

## Comment on Methods of Measuring Sign Brightness

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Currently in Chapter 28 there are 3 different methods of measuring brightness for different kinds of signs:

- Page 45: Sec. 28 xxx (c) (2) Signs in residential areas shall be illuminated with no greater than 200 foot candles
- Page 47: Sec. 28-241 (e) (7) (a) (1) All digital displays shall provide illumination at a level no greater than 0.3 foot candles over ambient light levels
- Page 71: Sec. 28-125 (b) (3) (b) Off-premise digital signs should not exceed a luminance (brightness) of 7,000 nits.

Foot Candle is a unit of illuminance on a surface that is one foot from a uniform point source of light of one candle and equal to one lumen per square foot. **It measures how much light is falling on a surface.**

Nit is a unit of luminance, or brightness, emitted from a luminous surface equal to one candle per square meter, measured perpendicular to the rays of the source. **Nits is the only scientific manner for measuring light energy being emitted from an internally illuminated sign.**

The City should measure the brightness emanating from signs because there is a relationship between sign brightness and driver and pedestrian safety. See page 41: "The objectives and strategies of this article are as follows: To recognize that most signs, by their nature, are designed and located to be seen by the driving public and to ensure that they are sized, located, and otherwise regulated so as to maximize traffic safety." The latest studies have proven that signage can be a distraction and a cause of traffic accidents. See attachment. Luminance measurement methodology employing a nit gun accounts for true sign brightness which is the primary determinant as to whether a sign is visible and legible to the motorist and affects driver safety. Excess sign luminance can lead to:

- Sign illegibility
- Not paying attention to traffic signals and the taillights, turn signals, or brake lights of other vehicles
- "discomfort glare" or "disability glare", making it temporarily difficult to recognize and respond to important objects in the field of view.

Note: Glare is defined as a visual condition in which there is excessive contrast or an inappropriate distribution of light sources that disturbs the observer or limits the ability to distinguish details and objects. Glare can be generally described as either Discomfort Glare or Disability Glare. Glare reduces visibility due to: (a) reduction in brightness of the scene due to constriction of the pupils in response to the glare source; (b) reduction

in contrast of the scene due to the scattering of light from the glare source within the eye; (c) reduction in contrast of the scene due to the scattering of light in particles in the air during precipitation; (d) reduction in contrast of the scene by veiling luminance from the glare source shining onto the windshield.

On the other hand, requiring that all digital displays be measured by evaluation of their ability to illuminate (a single point on the ground in front of the sign) - at a level no greater than 0.3 foot candles over ambient light levels (see page 47) contributes to the cumulative effect of excessive ambient light in an area and begs the question of whether or not a particular sign is a safety hazard for all areas having a view of the sign. To better know that, the sign's brightness would have to be measured by nit guns.

We note that Chapter 28 does not have one section on brightness, as it does on sign height and area, for example. (See page 42). We recommend that there be one general section that addresses luminance for all signage in daytime and nighttime. By having wording that applies to both day and night, it addresses the concern of sign companies that their messages are seen. It could be placed in the same part of the code. This wording comes from "Part 2: Proposed Language for Billboard Brightness Standards", prepared by the Veridian Group for the Nevada State Department of Transportation, Washoe County, City of Reno and City of Sparks, November 2014.

### **Nighttime Luminance Limits for Signs.**

- **Applicability.** This Section applies to all signs, including On-Premise, Off-Premise, Electrically animated and flashing signs and electronic variable message signs.
- **Maximum Luminance – Urban Areas.** No sign covered by this Section shall present a display or any part of a display that exceeds 150 nits between the end of civil twilight in the evening and the beginning of civil twilight in the morning.
- **Maximum Luminance – Suburban and Rural Areas.** No sign covered by this Section shall present a display or any part of a display that exceeds 100 nits between the end of civil twilight in the evening and the beginning of civil twilight in the morning.  
(Authors' note: If it is too difficult to distinguish between the two areas – and especially because of the projected development increase, this criteria can be removed.)
- **Measurement and Recording of Maximum Luminance.**
  - Luminance shall be measured using a calibrated, certified photometer.
  - Luminance measurements shall be taken during the hours between the end of evening civil twilight and the beginning of morning civil twilight
  - Luminance measurements shall be taken from a position as close to the sign being measured as reasonably possible.

