1. Introduction

This county-wide Crosswalk Policy is aimed at improving pedestrian safety and enhancing pedestrian mobility by providing a framework for installation, enhancement, and relocation of crosswalks throughout Athens-Clarke County (ACC). This policy identifies where crosswalks are warranted and what type of infrastructure is needed to make crossings safer. Once a location is identified as needing a crosswalk, it will be added to a list to be prioritized based on funding.

Note: This policy does not address criteria for prioritizing projects or sources of funding.

This document describes the function of crosswalks and their legal context in the Georgia Vehicle Code, discusses the advantages and disadvantages of marked crosswalks, and summary of best practices related to numerous pedestrian treatments, including geometric, signage and striping, and signal hardware or operational measure treatments.

The purpose of this Policy is to enable Athens-Clarke County Unified Government (ACCGov) staff to respond to crosswalk requests in a manner that improves pedestrian accessibility and improves public safety. Guidelines were written with the following priorities:

- Improve the visibility of pedestrians to motorists and vice-versa,
- Accommodate vulnerable populations such as persons with disabilities, children, and the elderly,
- Reduce conflicts between pedestrians and vehicles, and
- Reduce vehicular speeds at locations with potential pedestrian conflicts.

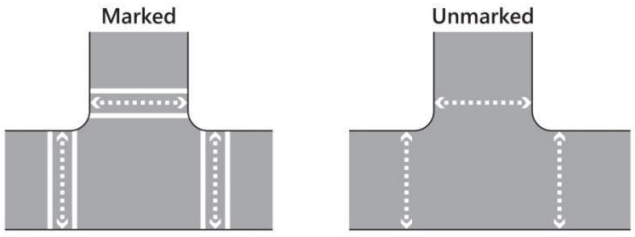
2. Crosswalk Fundamentals

Pedestrian crossing and right-of-way laws vary from state to state and are often a source of driver or pedestrian uncertainty and confusion for when crossing is legal. This section outlines the types of crosswalks, where crossing the street is legal in Georgia, and the steps ACCGov should take in identifying locations for marked crosswalks.

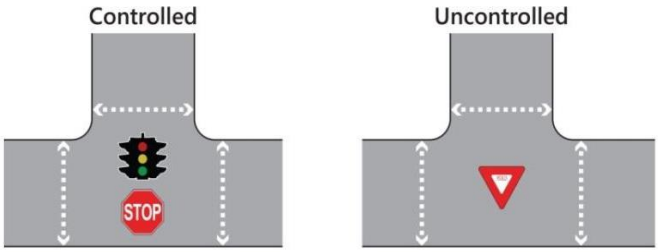
2.1 Types of Crosswalks

Crosswalks are primarily classified by three characteristics:

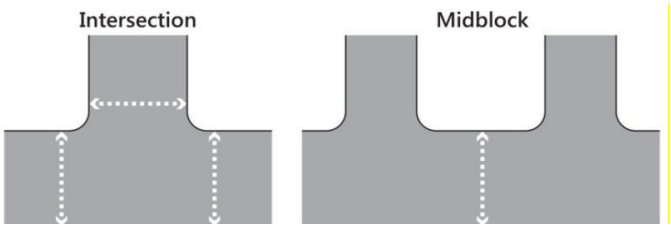
1. Whether they are marked (demarcated with striping on the street) or unmarked (no striping).



2. Whether they are controlled (by a traffic signal, stop-sign, roundabout, or traffic circle) or uncontrolled.



3. Whether they are located at an intersection (where two streets meet) or mid-block (between intersections).



2.2 What GA Codes Say About Pedestrians

In 1995, the Georgia legislature changed the crosswalk law such that drivers must “stop and stay stopped” for pedestrians, not just yield to them. All guidelines provided in this policy are subject to Title 40 - Motor Vehicles and Traffic, Chapter 6 - Uniform Rules of the Road, Article 5 - Rights and Duties of Pedestrians.

