

Section 5.2

TREATMENTS FOR PEDESTRIAN CROSSWALKS AT MIDBLOCK AND UNSIGNALIZED INTERSECTIONS

5.2.1 PURPOSE

This section establishes criteria and guidelines for the consistent installation and operation of pedestrian treatments at midblock and unsignalized intersections on the State Highway System. These treatments include marked pedestrian crosswalks, signs, traffic control devices, and other measures. Information on pedestrian crosswalks at roundabouts can be found in [*FDOT Design Manual \(FDM\), Chapter 213, Modern Roundabouts*](#).

5.2.2 GENERAL

- (1) A crosswalk facilitates pedestrian access and concentrates pedestrian crossing activity to a safe and predictable location. The intention of pedestrian treatments at midblock and unsignalized intersections is to improve pedestrian connectivity and reduce instances of pedestrians crossing at unpredictable locations. This can be achieved by reducing confusion and removing measurable risk to pedestrians and other road users.
- (2) Pedestrian crosswalks applied at midblock and unsignalized intersections may be a suitable treatment where documented pedestrian demand exists. For these locations, the distance to the nearest controlled intersection crossing would result in significant out-of-direction travel for pedestrians, increasing the risk for unexpected crossings and crashes.
- (3) Adding supplemental signage can improve safety and compliance in locations where a marked pedestrian crosswalk has been installed, including locations with or without traffic control devices. Other crosswalk design treatments including refuge islands, curb extensions, lighting, and raised crosswalks could also be considered to support pedestrian visibility and safety. **Figure 5.2-11, Midblock Crosswalk and Unsignalized Intersection Selection Guidance Matrix** illustrates the combined use of many of these treatments.
- (4) Marked crosswalks and pedestrian treatments that are well located and thoughtfully designed can serve as a mechanism for improving pedestrian connections, community walkability, and pedestrian safety. However, they are not suitable for all locations. Suitability can be determined by careful evaluation regarding expected levels of pedestrian crossing demand, safety characteristics of the crossing location, and design considerations for the crossing control type.

5.2.3 DEFINITIONS

Alternative Pedestrian Crossing Location. Any controlled location with a STOP sign, traffic signal, or a grade-separated pedestrian bridge or tunnel that accommodates pedestrian movement across the subject roadway.

Average Day. A day representing traffic volumes normally and repeatedly found at a specific location. Weekdays having volumes influenced by employment or weekend days having volumes influenced by entertainment or recreation represent two types of an Average Day.

Context Classification. Description of the land use and transportation context where a roadway is found. Roadways are designed to match the characteristics and demands defined by the appropriate Context Classification. See [FDOT Design Manual \(FDM\), Chapter 200](#) for additional information.

Controlled Approach. All lanes of traffic moving toward an intersection or a midblock location from one direction (including any adjacent parking lane) that are controlled by a sign, signal, marking, or other device.

In-Roadway Warning Lights. Special types of highway traffic control devices installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop.

Marked Crosswalk. Any portion of a roadway segment including an intersection or midblock distinctly indicated as a pedestrian crossing by pavement marking lines on the surface which might be supplemented by contrasting pavement structure, style, or color. Marked crosswalks serve to provide guidance, define and delineate crossing paths, define intersections, and designate a stopping location when motorists are required to stop in the absence of a stop line.

Midblock Crossing. Any location where a marked crosswalk (signalized or unsignalized) is proposed or already exists between intersections.

Midblock Traffic Control Signal. Any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed at midblock crosswalk.

Passive Pedestrian Detection. Automated pedestrian detection systems that can detect the presence and direction of pedestrians and activate the traffic control device without any required action by the pedestrian.

Pedestrian Attractor. A residential, commercial, office, recreational, or other land use that is expected to be an end destination for pedestrian trips.

Pedestrian Generator. A residential, commercial, office, transit, recreational or any other land use that serves as the starting point for a pedestrian trip.

Pedestrian Hybrid Beacon (PHB). A special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk. It is also known as high-intensity activated crosswalk (HAWK).

Rectangular Rapid Flashing Beacon (RRFB). A traffic control device consisting of two rapidly and alternately flashing rectangular yellow indications having LED array-based pulsing light sources that function as a warning beacon.

Shared Use Path. A multi-user path outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared use paths are used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers), bicyclist and other authorized motorized and non-motorized users.

Two-Stage Pedestrian Crossing. A marked crosswalk that is controlled by RRFB, PHB or midblock traffic signal designed to allow pedestrians to cross each half of the roadway independently, using a median refuge island for pedestrians to wait before completing the crossing. A two-stage pedestrian crossing may have a lesser impact to vehicle delay (compared to a single crossing) since the signal serves each direction independently while the median serves as a refuge area for pedestrians to wait prior to completing their crossing.

Uncontrolled Approach. All lanes of traffic moving toward an intersection or a midblock location from one direction (including any adjacent parking lane) that are not controlled by any sign, signal, marking, or other device.

Unmarked Crosswalk. The legal crossing area at an intersection connecting opposite sides of the roadway that does not have painted lines, words, or images.

5.2.4 PROCEDURES

The procedures below are applicable for all crosswalks at midblock and unsignalized intersections.

- (1) The appropriate District Traffic Operations Office handles all submitted requests for evaluation of marked crosswalks or other treatments at a midblock or unsignalized intersection (including driveways).
- (2) Special emphasis crosswalk markings and advance warning signs shall be installed for all midblocks. This will also apply for all uncontrolled approaches with crosswalks.
- (3) Additional treatments, such as pavement markings, signs, signals or other countermeasures may be installed when meeting the criteria listed in **Section 5.2.5**.

- (4) A study or warrant analysis shall be required for the use of a midblock traffic control signals or PHBs for existing marked crosswalks at midblock or unsignalized intersections. Refer to **Section 5.2.5** for more detailed guidance.
 - (5) For new marked crosswalks, an engineering study is required in accordance with **Section 5.2.6**. The engineering study shall include the pedestrian-vehicle crash history and the proposed treatments shall meet the criteria listed in **Section 5.2.5**.
 - (6) For new marked crosswalks, the following minimum safety considerations should be evaluated:
 - (a) Adequate stopping sight distance at marked crosswalk
 - (b) Sidewalk to connect crosswalk with established pedestrian generators and attractors
 - (c) Illumination at crosswalk
 - (d) For a roadway with five (5) or more lanes, a refuge island or raised median to facilitate a two-stage crossing
 - (e) Appropriate bus stop location to minimize conflicts with transit vehicles
- For further safety improvements that should be considered, see **Section 5.2.7**.
- (7) Prior to the approval of a new marked crosswalk with treatments, or additional treatment to an existing marked crosswalk, the District Traffic Operation Office should coordinate with the local maintaining agency to determine the eligibility of adding the newly installed treatments to the maintenance and compensation agreement.
 - (8) Any marked crosswalk or other treatment proposed for a midblock or unsignalized intersection on the State Highway System shall be reviewed and approved by the District Traffic Operations Engineer (DTOE) prior to installation.

