RESOLUTION NO. 2021-0093

Adopted by the Sacramento City Council

April 20, 2021

Adopt the ‘City of Sacramento Pedestrian Crossing Guidelines’, and Supersede the 2014 Version of the ‘Pedestrian Crossing Guidelines’

BACKGROUND

A. The proposed document – ‘City of Sacramento Pedestrian Crossing Guidelines’ (guidelines) is intended to update the existing ‘Pedestrian Crossing Guidelines’ that were adopted by the City Council on December 2, 2014. The updated guidelines incorporate new research including innovative treatments and devices related to pedestrian crossing facilities; modern principles and concepts of street design with emphasis on designing street that support a walkable urban environment; and updated standards and regulations that have emerged since the time of the adoption of the existing document.

B. The guidelines are intended to serve as a one-stop source of information that can be used to make objective decisions in a consistent manner when providing pedestrian crossing facilities.

C. The guidelines strive to maintain a reasonable balance between prescriptive requirements, and flexibility based on engineering judgement, engineering study, and other necessary considerations.


E. Overall, these guidelines will help provide safe pedestrian crossing facilities, which in turn will help ensure consistency with the modern principles of street design that supports a walkable urban environment.

BASED ON THE FACTS SET FORTH IN THE BACKGROUND, THE CITY COUNCIL RESOLVES AS FOLLOWS:

Section 1. The City of Sacramento Pedestrian Crossing Guidelines, attached as Exhibit A to this Resolution, are adopted.
Section 2.  The City Traffic Engineer is authorized to amend the Pedestrian Crossing Guidelines, as necessary, provided the amendments are: (i) required to comply with pertinent federal and / or state requirements, and / or (ii) in compliance with the authority delegated to the City Traffic Engineer pursuant to Sacramento City Code.


Section 4.  Exhibit A is attached and is part of this Resolution.

Table of Contents:
Exhibit A - Pedestrian Crossing Guidelines
Exhibit B - Treatment Application Guidelines

Adopted by the City of Sacramento City Council on April 20, 2021 by the following vote:

Ayes.  Members Ashby, Guerra, Harris, Jennings, Loloee, Schenirer, Valenzuela, Yang, and Mayor Steinberg

Noes:  None

Abstain:  None

Absent:  None

Attest:  Mindy Cuppy

Mindy Cuppy, City Clerk

The presence of an electronic signature certifies that the foregoing is a true and correct copy as approved by the Sacramento City Council.
DEFINING CROSSWALKS

The following California Vehicle Code (CVC) excerpts provide the legal definitions and right-of-way control for crosswalks:

**CVC Section 275.** Crosswalk is either:

(a) That portion of a roadway included within the prolongation or connection of the boundary lines of sidewalks at intersection where the intersecting roadways meet at approximately right angles, except the prolongation of such lines from an alley across a street.

(b) Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface. Notwithstanding the foregoing provisions of this section, there shall not be a crosswalk where local authorities have placed signs indicating no crossing.

**CVC Section 21950.** Right-of-Way at Crosswalks:

(a) The driver of a vehicle shall yield the right-of-way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at an intersection, except as otherwise provided in this chapter.

(b) This section does not relieve a pedestrian from the duty of using due care for his or her safety. No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle that is so close as to constitute an immediate hazard. No pedestrian may unnecessarily stop or delay traffic while in a marked or unmarked crosswalk.

(c) The driver of a vehicle approaching a pedestrian within any marked or unmarked crosswalk shall exercise all due care and shall reduce the speed of the vehicle or take any other action relating to the operation of the vehicle as necessary to safeguard the safety of the pedestrian.

(d) Subdivision (b) does not relieve a driver of a vehicle from the duty of exercising due care for the safety of any pedestrian within any marked crosswalk or within any unmarked crosswalk at an intersection.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABBREVIATIONS AND ACRONYMS</td>
<td>III</td>
</tr>
<tr>
<td>EXECUTIVE SUMMARY</td>
<td>IV</td>
</tr>
<tr>
<td>1.0 INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Purpose and Scope</td>
<td>1</td>
</tr>
<tr>
<td>1.2 Flexibility and the Role of Engineering Judgement</td>
<td>2</td>
</tr>
<tr>
<td>1.3 Crosswalk Overview</td>
<td>2</td>
</tr>
<tr>
<td>1.4 Updating the Guidance</td>
<td>2</td>
</tr>
<tr>
<td>2.0 EVALUATING CANDIDATE MARKED CROSSWALK LOCATIONS</td>
<td>3</td>
</tr>
<tr>
<td>2.1 Overview</td>
<td>3</td>
</tr>
<tr>
<td>2.2 Crosswalks at Uncontrolled Crossing Locations</td>
<td>3</td>
</tr>
<tr>
<td>2.3 Crosswalks at Controlled Crossing Locations</td>
<td>15</td>
</tr>
<tr>
<td>2.4 Crossings at Mid-Block Locations</td>
<td>15</td>
</tr>
<tr>
<td>2.5 Crosswalks at Trail Crossings</td>
<td>16</td>
</tr>
<tr>
<td>2.6 Prohibiting Pedestrian Crossings</td>
<td>16</td>
</tr>
<tr>
<td>3.0 EXISTING UNCONTROLLED MARKED CROSSWALKS</td>
<td>17</td>
</tr>
<tr>
<td>3.1 When Should The City Evaluate Existing Crosswalks?</td>
<td>18</td>
</tr>
<tr>
<td>3.2 Evaluation And Enhancement Approach</td>
<td>18</td>
</tr>
<tr>
<td>3.3 What If Enhancement Of An Existing Crosswalk Is Not Feasible?</td>
<td>19</td>
</tr>
<tr>
<td>3.4 Uncontrolled Marked Crosswalk Removal</td>
<td>21</td>
</tr>
<tr>
<td>3.5 Prioritizing Enhancements for Existing Uncontrolled Marked Crosswalks</td>
<td>22</td>
</tr>
<tr>
<td>4.0 PEDESTRIAN CROSSING TREATMENT GUIDANCE</td>
<td>23</td>
</tr>
<tr>
<td>4.1 Treatments for Marked Crosswalks at Uncontrolled Locations</td>
<td>23</td>
</tr>
<tr>
<td>4.2 Crosswalks at Mid-Block</td>
<td>29</td>
</tr>
<tr>
<td>4.3 Crosswalks at Trails or Shared-Use Paths</td>
<td>31</td>
</tr>
<tr>
<td>4.4 Crosswalks at Controlled Locations</td>
<td>33</td>
</tr>
</tbody>
</table>

APPENDCIES

Appendix A – Crosswalk Basics and Key Definitions
Appendix B – City of Sacramento Crosswalk Removal Outreach Policy
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADA</td>
<td>Americans with Disabilities Act</td>
</tr>
<tr>
<td>ADT</td>
<td>Average daily traffic</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
</tr>
<tr>
<td>APS</td>
<td>Accessible pedestrian signal</td>
</tr>
<tr>
<td>CA MUTCD</td>
<td>(Caltrans) California Manual on Uniform Traffic Control Devices</td>
</tr>
<tr>
<td>Caltrans</td>
<td>California Department of Transportation</td>
</tr>
<tr>
<td>CPUC</td>
<td>California Public Utilities Commission</td>
</tr>
<tr>
<td>CTCDC</td>
<td>California Traffic Control Devices Committee</td>
</tr>
<tr>
<td>CVC</td>
<td>California Vehicle Code</td>
</tr>
<tr>
<td>DPM</td>
<td>(City of Sacramento) Design and Procedures Manual</td>
</tr>
<tr>
<td>FHWA</td>
<td>Federal Highway Administration</td>
</tr>
<tr>
<td>HDM</td>
<td>(Caltrans) Highway Design Manual</td>
</tr>
<tr>
<td>IA</td>
<td>Interim Approval</td>
</tr>
<tr>
<td>IRWLs</td>
<td>In-Roadway Warning Lights</td>
</tr>
<tr>
<td>ITE</td>
<td>Institute of Transportation Engineers</td>
</tr>
<tr>
<td>LED</td>
<td>Light emitting diode</td>
</tr>
<tr>
<td>mph or mi/h</td>
<td>Miles per hour</td>
</tr>
<tr>
<td>MUTCD</td>
<td>Manual on Uniform Traffic Control Devices</td>
</tr>
<tr>
<td>NACTO</td>
<td>National Association of City Transportation Officials</td>
</tr>
<tr>
<td>NCHRP</td>
<td>National Cooperative Highway Research Program</td>
</tr>
<tr>
<td>PHB</td>
<td>Pedestrian Hybrid Beacon</td>
</tr>
<tr>
<td>RRFB</td>
<td>Rectangular Rapid Flashing Beacon</td>
</tr>
<tr>
<td>TCRP</td>
<td>Transit Cooperative Research Program</td>
</tr>
<tr>
<td>TRB</td>
<td>Transportation Research Board</td>
</tr>
<tr>
<td>VPH or vph</td>
<td>Vehicles per hour</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY

Purpose
The City of Sacramento 2021 Pedestrian Crossing Guidelines (Guidelines) provide guidance for the design and installation of marked crosswalks within the City of Sacramento. These guidelines document the preferred practice for the design and installation of marked crosswalks in Sacramento, subject to engineering judgement on a site-by-site basis. This document integrates available research related to pedestrian crossing facilities and recommended treatments with emphasis on designing streets that support a safe and walkable urban environment.

These guidelines are not meant to be rigid standards, rather, they provide additional guidance subject to engineering judgement on a case-by-case basis. The guidance seeks to maintain a reasonable balance between prescriptive requirements and flexibility based on engineering judgement, engineering study, and other necessary and useful considerations.

Candidate Marked Crosswalk Locations
The Guidelines provide suggested practices for evaluating candidate Marked Crosswalk Locations at uncontrolled crossing locations (i.e., at intersections and midblock locations that are not controlled by a traffic signal, stop, or yield sign). These locations may be identified as candidate locations either by City staff or as a request from the public. The guidance provides the following stepwise process (Section 2.2):

**Step 1: Initial Location Screening**
Uncontrolled marked crosswalks are ultimately appropriate at locations that meet the following conditions:

1. **DEMAND:**
   - Is there sufficient observed or latent demand?

2. **DISTANCE TO NEAREST CROSSING:**
   - Is the nearest marked crossing at least 300 feet away?

3. **VISIBILITY:**
   - Are the roadway and traffic conditions appropriate for providing a marked crossing?

4. **CROSSING SPACING:**
   - Will the marked crossing fill a gap in marked crosswalk spacing?

Exceptions to these conditions on a case-by-case basis. Refer to Section 2.2 on page 3 and the Crossing Location Evaluation Overview Flowchart on page 8 for more information.
**Step 2: Data Collection**

If a location is appropriate for a marked crosswalk, the Guidelines recommend collecting the following data to inform treatment selection:

- **ROADWAY CHARACTERISTICS**
- **BEHAVIORAL CHARACTERISTICS**
- **LOCATION CHARACTERISTICS**

Refer to pages 10-12 for a complete list of data to collect and collection worksheets.

---

**Step 3: Treatment Selection**

Step 3 provides guidance for selecting the following crossing enhancements (refer to **TABLE 2** on Page 14 and to the Treatment Applications Guide) based on the data collected in Step 2:

- High-visibility crosswalk markings (with parking restrictions, adequate nighttime lighting levels, and crossing warning signs)
- Raised crosswalk
- Advance yield sign and markings
- In-street pedestrian crossing sign
- Curb extension
- Pedestrian refuge island
- Rectangular Rapid Flashing Beacon (RRFB)
- Road diet
- Pedestrian hybrid beacon (PHB)
Evaluating Existing Uncontrolled Marked Crosswalks

The Guidelines provide suggested practices for evaluating existing uncontrolled marked crosswalks, with the following considerations:

**WHEN TO EVALUATE (SECTION 3.1)**
Evaluate as…
- Part of a land use project
- Part of a roadway project
- Part of a resurfacing project
- Outcome of traffic investigation\(^1\)

**HOW TO EVALUATE, ENHANCE, OR UPGRADE (SECTION 3.2)**
- Add location to citywide inventory
- Consult context classification guidance in Section 2 and treatment guidance in Section 4

**HOW TO CONSIDER FEASIBILITY (SECTION 3.3)**
- Evaluate based on location Type guidance
- Document determination

**WHEN TO REMOVE MARKED CROSSWALKS (SECTION 3.4)**
- Remove as an exceptional case subject to:
  - Engineering evaluation
  - Overriding safety considerations
  - Improvements determined to be infeasible\(^2\)
- Appropriate outreach conducted

---

**Prioritizing Enhancement Locations**

The Guidelines provide the criteria and process for prioritizing locations for crosswalk enhancement (Section 3.5). The criteria include:

- Crash history
- Demand
- Transit stop presence
- Vision Zero High Injury Network
- School Zone
- Social Equity (location is within a disadvantaged community)

---

**Defining Crosswalk Marking Treatments**

Section 4 of the guidance establishes basic signing and markings associated with different crosswalk types. The guidance uses the 2018 FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations as the basis for location types where enhancements may be necessary or desirable (see TABLE 3 on page 28).

---

1. A traffic investigation is a review of a specific location by City staff due to a traffic safety concern based on a public or internal request, including crosswalk reviews.

2. Improvements may be determined to be infeasible due to a variety of factors including cost, right of way constraints, or a lack of infrastructure, among others.
1.0 INTRODUCTION

1.1 Purpose and Scope

The City of Sacramento 2021 Pedestrian Crossing Guidelines provide guidance for the design and installation of marked crosswalks within the City of Sacramento. These guidelines document the preferred practice for the design and installation of marked crosswalks in Sacramento, subject to engineering judgement on a site-by-site basis. This document was adopted by City Council on April 20, 2021 (Resolution No. 2021-0093) and, as such, supersedes the 2014 Pedestrian Crossing Guidelines.

This document integrates available research related to pedestrian crossing facilities and recommended treatments with emphasis on designing streets that support a safe and walkable urban environment. Where applicable, the guidelines reflect pertinent current standards or regulations at the time of preparation of these guidelines (2021).

The City regularly receives requests to install marked crosswalks from various customers including residents, businesses, and institutions. This document provides guidance on the fundamental aspects of pedestrian crossings. The guidance can be used to determine if a marked crosswalk would be appropriate at a requested location and identifies a range of pedestrian crossing enhancement treatments that can be used to help accomplish the goal of getting pedestrians safely across the roadway. Accordingly, the guidelines and other provisions set forth in this document are based on the current versions of pertinent codes and treaties such as the California Vehicle Code (CVC), Caltrans’ Manual on Uniform Traffic Control Devices (CA MUTCD), and the Highway Design Manual (HDM), among other standards or regulations. Appendix A provides details on the legal definition of a crosswalk, the relationship between crosswalks and associated standards and regulations, as well as key definitions.

These guidelines integrate these referenced resources and 2021 best practices to provide guidance on concepts and treatments related to pedestrian crossings in the City of Sacramento with a focus on uncontrolled pedestrian crossings. For pedestrian crossing treatments or enhancements, please note the following:

- the City of Sacramento’s practice is to use traffic control devices that are approved for use in California.
- with advancement in engineering practice and technology, new treatments and devices may become available in the future. The City Traffic Engineer may approve the use of such treatments and devices, as determined appropriate. The City Traffic Engineer’s powers and duties are defined in Section 10.08.040 of the Sacramento City Code as:

  The city traffic engineer shall determine the installation and proper timing and maintenance of traffic-control devices and signals; conduct engineering analyses of traffic accidents and devise remedial measures; conduct engineering investigation of traffic conditions and co-operate with other city officials in the development of ways and means to improve traffic conditions; and carry out the additional powers and duties imposed by this title and other ordinances of the city.