Definitions from 40-1-1

“Crosswalk" means:

A. 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; or

B. Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.

"Intersection" means the area embraced within the prolongation or connection of the lateral curb lines, or, if none, then the lateral boundary lines of the roadways of two highways which join one another at, or approximately at, right angles, or the area within which vehicles traveling upon different highways joining at any other angle may come in conflict.

"Sidewalk" means that portion of a street between the curb lines, or the lateral lines of a railway, and the adjacent property lines, intended for use by pedestrians.

2.3 Why Do Cities Mark Crosswalks?

Sidewalks and crosswalks are essential links within a pedestrian network. A marked crosswalk has three (3)

primary functions:

1) To create reasonable expectations where pedestrians may cross a roadway safely.

2) To improve predictability of pedestrian actions and movement.

3) To channel pedestrians to designated crossing locations (often selected for their optimal sight distance).

3. Identifying Locations for Marked Crosswalks

3.1 Definition of Criteria

3.1.1 Location Near Pedestrian Generator

Crossings within 500 feet of a service or location expected to generate at least 10 pedestrians per hour if crossing was safe, including:

- Bus stop,
- School,
- Parks/Trails/Greenspace,
- Health center,
- Senior center,
- Community center,
- Library,
- Grocery store,
- Pharmacy, and/or
- Neighborhood-embedded commercial district.

3.1.2 Location is 300 Feet or Further from Nearest Crossing

Staff will use GIS, Google Earth, or visit the location to measure the distance from the proposed crosswalk to the nearest existing enhanced crossing (signalized crossing, stop-controlled crossing, or other marked crosswalk with appropriate enhancement devices). A distance of 300 feet or further is necessary for a location to qualify to be considered for a marked crosswalk.

3.1.3 Location Meets Volume Threshold

In order to determine if a location meets this criterion, staff will complete a pedestrian count during the anticipated peak hours. The number of pedestrians at the candidate crosswalk location and within the vicinity likely to use the crosswalk location will be counted. This typically includes pedestrians traveling within the intersection influence area, which may include pedestrians crossing downstream and upstream of the intersection depending on roadway and land use characteristics. Vulnerable pedestrians count 2x people towards volume thresholds when data is available. Vulnerable populations include children, the elderly, and persons with disabilities. The identification of vulnerable users will be determined by professional judgment of TPW staff or designee that is processing the count data.

Staff will identify the peak hour and determine if it meets the minimum pedestrian volume threshold of 10 peds/hour in any one hour. Pedestrian counts no more than three years old may be utilized. Staff will only repeat a pedestrian count earlier than three-years if the surrounding land-use has significantly changed.

3.1.4 Location Meets AASHTO Sight Distance Requirements

The American Association of State Highway and Transportation Officials (AASHTO) *A Policy on Geometric Design of Highways and Streets* manual (also known as the "Green Book") describes sight distance as "the length of the roadway ahead that is visible to the driver." Sight distance should be sufficient to allow for a vehicle traveling at the design speed to stop before reaching a stationary object. Refer to Chapter 3.2.2 of the AASHTO Green Book, for the minimum sight distance required at various design speeds.

