Minimum crosswalk safety enhancements should be used to enhance existing marked crosswalks that cross uncontrolled roadways on the State Highway System where the speed limit exceeds 40 mph, and the roadway has four or more lanes of travel, and an average daily traffic (ADT) of 12,000 vehicles per day or greater.
IMPLEMENTATION

Stage 1: Minimum Enhancements

If a marked crosswalk exists across an uncontrolled intersection or mid-block location on the State Highway System where the speed limit exceeds 40 mph and the roadway has four or more lanes of travel and an ADT of 12,000 vehicles per day or greater, advanced yield lines with associated Yield Here to Pedestrian (R1-5, R1-5a) signs should be placed 20 to 50 ft in advance of the crosswalk, pedestrian crossing (W11-2) warning signs with diagonal downward pointing arrow (W16-7p) plaques should be installed at the crosswalk, and a high visibility crosswalk marking pattern should be used.

Stage 2: Additional Enhancements

Other enhancements may be considered in conjunction with the minimum enhancements, based on engineering judgement or an engineering study (taking into account roadway characteristics, collision history, and pedestrian volumes) such as curb extensions, raised medians or pedestrian refuge islands, lighting, additional signing and marking, pedestrian actuated flashing beacons, pedestrian hybrid beacons or signalized control.

The Department’s Complete Intersections Guide, Sections 3.2, 4.1, 4.2, 5.1, 6.1, and 9.1, provides possible configurations of treatments for uncontrolled crossings. Additional guidance on the application of signing, marking, and control treatments is provided in the California Manual on Uniform Traffic Control Devices (CA MUTCD), Chapters 2B, 2C, 3B and Part 4. The Department’s Highway Design Manual, Topics 105, 301, 302, 303, 305, 401, 403 and 405, provides additional design considerations to improve pedestrian safety at uncontrolled crossings.
BACKGROUND

Federal guidance in Section 3B.18 of the 2009 Manual on Uniform Traffic Control Devices (MUTCD) that has been adopted into the 2012 California Manual on Uniform Traffic Control Devices (CA MUTCD), addresses “new” marked crosswalks across uncontrolled roadways, as follows:

“New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:

A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or
B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater.”

This policy directive addresses how to enhance “existing” marked crosswalks across uncontrolled roadways with four or more lanes that have an ADT of 12,000 vehicles per day or greater, where the speed limit exceeds 40 mph on the State Highway System.

DELEGATION

No new delegations of authority are created by this policy.
DESCRIPTION OF ENHANCEMENTS

Traffic Control Signal

(a) When pedestrian volumes are of a sufficient level to meet signal warrants, a traffic control signal may be installed to serve this demand. Applicable pedestrian signal warrants and installation guidelines are identified in Section 4C.05 of the CA MUTCD.

(b) For six-lane roadways or roadways with long crossing distances, a two-stage pedestrian crossing, using a raised median or pedestrian refuge island, should be considered where the proposed crossing will be controlled by a warranted pedestrian signal. A two-stage pedestrian crossing may have a lesser impact to vehicle delay (compared to a single crossing) since the signal serves each direction independently while the median serves as a refuge area for pedestrians to wait prior to completing their crossing.

Pedestrian Hybrid Beacon

(a) A possible alternative to the traffic control signal is the Pedestrian Hybrid Beacon. The Pedestrian Hybrid Beacon provides an initial solid red indication to drivers followed by a flashing red to allow vehicles to proceed with caution once pedestrians are clear. Chapter 4F of the CA MUTCD provides additional guidance on the use of Pedestrian Hybrid Beacons where pedestrian volumes do not meet the warrants for a traffic control signal under Section 4C.05 of the CA MUTCD.

(b) For a major street, the posted or the 85th percentile speed is used to select the appropriate figure in Chapter 4F of the CA MUTCD to consider the need for a Pedestrian Hybrid Beacon: 35 mph or less (Figure 4F-1), or greater than 35 mph (Figure 4F-2).

Supplemental Beacons

Supplemental beacons provide additional emphasis on the crosswalk and the presence of pedestrians. Two options are currently available for use: Standard Flashing Yellow Warning Beacons and Rectangular Rapid Flashing Beacons.