- treatments recommended in these guidelines reflect common treatments currently in use and may not include every treatment available.
- multiple treatment options are provided, where feasible, to provide flexibility in selection of appropriate treatments depending on the context and site-specific conditions of the crossing locations.

This is a technical document to guide the decision-making for marking crosswalks and the determination of appropriate crossing enhancement treatments. It is not aimed at addressing planning or policy-related aspects of walking as a mode of transportation. Those aspects are addressed in the City’s Pedestrian Master Plan. The companion document City of Sacramento Pedestrian Crossing Guidelines Treatment Applications Guide contains more information and guidance for crossing treatments.
1.2 Flexibility and the Role of Engineering Judgement

These guidelines are not meant to be rigid standards, rather, they provide additional guidance subject to engineering judgement on a case-by-case basis. The guidance seeks to maintain a reasonable balance between prescriptive requirements and flexibility based on engineering judgement, engineering study, and other necessary and useful considerations. Accordingly, the guidelines incorporate provisions pursuant to which the City Traffic Engineer may consider variations and exceptions in certain circumstances.

In some instances, this document may not provide a definitive solution absent the exercise of engineering judgement or engineering study by the City Traffic Engineer. In all situations, the exercise of engineering judgement and/or engineering study are emphasized as integral components of the decision-making process.

1.3 Crosswalk Overview

Legal pedestrian crossings exist at all non-alley intersections that meet at approximately right angles, whether marked crosswalks are present or not, except where a pedestrian crossing is specifically prohibited. Marked crosswalks serve to alert road users to expect crossing pedestrians and to direct pedestrians to desirable crossing locations. At mid-block locations, crosswalks only exist where marked. At these non-intersection locations, it is the crosswalk markings that legally establish a crosswalk.

These guidelines are consistent with the CA MUTCD which at the time of publication provides uniform standards and specifications for crosswalk markings and all other official traffic control devices in California.

1.4 Updating the Guidance

These guidelines should be updated to reflect advancements in the engineering practice and changes in best practices for pedestrian crossings, as needed. The City Traffic Engineer shall determine when and the extent to which any update to the Pedestrian Crossing Guidelines is necessary to maintain consistency with best practices and engineering guidance.
2.0 EVALUATING CANDIDATE MARKED CROSSWALK LOCATIONS

2.1 Overview

This chapter describes suggested practices for evaluating candidate marked crosswalk locations. Candidate marked crosswalk location are sites identified by City staff or requested by members of the public. Crosswalk marking practices at signalized and stop- or yield- controlled locations differ from uncontrolled crossings. The identification of candidate marked crosswalk locations is a two-stage process:

Locate pedestrian desire lines. Pedestrian desire lines for crossings are the places where people would like to cross the street. These locations are influenced by elements of the roadway network, such as transit stops, and nearby land uses (homes, schools, parks, trails, commercial centers, etc.).

Identify where people can cross safely. Of all road users, pedestrians have the highest risk of injury in a collision because they are the least protected. Choosing the location for a marked crosswalk must consider the site context to determine the most appropriate crossing location to improve walking accessibility and safety.

2.2 Crosswalks at Uncontrolled Crossing Locations

Uncontrolled crossings are:

- At intersections and midblock locations that are not controlled by a traffic signal, stop, or yield sign; and,
- may have marked crosswalks or unmarked crosswalks (as defined in CVC Section 275).

Notwithstanding the provisions of the CVC, there shall not be a crosswalk where local authorities have placed signs indicating no crossing.

The guidance below is provided to assist in the interpretation of the CVC for City of Sacramento staff and public users when determining the presence of an unmarked crosswalk:

- An unmarked crosswalk must be at an intersection.
- There cannot be an unmarked mid-block crosswalk.
- There cannot be an unmarked crosswalk at an intersection without sidewalks on at least one side.
- Intersecting roadways must meet at approximately right angles and cannot include an alley.

The CA MUTCD Section 3B.18 provides standards, guidance, and supporting information for crosswalk markings.

For uncontrolled crossing locations, the CA MUTCD recommends 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. This engineering study should consider:

- number of lanes;
- median presence;
- distance from adjacent signalized intersections;
- pedestrian volumes and delays;
- average daily traffic;
- posted and 85th percentile speed (when available);
- roadway or intersection geometry;
- pedestrian desire lines;
- crossing point consolidation;
- lighting presence; and,
- other appropriate factors, as needed.
A three-step process has been developed and refined by the City of Sacramento to help determine if an uncontrolled location is a potential candidate for a marked crosswalk. The steps provide guidance on the appropriateness of various additional crossing treatments for consideration if marking the crosswalk based on speed, average daily traffic, and roadway geometry.

**Step 1:**

*Initial Location Screening* provides a flow chart to assist City staff in evaluating the appropriateness of an uncontrolled crossing location for a marked crosswalk.

**Step 2:**

*Data Collection* provides data collection forms to assist City staff in gathering appropriate data to determine a recommended marked crosswalk location and associated treatments.

**Step 3:**

*Treatment Selection* provides guidance on selecting between additional treatments appropriate at the uncontrolled crossing site if it is recommended for crosswalk marking.
Step 1: Initial Location Screening

The first step of the uncontrolled crossing location evaluation is an initial screening process to objectively evaluate the general appropriateness of an uncontrolled marked crosswalk at a specific location; this is undertaken in coordination with engineering judgement. This evaluation of the proposed pedestrian crossing site conditions addresses the following fundamental questions:

- Is there sufficient observed or latent demand?
- Is there another appropriate crossing location nearby?
- Are the roadway and traffic conditions appropriate for providing a marked crossing?
- Will the marked crossing fill a gap in marked crosswalk spacing?

These questions form the basis for determining whether to mark a crosswalk at a location. **FIGURE 1** (page 8) illustrates the flow of the decision-making process for evaluating a crossing location for a potential marked crosswalk. Each factor for the decision-making process is discussed in the subsections that follow.

DEMAND

**GUIDANCE:**

Uncontrolled locations should be considered for marking if there is sufficient pedestrian crossing demand (either measured through actual counts or latent demand) at the study location according to the following criteria:

- Pedestrian volumes of 20 or more are expected during the peak hour of pedestrian demand; or,
- Elderly, children, disabled, and/or sight-impaired pedestrian volumes of 15 or more are expected during the peak hour of pedestrian demand; or,
- Pedestrians volumes of 15 or more are expected during any two or more hours throughout the day.

**Demand Exceptions:** If the proposed marked crosswalk location provides access to a trail/shared-use path, is on the Vision Zero Action Plan High-Injury Network, or is on a direct pedestrian route to certain destinations like a school, park, senior center, community center, hospital, transit stop, the City Traffic Engineer may consider an exception to the minimum demand requirements on a case-by-case basis.

In evaluating demand for new crossings, the minimum thresholds should consider both existing and estimated future demand at the site. Estimated future demand should be determined using engineering judgement based on anticipatedimpending land use or other contextual changes to the area near the study location that could increase pedestrian activity and crossing demand at the study location. When considering estimated future demand City staff should also consider whether pedestrian crossings are currently reduced due to the lack of a marked crosswalk or, when appropriate, enhanced crosswalk at the study location.

If the study location does not meet the pedestrian demand guidance the location may still be evaluated through the remaining steps of the evaluation process to consider its overall context within the transportation network, using engineering judgement. If the result of such an evaluation suggests that the location is appropriate for marking the crosswalk considering the overall context, the City Traffic Engineer may make a determination (on a case-by-case basis) as to whether or not to mark the crossing at the study location, even if the pedestrian demand requirements are not satisfied.

**DISTANCE TO THE NEAREST CROSSWALK**

**GUIDANCE:**

At an uncontrolled crossing location, crosswalks should be considered for marking if the nearest marked or controlled pedestrian crossing distance is greater than or equal to 300 feet from the study location.

The nearest crosswalk may be controlled or an appropriately treated marked uncontrolled crossing. An appropriately treated uncontrolled crossing is considered as one having the signage, pavement markings, and the pedestrian crossing treatments that are consistent with the applicable guidelines in this document.

Staff should evaluate and confirm that the proposed marked crosswalk at the location under consideration is appropriate based on the site conditions, the ability to consolidate multiple crossing locations, and to effectively channelize pedestrians.

The 300-foot distance is general guidance, rather than an absolute minimum requirement or a controlling design criterion. The City Traffic Engineer may consider an exception in this regard on a case-by-case basis based on engineering judgement, and other considerations such as:

- pedestrian crossing demand;
- unique conditions pertaining to the proposed crossing site;
- the need to consolidate multiple crossing points or to channel pedestrians to preferred crossing locations, such as controlled approaches, and/or appropriately treated uncontrolled crosswalks; or,
- overall context pertaining to the crossing site (e.g., land uses or roadway and traffic conditions such as number of lanes, traffic volume, and speed), that may justify marking the pedestrian crossing at the study location.
VISIBILITY

GUIDANCE:
Sight distance should be measured in the field to determine adequacy for approaching motorists to see and stop for a pedestrian starting to cross the street at the crosswalk. Stopping sight distance should be measured based on a pedestrian having stepped with one foot in the bike lane or roadway at the crossing, showing the intent to cross. If minimum stopping sight distance is not met, consideration should be given to removing the obstruction(s) or implementing treatments to slow vehicle speeds on the approach to the crossing to reduce the required stopping sight distance. Vehicle stopping sight distance should be measured in accordance with the Caltrans HDM as shown in TABLE 1. If stopping sight distance cannot be adequately provided, the location is not appropriate for an uncontrolled marked crosswalk.

The availability of lighting to illuminate the proposed crosswalk should be evaluated to determine nighttime visibility as per the CA MUTCD. If there are special circumstances that necessitate nighttime illumination and illumination is not present, the location may not be appropriate for an uncontrolled marked crosswalk. Special circumstances may include high levels of nighttime pedestrian activity due to adjacent land uses such as a theater or anticipated frequent vehicle-pedestrian conflicts under nighttime conditions.

Sight distance is the length of the roadway ahead that is visible to the driver or pedestrian. The available stopping sight distance on a roadway should be sufficient to enable a vehicle traveling at or near the design speed to stop before reaching a pedestrian in the crosswalk. This assessment should be based on the posted speed limit or 85th percentile speed, when available. For locations with separated bike lanes (Class IV bikeways) with painted or raised islands separating the bike lane from vehicle traffic, stopping sight distance should be measured from the crossing point from the location furthest into the roadway cross-section that provides a detectable warning surface to assist and warn pedestrians who are blind or visually-impaired.

Overhead lighting at a crossing provides increased visibility of pedestrians and the crossing by increasing the luminance contrast at the location. Luminance contrast is based on the difference in the measured brightness of the object of interest and its background. The presence of lighting should be determined when evaluating a crossing location. Where lighting is not present, the City Traffic Engineer may consider an exception on a case-by-case basis based on engineering judgement.

STOPPING SIGHT DISTANCE VALUES
The stopping sight distances for various speeds on level roadways are shown in the following table. The posted speed or 85th percentile speed, when available, should be used as the design speed for evaluating stopping sight distance for this guidance. When both the posted speed and 85th percentile speed are available, the higher of the two values should be used to determine the appropriate stopping sight distance.

TABLE 1 Stopping Sight Distance on Level Roadways

<table>
<thead>
<tr>
<th>DESIGN SPEED (MPH)</th>
<th>STOPPING SIGHT DISTANCE (FT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>15</td>
<td>100</td>
</tr>
<tr>
<td>20</td>
<td>125</td>
</tr>
<tr>
<td>25</td>
<td>150</td>
</tr>
<tr>
<td>30</td>
<td>200</td>
</tr>
<tr>
<td>35</td>
<td>250</td>
</tr>
<tr>
<td>40</td>
<td>300</td>
</tr>
<tr>
<td>45</td>
<td>360</td>
</tr>
<tr>
<td>50</td>
<td>430</td>
</tr>
<tr>
<td>55</td>
<td>500</td>
</tr>
<tr>
<td>60</td>
<td>580</td>
</tr>
<tr>
<td>65</td>
<td>660</td>
</tr>
</tbody>
</table>

Source: Adapted from the Caltrans Highway Design Manual, 2018.
GUIDANCE:
The distance between existing marked crosswalks should be measured from the evaluation site. The desired spacing frequency for marked crossings in the City of Sacramento is context-based, such that certain areas of the City have a higher crossing frequency standard than others based on the expected pedestrian demand and land use. The City’s crosswalk spacing standards are detailed below and based on a typical 400-foot block in Downtown Sacramento. Block lengths were measured from the center of adjacent intersections. Using this typical block as a reference for crossing frequencies, minimum desired crossing frequencies were established.

THE GRID:
- This context zone is made up of the area bounded by the American River, Interstate 5, Broadway, and the Capital City Freeway.
- Desired marked crossing frequency: 800 feet (every other block)

VISION ZERO HIGH INJURY NETWORK:
- This context zone is made up of the High Injury Network as designated in the Vision Zero Action Plan.
- Desired marked crossing frequency: 1,200 feet (every third block)

TRANSIT STOPS:
- Marked or enhanced crossings should be provided within 100 feet of all new transit stops if pedestrians can reasonably be expected to desire crossing the street at the transit stop.
- If a marked crossing cannot be installed within 100 feet of a new transit stop, the City should coordinate with the transit provider to identify an alternative crossing location to serve the transit stop, or coordinate to relocate the transit stop to a location where a marked or enhanced crossing can be provided.

ADDITIONAL GUIDANCE:
- For all other locations, no marked crosswalk spacing standard has been established.
- The City Traffic Engineer may consider an exception to the spacing guidance on a case-by-case basis based on engineering judgement, and other considerations at the potential crossing location.
FIGURE 1: Crossing Location Evaluation Overview Flowchart

City staff visits site and collects data

Demand
≥20 pedestrians per pedestrian peak hour
OR
≥15 elderly, children, disabled, or sight-impaired pedestrians per pedestrian peak hour
OR
≥15 pedestrians during two or more hours throughout the day

Demand Exceptions
Location provides access to a trail/shared-use path, is on the Vision Zero High-Injury Network, or is on a direct pedestrian route to destinations, such as:
• Schools
• Parks
• Senior or Community Centers
• Hospitals
• Transit Stops or Stations

Yes

No

Distance to Nearest Crossing
Is the location ≥300 feet from the nearest marked or controlled crossing?

Yes

No

Distance Exception
Location can be considered as an exception to the ≥300 feet distance requirements based on the demand exceptions above.

Yes

No

Visibility SIGHT DISTANCE
Does the location meet sight distance requirements?

Yes

No

Can the sight distance obstructions be removed?

Yes

No

Lighting
Does the location have lighting available?

Yes

No

Is lighting needed due to special nighttime circumstances or activity?

Yes

No

Crossing Spacing
Does the location meet the crosswalk spacing standards, if applicable?
• The Grid: 800 feet
• Vision Zero High Injury Network Corridors: 1,200 feet
• Transit Stop: 100 feet

Yes

No

Consider marked crossing location based on applicable crosswalk spacing standard

Yes

No

Treatment Selection
Based on roadway and traffic characteristics, select the appropriate crossing treatment(s)

Yes

No

Feasibility
Is the recommended treatment feasible to implement based on site conditions, context, budget, etc.?

Yes

No

Develop and implement the marked crossing action plan

Recommend next steps or interim improvements until the recommended treatment(s) can be implemented.

Notes:
1. Refer to Section 2.2 for detailed guidance on the evaluation process for crosswalks at uncontrolled locations.
2. Location may be considered for further evaluation on a case-by-case basis even if pedestrian demand is not met depending on overall context.