3.2 When to Consider Installing Marked Crosswalks

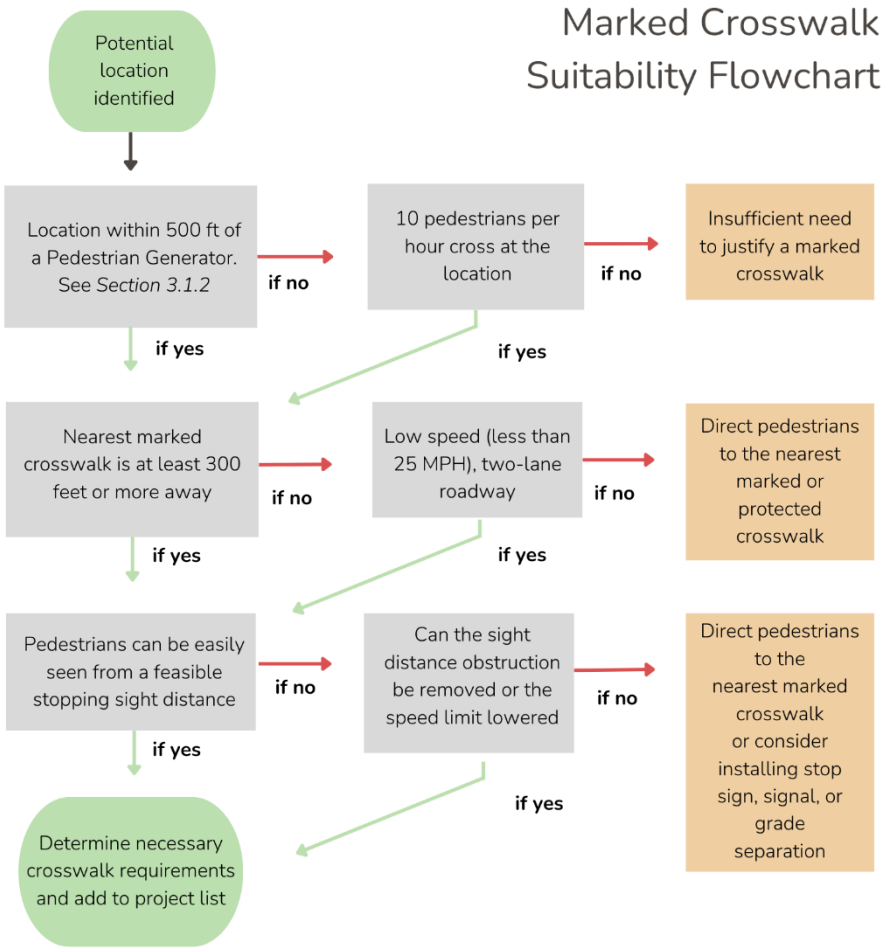
Marked crosswalks should be installed at all controlled intersections per MUTCD and ADA standards. As seen in Figure 1, once candidate locations for uncontrolled or mid-block crossings are identified, an engineering evaluation should be conducted to determine if a marked crosswalk should be installed, and if so, what visibility enhancements may be included in the design. Crossings should be marked where all of the following occur:

- Sufficient demand exists to justify the installation of a crosswalk.
- Sufficient sight distance as measured by stopping sight distance calculations exists and/or sight distance will be improved prior to crosswalk marking.
- Safety considerations do not preclude a crosswalk.

Identifying candidate locations for marked crosswalks involves two steps. The first step is to locate the places people would like to cross the street. These locations are called *pedestrian desire lines*, which represent the most desirable, and typically most direct, places that people want to cross a street. Pedestrian desire lines are influenced by elements of the roadway network, such as transit stops, and nearby land uses that generate pedestrian activities (homes, schools, parks, trails, commercial centers, etc.). This information provides a basis for identifying pedestrian crossing improvement areas and prioritizing such improvements, thereby creating a convenient, connected, and continuous walking environment. These locations may be identified through engineering studies, walk audits, staff observations, or public feedback.

The second step in identifying candidate locations for marked crosswalks is to identify where people can cross safely. The primary consideration in this step is adequate stopping sight distance. Of all road users, pedestrians have the highest risk of injury in a collision because they are the least protected. The crosswalk safety treatment toolboxes in this policy provide numerous options for enhancing pedestrian safety at uncontrolled and controlled crossings, respectively, with treatment selection based on the overall context of the crosswalk – including surrounding land uses, roadway characteristics, and user characteristics.

