UNCONTROLLED CROSSINGS
UNCONTROLLED CROSSINGS
DECISION MAKING & DESIGN

What is an Unmarked Crosswalk?

California Vehicle Code §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.
CALIFORNIA LAWS GOVERNING PEDESTRIAN SAFETY

Legislative intent:

21949. (a) The Legislature hereby finds and declares that it is the policy of the State of California that safe and convenient pedestrian travel and access, whether by foot, wheelchair, walker, or stroller, be provided to the residents of the state.

(b) In accordance with the policy declared under subdivision (a), it is the intent of the Legislature that all levels of government in the state, particularly the Department of Transportation, work to provide convenient and safe passage for pedestrians on and across all streets and highways, increase levels of walking and pedestrian travel, and reduce pedestrian fatalities and injuries.
CALIFORNIA LAWS GOVERNING PEDESTRIAN CROSSINGS

Drivers must yield to pedestrians:

21950. (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.

But...

(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.
CALIFORNIA LAWS GOVERNING PEDESTRIAN CROSSINGS

Pedestrians may cross midblock – must yield to traffic:

21954. (a) Every pedestrian upon a roadway at any point other than within a marked crosswalk or within an unmarked crosswalk at an intersection shall yield the right-of-way to all vehicles upon the roadway so near as to constitute an immediate hazard.

But...

(b) The provisions of this section shall not relieve the driver of a vehicle from the duty to exercise due care for the safety of any pedestrian upon a roadway.

Pedestrians may not cross midblock:

21955. 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.
MARKED CROSSWALK PURPOSE

- Provide guidance for pedestrians
- Help alert drivers to pedestrian crossing
- Establish legal mid-block crossing

Decorative crosswalk

Hopscotch crosswalk in Baltimore
Location is near an existing or proposed park, school, hospital or other major pedestrian generator/attraction

- Yes
  - Nearest appropriately marked or protected crosswalk is at least 300 feet away
    - Yes
      - Pedestrians can be easily seen from a distance 10x the speed limit or 250 feet
        - Yes
          - Use Crosswalk Treatment Identification Tool and Engineering Judgment to determine treatment options
        - No
          - Is it feasible to remove sight distance obstruction or lower speed limit?
            - Yes
              - Direct pedestrians to the nearest marked or protected crosswalk
            - No
              - Infeasible
                - Direct pedestrians to the nearest marked crosswalk or consider installing signal or grade separation
    - No
      - 40 pedestrians per hour (30 elderly and/or children) or 120 in 4 hours cross at location*
        - Yes
          - Direct pedestrians to the nearest marked or protected crosswalk
        - No
          - Citizen surveys or walkability audits overwhelmingly suggest the need for proactive treatment
            - Yes
              - No action recommended
            - No
              - Direct pedestrians to the nearest marked or protected crosswalk

*In the absence of a marked or protected crosswalk.
UNCONTROLLED CROSSINGS
DECISION MAKING & DESIGN

To Mark or Not to Mark?

Herms, Bruce. (1972) Pedestrian crosswalk study: accidents in painted and unpainted crosswalks. Transportation Research Record, 406.
- “The San Diego study”
- Marked crosswalks vs. unmarked crosswalks
- Increased incidence of pedestrian collisions in marked crosswalks
- Did not differentiate between:
  - Number of lanes
  - Traffic volume
  - Speed limit

FEHR & PEERS
UNCONTROLLED CROSSINGS
DECISION MAKING & DESIGN
To Mark or Not to Mark?

Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations (2002)
- “The Zegeer study”
- Marked vs. unmarked
- Two-lane roads - no difference in pedestrian crash rate
- Multilane roads - marked crosswalk, without other measures, associated with higher crash rate on roadways with higher ADT and speed
MULTIPLE THREAT CRASH
### UNCONTROLLED CROSSINGS DECISION MAKING & DESIGN

**Zegeer Study Key Findings**

Table 1. Recommendations for installing marked crosswalks and other needed pedestrian improvements at uncontrolled locations.*