Location is not currently NOT an appropriate site for a marked uncontrolled crossing.
Step 2: Data Collection

Once a location is determined to be appropriate for marking a crosswalk in Step 1, additional data should be obtained for roadway and traffic characteristics at the candidate location. In addition to collecting the data to determine the appropriateness of marking the crosswalk in Step 1, the following roadway characteristics should be documented for the candidate location:

**ROADWAY CHARACTERISTICS**
- existing pedestrian-related signs, markings, or other treatments/devices;
- posted speed or 85th percentile speed (when available);
- number of travel lanes for each approach;
- turn lane presence and type;
- medians or refuge islands;
- roadway width (curb to curb);
- sidewalk, bike lane, and/or trail presence;
- curb ramps and driveways;
- street lighting presence at the crossing location;
- drain inlets;
- on-street parking, alignment, and marked or signed restrictions; and,
- any other pertinent details

In addition to the roadway characteristics, pedestrian crossing and vehicle traffic behaviors should be observed and documented during the data collection. Behavioral observations should be recorded where pedestrian or vehicle activity is determined based on engineering judgement to have the potential to influence how pedestrians and vehicles may interact at the crossing locations. Potential behavioral characteristics that may be observed and recorded are summarized below.

**BEHAVIORAL CHARACTERISTICS**
- pedestrian crossing patterns near activity centers and pedestrian generators such as transit stops, schools, commercial districts, senior facilities, etc.;
- driver compliance at crosswalks and intersections; and,
- other pertinent pedestrian or driver actions based on observation.

Plans and historical data should also be reviewed to identify additional characteristics that may influence the decision to mark a crosswalk or include additional treatments. Additional data to consider include:

**ADDITIONAL LOCATION CHARACTERISTICS:**
- average daily traffic (ADT);
- transit boarding volumes from nearby stops;
- the most recent five years of available pedestrian-involved crash data within 250 feet of the location under evaluation;
- relevant traffic investigation history for the prior five years;
- surrounding existing and future land use;
- known programmed or planned improvements at the location; and
- other pertinent information, as available.

The recommended data collection form is provided in **FIGURE 2**.
# Uncontrolled Crosswalk Data Collection Form

<table>
<thead>
<tr>
<th>Location:</th>
<th>Prepared By:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Review Initiated:</td>
<td></td>
</tr>
</tbody>
</table>

## Data Collection Type:
- [ ] Request to mark new crosswalk
- [ ] Existing marked crosswalk

## Roadway Conditions Inventory

### Posted or 85th Percentile Speed
- [ ] ≤ 30 mph
- [ ] 35 mph
- [ ] ≥ 40 mph

### Total Vehicles per Day
- Average Daily Traffic (ADT): [ ]
- Approximate Vehicles per Hour (VPH)*: [ ]
  - [ ] ADT < 9,000
  - [ ] ADT 9,000–15,000
  - [ ] ADT > 15,000

### Travel Lane Configuration
- [ ] 2 lanes
- [ ] 2 lanes one-way
- [ ] 3 lanes without raised median
- [ ] 3 lanes with raised median
- [ ] 3 lanes one-way
- [ ] 4+ lanes without raised median
- [ ] 4+ lanes with raised median

### Crossing Length (feet):

### Raised median width (if present):

*VPH should be estimated if a PHB may be considered at the site. VPH is used to determine consistency with the PHB guidance in CA MUTCD Section 4F.1. VPH may be estimated by dividing the ADT by 24.

## Initial Location Screening

### Demand
- [ ] Location provides access to a trail, is on the Vision Zero High Injury Network, or is on a direct pedestrian route to destinations like a school, park, senior center, hospital, or transit stop.
- [ ] Location is recommended for further evaluation, even though it does not meet demand requirements

### Notes and/or Justification:

## Distance to Nearest Crossing

### Name of nearest pedestrian crossing location on an approach controlled by a traffic signal, stop, or yield:

### Distance to crossing above:

- [ ] Location is recommended for further evaluation, even though it does not meet crossing distance requirements

### Name of nearest location with appropriately treated uncontrolled marked crosswalk:

### Distance to marked crosswalk above:

### Notes and/or justification:
FIGURE 2 Uncontrolled Crosswalk Data Collection Form (Continued)

Visibility
SIGHT DISTANCE
Required stopping sight distance: 
Stopping sight distance met (both approaches):
☐ Yes  ☐ No
Location has adequate sight distance:
☐ Yes  ☐ No
If no, can obstructions be removed:
☐ Yes  ☐ No
If yes, note recommended measures:

LIGHTING
Lighting is present at the crossing location:
☐ Yes  ☐ No
If no, note recommended measures:

Crosswalk Spacing
Location is subject to crosswalk spacing standards:
☐ Yes, Grid
☐ Yes, Vision Zero High Injury Network
☐ No
If yes, existing marked crossings locations:

Distance between marked crossing locations:

PEDESTRIAN SAFETY ISSUES INVENTORY
Noted conflicts at crossing locations
☐ Yes  ☐ No
☐ History of turning movement crashes
☐ Observed conflicts at permitted crossing

Vehicle speed
☐ Yes  ☐ No
☐ History of speed-related crashes

Drivers not yielding to pedestrians in crosswalks
☐ Yes  ☐ No
☐ Crash history in marked crosswalks

Separation between pedestrians and traffic:
☐ Yes  ☐ No
☐ No buffer (e.g., landscape buffer, on-street parking, bike lanes)
Notes:
Would a marked crosswalk be appropriate based on site conditions, the ability to channelize pedestrians, and the consolidation of multiple crossings?

☐ Yes  ☐ No

If no, state reasons or contributing factors:


Recommend measures (if any) to make the location appropriate for marking the crosswalk:


Describe any known improvements programmed or planned at the location:


Five-year crash history (attach crash diagram or incident summary):

☐ Pedestrian-related crashes: ______________

☐ Total crashes: ______________

Crash history notes:


Five-year relevant traffic investigation history notes:


ADDITIONAL DATA COLLECTION

Attach aerial(s) or sketches showing the following, as applicable:

☐ Study location

☐ Number of travel lanes/direction

☐ Median/pedestrian refuge island

☐ Pedestrian-related improvements

☐ Sidewalks + Bike Lanes

☐ Trail

☐ Parking

☐ Curb ramps/driveways

☐ Street lights

☐ Drain inlets

☐ Other pertinent details
Step 3: Treatment Selection

Step 3 focuses on determining whether a marked crosswalk alone is sufficient and, if not, what treatments are most appropriate. This determination is based on the candidate location’s characteristics collected as part of Step 2, the recommended treatments by location type in TABLE 2, and engineering judgement.

TABLE 2 is adapted from the 2018 FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations which synthesizes the latest research and best practices for safety at uncontrolled pedestrian crossings. The table provides recommended treatments in a matrix by roadway configuration, posted speed, and traffic volumes. Given the conditions of each cell of the matrix, the treatments identified in the cell are classified into three levels of guidance:

- treatments that are candidates for the location type;
- treatments that should always be considered, but are not mandated or required (shown as a bolded number in a darkened box); and,
- crosswalk visibility enhancements that should always occur in conjunction with other identified treatments (shown as a bolded number in a darkened box with a black outline).

Once the candidate location context type and associated recommended treatments are identified, the selection of a treatment or package of treatments can proceed based on the specific site context and engineering judgement. Section 4 provides detailed guidance on appropriate treatments or enhancements based on the location type. The companion document City of Sacramento Pedestrian Crossing Treatment Applications Guide contains more detailed background information and guidance for crossing treatments.
### TABLE 2 Application of Pedestrian Crossing Treatments by Location Type

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and ADT</th>
<th>Vehicle ADT &lt;9,000</th>
<th>35 mph</th>
<th>≥40 mph</th>
<th>Vehicle ADT 9,000-15,000</th>
<th>35 mph</th>
<th>≥40 mph</th>
<th>Vehicle ADT &gt;15,000</th>
<th>35 mph</th>
<th>≥40 mph</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤30 mph</td>
<td></td>
<td></td>
<td>≤30 mph</td>
<td></td>
<td></td>
<td>≤30 mph</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 lanes</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>2 lanes one-way</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>3 lanes with raised median</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>3 lanes without raised median</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>3 lanes one-way</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>4+ lanes with raised median</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>4+ lanes without raised median</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>7</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
</tbody>
</table>

**Treatments:**

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs.
2. Raised crosswalk
3. Advance Yield Here to (Stop Here For) Pedestrians sign and yield (stop line)
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flashing Beacon (RRFB)**
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)**

**Selection Guidance:**

### Note:
- Treatments that are candidates for the location type
- Treatments shown as a bold number within a darkened box should always be considered, but are not mandated or required.
- Treatments shown as a bolded number in a darkened box with a black outline are crosswalk visibility enhancements that should always occur in conjunction with other identified treatments.

**Note:** The PHB and RRFB are not installed at the same crossing location.

*Adapted from FHWA’s Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (July 2018)*

Resolution 2021-0093 | April 20, 2021

City of Glendale
2.3 Crosswalks at Controlled Crossing Locations

Controlled pedestrian crossing locations are intersection approaches as well as midblock crossing sites that are controlled by a traffic signal, stop, or yield control.

**GUIDANCE:**
- At locations controlled by traffic control signals or on approaches controlled by STOP or YIELD signs, crosswalk lines should be installed where engineering judgement indicates they are needed to direct pedestrians to the proper crossing path(s).
- 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.
- See CA MUTCD Section 3B.18 for more information.
- High-visibility crosswalk markings may be considered at controlled crossing locations on the Vision Zero High-Injury Network. Additional locations may be considered on a case-by-case basis by the City Traffic Engineer based on engineering judgement.

Section 4.4 of this document provides treatment guidance on crosswalks at signalized, stop, and/or yield controlled approaches.

2.4 Crossings at Mid-Block Locations

As defined above and because excluded from the definition of “crosswalk” in Section 275 of the CVC mid-block locations cannot have an unmarked crosswalk. In order to establish a crosswalk at a mid-block location, it must be marked.

**GUIDANCE:**
Mid-block crosswalks may not be expected by motorists. As a result, additional measures such as signage, curb extensions, and parking restrictions are recommended to improve visibility for both pedestrians and motorists. 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.

Mid-block crosswalks should only be considered if the following conditions apply:
- There is a demonstrated need for marking the mid-block crossing based on demand and/or the need for channelizing crossing pedestrians.
- The location is serving a trail or pedestrian trip generator (schools, parks, senior centers, hospitals, commercial areas, etc.) on both sides of the street between controlled intersections.

Treatment requirements and recommendations for mid-block crossings can be found in Section 4.2.
2.5 Crosswalks at Trail Crossings

At locations where a trail or a shared-use path crosses a street, the appropriate guidance for controlled intersection crossings, uncontrolled intersection crossings, and mid-block locations should be used to determine whether or not to mark a crosswalk, and to select the appropriate crossing treatments. Ramp receiving areas should be considered at all evaluation locations to determine the most appropriate crossing location. The City Traffic Engineer may consider, on a case-by-case basis, exceptions in regard to the following while determining whether to mark the trail/shared-use path crossing at uncontrolled locations:

- Crossing demand
- Distance to the nearest crosswalk

2.6 Prohibiting Pedestrian Crossings

Legal crosswalks exist at most roadway intersections, even if they are not marked. An unmarked crosswalk is a legal crossing unless local authorities place signs indicating otherwise. The CVC allows local authorities to prohibit pedestrian crossing with signage. Guidance based on the CVC and best practice is provided below.

**GUIDANCE:**

Signs may be installed at or adjacent to an intersection directing that pedestrians shall not cross in a marked or unmarked crosswalk at the intersection. It is unlawful for any pedestrian to cross at the crosswalk prohibited by a sign. Closures of existing crosswalks should be avoided, and existing closed crosswalks should be evaluated for opening in combination with any necessary safety measures such as signal timing or signage changes. Where required, only one leg of an intersection should be closed. The impact on pedestrian convenience and accessibility should be considered in these decisions.

The City Traffic Engineer may restrict certain pedestrian movements at any intersection. The following are examples where pedestrian crossing prohibition may be considered:

- Heavy right- or left-turn volumes cross the path of the pedestrian crossing and protected signal phasing to separate the movements is infeasible due to cost, lack of infrastructure, or other safety considerations.
- Physical environment or geometric conditions provide inadequate visibility.
3.0 EXISTING UNCONTROLLED MARKED CROSSWALKS

This chapter addresses the following aspects of existing uncontrolled marked crosswalk locations:

- When should City staff evaluate existing uncontrolled marked crosswalks?
- How to evaluate, and enhance or upgrade existing marked crosswalks where there is an opportunity to align the location with the most current guidelines?
- What if the enhancement/upgrade of an existing marked crosswalk is not feasible?
- Removal of existing marked crosswalk(s).
3.1 When Should The City Evaluate Existing Crosswalks?

These guidelines recognize that some existing marked crosswalks and associated inventories of traffic control devices may not comply with the guidelines, and/or applicable standards. The City of Sacramento is 170 years old and has developed a street network based on engineering standards that have evolved over time. The City has also inherited many streets and street designs developed by agencies other than the City of Sacramento.

Unless mandated by the pertinent regulatory/governing documents, such non-conforming pedestrian crossing facilities may remain in service through the end of their useful service life and/or until the inventories are depleted (See CA MUTCD, Introduction and Caltrans HDM, Chapter 80, Topic 82 for more information). As such, these guidelines do not suggest that the existing non-conforming pedestrian crossing facilities become obsolete upon adoption of these or any future updates/revisions to the guidelines, policies, procedures, and practices.

---

3.2 Evaluation And Enhancement Approach

The approach for evaluation of an existing uncontrolled marked crosswalk, and enhancement of the same is suggested below.

**GUIDANCE:**

As part of a proactive safety management process, it is recommended to consider evaluating and enhancing, when feasible, existing marked uncontrolled crosswalks and associated traffic control devices under one or more of the following conditions:

- As part of a project involving change in land use (e.g., school closure, development project, etc.).
- As part of a project involving a change in roadway characteristics (e.g., roadway widening, lane reduction, etc.).
- As part of a roadway resurfacing project.
- Based on pedestrian safety related concerns identified during the course of any traffic investigation.

**GUIDANCE:**

1. The existing crosswalk location should be documented and added to the City’s crosswalk inventory database. At a minimum, the crosswalk documentation will include:
   - Marked crosswalk location
   - Site characteristics per the guidelines data collection form
   - Five-year pedestrian-crossing related crash history for the site
   - Potential for enhancement consistent with the guidance

2. Using the guidance presented in **Section 2** (page 3), determine the applicable roadway context classification of the crossing site and the recommended treatments for consideration.

3. Determine the appropriate additional treatment(s), if any, for the site using the treatment guidance in **Section 4** (page 23).

4. Compare the existing crosswalk and associated treatments with the recommended treatments. Determine if additional treatments are preferred for the crosswalk based on the guidelines.

5. If the evaluation of an existing uncontrolled marked crosswalk indicates that there is an opportunity for enhancements at the subject crosswalk based on the guidelines, take necessary measures, if feasible, to install the remaining components to enhance the crosswalk consistent with the guidelines.

6. The marked crosswalk characteristics and the enhancements made as part of the improvement should be added to the crosswalk inventory database to maintain a citywide inventory of known existing crosswalks. This update to the database entry should include the treatments, signage, or devices installed, the date of the most recent improvement(s), the reason for the improvement, and any additional relevant observations or data from the crosswalk site.
3.3 What If Enhancement Of An Existing Crosswalk Is Not Feasible?

These guidelines recognize that it may not be feasible to enhance every existing uncontrolled marked crosswalk based on these guidelines due to the financial constraints of public funds, extensive treatment requirements, the need for right-of-way acquisition, or other considerations.

