



INDIANA DEPARTMENT OF TRANSPORTATION
Driving Indiana's Economic Growth

Design Memorandum No. 16-23
Technical Advisory

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TO: All Design, Operations, and District Personnel, and Consultants

FROM: /s/Elizabeth W. Phillips
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SUBJECT: Pedestrian Crossing Treatments

REVISES: *Indiana Design Manual* Section 51-7.09 and Figure 51-7 O

EFFECTIVE: Immediately

Recommendations from the JTRP research project *Selection of Pedestrian Crossing Treatments at Controlled and Uncontrolled Locations* and IMUTCD §3B.18, ¶9 have been incorporated into the referenced *Indiana Design Manual* (IDM) section and figure.

The section and figure are an attachment to this memo and will be incorporated in the IDM at a later date.

Questions regarding project-specific pedestrian crossing treatments should be discussed with the appropriate district Traffic Engineer.

51-7.09 Path-Roadway Intersection Treatment Selection and Design [Rev. Jun. 2016]

A path-roadway intersection is among the most critical issues in shared-use-path design. According to the National Highway Traffic Safety Administration, more than half of all bicycle crashes occur at such intersections.

At an intersection, a bicyclist on a path faces many of the same conflicts as on a roadway, complicated by integration with pedestrians. Problems associated with an at-grade crossing often relate to the motorist's expectation that crosswalk users will be traveling at pedestrian speeds rather than bicycle speeds.

For a motorist entering a path-roadway intersection, the motor-vehicle stopping sight distance requirements described in Section 46-10.0 must be satisfied.

A path intersection with a roadway offers many risks. If approaching a free right turn, a motorist does not anticipate a conflict on the right, and is looking to the left for traffic entering the intersection, so he or she may not see a bicyclist approaching the intersection on a parallel path. A turning motorist may not consider that a bicyclist will be traveling off the road, yet will be within the right of way. In encountering a motorist, a bicyclist is often compelled to stop and yield to a left- or right-turning vehicle. To account for this, an appropriate balance is found by locating the crossing close enough to the intersection to allow adequate motorist visibility, yet far enough away to allow sufficient motorist reaction time, but not so far away that an approaching motorist is unaware of the crossing bikeway. A one-way path at a signalized intersection can increase visibility and safety, especially regarding a right-turning motorist and a through-traveling bicyclist. The site specific elements that should be considered when making a decision are pedestrian volumes and types, traffic volumes, existing traffic control, posted speed limit, and geometric characteristics, e.g. the number of lanes, width of crossing, and visibility.

Figure [51-7 O](#) indicates the treatment for a path-roadway intersection. Figure [51-7 O](#) lists guidelines, not absolute requirements, for intersection treatment. Each intersection is unique and will require engineering judgment as to the appropriate solution.

The following should be considered in using [Figure 51-7 O](#) to select an intersection treatment.

1. The type of crossing used for bicycle or pedestrian traffic at an intersection between a main road and a secondary road is usually the same as for the main road.
2. If the number of lanes to be crossed is greater than 3 in each direction, or the total intersection width is greater than 75 ft, the intersection should have a pedestrian refuge or

median island. Where a path user must wait on an island, a push button or bicycle-sensitive traffic detection device should be considered.

3. If the speed limit for a section of road without traffic signals is 45 mph or higher and it is not practical to provide a grade separation, reduction of the speed limit to 40 mph before the crossing, along with proper signing and lighting, should be considered.
4. In determining the need for, and suitability of, a grade separated crossing, the following criteria should be satisfied.
 - a. High vehicular volumes conflict with night pedestrian volumes, constituting an extreme hazard.
 - b. Modification of school routes, busing policies, campus procedures, or attendance boundaries to eliminate the need for a crossing is not feasible.
 - c. Physical conditions make a grade separation feasible from an engineering standpoint, including pedestrian channelization to ensure usage of the structure. In determining the location for a grade separation, the ramp grades on the path should be minimized, and the location should fit in with the rest of the path network.
 - d. Pedestrian crossings can be restricted for at least 600 ft on each side of the proposed pedestrian overpass.
 - e. A demonstrated problem exists that simpler, more economic solutions have failed to correct.
 - f. The anticipated benefits to be derived from the pedestrian overpass clearly outweigh the costs.

