

1. Parks, Recreation Areas and Wildlife Preserves

The default for undeveloped portions of government designated parks, recreation areas, and wildlife preserves is Lighting Zone 0. The local jurisdiction having authority over the property will know if the property is a government designated park, recreation area, or wildlife preserve.

The default for developed portions of government designated parks, recreation areas, and wildlife preserves is Lighting Zone 1. The local jurisdiction having authority over the property will know if the property is a government designated park, recreation area, or wildlife preserve. However, when a park, recreation area, wildlife preserve, or portions thereof, are surrounded by urban areas (as defined by the U.S. Census Bureau), such

areas may be designated as Lighting Zone 3 by adoption of the local jurisdiction. Similarly, a Lighting Zone 2 designation can be adopted if the area is surrounded by rural areas (as defined by the U.S. Census Bureau). All adjustments in LZ designation must be reviewed by the CEC for approval.

2. Rural Areas

The default for rural areas as defined by the U.S. Census Bureau is Lighting Zone 2. However, local jurisdictions having building permit authority may designate certain areas as either Lighting Zone 3 or Lighting Zone 4 if the local jurisdiction determines that ambient lighting levels are higher than typical for a rural area. Examples of areas that might be designated Lighting Zone 3 are special commercial districts or areas with special security considerations. All adjustments in LZ designation must be reviewed by the CEC for approval.

Local jurisdictions also may designate default Lighting Zone 2 areas as Lighting Zone 1, which would establish lower lighting power for outdoor areas with lower surrounding brightness. An example of an area that might be changed to Lighting Zone 1 would include an underdeveloped, environmentally sensitive or predominately residential area within a default Lighting Zone 2 area.

3. Urban Areas

~~The default Lighting Zone 3 is the default~~ for urban areas, as defined by the U.S. Census Bureau, ~~is Lighting Zone 3.~~ Local jurisdictions may designate areas to Lighting Zone 4 for high intensity nighttime use, such as entertainment or commercial districts or areas with special security considerations requiring very high light levels. All adjustments in LZ designation must be reviewed by the CEC for approval.

Local jurisdictions also may designate areas as Lighting Zone 2 or even Lighting Zone 1 if they deem that this is appropriate.

4.4.26.4.2 How to Determine the Lighting Zone for an Outdoor Lighting Project

Permit applicants may determine the Lighting Zone for a particular property using the following steps:

- Local jurisdiction – Check with the local jurisdiction having authority over permitting of the property. The local jurisdiction will know if the property is a government designated park, recreation area, or wildlife preserve, and therefore in default Lighting Zone 0 or 1. The local jurisdiction also may know if the property is contained within the physical boundaries of a Lighting Zone for which a locally-adopted change has been made. However, verify through the California Energy Commission website whether or not a locally-adopted change has been submitted to the Energy Commission.
- U.S. Census – Look at the U.S. Census website to determine if the property is within a rural (statewide default Lighting Zone 2) or urban (statewide default Lighting Zone 3) census block.
 - According to the US Census Bureau, there are two types of urban area, Urbanized Areas (UAs) of 50,000 or more people and Urban Clusters

(UCs) of at least 2,500 and less than 50,000 people. Furthermore, “Rural” encompasses all population, housing, and territory not included within an urban area.

- Go to the US Census page, street address search There is an address search tool provided by US Census Bureau. Enter the address and look up for the geography results indicating whether the entered address is urban or rural under geography type.
- (<http://factfinder.census.gov/faces/nav/jsf/pages/searchresults.xhtml?ref=adr&refresh=t>)
- A ‘Geography Results’ window will display a number of geographies within which the address is located. If you are in an urban area, one of the geographies will designate this; otherwise you are in a rural geography.
- Energy Commission website – Check the Energy Commission’s website to determine if the property is contained within the physical boundaries of a Lighting Zone that has been changed through a local jurisdiction adoption process.

1.4.36.4.3 Examples for Defining Physical Boundaries

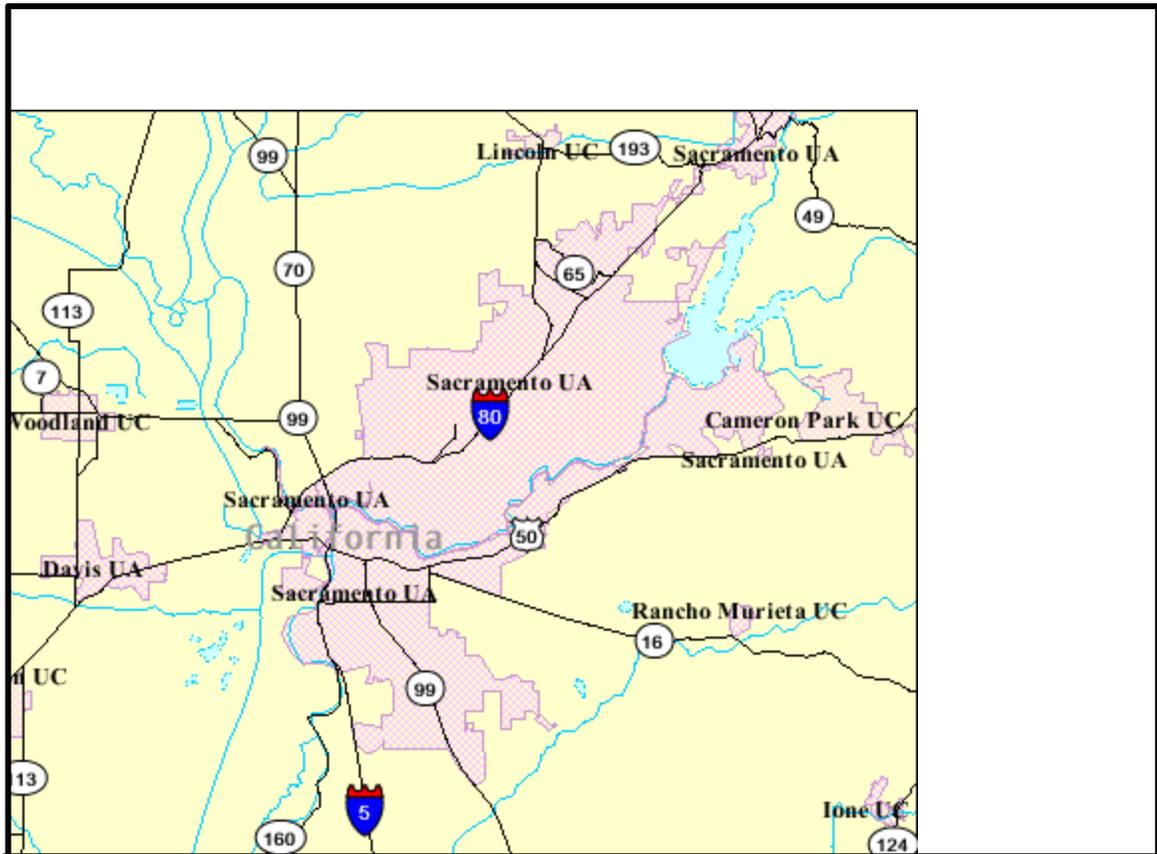
Using Metes and bounds is a good method to use for defining the physical boundaries of an adopted Lighting Zone.

Metes and bounds is a system that uses physical features of the local geography, along with directions and distances, to define and describe the boundaries of a parcel of land. The boundaries are described in a running prose style, working around the parcel of the land in sequence, from a point of beginning, returning back to the same point. The term “metes” refers to a boundary defined by the measurement of each straight run, specified by a distance between the terminal points, and an orientation or direction. The term “bounds” refers to a more general boundary descriptions, such as along a certain watercourse or public road way.

Following are examples of using metes and bounds to define the physical boundaries of an adopted Lighting Zone:

- Properties with frontage on Mazi Kennedy Memorial Expressway, between Nancy First Avenue and Jessica Main Street to a depth of 50 ft from each frontage property line.
- The area 500 ft east of Interstate 5, from 500 ft north of Gary Loomis Ave to 250 ft south of West Williaminding Way.
- The area of the Owen Sunrise Bike Trail starting at Michael Colfax Avenue and going east to Flamm Maple Park, the width of a path which is from the edge of the South Fork of the Joshua American River on one side, to 100 ft beyond the paved bike trail, or to private property lines, whichever is shorter, on the other side.
- The area that is bounded by the Nelson Truckee River on the West, Hudler Grizzly Lane on the south, Jon Caddis Road on the east, and the boundary of Beverly Placer County on the north.

Note: The physical boundaries of a changed Lighting Zone are not required to coincide with the physical boundaries of a census tract.



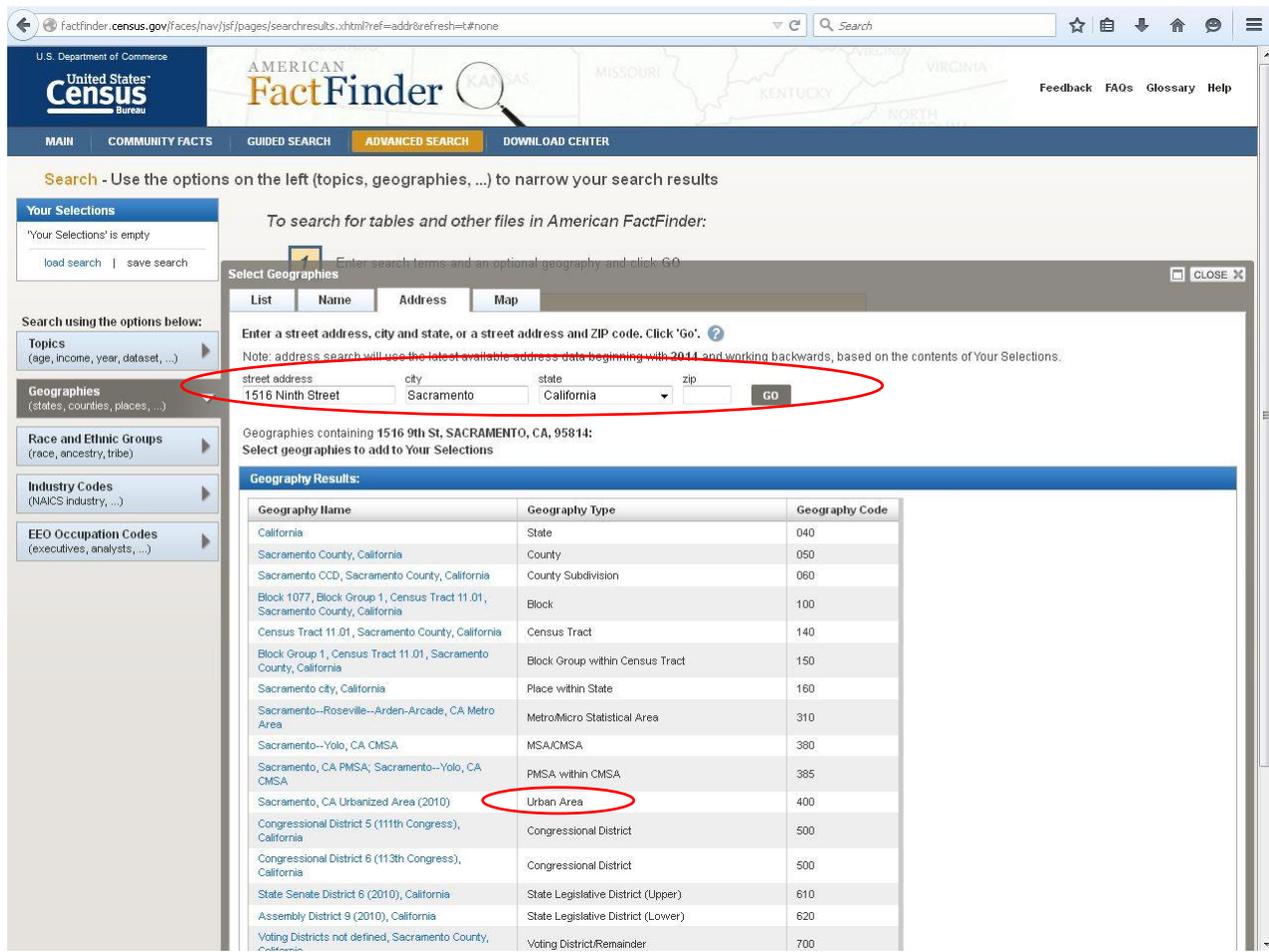


Figure 6-113 – Example of US Census Bureau Information

Example 6-13 Changing the Default Lighting Zone

Question

I want to have the default outdoor Lighting Zone for a particular piece of property changed. How do I accomplish that?

Answer

Check with the local jurisdiction having authority over the property and ask them what you need to do to petition them to have the default outdoor Lighting Zone officially adjusted.

1.4.46.4.4 Lighting Zone Adjustments by Local Jurisdictions

§10-114

Standards Table 10-114-A

The Energy Commission sets statewide default Lighting Zones. However, jurisdictions (usually a city or county), may change the zones to accommodate local conditions. Local governments may designate a portion of Lighting Zones 2 or 3 as Lighting Zone 3 or 4. The local jurisdiction also may designate a portion of Lighting Zone 3 to Lighting Zone 2 or

even Lighting Zone 1. When a local jurisdiction adopts changes to the Lighting Zone boundaries, it must follow a public process that allows for formal public notification, review, and comment about the proposed change. The local jurisdiction also must provide the Energy Commission with detailed information about the new Lighting Zone boundaries, and submit a justification that the new Lighting Zones are consistent with the specifications in §10-114.