Figure 1 Marked Crosswalk Suitability Flowchart



3.2.1 Pedestrian Infrastructure Requirements

Locations that are found to be appropriate for crossing improvements should have existing pedestrian curb ramps. If none exist, new pedestrian curb ramps that meet current PROWAG standards are required to be constructed prior to the installation of a marked crosswalk.[1]

3.3 Exceptions to Criteria

In some cases, it may be reasonable to allow exceptions to the criteria identified above. Approval from the Traffic Engineer is required for exceptions to these criteria. Exceptions should be appropriately documented. Any situations that are not clearly defined in this guide should also be brought to the Traffic Engineer for review and determination. If the Traffic Engineer anticipates that a location may meet the 10 pedestrians per hour requirement, the above procedure does not preclude counts from being collected. Engineering judgment should be exercised in all situations. There will be locations that should or should not be marked due to other factors including frequency of marked crosswalks along a corridor and other corridor characteristics. Traffic Engineer or their designee may decide to perform additional studies to determine whether an existing crosswalk is still warranted. This study is to be conducted no sooner than 1 year from the installation date.

[1] "Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way."

Appendix A: Uncontrolled Crossing Treatment Guidance

FHWA's Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations (Chapter 4: Select Countermeasures) presents best practices for the installation of marked crosswalks at uncontrolled intersections and mid-block locations. Uncontrolled crossings require additional consideration during planning and design since traffic signals and stop signs are not provided to require motorists to stop – they must recognize the pedestrian and stop accordingly. Thus, providing appropriate enhancements to improve the visibility and safety of pedestrians crossing the street at an uncontrolled location is critical. ACCGov will refer to the most recent version of FHWA's guide to determine countermeasure treatments at specific locations. See the July 2018 version of this guide below:

Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

Select Countermeasure(s)

GUIDING PRINCIPLES

This section can help the agency select countermeasures based on information previously collected and assessed. The agency can use the following resources to select countermeasures:

» First, reference Table 1 to compare roadway and vehicle speed characteristics to countermeasure options.

» Then, reference Table 2 to compare crash types and other observed safety issues to countermeasure options.

» Review Appendix B for more information about countermeasure CRFs and CMFs.

Application of Countermeasures by Roadway Feature

Table 1 includes a comprehensive matrix and list of STEP pedestrian crash countermeasures suggested for application at uncontrolled crossing locations per roadway and traffic features. The countermeasures are assigned to specific matrix cells based on safety research, best practices, and established national guidelines. When a pedestrian crossing is established, the agency should review the countermeasure options in the cells before selecting the optimal group of crossing treatments. The agency should consider the previously obtained characteristics such as pedestrian volume, operational speeds, land use context, and other site features when selecting countermeasures.

The agency should also reference the MUTCD and other national, State, and local guidelines when making the final selection of countermeasures.

For example, the agency may evaluate a 5-lane road with no raised median, an AADT of 12,000, and a 35 mph posted speed limit. The matrix recommends the agency strongly consider high-visibility crosswalks, adequate lighting, and parking restrictions on the approaches. In addition, the agency should strongly consider adding advance Yield Here To (Stop Here For) Pedestrians signs and yield (stop) lines, pedestrian refuge islands, and PHBs. Other candidate treatments include implementing a Road Diet along the corridor and adding curb extensions.

Table 1 provides initial countermeasure options for various roadway conditions. Each matrix cell indicates possibilities that may be appropriate for designated pedestrian crossings. Not all of the countermeasures listed in the matrix cell should necessarily be installed at a crossing.

For multi-lane roadway crossings with vehicle AADTs exceeding 10,000, a marked crosswalk alone is typically insufficient (Zegeer, 2005). Under such conditions, more substantial crossing improvements (such as the refuge island, PHB, and RRFB) are also needed to prevent an increase in pedestrian crash potential.

Table 1. Application of pedestrian crash countermeasures by roadway feature.

