

South Carolina Department of Transportation
Traffic Engineering Guidelines

NUMBER: TG-38

SUBJECT: Crosswalks

BACKGROUND: Section 3B.18 of the Manual on Uniform Traffic Control Devices (MUTCD) provides general guidance on crosswalks and crosswalk markings including design details such as dimensions, line type, and color. This section also includes general guidance regarding when marked crosswalks should be installed and when additional measures should be considered. While an engineering study considering many factors is recommended by the MUTCD when determining if a marked crosswalk should be installed, engineering judgment must ultimately be used to make the final determination.

This guideline provides more detailed guidance on various crosswalk-related issues and assists in establishing a more uniform application of marked crosswalks statewide. A flow chart (Figure 1) has been included as additional guidance to the information provided in this guideline.

Existing crosswalks statewide can be upgraded as necessary in accordance with these guidelines during construction/resurfacing projects and as other signing and marking improvements are implemented.

GUIDELINES: Standard Crosswalk Markings

- Standard crosswalk markings consist of two 8 inch solid white lines spaced no less than 6 feet apart in accordance with Std. Dwg. 625-305-00.
- Standard crosswalk markings should be considered at intersections where pedestrian accommodations such as sidewalks, multiuse paths, and pedestrian curb ramps are present unless otherwise directed by the high-visibility and non-standard markings sections of these guidelines. Refer to flow chart for additional guidance.

High-Visibility Crosswalk Markings

At locations where increased or potentially unexpected pedestrian presence exists, high-visibility crosswalk markings should be installed. Typically, the standard 8” white crosswalk lines are supplemented with 24” transverse lines, commonly referred to as ladder-style markings. Ladder-style markings should be installed in accordance with Std. Dwg. 625-305-00.

When laying out the ladder-style crosswalks for multilane roads, the 24” transverse lines should be centered on the approach lane lines and spaced

approximately 4 feet apart moving outward (6 feet on center) to avoid the wheel paths. This layout assumes a typical lane width of 12 feet.

Other patterns approved by FHWA may also be considered (see Non-Standard Crosswalk Markings section).

Installation of high-visibility crosswalk markings should be considered in the following cases:

- Marked crosswalks within a signed school zone
- Mid-block and/or uncontrolled crosswalks
- Locations where speed limit ≥ 40 mph
- Locations where the number of lanes ≥ 4 unless ≤ 30 mph
- As identified by a safety study
- Permitted and maintained by local municipality as approved by DTE
- High pedestrian activity

Mid-Block/Uncontrolled Crosswalks

Mid-block crosswalks are typically installed at locations where significant pedestrian traffic generators or destinations are located across from one another and where crossing at an adjacent signalized or stop-controlled intersection with crosswalk is unlikely to occur. Some crosswalks may occur at intersections on uncontrolled approaches. Such locations present unique safety concerns.

An engineering evaluation should be conducted as part of the installation process to assure the crosswalk will not produce an unsafe or hazardous condition. The study should include the following considerations with additional criteria details provided in the flow chart (Figure 1) notes:

- Pedestrian volumes
- Potential location and relocation options
- An unrestricted view of entire crosswalk that meets sight distance requirements
- Must address on-street parking, bulb outs, center refuge islands, etc.
- Posted speed limits
- Number of lanes

Additional treatments/countermeasures should be considered and included in accordance with Table 1 from the FHWA *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*, latest edition. A copy of Table 1 is included.

Non-standard Crosswalk Markings

Non-standard crosswalk markings include markings that are allowed on state roads but are not installed or maintained by SCDOT and markings that are not allowed on state roads as detailed below.

Allowable Under Permit or Maintenance Agreement

Based on MUTCD Interpretation Letter 3(09)-24(I) – Application of Colored Pavement, crosswalk treatments that simulate brick lattice or other similar pavement patterns may be allowed. These types of crosswalk treatments can be allowed if the following requirements are met:

- Acceptable colors are red, rust, brown, burgundy, clay, tan, or similar earth tone equivalents
- Devoid of retroreflective properties
- Material must provide a minimum skid resistance value of 55 BPN when tested in accordance with ASTM E303
- White, retroreflective pavement marking lines must be included to establish a legal crosswalk

These types of crosswalk treatments can be installed as part of a construction/streetscaping project or under an encroachment permit. Construction projects should include a maintenance agreement with the local government. The local government will agree to maintain if installed under an encroachment permit.

