The Commonwealth Transportation Board (CTB) adopted the Virginia Department of Transportation (VDOT) Policy for Integrating Bicycle and Pedestrian Accommodations in March 2004. That policy establishes that, “Bicycling and walking are fundamental travel modes and integral components of an efficient transportation network.” As such, the CTB’s adopted policy
requires that all VDOT highway construction projects shall be initiated with the presumption that
the facilities “will include accommodations for pedestrians, including pedestrians with
disabilities, along with motorized transportation modes in the planning, funding, design,
construction, operation, and maintenance of Virginia’s transportation network to achieve a safe,
effective, and balanced multimodal transportation system.”

Currently there is significant variation in how crosswalks are utilized in different locations
throughout Virginia. This Memorandum provides consistent, uniform guidance to designers for
determining when to install marked crosswalks, what type of crosswalk to install, and what other
traffic control devices or geometric improvements should potentially be considered in
conjunction with the marked crosswalk at unsignalized locations.

Pedestrians typically account for 10 - 15 percent of total highway fatalities in Virginia each year.
An assessment of 2012-2014 Virginia pedestrian crashes determined that 86% of pedestrian
fatalities occurred at locations without a marked crosswalk. Additionally, about half of Virginia’s
pedestrian fatalities occur on Primary system roadways. Some of Virginia’s road segments lack
adequate pedestrian accommodations for crossing the road, despite being located in areas
where the surrounding land use generates (or has the potential to generate) crossing pedestrian
traffic. Pedestrian accommodations include marked crosswalks as well as any facility, design
feature, operational change, or maintenance activity that improves the environment in which
bicycles and pedestrians travel. Marked crosswalks, by themselves or in conjunction with other
traffic control devices and pedestrian accommodations, can provide important safety benefits for
crossing pedestrians.

However, studies have demonstrated that marked crosswalks placed alone at uncontrolled
locations, and not in conjunction with geometric pedestrian safety improvements or other traffic
control devices, are not always recommended. High-visibility crosswalks (crosswalks marked
using longitudinal lines or bar pairs) perform better than standard crosswalks, but often are not
used in every situation due to higher installation and maintenance costs.

This Memorandum and the attached Standards replace the previous 2005 Guidelines for the
Installation for Marked Crosswalks document and the companion 2005 Guidelines for the
Installation of In-Roadway Warning Lights document, both of which were developed by the
Virginia Transportation Research Council (VTRC) for use by VDOT. It provides additional
guidance beyond what is in the 2009 Manual on Uniform Traffic Control Devices (MUTCD) and
the 2011 Virginia Supplement to the MUTCD, latest version.

This document focuses on pedestrian crossing guidance for unsignalized intersection crossings
and mid-block crossings, and should be used in conjunction with a separate I&IM (currently
under development) which will establish guidance for pedestrian accommodations at signalized
intersections.

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EFFECTIVE DATE

Future contracts: This Memorandum shall be effective for all contracts with an advertisement on or after December 1, 2016. The designer may also elect to apply this Memorandum to projects with an advertisement before that date.

Existing contracts: This Memorandum may be applied to projects constructed under existing contracts if the change is approved by the Project Engineer.

Land use permit for private developments: This Memorandum shall be effective for all projects where the final permit plans have not yet been submitted to VDOT. If agreed to by the permittee and VDOT, this Memorandum may also be applied to a previously-approved permit or to a permit currently under review.

Design-Build or PPTA projects: This Memorandum shall be effective for projects in which the design criteria package has not been completed for advertisement as of December 1, 2016. For current Design-Build or PPTA projects, this Memorandum should be implemented where feasible.

Existing marked crosswalks: Existing crosswalks may remain until the end of their useful service life. This Memorandum should be consulted when planning is underway for the roadway’s next resurfacing or reconstruction. This Memorandum should also be used when there is a need to prepare a safety evaluation of existing marked crosswalks.

Existing locations without marked crosswalks: Regions should conduct a review of pedestrian accommodations and determine whether new marked crosswalks are needed in accordance with this Memorandum in conjunction with resurfacing or reconstruction projects. This Memorandum should also be used if the need arises to prepare a safety evaluation of a location not scheduled for resurfacing.

CC:

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ATTACHMENT A

Unsignalized Marked Crosswalk Standards

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1.0 SUMMARY OF REVISIONS

The list below summarizes the major changes to the previous 2005 Guidelines for the Installation for Marked Crosswalks document and the companion 2005 Guidelines for the Installation of In-Roadway Warning Lights document.

- Establishes additional guidance on when marked crosswalks should or shall be installed at controlled or uncontrolled approaches (e.g. not controlled by a stop sign, yield sign, pedestrian hybrid beacon, or traffic signal) to unsignalized intersections, and at mid-block locations.
  - A separate I&IM (currently under development) details when pedestrian accommodations should be provided at signalized intersections.
- Establishes guidance/standards on when standard or high-visibility crosswalks (longitudinal lines or bar pairs) should be installed.
- Provides guidance on allowable high-visibility crosswalk marking styles.
- Establishes recommended crosswalk widths.
- Removes most guidance for In-Roadway Warning Lights due to their limited use by VDOT.
- Adds discussions on use of Rectangular Rapid Flashing Beacons (RRFBs) and Pedestrian Hybrid Beacons (PHBs).

2.0 BACKGROUND

A crosswalk is generally defined as the portion of roadway designated for pedestrians to use in crossing the street. Crosswalks may be marked or unmarked, as defined in the Code of Virginia § 46.2-100. At intersections, a sidewalk or pedestrian walkway extension across a street can define a crosswalk in addition to crosswalks defined by marked lines in the roadway.

A “pedestrian facility” is a general term denoting locations made to accommodate or encourage pedestrian travel outside the vehicle travelway between road crossings. It typically refers to sidewalks, shared use paths, and curb cuts. It can also refer to wide paved shoulders, or unpaved traversable areas adjacent to the road with a prepared surface, that can be used by pedestrians. An unpaved shoulder with worn-out path in the grass/soil due to pedestrian activity is generally considered a “pedestrian facility”.

