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User Guide

ABOUT THIS GUIDANCE

The City of Wichita Pedestrian Crossing Treatment Guidelines include two tools. The Site Evaluation Process flowcharts describe the decision-making process that should be followed when considering the installation or re-marking of a crosswalk on any City street. The Crosswalk Treatment Recommendations tables provide guidance on the types of treatments to apply to a given crosswalk location based on several factors. These guidelines were developed based upon research on the crosswalk marking policies of multiple U.S. cities\(^1\), guidance published by the Federal Highway Administration (FHWA), Kansas statutes, and City of Wichita laws. The Wichita Bicycle and Pedestrian Advisory Board and a working group of city staff and community stakeholders provided feedback on the guidelines.

The guidelines are intended to simplify and provide transparency in the decision-making process for crosswalk installation. The goals of the process are to prioritize pedestrian safety, reduce potential vehicle-pedestrian crashes based on sound scientific research, and promote walking within Wichita by creating a safer and more inviting pedestrian environment.

WHEN TO USE

This guidance should be used in the following occasions:
- When a request is made to install or move a crosswalk;
- When re-painting crosswalks (to evaluate if current configuration is sufficient);
- When new trails or school crossings are established; or
- When a new roadway is constructed.

Potential crosswalks should be evaluated holistically within the corridor. Because minimum distances are specified between crosswalks, the placement of any crosswalk, especially on a new road segment, will affect other potential crosswalk locations within the corridor. Therefore, the guidance in this document should be considered for the area as a whole and not just for the specific crossing site.

Data on the potential crossing location should be collected as outlined below. Staff should first follow the Site Evaluation Process flowchart to determine what type of action is recommended, selecting the Controlled or Uncontrolled Location flowchart as appropriate. If installation of a crosswalk is recommended, Staff should then refer to the appropriate Crosswalk Treatment Recommendations to determine the types of marking, signs, or additional safety measures that should be implemented.

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\(^1\) Cities researched include Kansas City, MO, Boulder, CO, Hennepin County, MN, Washington, DC, and Portland, OR. Boulder, CO’s “Pedestrian Crossing Treatment Installation Guide” (2011) provided the basis for many of the recommendations in this policy. The guide can be found at https://www-static.bouldercolorado.gov/docs/pedestrian-crossing-treatment-installation-guidelines-1-201307011719.pdf.
DATA COLLECTION
The following information should be collected when considering marking options for a crosswalk.

- **Current Crossing Control**: Note if the crossing is controlled by a stop sign, a traffic signal, or is not controlled. At a two-way stop-controlled intersection, the main road crossings are considered uncontrolled.

- **Roadway lanes and speed limit**: Note the posted roadway speed. Note the number of vehicle lanes (including parking and travel lanes), direction of vehicular travel (one- or two-way), and whether there is a raised median present.

- **Vehicle Gap Time**: Gather data on gaps in vehicular traffic at the proposed location (if it is an uncontrolled location with 2 lanes and a posted speed of 30 mph or less). Data may be collected using automatic vehicle counters. Data should be collected for at least 24 hours. Gap times should be calculated during the two peak hours of the day. These are typically the AM and PM commuting time periods. In some cases, such as near a school or a location impacted by a shift change, the peak hours may be outside the traditional AM and PM commuting time periods.

  An adequate gap time for a typical pedestrian\(^2\) to be able to identify a gap and cross the street is calculated as:

  \[
  \text{Roadway Width} \times \frac{3.5 \text{ ft/second}}{3.5 \text{ ft/second}} + 1
  \]

  This calculation could be based on a 3.0 ft/sec or slower walking speed based on the expected pedestrian population, such as locations with senior walking routes or school crossings. Common values based on these two walking speeds may be found using **Table 1** below.

**Table 1: Adequate Crossing Gap Time**

<table>
<thead>
<tr>
<th>Roadway width</th>
<th>Crossing time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3.5 ft/sec</td>
</tr>
<tr>
<td>40 ft</td>
<td>13</td>
</tr>
<tr>
<td>45 ft</td>
<td>14</td>
</tr>
<tr>
<td>50 ft</td>
<td>16</td>
</tr>
<tr>
<td>55 ft</td>
<td>17</td>
</tr>
<tr>
<td>60 ft</td>
<td>19</td>
</tr>
</tbody>
</table>

- **Multi-use path crossing**: Note if an existing or planned multi-use path crosses the road at the proposed location. If this is a midblock location, the crosswalk should line up with the multi-use path as directly as possible.