The Energy Commission has the authority to disallow Lighting Zone changes if it finds the changes to be inconsistent with the specification of ~~Standards Table 10-114-A or §10-114~~ including Table 10-114-A.

~~1.4.56.4.5~~ Outdoor Lighting Power Compliance

An outdoor lighting installation complies with the Energy Standards if the actual outdoor lighting power is no greater than the allowed outdoor lighting power. This section describes the procedures and methods for complying with §140.7(a through d).

In some situations, more than one lighting designer designs the outdoor lighting. An example might be that one designer is designing the pole mounted lighting for the parking lot and another designs the lighting that is attached to the building. Final compliance documentation must be developed that accounts for all outdoor lighting power and calculates the allowable lighting power once.

Two separate sets of outdoor lighting compliance documentation may unintentionally double count the allowances for outdoor lighting. Therefore, this needs to be considered when evaluating the sum total of the actual installed outdoor lighting installed power.

The allowed lighting power is determined by measuring the area or length of the lighting application and multiplying this area or length times the Lighting Power Allowance, which is expressed ~~either in W/ft², or W/ft, or W,~~ respectively. The allowed lighting power must be calculated for ~~either~~ the general hardscape lighting of the site and for specific applications if desired.

The area of the lighting application must be defined exclusive of any areas on the site that are not illuminated.

The actual power of outdoor lighting is the total watts of all of the non-exempt lighting systems (including ballast, driver or transformer loss). See §140.7(c).

The allowed outdoor lighting power is calculated by Lighting Zone as defined in §10-114. Local governments may amend Lighting Zones in compliance with §10-114. See Section 6.4.4 for more information about amending outdoor ordinances by local jurisdictions.

A. Maximum Outdoor Lighting Power

The Energy Standards establish maximum outdoor lighting power that can be installed. The allowed outdoor lighting power must be determined according to the Outdoor Lighting Zone in which the site is located. See Section 6.4.1A for more information about Outdoor Lighting Zones.

The wattage of outdoor luminaires must be determined in accordance with §130.0(~~dc~~) or Reference Nonresidential Appendix NA8. See Section ~~5.5-35.3~~ for more information about determining luminaire wattage.

The total allowed lighting power is the combined total of all of the allowed lighting power layers. There are lighting power allowances for general hardscape lighting and lighting power allowances for specific applications. An outdoor lighting installation complies with

the lighting power requirements if the actual outdoor lighting power installed is no greater than the allowed outdoor lighting power calculated under §140.7(d) and complies with certain stipulations associated with specific special application allowances. The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with §140.7(d)1, and the sum of the additional lighting power allowance for specific applications determined in accordance with §140.7(d)2.

B. Illuminated Area

With indoor lighting applications, the entire floor area is considered to be illuminated for the purpose of determining the allowed lighting power. However, for outdoor lighting applications, the number of luminaires, their mounting heights and their layout affect the presumed illuminated area and therefore the allowed lighting power.

The area of the lighting application may not include any areas on the site that are not illuminated. The area beyond the last luminaire is considered illuminated only if it is located within 5 mounting heights of the nearest luminaire.

In plan view of the site, the illuminated area is defined as any hardscape area within a square pattern around each luminaire or pole that is 10 times the luminaire mounting height, with the luminaire in the middle of the pattern. Another way to envision this is to consider an illuminated area from a single luminaire as the area that is 5 times the mounting height in four directions.

Illuminated areas shall not include any area that is obstructed by any other structure, including a sign or within a building, or areas beyond property lines.

The primary purpose for validating the illuminated area is to not include any areas that are not illuminated. Areas that are illuminated by more than one luminaire shall not be double counted. Either an area is illuminated or it is not illuminated.

When luminaires are located further apart (more than 10 times their mounting height apart), then the illuminated area stops at 5 times the mounting height of each luminaire.

Planters and small landscape areas are included within the general hardscape area as long as the ~~minor-short~~ dimension of the inclusion is less than 10 ft wide, and the inclusion is bordered on at least three sides.

Landscape areas that are greater than 10 ft wide in the ~~minor-short~~ dimension are excluded from the general hardscape area calculation, but the perimeter of these exclusions may be included in the linear wattage allowance (LWA) calculation. See Section 6.4.6C for information about the LWA.

1.4.66.4.6 General Hardscape Lighting Power Allowance

§140.7(d) 1, Standards Table 140.7-A

TABLE 140.7-A: GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

Type of Power Allowance	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Area Wattage Allowance (AWA)	No allowance*	0.020 W/ft ²	0.030 W/ft ²	0.040 W/ft ²	0.050 W/ft ²
Linear Wattage Allowance (LWA)		0.15 W/ft	0.25 W/ft	0.35 W/ft	0.45 W/ft
Initial Wattage Allowance (IWA)		340 W	450 W	520 W	640 W

*Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed in Lighting Zone 0 shall meet the maximum zonal lumen limits for Uplight and Glare specified in Table 130.2-A and 130.2-B.

(ae) **Calculation of Allowed Lighting Power.** The allowed lighting power shall be the combined total of the sum of the general hardscape lighting allowance determined in accordance with Section 140.7(d)1, and the sum of the additional lighting power allowance for specific applications determined in accordance with Section 140.7(d)2.

1. **General Hardscape Lighting Allowance.** Determine the general hardscape lighting power allowances as follows:

A. The general hardscape area of a site shall include parking lot(s), roadway(s), driveway(s), sidewalk(s), walkway(s), bikeway(s), plaza(s), bridge(s), tunnel(s), and other improved area(s) that are illuminated. In plan view of the site, determine the illuminated hardscape area, which is defined as any hardscape area that is within a square pattern around each luminaire or pole that is ten times the luminaire mounting height with the luminaire in the middle of the pattern, less any areas that are within a building, beyond the hardscape area, beyond property lines, or obstructed by a structure. The illuminated hardscape area shall include portions of planters and landscaped areas that are within the lighting application and are less than or equal to 10 feet wide in the short dimensions and are enclosed by hardscape or other improvement on at least three sides. Multiply the illuminated hardscape area by the Area Wattage Allowance (AWA) from Table 140.7-A for the appropriate Lighting Zone.

B. Determine the perimeter length of the general hardscape area. The total perimeter shall not include portions of hardscape that is not illuminated according to Section 140.7(d)1A. Multiply the hardscape perimeter by the Linear Wattage Allowance (LWA) for hardscape from Table 140.7-A for the appropriate lighting zone. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:

- i. Landscaped areas completely enclosed within the hardscape area, and which have a width or length less than 10 feet wide, shall not be added to the hardscape perimeter length.
- ii. Landscaped areas completely enclosed within the hardscape area, and which width or length is a minimum of 10 feet wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
- iii. Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.

C. Determine the Initial Wattage Allowance (IWA) for general hardscape lighting from Table 140.7-A for the appropriate lighting zone. The hardscape area shall be permitted one IWA per site.

D. The general hardscape lighting allowance shall be the sum of the allowed watts determined from (A), (B) and (C) above.

- 2. Additional Lighting Power Allowance for Specific Applications.** Additional lighting power for specific applications shall be the smaller of the additional lighting allowances for specific applications determined in accordance with **Error! Reference source not found.** for the appropriate lighting zone, or the actual installed lighting power meeting the requirements for the allowance.

TABLE 140.7-A GENERAL HARDSCAPE LIGHTING POWER ALLOWANCE

<u>Type of Power Allowance</u>	<u>Lighting Zone 0</u>	<u>Lighting Zone 1</u>	<u>Lighting Zone 2²</u>	<u>Lighting Zone 3²</u>	<u>Lighting Zone 4</u>
<u>Area Wattage Allowance (AWA)</u>	<u>No allowance¹</u>	<u>0.035</u> 0.020 W/ft ²	<u>0.045</u> 0.030 W/ft ²	<u>0.090</u> 0.040 W/ft ²	<u>0.115</u> 0.050 W/ft ²
<u>Linear Wattage Allowance (LWA)</u>		<u>0.25</u> 0.15 W/lf	<u>0.45</u> 0.25 W/lf	<u>0.60</u> 0.35 W/lf	<u>0.85</u> 0.45 W/lf
<u>Initial Wattage Allowance (IWA)</u>		<u>340 W</u>	<u>510</u> 450 W	<u>770</u> 520 W	<u>1030</u> 640 W

¹Continuous lighting is explicitly prohibited in Lighting Zone 0. A single luminaire of 15 Watts or less may be installed at an entrance to a parking area, trail head, fee payment kiosk, outhouse, or toilet facility, as required to provide safe navigation of the site infrastructure. Luminaires installed in Lighting Zone 0 shall meet the maximum zonal lumen limits for Uplight and Glare specified in Table 130.2-A and 130.2-B.

²For lighting Zone 2 and 3, where greater than 50% of the paved surface of a parking lot is finished with concrete, the AWA for that area shall be 0.035 W/ft² for Lighting Zone 2 and 0.040 W/ft² for Lighting Zone 3, and the LWA for both lighting zones shall be 0.70 W/lf. This does not extend beyond the parking lot, and does not include any other General Hardscape areas.

Hardscape is defined in §100.1 as an improvement to a site that is paved and has other structural features, including but not limited to, curbs, plazas, entries, parking lots, site roadways, driveways, walkways, sidewalks, bikeways, water features and pools, storage or service yards, loading docks, amphitheaters, outdoor sales lots, and private monuments and statuary.

The allowed lighting power for general hardscape lighting is calculated as the sum of three distinct items as follows:

- The first is the Area Wattage Allowance (AWA), which is the area of the illuminated hardscape, and is expressed in W/ ft².
- The second is Linear Wattage Allowance (LWA), which is the length of the perimeter of the illuminated hardscape, and is expressed in watts per linear foot.
- The third is the Initial Wattage Allowance (IWA), which is a flat allowance for each property, and is expressed in watts.

To determine the total allowed power for general hardscape lighting, add the AWA + LWA + IWA. The AWA, LWA, and IWA are described below.

A. General Hardscape Power Trade-Offs

Allowed lighting power determined according to §140.7(d) 1 for general hardscape lighting may be traded to specific applications in §140.7(d) 2, as long as provided the hardscape area from which the lighting power is traded continues to be illuminated in accordance with §140.7(d) 1A. This means that as long as the spacing and coverage rules are followed, the lighting allowance may be traded to specific applications, but if the spacing or coverage rules are not met, if luminaires used originally to determine the total hardscape illuminated area are not installed, then the general hardscape lighting power allowance

must also be reduced accordingly, and will not be available to trade-off. ~~However, if the illuminated area remains the same, but luminaire wattage is reduced, then unused allowed lighting power may be traded-off.~~ Table 140.7-A - General Hardscape Lighting Power Allowance, of the Energy Standards is included in the beginning of this section for ease of reference.

B. Area Wattage Allowances (AWA)

The Area Wattage Allowance (AWA) is the total illuminated hardscape area that is included in the project times the AWA listed in ~~Table 6-8~~. Multiply the illuminated hardscape area by the AWA from ~~Table 6-8~~ for the appropriate Lighting Zone.

The area for the AWA includes all illuminated hardscape, regardless of whether the area will have an additional lighting power allowances for Specific Applications from Table 140.7-A ~~Table 6-9~~.

C. Linear Wattage Allowances (LWA)

The Linear Wattage Allowance (LWA) is the total hardscape perimeter length that is included in the project times the LWA listed in Table 140.7-A ~~Table 6-8~~. Multiply the total hardscape perimeter length by the LWA from ~~Table 6-8~~ for the appropriate Lighting Zone.

The total hardscape perimeter is the length of the actual perimeter of the illuminated hardscape on the property, with specific perimeter additions for building and other area exclusions that have been removed from the AWA calculation above. Generally, if there is an enclosed exclusion in the area AWA calculation, the perimeter may be included in the LWA calculation.

The total hardscape perimeter shall not include portions of hardscape that is not illuminated according to §140.7(d) 1A. The perimeter length for hardscape around landscaped areas and permanent planters shall be determined as follows:

- Landscaped areas completely enclosed within the hardscape area, and which have width or length less than 10 ft wide, shall not be added to the hardscape perimeter length.
- Landscaped areas completely enclosed within the hardscape area, and which width or length are a minimum of 10 ft wide, the perimeter of the landscaped areas or permanent planter shall be added to the hardscape perimeter length.
- Landscaped edges that are not abutting the hardscape shall not be added to the hardscape perimeter length.

D. Initial Wattage Allowances (IWA)

The Initial Wattage Allowance (IWA) is allowed to be used one time per site. The purpose of the IWA is to provide additional watts for small sites, or for odd hardscape geometries. Add the IWA from Table 140.7-A ~~Table 6-8~~ for the appropriate Lighting Zone.