There are both advantages and disadvantages of marking crosswalks. Potential advantages of properly marked crosswalks include:

- Helping pedestrians find their way across complex intersections,
- Providing a visible reminder to motorists that pedestrians may be present,
- Directing pedestrians to the location of the recommended crossing path,
- Establishing the legal crosswalk where an unmarked crosswalk does not already exist,
- Reducing the likelihood that drivers will encroach the intersection or block pedestrian traffic when stopping for a STOP or YIELD sign, and/or
- Designating the location of approved school crossings or crossings along recommended school routes.
A potential disadvantage of marked crosswalks is that they may create a “false sense of security” for pedestrians (cause the pedestrian to assume that the motorist can and will stop in all cases).

If unnecessary and unwarranted marked crosswalks are installed, drivers may not expect them and may ignore or disregard them, which diminishes the effectiveness of marked crosswalks. Excessive marked crosswalk installation can also lead to increased installation and maintenance costs.

### 3.0 RELATIONSHIP TO AMERICANS WITH DISABILITIES ACT REQUIREMENTS

#### 3.1 Guidance

The 1990 federal Americans with Disabilities Act (ADA) requires that pedestrians with disabilities be accommodated in the design, planning, and maintenance of pedestrian facilities. The ADA requirements are based on the understanding that a wide range of people, including people with disabilities, will be using the pedestrian facilities and relying on them for their daily travel.

The need for ADA improvements to be programmed or constructed in conjunction with marked crosswalk improvements depends on whether the action is a maintenance activity or an alteration, as defined in the latest effective version of IIM-TE-376.

#### 3.2 Maintenance Activities

Examples of maintenance activities related to crosswalks include:

- Striping a marked crosswalk at an unsignalized intersection if the crossing is already a crosswalk (albeit an unmarked one) as defined by the Code of Virginia,
- Changing the striping pattern of an existing marked crosswalk, and
- Signing improvements.

There is no requirement for ADA assessments or improvements when maintenance activities are performed.

When an existing unmarked crosswalk is converted to a marked crosswalk, it is recommended that the Region or District assess and functionally rate the existing curb ramps (if present) in accordance with IIM-TE-376. At locations where curb ramps are not present (Grade D) or are not fully functional (Grades B or C), future upgrades should be considered based on funding availability in accordance with the latest effective version of IIM-TE-377.

#### 3.3 Alterations

Examples of alterations related to crosswalks at unsignalized locations include:

- Rectangular Rapid Flashing Beacon (RRFB) or Pedestrian Hybrid Beacon (PHB) installation,
- Resurfacing of the crosswalk area, and
• Establishing marked crosswalks at a location that would not currently be considered an unmarked crosswalk, such as at a midblock location.

When an alteration is being performed, the procedures required by IIM-TE-376 shall be followed.

4.0 APPLICABLE SECTIONS OF THE CODE OF VIRGINIA

Section §46.2-100 of the Code of Virginia defines a crosswalk as “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 any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.”

Note that the definition of “crosswalk” encompasses both marked and unmarked crosswalks. At locations where an unmarked crosswalk would not otherwise exist, and a crosswalk is present as a result of markings, the crosswalk only exists when the markings “distinctly indicate” the location of such crosswalk. This means that when such a marked crosswalk has degraded to the point where it is not sufficiently visible to the approaching motorist, it would no longer be considered a legal crosswalk. Moreover, marked crosswalks must meet the minimum requirements of the MUTCD (e.g., crosswalk width, line thickness, color) in order to be considered a marked crosswalk in Virginia.

Section §46.2-904 states that bicyclists have all of the same rights and responsibilities as pedestrians within crosswalks.

Section §46.2-923 states that pedestrians shall cross, wherever possible, only at intersections or marked crosswalks and shall not “carelessly or maliciously interfere” with traffic. If no marked crosswalks are available at an intersection, then pedestrians are not negligent if they cross by the most direct route at such an intersection.

Section §46.2-924A states that drivers must yield the right-of-way to pedestrians at:

• Any “clearly” marked crosswalks,
• Any unmarked crosswalks at “the prolongation of the lateral boundary lines of the adjacent sidewalk at the end of the block,” or
• Any intersection where the approach has a speed limit of 35 mph or below.

Section §46.2-924B sets forth the responsibilities of drivers and pedestrians. Pedestrians have the responsibility to avoid entering or crossing an intersection “in disregard of approaching traffic,” however they have the right-of-way over vehicles making turns. Drivers are required to “change their course, slow down, or stop” if necessary to permit pedestrians to cross.

Section §46.2-924C allows certain localities in Northern Virginia to establish ordinances imposing fines on drivers who fail to yield the right-of-way to pedestrians at locations where signs are installed and requires VDOT to establish criteria for this required signage in order to establish those fines. VDOT’s signing criteria is included as Attachment B to this Memorandum.
5.0 WHEN TO INSTALL MARKED CROSSWALKS AT UNSIGNALIZED INTERSECTIONS

5.1 General Guidance

As with any installation of traffic control devices, engineering judgment should be used for determining when installation of a crosswalk is justified. When considering whether to mark a crosswalk, the land uses adjacent to the roadway provide invaluable information to help indicate if the crosswalk is needed. Pedestrian-oriented land uses and transit stops will generate pedestrian crossings regardless of whether a marked crosswalk exists or not. When pedestrian-generating land uses exist adjacent to roadways where pedestrian crossings are legal, it is VDOT's responsibility to provide adequate safe pedestrian crossing opportunities and to direct pedestrians to those locations.

The presence of shared use paths can justify the installation of a marked crosswalk even if the adjacent land uses are not pedestrian-oriented.

Marked crosswalks should not be installed at the intersection of two low-speed roadways functionally classified as “local”, such as at the intersection of two subdivision streets.

In addition, marked crosswalks should not be installed where neither “pedestrian facilities” (defined previously) nor pedestrian-oriented attractors/generators are present on both sides of the crossing. Examples of pedestrian attractors/generators include schools, university campuses, libraries, hospitals, senior centers, major shopping centers, recreational areas, large employment centers, rail stations, bus transfer centers, hotels, residential developments of at least moderate density, parking garages or large parking lots, etc. Pedestrian attractors/generators should be considered as a factor if they are within reasonable walking distance of the crossing.