Not Allowed on State Roads

- Crosswalk Art - Graphics or multicolored artistic features that include, but not limited to, pictographs, symbols, multiple color arrangements, random or unsystematic treatments, or any treatment that can otherwise attempt to communicate with any roadway user are not allowed in accordance with MUTCD Interpretation Letter 3(09)-24(I) – Application of Colored Pavement.
- 3-Dimensional (3-D) Crosswalks – Any design that simulates 3-dimensional (3-D) objects in the roadway is considered crosswalk art and is prohibited.

Additional Crosswalk Enhancements

In urban areas where high pedestrian volumes are present, additional features may be considered to increase the visibility of crosswalks at uncontrolled crossings. These features include but are not limited to:

- Rectangular Rapid Flashing Beacons (RRFBs) – SCDOT Traffic Guideline 33 provides information on the installation procedure as well as required maintenance agreements. Permit install by others only.
- Raised Crosswalk – Appendix A of the SCDOT Traffic Calming Guidelines provides guidelines and design requirements for raised crosswalks. Permit install by others only.
- Pedestrian Hybrid Beacon (HAWK Signal) – SCDOT Traffic Signal Design Guidelines provide information on warrants, design, and installation.

- In-Street Ped Crossing Signs – Section 2B.12 of the MUTCD
- Yield Here to Ped Signs with Yield Bar – Section 2.B11 and Section 3B.16 of the MUTCD
- Curb extension/bulb-out – Latest SCDOT and FHWA guidance
- Median pedestrian refuge – Latest SCDOT and FHWA guidance
- Lighting – AASHTO Roadway Lighting Guide and Section 9D of the ARMS manual

Based on these guidelines and DTE approval, enhancement features may be installed under encroachment permit and funded and maintained by the local government applying for the permit. SCDOT may implement enhancements when deemed appropriate by the DTE unless noted above as permit install only.

Approved:

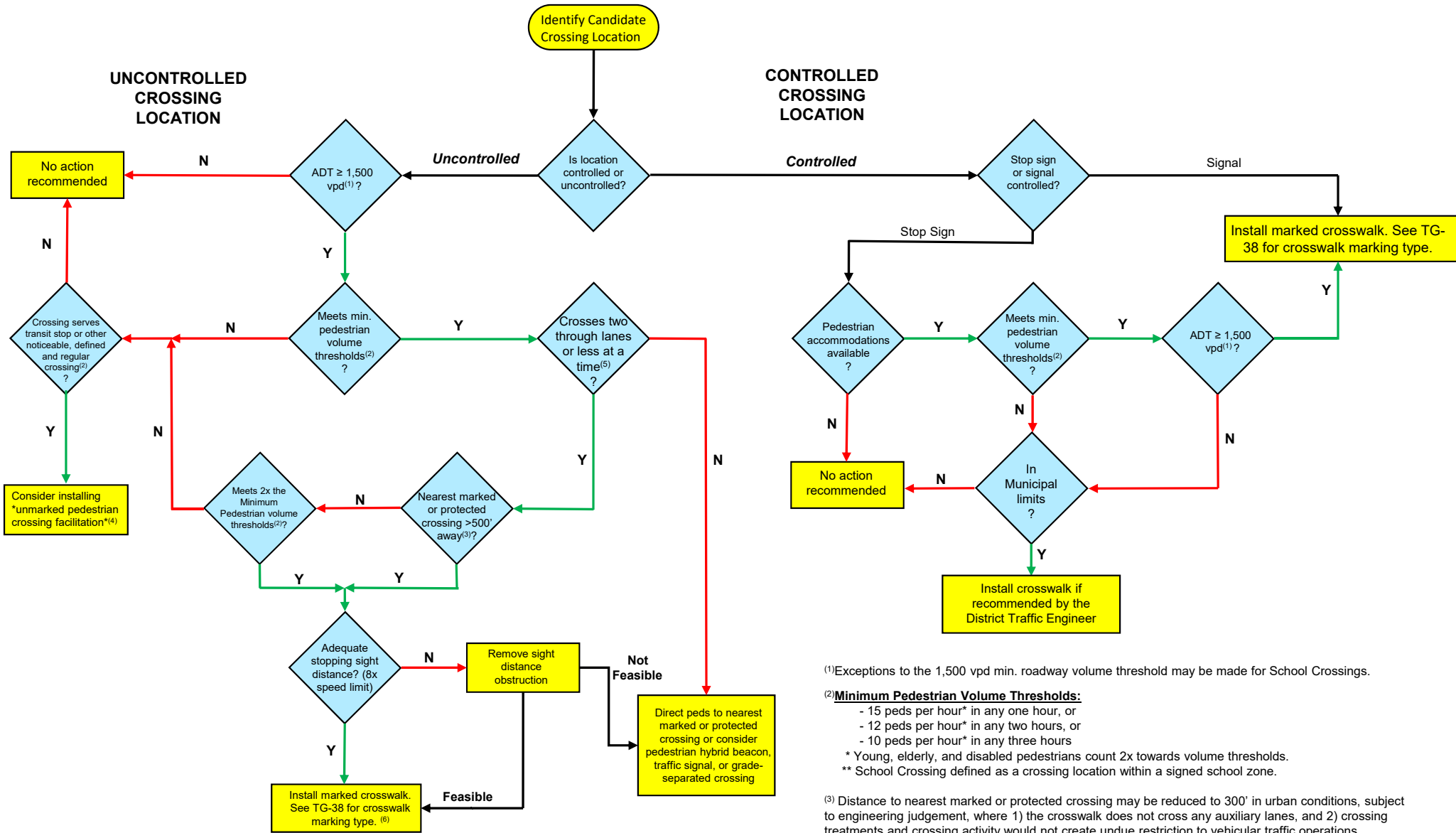


Director of Traffic Engineering

March 8, 2021

Date

Figure 1: Pedestrian Crossing Treatment Flowchart



(1) Exceptions to the 1,500 vpd min. roadway volume threshold may be made for School Crossings.

(2) **Minimum Pedestrian Volume Thresholds:**

- 15 peds per hour* in any one hour, or
- 12 peds per hour* in any two hours, or
- 10 peds per hour* in any three hours

* Young, elderly, and disabled pedestrians count 2x towards volume thresholds.

** School Crossing defined as a crossing location within a signed school zone.

(3) Distance to nearest marked or protected crossing may be reduced to 300' in urban conditions, subject to engineering judgement, where 1) the crosswalk does not cross any auxiliary lanes, and 2) crossing treatments and crossing activity would not create undue restriction to vehicular traffic operations.

(4) An "unmarked pedestrian crossing facilitation" is any treatment that improves a pedestrian's ability to cross a roadway, short of the marked, signed and enhanced crossings detailed in Table 1. Installation of this type of pedestrian facilitation is subject to engineering judgement and may include curb ramps and/or a raised median refuge. However, no effort is made to attract pedestrians or recommend that pedestrians cross at this location. The treatments simply provide an improvement for a low volume pedestrian crossing where pedestrians are already crossing and will likely continue to cross.

(5) Flowchart is intended for evaluating new crosswalk locations. For existing locations crossing more than two through lanes, consider removing crosswalk, relocating crosswalk, or providing a median refuge to reduce crossing distance. See Table 1 for additional enhancements to consider.

(6) See Table 1 for additional enhancements to consider.

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)	① 2 4 5 6	① 5 6 7 9	① 5 6 7 9	① 4 5 6 7 9	① 5 6 7 9	① 5 6 7 9	① 4 5 6 7 9	① 5 6 7 9	① 5 6 9
3 lanes with raised median (1 lane in each direction)	① 2 3 4 5	① 3 5 7 9	① 3 5 7 9	① 3 4 5 7 9	① 3 5 7 9	① 3 5 7 9	① 3 4 5 7 9	① 3 5 7 9	① 3 5 9
3 lanes w/o raised median (1 lane in each direction with a two-way left-turn lane)	① 2 3 4 5 6 7 9	① 3 5 6 7 9	① 3 5 6 9	① 3 4 5 6 7 9	① 3 5 6 7 9	① 3 5 6 9	① 3 4 5 6 7 9	① 3 5 6 9	① 3 5 6 9
4+ lanes with raised median (2 or more lanes in each direction)	① 3 5 7 8 9	① 3 5 7 8 9	① 3 5 8 9	① 3 5 7 8 9	① 3 5 7 8 9	① 3 5 8 9	① 3 5 7 8 9	① 3 5 8 9	① 3 5 8 9
4+ lanes w/o raised median (2 or more lanes in each direction)	① 3 5 6 7 8 9	① 3 5 6 7 8 9	① 3 5 6 8 9	① 3 5 6 7 8 9	① 3 5 6 7 8 9	① 3 5 6 8 9	① 3 5 6 7 8 9	① 3 5 6 8 9	① 3 5 6 8 9
<p>Given the set of conditions in a cell,</p> <ul style="list-style-type: none"> # 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.* <p>The absence of a number signifies that the countermeasure is generally not an appropriate treatment, but exceptions may be considered following engineering judgment.</p>					<ol style="list-style-type: none"> 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. Carlier, S. Smith, C. Sundstrom, N.J. Thirk, 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, Thirk, and Zegeer, (2016). NCHRP Synthesis 496: Application of Pedestrian Crossing Treatments for Streets and Highways. Transportation Research Board, Washington, D.C.; and personal interviews with selected pedestrian safety practitioners.