GENERAL GUIDANCE

The CA MUTCD Section 3B.18 provides the following guidance in regard to new marked crosswalks at uncontrolled locations:

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.

In addition, Caltrans’ Directive on Crosswalk Enhancements Policy (30) provides the following directions for minimum safety enhancements to existing marked crosswalks that cross uncontrolled roadways on the State Highway System with roadway characteristics that are similar to those addressed above:

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 feet in advance of the crosswalk, pedestrian crossing (WI1-2) warning signs with diagonal downward pointing arrow (W16-7b) 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.

See the above referenced Policy Directive for further information.

Guidance for Enhancing Existing Uncontrolled Marked Crosswalks

This section documents the recommended approach to enhancing existing uncontrolled marked crosswalks where it may not be feasible to improve them to be consistent with the recommendations of these guidelines. These recommendations expand on the general guidance from the CA MUTCD and Caltrans’ Directive on Crosswalks Enhancement Policy. Use of engineering judgement, as appropriate, is emphasized as an integral part of the entire process.

The recommended approach depends on roadway and traffic characteristics at the marked crosswalk site. The guidance has been separated into two different location types:

- Location Type 1 – Multi-Lane Roadways with Speed Limits ≥ 40 mph and ADT ≥ 12,000; and,
- Location Type 2 – All Other Crossing Locations

The two location types are based off the Caltrans’ Directive on Crosswalk Enhancements Policy definition of when a marked crosswalk requires minimum enhancements on the State Highway System. Locations meeting the Caltrans Policy Directive criteria, Location Type 1, are not recommended to remain marked without interim improvements. Location Type 2 marked crosswalk locations may remain marked until enhancements can be provided on a case-by-case basis determined by the City Traffic Engineer.
GUIDANCE

Location Type 1 – Multi-Lane Roadways with Speed Limits ≥40 mph and ADT ≥ 12,000:

For roadways where pedestrians must cross three lanes or more in one direction, or four or more lanes in both directions, and the posted speed limit is at or above 40 mph and volumes are greater than or equal to 12,000 ADT, the following approach should be taken:

1. Review pedestrian crossing volumes, transit stop locations, surrounding land uses, and reported pedestrian crash history at or near the crossing within the last five years.

2. Evaluate the feasibility of providing interim improvements based on the data collected above and roadway configuration, vehicle volumes, vehicle speeds, and visibility.

3. If interim improvements are feasible at the site, implement appropriate interim improvements to reduce the risk of pedestrian involved crashes until such time when the recommended pedestrian crossing enhancements are in place.

4. If, based on the location, interim improvements are deemed insufficient to reduce the risk of pedestrian-involved crashes, and recommended improvements are not feasible due to cost or constructability, remove the crosswalk per the crosswalk removal guidance in the following subsection.

5. It is recommended to prohibit the crossing by removing traffic control devices associated with the crossing and implementing measures to prevent pedestrian crossings. Crosswalk prohibition should only be implemented as a last resort when interim enhancements are infeasible at the site or there are overriding safety considerations arising from the site conditions. Enhancements may be determined to be infeasible due to a number of considerations, such as cost, lack of infrastructure, or right of way limitations.

6. The evaluations and recommendations should be based on an engineering study before presenting for approval to the City Traffic Engineer. The City Traffic Engineer may consider an exception to this guidance on a case-by-case basis.

Location Type 2 – All Other Crossing Locations:

For other crossing locations, the following approach should be taken:

1. Review pedestrian crossing volumes, transit stop locations, surrounding land uses, and reported pedestrian crash history at or near the crossing within the last five years.

2. Evaluate the roadway configuration, vehicle volumes, vehicle speeds, and visibility for safety concerns related to the crossing location.

3. If there have been no pedestrian crashes at or near the crossing (within 250 feet) in the last five years and there are no visibility or other safety concerns determine if appropriate interim improvements can provide reduced crash risk to the pedestrians until such time when all the recommended pedestrian crossing enhancements are in place. Interim improvements should provide as enhanced a crossing experience as possible for pedestrians within the available resources.

4. The evaluations and recommendations should be based on an engineering study before presenting for approval to the City Traffic Engineer. The City Traffic Engineer may consider an exception to this guidance on a case-by-case basis.

Documentation

Evaluations and recommendations for the interim enhancement or, as a last resort, removal of an existing uncontrolled marked crosswalk should be documented to provide the justification for the crosswalk interim enhancements or removal. The documentation should include:

- existing roadway configuration, vehicle volumes, vehicle speeds, and visibility;
- pedestrian crossing volumes, transit stop locations, surrounding land uses, and reported pedestrian crash history at or near the crossing within the last five years;
- treatments recommended based on these guidelines;
- justification of interim improvements or crosswalk removal; and,
- potential funding sources and estimated timeline to improve the site.
3.4 Uncontrolled Marked Crosswalk Removal

Although, it may be necessary to remove an uncontrolled marked crosswalk due to the risk of crashes involving pedestrians at the location, it is important to note that such a removal does not prevent pedestrians from crossing the street at an intersection unless the crosswalk is prohibited. If there is a desire or need for pedestrians to cross at that location, based on the adjacent land uses, pedestrians may continue to cross at the location.

If a determination is made to remove an existing uncontrolled marked crosswalk, the removal of the crosswalk shall be accomplished in a manner consistent with the CA MUTCD and CVC Section 21950.5. The recommended approach for uncontrolled marked crosswalk removal is provided below.

GUIDANCE:
Marked crosswalk removal should be an exceptional case and crosswalk markings can be recommended for removal while leaving an unmarked crosswalk legally available when:

- an engineering evaluation determines that other measures have not been effective;
- there are overriding safety considerations arising from the site conditions; or;
- interim improvements are not feasible, and the recommended improvements are not feasible to implement in a reasonable timeline.

If it is determined to be necessary to remove an uncontrolled marked crosswalk for safety reasons, the removal should be consistent with CA MUTCD and CVC noticing requirements and City of Sacramento Crosswalk Removal Outreach Policy (see Appendix B). Consistent with CVC 21950.5 notification will be posted at the crosswalk identified for removal for not less than 30 days from the scheduled date of removal. Notices will also be posted at transit stops within 500-feet of the proposed crosswalk removal.

Marked crosswalk removal may be accomplished by repaving or surface treatment per the City of Sacramento Standard Specifications. A marked crosswalk should not be eliminated by allowing it to fade out or be worn away. Surface treatment for crosswalk removal should not give the appearance of a faded or worn away marked crosswalk to avoid the appearance of a marked crossing to a pedestrian at the curb. The City Traffic Engineer should confirm with Signs and Markings staff after crosswalk removal to determine the need for repaving or resurfacing based on whether the grinding of the removed crosswalk markings give the appearance of a faded or worn crosswalk. If this condition is not met, the crosswalk location should be resurfaced or repaved.

If a marked crosswalk is removed and prohibited, the crosswalk prohibition shall include signs installed at the location directing that pedestrians shall not cross consistent with CA MUTCD Section 3B.18 and CVC 21106(b). The City Traffic Engineer may approve additional treatments to reinforce the crosswalk prohibition such as barricades or pedestrian fencing on a case-by-case basis, as needed.
3.5 Prioritizing Enhancements for Existing Uncontrolled Marked Crosswalks

Given the potentially large number of existing marked crosswalks that may need enhancement treatments based on these guidelines and limits to available funding for enhancements, a prioritization methodology has been developed to allow the City to address enhancements to existing marked crosswalks. This approach creates a systematic process for identifying and prioritizing those locations for enhancements based on the locations that are most likely beneficial to people walking.

The recommended prioritization process considers site characteristics, crash history, the surrounding land use context of the site, and equity considerations to prioritize existing marked crosswalk locations for enhancements. The recommended prioritization process is described in the guidance below.

**GUIDANCE**

1. Begin the prioritization process by obtaining the latest version of the potential enhancement crosswalk inventory as described in Section 3.2.

2. Use the following scoring criteria to score each crosswalk where enhancements are being considered:
   - **Crash History:** If the site has a pedestrian crossing-related fatal or serious injury crash within the past five years, the site receives 3 points. If the site has a history of non-fatal or serious injury pedestrian crossing-related crashes, the location receives 2 points. If pedestrian crossing-related safety issues are observed at the site, but there is no pedestrian crossing-related crash history, the location receives 1 point.
   - **Demand:** If the site has pedestrian crossings volumes of at least 20 pedestrians per hour, or directly serves a pedestrian generator (as defined in Section 2.2 above) the location receives 2 points. If the site indirectly serves a pedestrian generator, the location receives 1 point.
   - **Transit Stop:** If the site directly serves a transit stop or station, the location receives 2 points. If the location does not directly serve a transit stop or station but is within 500 feet of a transit stop or station, the location receives 1 point.
   - **Vision Zero High Injury Network:** If the site is on the Vision Zero High Injury Network as designated by the City, the location receives 1 point.
   - **School Zone:** If the site is within a school zone, the location receives 1 point.
   - **Equity:** If the site is within a disadvantaged community (as defined per Senate Bill 535 as within a Census Tract that is in the top 25% of CalEnviroScreen scores), the location receives 1 point.

3. Rank the crosswalk locations by score from highest to lowest.

4. Use the top 20% of the sites as the pool of locations for consideration, develop a short-list of projects for planning level evaluation based on available funding, geographic balance, implementation feasibility, upcoming resurfacing, repaving, or other maintenance activities, and engineering judgements.

5. Develop planning level cost estimates for the recommended improvements and interim improvements at each location for the selected sites.

6. Implement recommended or interim improvements in order of priority. Where recommended improvements are not able to be funded, implement interim improvements.

7. For sites where recommended or interim improvements are not able to be funded given current funding, identify potential funding sources.

8. If a site with an opportunity for enhancement consistent with the guidelines remains unfunded, the City Traffic Engineer may consider removing the marked crosswalk based on engineering judgement.

9. After a site has been enhanced consistent with the guidelines, remove the site from the potential enhancement crosswalk inventory database. Locations with interim improvements should remain in the database until no additional enhancements are recommended by the guidelines.
4.0 PEDESTRIAN CROSSING TREATMENT GUIDANCE

This chapter provides engineering guidance on designing marked pedestrian crossing facilities for uncontrolled and controlled crossing locations.

4.1 Treatments for Marked Crosswalks at Uncontrolled Locations

The design of marked pedestrian crossing facilities at uncontrolled locations in the City of Sacramento entails two major components:

- The ‘basic’ treatment as outlined in the subsection below; and
- pedestrian crossing facility enhancement(s) treatments to reduce the risk of pedestrian involved crashes and/or enhance the ability of pedestrians to cross the street.

BASIC TREATMENT FOR MARKED CROSSWALKS AT UNCONTROLLED LOCATIONS

The 'basic' treatment as outlined below and as depicted in FIGURE 3 is to be provided at marked crosswalks at uncontrolled locations. The City Traffic Engineer may consider variations/exceptions on a case-by-case basis. Exercising engineering judgement is important in such cases, as it is impractical to address every possible scenario of site conditions at different crossing locations.
GUIDANCE

The 'basic' treatment for marked crosswalks at uncontrolled locations consists of:

- City's standard high visibility triple four crosswalk markings; and
- Warning signs W11-2 at the crossing location(s). If a W11-2 sign at the location of the crossing point is post-mounted, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the W11-2 sign. If the W11-2 sign is mounted overhead, the (W16-7P) plaque shall not be used. Refer to CA MUTCD Section 2C.50 for further information.

- If the crosswalk location is across a 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 feet in advance of the crosswalk and adequate visibility should be provided by parking prohibitions. For parking restrictions, parking should be restricted to one stall or within the distance required to provide adequate stopping sight distance for approaching vehicles to stop for a pedestrian intending to cross, as well as one parking stall on the departure side.

- For all other locations, warning signs (W11-2) may be provided in advance of an uncontrolled marked crosswalks if an engineering judgement indicates that either there is a need for alerting road users in advance of where unexpected entries of pedestrian into the roadway might occur; OR where visibility of the crossing treatments or pedestrians is obstructed. Obstructions may include near side transit stops, trees, visual clutter, roadway geometry that limits sight distance, a large volume of heavy vehicles, etc.

- If the warning sign (W11-2) is used in advance of a pedestrian crossing (see above), it should be supplemented with plaques with the legend “AHEAD” or “XX FEET”.

- “SLOW PED XING” pavement word markings should be provided in conjunction with W11-2 warning signs if the W11-2 signs are provided in advance of the uncontrolled marked crosswalk to supplement the signs and provide additional emphasis for the warning messages. For trail crossings, “SLOWTRAIL XING” pavement markings should be used instead of “SLOW PED XING”.

- For streets with multiple uncontrolled marked crossings in series, excessive use of the signs and pavement markings should be avoided in order to ensure the effectiveness as well as the conservative use of these traffic control devices. Depending on site conditions, select appropriate locations to consolidate/minimize the locations of advanced warning signs (W11-2) and associated “SLOW PED XING” pavement word markings.
FIGURE 3   Uncontrolled Marked Crosswalk ‘Basic’ Treatment

NOTES

1. SELECT THE ADVANCE PLACEMENT DISTANCE BASED ON DESIGN SPEEDS.

2. REFER TO 2014 CA MUTCD (OR LATEST EDITION), SECTION 3B.20 FOR LETTER SIZE AND LONGITUDINAL SPACE BETWEEN PAVEMENT MARKINGS.

3. FOR WARNING SIGNS (W11-2) AND “SLOW PED XING” PAVEMENT MARKINGS IN ADVANCE OF UNCONTROLLED MARKED CROSSINGS, REFER TO SECTION 4.2 FOR GUIDANCE ON:
(A) APPLICABILITY; AND
(B) CONSOLIDATION OF LOCATIONS OF THESE SIGNS AND PAVEMENT MARKINGS FOR STREETS WITH multiple UNCONTROLLED MARKED CROSSINGS IN SERIES.

Source: City of Sacramento, 2014.
Enhancement Treatments for Marked Crosswalks at Uncontrolled Locations

Marked crosswalks at uncontrolled locations may need to be enhanced with appropriate treatments (depending on the roadway and traffic characteristics of the crossing location) to reduce the risk of crashes involving pedestrians and/or enhance the ability of pedestrians to cross the street. To achieve those two outcomes, pedestrian crossings often use several traffic control devices or design elements to meet the information and control needs of both motorists and pedestrians. The following characteristics are desirable for a pedestrian crossing:

- The street crossing task is simple and convenient for pedestrians.
- Waiting or crossing pedestrians are visible to motorists and pedestrians can see approaching vehicles.
- Vehicle speeds are slowed or controlled in the area of the pedestrian crossing.
- Vehicle drivers are aware of the presence of the crosswalk.
- Vehicle drivers yield the right-of-way to pedestrians.
- Pedestrians use designated crossing locations and obey applicable state and local traffic laws.

In a complex (e.g., multi-lane, high-speed, high-volume) street environment, it can be difficult to provide these characteristics with a single treatment, and these environments may require several treatments intended to serve different purposes. Streets with lower speeds or traffic volumes may not require multiple treatments to achieve the desirable characteristics above.

The guidance in this section for selecting enhancement treatments for marked crosswalks at uncontrolled locations is based on the 2018 FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations. The FHWA document provides guidance on specific aspects such as the effectiveness and/or applicability of various treatments under different combinations of roadway and traffic conditions based on the latest research and best practices of 2021. The City of Sacramento guidance uses the FHWA guide as its basis, while tailoring the guidance to fit the unique context of the City.