If neither pedestrian facilities nor pedestrian-oriented land uses currently exist on both sides of the crossing, the designer should consult with the District Planner or locality to assess whether there is a potential for pedestrian activity in the near future, and if so design the location to allow for future crosswalk installation to the extent possible (such as by setting the marked stop line or yield line, if present, at a location where it won’t conflict with a future marked crosswalk). Installing marked crosswalks in areas where there is minimal likelihood of existing or future pedestrian activity (based on adjacent land uses) is not recommended.

To the extent possible, marked crosswalks should match pedestrian desire lines by connecting pedestrian generators and attractors. In some rare circumstances, an unusually heavily used unsignalized crosswalk can adversely impact a roadway’s vehicular capacity. In these rare cases, engineering judgment should be used to balance locating the crosswalk along pedestrian desire lines while avoiding a substantial impact to roadway vehicular capacity.

A flow chart illustrating the general decision-making process for installation of crosswalks at unsignalized locations is shown in Figure C1 of Attachment C.

Note that if there is a STOP sign or YIELD sign immediately downstream of the crossing (for example, where a Shared Use Path (SUP) runs parallel to the main road and crosses the side
road such that drivers on the side road have the stop sign immediately downstream of the SUP), the approach is considered a controlled approach for the purposes of this IIM.

5.2 – When to Install Marked Crosswalks Across Stop-Controlled or Yield-Controlled Approaches

Marked crosswalks should be installed if pedestrian facilities or pedestrian-oriented attractors/generators exist on both sides of the crossing and any of the following statements are true, unless precluded by the recommendations in Section 5.1 or the Regional Traffic Engineer approves an exception to this recommendation:

- The crossing is part of a walking route approximately ¼ mile or less between a residential development of moderate or heavy density and a school or recreational area,
- The crossing is connected by pedestrian facilities to a rail transit stop or major bus transfer station within walking distance of approximately ¼ mile or less,
- The crossing is part of a shared use path or trail,
- The crossing is across a yield-controlled approach at an off-ramp junction or channelized right turn lane, or
- The crossing is within a downtown Central Business District area, and/or is in an area of known pedestrian activity and pedestrian-oriented land-use.

A flow chart illustrating the decision-making process for crosswalks at stop or yield-controlled locations is shown in Figure C2 of Attachment C.

5.3 – When to Install Mid-Block Marked Crosswalks or Marked Crosswalks Across Uncontrolled Approaches

An engineering study shall be performed before crosswalk markings are installed across uncontrolled locations (which include both crosswalks at mid-block locations and crosswalks across uncontrolled intersection approaches). Data collection templates to facilitate crosswalk engineering studies are provided in Attachment D of this memorandum.

The satisfaction of the criteria within this section does not in and of itself require the installation of a marked crosswalk across an uncontrolled location.

Crossings of uncontrolled roadway approaches shall not be marked unless all of the following are met:

1) The crossing is on a direct route between significant pedestrian generator(s) and attractor(s), where engineering judgment determines that the crosswalk would likely see a minimum of 20 pedestrians/bicyclists using the crosswalk in an hour. That threshold may be reduced to 10 pedestrians per hour if the crossing is expected to be used by a high number of vulnerable pedestrians (pedestrians who are disabled, age 65 and over, or age 15 and under), or if the reduced volume is met for three consecutive hours.

2) The location is 300 feet or more from another marked crosswalk across the same road, or engineering judgment determines that sufficient demand and pedestrian desire lines exist to justify both crosswalks.
3) Drivers will have an unrestricted view of the entire length of the crosswalk, including the waiting areas at either end of the crosswalk. If possible, this unrestricted view should be equal to or exceeding the Stopping Sight Distance (SSD) requirements shown in Table 1 and as per the latest effective version of VDOT’s Road Design Manual. If the SSD requirements cannot be met and the crosswalk cannot be relocated to a place where SSD requirements will be met, warning signs shall be used. (Warning signs may be omitted on downtown urban streets with speed limit < 35 mph if justified by documented engineering judgment.)

4) The required engineering study determines that the introduction of a marked crosswalk will not produce an unacceptable safety hazard.

A flow chart illustrating the decision-making process for crosswalks at uncontrolled locations is shown in Figure C3 of Attachment C.

Marked crosswalks across uncontrolled approaches should be avoided at locations that are unlit (roadway lighting not present) and higher speed (40 mph or greater) unless a high visibility crosswalk marking style and appropriate advance warning devices are utilized.

**Table 1 – Stopping Sight Distance Requirements Approaching Mid-Block Crosswalks or Crosswalks at Uncontrolled Intersection Approaches (feet)**

<table>
<thead>
<tr>
<th>Operating Speed *</th>
<th>Level Grade</th>
<th>Downgrades</th>
<th>Upgrades</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>-3%</td>
<td>-6%</td>
</tr>
<tr>
<td>25 mph</td>
<td>155</td>
<td>158</td>
<td>165</td>
</tr>
<tr>
<td>30 mph</td>
<td>200</td>
<td>205</td>
<td>215</td>
</tr>
<tr>
<td>35 mph</td>
<td>250</td>
<td>257</td>
<td>271</td>
</tr>
<tr>
<td>40 mph</td>
<td>305</td>
<td>315</td>
<td>333</td>
</tr>
<tr>
<td>45 mph</td>
<td>360</td>
<td>378</td>
<td>400</td>
</tr>
<tr>
<td>50 mph</td>
<td>425</td>
<td>446</td>
<td>474</td>
</tr>
<tr>
<td>55 mph Crosswalks should not be marked across uncontrolled approaches with operating speed of 55 mph or greater.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: VDOT Road Design Manual, Chapter 2D. This table is provided for convenience and is current as of June 2016. Any subsequent revisions to the Road Design Manual override the values provided in this table.)

*Operating speed can refer to actual 85th percentile speed, if speed data is available. Otherwise, operating speed can be estimated as the posted speed limit plus 7 mph, or based on documented engineering judgment. For operating speeds not in 5 mph increments, users should interpolate from this table to find the minimum SSD requirements.*

As per Section 3B.18 of the 2009 MUTCD, if a marked crosswalk is installed, pedestrian crossing warning signs should be installed in advance of non-intersection crosswalks and on-street parking should be prohibited where it will impede adequate visibility of the crosswalk and waiting areas.