5.2.5 SELECTION CRITERIA

5.2.5.1 Criteria for Marked Crosswalk

Placement of marked crosswalks should be based upon a strategic plan and requires an engineering study to validate the need. Marked crosswalks should not be used indiscriminately at midblock and unsignalized intersections. An engineering study (see **Section 5.2.6**) shall address, but not be limited to, pedestrian-vehicle crash history, proximity to significant generators and attractors, minimum levels of pedestrian demand, and minimum location characteristics. Listed below are the criteria for placement of marked crosswalks:

(1) Proximity to significant generators and attractors

Any midblock or unsignalized intersection under consideration for a marked crosswalk should exhibit either of the following information:

- (a)** A well-defined spatial pattern of pedestrian generators, attractors, and flow (across a roadway) between them; or
- (b)** A well-defined pattern of existing pedestrian crossings.

Identification of pedestrian generators and attractors shall be documented in an engineering study to illustrate potential pedestrian routes in relation to any proposed marked crosswalk locations, as described in **Section 5.2.6**.

(2) Recommended Levels of Pedestrian Demand

Pedestrian data for an average day shall be collected with the method described in **Section 5.2.6**.

- (a)** The following recommended thresholds should be required when considering a new marked crosswalk:
 - 20 or more pedestrians during a single hour (any four consecutive 15-minute periods) of an average day; or
 - 18 or more pedestrians during each of any two hours of an average day; or
 - 15 or more pedestrians during each of any three hours of an average day.
- (b)** A pedestrian volume demand threshold is not needed for the following:
 - Pedestrian crosswalks within a school zone
 - Pedestrian crosswalks under specific roadway context classification for posted speed of 35 MPH or less. These include the following Context Classifications:
 - C2T Rural Town Context Classification zone
 - C4 Urban General Context Classification zone
 - C5 Urban Center Context Classification zone
 - C6 Urban Core Context Classification zone

(c) Crosswalks threshold at midblock or unsignalized intersection connecting a **SHARED USE PATH**

In order to promote the use of shared use paths and reduce the impacts roadway crossings can create for pedestrians and bicyclists, crossing locations connecting a shared use path on each side of a roadway can use the following thresholds.

- In locations where the conditions in **Section 5.2.5.1-(2)b** are not met, a 50 percent reduction may be applied to the recommended pedestrian threshold in **Section 5.2.5.1-(2)a**.

Check with local strategic plan when determining the location for installing these types of marked crosswalk.

(3) Minimum Location Characteristics

- (a) A minimum vehicular volume of 2,000 Average Daily Traffic (ADT) along the roadway segment.
- (b) Minimum distance to nearest alternative crossing location is 300 feet per the [FDOT Design Manual \(FDM\), Chapter 222, Pedestrian Facility](#).

A proposed crossing location that falls between 100 and 300 feet from an alternative existing crossing may be considered if it is more practical for pedestrian use; this justification must be documented in the engineering study.

- (c) The proposed location must be outside the influence area of adjacent signalized intersections, including the limits of the auxiliary turn lanes.

Where an adjacent intersection is signalized, the design must ensure that the ends of standing queues do not extend to the proposed marked crosswalk location.

5.2.5.2 Criteria for Beacons and Signals

(1) **Yellow Flashing Beacons and RRFB**

Use of flashing beacons shall be limited to the roadways with the following conditions:

- (a) A marked special emphasis crosswalk
- (b) Four (4) or fewer through lanes
- (c) Posted speed limit of 35 MPH or less

For locations with five (5) lanes, a refuge island or raised median may be installed at the center of the roadway to create a four (4) through lane facility. A refuge island shall be included on Two-Way Left Turn Lanes.

Overhead flashing beacons and RRFB are preferred to be used for locations with Four (4) lanes divided, or Five (5) lane roadways with a median refuge island.

For locations that do not meet these criteria but still prefer the installation of an RRFB, a variation must be submitted to the Central Office Traffic Operations Office for review. For these locations, the following information must be submitted:

- (a) AADT
- (b) Sight Distance
- (c) Speed Data
- (d) Supplemental Information including location description and observations
- (e) Crash Data

(2) Pedestrian Hybrid Beacon (PHB)

A PHB should not be installed at an intersection or a driveway. A minimum distance of 100 feet from side streets or driveways controlled by signal, stop, or yield signs should be maintained when installing a PHB.

For locations within 100 feet from the side streets or driveways controlled by signal or stop sign, engineer of record shall address additional treatments to reduce conflict risk between pedestrians and vehicles. These additional treatments may include blank-out signs, static signs, in-roadway lights, R1-5b/R1-5c, R1-6a and any other treatments. This needs to be approved by the DTOE prior to the installation.

The following conditions may be considered for the installation of a PHB and shall be documented in the engineering study.

- (a) When a midblock traffic control signal is not justified under [Chapter 4C of the MUTCD](#) signal warrants and when gaps in traffic are not adequate to permit pedestrians to cross
- (b) When the speed of vehicles approaching the location on the major street is too high to permit pedestrians to cross
- (c) When pedestrian delay is excessive

PHBs shall meet [Chapter 4F of the MUTCD](#) PHB volume guidance. This guidance is treated as warrants in Florida and summarized in [Figure 5.2-1](#) and [Figure 5.2-2](#).

In an urban corridor under context classification C4, C5, and C6, with a site location that warrants a PHB in accordance to the criteria in [Section 5.2.4](#), the PHB may be substituted with a midblock traffic control signal using [Warrant 8 of the MUTCD, Roadway Network](#).

(3) Midblock Traffic Control Signal

Traffic control signals at midblock crosswalks shall meet a minimum distance of 300 feet from side streets or driveways controlled by a signal, stop, or yield sign.