~~Table 6-8 (Table 140.7-A in the Standards) – General Hardscape Lighting Power Allowance~~

Type of Power Allowance	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
Area Wattage Allowance (AWA)	0.035 W/ft ²	0.045 W/ft ²	0.090 W/ft ²	0.115 W/ft ²
Linear Wattage Allowance (LWA)	0.25 W/lf	0.45 W/lf	0.60 W/lf	0.85 W/lf
Initial Wattage Allowance (IWA)	340 W	510 W	770 W	1030 W

Example 6-1414 Power Allowance for Parking Lots

Question

In a parking lot in front of a retail store, we are not using the ~~maximum-full~~ lighting power allowance provided by values from Table 140.7-A for the parking lot. Can we use the remaining allowance to illuminate the building entrance and the walkways near the store to a higher level?

Answer

Yes, because hardscape power densities are tradable, you may use the unused portion of the power allowance in the parking lot to increase the illumination levels for other lighting applications, including building entrance and walkway areas.

Example 6-1545 Illumination for Stairs

Question

Lighting for stairs is exempt from the requirements of §140.7, so is a pole-mounted luminaire that is located at the stairs considered exempt, even though some of the light serves hardscape areas that are not exempt?

Answer

In this example, the luminaire is not regulated by the Energy Standards if the primary purpose for that luminaire is to illuminate the stairs (or other unregulated areas), and a majority of the light coming from a luminaire falls on stairs. However, the luminaire is regulated by the Energy Standards if the majority of the light coming from the luminaire falls on regulated areas, such as hardscape areas other than the stairs. For example, if the luminaire is equipped with optics that directs more than 50 percent of the light towards the stairs, then the luminaire may be considered stair lighting and therefore exempt. Conversely, the luminaire must be considered hardscape lighting if the lack of proper optical controls results in more than 50 percent of the light falling on the adjacent hardscape areas.

Example 6-1646 Calculating the Illuminated Area of a Parking Lot

Question

A parking lot is only illuminated from a series of 5 cut-off wall packs mounted on an adjacent building. The parking lot extends 100 ft from the building. The luminaires are mounted at a height of 15 ft above the ground and spaced 50 ft apart. How large is the illuminated area?

Answer

The illuminated area extends a distance equal to 5 times the mounting height in three directions (the fourth direction is not counted because it is covered by the building). The illuminated area therefore extends from the building a distance of 75 ft. The total illuminated area is 75 ft x 350 ft or 26,250 ft².

Example 6-17 Calculating the Illuminated Area**Question**

If a pole has a height of 15 ft, what are the dimensions of the square pattern used for power calculations?

Answer

The illuminated area is defined as any area within a square pattern around each luminaire or pole that is 10 times the luminaire mounting height, with the luminaire in the middle of the pattern. It does not include any area that is within a building, under a canopy, beyond property lines, or obstructed by a sign or structure. Therefore, for a 15 ft pole, the area will be described by a square that is 150 ft (15 ft x 10) on each side, or 22,500 ft² (150 ft x 150 ft), minus areas that are beyond the property line or other obstructions.

Example 6-18 Calculating the Illuminated Area**Question**

If two poles in the center of an illuminated area are a greater distance than 10 times the mounting height, will all of the square footage between them be included in the area?

Answer

In most applications, for example parking lots, these square patterns will typically overlap, so the entire area of the parking lot between poles will typically be included when determining the lighting power budget. However, if the poles are so far apart that they exceed 10 times the mounting height of the luminaires on the poles, the coverage squares do not overlap and the non-illuminated areas between poles cannot be included in determining illuminated hardscape area.

Example 6-19 Calculating the Power Allowance for a Roadway**Question**

A 300 ft long, 15 ft wide roadway leads through a wooded area to a hotel entrance in Lighting Zone 2, and the owner wants to light the roadway with luminaires mounted at a height of 20 ft. What is the allowed lighting power for this roadway?

Answer

The hardscape area for the roadway must first be calculated. If the entire roadway will be lighted, then the 20 ft poles will not be spaced more than 200 ft apart and not more than 100 ft from the ends of the roadway. (Lighted area is 10 times the pole height.) The hardscape area then is 15 ft x 300 ft or 4500 ft². The linear perimeter of this hardscape is the sum of the sides (not including the side that connects to the larger site) 300 ft + 15 ft + 300 ft or 615 ft.

Three allowances make up the total power allowance: Area, Linear, and Initial. However, the initial wattage allowance applies one time to the entire site. It is not considered for usage for this roadway piece which would only be one small part of the site. All allowances are based on Lighting Zone 2 and found in Table 6-8 (Table 140.7-A in of the Energy Standards). The area wattage allowance is equal to 202.5135 W (0.0450.03 W/ft² x 4500 ft²).

The linear wattage allowance (LWA) is equal to 276.75153.75 W (0.450.25 W/lf x 615 lf).

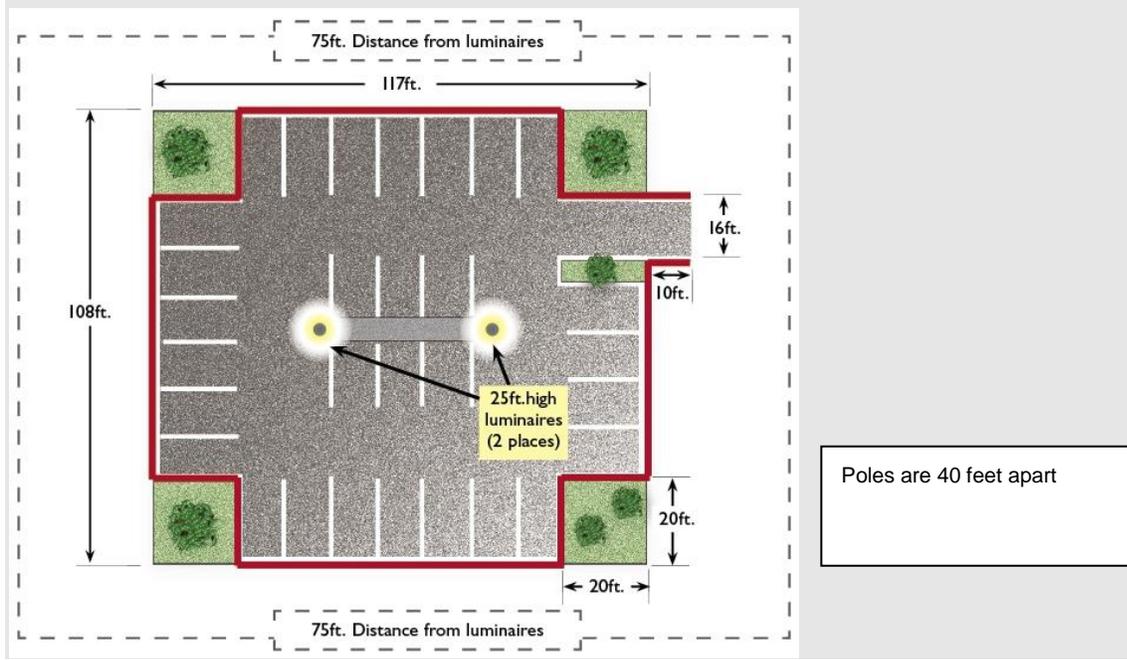
Finally, the sum of these allowances gives a total wattage allowance for the roadway of $479.288.75\text{ W}$ ($202.5135\text{ W} + 276.75153.75\text{ W}$).

<u>Type of Allowance</u>	<u>Allowance</u>	<u>Area/Perimeter Value</u>	<u>Power Allowance</u>
<u>Initial</u>	<u>450W</u>	<u>:</u>	<u>not used</u>
<u>Area</u>	<u>0.030 W/ft²</u>	<u>4500 ft²</u>	<u>135 W</u>
<u>Perimeter</u>	<u>0.25 W/LF</u>	<u>615 ft</u>	<u>153.75 W</u>
<u>TOTAL POWER ALLOWANCE</u>			<u>288.75 W</u>

Example 6-20 Calculating the Power Allowance for a Parking Lot

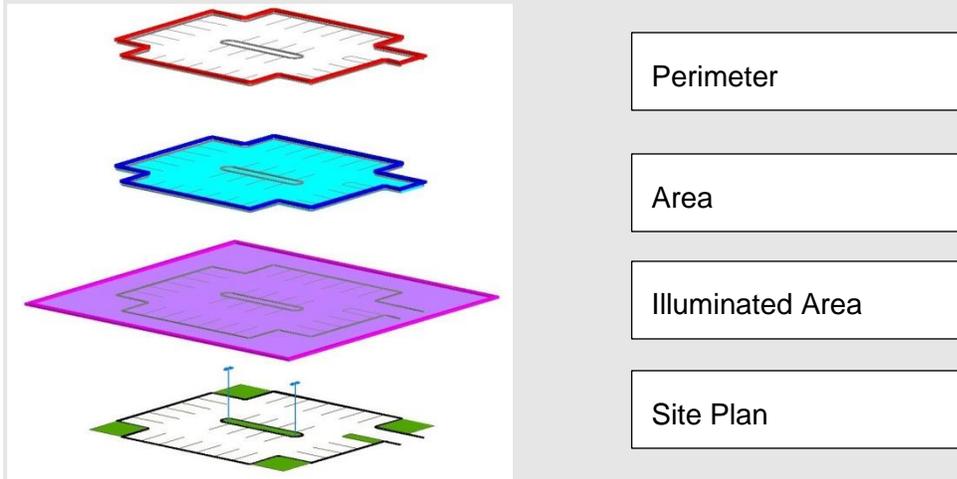
Question

The parking lot illustrated below has two luminaires that are mounted at a height of 25 ft. What is the illuminated hardscape area and what is the allowed lighting? The lot is located in Lighting Zone 3.



Answer

The poles are 40 ft apart, and using the 10 times mounting height rule, the illuminated area can be as large as 250 ft by 290 ft. The boundary of this maximum illuminated area extends beyond the edges of the parking lot as well as the entrance driveway, so the entire paved area is considered illuminated. The landscaped island in middle and peninsula below the entrance driveway are less than 10 ft wide, so they are included as part of the illuminated area, but not part of the hardscape perimeter. The landscaped cutouts (20 x 20 ft) in the corners of the parking lot are bound by pavement on only two sides so they are not included. The total paved area is 11,196 ft². [(12,636 ft² + 160 ft² (driveway) – 1,600 ft² (cutouts)]. The perimeter of the hardscape is 470 ft [(2 x 77 ft) + (2 x 68 ft) + (8 x 20 ft) + (2 X10 ft)].



Three allowances make up the total power allowance: Area, Linear, and Initial. All allowances are based on lighting zone 3 and found in ~~Table 6-8~~ (Table 140.7-A in of the Energy Standards). The area wattage allowance is equal to ~~1,007.6447.84 W~~ (0.0900.040 W/ft² x 11,196 ft²).

The linear wattage allowance (LWA) is equal to ~~282-164.5W~~ (0.600.35W/lf x470-x470 lf). The initial wattage allowance (IWA) is ~~770-520 W~~ for the entire site.

Finally, the sum of these three allowances gives a total wattage allowance for the site of ~~2,059.61132.34 W~~ (1,007.6447.84 W + 282W164.5W+ 770-520 W).

Type of Allowance	Allowance	Area/Perimeter Value	Power Allowance
Initial	770W520W	-	770-520 W
Area	0.0900.040 W/ft²	11,196 ft ²	1,007.6447.84 W
Perimeter	0.600.35 W/LF	470 ft	282-164.5 W
TOTAL POWER ALLOWANCE			2,059.61132.34 W

Example 6-21212123 Calculating the Illuminated Area of a Parking Lot

Question

In the parking lot layout shown above, what would the illuminated area be and what would the maximum allowed lighting power be if much smaller pedestrian style poles were used at 8 ft high and placed 30 ft apart?

Answer

If the mounting height is reduced to 8 ft, and the spacing to 30 ft and using the 10 times mounting height rule, the illuminated area can be a rectangle as large as 80 ft by 110 ft. The hardscape area that intersects the maximum allowed illuminated area is now 8,524 ft² [(80 ft x (80 ft + 30 ft) - 2 x (6 ft x 6 ft cutouts) - 2 x (6 ft x 17 ft cutouts)]. The new hardscape perimeter is 380 ft [(2 x 88 ft) + (2 x 68 ft) + (4 x 6 ft) + (2 x 6 ft) + (2 x 16 ft)].

Using the same allowances as in the previous example, the total wattage allowance for the site is 1,765,993.96 W (767,340.96 area W + 228,133 perimeter W + 770,520 initial W).

