

Addendum 1 for

ANSI/IES RP-8-18, Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting

Chapter 17

If you, as a user of ANSI/IES RP-8-18, believe you have located an error not covered by the following revisions, please email your information to Pat McGillicuddy, pmcgillicuddy@ies.org, or send a letter to Pat McGillicuddy, Manager of Standards Development, IES, 120 Wall St., 17th Floor, New York, NY 10005.

Additions will be posted as they become available.

Addendum 1 was approved by the IES Standards Committee on October 11, 2019, and by the American National Standards Institute (ANSI) on January 16, 2020.

NOTE: Additions are underlined. Deletions are shown with ~~strikethrough~~.

17.3.1.2 Vertical Illuminance

Vertical illuminance is the amount of light falling on a vertical plane or surface, such as a wall or a person's face. Best practice for lighting parking lots and parking garages includes performing measurements or calculations of vertical illuminance. These measurements or calculations should be made in the drive lane facing in the direction of oncoming vehicles, four compass directions using a grid of points similar to those calculated for horizontal illuminance. For measurements, the meter head should always be tilted 90 degrees from nadir. The vertical illuminance shall be determined at a height of 1.5 meters (5 ft) above the floor, ~~except that values facing outward from the outer row of interior luminaires do not apply because this would measure light from outside the parking facility. At a minimum, it is recommended that the designer determine the vertical illuminance on a vertical plane around the parking facility limits and facing the interior.~~ The minimum vertical illuminance shall then meet the recommended levels in Sections 17.4.3 and 17.5.3.

In the area beyond the last row of fixtures toward the perimeter, when the light meter is aimed facing the perimeter, no direct light will be cast on the meter as there is no light source providing vertical illuminance from that direction. However, reflected light can provide vertical illuminance in that direction. ~~For each point, this condition only occurs in one of the four compass directions. Vertical illuminance requirements still apply in the other three compass directions.~~

17.3.2.1 Detection and Visual Tasks

The minimum illuminance values in the tables in Sections 17.4.3 and 17.5.3 were based on a variety of sources identifying the visual tasks and safety issues typical in a parking facility, as summarized in the following paragraphs.

Research data from the Virginia Tech Transportation Institute "Light Levels for Parking Facilities Based on Empirical Evaluation of Visual Performance and User Perceptions" found that increases in visual performance and safety, comfort, and visibility perception plateaued at an average pavement

illuminance of 10 lux for parking garages and 2 lux for parking lots with asphalt and concrete pavements.²⁰ Data from a study of vehicular accidents in parking lots (Safety Design Guidelines in Parking Facilities¹) have shown about two-thirds of the accidents involved a moving vehicle striking a parked vehicle, less than one-third involved a moving vehicle striking another moving vehicle, about 6% involved striking fixed objects, and 1% involved striking pedestrians.² An average of 20% of these accidents occurred at night. However, this study did not include pedestrian slips or trips and falls, which were not recorded by police vehicular accident reports. If these were included in the consideration of parking facility lighting needs, then the proportion of total mishaps involving pedestrians would be greater than 1%.

In a 1998 publication by the Insurance Corporation of British Columbia,³ it was noted that of the 5,000 collisions in parking facilities reported to British Columbia police annually, about 600, or 12%, resulted in injury, and 5 (0.001%) resulted in a fatality. The data further indicated that 96% of collisions in parking facilities were vehicle to vehicle. Vehicle-pedestrian accidents accounted for only 3.5%. In a study of data from a different year, 44% of collisions involved a vehicle un-parking. A major study of claims in commercial parking facilities found slip or trip-and-fall pedestrian accidents accounted for about 75% of the number of total claims and slightly over 50% of the costs paid.⁴ The study found 7% of the claims were for personal assault, 9% for vehicle damage, and 5% for gate damage.

~~A paper examined the contrast required to see a 15-cm (6-in.) curb against a concrete floor of assumed reflectance, at a distance of 6 m (20 ft).⁵ The increased contrast required as a function of illuminance for a 60-year-old observer was plotted (see Annex G, Figure G2). For parking facilities with concrete pavement, a minimum point value of 10 lux (0.9 fc) horizontal, should be maintained to ensure the visibility required to see this task. For parking facilities with asphalt pavement, a minimum point value of 5 lux (0.5 fc) should be maintained, due to increased contrast between the pavement and curb (refer to Annex B for calculations.)~~

17.3.3.3 Security Lighting

Limited studies have identified lighting as a factor in crime reduction^{6,7,8}; however, details of the relationship between lighting characteristics and crime reduction have not been quantified. Personal assaults, vandalism and theft do occur in broad daylight because light is only one of many factors influencing security, and nighttime offenses are more likely to occur in areas with little or no lighting.¹⁰ While several major retailers specify a minimum value of 10 lux (0.9 fc) in their parking lots, measurements within existing facilities often find much less light. Identification of faces is a key factor in the crime-deterrent effect of lighting,¹ yet vertical illuminance is rarely specified. ~~A study⁹ found 5 lux (0.5 fc) of vertical illuminance sufficient to identify an approaching person from 10 meters distant. That distance, according to some security professionals, allows a person to take evasive action if uncomfortable or threatened.~~ The color rendering index (CRI) also warrants consideration, with values of 60 CRI or greater recommended for enhanced security. When security is determined to be an issue, additional information is contained in IES G-1-16, *Security Lighting for People, Property, and Critical Infrastructure*.¹

17.4.3.2 Vertical Illuminance

Vertical illumination allows visibility of vertical objects (pedestrians, other vehicles, site obstructions, or potential assailants) and is an important part of the design of parking facility lighting. Calculation of vertical illumination can be easily performed using software design tools, but field measurement of

vertical illumination is not always straight forward. Since vertical illumination is a factor of horizontal direction *and* the height that the reading is taken, a standard height for meter placement is set at 1.5 meters (5 ft) above finished grade (AFG), or above finished floor (AFF). The meter head shall always be tilted 90 degrees from nadir, and a tripod is recommended to keep readings consistent. At a minimum, it is recommended that the designer determine vertical illuminance at the drive aisle centerline. The horizontal spacing of calculation or measurement points shall not exceed one-third the mounting height of the luminaires. The minimum vertical illuminance shall then meet the recommended criteria of **Table 17-2 (Section 17.3.3.3)**.

~~The vertical illuminance does not apply to a direction facing outward along a boundary, because this would require luminaires beyond the property line. Similarly, it does not apply to a direction facing outward beyond an outer line of luminaires located inside the boundary line. Illuminance calculations and measurements should include the vertical illuminance from luminaires at right angles in the direction of vehicle travel to the point of measurement because an observer can be located in a broad area between adjacent luminaires (see **Figure H3** and **Section H.7.0** in **Annex H**). The minimum vertical illuminance between luminaires typically occurs at the farthest point from a luminaire prior to passing under the next luminaire. Note: The vertical illuminance does not apply to a direction facing outward along a boundary, because this would require luminaires beyond the property line. Similarly, it does not apply to a direction facing outward beyond an outer line of luminaires located inside the boundary line.~~