

CHAPTER 4L. IN-ROADWAY LIGHTS

Section 4L.01 Application of In-Roadway Lights

Support:

In-Roadway Lights are special types of highway traffic signals installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. This includes, but is not necessarily limited to, situations warning of marked school crosswalks, marked midblock crosswalks, marked crosswalks on uncontrolled approaches, marked crosswalks in advance of roundabout intersections as described in Sections 3B.24 and 3B.25, and other roadway situations involving pedestrian crossings.

Standard:

If used, In-Roadway Lights shall not exceed a height of 19 mm (0.75 in) above the roadway surface.

Option:

The flash rate for In-Roadway Lights may be different from the flash rate of standard beacons.

Section 4L.02 In-Roadway Warning Lights at Crosswalks

Standard:

If used, In-Roadway Warning Lights at crosswalks shall be installed only at marked crosswalks with applicable warning signs. They shall not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.

If used, In-Roadway Warning Lights at crosswalks shall be installed along both sides of the crosswalk and shall span its entire length.

If used, In-Roadway Warning Lights at crosswalks shall initiate operation based on pedestrian actuation and shall cease operation at a predetermined time after the pedestrian actuation or, with passive detection, after the pedestrian clears the crosswalk.

If used, In-Roadway Warning Lights at crosswalks shall display a flashing yellow signal indication when actuated. The flash rate for In-Roadway Warning Lights at crosswalks shall be at least 50, but not more than 60, flash periods per minute. The flash rate shall not be between 5 and 30 flashes per second to avoid frequencies that might cause seizures.

If used on one-lane, one-way roadways, a minimum of two In-Roadway Warning Lights shall be installed on the approach side of the crosswalk. If used on two-lane roadways, a minimum of three In-Roadway Warning Lights shall be installed along both sides of the crosswalk. If used on roadways with more than two lanes, a minimum of one In-Roadway Warning Light per lane shall be installed along both sides of the crosswalk.

If used, In-Roadway Warning Lights shall be installed in the area between the outside edge of the crosswalk line and 3 m (10 ft) from the outside edge of the crosswalk. In-Roadway Warning Lights shall face away from the crosswalk if unidirectional, or shall face away from and across the crosswalk if bidirectional.

Guidance:

If used, the period of operation of the In-Roadway Warning Lights following each actuation should be sufficient to allow a pedestrian crossing in the crosswalk to leave the curb or shoulder and travel at a normal walking speed of 1.2 m (4 ft) per second to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait. Where pedestrians who walk slower than normal, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 1.2 m (4 ft) per second should be considered in determining the period of operation. Where the period of operation is sufficient only for crossing from a curb or shoulder to a median of sufficient width for pedestrians to wait, additional measures should be considered, such as median-mounted pedestrian actuators.

If used, In-Roadway Warning Lights should be installed in the center of each travel lane, at the centerline of the roadway, at each edge of the roadway or parking lanes, or at other suitable locations away from the normal tire track paths.

The location of the In-Roadway Warning Lights within the lanes should be based on engineering judgment.

Standard:

In-Roadway Warning Lights (IRWLs) shall not be placed on or within the crosswalk markings. If the In-Roadway Warning Lights are activated by a push button, the PUSH BUTTON FOR PEDESTRIAN WARNING LIGHTS, CROSS WITH CAUTION (R62E(CA)) sign shall be used.

The following shall be considered when evaluating the need for In-Roadway Warning Lights:

- a. Whether the crossing is controlled or uncontrolled.
- b. An engineering traffic study to determine if In-Roadway Warning Lights are compatible with the safety and operation of nearby intersections, which may or may not be, controlled by traffic signals or STOP/YIELD signs.
- c. Standard traffic signs for crossings and crosswalk pavement markings are provided.
- d. At least 40 pedestrians regularly use the crossing during each of any two hours (not necessarily consecutive) during a 24-hour period.
- e. The vehicular volume through the crossing exceeds 200 vehicles per hour in urban areas or 140 vehicles per hour in rural areas during peak-hour pedestrian usage.
- f. The critical approach speed (85th percentile) is 70 km/h (45 mph) or less.
- g. In-Roadway Warning Lights are visible to drivers at the minimum stopping sight distance for the posted speed limit.
- h. Public education on In-Roadway Warning Lights is conducted for new installations.

Option:

Overhead or roadside Flashing Yellow Beacons may be installed in conjunction with In-Roadway Warning Lights. In-Roadway Warning Lights may be installed independently, but are not necessarily intended to be a substitute for standard flashing beacons. Engineering judgment should be exercised.

Guidance:

Typical applications of In-Roadway Warning Lights are shown in Figure 4L-101(CA).