<i>Type of Allowance</i>	<i>Allowance</i>	<i>Area/Perimeter Value</i>	<i>Power Allowance</i>
Initial	<u>770W520W</u>	-	<u>770,520 W</u>
Area	<u>0.0900,040 W/ft²</u>	8524 ft ²	<u>767,340.96 W</u>
Perimeter	<u>0.600,35 W/LF</u>	380 ft	<u>228,133 W</u>
TOTAL POWER ALLOWANCE			<u>1,765,993.96 W</u>

1.4.76.4.7

6.4.8 Additional Light Power Allowances and Requirements, by Application

Lighting Application	Lighting Zone 0	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.					
Building Entrances or Exits. Allowance per door. Luminaires must be within 20 feet of the door.	Not applicable	15 watts	25 watts	35 watts	45 watts
Primary Entrances to Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities. Allowance per primary entrance(s) only. Primary entrances are entrances that provide access for the general public. This allowance is in addition to the building entrance or exit allowance above. Luminaires must be within 100 feet of the primary entrance.	Not applicable	45 watts	80 watts	120 watts	130 watts
Drive Up Windows. Allowance per customer service location. Luminaires must be within 2 mounting heights of the sill of the window.	Not applicable	40 watts	75 watts	125 watts	200 watts
Vehicle Service Station Uncovered Fuel Dispenser. Allowance per fueling dispenser. Luminaires must be within 2 mounting heights of the dispenser.	Not applicable	120 watts	175 watts	185 watts	330 watts
ATM Machine Lighting. Allowance per ATM machine. Luminaires must be within 50 feet of the dispenser.	Not applicable	250 watts for first ATM machine, 70 watts for each additional ATM machine.			
WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.					
Outdoor Sales Frontage. Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires must be located between the principal viewing location and the frontage outdoor sales area.	Not applicable	No Allowance	22.5 W/linear ft	36 W/linear ft	45 W/linear ft
WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft²). May be used for any illuminated hardscape area on the site.					
Hardscape Ornamental Lighting. Allowance for the total site illuminated hardscape area. Luminaires must be rated for 100 watts or less and be post-top luminaires, lanterns, pendant luminaires, or chandeliers.	Not applicable	No Allowance	0.02 W/ft ²	0.04 W/ft ²	0.06 W/ft ²
WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft²). May be used as appropriate provided that only one is used for a given area (i.e., provided that two allowances are not applied to the same area).					
Building Facades. Only areas of building façade that are illuminated qualify for this allowance. Luminaires must be aimed at the façade and capable of illuminating it without obstruction or interference by permanent building features or other objects.	Not applicable	No Allowance	0.18 W/ft ²	0.35 W/ft ²	0.50 W/ft ²
Outdoor Sales Lots. Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non-sales areas are considered hardscape areas even if these areas are completely surrounded by sales lots on all sides. Luminaires must be within 5 mounting heights of the sales lot area.	Not applicable	0.164 W/ft ²	0.555 W/ft ²	0.758 W/ft ²	1.285 W/ft ²
Vehicle Service Station Hardscape. Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires must be illuminating the hardscape area and must not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	Not applicable	0.014 W/ft ²	0.155 W/ft ²	0.308 W/ft ²	0.485 W/ft ²
Vehicle Service Station Canopies. Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	Not applicable	0.514 W/ft ²	1.005 W/ft ²	1.300 W/ft ²	2.200 W/ft ²
Sales Canopies. Allowance for the total area within the drip line of the canopy. Luminaires must be located under the canopy.	Not applicable	No Allowance	0.655 W/ft ²	0.908 W/ft ²	1.135 W/ft ²
Non-sales Canopies and Tunnels. Allowance for the total area within the drip line of the canopy or inside the tunnel. Luminaires must be located under the canopy or tunnel.	Not applicable	0.084 W/ft ²	0.205 W/ft ²	0.408 W/ft ²	0.585 W/ft ²

The lighting power for Specific Applications provides additional lighting power that can be layered in addition to the General Hardscape lighting power allowances as applicable.

Most of a site will be classified as 'General Hardscape' and will be calculated using ~~Table 6-8~~ (Table 140.7-A in of the Standards ~~the Energy Standards~~) as the only source of allowance.

Some portions of the site may fit use categories that permit the inclusion of an additional ~~of another~~ lighting allowance for that portion of the site. These Specific Applications are detailed in ~~Table 6-9~~ (Table 140.7-B in of the Standards ~~the Energy Standards~~). Not all of these allowances are based on area.

The single exception to this is the allowance for Hardscape Ornamental Lighting, which is calculated independent of the rest of the Specific Applications, and no regard to the overlap of this Application is made. See Section D for more information about the Hardscape eOrnamental Lighting allowance.

Assigned lighting applications must be consistent with the actual use of the area. Outdoor lighting definitions in §100.1 must be used to determine appropriate lighting applications.

Specific Special Applications that are based on specific instances on the site are the cumulative total of those instances on the site, with the allowance being accumulated per instance.

Specific Special Applications that are based on the length of an instance on the site are calculated as the product of the total length of the instance and the allowance per linear foot for the Application.

A. Specific Allowances Power Trade-Offs Not Allowed

Allowed lighting power for specific applications shall not be traded between specific applications, or to hardscape lighting in §140.7(d)1. This means that for each and every specific application, the allowed lighting power is the smaller of the allowed power determined for that specific application according to ~~Table 140.7-B~~ §140.7(d)2, or the actual installed lighting power that is used in that specific application.

B. Wattage Allowance per Application (watts)

The applications in this category are provided with additional lighting power, in watts (W) per instance, as defined in ~~Table 6-9~~ (Table 140.7-B in of the Energy Standards). Use all that apply as appropriate. Wattage allowances per application are available for the following areas:

- Building Entrances or Exits.
- Primary Entrances of Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities.
- Drive-Up Windows. See Section ~~6.4.9F~~ 6.4.8G for additional information about drive-up windows
- Vehicle Service Station Uncovered Fuel Dispenser. See Section ~~6.4.9C~~ 6.4.8D for additional information about vehicle service stations.
- ATM Machine Lighting

C. Wattage Allowance per Unit Length (w/linear ft) for Outdoor Sales Frontage Application

The wattage allowance per linear foot is available only for outdoor sales frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor. The outdoor sales frontage allowance is calculated as the product of the total length of qualifying sales frontage times the outdoor sales frontage lighting allowance in ~~Table 6-9~~ (Table 140.7-B in ~~of the Standards~~ of the Energy Standards). See Section 6.4.8C for additional information about sales frontage.

D. Wattage Allowance per Hardscape Area Ornamental Lighting Application (W/ft²)

The ornamental lighting allowance on the site is calculated as the product of the total illuminated hardscape for the site times the hardscape ornamental lighting allowance in ~~Table 6-9~~ (Table 140.7-B in ~~of the Standards~~ of the Energy Standards), in watts per square foot (W/ft²). Luminaires qualifying for this allowance shall be rated for 100 W or less as determined in accordance with §130.0(d), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers ~~in accordance with Table 6-9~~. This additional wattage allowance may be used for any illuminated hardscape area on the site. See Section ~~6.4.9E~~ 6.4.8F, Ornamental Lighting, for additional information about ornamental lighting.

E. Wattage Allowance per Specific Area (W/ft²)

Applications in this category are provided with additional lighting power, in watts per ~~instance~~ square foot (W/ft²), as defined in Table 140.7-B of the Energy Standards ~~Table 6-9~~. Wattage allowances per specific area are available for the following areas:

1. Building Facades.

Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects. See Section ~~6.4.9A~~ 6.4.8A for additional information about building facades.

2. Outdoor Sales Lots.

Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non-sales areas shall be considered hardscape areas, not outdoor sales lots, even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this allowance shall be within 5 mounting heights of the sales lot area.

3. Vehicle Service Station Hardscape.

Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure. See Section ~~6.4.9C~~ 6.4.8D for additional information about vehicle service stations.

4. Vehicle Service Station Canopies.

Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy. See Section ~~6.4.9C~~~~6.4.8D~~ for additional information about vehicle service stations.

5. Sales Canopies.

Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy. See Section ~~6.4.9D~~~~6.4.8E~~ for additional information about lighting under canopies.

6. Non-sales Canopies and Tunnels.

Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy. See Section ~~6.4.9D~~~~6.4.8E~~ for additional information about lighting under canopies.

7. Guard Stations.

Allowance up to 1,000 ft² per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates, and vehicle contents. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse. See Section ~~6.4.9G~~~~6.4.8H~~ for additional information about guarded facilities.

8. Student Pick-up/Drop-off zone.

Allowance for the area of the student pickup/drop-off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick-up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 ft, times the smaller of the actual length or 250 ft. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.

9. Outdoor Dining.

Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.

10. Special Security Lighting for Retail Parking and Pedestrian Hardscape.

This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.

1.4.86.4.9 Further Discussion about Additional Lighting Power Allowance for Specific Applications

A. Building Facades

~~§140.7(d)2~~

Building façade is defined in §100.1 as the exterior surfaces of a building, not including horizontal roofing, signs, and surfaces not visible from any ~~reasonable viewing public~~

viewing location. Only areas of building façade that are illuminated ~~shall~~should qualify for this allowance. Luminaires qualifying for this allowance ~~shall~~should be aimed at the façade and ~~shall~~should be capable of illuminating it without obstruction or interference by permanent building features or other objects.

Building façades and architectural features may be illuminated by flood lights, sconces or other lighting attached to the building. Building façade lighting is not permitted in Lighting Zone 0 and Lighting Zone 1. Façade orientations that are not illuminated and façade areas that are not illuminated because the lighting is obstructed shall not be included. General site illumination, sign lighting, and/or lighting for other specific applications can be attached to the side of a building and not be considered façade lighting. Wall packs mounted on sides of the buildings are not considered façade lighting when most of the light exiting these luminaires lands on areas other than the building façade.

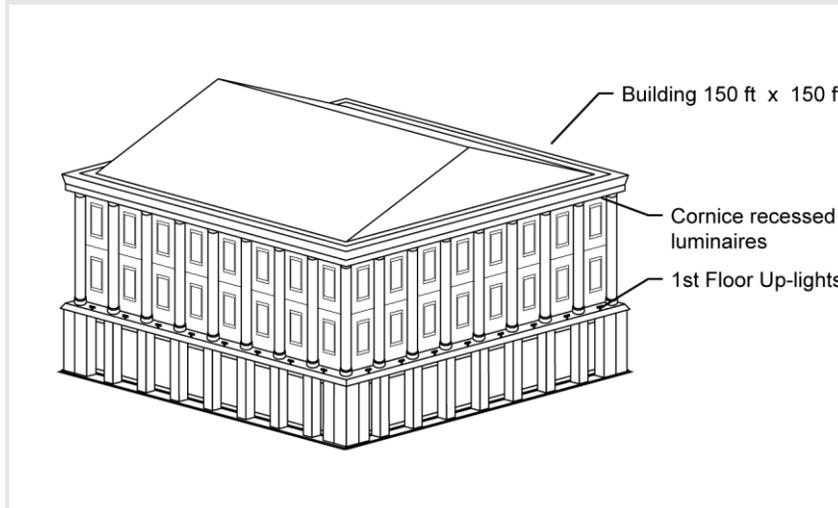


Courtesy of Horton Lees Brogden Lighting Design, Inc of San Francisco
Photographer: Jay Graham

Figure 6-2224 – Façade Lighting

Example 6-22 Calculating the Allowance for a Projected Area

Question



(Lighting Zone 3) A city wants to illuminate its city hall on two sides. The structure is a three-story building with a colonnade on the second and third floors and a cornice above. The columns are considered important architectural features and the principal goal of the lighting project is to highlight these features. The columns are 30 ft tall x 3 ft in diameter and are spaced at 8 ft. For the purposes of determining the lighting power allowance for the building, what is the surface area to be illuminated? What is the lighting power allowance? The columns will be illuminated by downlights at the cornice and uplights above the first floor.

Answer

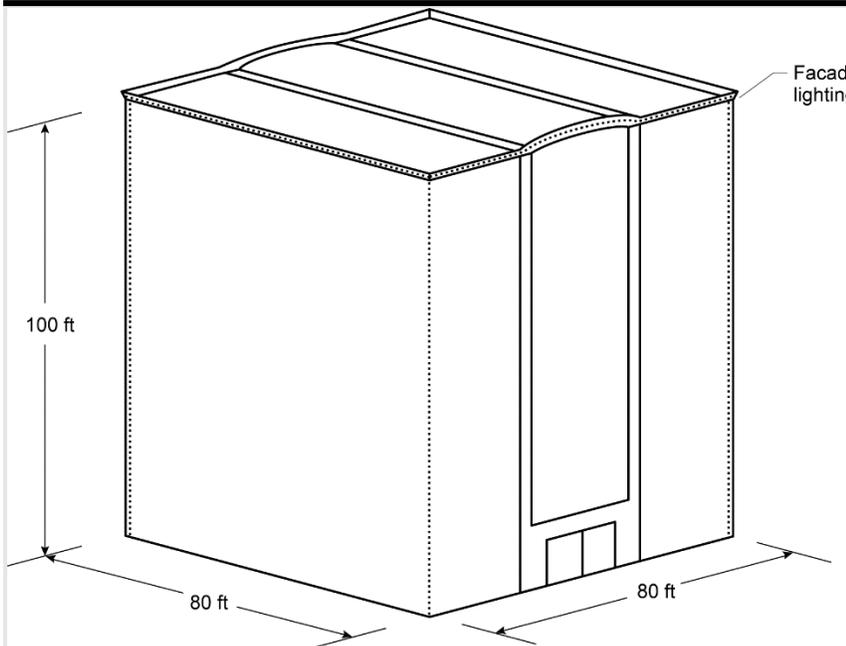
The area of the façade for the purposes of calculating the lighting allowance is the projected area of the illuminated façade. Architectural features such as columns, recesses, facets, etc. are ignored. The illuminated area for each façade is therefore 30 ft x 150 ft or 4,500 ft². The façade allowance for Lighting Zone 3 is 0.35 W/ft², so the total power allowed is 1,575 W per façade, or 3,150 W total.