The R1-5 “Yield Here to Pedestrians” sign may be used in advance of a marked mid-block crosswalk across a multi-lane (i.e. two or more travel lanes per direction) uncontrolled approach to direct vehicles to yield in advance of the crosswalk. This is done to minimize the risk of a vehicle in one lane from blocking the view of a crossing pedestrian from a vehicle approaching in the other lane. If used, the R1-5 sign should be placed 20 to 50 feet in advance of the
crosswalk as per Section 2B.11 of the 2009 MUTCD and FHWA’s Official Interpretation 2(09)-861. Yield line (“shark’s teeth”) pavement markings may be used in conjunction with the R1-5 sign, as per Section 3B.16 of the 2009 MUTCD.

If a marked crosswalk is to be installed across an uncontrolled approach, Table 2 should be used to determine if additional enhancements may be necessary to facilitate safe crossing at uncontrolled locations. A flow chart illustrating the use of Table 2 is shown in Figure C4 of Attachment C.

Treatments to inhibit pedestrian crossings (such as landscaping or fences) should only be considered where existing crosswalks are located within 300 feet and an additional crossing would create an unsafe condition, or where pedestrian demand exists but the natural pedestrian desire line results in unsafe crossings, such as locations where visibility (for pedestrians or motorists) is obstructed and the obstruction cannot be reasonably removed.
## Table 2. Recommendations for Considering Marked Crosswalks and Other Needed Pedestrian Improvements Across Uncontrolled Approaches

<table>
<thead>
<tr>
<th>Roadway Configuration</th>
<th>Roadway ADT and Speed Limit</th>
<th>1,500 to 9,000 VPD</th>
<th>9,000 to 12,000 VPD</th>
<th>12,000 to 15,000 VPD</th>
<th>More than 15,000 VPD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>≤ 30 MPH 35 MPH 40 MPH ≥ 45 MPH</td>
<td>≤ 30 MPH 35 MPH 40 MPH ≥ 45 MPH</td>
<td>≤ 30 MPH 35 MPH 40 MPH ≥ 45 MPH</td>
<td>≤ 30 MPH 35 MPH 40 MPH ≥ 45 MPH</td>
<td>≤ 30 MPH 35 MPH 40 MPH ≥ 45 MPH</td>
</tr>
<tr>
<td>2 Lanes (undivided two-way street or two-lane one-way street)</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>3 Lanes with refuge island OR 2 Lanes with raised median*</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>3 Lanes (center turn lane)</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>4 Lanes (two-way street with no median)</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>5 Lanes with refuge island OR 4 lanes with raised median*</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>5 Lanes (center turn lane)</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>6 Lanes (two-way street with* or without median)</td>
<td>A</td>
<td>B</td>
<td>D</td>
<td>D</td>
<td>B</td>
</tr>
</tbody>
</table>

Source: Guidance for Installation of Pedestrian Crosswalks on Michigan State Trunkline Highways (Michigan Department of Transportation, 2014)

### Conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Candidate site for marked crosswalk alone (standard if speed limit is 30 MPH or less, high-visibility if speed limit is 35 MPH or greater). Evaluate need for advance signing</td>
</tr>
<tr>
<td>B</td>
<td>Potential candidate site for marked crosswalk. Location should be monitored &amp; consideration given to providing a high-visibility crosswalk and/or warning signs (see Section 7.2)</td>
</tr>
<tr>
<td>C</td>
<td>Marked crosswalks alone are insufficient. The crosswalk shall use a high-visibility pattern and other improvements (warning signs and/or geometric/ traffic calming improvements) (see Section 7.2) will likely be necessary.</td>
</tr>
<tr>
<td>D</td>
<td>Marked crosswalks shall not be installed</td>
</tr>
</tbody>
</table>
The pedestrian walkway through a refuge island shall be at least 5 feet wide (6 feet width or greater is preferred) and at least 6 feet long to be considered a safe refuge area (see detail on the bottom right from VDOT Standard Drawing CG-12). A raised median generally provides greater pedestrian-vehicle crash reduction benefit than a flush (painted) median, however the presence of a painted median can also provide advantages to the crossing pedestrian over an undivided road.

6.0 CROSSWALK DESIGN

6.1 – Crosswalk Width and Location

In general, crosswalks should be the same width as the pedestrian facility on either side of the roadway, subject to the following requirements:

- Crosswalks shall be at least six feet wide as per the MUTCD, and
- Crosswalks should be at least seven feet wide in order to allow two wheelchairs, parents with strollers, etc. to pass each other.

Wider crosswalks than described above should be provided at locations with heavy pedestrian volumes during peak periods, to avoid creating situations where pedestrians are “crowded out” of the crosswalk. The width should not exceed 10 feet except when necessary to accommodate peak pedestrian periods at locations with exceptionally high pedestrian activity. Crosswalks that are part of a shared use path should be at least as wide as the path (ten feet recommended) to accommodate bicyclists passing in both directions.

Unnecessarily wide crosswalks can result in the stop lines having to be placed further back from the intersection which in turn can have an adverse impact on driver’s sight distance.

Crosswalks shall start and end at curb ramps where curb is present. Crosswalks shall be straight and not kinked, except that crosswalks may change direction from within a refuge island. If existing curb ramps are present on a project involving alterations, then it might be necessary to reconstruct/relocate existing curb ramps and/or modify existing raised medians in order to provide crosswalks at a logical location.

6.2 – Crosswalk Marking Patterns

Marked crosswalk patterns can be divided into two basic categories: standard and high-visibility. Standard crosswalks use the transverse lines (two parallel lines) pattern. High-visibility crosswalks have bar-pairs, ladder, longitudinal lines, or zebra patterns. Permissible crosswalk marking patterns that may be used on VDOT-maintained roadways are shown in Table 3.
According to an FHWA study\(^3\), high-visibility crosswalks can have up to double the detection distance (for drivers approaching the crosswalk) compared to standard crosswalks - an 8 second increase in detection distance for a 30 mph approach. However, high-visibility crosswalks are also more expensive (as much as five times the cost) - both for initial installation and future maintenance. Some high-visibility crosswalk marking materials can also become slick when wet, potentially resulting in a loss of traction for vehicles (particularly motorcyclists and bicyclists) in the travel lanes as well as for pedestrians crossing the crosswalk. High-visibility crosswalks can lose some of their enhanced effectiveness if they are used too often.