• **School crossing:** Note if the proposed location is a designated school crossing, or crosses a roadway adjacent to a school in the same block as the school. This could be a midblock crossing lined up with a school entrance, or a crossing at an intersection at the end of the block of the school, and/or any other crossing designated as a school crossing per the City of Wichita’s school crossing designation process.

• **Distance to nearest marked or controlled crossing:** Measure the distance from the proposed location to the nearest marked crossing of the same road.

• **Stopping sight distance:** Utilize Table 2 below to determine the required stopping sight distance based upon the roadway’s speed limit. Then, measure the given distance in either direction from the proposed location and note if there are any obstacles obstructing drivers’ view of the location.

  **Table 2: Stopping Sight Distance Selection (AASHTO Green Book)**

<table>
<thead>
<tr>
<th>Vehicle Speed (mph)</th>
<th>Stopping Sight Distance (feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>70</td>
</tr>
<tr>
<td>20</td>
<td>90</td>
</tr>
<tr>
<td>25</td>
<td>115</td>
</tr>
<tr>
<td>30</td>
<td>140</td>
</tr>
<tr>
<td>35</td>
<td>165</td>
</tr>
<tr>
<td>40</td>
<td>195</td>
</tr>
<tr>
<td>45</td>
<td>220</td>
</tr>
<tr>
<td>50</td>
<td>245</td>
</tr>
<tr>
<td>55</td>
<td>285</td>
</tr>
</tbody>
</table>

• **Level of illumination:** Observe the location at night time and note whether visibility is adequate for drivers to see pedestrians in the crosswalk or if lighting should be improved.

**THRESHOLDS**

The following measurement thresholds correspond to the items in the Site Evaluation Process flowchart, in the order given.

**Uncontrolled Location**

• **Roadway lanes and speed limit:** If the roadway being crossed has two or fewer lanes AND a speed limit of 30 mph or less, the gap times should be measured in order to determine if a crosswalk should be installed. If the roadway has a speed limit of 35 mph or greater, OR four or more lanes, and all other treatment criteria
are met, an enhanced crosswalk should be installed. Locations with staff concerns about driver compliance may also qualify for enhanced crosswalks.

- **Vehicle gap time:** If an average of at least 60 gaps of the appropriate crossing time occur during the vehicle peak hour measured, no crosswalk is needed (see Table 1 on how to calculate adequate crossing gap times). If fewer gaps exist, a crosswalk should be considered if further conditions are met.

  Note: locations with sufficient gap time should still be reviewed for vehicle stopping sight distance. If stopping sight distance cannot be provided, a beacon or signal may be necessary.

- **Multi-use paths and school crossings:** These should receive a marked crossing, either standard or enhanced.

- **Distance to nearest marked crossing:** If there are no special crossing conditions like a multi-use path or school crossing, crosswalks should be installed only when there is not another marked crosswalk nearby. The ideal distance between marked crossings varies by neighborhood typology according to Table 3 below.

  Table 3: Ideal Distance between Marked Crossings

<table>
<thead>
<tr>
<th>Neighborhood Typology</th>
<th>Distance between marked crossings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtown</td>
<td>330 ft (1/16th mile)</td>
</tr>
<tr>
<td>Residential Grid</td>
<td>660 ft (1/8 mile) to 1320 ft (1/4 mile)⁵</td>
</tr>
<tr>
<td>Grid &amp; Curvilinear</td>
<td>1320 ft (1/4 mile)</td>
</tr>
<tr>
<td>High density curvilinear with cul-de-sac</td>
<td>1320 ft (1/4 mile) to 2640 ft (1/2 mile)⁶</td>
</tr>
<tr>
<td>Low density curvilinear with cul-de-sac</td>
<td>2640 ft (1/2 mile)</td>
</tr>
</tbody>
</table>

- **Stopping sight distance:** Stopping sight distance should be adequate and unobstructed before crosswalks. Adequate stopping sight distance is calculated using Table 2. If the stopping sight distance is not deemed adequate, obstructions should be removed before installing a crossing. If this is not possible, signalization should be installed at the location if all other thresholds are met.

- **Illumination:** All standard and enhanced crossings should have adequate illumination. If illumination is deemed inadequate, it must be installed along with the crosswalk. Other crosswalk enhancements (such as those described on page 11) do not generally address lighting issues. If illumination absolutely cannot be

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³ Acceptable gap time is calculated based on the principle that pedestrians generally tolerate delays of only 10 to 30 seconds when waiting to cross the street. Therefore, there should be a gap of the appropriate length every 30 seconds on average, or around 60 times every hour (Highway Capacity Manual).