Roadway Configuration	Posted Speed Limit and AADT								
	Vehicle AADT <9,000			Vehicle AADT 9,000–15,000			Vehicle AADT >15,000		
	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph	≤30 mph	35 mph	≥40 mph
2 lanes (1 lane in each direction)	❶ 2 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6	❶ 5 6 7 9	① 5 6 ❼ ❾	❶ 4 5 6 7 9	① 5 6 7 9	① 5 6 ❾
3 lanes with raised median (1 lane in each direction)	❶ 2 3 4 5	❶ ❸ 5 7 9	① ❸ 5 ❼ ❾	① 3 4 5	① ❸ 5 ❼ ❾	① ❸ 5 ❼ ❾	① ❸ 4 5 7 9	① ❸ 5 ❼ ❾	① ❸ 5 ❾
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	❶ 2 3 4 5 6 7 9	❶ ❸ 5 6 7 9	① ❸ 5 6 ❾	① 3 4 5 6 7 9	① ❸ 5 6 ❼ ❾	① ❸ 5 6 ❾	① ❸ 4 5 6 7 9	① ❸ 5 6 ❾	① ❸ 5 6 ❾
4+ lanes with raised median (2 or more lanes in each direction)	❶ ❸ 5 7 8 9	❶ ❸ 5 7 8 9	① ❸ 5 8 ❾	① ❸ 5 7 8 9	① ❸ 5 ❼ 8 9	① ❸ 5 8 ❾	① ❸ 5 ❼ 8 9	① ❸ 5 8 ❾	① ❸ 5 8 ❾
4+ lanes w/o raised median (2 or more lanes in each direction)	❶ ❸ 5 6 7 8 9	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 7 8 9	① ❸ 5 ❻ ❼ 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ ❼ 8 9	① ❸ 5 ❻ 8 ❾	① ❸ 5 ❻ 8 ❾

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)**

Refer to Chapter 4, 'Using Table 1 and Table 2 to Select Countermeasures,' for more information about using multiple countermeasures.

***It should be noted that the PHB and RRFB are not both installed at the same crossing location.*

This table was developed using information from: Zegeer, C.V., J.R. Stewart, H.H. Huang, P.A. Lagerwey, J. Feaganes, and B.J. Campbell. (2005). Safety effects of marked versus unmarked crosswalks at uncontrolled locations: Final report and recommended guidelines. FHWA, No. FHWA-HRT-04-100, Washington, D.C.; FHWA. Manual on Uniform Traffic Control Devices, 2009 Edition. (revised 2012). Chapter 4F, Pedestrian Hybrid Beacons. FHWA, Washington, D.C.; FHWA. Crash Modification Factors (CMF) Clearinghouse. http://www.cmfclearinghouse.org/; FHWA. Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE). http://www.pedbikesafe.org/PEDSAFE/; Zegeer, C., R. Srinivasan, B. Lan, D. Carter, S. Smith, C. Sundstrom, N.J. Thirsk, J. Zegeer, C. Lyon, E. Ferguson, and R. Van Houten. (2017). NCHRP Report 841: Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments. Transportation Research Board, Washington, D.C.; Thomas, Thirsk, and Zegeer. (2016). NCHRP Synthesis 498: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.

Safety Issues Addressed per Countermeasure

The results of the crash analysis, road safety audit, and/or stakeholder input provide the agency with a better understanding of the risk factors at uncontrolled crossing locations. The countermeasures listed in this guide can improve the visibility of crossing locations and reduce crashes, and they each address at least one additional safety concern associated with a higher risk of collision and/or severe injury. These additional safety issues include the following: excessive vehicle speed, inadequate conspicuity/visibility, drivers not yielding to pedestrians in crosswalks, and insufficient separation from traffic.

Table 2 shows the specific safety issues that each countermeasure may address. For example, the addition of PHBs has been consistently shown to improve motorist yielding by 90 percent or greater, when compared with no traffic control or warning type devices.

Table 2. Safety issues addressed per countermeasure.