**Standard crosswalks should be used for all marked crosswalks except at locations meeting the below criteria.**

A high-visibility crosswalk pattern shall be utilized where any of the following conditions exist:

- The crossing is at an uncontrolled roadway approach and meets Condition C (orange area) of the selection chart in Table 2,
- The crossing is located across a multilane roundabout approach or exit from a multi-lane roundabout,
- The crossing is part of a shared use path and crosses an uncontrolled roadway approach with a speed limit > 25 mph, or
- The crosswalk is part of a Pedestrian Hybrid Beacon (PHB) crossing.

High-visibility marked crosswalks should be installed at locations where all of the following conditions exist:

- The speed limit is > 25 mph,
- The crossing is across an uncontrolled roadway approach, and
- One or more of the following special conditions apply:
  - The crossing meets Condition B (yellow area) of the selection chart in Table 2,
  - The crossing is not illuminated by nearby roadway lighting,
  - Engineering judgment determines that the pedestrian crossing volume is expected to be very high\(^4\),
  - The crossing is part of a walking route approximately ¼ mile or less between a residental development of moderate or heavy density and a school or recreational area,
  - The crossing is connected by pedestrian facilities to a rail transit stop or major bus transfer station within walking distance of approximately ¼ mile or less,
  - The crosswalk is within a downtown Central Business District area, or
  - The crosswalk is in a location where the surrounding land use is indicative of walking as a transportation mode.

---


\(^4\) The designer should use local knowledge and site context to determine if current or anticipated pedestrian crossing volume could be considered “very high.” A crossing with very high pedestrian volume usually is expected to have pedestrian activity during most 15-minute daytime periods when weather conditions are conducive to walking. [EXPLANATION FOR MY EDIT: even in areas with tons of pedestrian movements like, say, right in front of the Metro stop, you probably have fairly light pedestrian volumes at certain hours. For example, 7:15 on a Sunday morning]
In addition, marked crosswalks across single-lane roundabout approaches and exits should use a high-visibility marking pattern.

High-visibility crosswalks may also be installed where engineering judgment determines that they are necessary to increase driver recognition distance to help compensate for other factors such as roadway geometry, visual clutter in the surrounding environment, crash history, and/or traffic and pedestrian volume patterns.

### Table 3 – Permissible Crosswalk Types on VDOT-maintained Roadways

<table>
<thead>
<tr>
<th>Type</th>
<th>Class</th>
<th>Design details</th>
<th>Sketch</th>
</tr>
</thead>
</table>
| Transverse Lines    | Standard       | • The transverse lines shall be between 6" and 12" in width.  
• Typically, VDOT uses 6" width, however 8", 10", or 12" widths can be used to increase the visibility of the lines as they become worn over time. | ![Sketch](transverse_lines.png) |
| Longitudinal Lines  | High-Visibility| • Refer to PM-3 standards for details of longitudinal line widths and placement.  
• Longitudinal lines should be spaced to avoid the wheel paths of through vehicles. | ![Sketch](longitudinal_lines.png) |
| Bar Pairs           | High-Visibility| • Identical to Longitudinal Lines crosswalk, but uses pairs of 8” lines with 8” gap (8/8/8 pattern) in lieu of a 24” longitudinal line.  
• Spacing between the 8/8/8 bar pairs shall be the same as the requirements of PM-3 for spacing between Longitudinal Lines.  
• The bar pairs should be spaced to avoid the wheel paths of through vehicles. | ![Sketch](bar_pairs.png) |

Source: 2008 VDOT Road and Bridge Standards, Section 1330.33
Other high-visibility marking patterns, such as “ladder” or “zebra” markings, should not be used except when necessary to match the pattern of other adjacent marked crosswalks.

Bar Pairs crosswalks have several advantages over Longitudinal Lines crosswalks:

- An FHWA study of the Bar Pairs pattern concluded that it behaves comparably with the Longitudinal Lines pattern in terms of driver recognition and behavior,
- Similar cost as Longitudinal Lines crosswalks (although installation is slightly more complicated, the Bar Pairs crosswalk uses less marking material),
- Easier for motorcyclist/bicyclist traffic to avoid traveling over the pavement marking material, which may be slick when wet, and
- Easier for pedestrians to avoid stepping directly on the pavement marking material, which may be slick.

If an existing standard crosswalk is upgraded to a high-visibility crosswalk independent of a roadway resurfacing project, the transverse lines may be retained to eliminate the need for pavement marking eradication. The transverse lines should not be restored when the roadway is resurfaced.

### 6.3 – Aesthetic Treatments Between Crosswalk Lines

Localities may request the use of aesthetic treatments, such as stamped concrete, brick pavers, or thermoplastic patterned inlays, between the crosswalk lines. Such requests will be evaluated as per the latest edition of L&D Instructional & Informational Memorandum IIM-LD-218. Such aesthetic treatments by themselves do not constitute a marked crosswalk; they must be edged by transverse white lines to legally establish the marked crosswalk and also to provide visual contrast between the pavement and the aesthetic treatment.

As per Section 3G.01 of the 2009 MUTCD, aesthetic or colored pavement between crosswalk lines should not use colors or patterns that degrade the contrast of the white transverse crosswalk lines or that might be mistaken by road users as a traffic control application.

### 7.0 OTHER PEDESTRIAN CROSSING SAFETY TREATMENTS

#### 7.1 Pedestrian or School Regulatory and Warning Signs

Pedestrian/school regulatory and warning signs, when used, shall be located and installed in accordance with the MUTCD and the Virginia Supplement to the MUTCD.
7.2 Geometric/Traffic Calming Improvements

There are many options available to designers to modify or construct new roadway geometry to improve the safety of crossing pedestrians by achieving one or more of the following goals:

- Reducing the crossing distance length (which reduces the pedestrian’s exposure to traffic),
- Increasing the visibility of pedestrians who are crossing or waiting to cross, or
- Encouraging drivers to drive at slower speeds.

These options include:

- Installing corner or midblock bulb-outs,
- Installing median refuge islands and “choker” islands,
- Reducing corner radii,
- Increasing the intersecting angle of channelized turn lanes,
- Installing raised crosswalks, and/or
- Installing mini-roundabouts.

These design elements should be designed in accordance with Appendix B(2) of the latest effective version of VDOT’s Road Design Manual and DRPT’s Multimodal System Design Guidelines.