⁴ Neighborhood typology definitions are found in Chapter 2 of the Wichita Pedestrian Mater Plan (2014), at http://www.wichita.gov/Planning/Pages/Pedestrian.aspx

⁵ Distance range depends on land use in the surrounding area; a denser land use may necessitate a shorter distance between crossings.

⁶ See above
addressed, a signalized crossing (pedestrian hybrid beacon or traffic signal) could be considered.

**Controlled Location**

- **Signal Controlled:** Signal controlled locations should always have at least a standard crosswalk, although staff may choose to enhance the crossing based on concerns about driver compliance or conflicts.
- **Stop Controlled:** Stop controlled crossings may or may not require crosswalk markings.
- **Peak Hour Volumes:** Stop-controlled locations should have a marked crossing where bi-directional vehicular volume across the crossing location exceed 200 vehicles per hour during the peak hour.
- **Multi-use paths and school crossings:** These should always receive an enhanced crossing.
- **Staff concerns about driver compliance or frequent turning conflicts:** If concerns are present, an enhanced crossing should be installed. This may include locations where:
  - Crashes or near misses have been reported,
  - Other pedestrian trip generators besides transit stops or schools are present,
  - Intersection geometry is complex or confusing, or
  - Vehicle turning speeds are higher than is typically expected.

**NEXT STEPS**

**Needs for Supporting documents**

To ensure effective application of this document, the following additional resources should be developed:

- An inventory and map of all school crossing locations, to be updated on a regular basis
- A process for determining school crossing locations
- A map applying the neighborhood typologies referred to in the Pedestrian Master Plan to all the streets in Wichita.

**Implementation**

The decision-making guidance outlines in this document falls under the purview of the Department of Engineering. However, support and funding for the installation of marked crossings should be considered by all community stakeholders. Funding for new crosswalks could be supported by neighborhood institutions that will benefit from improved crosswalks, including schools, churches, commercial and residential developments, and others.
Site Evaluation Process: Uncontrolled Location

Identify uncontrolled crossing location

Does the road have speed limit ≤ 30 mph AND 2 lanes?

Yes → Install enhanced crosswalk (see page 10)

No → Is there a multi-use path OR a school crossing?¹

Yes → Install signalization

No → Are there adequate crossing gaps?¹

Yes → Yes

No → No

Is there already a marked crosswalk nearby?¹

Yes → Is there adequate stopping sight distance?²

Yes → Can the sight distance obstruction be removed? (Remove if yes)

No → No

Is there adequate illumination or can it be installed?³

Yes → Yes

No → No

Are there staff concerns about driver compliance?

Yes → Install standard crosswalk OR traffic calming (see page 8)

No → Does the road have speed limit ≥ 35 mph OR ≥ 4 lanes?

Yes → Install enhanced crosswalk (see page 10)

No → No

1. For a description of these terms, see user guide beginning on page 1.

2. Adequate distance depends on roadway speed. See Stopping Distance Selection Table in user guide (page 3).

3. Location should be observed at night to determine if illumination provides sufficient visibility.
Site Evaluation Process: Controlled Location

1. For a description of these terms, see user guide beginning on page 1.

Identify controlled crossing location

Is there a stop sign or a traffic signal?

- Stop Sign
- Traffic Signal

Is there a multi-use path OR a school crossing?¹

- No
- Yes

Are there staff concerns about driver compliance or frequent turning conflicts?

- No
- Yes

No action recommended

Install standard crosswalk OR traffic calming (see page 8)

Install enhanced crosswalk (see page 10)
Crossing Treatment Recommendations: Standard Crosswalk or Traffic Calming

Standard Crosswalk Design

All standard crosswalks should include the following design elements.

Continental-style crosswalk markings
  - Longitudinal lines 12- to 24-inches wide and separated by gaps of 12- to 60-inches. The design of the lines and gaps should avoid the wheel paths if possible, and the gap between the lines should not exceed 2.5 times the width of the longitudinal lines.
  - Where brick crosswalks are standard, lateral stripes are included on both sides of the brick.

High-visibility materials
  - Cold plastic pavement markings should be used to mark crosswalks whenever possible.