	Safety Issue Addressed				
Pedestrian Crash Countermeasure for Uncontrolled Crossings	Conflicts at crossing locations	Excessive vehicle speed	Inadequate conspicuity/ visibility	Drivers not yielding to pedestrians in crosswalks	Insufficient separation from traffic
Crosswalk visibility enhancement	✓	✓	✓	✓	✓
High-visibility crosswalk markings*	✓		✓	✓	
Parking restriction on crosswalk approach*	✓		✓	✓	
Improved nighttime lighting*	✓		✓		
Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line*	✓		✓	✓	✓
In-Street Pedestrian Crossing sign*	✓	✓	✓	✓	
Curb extension*	✓	✓	✓		✓
Raised crosswalk	✓	✓	✓	✓	
Pedestrian refuge island	✓	✓	✓		✓
Pedestrian Hybrid Beacon	✓	✓	✓	✓	
Road Diet	✓	✓	✓		✓
Rectangular Rapid-Flashing Beacon	✓		✓	✓	✓

*These countermeasures make up the STEP countermeasure "crosswalk visibility enhancements." Multiple countermeasures may be implemented at a location as part of crosswalk visibility enhancements.

Using Table 1 and Table 2 to Select Countermeasures

Table 1 provides initial countermeasure options for various roadway conditions. Each matrix cell indicates possibilities that may be appropriate for designated pedestrian crossings. Not all of the countermeasures listed in the matrix cell should necessarily be installed at a crossing. Agency officials should also review safety issues referenced in Table 2, the surrounding land development context, pedestrian travel patterns, countermeasure effectiveness, and costs when considering what countermeasure(s) are best suited for the crossing.

A marked crosswalk is useful to show pedestrians and drivers preferred crossing locations. However, for multi-lane roadway crossings where vehicle AADTs are in excess of 10,000, a marked crosswalk alone is typically not sufficient (Zegeer, 2005). Under such conditions, more substantial crossing improvements are also needed to prevent an increase in pedestrian crash potential. Examples of more substantial treatments include the refuge island, PHB, and RRFB. Refer to the symbols used in Table 1 for when a marked crosswalk should be paired with one or more of the other countermeasures described.

To further increase visibility of pedestrian crossings, agencies often integrate multiple countermeasures. For example, the Pedestrian Hybrid Beacon is often installed in conjunction with advance stop markings and signs. Also, Road Diets present opportunities for adding pedestrian refuge islands and curb extensions at key crossing locations. Agencies should consider roadway geometry and the MUTCD when integrating multiple countermeasures.

Countermeasure Descriptions

This subsection describes considerations for implementation of each of the countermeasures included in Tables 1 and 2. The agency can review other guidance—such as the MUTCD, the AASHTO Pedestrian Guide, and/or agency policies and practices—to identify and select countermeasures for implementation.

Crosswalk visibility enhancements

High-visibility crosswalks may include a variety of crosswalk striping designs, such as ladder, continental, or bar pairs. A high-visibility crosswalk is much easier for an approaching motorist to see than the traditional parallel lines. The agency should strongly consider providing high-visibility crosswalks at all established midblock pedestrian crossings. The high-visibility markings may be supplemented with the pedestrian crossing warning signs (sign W11-2 in the MUTCD) on each approach to the crosswalk. MUTCD Section 2C.50—*Non Vehicular Warning Signs* and Section 3B.18—*Crosswalk Markings* provide additional information.

The agency should also strongly consider implementing parking restrictions on the crosswalk approach at all established

pedestrian crossings (both approaches) so there is adequate sight distance for motorists on the approaches to the crossings and ample sight distance for pedestrians attempting to cross. The minimum setback is 20 feet where speeds are 25 mph or less, and 30 feet between 26 mph and 35 mph. If this cannot be done, the curbs should be "bulbed out" to allow the pedestrian to see past the parked vehicle along the street. Adjacent bus stops should be placed downstream of the crosswalk and not on the crosswalk approach.