GUIDANCE:
These guidelines are intended to provide a balance between engineering judgement and prescriptiveness. Although the recommendations presented in this section provide guidance in selecting appropriate pedestrian crossing treatments, engineering judgement should be exercised in selecting a specific treatment(s) for installation.

PRIMARY ENHANCEMENTS
Nine primary treatments are recommended for pedestrian crossing enhancements based on FHWA’s 2018 guidance for marked uncontrolled crossings locations. The primary enhancements include:

1. High-visibility crosswalk markings with parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs
2. Raised crosswalks
3. Advance Yield Here to Pedestrians signs and yield lines
4. In-street Pedestrian Crossing signs
5. Curb extensions
6. Pedestrian refuge islands
7. Rectangular Rapid-Flashing Beacons (RRFBs)
8. Road diets
9. Pedestrian Hybrid Beacons (PHBs)
Recommended primary enhancement treatments by roadway configuration, posted speed, and average daily traffic are presented in TABLE 3. (see page 28). The recommended treatments are determined by the roadway and traffic characteristics of the crossing site.

The primary treatment recommendations are provided in three categories for each matrix cell:

- Treatments that are candidates for the location type;
- Treatments that should always be considered, but are not mandated or required (shown as a bolded number in a darkened box);
- Crosswalk visibility enhancements that should always occur in conjunction with other identified treatments (shown as a bolded number in a darkened box with a black outline)

Where a treatment is not represented in a matrix cell, it is not recommended for use at sites meeting those conditions.

Not all of the treatments listed in a matrix cell should necessarily be installed at the crossing. The observations and results from the location screening and data collection phases should be used to determine which treatments seem most likely to be effective at reducing risk of crashes involving pedestrians.

Additionally, the surrounding land use context, pedestrian volumes and activity patterns, and treatment effectiveness and cost should be considered when selecting the treatment most suitable for the crossing.

For multi-lane roadway crossings where vehicle ADT exceeds 10,000, FHWA guidance has established that a marked crosswalk alone is typically not sufficient. When these conditions are met, more substantial crossing treatments should be used to prevent an increase in pedestrian crash potential. Treatments such as a pedestrian refuge island, RRFB, or PHB may be considered. Refer to the TABLE 3 matrix for when a marked crosswalk (Treatment #1) should be paired with one or more of the other treatments (shown in bold with a darker background). Additionally, substantial crossing treatments such as traffic signals or pedestrian signals should also be considered at these locations when warranted and could help reduce the risk of crashes involving pedestrians.

To improve the visibility of the marked crossing and pedestrians, multiple treatments may be combined. Roadway geometry and CA MUTCD requirements should be considered when considering installing multiple treatments.

The companion Pedestrian Crossing Treatments Application Guide provides more information on the primary treatments.

**SUPPLEMENTAL TREATMENTS**

Supplemental treatments may be potentially useful as supplements or add-ons to the City’s basic treatment and/or primary treatments. The companion document City of Sacramento Pedestrian Crossing Treatment Applications Guide provides guidance on the primary and supplemental treatments including pertinent requirements.

**NEW TREATMENTS**

The treatments recommended in these guidelines reflect the more common treatments being used and may not include every treatment available. Furthermore, the City of Sacramento’s practice is to use only those traffic control devices that are approved for use in California. Accordingly, only those treatments and devices that are either included in the CA MUTCD or approved for their use by the CTCDC at the time of development of these guidelines are included as the recommended treatments. With advancements in technology, new treatments and devices may become available in the future. The City Traffic Engineer may approve the use of such treatments and devices if they meet the requirement above consistent with the powers and duties defined in the Sacramento City Code, Section 10.80.040.

---

### TABLE 3 Application of Pedestrian Crossing Treatments by Location Type

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and ADT</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicle ADT &lt;9,000</td>
<td>35 mph</td>
<td>&gt;40 mph</td>
<td>Vehicle ADT 9,000-15,000</td>
<td>35 mph</td>
<td>&gt;40 mph</td>
</tr>
<tr>
<td></td>
<td>1 2 3 1 1 3</td>
<td>1 3</td>
<td>1</td>
<td>1 3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2 lanes</td>
<td>4 5 6 5 6</td>
<td>4 5 6</td>
<td>5 6</td>
<td>4 5 6 5 6</td>
<td>5 6</td>
<td>4 5 6 5 6</td>
</tr>
<tr>
<td></td>
<td>7 9 7 9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
</tr>
<tr>
<td>2 lanes one-way</td>
<td>1 3 1 3</td>
<td>1 3 1</td>
<td>1</td>
<td>1 3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5 5 5</td>
<td>5 5</td>
<td>5</td>
<td>5 5</td>
<td>5</td>
<td>5 5</td>
</tr>
<tr>
<td></td>
<td>7 9 7 9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
</tr>
<tr>
<td>3 lanes with raised median</td>
<td>1 2 3 1</td>
<td>1 3 1</td>
<td>1</td>
<td>1 3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>4 5 5</td>
<td>4 5 5</td>
<td>5</td>
<td>4 5 5</td>
<td>5</td>
<td>4 5 5</td>
</tr>
<tr>
<td></td>
<td>7 9 7 9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
</tr>
<tr>
<td>3 lanes without raised median</td>
<td>4 5 6</td>
<td>4 5 6</td>
<td>5 6</td>
<td>4 5 6</td>
<td>5 6</td>
<td>4 5 6</td>
</tr>
<tr>
<td></td>
<td>7 9 7 9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
<td>9</td>
<td>7 9 7</td>
</tr>
<tr>
<td>3 lanes one-way</td>
<td>1 3 1 3</td>
<td>1 3 1</td>
<td>1</td>
<td>1 3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5 5 5</td>
<td>5 5</td>
<td>5</td>
<td>5 5</td>
<td>5</td>
<td>5 5</td>
</tr>
<tr>
<td></td>
<td>7 8 9 7</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
</tr>
<tr>
<td>4+ lane: with raised median</td>
<td>1 3 1</td>
<td>1 3 1</td>
<td>1</td>
<td>1 3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5 5 5</td>
<td>5 5</td>
<td>5</td>
<td>5 5</td>
<td>5</td>
<td>5 5</td>
</tr>
<tr>
<td></td>
<td>7 8 9 7</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
</tr>
<tr>
<td>4+ lane: without raised median</td>
<td>1 3 1</td>
<td>1 3 1</td>
<td>1</td>
<td>1 3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>5 6 5</td>
<td>5 6</td>
<td>5</td>
<td>5 6</td>
<td>5</td>
<td>5 6</td>
</tr>
<tr>
<td></td>
<td>7 8 9 7</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
<td>7 8 9</td>
</tr>
</tbody>
</table>

**Treatments:**

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs.

2. Raised crosswalk

3. Advance Yield Here to (Stop Here For) Pedestrians sign and yield (stop line)

4. In-Street Pedestrian Crossing sign

5. Curb extension

6. Pedestrian refuge island

7. Rectangular Rapid-Flashing Beacon (RRFB)\(^a^\)

8. Road Diet

9. Pedestrian Hybrid Beacon (PHB)\(^a^\)

**Selection Guidance:**

\(^a^\) treatments that are candidates for the location type

\(^b^\) treatments shown as a bold number within a darkened box should always be considered, but are not mandated or required.

\(^c^\) treatments shown as a boldered number in a darkened box with a black outline are crosswalk visibility enhancements that should always occur in conjunction with other identified treatments.

\(^d^\) Note: The PHB and RRFB are not installed at the same crossing location

*Source: Adapted from FHWA’s Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (July 2018)*
4.2 Crosswalks at Mid-Block

Guidance for the design of marked pedestrian crossing facilities at uncontrolled mid-block locations is provided below.

**GUIDANCE:**

If an uncontrolled mid-block location is selected for a marked crosswalk in accordance with the guidelines in Section 2, the location should be provided with the following treatments (see FIGURE 4 for details):

- City’s standard high visibility triple four crosswalk markings;

- Advanced yield lines with associated “Yield Here to Pedestrians” (R1-5, R1-5a) signs should be placed 20 to 50 feet in advance of the crosswalk for mid-block crossings and parking should be prohibited between the yield lines and the crosswalk. Additionally, parking should be restricted to one stall or within the distance required to provide adequate stopping sight distance for approaching vehicles to stop for a pedestrian intending to cross, as well as one parking stall on the departure side.

- Warning signs W11-2 at the crossing location(s). If a W11-2 sign at the location of the crossing point is post-mounted, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the W11-2 sign. If the W11-2 sign is mounted overhead, the (W16-7P) plaque shall not be used. Refer to MUTCD Section 2C.50 for further information.

- Warning signs (W11-2) may be provided in advance of an uncontrolled marked crosswalk if engineering judgement indicates that either there is a need for alerting road users in advance of where unexpected entries of pedestrians into the roadway might occur, OR where visibility of the crossing treatments or pedestrians is obstructed. Obstructions may include near side transit stops, trees, visual clutter, roadway geometry that limits sight distance, a large volume of heavy vehicles, etc.

- If the warning sign (W11-2) is used in advance of a pedestrian crossing (see above), it should be supplemented with plaques with the legend “AHEAD” or “XX FEET”.

- “SLOW PED XING” pavement word markings should be provided in conjunction with W11-2 warning signs if the W11-2 signs are provided in advance of the uncontrolled marked crosswalk to supplement the signs and provide additional emphasis for the warning messages. For trail crossings, “SLOW TRAIL XING” pavement markings should be used instead of “SLOW PED XING”.

- Pedestrian crossing enhancement treatments as recommended in TABLE 3 (page 28)
FIGURE 4 Uncontrolled Marked Crosswalk ‘Basic’ Treatment at Mid-Block Locations

NOTES

1. SELECT THE ADVANCE PLACEMENT DISTANCE BASED ON DESIGN SPEEDS.

2. REFER TO 2014 CA MUTCD (OR LATEST EDITION), SECTION 3B.20 FOR LETTER SIZE AND LONGITUDINAL SPACE BETWEEN PAVEMENT MARKINGS.

3. FOR WARNING SIGNS (W11-2) AND “SLOW PED XING” PAVEMENT MARKINGS IN ADVANCE OF UNCONTROLLED MARKED CROSSINGS, REFER TO SECTION 4.2 FOR GUIDANCE ON:
   (A) APPLICABILITY; AND
   (B) CONSOLIDATION OF LOCATIONS OF THESE SIGNS AND PAVEMENT MARKINGS FOR STREETS WITH MULTIPLE UNCONTROLLED MARKED CROSSINGS IN SERIES.

4. (A) PARKING SHOULD BE PROHIBITED BETWEEN YIELD LINES AND MARKED CROSSWALK.
   (B) FOR STREETS WITH ONLY ONE LANE IN DIRECTION, THE USE OF ADVANCE YIELD LINE AND PROHIBITION OF PARKING BETWEEN YIELD LINE AND CROSSWALK IS NOT REQUIRED.

Source: City of Sacramento, 2014.
4.3 Crosswalks at Trails or Shared-Use Paths

Guidance for the design of marked crosswalks at a trail or shared-use path at an uncontrolled location is provided below.

**GUIDANCE:**
If a determination is made to provide a marked crossing for a trail or a shared-use path at an uncontrolled location, the crossing location should be provided with the following treatments (see Figure 5 for details):

- City's 'basic' treatment as outlined above with the following additional considerations. CA MUTCD Section 9B.16 should be consulted for guidance on the use and applicability of intersection warning signs (W2-1 through W2-5) in advance of a shared-use path / roadway intersection. CA MUTCD Section 9B.18 should be consulted for guidance on the use and applicability of Bicycle Warning sign (W11-1), and combination Bicycle / Pedestrian (W11-15) signs in advance of, and at a path crossing including the use of applicable supplemental plaques. See **FIGURE 5** for details.

- Pedestrian crossing enhancement treatments as recommended in **TABLE 3** (page 28). Refer to the previous subsection for more detailed guidance on selecting pedestrian crossing enhancement treatments.
FIGURE 5 Uncontrolled Marked Crosswalk 'Basic' Treatment at Trail or Shared-Use Path Locations

1. INSTALL W2-1 SIGN IF NO STOP, YIELD, OR SIGNAL CONTROL ON PATH.

2. INTERSECTION TRAFFIC CONTROL DEVICES MIGHT BE STOP OR YIELD SIGNS FACING SHARED-USE PATH APPROACHES, ROADWAY APPROACHES, OR BOTH, DEPENDING ON CONDITIONS (SEE 2014 CA MUTCD (OR LATEST EDITION), SEC. 9B.03)

3. FOR GUIDANCE ON WARNING SIGNS W2 SERIES, AND W11-1 / W11-15 INCLUDING APPLICABLE SUPPLEMENTAL PLAQUES, REFER TO 2014 CA MUTCD (OR LATEST EDITION), SECTION 9B.16, AND 9B.18 RESPECTIVELY.

4. FOR GUIDANCE ON PAVEMENT WORD, AND SYMBOL MARKINGS, REFER TO 2014 CA MUTCD (OR LATEST EDITION), SECTION 3B.20.

NOTES
4.4 Crosswalks at Controlled Locations

The recommended guidelines for marking crosswalks at signalized and stop or yield controlled locations are presented in the two subsections below, respectively.

Signalized Intersections

These guidelines recommend the following approach for marking crosswalks at signalized intersections (see FIGURE 6 for details).

GUIDANCE:

- Provide marked crosswalks on each approach of the signalized intersection unless a pedestrian crossing is prohibited. See Section 2.6 for more detailed guidance on crossing prohibitions.

- The marked crosswalks should be 12 feet wide with a 10 feet inside clear space. The City Traffic Engineer may consider approving lesser space on a case-by-case basis, provided it is not less than 6 feet. See CA MUTCD Section 3B.18 for more information.

- It is recommended to install a 24-inch advanced stop line seven feet in advance of the crosswalk on each approach to a signalized intersection.

- High visibility crossing markings, including the City’s standard high visibility triple four crosswalk markings, should be considered on a case-by-case basis at signalized crossings serving a school zone, transit stops and stations, a corridor on the Vision Zero High-Injury Network, and locations with heavy pedestrian volumes as determined by engineering judgement. Different high visibility markings may be used to differentiate controlled crossing types or contexts.

- Supplemental hardware and operational treatments may be considered for signalized crossing locations. Information on the supplemental hardware and operational treatments to help achieve optimal pedestrian crossing service is covered in this guidance’s companion document Pedestrian Crossing Guidelines Treatments Application Guide.
FIGURE 6  Marked Crosswalk Treatment at a Signalized Crossing Location

NOTES

I. MARKED CROSSEWALKS SHOULD BE 12 FEET WIDE WITH A 10 FEET INSIDE CLEAR SPACE. THE CITY TRAFFIC ENGINEER MAY CONSIDER USING A LESSER SPACE PROVIDED IT IS NOT LESS THAN 6 FEET.
Stop- or Yield-Controlled Locations

These guidelines recommend the following approach for marking crosswalks at stop- or yield-controlled intersections (see FIGURE 7 and FIGURE 8 for details, respectively).

**GUIDANCE:**

**Stop-Controlled Locations**

- Install marked crosswalks if recommended by the City Traffic Engineer, otherwise, install only a 12-inch wide limit line with associated traffic control devices (e.g., signs, pavement markings, etc.) consistent with CA MUTCD. The City may consider marking the crosswalks at stop-controlled locations based on engineering judgement.

- The marked crosswalks (if provided) should be 12 feet wide with a 10 foot inside clear space and be provided with associated traffic control devices (e.g., signs, pavement markings, etc.) consistent with CA MUTCD. The City Traffic Engineer may consider approving less clear space on a case-by-case basis, provided it is not less than 6 feet.