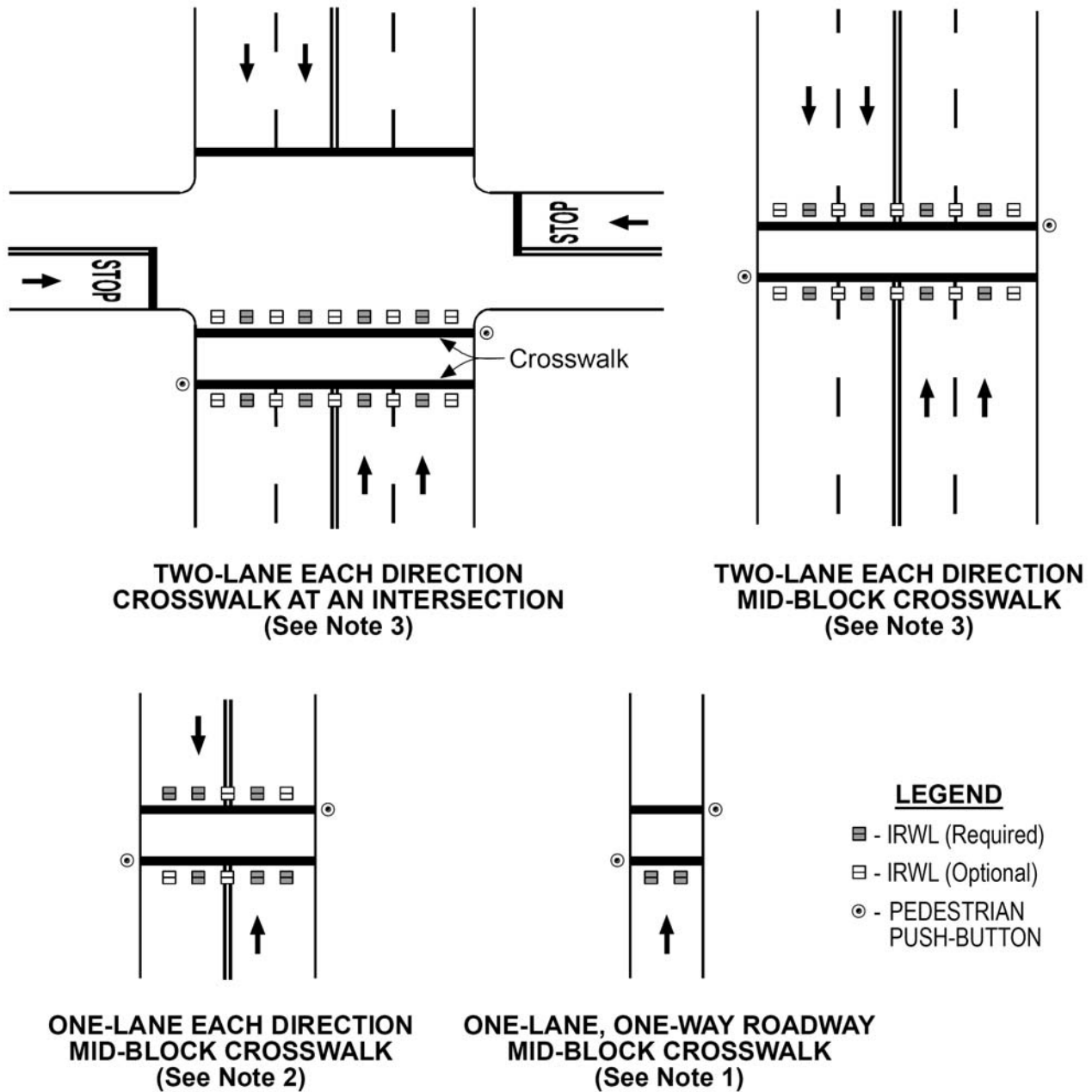
Section 4L.101(CA) In-Roadway Warning Lights at Crosswalks Financing and Maintenance-State Highways

Standard:

When In-Roadway Warning Lights are proposed by Department of Transportation on State highways, the Department of Transportation shall pay the costs of installation and maintenance. When In-Roadway Warning Lights are proposed and installed by a local agency on State highways, the installation of In-Roadway Warning Lights shall be covered by an Encroachment Permit issued by the local District Director of Department of Transportation. The local agency shall be responsible for installation and maintenance of the In-Roadway Warning Lights.

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Figure 4L-101 (CA). Typical Layout for In-Roadway Warning Lights (IRWLs)



NOTES:

1. One-Lane, One-Way Roadways, a minimum of two IRWLs shall be installed on the approach side of the crosswalk.
2. One-Lane each direction, a minimum of three IRWLs shall be installed along both sides of the crosswalk.
3. Two-Lanes each direction, a minimum of one IRWLs per lane, shall be installed along both sides of the crosswalk.
4. IRWLs should be located off the tire tracks.