HOW TO STUDY A CROSSWALK

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AGENDA

1. Background on Crosswalks
2. Uncontrolled Crosswalk Study Steps
1. What is a crosswalk?

2. Who is responsible for crosswalks?

3. Pedestrian safety
1. What is a crosswalk?
2. Who is responsible for crosswalks?
3. Pedestrian safety
   How many crosswalks at this intersection?
Title 75, Section 102. Definitions

"Crosswalk."
(1) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway, measured from the curbs or, in the absence of curbs, from the edges of the traversable roadway; and, in the absence of a sidewalk on one side of the roadway, that part of a roadway included within the extension of the lateral lines of the existing sidewalk.
(2) Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.
BACKGROUND ON CROSSWALKS

Inconsistent applications
BACKGROUND ON CROSSWALKS

Inconsistent applications
BACKGROUND ON CROSSWALKS

Inconsistent applications
What are critical factors for pedestrian safety?
Background on Crosswalks

- Speed
- Traffic control
- Volume
- Crossing distance
- Number of lanes
- Turning vehicles
- Nighttime visibility
- Type of pedestrian
- Sight distance

As motor vehicle speeds increase, the risk of serious injury or fatality for a pedestrian also increases (AARP Impact Speed and a Pedestrian's Risk of Severe Injury or Death 2011, p. 1). Also, motorist visual field and peripheral vision is reduced at higher speeds.
1. Why a study?
2. Study steps
3. Resources
Choosing to mark a crosswalk:

- Crosswalks should not be marked indiscriminately
- A study should be performed before a crosswalk is marked on an uncontrolled approach
- Section 3B.18

**Pedestrians shall be accommodated**
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Controlled versus uncontrolled approaches
What should a study consist of?
Study Steps

1. Conduct field review
2. Collect data
3. Perform safety assessment
4. Assess walkability
5. Determine crosswalk markings
6. Consider signs and other features
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Step 1: Field Review
- Existing traffic control devices
- Sight distance (pedestrians and approaching vehicles)
- Facilities (sidewalks, ramps, etc.)
- Roadway geometry (lanes, lane widths, parking, alignment, etc.)
- Crossing distance and number of lanes
- Speed limits and operating speeds
- Lighting
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Step 2: Data Collection

- Crash data
- Traffic volumes
- Pedestrian volumes
- Pedestrian locations (desire lines)
- Pedestrian types
- Traffic speeds
- Transit
- Priorities
## HOW TO STUDY A CROSSWALK

### Unsignalized Intersection Inventory and Assessment Form

**Traffic Control Devices Data**

1. Fill in cells with either a value or selection from a drop down menu (on right of cell).
2. After Finishing All Tabs, go to 11-Data Summary to compile all elements

<table>
<thead>
<tr>
<th></th>
<th>Clayton Avenue NB</th>
<th>Clayton Avenue SB</th>
<th>5th St EB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OVERALL INTERSECTION</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection warning sign(s)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Type of sign(s)</td>
<td>W2-1</td>
<td>W2-1</td>
<td></td>
</tr>
<tr>
<td>Size of sign(s) (inches)</td>
<td>Poor</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>Condition of sign(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sign installation date</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intersection warning sign(s) adequately located</td>
<td>No</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Existing enhancement(s) to conspicuity of sign(s) (click all that apply)</td>
<td>None</td>
<td>Increased size, None</td>
<td></td>
</tr>
<tr>
<td>Accompanying advisory speed plaque</td>
<td>None</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Comments related to intersection warning sign</td>
<td></td>
<td></td>
<td>Installed and not installed per Pub 111 requirements.</td>
</tr>
</tbody>
</table>
Step 3: Perform Safety Assessment
## HOW TO STUDY A CROSSWALK

### Table 2. Recommendations for Considering Marked Crosswalks and Other Needed Pedestrian Improvements Across Uncontrolled Approach

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>1,500 to 9,000 VPD</th>
<th>9,000 to 12,000 VPD</th>
<th>12,000 to 15,000 VPD</th>
<th>More than 15,000 VPD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 30 MPH</td>
<td>35 MPH</td>
<td>≥ 45 MPH</td>
<td>≤ 30 MPH</td>
</tr>
<tr>
<td>2 Lanes (undivided two-way street or two-lane one-way street)</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>3 Lanes (center turn lane)</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>4 Lanes (two-way street with no median)</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>5 Lanes (center turn lane)</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>6 Lanes (two-way street with* or without median)</td>
<td>A</td>
<td>B</td>
<td>D</td>
<td>D</td>
</tr>
</tbody>
</table>

Source: Guidance for Installation of Pedestrian Crosswalks on Michigan State Trunkline Highways (Michigan Department of Transportation, 2014)
Step 4: Assess Walkability
- Community connections
- Pedestrian travel desire lines and alternative crossing locations
- Types of pedestrians
- Facilities (sidewalks, paths, ramps, etc.)
- Relationship to other plans
- Transit stops/facilities
Step 5: Determine Marking Style
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Develop a consistent marking approach for your community
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Step 6: Determine Signs and Other Features
### Table 1. Application of pedestrian crash countermeasures by roadway feature.