The agency should consider providing an appropriate level of lighting at all established pedestrian crossings. Consideration should be given to placing the lights 10 to 15 feet in advance of the crosswalk on both sides of the street and on both approaches to better light the front of the pedestrian and avoid silhouette lighting (where possible).

In-street Pedestrian Crossing sign

In-street signs are placed in the middle of the road at a crossing and are often used in conjunction with refuge islands. These signs may be appropriate on 2-lane or 3-lane roads with speed limits of 30 mph or less. On higher-speed, higher-volume, and/or multilane roads, this treatment may not be as visually prominent; therefore, it may be less effective (drivers may not notice the signs in time to stop in advance of the crosswalk). For such roadways, more robust treatments will be needed. When making the choice to use these signs, the agency should consider making a plan and securing a funding source for the maintenance and prompt replacement of damaged signs. The MUTCD permits in-street pedestrian signs for installation on centerlines and along lane lines. MUTCD Section 2B.12—*In-Street and Overhead Pedestrian Crossing Signs* contains additional information about these signs.

Advance Yield Here To (Stop Here For) Pedestrians sign and yield (stop) line

Advance Yield Here To (Stop Here For) Pedestrians signs are placed between 30 and 50 feet in advance of the marked crosswalk along with the stop line or "shark's teeth" yield line. This is a candidate treatment for any uncontrolled pedestrian crossing, and should be strongly considered for any established pedestrian crossing on roads with four or more lanes and/or roads with speed limits of 35 mph or greater. Stop Here For Pedestrians signs should only be used where the law specifically requires that a driver must stop for a pedestrian in a crosswalk. MUTCD Section 2B.11—*Yield Here To Pedestrians Signs and Stop Here For Pedestrians Signs* and Section 3B.16—*Stop and Yield Lines* contain additional information.

Curb extension

A curb extension or "bulbout" extends the sidewalk or curb line into the street or parking lane, thus reducing the street width and improving sight distance between the driver and pedestrian. A curb extension is a candidate treatment for any uncontrolled pedestrian crossing, particularly where parking lanes exist. Curb extensions should not extend into paths of travel for bicyclists.

Raised crosswalk

Raised crosswalks function as an extension of the sidewalk and allow a pedestrian to cross the street at a constant grade. A raised crosswalk is typically a candidate treatment on 2-lane or 3-lane roads with speed limits of 30 mph or less and AADTs below 9,000. Raised crossings are generally

avoided on truck routes, emergency routes, and arterial streets. Drainage needs to be accommodated. See MUTCD Section 3B.25—*Speed Hump Markings* for additional information about markings that can be used alongside raised crosswalks.

Pedestrian refuge island

A pedestrian island is typically constructed in the middle of a 2-way street and provides a place for pedestrians to stand and wait for motorists to stop or yield. This countermeasure is highly desirable for midblock pedestrian crossings on roads with four or more lanes, and should be considered for undivided crossings of four or more lanes with speed limits of 35 mph or greater and/or AADTs of 9,000 or greater. Median islands may also be a candidate treatment for uncontrolled pedestrian crossings on 3-lane or 2-lane roads, especially where the street is wide and/or where vehicle speed or volumes are moderate to high. Consideration should be given to creating a two-stage crossing with the island to encourage pedestrians to cross one direction of traffic at a time and look towards oncoming traffic before completing the second part of the crossing. The minimum pedestrian refuge island width is approximately 6 feet. MUTCD Section 3B.10—*Approach Markings for Obstructions*, Section 3B.18—*Crosswalk Markings*, and Section 3B.23—*Curb Markings* provide additional information.