For midblock crosswalks that are greater than 300 feet from the nearest signalized intersection, its distance to adjacent signals and availability of adequate gaps for pedestrian crossing shall also be considered to determine whether the signal is needed for safe pedestrian crossing.

Traffic Control Signals at midblock crosswalks shall meet [Warrant 4 of the MUTCD, Pedestrian Volume](#). [Figure 5.2-1](#) and [Figure 5.2-2](#) summarize this warrant. This warrant includes the following reductions in minimum Pedestrian Per Hour (PPH) requirement:

- (a) When the 15th percentile crossing speed is less than 3.5 feet per second, the pedestrian volume that crosses the major street can be reduced as much as 50 percent.
- (b) When the 85th percentile speed on the major street exceeds 35 mph or when the area of the midblock crossing is within the built-up area of an isolated community having a population of less than 10,000, the pedestrian volume that crosses the major street can be reduced by 30 percent.

Combining both pedestrian volume reductions of 30 and 50 percent to a specific location is allowed where it meets the criteria listed above.

Information on requirements for traffic control signal at intersections can be found in [Section 3.3](#) of the *TEM*.

Figure 5.2-1. Guidelines for the Installation of Pedestrian Treatments on Low-Speed Roadways

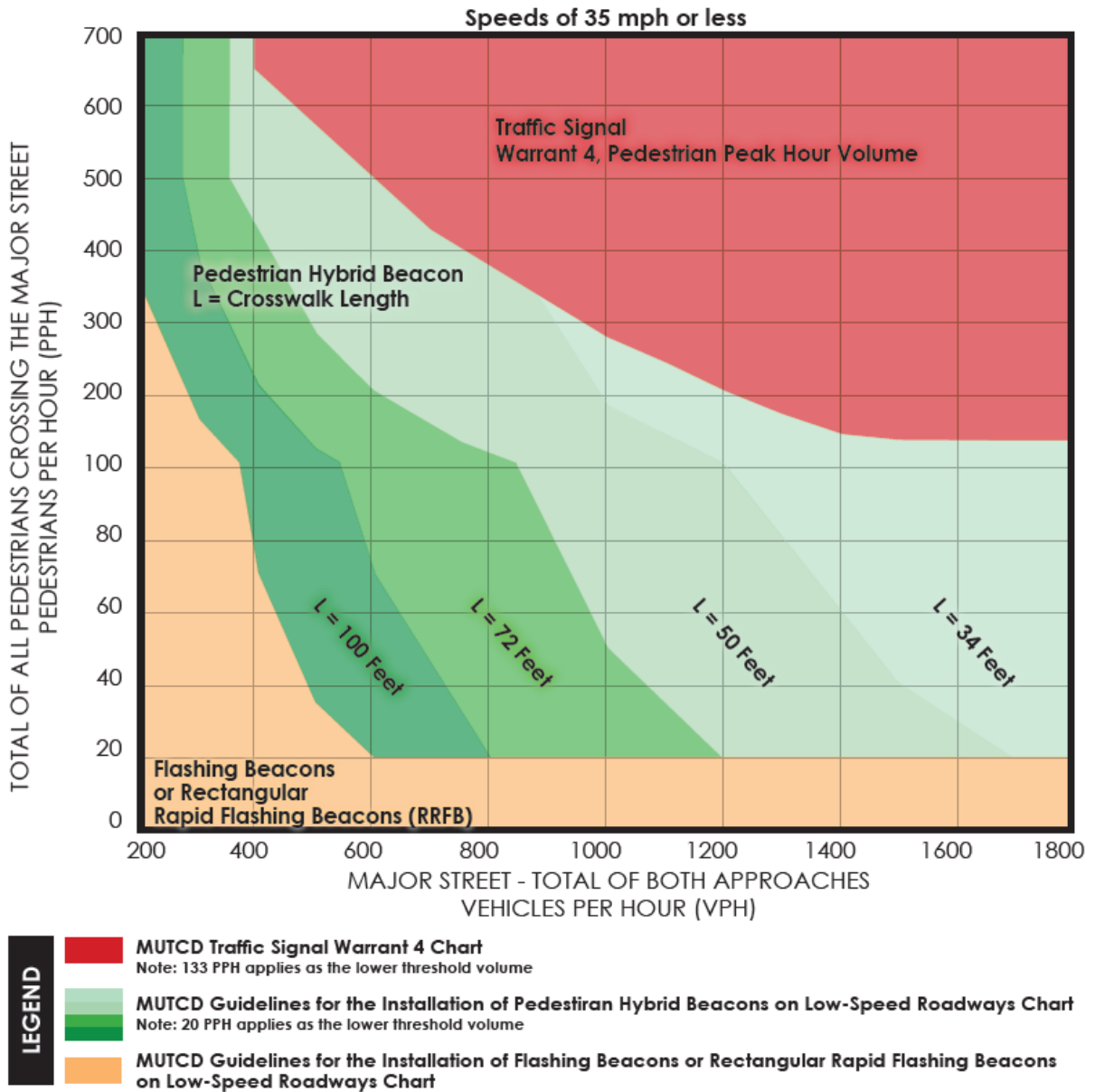
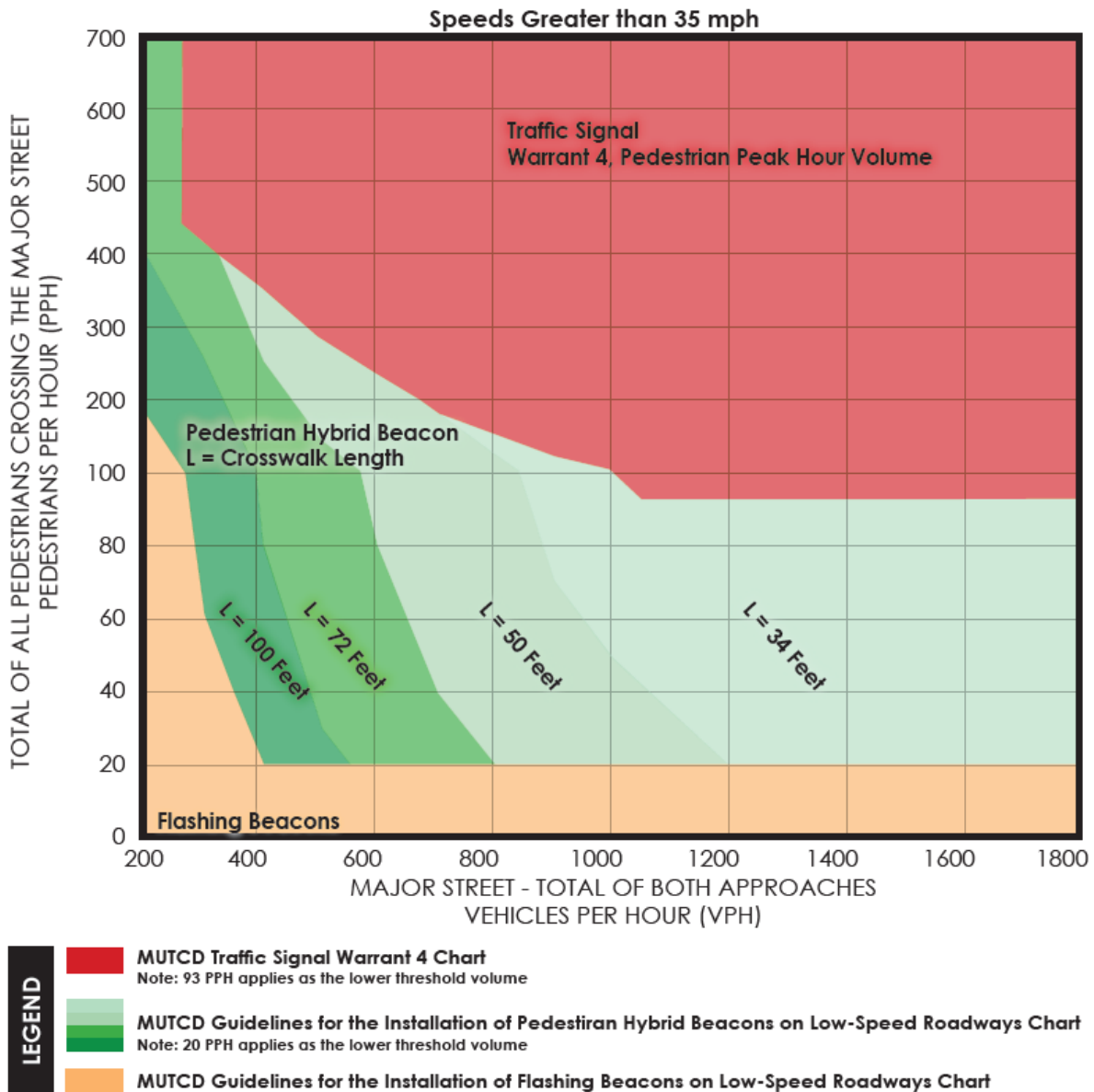