Curb Ramps
  - Crosswalk markings should be located so that curb ramps are within the extension of the crosswalk markings.
  - Curb ramps should follow all ADA standards for detectable warning surfaces, slope, and size.

Medians and Road Diets

When reviewing a corridor that has challenging pedestrian crossings, changes to the roadway geometry should be considered. Roadways with more than two lanes in each direction (e.g. four lane undivided) can introduce a multiple threat situation for pedestrians.

As a result, Table 1 suggests more substantial crossing treatments for roads with two or more lanes in one direction. Consider converting from a four-lane roadway to a three-lane roadway with a center turn lane. The feasibility of this type of conversion will depend on traffic volumes along the corridor and the prevalence of left-turning vehicular movements.

Further, three-lane roadways with two-way turn lanes are good candidates to add medians. While the multiple threat condition is eliminated with a conversion from four lanes to three lanes, the center turn lane is still a travel lane. Pedestrians are required to cross all three lanes at once, and therefore need more assistance from crossing treatments. However, a center median with a raised curb allows for pedestrians to cross one lane of traffic at a time.

Consider these types of changes before reviewing the crossing treatment table. If a road diet or median can be implemented, the required level of treatment may be reduced.

Traffic Calming Treatments

Traffic calming measures can improve crossing conditions at marked or unmarked locations by altering driver behavior, encouraging yielding and slowing motor vehicle speeds. Potential traffic calming measures are described below. These may be used in place of, or in combination with, a standard marked crosswalk as described above. The crossing treatment table on page 10 is based on the posted speed limit. However, substantial traffic calming measures may reduce vehicle operating speeds to well below the posted speed limit. In these cases, it may be possible to used a treatment from a lower speed category.

Pedestrian crossing islands
  - A raised median in the middle of a two-way street that allows pedestrians to cross only one direction of traffic at a time by providing a place to wait for drivers to yield before completing the second part of the crossing.
  - The minimum width for a crossing island is 6ft; 10ft is preferred at locations where bicycles may be using the crossing.
  - Crossing islands should have curb cuts and ADA accessible ramps.
Turning radii
• Curb radii at corners affect how quickly drivers turn the corner; slower turns will reduce the likelihood of collision with a crossing pedestrian.
• Curb radii should generally be between 10 and 15 feet.
• Flex-posts may be used to tighten curb radii at a lower cost than extending the curb.

Curb extensions/bulbouts
• An extension of the curb or sidewalk into the street or parking lane.
• These can position pedestrians at a more visible location for vehicles, reduce crossing lengths, and reduce motor vehicle speeds.
• Curb extensions may occur at intersections or at mid-block locations. They should not extend into the path of travel for bicyclists.

Lane widths
• Narrower lanes (9 to 11 ft) encourage lower vehicle speeds without significantly affecting motor vehicle capacity.
• They also allow additional space for bicycle or pedestrian infrastructure, and reduce crossing distances.

On-street parking
• Allocating curb space to parking can narrow travel lanes and reduce vehicle speeds by increasing side friction.
• Parallel parking has the greatest effect on speeds, but angled parking may also be used.
• The effectiveness of the treatment is affected by demand. Parking may be limited to off-peak hours, in which case it would not have traffic calming impacts when pedestrian volumes are highest.

Trees / landscaping
• The addition of street trees can create a vertical edge or frame around the street, ausing drivers to slow down.

Art
• Painting murals and decorations on streets and intersections adds visual interest to the street, prompting drivers to slow down for a better view.

Chicanes
• Curb extensions that are offset along the length of a block, creating a meandering effect that causes drivers to slow down.
• Chicanes should only be used on low volume or residential streets.

Speed tables or humps
• Installations to raise the level of the roadway in a single location, causing drivers to slow down.
• These may be placed on secondary roads that are commonly used as cut-throughs to avoid busier roads.
# Crossing Treatment Recommendations: Enhanced Crosswalk

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Roadway ADT and Posted Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 9,000 vpd</td>
</tr>
<tr>
<td></td>
<td>&lt; 30 mph</td>
</tr>
<tr>
<td>3 lanes w/ raised median*</td>
<td>A</td>
</tr>
<tr>
<td>3 lanes w/ striped median** a</td>
<td>B1</td>
</tr>
<tr>
<td>4 lanes w/ raised median***</td>
<td>C1</td>
</tr>
<tr>
<td>4 lanes w/o raised median b</td>
<td>C1</td>
</tr>
<tr>
<td>5 lanes or more</td>
<td>D</td>
</tr>
</tbody>
</table>