Pedestrian Hybrid Beacon (PHB)

A PHB head consists of two red lenses above a single yellow lens, and is used in conjunction with pedestrian signal heads installed at each end of a marked crosswalk. Figure 6 shows a rendering of a PHB. The PHB has been referred to as the High-Intensity Activated crossWalK beacon (HAWK), but the MUTCD refers to this device as the PHB.

Unlike a traffic signal, the PHB rests in 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 control vehicular traffic while the pedestrian signal heads indicate the pedestrian walk interval and a pedestrian clearance interval.

The PHB should meet the installation guidelines—based on speed, pedestrian volume, vehicular volume, and crossing length—as provided in Section 4F.01 of the MUTCD (See Figure 4F-1 for speeds of 35 mph or less; Figure 4F-2 for speeds greater than 35 mph). Research indicates that PHBs are most effective at roads with three or more lanes that have AADTs above 9,000. PHBs should be strongly considered for all midblock crossings where the roadway speed limits are equal to or greater than 40 mph. Refer to Table 1 for other conditions where PHBs should be strongly considered. It should be noted that the PHB and RRFB are not both installed at the same crossing location.

PHBs have also been installed successfully at intersections under certain conditions. Since the current MUTCD guidance is to locate PHBs at least 100 feet away from an intersection, engineering judgment/ engineering study must be carefully applied if considering an installation at an intersection.

Figure 6. Rendering of a PHB.

Source: FHWA STEP Countermeasure Tech Sheets.
(Note: Drawing not to scale.)

Road Diet

A road diet reconfigures the roadway. A frequently-implemented Road Diet involves converting a 4-lane, undivided roadway into a 3-lane roadway with a center turn lane. This is a candidate treatment for any undivided road with wide travel lanes or multiple lanes that can be narrowed or repurposed to improve pedestrian crossing safety.

After conducting a traffic analysis to consider its feasibility, the agency may determine that a Road Diet is a good candidate for use on roads with four or more lanes and traffic volumes of approximately 20,000 or less. In some cases, agencies have successfully implemented Road Diets on roads with AADTs of up to 25,000. By reducing the width of the roadway, pedestrians benefit from shorter crossing distances and often bike lanes or streetscape features can be added. Road Diets are often effectively accomplished during pavement resurfacing.

Rectangular Rapid-Flashing Beacon (RRFB)

An 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.

RRFBs may be used to enhance the conspicuity of standard pedestrian and school crossing warning signs at uncontrolled marked crosswalks. 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). The RRFB's irregular flashing pattern pattern is unlit when not activated and can be activated manually by pedestrians using a push button or passively by a pedestrian detection system. This device is not currently included in the MUTCD, but FHWA has issued Interim Approval 21 (IA-21) for the use of the RRFB. State and local agencies must request and receive permission to use this interim approval before they can use the RRFB. IA-21 provides additional information about the conditions of use, including dimensions, placement, and flashing requirements. IA-21 does not provide guidance or criteria based on number of lanes, speed, or traffic volumes.

The RRFB is a treatment option at many types of established pedestrian crossings. Research indicates RRFBs can result in motorist yielding rates as high as 98 percent at marked crosswalks. However, yielding rates as low as 19 percent have also been noted. Compliance rates varied most per the city location, posted speed limit, crossing distance, and whether the road was one- or two-way.[1] RRFBs are particularly effective at multilane crossings with speed limits less than 40 mph. Consider the PHB instead of RRFBs for roadways with higher speeds. Table 1 provides specific conditions where practitioners should strongly consider the PHB instead of the RRFB.

[1]*Fitzpatrick, K., M. Brewer, R. Avelar, and T. Lindheimer.* Will You Stop for Me? Roadway Design and Traffic Control Device Influences on Drivers Yielding to Pedestrians in a Crosswalk with a Rectangular Rapid-Flashing Beacon. *Report No. TTI-CTS-0010. Texas A&M Transportation Institute, College Station, Texas. June 2016.* https://static.tti.tamu.edu/tti.tamu.edu/documents/TTI-CTS-0010.pdf