Type of Allowance	Allowance	Area/Perimeter Value	Power Allowance
Facade	0.35 W/ft ²	B. 4,500 ft ²	1,575 W
TOTAL POWER ALLOWANCE			1,575 W

Example 6-23 Permanent vs. Temporary Façade Lighting

Question

I am designing a high-rise building and permanently mounted marquee lights will be installed along the corners of the building. The lights will be turned on at night, but only for the holiday season, roughly between mid-November and mid-January. The lights consist of a series of 9 W compact fluorescent luminaires spaced at 12 inches on-center (OC) along all the corners of the building and along the top of the building. Essentially, the lights provide an outline of the building. For the purposes of the Outdoor Lighting Standards, are these considered façade lighting? Because they will only be used for about two months of the year, are they considered temporary lighting and exempt?



Answer

The lighting is permanent lighting and must comply with the Energy Standards. Temporary lighting is defined in §100.1404 as is a lighting installation with plug-in connections that does not persist beyond 60 consecutive days or more than 120 days per year. Anything that is permanently mounted to the building is considered permanent lighting, and the hours of intended use do not affect its status as permanent lighting.

Because this lighting is primarily used to accent the architectural outline of the building, it may be considered façade lighting. And because all corners of the building are illuminated, all four façades may be considered to be illuminated. The area on each façade is 80 ft x 100 ft or 8,000 ft². The total illuminated area is four times 8,000 ft² or 32,000 ft². The Lighting Zone 3 allowance for façade lighting is 0.35 W/ft² and the total power allowance for façade lighting is 11,200 W.

There are 100 ft x 4 plus 80 ft x 4 lamps (a total of 720 lamps) on the building. Each lamp is 13 W (including the ballast). This data is taken from Reference Nonresidential Appendix NA8. The installed power is 720 lamps times 13 W/lamp or 9,360 W. The installed power is less than the allowance so the façade lighting complies. If this building were in Lighting Zone 2, the allowance would be 0.18 W/ft² or a total of 5,760 W. The lighting design would not comply in Lighting Zone 2.

Type of Allowance	Allowance	Area/Perimeter Value	Power Allowance
Facade	0.35 W/ft ²	32,000 ft ²	11,200 W
TOTAL POWER ALLOWANCE			11,200 W

Example 6-24 Power Allowance for Facades

Question

Portions of the front façade of a proposed wholesale store in Lighting Zone 3 are going to be illuminated. The front wall dimensions are 120 ft by 20 ft. There is 250 ft² of fenestration in the front wall that is illuminated by the façade lighting. Signs cover another 500 ft² of the front wall, and another 400 ft² is not illuminated at all. What is the allowed front façade lighting power?

Answer

The gross wall area is 2,400 ft² (120 x 20). However we must subtract all those areas that are not illuminated. Note that because the 250 ft² of fenestration is intended to be illuminated by the façade lighting, this area may be included in the total area eligible for power calculations.

The areas not eligible for power calculations include:

500 ft² of signs + 400 ft² of unlighted façade = 900 ft²

Net wall area used for façade lighting: 2,400 ft² – 900 ft² = 1,500 ft²

From ~~Table 6-9~~ (Table 1407-B in of the Energy Standards), the allowed façade lighting power density in Lighting Zone 3 is 0.35 W/ft²

The calculated allowed power based on net wall area is 1,500 ft² x 0.35 W/ft² = 525 W.

The allowed power is therefore the smaller of actual wattage used for façade lighting or 525 W.

<i>Type of Allowance</i>	<i>Allowance</i>	<i>Area/Perimeter Value</i>	<i>Power Allowance</i>
Facade	0.35 W/ft ²	1,500 ft ²	525 W
TOTAL POWER ALLOWANCE			525 W

Example 6-25 Sign Lighting

Question

Is sign lighting part of my façade lighting?

Answer

The sign area must be subtracted from the façade area so that the area is not double counted. The sign lighting must meet the requirements of the Energy Standards for sign lighting. See Chapter 7 for more information about sign lighting.

Example 6-26 Oranamental vs. Façade Lighting

Question

Is the lighting of my parapet wall with small wattage decorative lighting considered ornamental or façade lighting?

Answer

In this example, the lamps attached to a the building façade are considered façade lighting. This cannot be considered ornamental lighting because ornamental lighting is defined in Table 140.7-B of the Energy Standards as post-top luminaires, lanterns, pendant luminaires, chandeliers.

Example 6-27 Hardscape vs. Façade Lighting

Question

If I mount a luminaire on the side of my building to illuminate an area is it considered façade lighting or hardscape lighting?

Answer

It depends on the primary intent of the luminaire. For example, if the luminaire is primarily illuminating the walls (such as a sconce), then it should be considered part of the building façade lighting. If on the other hand, the luminaire is primarily illuminating the parking lot beyond (most wall packs), then it should be part of the hardscape lighting. It should be noted that lighting power tradeoffs are not allowed between building façade and hardscape areas.

C.B. Sales Frontage

§140.7(d)2

This additional allowance is intended to accommodate the retailers need to highlight merchandise to motorists who drive by their lot. Outdoor sales frontage includes car lots, but can also include any sales activity.

Outdoor sales frontage must be immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor. The outdoor sales frontage allowance is calculated as the product of the total length of qualifying sales frontage times the outdoor sales frontage lighting allowance in ~~Table 6-9~~ (Table 147-B in of the Energy Standards).

When a sales lot qualifies for the sales frontage allowance, the total sales lot wattage allowance is determined by adding the following three layers:

- General hardscape lighting power allowance
- Outdoor sales frontage
- Outdoor sales lot

D.C. Vehicle Service Stations

§140.7(d)2

According to the definition in §100.1, vehicle service station is a gasoline, natural gas, diesel, or other fuel dispensing station. In addition to allowances for building entrances and exits, hardscape ornamental lighting, building façade, and outdoor dining allowances, as appropriate; the total wattage allowance specifically applying to vehicle service station hardscape is determined by adding the following layers, as appropriate:

- General hardscape lighting power allowance
- Vehicle service station uncovered fuel dispenser (allowance per fuelling dispenser, with 2 mounting heights of dispenser)
- Vehicle service station hardscape (less area of buildings, under canopies, off property, or obstructed by signs or other structures)
- Vehicle service station canopies (within the drip line of the canopy)

The lighting power allowances are listed in ~~Table 6-9~~ (Table 140.7-B in of the Energy Standards).



Source: AEC Photographer: Tom Bergstrom



Source: AEC Photographer: Tom Bergstrom

Figure 6-3335 – Service Station Hardscape Areas

Example 6-28282830 Calculating Canopy Lighting Area and Hardscape Area

Question

Where does canopy lighting area end and hardscape area start?

Answer

The horizontal projected area of the canopy on the ground establishes the area for under canopy lighting power calculations. This area also referred to as the “drip line” of the canopy.

E.D. Under Canopies

§140.7(e)2

According to the definition in §100.1, a **canopy** is a permanent structure, other than a parking garage, consisting of a roof and supporting building elements, with the area beneath at least partially open to the elements. A canopy may be freestanding or attached to surrounding structures. A canopy roof may serve as the floor of a structure above.

The definition of a canopy states that a canopy is not a parking garage. A parking garage is classified as an unconditioned interior space, whereas a canopy is classified as an outdoor space.

The lighting power allowance for a canopy depends on its purpose. Service station canopies are treated separately (see the previous section). The two types of canopies addressed in this section are those that are used for sales and those that are not. Non-sales canopies include covered walkways, and covered entrances to hotels, office buildings, convention centers and other buildings. Sales canopies specifically cover and protect an outdoor sales area, including garden centers, covered automobile sales lots, and outdoor markets with permanent roofs. The lighting power allowances are listed in ~~Table 6-9~~ (Table 140.7-B in of the Energy Standards).

The area of a canopy is defined as the horizontal projected area, in plain-plan view, directly underneath the canopy. This area is also referred to as the “drip line” of the canopy. Canopy lighting, either sales or non-sales shall comply separately, e.g. trade-offs are not permitted between other specific lighting applications or with general site illumination.

General site lighting or other specific applications lighting, and/or sign lighting that are attached to the sides or top of a canopy, cannot be considered canopy lighting. For example, internally illuminated translucent panels on the perimeter of a canopy are considered sign lighting, while the lighting underneath the canopy and directed towards the ground is canopy lighting.



Source: AEC Photographer: Tom Bergstrom

Figure 6-4446 – Canopy Lighting

Example 6-29 Power Allowance Under Canopies

Question

The first floor of an office tower in Lighting Zone 3 is setback 20 ft on the street side. The width of the recessed façade is 150 ft. The primary purpose of the setback (and canopy) is to provide a suitable entrance to the office tower; however, space under the canopy is leased as news-stand, a flower cart and a shoe shine stand. These commercial activities occupy about half of the space beneath the canopy. What is the allowed lighting power?

Answer

The total canopy area is 20 ft x 150 ft or 3,000 ft². The General ~~H~~Hardscape allowance for the site will need to be separately determined. The canopy allowance is an additional layer allowed only for the canopy area. The 1,500 ft² used for the flower cart, news-stand and shoe shine stand is considered a sales canopy and the allowance is 0.908 W/ft² or a total of 1,362 W. The other 1,500 ft² is a non-sales canopy and the

allowance is 0.408 W/ft² or a total of 612 W. Trade-offs are not permitted between the sales portion and the non-sales portions.

Type of Allowance	Allowance	Area/Perimeter Value	Power Allowance
Non-Sales Canopy	0.408W/ft ²	1,500 ft ²	612 W
Sales Canopy	0.908 w/ft ²	1,500 ft ²	1,362 W
TOTAL POWER ALLOWANCE			1,575 W

F.E. Ornamental Lighting

§140.7(d)2

Ornamental lighting is defined in §101.100.1 as post-top luminaires, lanterns, pendant luminaires, chandeliers, and marquee lighting. However, marquee lighting does not qualify for the ornamental lighting allowance. The allowances for ornamental lighting are listed in Table 6-9 (Table 140.7-B in of the Energy Standards).

The ornamental lighting allowance on the site is calculated as the product of the total illuminated hardscape for the site times the hardscape ornamental lighting allowance in Table 6-9 Table 140.7-B. This allowance is calculated separately, and is not accumulated into the other allowances. This additional wattage allowance may be used for any illuminated hardscape area on the site.

Luminaires used for ornamental lighting as defined in Table 140.7-B shall have a rated wattage, as listed on a permanent, pre-printed, factory-installed label, of 100 W or less.



Source: Ted Walson Photographer

Figure 6-5557– Ornamental Lighting (The cobra head luminaires shown in the above figure are not ornamental lighting. However, if the post-top acorn luminaires are rated 100 watts or less, they qualify as ornamental lighting)

Example 6-30 Bollard Luminaires

Question

Are bollard luminaires considered ornamental lighting?

Answer

No, Ornamental lighting is defined in Table 140.7-B of the Energy Standards as post-top luminaires, lanterns, pendant luminaires, chandeliers.

G.F. Drive-up Windows

§140.7(d)2

Drive-up windows are common for fast food restaurants, banks, and parking lot entrances. In order to qualify, a drive-up window must have someone working behind the “window”. Automatic ticket dispensers at parking lots do not count.

The lighting power allowances are listed in ~~Table 6-9~~ (Table 140.7-B in of the Energy Standards) as a wattage allowance per application.

The wattage allowance in Lighting Zone 3 is 125 W for each drive-up window.

Luminaires qualifying for this allowance must be within 2 mounting heights of the sill of the window.



Source: AEC Photographer: Tom Bergstrom

Figure 6-~~668~~ – Drive-up Windows

Example 6-31 Power Allowance for Drive-up Window**Question**

A drive-up window in Lighting Zone 2 has width of 7 ft. What is the allowed lighting power for this drive-up window?

Answer

The width of a drive-up window is not used for determining the allowed wattage. In Lighting Zone 2, 75 W is allowed for each drive-up window.

H.G. Guarded Facilities

Guarded facilities, including gated communities, include the entrance driveway, gatehouse, and guardhouse interior areas that provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants including, identification documentation, vehicle license plates, and vehicle contents.

There is an allowance of up to 1,000 ft² per vehicle lane. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse.

The power allowances for guarded facilities are listed in ~~Table 6-9~~ (Table 140.7-B in of the Energy Standards).

Example 6-32 Power Allowance for Guard Stations

Question

A guard station to the research campus of a defense contractor consists of a guard station building of 300 ft². Vehicles enter to the right of the station and exit to the left. What is the outdoor lighting power allowance? The guard station is located in Lighting Zone 2.

Answer

Assuming there are two lanes and each lane is 1000 feet long, the allowance for Lighting Zone 2 is 2,000 times 0.355 W/ft² is ~~700~~ 710 W, in addition to the general hardscape lighting power allowance.

Example 6-33 Residential Guarded Facilities

Question

Is the guarded facility at the entrance to a residential gated community covered by the Energy Standards?

Answer

Yes, residential guarded facilities are covered by the Energy Standards.

~~Table 6-9 (Table 140.7-B in the Standards) – Additional Lighting Power Allowance For Specific Applications~~

All area and distance measurements in plan plain view unless otherwise noted.