**Definitions**

ADT: average daily traffic
vpd: vehicles per day
mph: miles per hour

*one lane in each direction
**one lane in each direction and a two-way left turn lane
***more than one lane in each direction

*a Review feasibility of adding a raised median before applying treatments
*b Review feasibility of converting to three lanes with striped median before applying treatments
<table>
<thead>
<tr>
<th>Crossing Treatment Type</th>
<th>Treatment Description</th>
<th>Signs/Signals</th>
</tr>
</thead>
</table>
| A                      | High visibility markings and standard signage                  | • Standard (W11-2) pedestrian warning signs side-mounted with down arrow (W16-7) or overhead at crossing location  
|                        |                                                              | • S1-1 signs for School Crossing                                                                |
| B1                     | High visibility markings and standard signage, plus in-roadway yield signs | • “State Law - Yield to Pedestrians” (R1-6) signs mounted on flexible in-roadway panel at crossing location  
|                        |                                                              | • Standard (W11-2) pedestrian warning signs side-mounted with down arrow (W16-7) or overhead at crossing location  
|                        |                                                              | • S1-1 signs for School Crossing                                                                |
| B2                     | High visibility markings, plus “state law” signage (modified R1-6) | • Modified “State Law - Yield to Pedestrians” (R1-6a or R1-9) signs side-mounted with down arrow (W16-7) or overhead at crossing location  
|                        |                                                              | • S1-1 signs for School Crossings                                                                |
| C1                     | High visibility markings, plus “state law” signage (modified R1-6) plus side/median mounted yield signs and advanced yield lines | • Modified “State Law - Yield to Pedestrians” (R1-6a or R1-9) signs side-mounted with down arrow (W16-7) or overhead at crossing location  
|                        |                                                              | • “Yield here to pedestrians” (R1-5) signs and yield lines in advance of the crossing location  
|                        |                                                              | • S1-1 signs for School Crossing locations                                                        |
| C2                     | High visibility markings, plus “state law” signage (modified R1-6) plus side/median mounted yield signs and advanced yield lines, plus raised crosswalk | • Modified “State Law - Yield to Pedestrians” (R1-6a or R1-9) signs side-mounted with down arrow (W16-7) or overhead at crossing location  
|                        |                                                              | • “Yield here to pedestrians” (R1-5) signs and yield lines in advance of the crossing location  
|                        |                                                              | • S1-1 signs for School Crossings                                                                
|                        |                                                              | • Speed table added to raise crosswalk to sidewalk level                                           |
| D                      | High visibility markings and standard signage, side mounted yield signs and advanced yield lines, plus Rectangular Rapid Flashing Beacon (RRFB) | • “Yield here to pedestrians” (R1-5) signs and yield lines in advance of the crossing location  
|                        |                                                              | • Standard (W11-2) pedestrian warning signs with RRFB side-mounted with down arrow (W16-7) or overhead  
|                        |                                                              | • S1-1 signs for School Crossing locations                                                        |
| E                      | High visibility markings and standard signage, overhead stop for crosswalk signs and stop bars, plus signalization | • Traffic Signal or Pedestrian Hybrid Beacon (HAWK), based on warrants and engineering judgement. (Traffic signals are generally preferred, except when a HAWK signal is better aligned with intersection geometry and/or traffic warrants)  
|                        |                                                              | • “Stop here on red” (R10-6) signs and stop bars in advance of the crossing  
|                        |                                                              | • Standard (W11-2) pedestrian warning signs side-mounted with down arrow (W16-7) or overhead  
|                        |                                                              | • “Crosswalk Stop on Red” (R10-23) sign mounted overhead adjacent to signal face  
|                        |                                                              | • S1-1 signs for School Crossing locations                                                        |
High visibility markings and standard signage

High visibility markings, plus in-roadway yield signs

High visibility markings, plus “state law” signage (modified R1-6)

High visibility markings, plus “state law” signage (modified R1-6) plus side/median mounted yield signs and advanced yield lines
High visibility markings, plus “state law” signage (modified R1-6) plus side/median mounted yield signs and advanced yield lines, plus raised crosswalk

High visibility markings and standard signage, side mounted yield signs and advanced yield lines, plus RRFB

E. High visibility markings and standard signage, overhead stop for crosswalk signs and stop bars, plus signalization

E. High visibility markings and standard signage, overhead stop for crosswalk signs and stop bars, plus signalization