- If a marked crosswalk is to be provided, the City’s standard high visibility triple four crosswalk markings should be considered on a case-by-case basis at stop-controlled crossings serving school walking routes, transit stops and stations, and based on pedestrian volumes. Use of these markings will be determined by engineering judgement.

- A limit line at a stop-controlled approach is not required where a marked crosswalk exists but may be considered on a case-by-case basis as determined by engineering judgement.

**Yield-Controlled Locations**

- Install marked crosswalks if recommended by the City Traffic Engineer, otherwise, install a yield line with associated traffic control devices (e.g., signs, pavement markings, etc.) consistent with CA MUTCD. The City may consider marking the crosswalks at yield-controlled locations based on engineering judgement.

- Marked crosswalks (if provided) should be 12 feet wide with a 10 feet inside clear space and the yield-controlled approach be provided with associated traffic control devices (e.g., signs, pavement markings, etc.) consistent with CA MUTCD. The City Traffic Engineer may consider approving less clear space on a case-by-case basis, provided it is not less than 6 feet.

- Yield-controlled pedestrian crossings may exist under a wide range of site conditions, and the City Traffic Engineer may need to consider modifications to the crossing treatments recommended above based on engineering judgement on a case-by-case basis.

**Additional Guidance for Stop- or Yield-Controlled Locations**

- The treatments presented above cover the basic information on marking the crosswalks at the stop or yield controlled intersections. Refer to the following sections of the CA MUTCD for guidance related to crossing facilities at these locations, as needed: Section 3B.16 (Stop and Yield Lines), Section 3B.18 (Crosswalk Markings) and Section 3B.20 (Pavement Word, Symbol, and Arrow Markings).
FIGURE 7  Marked Crosswalk Treatment at a Stop-Controlled Crossing Location

NOTES

1. CROSSWALKS MAY BE MARKED AT A STOP-CONTROLLED LOCATION USING THE CITY’S STANDARD HIGH VISIBILITY CROSSWALK MARKINGS.

2. REFER TO 2014 CA MUTCD (OR LATEST EDITION), SECTION 3B.20 FOR LETTER SIZE AND LONGITUDINAL SPACE BETWEEN PAVEMENT MARKINGS
FIGURE 8 Marked Crosswalk Treatment at a Yield-Controlled Crossing Location

NOTES

1. CROSSWALKS MAY BE MARKED AT A YIELD-CONTROLLED LOCATION USING THE CITY’S STANDARD HIGH VISIBILITY CROSSWALK MARKINGS.

2. REFER TO 2014 CA MUTCD (OR LATEST EDITION), SECTION 3B.20 FOR LETTER SIZE AND LONGITUDINAL SPACE BETWEEN PAVEMENT MARKINGS.
Appendix A – Crosswalk Basics and Key Definitions

Function of Crosswalks

Marked crosswalks serve multiple purposes; they:

- provide guidance for pedestrians who are crossing roadways by defining and delineating paths to and within the controlled intersections;
- alert road users (in conjunction with signs and other traffic control devices) of a designated pedestrian crossing point across roadways at locations that are uncontrolled; and,
- legally establish the crosswalk at non-intersection locations (adapted from CA MUTCD, Section 3B.18).

The following relevant legal statutes are contained in the CVC.

Section 275 defines a crosswalk as:

275 “Crosswalk” is either:

(a) That portion of a roadway included within the prolongation or connection of the boundary lines of sidewalks at intersections where the intersecting roadways meet at approximately right angles, except the prolongation of such lines from an alley across a street.

(b) Any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

Notwithstanding the foregoing provisions of this section, there shall not be a crosswalk where local authorities have placed signs indicating no crossing.

Section 21950 describes right-of-way at a crosswalk:

(a) The driver of a vehicle shall yield the right of way to a pedestrian crossing the roadway within any marked crosswalk or within any unmarked crosswalk at an intersection.

(b) This section does not relieve a pedestrian from the duty of using due care for his or her safety. No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle which is so close as to constitute an immediate hazard. No pedestrian may unnecessarily stop or delay traffic while in a marked or unmarked crosswalk.

(c) The driver of a vehicle approaching a pedestrian within any marked or unmarked crosswalk shall exercise all due care and shall reduce the speed of the vehicle or take any other action relating to the operation of the vehicle as necessary to safeguard the safety of the pedestrian.

(d) Subdivision (b) does not relieve a driver of a vehicle from the duty of exercising due care for the safety of any pedestrian within any marked crosswalk or within any unmarked crosswalk at an intersection.

Section 21955 pertains to crossing between controlled intersections:

Between adjacent intersections controlled by traffic control signal devices or by police officers, pedestrians shall not cross the roadway at any place except in a crosswalk.
Key Definitions

The meanings of following words and phrases when used in this document are explained below:

**AVERAGE DAILY TRAFFIC (ADT)**
The average 24-hour volume, being the total volume during a stated period divided by the number of days in that period. Normally, this would be periodic daily traffic volumes over several days, not adjusted for days of the week or seasons of the year. (CA MUTCD Section 1A.13)

**CONTROLLED INTERSECTION**
A controlled intersection is one where each approach to the intersection is regulated by a traffic signal, stop, or yield traffic control device.

**CRITICAL GAP**
The time in seconds below which a pedestrian will not attempt to begin crossing the street.

**CROSSWALK LINES**
White or yellow (in school areas per CVC 21368) pavement marking lines that identify a crosswalk. (CA MUTCD Section 1A.13)

**LIMIT LINE**
A solid white line not less than 12 nor more than 24 inches wide, extending across a roadway or any portion thereof to indicate the point at which traffic is required to stop in compliance with legal requirements. (CA MUTCD Section 1A.13)

**MARKED CROSSWALK**
A pedestrian crossing delineated by crosswalk lines.

**MEDIAN**
The area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges, and at opposite approaches of the same intersection. (CA MUTCD Section 1A.13)

**MOTORIST COMPLIANCE**
Percent of motorists yielding or stopping for pedestrians.

**MULTI-LANE**
More than one lane moving in the same direction. A multi-lane street, highway, or roadway has a basic cross-section comprised of two or more through lanes in one or both directions. A multi-lane approach has two or more lanes moving toward the intersection, including turning lanes. (CA MUTCD Section 1A.13)

**MULTIPLE THREAT CRASHES**
A multiple-threat crash involves a driver stopping in one lane of a multilane road to permit pedestrians to cross, and an oncoming vehicle (in the same direction) strikes the pedestrian who is crossing in front of the stopped vehicle. This crash type involves both the pedestrian and driver failing to see each other in time to avoid the collision.

**PEDESTRIAN**
A person on foot, in a wheelchair, on a non motorized scooter, on skates, or on a skateboard. As per CVC 467, (a) “pedestrian” is a person who is afoot or who is using any of the following: (1) A means of conveyance propelled by human power other than a bicycle. (2) An electric personal assistive mobility device. (b) “Pedestrian” includes a person who is operating a self-propelled wheelchair, motorized tricycle, or motorized quadricycle and, by reason of physical disability, is otherwise unable to move about as a pedestrian, as specified in subdivision(a). (CA MUTCD Section 1A.13)

**STOP LINE**
A solid white pavement marking line extending across approach lanes to indicate the point at which a stop is intended or required to be made. For all purposes, limit line(s) as defined per CVC 377 shall mean stop line(s). (CA MUTCD Section 1A.13)

**TRAFFIC CONTROL DEVICE**
A sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, private road open to public travel, pedestrian facility, or shared-use path by authority of a public agency or official having jurisdiction, or, in the case of a private road open to public travel, by authority of the private owner or private official having jurisdiction. (CA MUTCD Section 1A.13)

**YIELD LINE**
A row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made. (CA MUTCD section 1A.13)

**85TH PERCENTILE SPEED**
The speed at or below which 85 percent of the motor vehicles travel. (CA MUTCD section 1A.13)
Appendix B – City of Sacramento Crosswalk Removal Outreach Policy
MEMORANDUM

TO: Transportation Division
FROM: Ryan Moore, PE, TE, City Traffic Engineer
SUBJECT: Crosswalk Removal Outreach Policy
DATE: June 8, 2018

Purpose:
To establish Transportation Division policy and procedures related to informing the public about proposed marked crosswalk removal.

Policy:
Public Works Transportation Division staff will conduct the following actions when noticing of a proposed marked crosswalk removal.

A. Conform with CVC 21950.5 by posting of proposed removal at the crosswalk identified for removal for not less than 30 days from the scheduled date of removal.

B. Provide noticing in multiple languages, languages to be determined through input from the Council District Office, the City Manager's Public Information Office, and Neighborhood Services.

C. Post noticing at transit stops within 500-feet of crosswalk proposed for removal not less than 30 days from the scheduled date of removal.

D. Communicate with Council District Office, the City Manager's Public Information Office, and Neighborhood Services prior to removal to identify appropriate community organizations to provide notice via electronic communications, including but not limited to:
   a. Community and neighborhood associations;
   b. Property business improvement districts; and
   c. Schools.

Notice to be made not less than 30 days from the scheduled date of crosswalk removal.
# TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 PRIMARY TREATMENTS 3
2.1 Crosswalk Visibility Enhancements 3
2.2 Raised Crosswalk 6
2.3 Pedestrian Refuge Island 7
2.4 Road Diet 9
2.5 Rectangular Rapid Flashing Beacon 11
2.6 Pedestrian Hybrid Beacon 13

3.0 SUPPLEMENTAL TREATMENTS 15
3.1 Tighter Curb Radii 15
3.2 Textured Pavement 15
3.3 Locate Transit Stops on the Far Side of the Intersection 15
3.4 Flashing Warning Beacon 15
3.5 Improved Right-Turn Slip-Lane Design 16
3.6 Traffic Calming Measures 16
3.7 Pedestrian-Activated Flashing (Embedded LED) Warning Sign 16
3.8 Raised Intersection 16
3.9 Protected Intersection 16

4.0 SIGNALIZED INTERSECTION TREATMENTS 17
4.1 Shorter Cycle Lengths 17
4.2 Longer Crossing Times 17
4.3 Pushbuttons or Passive Pedestrian Detectors 17
4.4 Pedestrian Countdown Signal 18
4.5 Extended Pushbutton 18
4.6 Pedestrian Recall 18
4.7 No Turn On Red Restrictions 18
4.8 Protected Left-Turn 19
4.9 Leading Pedestrian Interval 19
4.10 Accessible Pedestrian Signals 19
4.11 Animated Eyes Pedestrian Pushbutton 19
4.12 Pedestrian Scramble Intersection 19

5.0 CONCLUSION 20
1.0 INTRODUCTION

The 2021 Pedestrian Crossing Guidelines Treatment Applications Guide provides additional design and implementation guidance to help City staff select pedestrian crossing treatments for new marked crosswalks or to enhance existing marked crosswalks in combination with the guidance provided in the City of Sacramento 2021 Pedestrian Crossing Guidelines. The initial consideration of countermeasures should be done using the 2021 Pedestrian Crossing Guidelines’ Application of Pedestrian Crossing Treatments by Location Type table, presented in Table 1 on Page 2. This table represents a summary of the 2021 research and best practices related to pedestrian crossing treatments and has been adapted from the Federal Highway Administration (FHWA) Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (2018). The recommendations from the FHWA guide have been adapted to fit the unique characteristics of pedestrian crossings in the City of Sacramento.

In the following section (Section 2.0 Primary Treatments), treatment-specific application guidance for the primary treatments identified in the 2021 Pedestrian Crossing Guidelines is provided. This guidance is adapted from the Federal Highway Administration (FHWA) Field Guide for Selecting Countermeasures at Uncontrolled Pedestrian Crossing Locations (FHWA Field Guide) (2018). This guidance has been supplemented with additional guidance and information from City of Sacramento practices, national best practices and research, and the California Manual on Uniform Traffic Control Devices (CA MUTCD) MUTCD and Caltrans Highway Design Manual (HDM), as appropriate. National best practices were obtained from the following sources:


- Peer Agency Guidance review, including:
  - City of Oakland, CA
  - City of San Diego, CA
  - San Francisco, CA
  - Portland, OR
  - North Carolina Department of Transportation

In addition to the detailed guidance on the primary treatments, Section 3.0 Supplemental Treatments provides guidance and information for supplemental treatments that may be considered at a crossing location on a case-by-case basis based on site conditions and context. Finally, Section 4.0 Signalized Intersection Treatments, provides guidance for signalized intersection treatments that may be considered at signalized pedestrian crossing locations on a case-by-case basis.
# TABLE 1  Application of Pedestrian Crossing Treatments by Location Type

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and ADT</th>
<th>Vehicle ADT &lt;9,000</th>
<th>35 mph</th>
<th>40 mph</th>
<th>40 mph</th>
<th>Vehicle ADT 9,000-15,000</th>
<th>35 mph</th>
<th>40 mph</th>
<th>40 mph</th>
<th>Vehicle ADT &gt;15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>≤30 mph</td>
<td>35 mph</td>
<td>≥40 mph</td>
<td>≥40 mph</td>
<td>≤30 mph</td>
<td>35 mph</td>
<td>≥40 mph</td>
<td>≥40 mph</td>
<td>≤30 mph</td>
</tr>
<tr>
<td>2 lanes</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>2 lanes one-way</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3 lanes one-way</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3 lanes with raised median</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>3 lanes without raised median</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4+ lanes: with raised median</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4+ lanes: without raised median</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>

**Treatments:**

1. High-visibility crosswalk markings, parking restrictions on crosswalk approach, adequate nighttime lighting levels, and crossing warning signs.
2. Raised crosswalk
3. Advance Yield Here to (Stop Here For) Pedestrians sign and yield (stop line)
4. In-Street Pedestrian Crossing sign
5. Curb extension
6. Pedestrian refuge island
7. Rectangular Rapid-Flash Beacon (RRFB)\textsuperscript{**}
8. Road Diet
9. Pedestrian Hybrid Beacon (PHB)\textsuperscript{**}

**Selection Guidance:**

- \#: treatments that are candidates for the location type
- \#: treatments shown as a bold number within a darkened box should always be considered, but are not mandated or required.
- \#: treatments shown as a bolded number in a darkened box with a black outline are crosswalk visibility enhancements that should always occur in conjunction with other identified treatments.

\textsuperscript{**} Note: The PHB and RRFB are not installed at the same crossing location

*Source: Adapted from FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (July 2018)*
2.0 PRIMARY TREATMENTS

2.1 Crosswalk Visibility Enhancements

**FIGURE 1 Example Crosswalk Visibility Improvements #1**

![Diagram of crosswalk visibility improvements](image)

**DEFINITION**

This group of treatments includes high-visibility crosswalk markings, improved nighttime lighting, advance or in-street warning signage, curb extensions, and parking restrictions. These features may be used in combination to indicate preferred locations for people to cross, to increase visibility of the crossing location, and to help reinforce the driver requirement to yield the right-of-way to pedestrians at crossing locations.

**ROADWAY AND SITE INFORMATION**

Established midblock or intersection uncontrolled crossing locations should be consistent with the 2021 Pedestrian Crossing Guidelines ‘basic’ treatments and additional guidance recommendations. To reduce the risk of crashes involving pedestrians at an uncontrolled marked crosswalk, on-street parking restrictions and curb extensions should also be considered for implementation with the marked crossing.

Per the FHWA Field Guide, on roadways with 4 or more lanes and more than 9,000 vehicles per day, the risk for pedestrian crashes could increase if marked crosswalks are not combined with other treatments, such as refuge islands or Pedestrian Hybrid Beacons.