Figure 5.2-2. Guidelines for the Installation of Pedestrian Treatments on High-Speed Roadways



5.2.6 ENGINEERING STUDY

Perform an engineering study before the installation of a marked pedestrian crosswalk or traffic control device at a midblock location or unsignalized intersection. Criteria for selecting the specific treatment(s) includes the pedestrian volumes and crossing difficulty, as documented in the study. In locations where the crosswalks experience

high pedestrian volumes, a pedestrian treatment such as a traffic control device may be an appropriate installation.

The following traffic control devices must satisfy the **MUTCD** and FDOT Warrants as identified in the criteria provided in **Section 5.2.5**:

- (1) Midblock Traffic control signal (for high pedestrian volume)
- (2) PHB (for low pedestrian volume)

Additionally, pedestrian actuated warning devices including RRFBs, pedestrian flashing beacons, and in-roadway warning lights may be used. Recommendations for installation of these devices are in **Section 5.2.7**. The engineering study shall include these documented uses.

An engineering study for pedestrian treatments must include, at a minimum, the following information:

- (1) Field data to demonstrate the need for a marked crosswalk based upon minimum pedestrian volumes (except as described in **Section 5.2.5.1** and availability of any alternative crossing locations that satisfy the criteria described in **Section 5.2.5**).

Data collection should be based upon pedestrian volumes observed crossing the roadway outside a crosswalk at or in the vicinity of the proposed location, or at an adjacent (nearby) intersection. A bicyclist can be counted as a pedestrian if appropriate for the crossing.

The [Department's Manual on Uniform Traffic Studies \(MUTS\)](#) provides additional information on obtaining pedestrian group size and vehicle gap size field data for use in making assessments of opportunities for safe crossings at midblock and unsignalized intersections.

- (2) Field data for estimating individual pedestrian walking speeds, pedestrian speed cumulative curve, and the 15th percentile pedestrian crossing speed. The [Department's Manual on Uniform Traffic Studies \(MUTS\), Chapter 9](#) provides additional information on the procedure and method for calculating the parameters of pedestrian walking speed.
- (3) Potential links between pedestrian generators and attractors. Generators and attractors should be identified over an aerial photograph to illustrate potential pedestrian routes in relation to any proposed marked crosswalk location. This information is required for establishing the proposed crossing location or to confirm existing pedestrian crossing patterns.
- (4) All safety considerations as described in **Section 5.2.4** with respect to stopping sight distances, illumination levels, and proximity to intersection conflict areas.

- (5) The proposed crossing location and corresponding signing, marking, and signal treatments (if applicable). A schematic layout should be provided over aerial photography or survey to show locations of signs, markings, and other treatments in proximity to existing traffic control devices.

Treatments are dependent upon the site context, vehicle operating speeds, roadway cross-section, pedestrian volumes, and other variables. Treatments may include consideration of traffic signals or other warning devices to support pedestrian visibility and driver yielding. Other treatments such as median refuge areas, curb extensions, raised crosswalks, and supplemental signing and markings may also be applicable at some locations to support reduced crossing distance and enhanced pedestrian safety. See **Section 5.2.7** for discussion of treatment options and guidance on treatment selection.

- (6) Any pedestrian-vehicle crash history within the vicinity of the proposed crosswalk that has occurred based upon a minimum of three years of data. Document the number and nature of any pedestrian-vehicle conflicts based on field observations.
- (7) Transit stop activity data and the location of transit stops within the vicinity of the proposed crosswalk, as applicable.

Alternative analysis can be conducted at adjacent intersection and midblock locations through an Intersection Control Evaluation (ICE) procedure. Intersection and Midblock crosswalk's needs might be identified and resolved by considering alternative control strategies that meets the projects purpose and need. The FDOT [Manual on Intersection Control Evaluation](#) provides guidelines on these alternative designs.

