

CITY OF LANCASTER
DEVELOPMENT SERVICES DEPARTMENT
CITY ENGINEERING DIVISION

FLASHING LED SIGN INSTALLATION GUIDELINES



Approved:


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1.0 Acronyms and Definitions

CA MUTCD California Manual on Uniform Traffic Control Devices

LED Light emitting diode

Regulatory Signs Signs that are used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements

Warning Signs Signs that call attention to unexpected conditions on or adjacent to a highway or street and to situations that might not be readily apparent to road users.

2.0 Purpose

The 2014 California Manual on Uniform Traffic Control Devices (CA MUTCD), Section 2A.07 provides standards and options for the usage of Light Emitting Diode (LED) units within the face of a sign and in the border of a sign to improve conspicuity and increase the legibility of sign legends and borders. These Flashing LED signs may be used on stop signs, Warning signs and other Regulatory signs such as speed limit signs or school signs. Agencies may adopt additional policies on the appropriate use of LED signs. This policy provides guidance on identifying locations where flashing LED signs may be beneficial and outlines the requirements that must be met for a flashing LED sign to be installed on City of Lancaster maintained roadways.

3.0 Background

Previous studies¹ have shown that the use of stop signs with red flashing LEDs embedded at each corner of the sign face have had consistent statistically significant beneficial effects on daytime and nighttime stopping compliance and are effective in reducing stop sign violations. The following policy provides a process through which to identify the above conditions and determine whether a flashing LED stop sign shall be installed. Installing flashing LED signs can be a cost-effective solution with a high benefit-to-cost ratio for locations that meet these requirements.

4.0 CA MUTCD Requirements

- 4.1 LEDs shall have a maximum diameter of ¼-inch and shall be the following colors based on the type of sign:
 - a. Red - if used with STOP, DO NOT ENTER, or WRONG WAY signs.
 - b. White - if used with Regulatory signs, including YIELD signs.
 - c. Yellow - if used with Warning signs.
- 4.2 If flashed, the LED units shall flash simultaneously at a rate of more than 50 and less than 60 times per minute.
- 4.3 The uniformity of the sign design shall be maintained without any decrease in visibility, legibility, or driver comprehension during either daytime or nighttime conditions.
- 4.4 A module of multiple LED units used as a closely-spaced, single light source shall only be used within the sign face for legends or symbols.

¹ Impact of Flashing LED Stop Signs on Crash Reduction and Driver Behavior, Minnesota Department of Transportation, February 2014.

Embedded LEDs In Signs, FHWA, May 2009 referenced studies conducted by Texas Transportation Institute (2004) and Virginia Transportation Research Council (2007).

5.0 Policy

The usage of any illumination methods for traffic signs, including LEDs, is strictly limited to intersections with documented collision history. However, in all cases it is at the sole discretion of the City Engineer to approve the installation of a flashing LED sign. The following are requirements established by the City of Lancaster for the installation of flashing LED sign:

- 5.1 Flashing LED signs shall only be considered at existing locations. New locations shall not be considered until a minimum of three years of crash data is available for a traffic investigation and an evaluation study by the City of Lancaster is prepared using the criteria outlined in this policy.
- 5.2 The following countermeasures shall be considered prior to installation of any flashing LED stop sign:
 - a. Improve visibility of sign
 - b. Remove obstructions
 - c. Add additional striping
 - d. Add additional advance warning signs
 - e. Double marking STOP AHEADS or STOP signs
 - f. Flags on signs
 - g. Rumble strips (not allowed in residential areas)
 - h. Increase sign sizes
 - i. Increase lighting levels
 - j. Selective enforcement
 - k. Implementation of techniques designed to improve roadway safety and slow vehicle travel speed. These techniques include, but are not limited to, road diets, buffered bike lanes, and pedestrian bulb-outs.
 - l. Others

Note: Flashing LED signs shall only be considered after all other countermeasures have been considered.

- 5.3 Prior to installation of flashing LED STOP and STOP AHEAD signs at intersections, the following criteria must be met:
 - m. The intersection must be all-way stop controlled.
 - n. Evidence of crashes due to failure to stop (i.e., running the stop sign) shall exist at the studied location. The definition of evidence is defined in Section E of this policy.
- 5.4 To avoid a proliferation of flashing LED signs, they shall only be used for STOP and STOP AHEAD signs. These are considered the more important of the regulatory and warning sign series. There is the longstanding concern that overuse of the flashing LED signs will diminish their effectiveness.
- 5.5 Do not install flashing LED STOP signs and STOP AHEAD signs on the same approach. Where there is a curve or hill approaching a STOP sign, use flashing LED on STOP AHEAD sign rather than STOP sign.
- 5.6 Do not mix beacons and flashing LED signs with STOP and/or STOP AHEAD signs on the same approach.

6.0 Guidelines for use of Flashing LED Stop Signs

Installation of a flashing LED STOP sign shall be considered by the City Engineer at locations that obtain a minimum of 40 points using the warrant criteria listed below.

- 6.1 **Crash Experience (Maximum 40 Points):** The number of correctible crashes that have occurred during any rolling 12-month period within three years prior to investigation. These crashes must be the direct cause of a vehicle failing to stop at the intersection involving personal injury or property damage exceeding the applicable requirements for a reportable crash. See Table 1 for point values. In addition, for any location to be considered for the installation of a flashing LED sign, a minimum of two incidents within three years prior to the investigation and/or four incidents within five years prior to the investigation shall have occurred.