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Posted Speed Limit and AADT</th>
<th>Vehicle AADT &lt;9,000</th>
<th>Vehicle AADT 9,000–15,000</th>
<th>Vehicle AADT &gt;15,000</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤30 mph</td>
<td>35 mph</td>
<td>≥40 mph</td>
<td>≤30 mph</td>
</tr>
<tr>
<td>2 lanes (1 lane in each direction)</td>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>3 lanes w/ raised median (1 lane in each direction)</td>
<td>1 2 3 4 5 7 9</td>
<td>1 2 3 4 5 7 9</td>
<td>1 2 3 4 5 7 9</td>
<td>1 2 3 4 5 7 9</td>
</tr>
<tr>
<td>3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)</td>
<td>1 2 3 4 5 7 9</td>
<td>1 2 3 4 5 7 9</td>
<td>1 2 3 4 5 7 9</td>
<td>1 2 3 4 5 7 9</td>
</tr>
<tr>
<td>4+ lanes w/ raised median (2 or more lanes in each direction)</td>
<td>1 2 3 4 5 7 8 9</td>
<td>1 2 3 4 5 7 8 9</td>
<td>1 2 3 4 5 7 8 9</td>
<td>1 2 3 4 5 7 8 9</td>
</tr>
<tr>
<td>4+ lanes w/o raised median (2 or more lanes in each direction)</td>
<td>1 2 3 4 5 7 8 9</td>
<td>1 2 3 4 5 7 8 9</td>
<td>1 2 3 4 5 7 8 9</td>
<td>1 2 3 4 5 7 8 9</td>
</tr>
</tbody>
</table>

*Given the set of conditions in a cell,

- # Signifies that the countermeasure is a candidate treatment at a marked uncontrolled crossing location.
- ● Signifies that the countermeasure should always be considered, but not mandated or required, based upon engineering judgment at a marked uncontrolled crossing location.
- ○ Signifies that crosswalk visibility enhancements should always occur in conjunction with other identified countermeasures.*

The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.

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)**
Based upon your input, the following countermeasures were found:

**At Crossing Locations**
- Pedestrian Crossing Island
- Curb Extension
- Parking Restrictions

**Transit**
- Access to Transit

**Roadway Design**
- Raised Median

**Traffic Management**
- Left Turn Prohibitions
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Pedestrian/Bicyclist

- Bicycle Lanes
- Medians and Pedestrian Refuge Islands in Urban and Suburban Areas
- Road Diets (Roadway Configuration)
- Crosswalk Visibility Enhancements
- Pedestrian Hybrid Beacons
- Walkways
- Leading Pedestrian Interval
- Rectangular Rapid Flashing Beacons (RRFB)

STEP
Safe Transportation for Every Pedestrian

<table>
<thead>
<tr>
<th>Crossing Treatment</th>
<th>Yield Rate (%)</th>
<th>Sample Size (sites)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No treatment (unmarked)</td>
<td>24</td>
<td>37</td>
</tr>
<tr>
<td>Crosswalk markings only (any type)</td>
<td>33</td>
<td>58</td>
</tr>
<tr>
<td>Crosswalk markings, plus:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pedestal-mounted flashing beacon</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>Overhead sign</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Overhead flashing beacon (push-button activation)</td>
<td>51</td>
<td>14</td>
</tr>
<tr>
<td>Overhead flashing beacon (passive activation)</td>
<td>73</td>
<td>29</td>
</tr>
<tr>
<td>In-roadway warning lights</td>
<td>58</td>
<td>11</td>
</tr>
<tr>
<td>Median refuge island</td>
<td>60</td>
<td>21</td>
</tr>
<tr>
<td>Pedestrian crossing flags</td>
<td>74</td>
<td>6</td>
</tr>
<tr>
<td>In-street pedestrian crossing signs</td>
<td>76</td>
<td>20</td>
</tr>
<tr>
<td>Rectangular rapid-flashing beacon (RFFB)</td>
<td>82</td>
<td>64</td>
</tr>
<tr>
<td>School crossing guard</td>
<td>86</td>
<td>—</td>
</tr>
<tr>
<td>School crossing guard and RFFB</td>
<td>92</td>
<td>—</td>
</tr>
<tr>
<td>Pedestrian hybrid beacon (HAWK)</td>
<td>91</td>
<td>37</td>
</tr>
<tr>
<td>Mid-block crossing signals, half signals</td>
<td>98</td>
<td>13</td>
</tr>
</tbody>
</table>
HOW TO STUDY A CROSSWALK
RESOURCES

PennDOT Publication 787, Active Transportation Plan: [https://www.dot.state.pa.us/public/PubsForms/Publications/PUB%20787.pdf](https://www.dot.state.pa.us/public/PubsForms/Publications/PUB%20787.pdf)


PennDOT Publications 13M, 46, 11, 236, and 383

FHWA Safe Transportation for Every Pedestrian (STEP) [https://safety.fhwa.dot.gov/ped_bike/step/resources](https://safety.fhwa.dot.gov/ped_bike/step/resources)


National Association of City Transportation Officials: [https://nacto.org/](https://nacto.org/)

Smart Growth America. [https://smartgrowthamerica.org/](https://smartgrowthamerica.org/)


FHWA Proven Safety countermeasures: [https://safety.fhwa.dot.gov/provencountermeasures/](https://safety.fhwa.dot.gov/provencountermeasures/)

Pedestrian/Bicycling Information (FHWA clearinghouse) [https://www.pedbikeinfo.org/](https://www.pedbikeinfo.org/)


Pennsylvania Title 67, Chapter 212, and Title 75 Unsignalized Intersection Improvement Guide (UIIG): [https://toolkits.ite.org/uiig/](https://toolkits.ite.org/uiig/)