5.2.7 TREATMENT OPTIONS

5.2.7.1 Pavement Markings

(1) Marked Pedestrian Crosswalk

This is the minimum treatment for a midblock or intersection crossing. A marked pedestrian crosswalk warns motorists when to expect pedestrian crossings and indicates preferred crossing locations for pedestrians. Marked crosswalks are desirable at some high pedestrian volume locations to guide pedestrians along a preferred walking path. The [Department's Standard Plans, Index No. 711-001](#) and [FDOT Design Manual \(FDM\), Chapter 230](#) provides additional information on typical design of marked crosswalks at intersections and midblock locations. Marked pedestrian crosswalks can be a special emphasis crosswalk or standard crosswalk design. For guidance on design criteria, adhere to [FDOT Design Manual \(FDM\), Chapter 230](#).

(a) Special Emphasis Crosswalk

Marked crosswalks at unsignalized intersection (uncontrolled approach) and midblock crossing require a special emphasis crosswalk. Follow the procedures identified in **Section 5.2.4** prior to installation. At locations where the minor road is yield controlled, modify the approach to a stop-controlled approach prior to installation of the special emphasis crosswalk.

(b) Standard Crosswalk

At an unsignalized intersection-controlled approach, the crosswalk marking must comply with [FDOT Design Manual \(FDM\), Chapter 230](#) design criteria.

(2) Pavement W11-2 Marking

The pavement **W11-2** marking can be utilized to supplement signage at a marked pedestrian crossing where high vehicular volumes and speeds have been observed. This observation shall be documented in the engineering study and approved by the DTOE. These should be considered in the following:

- (a)** Multi-lane 45 MPH or more
- (b)** Rural two-lane 50 MPH or more
- (c)** Crosswalks with sight distance issues. For example, obstructions, trees and parking.
- (d)** History people not yielding

Consider the following factors when installing pavement **W11-2** markings at midblock or unsignalized intersections:

- (a)** Align pavement **W11-2** markings in the center of each lane.
- (b)** All pavement **W11-2** markings shall be 15 feet in length.
- (c)** All pavement **W11-2** markings shall be pre-formed thermoplastic.
- (d)** Each marking shall have contrast for both asphalt and concrete pavement.
- (e)** Place no more than one set of markings (Pavement **W11-2** Markings or Pavement Word Markings).
- (f)** Install the pavement **W11-2** marking in a single line across the roadway. Do not stagger.

Figure 5.2-3. Pavement W11-2 Marking



(3) Pavement Word Markings

Information on the use of Pavement Word Markings can be found in **Section 4.2** of the *TEM*.

5.2.7.2 Signs

The purpose of the following pedestrian signs is primarily to improve the yield and stopping behavior of drivers for pedestrian safety at midblock crosswalks and unsignalized intersections. For sign placement details, see [FDOT Design Manual \(FDM\), Chapter 230, Signs and Pavement Marking](#).

For enhancing sign conspicuity, the use of highlighted signs or flashing beacons arranged vertically or horizontally is permitted in accordance with [Section 2A.15 of the MUTCD](#). The flashing method may be either simultaneously or alternatively programmed. Flashing either highlighted signs or traditional beacons may be actuated and coordinated with RRFB signs and other treatments.

(1) STOP HERE FOR PEDESTRIANS Sign (*R1-5b* and *R1-5c*)

To provide additional emphasis of the requirement to stop for pedestrians in the marked crosswalk, a stop line and associated STOP HERE FOR PEDESTRIANS sign (*R1-5b* and *R1-5c*) may be used.

If a stop line is provided, the corresponding STOP HERE FOR PEDESTRIANS (*R1-5b* and *R1-5c*) sign shall be provided. [Section 2B.11 of the MUTCD](#) provides additional guidance on the placement of the *R1-5* series sign.

If used, the stop line should be placed 40 feet in advance of the marked crosswalk.

When used, parking should be prohibited in the area between the stop line and the marked crosswalk. Use a solid lane line between the stop line and crosswalk.

The **R1-5b** and **R1-5c** signs shall be used with the advanced warning **W11-2** and **W16-7P** signs.

The **R1-5b** and **R1-5c** signs shall not be used in combination with the traffic signal or PHB.

**Figure 5.2-4. Pedestrian Crossing Signs
(R1-5b and W11-2 with an RRFB)**



(2) PEDESTRIAN CROSSING Sign (W11-2)

A PEDESTRIAN CROSSING (**W11-2**) warning sign with supplemental AHEAD plaque (**W16-9P**) shall be used in combination with the **R1-5b** or **R1-5c** sign.

(3) STOP FOR PEDESTRIANS IN CROSSWALK Sign

The STOP FOR PEDESTRIANS IN CROSSWALK sign may be used at locations where there is non-compliant stopping for pedestrians at an existing mid-block crosswalk, as follows:

- (a) One sign in each direction
- (b) Within 100 feet in advance of the crosswalk
- (c) Shall not interfere with other required signing

(4) In-Street Sign (*R1-6a*)

In-street signs (*R1-6a*) are useful on low speed roadways to remind road users of laws regarding right-of-way at a midblock or unsignalized pedestrian crosswalk. In-street signs (*R1-6a*) can only be implemented in roadways with four (4) or less lanes and with a posted speed limit of 35 MPH or less.

The use of *R1-6a* on lane lines may be substituted with tubular markers to reduce the maintenance and replacement cost due to periodic impacts from vehicular traffic. To provide additional emphasis for the pedestrian crossing and to provide a channelizing and potentially calming effect on vehicle traffic, one or more tubular markers may be used on the center line, lane lines, or edge lines at a mid-block pedestrian crossing. See [FHWA Letter Of Interpretation](#) issued on August 3, 2020 with guidance and illustrations.

If used, the in-street signs (*R1-6a*) shall be placed in the roadway at the marked crosswalk location on the center line, on a lane line, or on a median island as allowed by [Section 2B.12 of the MUTCD](#).

[Department's Standard Plans, MSP Index No. 700-7](#) provides design details for the installation of in-street signs (*R1-6a*).

The in-street sign (*R1-6a*) shall not be post-mounted on the left-hand or right-hand side of the roadway.

The in-street sign (*R1-6a*) should not be used at the following locations to educate road users about the state law: 1) areas in advance of a marked crosswalk, 2) areas along a highway that are not near a crosswalk.