Speed Limit	Roadway Type	ADT	Proposed Treatments Levels
≤ 30 mph	2 Lanes	<12,000	1 or 2
		≥12,000	2 + (3 or 4)
	3 Lanes	<12,000	1 or 2
		≥12,000	2 + (3 or 4)
	≥ 4 Lanes with Raised Median	<12,000	1 or 2
		12,000 ≤ ADT < 15,000	2 + (3 or 4)
		≥15,000	[2 + (3 or 4)] or 5
	≥ 4 Lanes without Raised Median	< 9,000	1 or 2
		9,000 ≤ ADT < 12,000	2 + (3 or 4)
≥12,000		[2 + (3 or 4)] or 5	
35 mph or 40 mph	2 Lanes	<12,000	2
		≥12,000	2 + (3 or 4)
	3 Lanes	<9,000	2
		9,000 ≤ ADT < 15,000	2 + (3 or 4)
		≥15,000	[2 + (3 or 4)] or 5
	≥ 4 Lanes with Raised Median	<9,000	2
		9,000 ≤ ADT < 15,000	2 + (3 or 4)
		≥15,000	[2 + (3 or 4)] or 5
	≥ 4 Lanes without Raised Median	<12,000	2 + (3 or 4)
≥12,000		[2 + (3 or 4)] or 5	
≥ 45 mph	2 Lanes	<12,000	2 + (3 or 4)
		≥12,000	[2 + (3 or 4)] or 5
	3 Lanes	<12,000	2 + (3 or 4)
		≥12,000	[2 + (3 or 4)] or 5
	≥ 4 Lanes with Raised Median	<15,000	2 + (3 or 4)
		≥15,000	5
	≥ 4 Lanes without Raised Median	<12,000	[2 + (3 or 4)] or 5
		≥12,000	5

RECOMMENDED TREATMENT OF SHARED USE PATH
AND ROADWAY INTERSECTION

Figure 51-7 O (1 of 2)

Level 1 Basic Crosswalk Treatment

Standard Crosswalk (two transverse lines)

Level 2 Enhanced Crosswalk Treatment

- 1) Longitudinal Crosswalk Markings ("Piano Key" or "Continental" pattern)
- 2) Raised Midblock Crosswalk (crossing elevated to match top of curb across entire width and length of crosswalk, formed with concrete or HMA, a plan detail is required.)
- 3) For local projects, other high visibility crosswalk marking patterns such as diagonal crosswalk markings ("Zebra" pattern) may be used or textured pavement crosswalks with white retroreflective markings.

Level 3 Refuge Islands and Bulbouts

- 1) Median Refuge Islands
- 2) Split Pedestrian Crossover (SPXO – median refuge island with longitudinal offset between crosswalks)
- 3) Intersections Bulbouts*
- 4) Midblock Bulbouts*

*(Bulbouts are an extension of the sidewalk/curb area at a pedestrian or shared use path crossing and are designed to reduce the crossing length. A plan detail is required)

Level 4 Flashing Beacons

- 1) Ground mounted flashing beacons
- 2) Overhead signs and flashing beacons
- 3) Rectangular rapid flashing beacons ("RRFB")

Level 5 Traffic Signals and Grade Separation

- 1) Pedestrian Hybrid Beacon ("HAWK Signal")
- 2) Pedestrian-Actuated Traffic Signal
- 3) Grade-Separated Crossing

RECOMMENDED TREATMENT OF SHARED USE PATH AND ROADWAY INTERSECTION

Figure 51-7 O (2 of 2)