Lighting Application	Lighting Zone 1	Lighting Zone 2	Lighting Zone 3	Lighting Zone 4
WATTAGE ALLOWANCE PER APPLICATION. Use all that apply as appropriate.				
Building Entrances or Exits. Allowance per door. Luminaires qualifying for this allowance shall be within 20 ft of the door.	30W	60 W	90 W	90 W
Primary Entrances, Senior Care Facilities, Police Stations, Hospitals, Fire Stations, and Emergency Vehicle Facilities. Allowance per primary entrance(s) only. Primary entrances shall provide access for the general public and shall not be used exclusively for staff or service personnel. This allowance shall be in addition to the building entrance or exit allowance above. Luminaires qualifying for this allowance shall be within 100 ft of the primary entrance.	45 W	80 W	120 W	130 W
Drive Up Windows. Allowance per customer service location. Luminaires qualifying for this allowance shall be within 2 mounting heights of the sill of the window.	40 W	75 W	125 W	200 W
Vehicle Service Station Uncovered Fuel Dispenser. Allowance per fueling dispenser. Luminaires qualifying for this allowance shall be within 2 mounting heights of the dispenser.	120 W	175 W	185 W	330 W
WATTAGE ALLOWANCE PER UNIT LENGTH (w/linear ft). May be used for one or two frontage side(s) per site.				
Outdoor Sales Frontage. Allowance for frontage immediately adjacent to the principal viewing location(s) and unobstructed for its viewing length. A corner sales lot may include two adjacent sides provided that a different principal viewing location exists for	No Allowance	22.5 W per linear ft	36 W per linear ft	45 W per linear ft

each side. Luminaires qualifying for this allowance shall be located between the principal viewing location and the frontage outdoor sales area.				
WATTAGE ALLOWANCE PER HARDSCAPE AREA (W/ft²). May be used for any illuminated hardscape area on the site.				
Hardscape Ornamental Lighting. Allowance for the total site illuminated hardscape area. Luminaires qualifying for this allowance shall be rated for 100 W or less as determined in accordance with § 130(d), and shall be post-top luminaires, lanterns, pendant luminaires, or chandeliers.	No Allowance	0.02 W/ft ²	0.04 W/ft ²	0.06 W/ft ²
WATTAGE ALLOWANCE PER SPECIFIC AREA (W/ft²). Use as appropriate provided that none of the following specific applications shall be used for the same area.				
Building Facades. Only areas of building façade that are illuminated shall qualify for this allowance. Luminaires qualifying for this allowance shall be aimed at the façade and shall be capable of illuminating it without obstruction or interference by permanent building features or other objects.	No Allowance	0.18 W/ft ²	0.35 W/ft ²	0.50 W/ft ²
Outdoor Sales Lots. Allowance for uncovered sales lots used exclusively for the display of vehicles or other merchandise for sale. Driveways, parking lots or other non-sales areas shall be considered hardscape areas even if these areas are completely surrounded by sales lot on all sides. Luminaires qualifying for this allowance shall be within 5 mounting heights of the sales lot area.	0.164 W/ft ²	0.555 W/ft ²	0.758 W/ft ²	1.285 W/ft ²
Vehicle Service Station Hardscape. Allowance for the total illuminated hardscape area less area of buildings, under canopies, off property, or obstructed by signs or structures. Luminaires qualifying for this allowance shall be illuminating the hardscape area and shall not be within a building, below a canopy, beyond property lines, or obstructed by a sign or other structure.	0.014 W/ft ²	0.155 W/ft ²	0.308 W/ft ²	0.485 W/ft ²
Vehicle Service Station Canopies Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.514 W/ft ²	1.005 W/ft ²	1.300 W/ft ²	2.2 W/ft ²
Sales Canopies Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	No Allowance	0.655 W/ft ²	0.908 W/ft ²	1.135 W/ft ²
Non-sales Canopies. Allowance for the total area within the drip line of the canopy. Luminaires qualifying for this allowance shall be located under the canopy.	0.084 W/ft ²	0.205 W/ft ²	0.408 W/ft ²	0.585 W/ft ²
Guard Stations. Allowance up to 1,000 ft ² per vehicle lane. Guard stations provide access to secure areas controlled by security personnel who stop and may inspect vehicles and vehicle occupants, including identification, documentation, vehicle license plates, and vehicle contents. Qualifying luminaires shall be within 2 mounting heights of a vehicle lane or the guardhouse.	0.154 W/ft ²	0.355 W/ft ²	0.708 W/ft ²	0.985 W/ft ²
Student Pick up/Drop off zone. Allowance for the area of the student pick up/drop off zone, with or without canopy, for preschool through 12th grade school campuses. A student pick up/drop off zone is a curbside, controlled traffic area on a school campus where students are picked up and dropped off from vehicles. The allowed area shall be the smaller of the actual width or 25 ft, times the smaller of the actual length or 250 ft. Qualifying luminaires shall be within 2 mounting heights of the student pick-up/drop-off zone.	No Allowance	0.12 W/ft ²	0.45 W/ft ²	No Allowance
Outdoor Dining. Allowance for the total illuminated hardscape of outdoor dining. Outdoor dining areas are hardscape areas used to serve and consume food and beverages. Qualifying luminaires shall be within 2 mounting heights of the hardscape area of outdoor dining.	0.014 W/ft ²	0.135 W/ft ²	0.240 W/ft ²	0.400 W/ft ²
Special Security Lighting for Retail Parking and Pedestrian Hardscape. This additional allowance is for illuminated retail parking and pedestrian hardscape identified as having special security needs. This allowance shall be in addition to the building entrance or exit allowance.	0.007 W/ft ²	0.009 W/ft ²	0.019 W/ft ²	No Allowance

Example 6-34 Outdoor Lighting for Hospitals**Question**

Is the parking lot outside of a hospital (“I” occupancy) regulated by the Energy Standards?

Answer

No. Hospitals are “I” type occupancies and are not covered by the Building Energy Efficiency Standards. This includes all outdoor areas. The same is true for all other “I” type occupancies such as detention facilities.

Example 6-35 Parking Garage Standards**Question**

We have a 5 story parking garage. The top level is uncovered. What are the lighting Standards requirements for this garage?

Answer

Because the lower 4 floors have a roof, they are considered indoor unconditioned buildings and must comply with the requirement of Standards Table 140.6-C. For these levels, indoor compliance ~~forms~~ documents will be required. The uncovered top floor is considered a parking lot and therefore must comply with the hardscape requirements of ~~Table 6-8~~ (Table 140.7-A in the Energy Standards). Outdoor lighting compliance ~~forms~~ documents will be required for the top level.

Example 6-36 Hardscape Materials for Parking Lots**Question**

Our overflow parking lot is covered with gravel. Is this parking lot considered “hardscape” and must it comply with ~~Table 6-8~~ requirements?

Answer

Yes, parking lots covered with gravel, or any other material used to enhance the surface to accommodate parking or travel, such as pavers, asphalt, cement, or other pervious or non-pervious materials are considered hardscape and must comply with the requirements for hardscape areas.

1.56.5 Alterations and Additions for Outdoor Lighting

§141.0(b)2J

This section will be released for comment separately.

1.6.6 Outdoor Lighting Compliance Documents

This section contains information about required outdoor lighting documentation, including outdoor lighting plan check documents in Section 6.6.5, Installation Certificate in Section 6.6.7, and Certificate of Acceptance in Section 6.6.9.

1.6.16.6.1 Overview

At the time a building permit application is submitted to the enforcement agency, the applicant also submits plans and energy compliance documentation. This section describes the compliance documentations (compliance forms) recommended needed for compliance with the nonresidential outdoor lighting requirements of the 2013 Energy Standards.

This section is addressed to the person preparing construction and compliance documents, and to the enforcement agency plan checkers who are examining those documents for compliance with the Standards the Energy Standards.

~~Documents for compliance with the 2013 lighting requirements are proposed to change as follows:~~

- ~~A. For the period of January 1 through December 31, 2014, compliance documents are proposed to be similar to the 2008 compliance documents, except they have been updated to reflect changes in the 2013 Standards.~~
- ~~B. Starting on January 1, 2015, the Energy Commission proposes to have developed electronic compliance documents to replace existing nonresidential paper documents.~~

1.6.2 Submitting Compliance Documentation

~~At the time a building permit application is submitted to the enforcement agency, the applicant also submits plans and energy compliance documentation. This section describes the recommended compliance documentation (forms) for complying with the nonresidential outdoor lighting requirements of the Standards. It does not describe the details of the requirements.~~

~~This section is addressed to the person preparing construction and compliance documents, and to the enforcement agency plan checkers who are examining those documents for compliance with the Standards.~~

1.6.3 Varying Number of Rows per Document

~~The paper prescriptive compliance documents have a limited number of rows per section for entering data. Some designs may need fewer rows, and some designs may need additional rows. If additional rows are required for a particular design, then multiple copies of that page may be used.~~

1.6.46.6.2 Compliance Documentation and Numbering Scheme

Nonresidential outdoor lighting Certificate of Compliance documents are listed below:

- NRCC-LTO-01-E; Certificate of Compliance: Outdoor Lighting
- NRCC-LTO-02-E; Certificate of Compliance: Outdoor Lighting Controls
- NRCC-LTO-03-E; Certificate of Compliance: Outdoor Lighting Power Allowances

Nonresidential outdoor lighting Certificate of Installation documents are listed below:

- NRCI-LTO-01-E; Certificate of Installation; Outdoor Lighting
- NRCI-LTO-02-E; Certificate of Installation: Energy Management Control System or Lighting Control System
- —

Nonresidential outdoor lighting Certificate of Acceptance document:

- NRCA-LTO-02-A; Certificate of Acceptance, Outdoor Lighting Controls

~~Following is an explanation of the~~ The Energy Standards use the following numbering scheme for of the 2013-nonresidential lighting compliance documentation numbering documents:

NRCC	Nonresidential Certificate of Compliance
NRCA	Nonresidential Certificate of Acceptance
NRCI	Nonresidential Certificate of Installation
NRCA	Nonresidential Certificate of Acceptance

LTI	Lighting, Indoor
LTO	Lighting, Outdoor
LTS	Lighting, Sign
01	The first set of compliance documents in this sequence
E	Primarily used by enforcement authority
A	Primarily used by acceptance tester

The paper prescriptive compliance documents have a limited number of rows per section for entering data. Some designs may need fewer rows, and some designs may need additional rows. If additional rows are required for a particular design, then multiple copies of that page may be used.

1.6.5 Certificate of Compliance Documents

~~Nonresidential outdoor lighting Certificate of Compliance documents are listed below:~~

- ~~NRCC-LTO-01-E; Certificate of Compliance: Outdoor Lighting~~
- ~~NRCC-LTO-02-E; Certificate of Compliance: Outdoor Lighting Controls~~
- ~~NRCC-LTO-03-E; Certificate of Compliance: Outdoor Lighting Power Allowances~~

1.6.6 Instructions for Completing Certificates of Compliance

A. NRCC-LTO-01-E: Certificate of Compliance: Outdoor Lighting

~~If there are outdoor lighting for the newly constructed building or for the addition, or there are any altered outdoor lighting, t~~The NRCC-LTO-01-E Certificate of Compliance form is in six pages. Each page, if required (see below), must appear on the plans (usually near the front of the electrical drawings). A copy of these forms should also be submitted to the enforcement agency along with the rest of the compliance submittal at the time of building permit application. With enforcement agency approval, the applicant may use alternative formats of these forms (rather than the official Energy Commission forms), provided the information is the same and in a similar format.

Project Description

- ~~PROJECT NAME~~ is the title of the project, as shown on the plans and known to the enforcement agency.
- ~~DATE PREPARED~~ is the date of preparation of the compliance submittal package. It should be on or after the date of the plans, and on or before the date of the building permit application.
- ~~PROJECT ADDRESS~~ is the address of the project as shown on the plans and as known to the enforcement agency.
- ~~TOTAL HARDSCAPE ILLUMINATED AREA~~ is the total of the hardscape illuminated area determined in accordance with §140.7(d)1A. This number shall be taken from OLTG (Page 1 of 3), section A. Lighting Power Allowance for General Hardscape, the sum of Column A

General Information

- ~~PHASE OF CONSTRUCTION~~ indicates the status of the outdoor lighting project described in the compliance documents. Refer to Section 1.6 for detailed discussion of the various choices.
 - ~~NEW CONSTRUCTION~~ should be checked for all new outdoor lighting systems.
 - ~~ADDITION~~ should be checked for an addition to a site with an existing outdoor lighting system.
 - ~~ALTERATION~~ should be checked for alterations to an existing outdoor lighting system.
- ~~OUTDOOR LIGHTING ZONE~~ is described in Table 10-114-A of the Standards. Default lighting zones shall be used unless the local jurisdiction having authority has conducted a public process to officially amend the outdoor lighting zone of a specific area, and has filed the change with the Energy Commission.

~~One box shall be checked to declare the outdoor lighting zone, and another box shall be checked to declare if the default lighting zone or the amended outdoor lighting zone is used. Documentation Author's Declaration Statement~~

- ~~DOCUMENTATION AUTHOR~~ is the person who prepared the energy compliance documentation and who signs the Declaration Statement. The person's telephone number

is given to facilitate response to any questions that arise. A Documentation Author may have additional certifications such as an Energy Analyst or a Certified Energy Plans Examiner certification number. Enter number in the EA# or CEPE# box if applicable.