(a) Standard Flashing Yellow Warning Beacons

The use of standard flashing yellow warning beacons may provide additional emphasis on the crossing location by supplementing the appropriate pedestrian crossing warning or regulatory signs. Chapter 4L of the CA MUTCD provides additional guidance on standard flashing yellow warning beacons. Any standard flashing yellow warning beacon installed at a crosswalk at an uncontrolled location should consider the use of pedestrian actuation, as to elicit a more effective response from motorists than continuously flashing beacons.
DESCRIPTION OF ENHANCEMENTS (CONTINUED)

(b) Rectangular Rapid Flashing Beacons

The Federal Highway Administration (FHWA) provided California a statewide interim approval on August 10, 2011 to use Rectangular Rapid Flashing Beacons (RRFB). The use of this device will require notification to the California Traffic Control Devices Committee prior to implementation. The rectangular beacons are provided in pairs below the pedestrian crossing (W11-2) warning sign and operate in a “wig-wag” pattern upon activation by the pedestrian. When used, RRFBs shall be pedestrian activated, using approved detectors. Detailed conditions of use, including sign/beam assembly, dimensions and placement, and flashing rates are provided in the FHWA Interim Approval memorandum dated July 16, 2008 and subsequent Official Interpretations.

In-Roadway Warning Lights

(a) Chapter 4N of the CA MUTCD establishes the standards by which In-Roadway Warning Lights can be installed and operated at uncontrolled crossings.

(b) In-Roadway Warning Lights shall not be used where YIELD (R1-2) or STOP (R1-1) signs, or traffic signals are present.

Raised Medians or Pedestrian Refuge Islands

(a) Pedestrian refuge areas lessen the risk of pedestrian exposure to traffic. They allow pedestrians to cross fewer lanes of traffic at a time and judge conflicts separately. They also provide a refuge so slower pedestrians can wait for a gap in traffic.

(b) Topic 305 of the Highway Design Manual establishes the design criteria by which raised medians can be installed. Index 405.4 and Figure 405.4 of the Highway Design Manual establishes the design criteria by which pedestrian refuge islands can be installed.

Curb Extensions

(a) A bulbout is a curb extension of a sidewalk into the roadway when there is marked on-street parking. Bulbouts provide queuing space and shorten crossing distances, thereby reducing pedestrian conflict time with mainline traffic. They also improve visibility between approaching motorists and waiting pedestrians.

(b) Index 303.4 and Figure 303.4 of the Highway Design Manual establishes the design criteria by which bulbouts can be installed.

Lighting

(a) Lighting may be used to promote the safe and orderly movement of all road users by illuminating areas which may require additional care and alertness to negotiate.

(b) Chapter 9 of the California Traffic Manual contains additional criteria by which lighting can be installed and operated.
DESCRIPTION OF ENHANCEMENTS (CONTINUED)

Supplemental Signing and Markings

(a) High visibility crosswalk markings consist of diagonal or longitudinal lines parallel to traffic flow. When high visibility crosswalk markings are used to mark a crosswalk, the transverse crossing lines may be omitted. High visibility crosswalk markings may be used at locations where pedestrians cross without any other traffic control device, at locations where physical conditions are such that added visibility of the crosswalk is desired, or at places where a pedestrian crosswalk might not be expected. Section 3B.18 and Figure 3B-19 of the CA MUTCD provide additional guidance on high visibility crosswalk markings.

(b) An advanced yield line and associated Yield Here to Pedestrians (R1-5, R1-5a) sign provide additional emphasis on the requirement to yield to pedestrians in the crosswalk. If used, the advanced yield line should be placed 20 to 50 ft in advance of the crosswalk. Section 3B.16 and Figure 3B-16(CA) of the CA MUTCD provide additional guidance on yield lines. Where an advanced yield line is used, parking should be prohibited in the area between the yield line and the crosswalk. If an advanced yield line is provided across an uncontrolled roadway, the corresponding Yield Here to Pedestrians (R1-5, R1-5a) sign shall be provided. Section 2B.11 of the CA MUTCD provides additional guidance on the Yield Here to Pedestrians (R1-5, R1-5a) sign. At locations where the Yield Here to Pedestrians (R1-5, R1-5a) sign is used in advance of the crosswalk, pedestrian crossing (W11-2) warning signs with diagonal downward pointing arrow (W16-7p) plaques may be posted mounted at the crosswalk location or mounted overhead at the crosswalk location. If a pedestrian crossing (W11-2) warning sign with diagonal downward pointing arrow (W16-7p) plaque has been posted mounted at the crosswalk location where a Yield Here to Pedestrians (R1-5, R1-5a) sign is used on the approach, the Yield Here to Pedestrians (R1-5, R1-5a) sign shall not be placed on the same post as or block the road user’s view of the pedestrian crossing (W11-2) warning sign. An advance pedestrian crossing (W11-2) warning sign with supplemental AHEAD (W16-9p) plaque may be used in combination with the Yield Here to Pedestrians (R1-5, R1-5a) sign. An advanced yield line and associated Yield Here to Pedestrians (R1-5, R1-5a) sign are not to be used in combination with the Pedestrian Hybrid Beacon or Traffic Control Signal.