<table>
<thead>
<tr>
<th>Roadway Type (Number of Travel Lanes and Median Type)</th>
<th>Vehicle ADT &lt; 9,000</th>
<th>Vehicle ADT &gt; 9,000 to 12,000</th>
<th>Vehicle ADT &gt; 12,000 to 15,000</th>
<th>Vehicle ADT &gt; 15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 30 mi/h</td>
<td>35 mi/h</td>
<td>40 mi/h</td>
<td>≤ 30 mi/h</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>2 Lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤ 30 mi/h</td>
<td>35 mi/h</td>
<td>40 mi/h</td>
<td>≤ 30 mi/h</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>3 Lanes</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Lane (4 or More Lanes) With Raised Median***</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-Lane (4 or More Lanes) Without Raised Median</td>
<td>C</td>
<td>P</td>
<td>P</td>
<td>N</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Key:</td>
<td>C = Candidate sites for marked crosswalks;</td>
<td>P = Possible increase in pedestrian crashes may occur if crosswalks are marked without other pedestrian enhancements;</td>
<td>N = Marked crosswalks alone are insufficient.</td>
<td></td>
</tr>
</tbody>
</table>
Regardless of whether marked crosswalks are used, there remains the fundamental obligation to get pedestrians safely across the street.

FHWA Safety Effects of Marked v. Unmarked Crosswalks
CROSSWALK SAFETY BACKGROUND

**TABLE D.1. Summary of Treatments for Major Street Crossings at Uncontrolled Locations**

<table>
<thead>
<tr>
<th>Treatment Type</th>
<th>Description</th>
<th>Picture &amp; Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Visibility Markings</strong></td>
<td>- Description: This method uses high-visibility retro-reflective pavement markings.</td>
<td>New York, USA.</td>
</tr>
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<td></td>
<td>- Application: Crossings on high-volume multilane roads</td>
<td></td>
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<tr>
<td></td>
<td>- Cost (including labor): In U.S. Dollars: $500-$5,000 per crossing</td>
<td></td>
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<tr>
<td></td>
<td>- Studies of Effectiveness: See section 6.2 of NCHRP Information Report (44)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Countries: Where Treatment is Used: - U.S.A., France, Sweden</td>
<td></td>
</tr>
<tr>
<td><strong>Double-Faced Pedestrian Crossing Signs</strong></td>
<td>- Description: Standard pedestrian crossing signs are installed on both sides of the approaching roadway at an uncontrolled crosswalk in addition to the near-side pedestrian warning signs posted at and in advance of the crosswalk.</td>
<td>Fayette Sound, Washington, USA.</td>
</tr>
<tr>
<td></td>
<td>- Application: Uncontrolled multilane road</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Cost (including labor): In U.S. Dollars: $200 per sign</td>
<td>Near Downtown Los Angeles, California, U.S.A.</td>
</tr>
<tr>
<td></td>
<td>- Studies of Effectiveness: - None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Countries: Where Treatment is Used: - U.S.A., Canada</td>
<td></td>
</tr>
</tbody>
</table>
Advance yield line (shark’s teeth) & sign
Consider double white lines for no passing
CROSSWALK DESIGN
Rectangular Rapid Flashing Beacons (RRFBs)

- Solar or wired power
- Active detection (push button) - ADA Compliant (APS)
- Passive detection - Bollards, video, microwave
- Two RRFBs per approach
- RRFB in median if there is a median
- Allowable to mount overhead

Two RRFBs per approach
Passive detection bollards
Pedestrian confirmation lights
CROSSWALK DESIGN
Pedestrian Hybrid Beacons (previously “HAWKs”)

- Similar in design and cost to pedestrian signal
- Current MUTCD says PHB should not be installed within 100’ of intersections
- Shall only be used to control one crossing at an intersection
- Shall have a minimum of two signal heads per approach
- Pedestrian head shall rest with upraised hand*
CROSSWALK DESIGN
Pedestrian Hybrid Beacons (previously “HAWKs”)

1. Blank for drivers
2. Flashing yellow
3. Steady yellow
4. Steady red
5. Wig-Wag
   Return to 1
UNCONTROLLED CROSSING
DECISION MAKING & DESIGN
Device Selection Resources
Helping Cities Implement VISION ZERO

1. COMMIT to Multidisciplinary Engagement
2. BUILD the Vision Zero Database
3. DEVELOP the High-Visibility Network
4. ANALYZE Descriptive Statistics & Identify Collision Profiles
5. MATCH Countermeasures to Collision Profiles
6. PRIORITIZE Project through Scenario Planning
7. IMPLEMENT Priority Projects
8. EVALUATE Outcomes
65% of all deaths and severe injuries involving people walking occur on just 5% of our streets.
Figure 8
Evaluation Metrics Infographic of Selected Strategy Prioritized Locations