Responsible Person's Declaration Statement

The "responsible person" signing the Certificate of Compliance is required to be eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design, to certify conformance with Part 6. If more than one person has responsibility for the building design, each person (such as an eligible lighting designer) shall sign the Certificate of Compliance document(s) applicable to that portion of the design for which the person is responsible. Alternatively, the person with chief responsibility for the building design shall prepare and sign the Certificate of Compliance document(s) for the entire building design.

The person's telephone number is given to facilitate response to any questions that arise.

Lighting Compliance Documents Checklist

Check all appropriate boxes to indicate which compliance documents are included in the nonresidential lighting compliance documentation package.

Summary of Allowed Outdoor Lighting Power

A lighting design complies with the lighting power requirements if the installed lighting power is less than or equal to the allowed lighting power. This summary table is used to calculate and document if the project complies with the lighting power requirements.

The values inserted into this table must be calculated and documented on other pages of the lighting compliance documents, as shown in the table:

Declaration of Required Certificates of Installation

In addition to the Certificates of Compliance, the Standards also require a number of Certificates of Installation to be submitted to the authority having jurisdiction. See section 6.6.7 of this chapter for additional information.

This section of the compliance documentation serves as an acknowledgement of, and a declaration that Certificates of Installation are required to be submitted for compliance with the nonresidential lighting Standards. The boxes must be checked for every Certificate of Installation that applies to the job.

The required nonresidential outdoor lighting Certificates of Installation include the following:

- ~~NRCI-LTO-01-E~~ must be submitted for all buildings. This is the general Certificate of Installation used to declare that what was proposed in the Certificates of Compliance is actually what was installed.
- ~~NRCI-LTO-02-E~~ must be submitted whenever a lighting control system, and whenever an Energy Management Control System (EMCS), has been installed to comply with any of the lighting control requirements in the Standards.

See section 6.6.8 of this chapter for additional information.

Declaration of Required Certificates of Acceptance

Before an occupancy permit shall be granted for a newly constructed building or area, or a new lighting system serving a building, area, or site is operated for normal use, indoor and outdoor lighting controls serving the building, area, or site shall be certified as meeting the Acceptance Requirements for Code Compliance.

This section of the compliance documentation serves as an acknowledgement of, and as a declaration that Certificates of Acceptance are required to be submitted for compliance with the nonresidential lighting Standards. The boxes must be checked for every Certificate of Acceptance that applies to the job.

See section 6.6.9 of this chapter for additional information.

- Instructions to the Designer:

The Acceptance Test forms are to be used by the designer and attached to the plans.

The tester is required to check the acceptance tests and check that all control devices serving the building or space are certified as meeting the Acceptance Requirements for Code Compliance. If all the lighting systems or controls of certain types require a test, list the different lighting and the number of systems. The NA7 Section in the Nonresidential Reference Appendices Manual describes the test. Forms can be grouped by type of Luminaire controlled.

- For the Enforcement Agency:

The Certificates of Acceptance compliance documents are not considered complete and are not to be accepted by the enforcement agency unless the boxes are checked and/or filled and signed. The field inspector must receive the properly filled out and signed forms before the building can receive final occupancy. A copy of the Certificates of Acceptance must be provided to the owner of the building for their records.

The required nonresidential outdoor lighting Certificates of Acceptance include the following:

- NRCA-LTO-02-E – Must be submitted whenever outdoor lighting controls are installed.

Schedule of luminaires exempt from the outdoor lighting power requirements in §140.7.

When more than 50 percent of the light from a luminaire falls on one or more of the 13 Exceptions to §140.7, the lighting power for that luminaire shall be exempt from §140.7(b). This table is where those exempt luminaires are documented.

- NAME OR SYMBOL shall correspond to the name or symbol on the plans
- DESCRIPTION – all luminaires included in this column must be in accordance with §140.7.

Schedule of luminaires exempt from the cutoff requirements in §130.2(b)

Outdoor luminaires that use lamps rated less than or equal to 150 W (§130.2(b)) in the hardscape areas, parking lots, building entrances, canopies and all outdoor sales areas are exempt from the Uplight and Glare zonal lumen limits as designated in Table 130.2-A. This table is where those exempt luminaires are documented.

- NAME OR SYMBOL shall correspond to the name or symbol on the plans
- DESCRIPTION – all luminaires included in this column must be in accordance with §130.2(b).

Schedule of luminaires exempt from the outdoor lighting control requirements in §130.2(c)

Outdoor luminaires are exempted from the outdoor lighting control requirements in the following cases:

- Outdoor lighting not permitted by to be turned OFF for compliance with a health or life safety statute, ordinance, or regulation to be turned OFF.

- ~~Lighting in tunnels required to be illuminated 24 hours per day and 365 days per year.~~

~~This table is where those exempt luminaires are documented.~~

- ~~NAME OR SYMBOL shall correspond to the name or symbol on the plans~~
- ~~DESCRIPTION – all luminaires included in this column must be in accordance with §130.2(c).~~

~~Luminaire Schedule~~

- ~~NAME OR TAG is the name or symbol used on the plans to identify the luminaire.~~
- ~~LUMINAIRE DESCRIPTION is a complete narrative description of the luminaire, including the type of luminaire, number and type of lamps or light sources in the luminaire, and number and type of ballast(s), drivers or generators in the luminaire. For example:~~
- ~~LUMINAIRE TYPE is the type of luminaire, such as shoe box, cobra head, post top, etc.~~
- ~~LAMP OR LIGHT SOURCE TYPE is the type of lamps or light source such as high pressure sodium, ceramic metal halide, induction, LED, etc.~~
- ~~BALLAST OR DRIVER TYPE is the type of ballast or driver, such as electronic, dimmable, etc.~~
- ~~WATTS PER LUMINAIRE is the total input wattage of the complete lighting unit in accordance with §130.0(c or d). This is the total rated wattage of the luminaire, including lamp, light source, ballast, driver and/or generator not the nominal wattage of the lamp or light source (bulb) used in the luminaire.~~
- ~~SPECIAL FEATURES is if there exist any special features for the field inspector to verify.~~
- ~~HOW WAS WATTAGE DETERMINED? If CEC DEFAULT is checked, this indicates the wattage is a standard value taken from the data in Reference Nonresidential Appendix NA8. If this column is not checked, this indicates the nonstandard values must be substantiated with manufacturer's data sheets and determined according to §130.0(c or d).~~
- ~~NUMBER OF LUMINAIRES is the number of luminaires of the identical type used for this particular function area.~~
- ~~INSTALLED WATTS is determined by the product of the watts per Luminaire (column D) and the number of luminaires (column G).~~
- ~~After the page has been completed, all of the installed watts in Column H shall be added up and entered into OLTG-1C, Page 4, Row HI.~~
- ~~FIELD INSPECTOR, this column is reserved for the field inspector whom determines if the system installed matches the forms. The inspector is to indicate in this column whether the system passes or fails.~~

~~B. NRCC-LTO-02-E: Certificate of Compliance: Outdoor Lighting Controls~~

~~The project name and date shall match the information on NRCC-LTO-01-E.~~

~~Mandatory Outdoor Lighting Control Declaration Statements~~

The check boxes on this page serve as declaration statements for which the person signing the document is taking responsibility. All relevant boxes are required to be checked.

~~Mandatory Outdoor Lighting Control Schedule and Field Inspection Checklist~~

This table serves two purposes, one is to document compliance with the outdoor lighting control requirements in §130.2 and the other is for use as a field inspection checklist.

- ~~LOCATION AND APPLICATION OF LUMINAIRES BEING CONTROLLED~~

indicates the location and the type of area the control serves;

- ~~TYPE/DESCRIPTION~~ is a short description of the generic type of control that is installed shall be a narrative describing the device.

- ~~NUMBER OF UNITS~~ indicates to the number of controls of the same type that are installed in that location/area ~~STANDARDS~~ area STANDARDS ~~COMPLYING WITH~~. In each row, enter a check to show which code section this particular control is installed to comply with. Typically, only one box will be checked per row.

If the area is exempted from that particular code requirement, enter “E” (for “exempt”) in the column.

For each location/application, sufficient controls must be installed to meet the requirements of all applicable code sections.

- ~~✓ IF ACCEPTANCE TEST REQUIRED~~. Check this box if an acceptance test is required for this control. Under section 130.4, acceptance tests are required for the following control types:

- ~~Outdoor Motion Sensor~~

- ~~Outdoor Lighting Automatic Shut-off Controls~~

- ~~Outdoor Photocontrol~~

- ~~Astronomical Time Switch~~

- ~~Part Night Functional Testing~~

- ~~FIELD INSPECTOR PASS/FAIL~~. This column allows the field inspector to indicate whether the control either passed or failed the acceptance test (if required);

~~Documentation Author's Declaration Statement~~

- ~~DOCUMENTATION AUTHOR~~ is the person who prepared the energy compliance documentation and who signs the Declaration Statement. The person's telephone number is given to facilitate response to any questions that arise. A Documentation Author may have additional certifications such as an Energy Analyst or a Certified Energy Plans Examiner certification number. Enter number in the EA# or CEPE# box if applicable.

~~Responsible Person's Declaration statement~~

The “responsible person” signing the Certificate of Compliance is required to be eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design, to certify conformance with Part 6. If more than one person has responsibility for the building design, each person (such as an eligible lighting designer) shall sign the Certificate of Compliance document(s) applicable to that portion of the design for which the person is responsible. Alternatively, the person with chief

responsibility for the building design shall prepare and sign the Certificate of Compliance document(s) for the entire building design.

The person's telephone number is given to facilitate response to any questions that arise.

C.— NRCC-LTO-03-E; Certificate of Compliance: Outdoor Lighting Power Allowances Form NRCC-LTO-03-E shall be completed and submitted to indicate the allowed lighting power for the project. This form is not required to be on the plans; it may be submitted separately in the energy compliance package, or it may be included on the plans.

Outdoor Lighting Power Allowance Summary

This table is used to calculate of the total lighting power allowance for the project, calculated as the sum of the hardscape allowances shown in table B, and the additional specific "use-it-or-lose-it" allowances shown in tables C-1 through C-4

General Hardscape Lighting Power Allowance From Table 140.7-A

This table is used to calculate the general hardscape lighting power allowances for general hardscape illumination (Standards Table 140.7-A).

- — ILLUMINATED HARDSCAPE AREA is the area of the general hardscape determined in accordance with §140.7(d)1A.
- — AREA WATTAGE ALLOWANCE (AWA) PER SQUARE FOOT is amount of wattage allowed per square foot of hardscape area found listed in Standards Table 147-A.
- — AWA is calculated by multiplying the ILLUMINATED HARDSCAPE AREA (column A) and the AWA PER SQUARE FOOT (column B). The result is the allowed wattage in watts for that area.
- — PERIMETER LENGTH is the measured length of the general hardscape area determined in accordance with §140.7(d) 1B.
- — LINEAR WATTAGE ALLOWANCE (LWA) PER LINEAR FOOT is the allowed wattage per linear foot listed in Standards Table 140.7-A.
- — LWA is calculated by multiplying the PERIMETER LENGTH (column D) and the LWA PER LINEAR FOOT (column E). The result is the allowed wattage in watts.
- — INITIAL WATTAGE ALLOWANCE (IWA) is a power allowance given for each project, irrespective of the type, area or perimeter length of the project. The number of Watts allowed is dependent of the outdoor lighting zone, and listed in Standards Table 147-A.
- — TOTAL GENERAL HARDSCAPE LIGHTING ALLOWANCE is the total allowed watts for the general hardscape illumination and is calculated by the sum of the AWA (column C), LWA (column F) and the IWA (column G).

Add up all of the rows for Column H, and insert the total site General Hardscape Lighting Allowance into the summary table above, and in NRCC-LTO-01-E, into row 1 of the table labeled "Summary of Allowed Outdoor Lighting Power".

The "Yes" box shall be checked to declare that the AWA, LWA, and IWA from Table 140.7-A was used as appropriate for the Outdoor Lighting Zone for this particular site.

Additional Specific "Use It Or Lose It" Outdoor Lighting Power Allowances

The four tables in this section are used to calculate the four types of additional specific "use-it-or-lose-it" allowances. For each allowance, the allowed wattage (for use in the

Performance Method of compliance) is the lesser of the allotted wattage or the design wattage.