(c) The In-Street Pedestrian Crossing (R1-6) or the Overhead Pedestrian Crossing (R1-9) sign reminds road users of laws regarding right-of-way at an unsignalized pedestrian crosswalk. An In-Street or Overhead Pedestrian Crossing sign shall not be placed in advance of a crosswalk to educate road users about the State law prior to reaching the crosswalk, nor shall it be installed as an educational display along the highway that is not near any crosswalk. Additional information is provided in Section 2B.12 of the CA MUTCD. If used, the In-Street Pedestrian Crossing (R1-6) signs shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island. The InStreet Pedestrian Crossing (R1-6) sign shall not be post-mounted on the left-hand or right-hand side of the roadway. If used, the Overhead Pedestrian Crossing (R1-9) sign shall be placed over the roadway at the crosswalk location.
DEFINITIONS

When used in this Traffic Operations Policy Directive, the text shall be defined as follows:

1) **Standard** – a statement of required, mandatory or specifically prohibited practice. All standards text appears in **bold** type. The verb, “**shall**” is typically used. Standards are sometimes modified by Options.

2) **Guidance** – a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. All Guidance statements text appears in **underlined** type. The verb, “**should**” is typically used. Guidance statements are sometimes modified by Options.

3) **Option** – a statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to a Standard or Guidance. All Option statements text appears in normal type. The verb, “**may**” is typically used.

4) **Support** – an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements text appears in normal type. The verbs “**shall,**” “**should,**” and “**may**” are not used in Support statements.

ATTACHMENTS

CTCDC Recommendation for Section 3B.18.pdf

Figure 3B-17(CA).pdf
Section 3B.18 Crosswalk Markings

Support:
01 Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops.
02 In conjunction with signs and other measures, crosswalk markings help to alert road users of a designated pedestrian crossing point across roadways at locations that are not controlled by traffic control signals or STOP or YIELD signs.
03 At non-intersection locations, crosswalk markings legally establish the crosswalk.

Standard:
04 When crosswalk lines are used, they shall consist of solid white lines that mark the crosswalk. They shall not be less than 6 12 inches or greater than 24 inches in width.

Guidance:
05 If transverse lines are used to mark a crosswalk, the gap between the lines should not be less than 6 feet. If diagonal or longitudinal lines are used without transverse lines to mark a crosswalk, the crosswalk should be not less than 6 feet wide.
06 Crosswalk lines, if used on both sides of the crosswalk, should extend across the full width of pavement or to the edge of the intersecting crosswalk to discourage diagonal walking between crosswalks (see Figures 3B-17 and 3B-19).
07 At locations controlled by traffic control signals or on approaches controlled by STOP or YIELD signs, crosswalk lines should be installed where engineering judgment indicates they are needed to direct pedestrians to the proper crossing path(s).
08 Crosswalk lines should not be used indiscriminately. An engineering study should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.
09 New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:
A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or
B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater.

Insert Guidance:
If a marked crosswalk exists across an uncontrolled roadway where the speed limit exceeds 40 mph and the roadway has four or more lanes of travel and an ADT of 12,000 vehicles per day or greater, advanced yield lines with associated Yield Here to Pedestrians (R1-5, R1-5a) signs should be placed 20 to 50 ft in advance of the crosswalk, adequate visibility should be provided by parking prohibitions, pedestrian crossing (W11-2) warning signs with diagonal downward pointing arrow (W16-7p) plaques should be installed at the crosswalk, and a high visibility crosswalk marking pattern should be used (See Figure 3B-17(CA)).

Support:
10 Chapter 4F contains information on Pedestrian Hybrid Beacons. Section 4L.03 contains information regarding Warning Beacons to provide active warning of a pedestrian’s presence. Section 4N.02 contains information regarding In-Roadway Warning Lights at crosswalks. Chapter 7D contains information regarding school crossing supervision.

Guidance:
11 Because non-intersection pedestrian crossings are generally unexpected by the road user, warning signs (see Section 2C.50) should be installed for all marked crosswalks at non-intersection locations and adequate visibility should be provided by parking prohibitions.
Section 3B.16 contains information regarding placement of stop line markings near crosswalk markings.