Table 1 - Crash Experience

Crashes (12 Months)	Points
1	10
2	20
3	30
4+	40

- 6.2 **Proximity to School (Maximum 15 Points):** Points shall be assigned for the intersection being adjacent to or within two blocks from the school. Multiple schools will generate additional points using the same point distribution. See Table 2 for point values.

Table 2 School Proximity

Intersection	School 1	School 2	School 3
Adjacent	5 points	5 points	5 points
One Block (± 1,320')	3 points	3 points	3 points
Two Block (± 2,640')	1 point	1 point	1 point

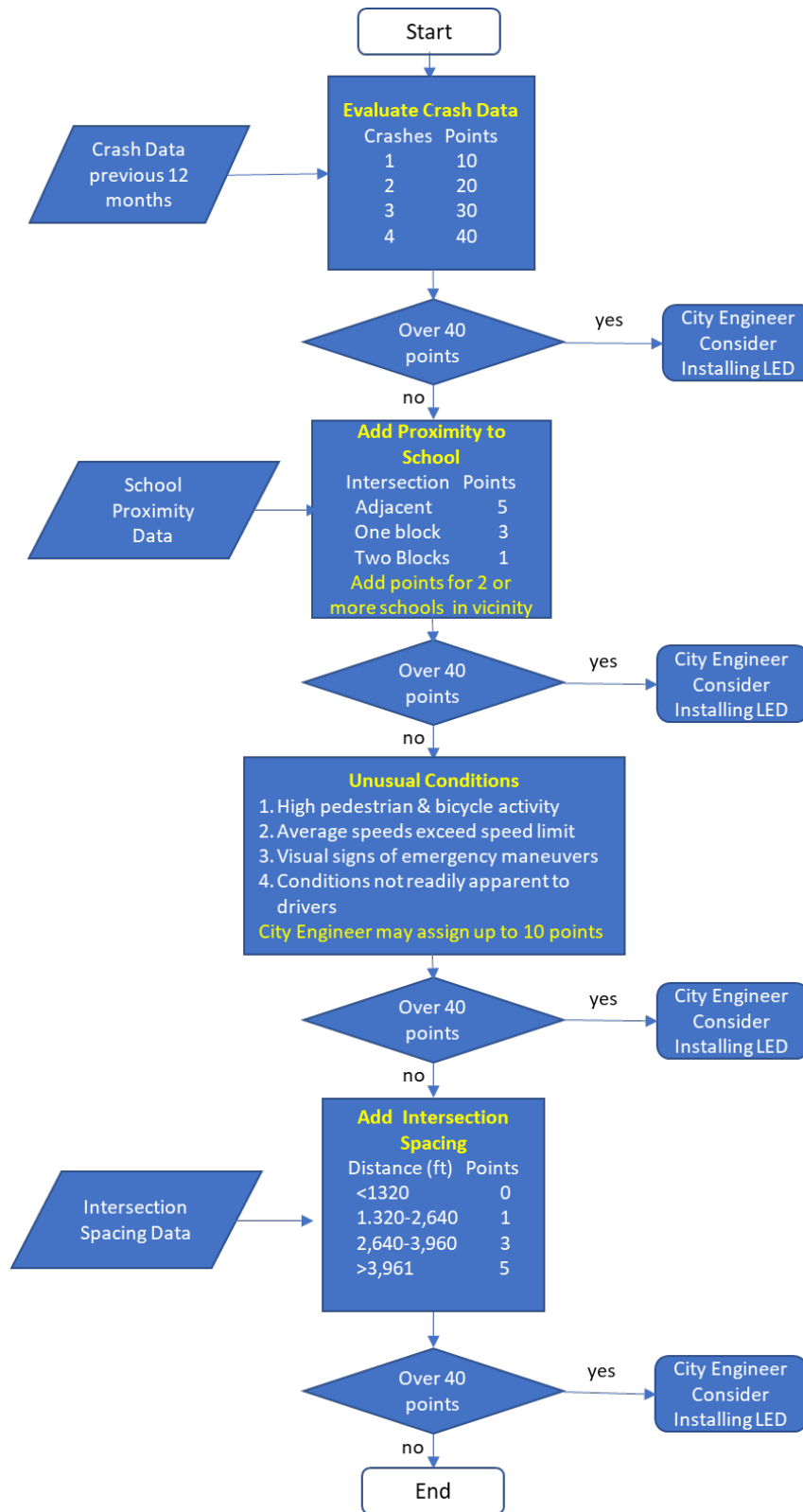
- 6.3 **Intersection Spacing (Maximum 5 Points):** This is the distance between the limit line on the approach of an intersection being investigated and the upstream intersection. See Table 3 for point values.

Table 3 - Intersection Spacing

Distance (ft)	Points
<1,320	0
1,320-2,640	1
2,641-3,960	3
>3,961	5

- 6.4 Unusual Conditions (Maximum 10 Points): Points may be assigned at the discretion of the City Engineer considering the severity of:
- a. High pedestrian and bicycle activity (a combination of 120 pedestrians and/or bicycles in one hour) because of proximity to recreational facilities including school facilities, parks, senior centers, high-density housing, neighborhood library, transit stops, and other facilities that generate high pedestrian and bicycle activity;
 - b. Crashes related to excessive speed;
 - c. Visual signs of emergency maneuvers, such as skid marks and crash debris;
 - d. Conditions not readily apparent to drivers.

See flow chart below for a graphic representation of the Flashing LED Stop Sign Guideline.



Flashing LED Sign Installation Guidelines Summary Flow Chart