Traffic calming improvements on residential streets, such as raised crosswalks or choker islands, should be planned and designed in accordance with the latest effective version of VDOT’s Traffic Calming Guide for Local Residential Streets.

7.3 Midblock Pedestrian Signals and Pedestrian Hybrid Beacons

Vehicular traffic signals may be used to control a midblock pedestrian crossing if the traffic signal is warranted based on the Pedestrian Volume Warrant in Section 4C.05 of the 2009 MUTCD.

Pedestrian Hybrid Beacons (PHBs) may be used to control a midblock pedestrian crossing if warranted, designed, and operated as per Chapter 4F of the 2009 MUTCD. As per Official Interpretation 4(09)-14(I), a red clearance interval is permissible and should be considered between the start of the steady red phase and the start of the pedestrian walk interval, and then again between the end of the pedestrian walk interval and the end of the alternating flashing red interval. The duration of the flashing yellow interval should be as per Official Interpretation 4(09)-32(I).

PHBs shall not be installed where the crossing volume is less than 20 pedestrians per hour.
7.4 Rectangular Rapid Flashing Beacons (RRFBs)

If Condition B (yellow area) or C (orange area) is met in Table 2, RRFBs may be considered as an appropriate additional crossing treatment to supplement marked crosswalks.

RRFBs, similar to In-Roadway Warning Lights (IRWLs), rely on lights that flash upon pedestrian activation to alert drivers to the likely presence of pedestrians within or waiting to cross the crosswalk. However, RRFBs are mounted on the sign posts (or, less often, overhead) and therefore have lesser long-term maintenance costs than the in-pavement IRWLs which are subjected to vehicular wear, snowplows, and pavement resurfacing.

RRFBs are not currently included in the 2009 MUTCD and may only be used per the requirements of FHWA’s Interim Approval. In 2011 VDOT received Interim Approval from FHWA to operate RRFBs on VDOT maintained roads. Localities that maintain their own roads must separately apply for and receive Interim Approval from FHWA prior to installing RRFBs.

FHWA’s MUTCD Interim Approval website lists several Official Interpretations that clarify and/or amend the initial RRFB approval. These interpretations shall be followed when planning, designing, and operating RRFB installations. This website should be monitored periodically for updated Interpretations. Note that existing installations do require retrofits should new requirements come out after initial activation. As of the date of this revised IIM, the following interpretation subjects include:

Overhead Mounting, 2009
Use with W11-15 Sign, 2010
Light Intensity, 2012
Dimming during Daytime Hours, 2012
Flashing Extensions and Delays, 2013
Placement of Units above Sign, 2016

RRFBs should not be used indiscriminately. Overuse of RRFBs in the roadway environment could decrease not only the effectiveness of the RRFBs but those crossings without RRFBs.

7.4.1 Visibility

The sign and light components of the RRFBs should be prominently visible to approaching vehicles, and the RRFBs should have side indication lights informing pedestrians when the flashers are activated.
An RRFB assembly should be placed on the median or on an overhead mast arm at crossings with obstructed visibility for side-mounted traffic control devices (e.g. near side transit stops, trees, visual clutter, roadway geometry, large volume of heavy vehicles, and etc.).

If a median is present and the RRFBs are post-mounted, both right hand and median mounted RRFBs should be installed.

Advance RRFBs should be considered for any crossings that have excessive surrounding visual clutter, steep vertical and/or sharp horizontal roadway curvature.

7.4.2 Speed

There may be conditions that necessitate the installation of pedestrian crossings where speeds are higher and special consideration is warranted (B and C Conditions in Table 2 where speed limit is > 35 mph). Consideration should also be given to installing advance RRFBs on higher speed (> 35 mph) roadways even if there is adequate SSD on both approaches. See Figures 1 and 2 for additional guidance on low speed (≤ 35 mph) and high speed (> 35 mph) roadways.

Vehicle and Pedestrian/Bicycle Volume

RRFBs should not be installed unless there are a minimum of 20 pedestrians/bicyclists using the crosswalk in an hour. That threshold may be reduced to 10 pedestrians per hour if the crossing is expected to be used by a high number of vulnerable pedestrians (pedestrians who are disabled, aged 65 and over, or aged 15 and under), or if the reduced volume is met for three consecutive hours.

RRFBs shall not be installed if pedestrian and vehicular volumes fall outside the limit lines shown in Figures 1 and 2, unless approved by the Regional Traffic Engineer (RTE). RRFBs may not be appropriate in locations where there is a combination of both high traffic volumes and high pedestrian volumes (above the RRFB upper thresholds in the below figures). At such locations there may be an increase in crashes and/or traffic delay that make the use of RRFBs inappropriate. At such locations, PHBs, pedestrian traffic signals, or grade separated crossings should be considered. The colored lines in Figures 1 and 2 depict the warrant requirements for PHBs as per Section 4F.01 of the MUTCD.

Engineering judgement should take into account the proximity of adjacent signals.

If PHBs are considered, Section 4F of the 2009 MUTCD contains warranting guidelines that utilize traffic, automobile speeds, and pedestrian crossing distance.
7.5 **In-Roadway Warning Lights (IRWLs)**

IRWLs rely on lights embedded in the pavement that flash upon pedestrian activation or detection to alert drivers to the likely presence of pedestrians within or waiting to cross the crosswalk.

It is recommended that RRFBs or other treatments be considered in lieu of IRWLs due to their long-term maintenance costs.

8.0 **UNCONVENTIONAL LOCATIONS**

8.1 **T and Offset Intersections**

At closely spaced T and offset intersections, it might not be prudent or necessary to mark all legal crosswalks. At T intersections, it may be appropriate to only mark one of the two crossings.
across the through road. This decision should be based on pedestrian demand volumes and the
volume of left- and right-turning traffic from the stem of the T.

8.2 Roundabouts

Pedestrian crossings at roundabouts should be located and designed as per the latest effective
version of VDOT’s Road Design Manual, Chapter 2D, Roundabouts: An Informational Guide, 2nd
Edition (NCHRP Report 672), and the 2009 MUTCD, Section 3C.05.

The Code of Virginia’s definition of where unmarked crosswalks exist at intersections does not
necessarily apply to roundabout intersections. In order to establish that a crosswalk exists, and
also for safety reasons, marked crosswalks shall be provided across all legs of a roundabout
(both entrances and exits) where there are adjacent pedestrian facilities on both sides of the
leg, unless the Regional Traffic Engineer or designee concurs that a significant operational or
safety concern prevents their use.