For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45-degree angle to the line of the crosswalk or with white longitudinal lines parallel to traffic flow as shown in Figure 3B-19. When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. This type of marking may be used at locations where substantial numbers of pedestrians cross without any other traffic control device, at locations where physical conditions are such that added visibility of the crosswalk is desired, or at places where a pedestrian crosswalk might not be expected.

If used, the diagonal or longitudinal lines should be 12 to 24 inches wide and separated by gaps of 12 to 60 inches. The design of the lines and gaps should avoid the wheel paths if possible, and the gap between the lines should not exceed 2.5 times the width of the diagonal or longitudinal lines.

When an exclusive pedestrian phase that permits diagonal crossing of an intersection is provided at a traffic control signal, a marking as shown in Figure 3B-20 may be used for the crosswalk.

Crosswalk markings should be located so that the curb ramps are within the extension of the crosswalk markings.

Detectable warning surfaces mark boundaries between pedestrian and vehicular ways where there is no raised curb. Detectable warning surfaces are required by 49 CFR, Part 37 and by the Americans with Disabilities Act (ADA) where curb ramps are constructed at the junction of sidewalks and the roadway, for marked and unmarked crosswalks. Detectable warning surfaces contrast visually with adjacent walking surfaces, either light-on-dark, or dark-on-light. The “Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)” (see Section 1A.11) contains specifications for design and placement of detectable warning surfaces.

Crosswalk markings near schools shall be yellow as provided in CVC 21368. See Part 7.

Pedestrian crosswalk markings may be placed at intersections, representing extensions of the sidewalk lines, or on any portion of the roadway distinctly indicated for pedestrian crossing. Refer to CVC 275.

In general, crosswalks should not be marked at intersections unless they are intended to channelize pedestrians. Emphasis is placed on the use of marked crosswalks as a channelization device.

The following factors may be considered in determining whether a marked crosswalk should be used:
A. Vehicular approach speeds from both directions.
B. Vehicular volume and density.
C. Vehicular turning movements.
D. Pedestrian volumes.
E. Roadway width.
F. Day and night visibility by both pedestrians and motorists.
G. Channelization is desirable to clarify pedestrian routes for sighted or sight impaired pedestrians.
H. Discouragement of pedestrian use of undesirable routes.
I. Consistency with markings at adjacent intersections or within the same intersection.

Crosswalk markings may be established between intersections (mid-block) in accordance with CVC 21106(a).

Mid-block pedestrian crossings are generally unexpected by the motorist and should be discouraged unless, in the opinion of the engineer, there is strong justification in favor of such installation. Particular attention should be given to roadways with two or more traffic lanes in one direction as a pedestrian may be hidden from view by a vehicle yielding the right-of-way to a pedestrian.

When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted.

However, when the factor that determined the need to mark a crosswalk is the clarification of pedestrian routes for sight-impaired pedestrians, the transverse crosswalk lines shall be marked.
Option:
27 At controlled approaches, limit lines (stop lines) help to define pedestrian paths and are therefore a factor the engineer may consider in deciding whether or not to mark the crosswalk.

28 Where it is desirable to remove a marked crosswalk, the removal may be accomplished by repaving or surface treatment.

Guidance:
29 A marked crosswalk should not be eliminated by allowing it to fade out or be worn away.

Support:
30 The worn or faded crosswalk retains its prominent appearance to the pedestrian at the curb, but is less visible to the approaching driver.

Standard:
31 Notification to the public shall be given at least 30 days prior to the scheduled removal of an existing marked crosswalk. The notice of proposed removal shall inform the public how to provide input related to the scheduled removal and shall be posted at the crosswalk identified for removal. Refer to CVC 21950.5

Option:
32 Signs may be installed at or adjacent to an intersection directing that pedestrians shall not cross in a crosswalk indicated at the intersection in accordance with CVC 21106(b).

33 White PED XING pavement markings may be placed in each approach lane to a marked crosswalk, except at intersections controlled by traffic signals or STOP or YIELD signs.
Figure 3B-17 (CA). Examples of Crosswalk Enhancements at Uncontrolled Multilane Approaches

A - Two-way roadway - Midblock

B - One-way roadway - Midblock

C - Two-way roadway - Intersection

Legend

- Direction of travel

* Optional

NOTE: Adequate visibility should be provided.

Adequate visibility should be provided.