**Figure 5.2-5. Pedestrian Crossing Signs
(*R1-6a* and *W11-2*)**



(a) In-street Sign Gateway Effect

Approval by the FDOT Central Office STOE and the [MUTCD Request to Experimentation 2\(09\)-142\(e\) R1-6a Gateway Effect](#) is required prior to installing the gateway effect configuration.

The in-street gateway signs shall be placed in the roadway at the crosswalk on the edge line or gutter pan, on the lane line if applicable, and on the center line or median island if applicable for both approaches.

The gateway effect shall meet all criteria for a typical in-street sign (**R1-6a**) application.

(5) Portable Changeable Message Sign (PCMS)

PCMS are temporary traffic control devices installed for temporary use with the flexibility to display a variety of messages.

(a) A PCMS shall be installed for all new RRFB, PHB, flashing yellow beacon and midblock traffic control signal at midblock crosswalk.

(b) A PCMS shall be displayed with the following safety message

- NEW SIGNAL XX/XX
- PREPARED TO STOP

Practitioners shall refer to the [FDOT Library of Approved Safety Message for DMS](#) webpage for example of the PCMS message.

(c) A PCMS shall be installed two weeks (14 days) prior to open to traffic and be installed for at least one week (7 days).

(d) District shall notify local law enforcement and local agency 14 days before the PCMS is installed.

(e) No reviews are required for the PCMS installation.

5.2.7.3 Beacons (Signal Warrant Analysis Not Required)

For locations not warranted for traffic control signals or PHBs, alternative pedestrian-actuated warning devices presented in this section may be considered to provide additional emphasis of the marked crosswalk and of the presence of pedestrians. For guidance on supplemental warning device options that are exempt from warrants, see **Section 5.2.4** for details.

Additional treatments, not included in this section, may also be appropriate depending upon the individual site characteristics. Engineering judgment should guide decisions about which additional treatment options to include, if any.

(1) **Rectangular Rapid Flashing Beacons (RRFB)**

The FHWA issued [Interim Approval 21, Rectangular Rapid Flashing Beacons at Crosswalks \(IA-21\)](#) on March 20, 2018, which specifies the intended use and design requirements for RRFB devices.

FDOT has received FHWA approval to install RRFBs on the State Highway System. Local agencies must receive FHWA approval prior to installing RRFBs on their local roads.

The rectangular beacons are provided in pairs below the PEDESTRIAN CROSSING warning sign (**W11-2**) (and above the diagonal downward arrow (**W16-7P**) plaque for post mounted RRFB) and operate in a flash pattern upon activation by the pedestrian. Detailed conditions of use, including sign/beacon assembly, dimensions, placement, and flashing rates are provided in [Interim Approval \(IA-21\)](#). Refer to the following FDOT policy for more guidance on RRFB implementation:

- (a) [FDOT Standard Plans, Index No. 654-001](#)
- (b) [FDOT Design Manual \(FDM\), Chapter 327, Signalization Plans](#)
- (c) [FDOT Standard Specifications, Section 700, Highway Signing](#)
- (d) [FDOT Standard Specifications, Section 654, Midblock Crosswalk Enhancement Assemblies](#) requires that RRFBs shall include an instruction sign with the following 3-line legend PUSH BUTTON FOR WARNING LIGHTS / WAIT FOR TRAFFIC TO STOP / CROSS WITH CAUTION (**FTP-68C-21**) sign mounted adjacent to or integral with the pedestrian push button device.

As of January 1, 2021, all new RRFB installations shall include an audible warning message that states "WAIT FOR TRAFFIC TO STOP THEN CROSS WITH CAUTION" when activated. An example of the RRFB treatment is shown in **Figure 5.2-6**.

Figure 5.2-6. Rectangular Rapid Flashing Beacons



(2) Flashing Yellow Beacons

For locations where traffic signals are not warranted, additional emphasis of the crossing location can be provided when using flashing yellow beacons to supplement the appropriate marked crossing warning or regulatory signs. These devices are still allowable in the *MUTCD*, although newer devices such as RRFBs have increased in popularity.

When used, flashing yellow beacons shall meet the requirements of [Chapter 4L of the MUTCD](#).

[Department's Standard Plans, Index No. 700-120](#) provides design details for the installation of flashing beacons.

Configuration of beacons are either overhead or side-mounted; however, the preferred configuration is a side post-mounting to avoid drivers confusing the beacons for a flashing traffic signal.

- (a)** When post mounted, the recommendation is to have a configuration of two vertically aligned beacons. These beacons should operate in an alternating flash pattern.
- (b)** When overhead mounted, flashing yellow beacons should feature an internally illuminated Overhead Pedestrian Crossing sign (**R1-9a**) in conjunction with the beacons, which is continuously lit at night.

(3) In-Roadway Warning Lights

[Chapter 4N of the MUTCD, In-Roadway Lights](#) provides detailed guidance on installation of in-roadway warning lights.

In-roadway warning lights are installed in the roadway surface to warn road users that they are approaching a condition on or adjacent to the roadway that might not be readily apparent and might require the road users to slow down and/or come to a stop. This includes marked midblock crosswalks and marked crosswalks on uncontrolled approaches.

In-roadway lights may be installed at certain marked crosswalks, based on an engineering study or engineering judgment, to provide additional warning to road users.

When used, in-roadway warning lights shall be flashed and shall not be steadily illuminated.

The installation of in-roadway warning lights in conjunction with overhead or LED roadside highlighted signs or flashing yellow beacons is allowed as long as the flashing rates are identical and flash in unison. Exercising engineering judgment is of great importance.

In locations where overhead lighting has been omitted by the engineer of record, in-roadway lights shall be considered.

In-roadway warning lights shall:

- (a) Be installed only at marked crosswalks with applicable warning signs;
- (b) Be installed along both sides of the crosswalk and shall span its entire length; and
- (c) Not be used at crosswalks controlled by YIELD signs, STOP signs, or traffic control signals.

If pedestrian push buttons are used to actuate the in-roadway lights, a Push Button To Turn On Warning Lights (with push-button symbol) (**R10-25** or **FTP-68C-21**) sign shall be mounted adjacent to or integral with each pedestrian push button.

5.2.7.4 Beacons and Signals (Warrant Analysis Required)

(1) Pedestrian Hybrid Beacon (PHB)

A possible alternative to the traffic signal is a PHB. If used, PHBs shall be used in conjunction with signs and pavement markings to warn and control traffic at

locations where pedestrians enter or cross a street or highway. An example of the PHB treatment is shown in **Figure 5.2-7**.