Marked crosswalks at single-lane roundabouts should use a high-visibility marking pattern.
Marked crosswalks across multilane roundabout approaches or exits shall use a high-visibility
marking pattern.

Note that neighborhood traffic circles that do not meet the design criteria for a modern
roundabout (e.g. lack of splitter islands) need not have marked crosswalks. Unmarked
crosswalks are typically sufficient for neighborhood traffic circles and other subdivision streets.

8.3 Interchanges

Due to high-speed merging and diverging traffic that may be present on the cross road at
interchanges, it may be desirable to limit the pedestrian pathway through the interchange to just
one side of the cross street. Pedestrian pathways through interchanges need to be carefully
planned to take into account conflicts from merging and diverging traffic. At free-flowing or
YIELD controlled ramps, the crosswalk should be installed perpendicular to the ramp at a
location where sight distance is optimal, even if this location is further away from the parallel
roadway.

For interchanges with multiple merging and diverging ramps, such as cloverleaf interchanges
and Diverging Diamond Interchanges (DDIs), it may be desirable to provide a pedestrian
pathway through the median of the cross road to minimize pedestrian-vehicle conflict if space
for a pedestrian facility in the median exists.
9.0 REFERENCE

- VDOT Policy for Integrating Bicycle and Pedestrian Accommodations
- 2009 MUTCD with Revisions
- 2011 Virginia Supplement to the MUTCD With Revisions
- VDOT Road Design Manual (latest effective version)
- 2008 VDOT Road and Bridge Standards
- DRPT Multimodal System Design Guidelines
- Instructional & Informational Memorandum IIM-LD-218, Latest Revision
- City of Boulder Pedestrian Crossing Treatment Installation Guidelines
- MDOT Guidance for Installation of Pedestrian Crosswalks on Michigan State Trunkline Highways
- FHWA Crosswalk Marking Field Visibility Study
ATTACHMENT B

Complete Section

Virginia Code 46.2-924 Signing and Marking Criteria
BACKGROUND:

- Virginia Code Section §46.2-924 Part 3C states that certain localities in Northern Virginia District may impose a fine for drivers who fail to yield the right-of-way to pedestrians crossing or attempting to cross the highway, provided the following:
  - The fine is enacted by ordinance and the crosswalk is marked
  - There are standard highway signs informing drivers of their duty to yield to pedestrians at each and every crossing location covered by the higher fines ordinance
- This document provides VDOT's “criteria for the design, location and installation of such signs” as required by §46.2-924.
- These criteria are based primarily on the FHWA Manual on Uniform Traffic Control Devices (MUTCD), the Virginia Supplement to the MUTCD and traffic engineering best practices.
- Localities that maintain their own roads shall still abide by these criteria and by the MUTCD. They may also choose to adopt the Virginia Supplement to the MUTCD.
- The current edition of the MUTCD and Virginia Supplement became effective January 1, 2012 and should be followed as outlined in both manuals.

CRITERIA:

- The crosswalk marking pattern and dimensions shall be as per this IIM, preferably with high-visibility marking patterns.
- An R1-5 or R1-5A “Yield Here to Pedestrians” sign shall be placed approximately 20-50 feet upstream of the near crosswalk edge in both directions, as per Section 2B.11 of the MUTCD.
  - Signs that read “Stop for Pedestrians” shall not be used, as the Code requires drivers to “yield” to pedestrians.
- A R2-6P “Fines Higher” or R2-6bP “$XXX Fine” sign shall be placed below the R1-5/R1-5a signs, as required by Section 2B.17 of the MUTCD.
- On multilane approaches, the R1-5/R1-5a sign should be coupled with yield line markings (“shark’s teeth”) MUTCD Markings Requirements Section 3B.16, Figures 3B-16 and 3B-17, or other approved markings.
- Alternatively, the locality may modify the R1-6 “State Law Yield to Pedestrians Within Crosswalk” or overhead R1-9 “State Law Yield to Pedestrians” sign to add a “Fines Higher” or “$XXX fine” message, using black all-caps text on white background.
  - As per Section 2B.12 of the MUTCD, modified R1-6 signs shall not be post-mounted on the left or right side of the highway.

Standard signs shall be erected and maintained by localities. On VDOT-maintained roads, the VDOT Regional Traffic Engineer or designee shall approve these sign locations.
ATTACHMENT C

Process Flow Charts for Determining Appropriate Pedestrian Crossing Accommodations at Unsignalized Locations

ATTACHMENT CONTENTS

- Figure C1. Potential Crosswalk Flow Chart ................................................................. C1
- Figure C2. Stop or Yield Controlled Flow Chart .......................................................... C2
- Figure C3. Uncontrolled Approach Flow Chart ......................................................... C3
- Figure C4. Table 2 Flow Chart ....................................................................................... C4
Figure C1. Potential Crosswalk Flow Chart

- **POTENTIAL CROSSWALK**
  - **INTERSECTION OF TWO LOW-SPEED “LOCAL” ROADWAYS?**
    - **YES**
    - **PRESENT OR FUTURE PED-ORIENTED LAND USE ON BOTH SIDES?**
      - **YES**
      - **MARKED CROSSWALK NOT NECESSARY**
      - **GO TO UNCONTROLLED FLOW CHART**
      - **ACROSS STOP OR YIELD CONTROLLED APPROACH TO INTERSECTION**
        - **YES**
        - **GO TO STOP/YIELD CONTROLLED FLOW CHART**
    - **NO**
    - **PED FACILITIES ON BOTH SIDES?**
      - **YES**
      - **GO TO UNCONTROLLED FLOW CHART**
      - **NO**

Date: July 18, 2016
Figure C2. Stop or Yield Controlled Flow Chart

STOP OR YIELD CONTROLLED

PART OF ¼ MILE OR SHORTER ROUTE BETWEEN RESIDENTIAL DEVELOPMENT AND SCHOOL OR REC. AREA

YES

WITHIN ¼ MILE OF RAIL TRANSIT OR MAJOR BUS-TRANSFER STATION

NO

INSTALL STANDARD CROSSWALK

YES

SHARED USE PATH

NO

YES

YIELD-CONTROLLED OR CHANNELIZED RIGHT TURN

NO

CBD OR KNOWN PED ACTIVITY CLEAR WITH EVIDENCE OF PED ACTIVITY

YES

NO ACTION – UNMARKED CROSSWALK

NO
Figure C3. Uncontrolled Approach Flow Chart

UNCONTROLLED APPROACH (LEAVE IT UNMARKED IF ≤ 1500 ADT)