The FHWA Field Guide recommends consideration of adding advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line if the roadway(s) are described by one of the following sets of conditions:

- Any ADT + 4 or more lanes (with or without a raised median) + any speed limit
- Any ADT + any number of lanes + ≥ 35 mph speed limit
CONSIDERATIONS

Crosswalk visibility enhancements are most needed when the following are observed at the site:

- Drivers not yielding to pedestrians in crosswalks
- Inadequate conspicuity/visibility of the crosswalk and/or crossing pedestrian
- Noted conflicts at crossing locations

ADDITIONAL INSTALLATION AND DESIGN GUIDANCE

CROSSWALK MARKINGS

- High-visibility crosswalks may include a variety of crosswalk striping designs, such as ladder, continental, or bar pairs.
- High-visibility markings may be supplemented with the pedestrian crossing warning signs (sign W1-2 in the MUTCD) on each approach to the crosswalk.
- See MUTCD Section 2C.50\(^1\) for more information about Non-Vehicular Warning Signs and Section 3B.18 for more information about crosswalk markings.
- Adjacent bus stops should be placed downstream of the crosswalk and not on the crosswalk approach.
- Sufficient sight distance should be provided for vehicles and pedestrians.
- In school zones, yellow pavement markings should be used.

OVERHEAD LIGHTING

- Overhead lights should be placed in advance of uncontrolled crossings on both approaches to illuminate the front of the pedestrian and avoid creating a silhouette.
- Consider placing the light fixtures 10 to 15 feet in advance of the crosswalk on both sides of the street.

ADVANCE YIELD HERE TO PEDESTRIANS SIGN AND YIELD LINE

- The stop line or “shark’s teeth” yield line is placed 20 to 50 feet in advance of a marked crosswalk to indicate where vehicles are required to stop or yield in compliance with the accompanying Yield Here To Pedestrians sign.

IN-STREET OR OVERHEAD PEDESTRIAN CROSSING SIGN

- The In-Street Pedestrian Crossing sign (sign R1-6 or R1-6b in the CA MUTCD) can be placed on the center line, on a lane line, or in conjunction with a median/refuge island.
- The In-Street Pedestrian Crossing sign shall not be post-mounted on the left-hand or right-hand side of the roadway.
- Consider maintenance and prompt replacement of damaged in-street (and other) signs.
- If used, the Overhead Pedestrian Crossing sign shall be placed over the roadway at the crosswalk location.
- See CA MUTCD Section 2B.12\(^3\) for more information about In-Street or Overhead Pedestrian Crossing signs.

Refer to the FHWA Crosswalk Visibility Enhancements Tech Sheet\(^4\) for more information about this set of treatments.

\(^6\) https://safety.fhwa.dot.gov/pcd_bike/stop/docs/TechSheet_VizEnhancement_508compliant.pdf
FIGURE 2 Example Crosswalk Visibility Improvements #2


PARKING RESTRICTIONS
- Parking restrictions can include the removal of parking space markings or the installation of “no parking” signs or pavement markings.
- The minimum setback for parking restrictions is 20 feet in advance of the crosswalk where speeds are 25 mph or less, and 30 feet in advance of the crosswalk where speeds are between 26 and 35 mph.
- Adequate visibility for motorists is considered through a clear sight triangle based on required stopping sight distance of approaching motorists.
- The City Traffic Engineer may consider variations to the guidelines recommended on a case-by-case basis depending on overall context of the crossing location such as roadway and traffic conditions (number of lanes, traffic volume, and speed); area type (downtown / central business districts, suburban areas, etc.); required and available sight distance; reported crash history involving pedestrian related crashes; etc.

CURB EXTENSIONS
- Curb extensions can be installed at intersections or mid-block to extend the curb and pedestrian space further into the roadway, shortening the exposure crossing distance for pedestrians.
- Curb extensions must not extend into travel lanes and should not block bicycle lanes.
- Curb extensions should be constructed to accommodate ADA requirements.

Refer to the FHWA Crosswalk Visibility Enhancements Tech Sheet7 for more information about this set of treatments.

7 https://safety.fhwa.dot.gov/pcd_bike/stcp/docs/TechSheet_VizEnhancemt_508compliant.pdf
2.2 Raised Crosswalk

**DEFINITION**

Raised crosswalks are ramped speed tables spanning the entire width of the roadway, often placed at midblock crossing locations.

**ROADWAY AND SITE INFORMATION**

Per the FHWA Field Guide, this treatment is best suited for 2 or 3 lane roadways also described by the following conditions:

- ADT < 9,000 + ≤ 30 mph speed limit

**CONSIDERATIONS**

This treatment may help address the following:

- Inadequate conspicuity/visibility of the crosswalk and/or crossing pedestrian
- Excessive vehicle speed
- Raised crosswalks should be flush with the height of the sidewalk.
- The crosswalk table is typically at least 10 feet wide and designed to allow the front and rear wheels of a passenger vehicle to be on top of the table at the same time.
- Detectable warnings (truncated domes) and curb ramps should be installed at the street edge for pedestrians with impaired vision.
- Raised crossings are generally avoided on arterial streets and primary routes for heavy trucks, bus transit, and emergency response vehicles.
- Consider storm water drainage in the design of the raised crosswalk.
- See MUTCD Section 3B.25 for information about Speed Hump Markings and other markings that can be used with raised crosswalks.
- Refer to the FHWA Raised Crosswalks Tech Sheet for more information about this treatment.

---


2.3 Pedestrian Refuge Island

**FIGURE 4 Example Pedestrian Refuge Island**


**DEFINITION**
A pedestrian refuge island is a median with a refuge area that is intended to help protect pedestrians who are crossing the road. This treatment is sometimes referred to as a crossing island or pedestrian island.

**ROADWAY AND SITE INFORMATION**
Consider this treatment for established pedestrian crossings at 2 or 3 lane roadways without a raised median.

Per the FHWA Field Guide, this treatment should strongly be considered if the roadway(s) are described by one of the following sets of conditions:

- ADT ≥ 9,000 + 4 or more lanes without a raised median + any speed limit
- Any ADT + 4 or more lanes without a raised median + ≥ 35 mph speed limit

**CONSIDERATIONS**
This treatment may be most effective where the following are observed at the site:

- Inadequate conspicuity/visibility of the crosswalk and/or crossing pedestrian
- Excessive vehicle speed
- Lack of pedestrian separation from traffic during long crossings
**ADDITIONAL INSTALLATION AND DESIGN GUIDANCE**

- Consideration should be given to creating a two-stage crossing. The island can encourage pedestrians to cross one direction of traffic at a time and look towards oncoming traffic before completing the second part of the crossing.

- Pedestrian refuge islands should be at least 6 feet wide (preferably 8 feet) and of adequate length to allow the anticipated number of pedestrians to stand and wait for gaps in traffic before crossing. Pedestrian islands at least 4 feet wide may be considered on a case-by-case basis when site conditions do not allow a 6-foot wide island.

- The cut-through of the island must include detectable warnings if island width is at least 6 feet.

- Refuges islands should be illuminated or highlighted with streetlights, signs, and/or reflectors to ensure that they are visible to motorists.

- See MUTCD Section 3B[10] for more information about the following for refuge islands:
  - Section 3B.10 - Approach Markings for Obstructions
  - Section 3B.18 - Crosswalk Markings
  - Section 3B.23 - Curb Markings

- If applicable, evaluate the impact of the island on bicycle facility design.

- The design, and installation of the raised island should evaluate the impact on left turn movements to or from the side street.

Refer to the FHWA Pedestrian Refuge Island Tech Sheet for more information about this treatment[11].

---


2.4 Road Diet

FIGURE 5 Example Roadway Before Road Diet

Standard Crosswalk Markings


DEFINITION

A Road Diet is a roadway reconfiguration resulting in a reduction in the number of travel lanes, which is usually achieved by converting a four-lane undivided road to three lanes. The space gained by eliminating lanes is typically used for other uses and travel modes.

Road diets can reduce the risk of crashes involving pedestrians by:

- decreasing vehicle travel lanes for pedestrians to cross, therefore reducing the “multiple threat” conditions for pedestrians;
- providing room for a pedestrian refuge island;
- improving safety for bicyclists when bike lanes are added (such lanes also create buffer space between pedestrians and vehicles);
- reducing rear-end and sideswipe crashes; and,
- improving speed limit compliance and decreasing crash severity when crashes do occur.

ROADWAY AND SITE INFORMATION

Per the FHWA Field Guide:

- Consider this treatment for roadways with four or more lanes without a raised median.
- Typically, Road Diets are considered for roadways with current and future average daily traffic (ADT) equal to or less than about 20,000.

CONSIDERATION

This treatment may help address the following:

- Conflicts at crossing locations
- Excessive vehicle speeds
- Lack of pedestrian separation from traffic during long crossings
**ADDITIONAL INSTALLATION AND DESIGN GUIDELINES**

- Driveway density, transit routes, the number and design of intersections along the corridor, as well as operational characteristics are some considerations to be evaluated before deciding to implement a road diet.

- The FHWA Road Diet Informational Guide identifies a range of additional design considerations for road diets, including:
  - Vehicle speed
  - Level of Service (LOS)
  - Quality of Service
  - Operation and volume of pedestrians, bicyclists, transit, and freight
  - Peak hour and peak direction traffic flow
  - Vehicle turning volumes and patterns
  - Frequency of stopping and slow-moving vehicles
  - Presence of parallel roadways

- Where fewer travel lanes are not possible, narrower lanes may be considered, especially left- and right-turn pockets. Narrower travel lanes decrease pedestrian crossing exposure by reducing the unprotected crosswalk length.

Refer to the FHWA Road Diet Tech Sheet for more information about this treatment.\(^{12}\)

---

\(^{12}\) [https://safety.fhwa.dot.gov/pcd_bikc/stept/docs/techSheet_RoadDiet2018.pdf](https://safety.fhwa.dot.gov/pcd_bikc/stept/docs/techSheet_RoadDiet2018.pdf)
2.5 Rectangular Rapid Flashing Beacon

FIGURE 7 Example Rectangular Rapid Flashing Beacon

DEFINITION

A Rectangular Rapid Flashing Beacon (RRFB) is a pedestrian-actuated conspicuity enhancement used in combination with a pedestrian, school, or trail crossing warning sign to improve safety at uncontrolled, marked crosswalks. The device includes two rectangular-shaped yellow indications, each with an LED-array-based light source, that flash with high frequency when activated.

ROADWAY AND SITE INFORMATION

Per the FHWA Field Guide, this treatment should be considered if the roadway(s) are described by one of the following sets of conditions:

- ADT ≤ 15,000 + 2 lanes or 3 lanes (with a raised median) + ≥ 40 mph speed limit
- ADT 9,000–15,000 + 3 or more lanes (with or without median) + ≥ 35 mph speed limit

The FHWA Field Guide suggest strongly considering a PHB instead of an RRFB for the following:

- ADT 9,000–15,000 + 3 lanes (without raised median) or more lanes + ≥ 40 mph speed limit

CONSIDERATIONS

This treatment may help address the following:

- Noted conflicts at crossing locations
- Inadequate conspicuity/visibility of the crosswalk and/or crossing pedestrian
- Lack of pedestrian separation from traffic for long crossing distances

ADDITIONAL INSTALLATION AND DESIGN GUIDANCE

- The RRFB is not currently included in the MUTCD. FHWA has issued interim approval for the optional use of the RRFB (Interim Approval 21 or IA-21)\(^1\). California has requested and received statewide permission to use the RRFB.

- IA-21 provides additional information about the conditions of use, including dimensions, placement, accessibility features, and flashing requirements. IA-21 does not provide guidance or criteria based on number of lanes, speed, or traffic volumes.

- RRFBs are placed on both ends of a crosswalk. If the crosswalk contains a pedestrian refuge island or other type of median, an RRFB should be placed to the right of the crosswalk and on the median (instead of the left side of the crosswalk).

- An RRFB shall only be used to supplement the following warning signs, located at or immediately adjacent to an uncontrolled marked crosswalk:
  - Post-mounted W11-2, S1-1, or W11-15 crossing warning sign with a (W16-7P) plaque; OR
  - An overhead-mounted W11-2, S1-1, or W11-15 crossing warning sign.

- See MUTCD Section 2C.50 Non-Vehicular Warning Signs\(^4\) and Section 7B.08 School Sign (S1-1)\(^5\) for more information about signs that may be used with an RRFB.

- The RRFB may be pushbutton activated or activated with passive detection.

- For locations with obstructed visibility for side-mounted RRFB treatment, a median-mounted RRFB treatment shall be considered. For locations where a median island RRFB treatment is not feasible, or there are more than two lanes in a direction, other appropriate treatments, such as a PHB shall be considered.

- RRFBs may be considered for mounting overhead consistent with FHWA’s Interpretation Letter regarding RRFB Overhead Mounting\(^6\).

Refer to the FHWA Road Diet Tech Sheet for more information about this treatment\(^7\).

\(^1\) [https://mutcd.fhwa.dot.gov/resources/interim_approval/ia21/index.htm](https://mutcd.fhwa.dot.gov/resources/interim_approval/ia21/index.htm)
\(^4\) [http://mutcd.fhwa.dot.gov/resources/interpretations/4_376.htm](http://mutcd.fhwa.dot.gov/resources/interpretations/4_376.htm)
2.6 Pedestrian Hybrid Beacon

FIGURE 8 Example Pedestrian Hybrid Beacon

DEFINITION

A Pedestrian Hybrid Beacon (PHB) is a hybrid beacon used to control traffic and reverts to all dark until a pedestrian activates it via pushbutton or other form of detection. When activated, the beacon displays a sequence of flashing and solid lights that indicate when pedestrians should cross and when it is legal for drivers to proceed.

ROADWAY AND SITE INFORMATION

Per the FHWA Field Guide, this treatment should be considered if the roadway(s) are described by one of the following sets of conditions:

- ADT ≥ 15,000 + 4 or more lanes + any speed limit
- ADT ≥ 9,000 + 3 or more lanes (with or without median) + ≥ 35 mph speed limit
- Any ADT + any number of lanes + ≥ 40 mph speed limit

CONSIDERATIONS

This treatment may help address the following:

- Drivers not yielding to pedestrians in crosswalks
- Noted conflicts at crossing locations

ADDITIONAL INSTALLATION AND DESIGN GUIDELINES

- A PHB should only be installed in conjunction with a marked crosswalk and pedestrian countdown signals.
- A pedestrian hybrid beacon may be considered for installation to facilitate pedestrian crossings at a location that does not meet traffic signal warrants, or at a location that meets traffic signal warrants under MUTCD Sections 4C.05 (Warrant 4, Pedestrian Volume) and/or 4C.06 (Warrant 5, School Crossing) but a decision is made to not install a traffic control signal.
- For roadways with speeds of 35 mph or less, see MUTCD Figure 4F-1. For roadways speeds greater than 35 mph, see MUTCD Figure 4F-2. These charts compare crosswalk length, approximate vehicles per hour (VPH, including both approaches), and pedestrians per hour (PPH). The MUTCD recommends installation of a PHB where these conditions meet minimum criteria.
- The PHB should be installed at least 100 feet from side streets or driveways that are controlled by STOP or YIELD signs.
- Parking should be prohibited, and other sight obstructions should be removed at least 100 feet in advance of and at least 20 feet beyond the marked crosswalk and PHB.
- The PHB should be coordinated if within a signal system.
- Review the MUTCD Part 4F for more information about the design and operation of the beacon face and the installation of optional signage.
- Refer to the PHB Tech Sheet for more information about this treatment.

---

3.0 SUPPLEMENTAL TREATMENTS

3.1 Tighter Curb Radii

Tighter curb radii reduce right-turning vehicle speeds at an intersection by forcing sharper turns. Reduced corner radii also shorten crossing distances for pedestrians. Tighter turn radii may be considered for:

- Intersections with average right-turn speeds above 15 miles per hour and where pedestrian volumes are greater than 20 pedestrians per hour.
- Intersections with a documented crash history of right-turning vehicle and pedestrian conflicts.