~~1. — Lighting Compliance Summary per Application~~

~~Part D of the OLTG-2C, Page 2 of 3 is for specific application lighting wattage allowance per application in accordance with Table 140.7-B.~~

- ~~• — SPECIFIC LIGHTING APPLICATION is listed in accordance with Standards Table 140.7-B.~~
- ~~• — NUMBER OF LUMINAIRES is the number of identical luminaires used in the single specific application identified in Column A for this row.~~
- ~~• — SPECIFIC APPLICATION ALLOWANCE is the allowed watts for the specific application listed in this row, dependent on outdoor lighting zone, and found in Standards Table 140.7-B. Note: for this section this shall be listed as watts.~~
- ~~• — WATTAGE ALLOWED is the product of the NUMBER OF LUMINAIRES (column B) and the SPECIFIC APPLICATION ALLOWANCE of column C.~~
- ~~• — LUMINAIRE SYMBOL is the description corresponding to the plans.~~
- ~~• — LUMINAIRE TYPE is the description of the type of luminaire used in this specific application.~~
- ~~• — LUMINAIRE QUANTITY is the number of identical luminaire types for this single specific application.~~
- ~~• — WATTS PER LUMINAIRE is the number of watts the luminaire is rated at as determined according to §130.0(c and d). It is not the wattage of the lamp (bulb) or light source installed in the luminaire.~~
- ~~• — DESIGN WATTS is the product of the number of luminaires of the same type (column G) and the watts per luminaire (column H).~~
- ~~• — ALLOWED WATTS is the smaller of the wattage allowed in column D or the DESIGN WATTS of column I.~~

~~Add up all of the rows for Column J, and insert the Specific application wattage allowance per application into OLTG-1C (Page 4 of 4) Row D.~~

~~2. — Lighting Compliance Summary for Special Applications Per Unit Length~~

~~Part B of the OLTG-2C, Page 1 of 3 is for specific application lighting wattage allowance per unit length, which is available only for projects with a sales frontage.~~

- ~~• — SPECIFIC LIGHTING APPLICATION shall only list “Outdoor Sales Frontage” in accordance with Standards Table 140.7-B. No other lighting applications qualify to use this allowance.~~
- ~~• — LINEAR FEET OF FRONTAGE is the measured value of the sales frontage measured in feet.~~
- ~~• — SALES FRONTAGE ALLOWANCE is the amount listed, dependent of outdoor lighting zone, and found in Standards Table 140.7-B.~~
- ~~• — WATTAGE ALLOWED is the product of the LINEAR FEET (column B) and the SALES FRONTAGE ALLOWANCE of column C.~~
- ~~• — NAME OF SYMBOL is the description corresponding to the plans.~~

- ~~LUMINAIRE TYPE is the description of the type of luminaire.~~
- ~~LUMINAIRE Uplight and Glare Lumen Limits for luminaires greater than 150 watts as installed (including tilt).~~
- ~~LUMINAIRE QUANTITY is the number of identical luminaires.~~
- ~~WATTS PER LUMINAIRE is the rated watts the luminaire as determined in accordance with §130.0(c or d). It is not the wattage of the lamp (bulb) or light source installed in the luminaire.~~
- ~~DESIGN WATTS is the product of the number of luminaires of the same type (column G) and the watts per luminaire (column H).~~
- ~~ALLOWED WATTS is the smaller of the wattage allowed in column D or the DESIGN WATTS of column I.~~

Add up all of the rows for Column J and insert the Specific application lighting wattage allowance per unit length into OLTG-1C (Page 4 of 4) Row B.

3. ~~Lighting Compliance Summary for Ornamental Lighting~~

Part C of the OLTG-2C, Page 1 of 3 is for specific application lighting wattage allowance for ornamental lighting, which is available only for projects with hardscape ornamental lighting.

- ~~SPECIFIC LIGHTING APPLICATION shall only be listed as “Hardscape Ornamental Lighting” in accordance with Table 140.7-B.~~
- ~~SQUARE FEET OF HARDSCAPE is the total hardscape area for the site, as defined in §100.1.~~
- ~~ORNAMENTAL LIGHTING ALLOWANCE is the amount listed, depending on the outdoor lighting zone, in accordance with Standards Table 140.7-B.~~
- ~~WATTAGE ALLOWED is the product of the SQUARE FEET (column B) and the ORNAMENTAL LIGHTING ALLOWANCE of column C.~~
- ~~NAME OF SYMBOL is the description corresponding to the plans.~~
- ~~LUMINAIRE TYPE is the description of the lighting type.~~
- ~~LUMINAIRE Uplight and Glare lumen limits for luminaires greater than 150 watts as installed (including tilt).~~
- ~~LUMINAIRE QUANTITY is the number of identical luminaires.~~
- ~~WATTS PER LUMINAIRE is the rated watts of the luminaire in accordance with §130.0(c and d). It is not the wattage of the lamp (bulb) or light source installed in the luminaire.~~
- ~~DESIGN WATTS is the product of the number of identical luminaires (column G) and the watts per luminaire (column H).~~
- ~~ALLOWED WATTS is the smaller of the wattage allowed in column D or the DESIGN WATTS of column I.~~

Add up all of the rows for Column J, and insert the Specific application wattage allowance for ornamental lighting into OLTG-1C (Page 4 of 4) Row C.

4. ~~Lighting Compliance Summary per Specific Application Area~~

Part E of the OLTG-2C, Page 2 of 3 is for specific application lighting wattage allowance area.

- ~~SPECIFIC LIGHTING APPLICATION~~ is listed in Standards Table 140.7-B.
- ~~ILLUMINATED AREA~~ is the calculated area specific to the single application listed on this row.
- ~~SPECIFIC APPLICATION ALLOWANCE~~ is the watts per square foot listed, dependent on outdoor lighting zone, and found in Standards Table 140.7-B.
- ~~WATTAGE ALLOWED~~ is the product of the SQUARE FEET (column B) and the SPECIFIC APPLICATION ALLOWANCE of column C.
- ~~CODE FOR LUMINAIRE TYPE~~ is the description corresponding to the plans.
- ~~LUMINAIRE TYPE~~ is the description of the lighting type.
- ~~LUMINAIRE Uplight and Glare lumen limits~~ for luminaires over 150 watts, unless exempted such as building façade and sign lighting.
- ~~LUMINAIRE QUANTITY~~ is the number identical luminaires for this single specific application.
- ~~WATTS PER LUMINAIRE~~ is the number of watts the luminaire is rated as determined in accordance with §130.0(c and d). It is not the wattage of the lamp (bulb) or light source installed in the luminaire.
- ~~DESIGN WATTS~~ is the product of the number of identical luminaires (column G) and the watts per luminaire (column H).
- ~~ALLOWED WATTS~~ is the smaller of the wattage allowed in column D or the DESIGN WATTS of column I.

Add up all of the rows for Column J, and insert the Specific application lighting wattage allowance per area into OLTG-1C (Page 4 of 4) Row E.

Outdoor Lighting Mandatory Measures

This portion requests the location of notes clarifying the inclusion of the mandatory requirements. Notes should be included on the plans to demonstrate compliance with mandatory requirements of the Standards.

Following are prototype examples of the notes that should be rewritten to actual conditions. A note for each of the items listed should be included, even if the note states “not applicable”.

Determining installed lighting power

Installed lighting power has been determined in accordance with §130.0(c and d).

Controls for inefficient lighting systems

All outdoor incandescent luminaires with lamps rated over 100 W must be controlled by a motion sensor [§130.2(a)].

Outdoor luminaire Uplight and Glare zonal lumen limits

Controls to turn off the lights during the day

All permanently installed outdoor lighting must be controlled by a photoelectric switch or astronomical time switch that automatically turns off the outdoor lighting when daylight is available (§130.2(c)1).

~~Controls to provide the option to turn off a portion of the lights~~

~~For lighting of building facades, parking lots, garages, sales and non-sales canopies, and all outdoor sales areas, automatic controls are required to provide the owner with the ability to turn off the lighting or to reduce the lighting power by at least 50 percent but not exceeding 80 percent when the lighting is not needed [§130.2(c)2].~~

~~The above notes are only examples of wording. Each mandatory measure that requires a separate note should be listed on the plans.~~

~~To verify certification, use one of the following options:~~

- ~~• The Energy Hotline (see above) can verify certification of appliances not found in the above directories.~~
- ~~• The Energy Commission's Web Site includes listings of energy efficient appliances for several appliance types. The web site address is <http://www.energy.ca.gov/appliances/database/>~~

~~Documenting the mandatory measures on the plans is accomplished through a confirmation statement, notes and actual equipment location as identified on the plans. The plans should clearly indicate the location and type of all mandatory control devices; such as motion sensors, photocontrols, astronomical time switches, and automatic time switches.~~

~~Special Features Inspection Checklist~~

~~This section is for special features upon which require written justification, documentation and inspection.~~

~~Acceptance Form~~

~~The person with overall responsibility of the project must list the applicable Acceptance Testing, OLTG-2A that is to be completed by the end of the project. The space provided should list each system and accompanying test.~~

- ~~• EQUIPMENT — indicate the equipment type that requires testing.~~
- ~~• DESCRIPTION — give a brief description of the luminaires controlled by the equipment described in the previous column.~~
- ~~• NUMBER OF CONTROLS — indicate the number of controls that will be included in the test.~~
- ~~• LOCATION — indicate the location or area being controlled and tested.~~

~~Indicate the Acceptance Test pertinent to the equipment described in that row. Insert:~~

- ~~• OMS for Outdoor Motion Sensor~~
- ~~• OLSC for Outdoor Lighting Shutoff Controls~~
- ~~• OP for Outdoor Photocontrol~~
- ~~• ATS for Astronomical Time Switch~~
- ~~• STS for Standard (non-astronomical) Time Switch~~

1.6.7.6.3 Certificate of Installation Documents

The Certificates of Installation are primarily used to declare that what was installed matches as declarations, the plans on the Certificates of Compliance. The Certificate is signed by a person with an approved license, that what was claimed on the Certificates of Compliance is actually what was installed.

A copy of the completed signed and dated Installation Certificate must be posted at the building site for review by the enforcement agency in conjunction with requests for final inspection for the building. See Section 2.2.3 for more information about the Installation Certificate.

~~Nonresidential outdoor lighting Certificate of Installation documents are listed below:~~

- ~~• NRCI-LTO-01-E; Certificate of Installation; Outdoor Lighting~~
- ~~• NRCI-LTO-02-E; Certificate of Installation: Energy Management Control System or Lighting Control System~~

1.6.8 Instructions for Completing Certificates of Installation

- ~~• NRCI-LTO-01-E; Certificate of Installation; Outdoor Lighting~~

~~This Certificate of Installation must be submitted for all buildings. This is the general certificate used to declare that what was proposed in the Certificates of Compliance is actually what was installed.~~

~~The table on the second page is used to document how it was of construction documents on the Certificate is used to list the construction documents that show the outdoor lighting and controls were determined that the job was installed as it was proposed in the Certificates of Compliance. On what pages of the plan set does that documentation exist, or what additional documentation validates the installation?~~

- ~~• The table on the second page is used to document how it was determined that the job was installed as it was proposed in the Certificates of Compliance. On what pages of the plan set does that documentation exist, or what additional documentation validates the installation?~~
- ~~NRCI-LTO-02-E; Certificate of Installation: Energy Management Control System or Lighting Control System~~

~~This Certificate of Installation must be submitted whenever a lighting control system, and whenever an Energy Management Control System (EMCS), has been installed to comply with any of the outdoor lighting control requirements in the Standards.~~

~~If this Certificate of Installation is not submitted, or if all of the appropriate boxes have not been checked, the lighting controls system or the EMCS will not be recognized for compliance with the lighting control requirements in the Standards.~~

~~Note that if the lighting control systems are installed to function as an automatic daylighting control, occupancy sensing control, or automatic time-switch control, a Certificate of Acceptance must also be submitted.~~

~~Check all appropriate boxes in this certificate as a declaration that the control system has been installed to meet all of the minimum specifications and functionalities.~~

- ~~• Part 1 Identify if the system is a lighting control system, or an EMCS, by checking the appropriate boxes.~~

- ~~Part 2 – Lighting Control Functional requirements: Check all boxes that apply to verify the functionality of the Lighting Control System or EMCS.~~
- ~~Part 3 – Check all boxes to indicate what sections of the Standards the control has been installed to comply with~~

~~If this lighting control system or EMCS has been installed to qualify for a Power Adjustment Factor, the NRCI-LTI-05-E must also be submitted.~~

1.6.96.6.4 Certificate of Acceptance

~~NRCA LTO-02 A: Certificate of Acceptance, Outdoor Lighting Controls~~

Before an occupancy permit is granted for a new building or space, or a new lighting system serving a building, space, or site is operated for normal use, all outdoor lighting controls serving the site shall be certified as meeting the Acceptance Requirements for Code Compliance. A Certificate of Acceptance shall be submitted to the enforcement agency under Administrative Regulations §10-103(a).

The acceptance requirements that apply to outdoor lighting controls include the following:

- Certifies plans, specifications, installation certificates, and operating and maintenance information meet the requirements of the Energy Standards.
- Certified that outdoor lighting controls meet the applicable requirements of §110.9 and §130.2.

Acceptance testing must be conducted, and a Certificate of Acceptance must be completed and submitted before the enforcement agency can issue the certificate of occupancy. The procedures for performing the acceptance tests are documented in Reference Nonresidential Joint Appendix ~~NA7.7~~NA7.8. See the following chapters for more information about outdoor lighting control acceptance requirements.

- Chapter 2.2.4 Certificate of Acceptance
- Chapter 10.1 Acceptance Requirements
- Chapter 10.7 Testing Procedures for Lighting Equipment
- Chapter 10.9 Outdoor Lighting ~~forms~~ documents For Acceptance Requirements
- Reference Nonresidential Joint Appendix ~~NA7.7~~NA7.8, Outdoor Lighting Controls Acceptance Test