ON DIRECT ROUTE BETWEEN SIGNIFICANT PED GENERATORS

NO

300 FEET FROM NEAREST CROSSWALK

NO

ENGINEERING JUDGMENT DETERMINES SUFFICIENT DEMAND

YES

NO ACTION

YES

ENGINEER DETERMINES MARKED CROSSWALK WILL PRODUCE UNACCEPTABLE SAFETY HAZARD

NO

MEETS SSD REQUIREMENT IN TABLE 1

NO

CAN SSD ISSUE BE FIXED?

YES

REFER TO TABLE 2

NO

REFER TO TABLE 2 – MIN. “C” CONDITION
Figure C4. Table 2 Flow Chart

TABLE 2

CONDITION A MET?

ROADWAY ≥ 35 MPH?

CONDITION B MET?

CONDITION C MET?

ARE MITIGATION MEASURES NEEDED (GEOMETRIC OR SIGNS)?

CONDITION D MET?

NO ACTION

NO

YES

YES

NO

NO

YES

IMPLEMENT MITIGATION MEASURES

HIGH-VISIBILITY CROSSWALK

TRANSVERSE LINES CROSSWALK

I&I Memorandum 384.0 – Ped Crossing Accommodations at Unsignalized Locations – ATTACHMENT C

July 18, 2016
ATTACHMENT D

Data Collection Sheets for Pedestrian Crossing Accommodation Studies at Unsignalized Locations

ATTACHMENT CONTENTS

914 Data Collection Sheet: Location Description Part 1 .................................................. D1
915 Data Collection Sheet: Location Description Part 2 .................................................. D2
916 Data Collection Sheet: Traffic Data .......................................................................... D3
## LOCATION DESCRIPTION – PART 1

Name of Data Collector: ________________________________________________________________

Date of Data Collection: _____________________________________________________________________________

Locality/District of Study Location: _____________________________________________________________________________

1) Crossing Location: □ Unsignalized Intersection □ Mid-block

If crossing is (or will be) at unsignalized intersection location, define intersecting streets:

<table>
<thead>
<tr>
<th>Major Street</th>
<th>Name:</th>
<th>Functionality: □ Arterial □ Collector □ Local</th>
<th>Posted Speed Limit: ___________ MPH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor Street</td>
<td>Name:</td>
<td>Functionality: □ Arterial □ Collector □ Local</td>
<td>Posted Speed Limit: ___________ MPH</td>
</tr>
</tbody>
</table>

If crossing is (or will be) at mid-block location, define location on major street:

<table>
<thead>
<tr>
<th>Major Street</th>
<th>Name:</th>
<th>Functionality: □ Arterial □ Collector □ Local</th>
<th>Location Description (e.g. 500 ft East of Main St.):</th>
</tr>
</thead>
</table>

2) Is this a shared-use path (e.g. bicycles) crossing? □ Yes □ No

3) Existing Nearby Pedestrian Generators and Attractors (e.g. moderate density residential developments, schools, parks, commercial establishments, transit stops):

North/East of crossing: ____________________________________________________________

South/West of crossing: ____________________________________________________________

4) Existing Traffic Control: □ Stop/Yield Sign □ Uncontrolled

5) Is there Another Marked Crosswalk across the same roadway within 300 feet of the Crossing Location? □ Yes □ No

6) Existing Crossing Treatments (if any) (e.g. standard crosswalk, curb ramps, and etc.):

_____________________________________________________________________________________

_____________________________________________________________________________________

7) *(for stop/yield controlled locations only)* Is the Crossing Location Across a Yield-controlled Approach at an Off-ramp Junction or Channelized Right Turn Lane? □ Yes □ No
### LOCATION DESCRIPTION – PART 2

8) Roadway Configuration:
- □ 2-Lanes (one-way street)
- □ 2-Lanes (two-way street with no median)
- □ 2-Lanes with raised median
- □ 3-Lanes with refuge island
- □ 3-Lanes (center turn lane)
- □ 4-Lanes (two-way street with no median)
- □ 4-Lanes with raised median
- □ 5-Lanes with refuge island
- □ 5-Lanes (center turn lane)
- □ 6-Lanes (two-way street with or without median)
- □ Other: ____________________________

9) Crossing Distance by Direction:
- Total: _______ ft
- (if applicable) From one end to the median: _______ ft, Direction: _______
- (if applicable) From other end to the median: _______ ft, Direction: _______

10) Nearest Marked or Protected Pedestrian Crossing: __________________ Distance to: _______ ft

11) Could the Crossing Contain a Crosswalk of at Least 6 ft in Width? □ Yes □ No

12) *(for uncontrolled locations only)* Stopping Sight Distance (SSD):
- _______ ft, Direction: _______
- _______ ft, Direction: _______
- Can SSD be improved? □ Yes □ No □ Other: ____________________________

13) Potential Safety Hazard within Crossing Location (if any):
- __________________________________________________
  _____________________________________

14) Sketch/Photo of the Crossing Location:
### STEP 3 – TRAFFIC DATA

What are the peak period(s) for pedestrian activity?

- □ AM  □ PM  □ Midday  □ Other: ____________________________

Major Street Vehicular Volume (ADT): ______________ vehicles/day

(if applicable) Minor Street Vehicular Volume (ADT): ______________ vehicles/day

(Complete where appropriate) Pedestrian Crossing Volumes / Bicycle Crossing Volumes:

<table>
<thead>
<tr>
<th>Time:</th>
<th>AM</th>
<th>Mid-day</th>
<th>PM</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date / Day of Week:</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
</tr>
<tr>
<td>Major Street Vehicular Volume (Hourly):</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of Bicyclists (if known)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td># of Pedestrians (if known)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Is a significant proportion of the pedestrians at this location expected to be young (middle school students or below), elderly, or disabled?

- □ Yes  □ No  Describe: ____________________________

_________________________________