The primary benefits of smaller curb-return radii to pedestrians include:

- increasing motorist visibility of pedestrians waiting to cross the street;
- reducing pedestrian crossing distance (which also benefits vehicles with a shorter cycle length at signalized intersections) and exposure to traffic;
- providing the shortest accessible route for disabled persons; and,
- reducing speed of turning vehicles and severity of the crashes if they occur.

Curb-return radii should be designed to reflect the “effective” turning radius of the corner. The effective turning radius considers the wheel tracking of the design vehicle utilizing the width of parking and bicycle lanes. Use of the effective turning radii allows a smaller curb-return radius while retaining the ability to accommodate larger design vehicles. Tighter turn radii should be balanced with the need to provide convenient turning movements for larger vehicles (e.g., using a truck turning template on the intersection) to consider vehicle speeds and pedestrian crossing safety.

3.2 Textured Pavement

Textured paving treatments (e.g., stamped asphalt or concrete) may send a visual cue to motorists about the function of a street. They can also create an aesthetic enhancement of a street and be used to delineate separate space for pedestrians or bicyclists.

The City may allow the use of textured pavement in the crosswalk and/or intersection as long as:

- the textured pavement treatment is consistent with FHWA guidelines;
- the crosswalk markings are consistent with the 2021 Pedestrian Crossing Guidelines; and,
- there is a provision/agreement in place for funding for maintenance and/or replacement of the textured pavement.

3.3 Locate Transit Stops on the Far Side of the Intersection

Buses at near side transit stops and heavy vehicles obstruct the visibility of side-mounted treatments (such as RRFBs) making overhead placement of the devices an option to be considered. When possible, the transit stop should be located to the far side of the intersection.

At intersections, far-side placement is generally preferred; however, location selection should be done on a case-by-case basis. Placing bus stops on the near side of intersections or crosswalks may block the pedestrians’ view of approaching traffic and approaching motorists may be unable to stop in time when a pedestrian steps from in front of a stopped bus to cross vehicle travel lanes.

Locating stops on the far side of an intersection encourages pedestrians to cross the street behind the bus where they are more visible to approaching traffic, reduces delay for buses, and minimizes conflicts between buses and right turning motor vehicles. For Class IV separated bike lanes, far side stops should be coordinated with the transit agency to identify any concerns related to floating transit islands and/or stopping in the vehicle lane.

3.4 Flashing Warning Beacon

Typical uses of flashing beacons include obstructions in or immediately adjacent to the roadway, supplemental to advance warning signs, at mid-block crosswalks, and at intersections where a warning is appropriate.

Several studies have shown that intermittent (typically activated using a manual pushbutton or automated sensor) flashing beacons provide a more effective response from motorists than continuously flashing beacons.

Standard beacons should only be used as supplemental treatments. Flashing warning beacons can be installed overhead or post-mounted on the roadside either in advance of the crosswalk or at the crosswalk to increase visibility of a pedestrian crossing.

The design and installation of flashing warning beacons shall comply with the requirements of CA MUTCD Chapter 4L.

https://dot.ca.gov/-/media/dot-media/programs/traffic-operations/documents/ca_mutcd/camutcd2014-chap4l-all1ypdf
3.5 Improved Right-Turn Slip-Lane Design

Right-turn slip lanes should be designed to:

- slow turning vehicles;
- allow drivers and pedestrians to easily see each other;
- reduce pedestrian exposure in the roadway;
- reduce the complexity of an intersection by breaking it into manageable parts; and,
- allow drivers to see oncoming traffic as they merge into the receiving roadway.

Drivers are often looking to their left to merge into cross-street traffic and are not always attentive to the presence of pedestrians when turning right.

See ITE’s Recommended Practice - Designing Walkable Urban Thoroughfares: A Context Sensitive Approach for more detailed design guidance. This guidance can be used to retrofit existing right-turn slip-lane designs as part of maintenance projects or address pedestrian safety when new slip-lanes are in design.

3.6 Traffic Calming Measures

Installing traffic-calming measures may be appropriate on certain streets to slow vehicle speeds and/or reduce cut-through traffic. Traffic-calming measures include raised crossings (raised crosswalks, raised intersections), street narrowing measures (chicanes, slow points, “skinny street” designs), and intersection designs (traffic mini circles, diagonal diverters).

Some traffic-calming measures are better suited to local or neighborhood streets than to collector or arterial streets.

3.7 Pedestrian-Activated Flashing (Embedded LED) Warning Sign

Similar to a typical warning sign, pedestrian-activated flashing warning signs are intended to increase motorist awareness of a pedestrian in a crosswalk. The sign includes embedded Light Emitting Diodes (LED) within the sign border that illuminate when activated. The sign may be pushbutton activated or activated with passive detection. Embedded LED units enhance visibility and recognition of signs to drivers, especially under low-light or low-visibility conditions.

Light Emitting Diode (LED) units may be used in the border of a STOP or warning sign to improve the conspicuity of the sign. If flashed, all LED units shall flash simultaneously. The uniformity of the sign design shall be maintained without any decrease in visibility, legibility, or driver comprehension during either daytime or nighttime conditions.

See CA MUTCD Section 2A.07 states for more guidance.

3.8 Raised Intersection

Raised intersections are similar to raised crosswalks but raise the entire intersection footprint flush with the sidewalk. The raised intersection helps to manage speeds and can assist in encouraging motorists yielding to pedestrians crossing at the intersection. Bollards or other vertical elements should be installed at the edge of the raised intersection to prevent motorists from entering the sidewalk/pedestrian space.

3.9 Protected Intersection

Protected intersections are an intersection design that provides a physically separated space for bicyclists up until the intersection. Corner islands are used to extend the bicycle lane as far as possible into the intersection and tighten the corner’s turn radius. This intersection design provide shorter crossings for pedestrians and can improve sightlines and reduce vehicle turning-related conflicts for bicyclists and pedestrians.

22 https://www.ite.org/pub?id=E1CFF13C-2354-D714-51D9-D82B39D4DBAD

4.0 SIGNALIZED INTERSECTION TREATMENTS

The following treatments address pedestrian crossings at signalized intersections. When selecting treatments to signalized intersections, the following signalization principles from the NACTO Urban Street Design Guide should be considered:

- Shorten signal cycle lengths to increase turnover to minimize delay, reduce wait times, and create crossing opportunities at closer intervals.
- Avoid adding multiple turn lanes and increasing turn phase intervals – do one or the other, but not both.
- Keep the number of signal phases to a minimum and consider turn restrictions.
- Time signals to the speed you intend traffic to go to discourage speeding, especially on one-way streets.
- Adjust timing for peak and off-peak volumes to meet different activity levels throughout the day.
- Used fixed versus actuated signals to increase predictability and provide consistent pedestrian crossing opportunities.

4.1 Shorter Cycle Lengths

Long cycle lengths at signalized intersections result in long pedestrian wait times to cross a street. These long wait times can make crossing a street or walking even a short distance prohibitive and frustrating, discouraging walking and separating destinations. By shortening an intersection’s cycle length, pedestrians do not have to wait as long to cross after pushing the button to request a “Walk” signal.

In general, shorter cycle lengths and longer walk intervals provide better service to pedestrians and encourage better signal compliance. Cycle lengths of 60 to 90 seconds are ideal. The length of the crossing and presence of elderly pedestrians or children should be considered when using shorter cycle lengths. Other efforts to shorten the crossing distance may complement shorter cycle lengths to address these issues.

4.2 Longer Crossing Times

Longer crossing times at crosswalks improve the likelihood that pedestrians are able to cross the street within the allotted time.

Longer crossing times may apply at:

- Signalized intersections where pedestrian crossing times are inadequate for pedestrian volumes
- Locations with a documented crash history of pedestrians frequently crossing against the signal

Longer crossing times can also be used to help manage vehicle speeds along a corridor.

See CA MUTCD Chapter 4E24 states for more detailed guidance and requirements.

4.3 Pushbuttons or Passive Pedestrian Detectors

Pedestrian pushbuttons are detectors intended to provide pedestrians with the ability to activate a pedestrian signal and reassure pedestrians that they will receive a crossing indication. Pushbuttons have been shown to increase crossing compliance with the walk phase and reduce the number of pedestrians trapped in the roadway after a crossing phase.

Pushbuttons should be designed and installed for maximum convenience, conspicuity, and communication for pedestrians. Pushbuttons are not required at locations where pedestrian signal intervals are automatically activated for every signal cycle. Automatic pedestrian signal intervals are preferred at locations with significant and/or consistent pedestrian activity.

Pedestrian signals may be equipped with passive detectors instead of pushbuttons. Passive detection devices register the presence of a pedestrian in a position indicative of a desire to cross, without requiring the pedestrian to push a button. Some passive detection devices are capable of tracking the progress of a pedestrian as the pedestrian crosses the roadway for the purpose of extending or shortening the duration of certain pedestrian timing intervals.

Refer to Section 4E.08 of the CA MUTCD23 for specific guidance on the location and other requirements related to pushbuttons at traffic signals.

4.4 Pedestrian Countdown Signal

Pedestrian countdown signals give pedestrians “Walk” and “Don’t Walk” signals to inform them how long they have to cross the street. Pedestrian countdown signals are required for pedestrian signal heads when the pedestrian change interval is more than 7 seconds to inform pedestrians of the number of seconds remaining in the pedestrian change interval.

Fewer pedestrians cross the street late in the countdown as compared to signal heads with only the Flashing Don’t Walk light. Where they are installed, pushbuttons to activate the pedestrian signal should be easily accessible by pedestrians, wheelchair users, and bicyclists for each crossing.

Pedestrian countdown signals are particularly useful to pedestrians at longer distance crossings, so pedestrians know how much time remains before the signal changes. Countdown signals may be useful where crash or conflict patterns indicate pedestrians cross frequently against the signal.

CA MUTCD Section 4E.07\(^{23}\) contains more information on design guidance.

4.5 Extended Pushbutton

Some pedestrians may need extra time to cross a street. Traffic signals can be programmed to increase crossing time by pressing the pushbutton longer.

This treatment should be considered where pedestrians must cross long distances at the intersection and/or near schools, hospitals, senior facilities, or other pedestrian generators where pedestrians may be expected to at times need additional time to cross the intersection.

CA MUTCD Section 4E.06 and 4E.08\(^{23}\) contains further guidance.

4.6 Pedestrian Recall

Pedestrian recall gives pedestrians a “Walk” signal at every cycle. No pushbutton or detection is necessary since a “Walk” signal will always be given.

Pedestrian recalls may be considered in areas with high levels of pedestrian activity.

4.7 No Turn On Red Restrictions

Mounted signs eliminate the right of motorists to make a right turn at a red light. These prohibitions can be used full-time or under restricted time intervals. Restrictions should be considered where:

- Exclusive pedestrian phases or high pedestrian volumes are present.
- There is inadequate sight distance for pedestrians and vehicles to see each other — inadequate sight distance means insufficient stopping sight distance for motorists and/or pedestrians that do not have sufficient line of sight to judge a safe gap to cross based on prevailing vehicle speeds.
- Geometric or operational characteristics may result in unexpected conflicts.
- The traffic signal has school or railroad crossings.
- The traffic signal has three or more phases.

No turn on red restriction can also be considered for left turning movements, i.e. No Left-Turn-on-Red (from a one-way street to one-way street).

Additionally, a “blank out” turn restriction sign can be used instead of the conventional “No Right Turn on Red” signs. The “blank out” turn restriction sign displays either the NOT TURN ON RED legend or the No Right Turn symbol or word message, as appropriate, only at certain times during the day or during one or more portion(s) of a particular cycle of the traffic signal. “Blank out” turn restriction signs have been found to be more effective than convention “No Right Turn on Red” signs. Furthermore, the conventional “No Right Turn on Red” signs that specify time-of-day restrictions may be confusing to motorists.

See CA MUTCD, Section 2B.54\(^{24}\) for more guidance.

4.8 Protected Left-Turn

Protected left-turn phasing adjusts the traffic signal phasing to allow left-turning vehicles a dedicated phase or portion of a phase (protected versus protected/permisssive) left-turn phase instead of a permissive phase turning across opposing traffic. Implementing protected left turn phasing can reduce conflicts with pedestrians crossing parallel to vehicle traffic by separating pedestrian crossings and left turns across the crosswalk into separate phases.

Protected left-turn phasing may be considered under the following conditions:

- Signalized intersections where left-turning vehicle-pedestrian crashes are frequent.
- Signalized intersections where left-turning vehicles and pedestrians have frequent conflicts.

Refer to CA MUTCD Section 4D.19 for additional protected left-turn phasing guidance.

4.9 Leading Pedestrian Interval

A leading pedestrian interval (LPI) advances the “Walk” signal for 3 to 7 seconds while vehicles continue to receive a red light to give crossing pedestrians a “head start”. Intervals of up to 10 seconds may be appropriate where pedestrian volumes are high and/or the crossing distance is long.

LPIs improve the visibility of pedestrians and give them priority by allowing them to enter the crosswalk before vehicles start moving. As a result, LPIs can help reduce conflicts with pedestrians and vehicles turning across the crosswalk. LPIs typically require adjustments to existing signal timing that are relatively low-cost compared to other treatments. A leading bicycle interval can be implemented with an LPI where a bikeway on the through movement conflicts with turning traffic to help prevent right hook crashes.

Leading Pedestrian Intervals may apply at the following locations:

- Intersections where frequent turning vehicle movements make pedestrian crossing movements uncomfortable.
- Intersections with a documented history of turning movement-related vehicle-pedestrian crashes.

See CA MUTCD Section 4E.06 for more guidance.

4.10 Accessible Pedestrian Signals

Accessible pedestrian signals (APS) and detectors provide information, in non-visual formats (such as audible tones, speech messages, and/or vibrating surfaces) to improve accessibility for pedestrians who have visual disabilities.

APS detectors must address a demonstrated need in the form of a request from an individual or group that would use the audible signal. See CA MUTCD Section 4E.09 through 4E.13 for more information and design guidance on accessible pedestrian signals.

The City’s current practice is that the new signalized intersections should be provided with the necessary hardware for installation of APS based on the future requests. For existing signalized intersections, the City’s current practice is to retrofit the signal with APS if there is a request for the same from an individual or group.

4.11 Animated Eyes Pedestrian Pushbutton

Animated eyes pedestrian signals feature eyes that look from side to side when a “Walk” signal is given. The signals remind pedestrians to look for turning vehicles before proceeding into the crosswalk.

CA MUTCD Section 4E.04 contains design guidance on animated eyes pushbuttons.

4.12 Pedestrian Scramble Intersection

A pedestrian scramble intersection operates by providing an exclusive pedestrian crossing phase to a signal-controlled intersection that allows pedestrians to cross in any direction, including diagonally, at the same time while all vehicles are stopped at a red signal. This treatment may be effective where there is high crossing demand for diagonal crossing movements or there are frequent conflicts with turning vehicles.
5.0 CONCLUSION

The treatments presented in this guidance represent the pedestrian crossing treatments that the City of Sacramento has implemented or identified for potential future implementation at pedestrian crossings. The City of Sacramento’s practice is to use traffic control devices that are approved for use in California. With advancement in engineering practice and technology, new treatments and devices may become available in the future. The City Traffic Engineer may approve the use of such treatments and devices, as determined appropriate. As these treatments are approved, they may be added to the Treatment Applications Guide or otherwise documented by City staff for consideration in future crosswalk marking and/or crosswalk enhancement evaluations.