- The photometer shall be positioned for measurements such that the sign being measured fills the central circle of the viewfinder (the “measurement area”). If the sign being measured contains multiple colors, the photometer shall be positioned such that an area of the sign displaying all white fills the measurement area, it will be necessary to move the photometer closer to the sign until this takes place.
- At least five (5) measurements shall be made for each sign or sign areas, and the readings recorded.
- The recorded measurements, including the date and time made and the permit number for the sign(s) in question shall be provided by the owners/installers to the Development Services Department within thirty (30) days.

#### **Daytime Luminance Limits for Signs.**

- **Applicability.** This Section applies to all signs, including On-Premise, Off-Premise, Electrically animated and flashing signs and electronic variable message signs.
- **Maximum Luminance.** No sign covered by this Section shall present a display or any part of a display that exceeds 3000 nits between the beginning of civil twilight in the morning and the end of civil twilight in the evening.
- **Measurement and Recording of Maximum Luminance.**
  - Luminance shall be measured using a calibrated, certified photometer.
  - Luminance measurements shall be taken during the hours beginning two hours after the end of morning civil twilight and two hours prior to the beginning of evening civil twilight.
  - Luminance measurements shall be taken from a position as close to the sign being measured as reasonably possible.
  - The photometer shall be positioned for measurements such that the sign being measured fills the central circle of the viewfinder (the “measurement area”). If the sign being measured contains multiple colors, the photometer shall be positioned such that an area of the sign displaying all white fills the measurement area, it will be necessary to move the photometer closer to the sign until this takes place.
  - At least five (5) measurements shall be made for each sign or sign areas, and the readings recorded.
  - The recorded measurements, including the date and time made and the permit number for the sign(s) in question shall be provided by the owners/installers to the Development Services Department within thirty (30) days.

### **Dimming Capability for Signs.**

- **Applicability.** All signs that have the capability for automatic or remote luminance adjustment shall be equipped with technology that automatically adjusts the sign's luminance in direct correlation with ambient light conditions. In no case shall such capability permit the sign to operate at luminance levels greater than those set forth herein.

### **Component or System Failure.**

- **Applicability.** In the event that any component of the sign, including, but not limited to, its display, control, communication, design, or other operational component causes any portion of the display to fail or malfunction, including display brightness at luminance levels greater than those set forth herein, the sign owner or operator shall take immediate action to turn the display off, or reduce the entire display to its minimum possible luminance level. The display shall remain in this condition until the problem has been resolved.

New definitions would need to be added:

- **Bright, brightness.** "Brightness" means the subjective attribute of visual perception in which a source appears to be emitting or reflecting light. It is the perception elicited by the luminance of a visual target. For purposes of this Section, brightness means luminance.
- **Civil Twilight.** "Civil Twilight" means that time that begins in the morning, and ends in the evening, when the center of the Sun is geometrically 6 degrees below the horizon. This is the limit at which twilight illumination is sufficient, under good weather conditions, for terrestrial objects to be clearly distinguished, at the beginning of morning civil twilight, or end of evening civil twilight, the horizon is clearly defined and the brightest stars are visible under good atmospheric conditions in the absence of moonlight or other illumination. In the morning before the beginning of civil twilight and in the evening after the end of civil twilight, artificial illumination is normally required to carry on ordinary outdoor activities.
- **Nit Gun.** "Nit Gun" means an instrument that measures light intensity in terms of luminance. A Nit Gun is equivalent to a Photometer.
- **Photometer.** "Photometer" means an instrument that measures light intensity in terms of luminance. A Photometer is equivalent to a Nit Gun.

And the references on pages 45, 47, and 71 referred to at the beginning of this statement will need some adjustment.