A PHB shall only be installed at a midblock crosswalk. [Chapter 4F of the MUTCD, Pedestrian Hybrid Beacons](#) provides guidance and criteria for PHB installation.

For six-lane roadways or crossing distances exceeding 80 feet, a two-stage pedestrian crossing with a median refuge island should be considered where a warranted PHB will control the proposed marked crossing.

PHB treatments shall include the CROSSWALK, STOP ON RED, PROCEED ON FLASHING RED WHEN CLEAR (**R10-23a**) sign. The **R10-23a** replaces the existing **MUTCD R10-23** sign per the [FHWA Interpretation Letter 4\(09\)-61\(I\)](#).

Figure 5.2-7. Pedestrian Hybrid Beacons



(2) Midblock Traffic Control Signal

When pedestrian volumes are of a sufficient level to meet the [Signal Warrant 4 of the MUTCD](#), a midblock traffic control signal may be installed to serve this demand in accordance with [Section 4C.05 of the MUTCD](#) for the following locations:

- (a) High pedestrian demand (provided an **MUTCD** signal warrant is satisfied) and the new pedestrian signal is compatible with the signal system along the arterial corridor.

- (b) Where signalized control is selected for the pedestrian crossing, additional coordination for the crossing location is recommended with the District Access Management Review Committee and the DTOE.

For six-lane divided roadways or crossing distances exceeding 80 feet, a two-stage pedestrian crossing with a median refuge island should be considered where a warranted traffic control signal will control the proposed marked midblock crossing.

At locations where pedestrian compliance is of concern, feedback devices may be installed with the traffic control signal button to provide pedestrians with confirmation of the call.

For locations where signal warrants are met, consideration may be given to providing a pedestrian bridge or tunnel to address safety and compliance issues that cannot be addressed by a traffic signal.

In some cases, a traffic control signal may not be needed at the study midblock location if adjacent coordinated traffic control signals consistently provide gaps of adequate length for pedestrians to cross the roadway. The [Department's Manual on Uniform Traffic Studies \(MUTS\)](#) provides additional guidance on conducting Pedestrian Group Size and Vehicle Gap Size studies.

Information on the use of accessible pedestrian signals can be found in **Section 3.7** of the **TEM**.

[Department's Standard Plans, Index 653-001](#) provides details for installing midblock traffic control signals. An example of the midblock traffic control signal treatment is shown in **Figure 5.2-8**.

Figure 5.2-8. Midblock Traffic Control Signal



5.2.7.5 Other Treatments

Incorporation of the following treatments to improve visibility, support pedestrian travel, and increase awareness for pedestrians at crossings is worth consideration. Further information on design criteria of these treatments are in the [*FDOT Design Manual \(FDM\), Chapter 222 Pedestrian Facility*](#).

- (1) Pedestrian refuge islands or raised median
- (2) Curb extensions
- (3) Raised crosswalks (See **Figure 5.2-9**)

Figure 5.2-9. Raised Pedestrian Crosswalk



- (4) Speed reduction treatments (See [FDOT Design Manual \(FDM\), Chapter 202 Speed Management](#))

- (5) Overhead lighting

Crosswalk illumination shall be provided at all newly constructed uncontrolled approach crosswalks in accordance with [FDOT Design Manual \(FDM\), Chapter 231, Lighting](#).

There may be locations such as environmental-sensitive areas or crosswalks serving facilities that are open only during daylight hours, where lighting may be omitted. DTOEs shall approve this omission. In-roadway lighting shall be considered at these locations.

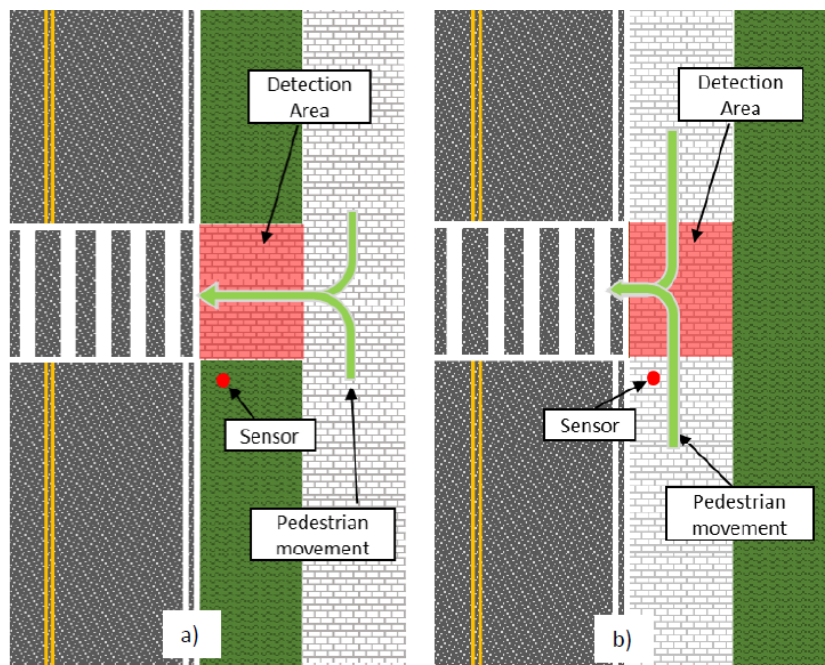
- (6) Passive pedestrian/bicyclist detection

In addition to traditional active pedestrian detection (push button), passive pedestrian detection may be used to supplement and improve pedestrian detection for signals, RRFBs, PHBs, and warning beacons.

- (a) Passive pedestrian detection should be used when there is a documented observation of low usage of the active pedestrian detection (push button). This could be acquired by field review, demographics, or per request. Children/teenagers, school zone, aging roadway users, and other demographics should be considered when implementing passive pedestrian detection.

- (b) When passive pedestrian detection is installed, adequate passing space around the waiting detection area on the sidewalk should be present.
- (c) Overhead lighting shall be provided to increase pedestrian visibility and detector accuracy.
- (d) Detection zones should be adjusted after installation to cover the exact specified pedestrian waiting area.
- (e) When using passive pedestrian detection, adequate installation height, detection distance, and position and angle of the detector should be ensured to recognize pedestrian features and detect the presence of pedestrians. If there are no existing poles or infrastructure at the implementation site, a supplemental pole or an extended arm from an existing pole should be considered and installed.
- (f) When deploying passive pedestrian detection system, two options will be encountered for the sidewalk locations, as illustrated in Figure 5.2-10.
 - For the option in **Figure 5.2-10 a)**, a grassy shoulder/buffer is constructed between the sidewalk and the road. The area leading towards the crosswalk can be used as the detection zone for the system, providing a well-established and clear area for detection. This option is preferable for deploying passive pedestrian detection.
 - For the option in **Figure 5.2-10 b)**, a sidewalk is constructed next to a curb without any buffer between them, which is common in urban environments with limited right-of-way. The area that can be used for detection is smaller, and a pedestrian walking on the sidewalk turning into the crosswalk may not be detected in some cases. There may also be false detections with this design. The pedestrian “WALK” signal can be activated by pedestrians that walk along the sidewalk but don’t turn to the crosswalk. This limitation must be considered when implementing the passive pedestrian detection.

Figure 5.2-10 Sidewalk Location Options for Passive Pedestrian Detection



For a shared use path that crosses a state roadway, passive bicyclist detection may be added in addition with an active bicyclist detection (push button) to improve driver yielding behavior and cyclist safety. Consider the following guidance when installing passive bicyclist detection at midblock or unsignalized intersections.

- (a) At unsignalized intersections and midblock that require bicyclist to be detected, passive bicyclist detection shall be considered.
- (b) The passive bicyclist detection devices shall be placed in the expected path of the bicyclists.
- (c) Bicycle detection devices shall be located in the most conspicuous location and supplemented by appropriate signing and pavement markings to inform bicyclists of where to wait.
- (d) Advanced bicycle detection should be installed on the approach to the intersection to extend the phase, or to prompt the phase and allow for continuous bicycle through movements.
- (e) The design of loop detectors shall consider the amount of metal in typical bicycles. Certain types of loop configurations are better at detecting bicyclists than others and settings for loop detectors shall be adjusted to properly detect bicycles.

(7) Transverse rumble strips

Transverse rumble strips in advance of rural stop-controlled intersections has shown to improve driver awareness and overall safety performance. Therefore, this type of rumble strips may be used in advance of midblock and unsignalized intersections where driver yielding behavior has not been successful with other advance warning treatments identified in this Section. Consider the following factors when installing transverse rumble strips near midblock or unsignalized intersections:

- (a) The noise impact of installing transverse rumble strips near residential areas should be evaluated before installation.
- (b) There are two basic layouts for transverse rumble strips, extending across the entire traffic lane or placement only in the wheel tracks. The wheel track layout is preferred because it allows drivers that do not need additional warning to avoid the rumbles without having to drive into the opposing lane.
- (c) Use the transverse rumble strips in combination with Pedestrian Crossing (**W11-2**) signs.

5.2.8 TREATMENT OPTIONS SELECTION MATRIX

Pedestrians treatments at midblock crosswalks and unsignalized intersections shall be selected based on pedestrian volume, roadway context classification, number of lanes, posted speed limit and other related factors as identified in **Section 5.2.4 Procedures**, **Section 5.2.5 Selection Criteria** and **Section 5.2.7 Treatment Options**. As a reference **Figure 5.2-11, Midblock Crosswalk and Unsignalized Intersection Selection Guidance Matrix** has been designed to aid in the treatment option selections process. This matrix highlights the procedures, selection criteria and treatment requirements identified in **TEM Section 5.2**.

Figure 5.2-11. Midblock Crosswalk and Unsignalized Intersection Selection Guidance Matrix

TEM 5.2 Midblock Crosswalks and Unsignalized Intersection Selection Guidance Matrix			Midblock and Intersections							Midblock		TEM SECTION
			Pavement Markings				Beacons			Beacons and Signals		
			Special Emphasis Crosswalk			Standard Crosswalk	RRFB		Flashing Beacon	PHB	Traffic Signal	
			20 PPH for 1 Hr or 18 PPH for 2 Hr or 15 PPH for 3 Hr or SHARE USE PATH 50% PPH reduction or school zones				2-4 lanes	3-5 lanes With TWTL				
			0-35 MPH	35-45 MPH	45+ MPH					Stop controlled sidestreets and driveways		
Pavement Markings	Special emphasis crosswalk	Midblock	M	M	M	N	M	M	M	M	M	
		Intersection	M	M	M	N	M	M	M	N	N	
	Standard crosswalk		N	N	N	M	N	N	N	N	N	
	Other pavement markings		O	O	O	O	O	O	O	O	O	
Signs	R1-5b/R1-5c	Enhance option: highlighted or beacon	O	O	O	O	M	M	O	N	N	
	W11-2/W16-9P		O	O	O	O	O	O	O	O	O	
	W16-7P/FTP-68C-21		O	O	O	O	M	M	O	O	O	
	R1-9a		O	O	O	O	O	O	M	O	O	
	R10-23a		O	O	O	O	O	O	O	M	O	
	Stop for pedestrians in crosswalk		O	O	O	O	O	O	O	O	O	
	In-street sign (R1-6a)	1-4 lanes	R	R	N	O	R	N	O	N	N	
Beacons	Audible message		N/A	N/A	N/A	N/A	M	M	N	N	N	
	In-roadway warning light		N/A	N/A	N/A	N/A	O	O	O	O	N	
Other Treatments	Two-stage pedestrian crossing	Pedestrian refuge islands	O	O	R	O	R	M	O	R	R	
		Raised median	O	O	R	O	O	R	O	R	R	
	Passive pedestrian and bike detection	SHARED USE PATH	N/A	N/A	N/A	N/A	R	R	R	R	R	
		All others locations	N/A	N/A	N/A	N/A	O	O	O	O	O	
	Curb extensions		O	O	R	O	O	O	O	O	O	
	Transverse rumble strips		O	O	O	O	O	O	O	O	O	
	Raised crosswalks		O	O	R	O	O	O	O	O	O	
	Speed reduction treatments		O	O	R	O	O	O	O	O	O	
Overhead lighting		M	M	M	O	M	M	M	M	M		
TEM SECTION			5.2.5.1			5.2.5.2						

Legend
█ Mandatory if applied
█ Recommend
█ Available Option
█ Cannot be Applied
█ Not Available Option*

*Identifies where the treatment cannot be applied because the infrastructure is not there. Ex: Audible Message on a Marked Crosswalk