VERMONT AGENCY OF TRANSPORTATION

GUIDELINE FOR THE INSTALLATION OF CROSSWALK MARKINGS AND PEDESTRIAN SIGNING AT MARKED AND UNMARKED CROSSINGS

(Revised July 2004)

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1.0 Introduction

1.1 Use of Guideline:

The purpose of this guideline is to ensure that pedestrian crossings are treated consistently throughout the state, on both state highways and local roads, by providing guidance on the location of marked and unmarked crossings, and the associated pavement markings and signs.

This guideline is intended to supplement the Manual on Uniform Traffic Control Devices (MUTCD), and conflicts between the two documents should defer to the latest edition of the MUTCD. References to sections of the MUTCD in this guideline correspond to the 2003 Edition.

This guideline is also intended to incorporate Vermont state law where applicable. Conflicts between this guideline and the latest statutes should defer to the statute. References in this guideline correspond to the 2004 Motor Vehicle Laws of Vermont.

It must be recognized that not all situations can be adequately addressed in this guideline; therefore engineering judgment must be used at all times.

The Vermont Pedestrian and Bicycle Facility Planning and Design Manual, published by VTrans, also contains valuable information about crosswalk design. Included in that manual are recommendations on making pedestrian facilities accessible to all users and meeting Americans with Disabilities Act (ADA) requirements.

Prior to the marking of pedestrian crosswalks on public highways under their respective jurisdiction, the responsible municipal official or the District Transportation Administrator should review the plan of the proposed markings to ensure that the crosswalks conform to this guideline, the MUTCD, and state statutes.

Crosswalk markings shall only be installed and/or maintained after receiving written approval from the appropriate governing entity: Agency of Transportation in the case of state highways, Select Board in the case of town highways, or legislative body of a city in the case of city streets.

The following excerpts from the MUTCD and the Vermont Statutes provide the framework for this guideline.

1.2 MUTCD Support and Guidance:

MUTCD Section 3B.17 states in part:

> "Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within

signalized intersections, and on approaches to other intersections where traffic stops.

Crosswalk markings also serve to alert road users of a pedestrian crossing point across roadways not controlled by traffic signals or STOP signs.

At non-intersection locations, crosswalk markings legally establish the crosswalk.

Crosswalks should be marked at all intersections where there is substantial conflict between vehicular and pedestrian movements.

Marked crosswalks also should be provided at other appropriate points of pedestrian concentration, such as … mid-block pedestrian crossings, or where pedestrians could not otherwise recognize the proper place to cross.

Crosswalk lines should not be used indiscriminately. An engineering study should be performed before they are installed at locations away from traffic signals or STOP signs.

Because non-intersection pedestrian crossings are generally unexpected by the road user, warning signs … should be installed and adequate visibility should be provided by parking prohibitions."

1.3 Vermont Law:

The following are excerpts from the Vermont Statutes, 2004 Edition, as they refer to pedestrian crossings:

Title 23 Section 4 **Definitions** (7) "**Crosswalks**": Defines crosswalks as:

(A) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs, or, in the absence of curbs, from the edges of the traversable roadway.

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

Title 23 Section 1025 **Adopts the MUTCD** as Vermont's "standards for all signs, signals and markings within the state."

Title 19 Section 905b **Crosswalks** states:

All crosswalk markings shall be of uniform color, dimension and location and be in conformance with the United States Department of Transportation Federal Highway Administration's Manual on Uniform Traffic Control Devices.

Title 23 Section 1051 **Pedestrians' right of way in crosswalks** states:

> (a) If traffic-control signals are not in operation, the driver of a vehicle shall yield the right-of-way, slowing down or stopping if necessary, to a pedestrian crossing the roadway within the crosswalk.
>
> (b) No pedestrian may suddenly leave a curb or other place of safety and walk or run into the path of a vehicle which is so close that it is impossible for a driver to yield.
>
> (c) If any vehicle is stopped at a marked crosswalk or at any unmarked crosswalk at an intersection to permit a pedestrian to cross the roadway, the driver of any other vehicle approaching from the rear may not overtake and pass the stopped vehicle.

Title 23 Section 1052 **Crossing except at crosswalks** states**:**

> (a) Every pedestrian crossing a roadway at any point other than within a marked crosswalk shall yield the right-of-way to all vehicles upon the roadway.
>
> (b) Every pedestrian crossing a roadway at a point where a pedestrian tunnel or overhead pedestrian crossing has been provided shall yield the right of way to all vehicles upon the roadway.
>
> (c) Between adjacent intersections at which traffic-control signals are in operation pedestrians may not cross at any place except in a marked crosswalk.
>
> (d) No pedestrian may cross a roadway intersection diagonally unless authorized by official traffic-control devices or an enforcement officer. When authorized to cross diagonally, pedestrians may cross only in accordance with the official traffic-control devices or signal of an enforcement officer.

Title 23 Section 1053 **Drivers to exercise due care** states:

> Notwithstanding the provisions of this chapter every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian upon any roadway, shall give warning by sounding the horn when necessary, and shall exercise proper precaution upon observing any child or any obviously confused or incapacitated person upon a roadway.

Title 23 Section 1054 **Pedestrians to use right half of crosswalks** states:

> Pedestrians may move, whenever practicable, upon the right half of crosswalks only.

Title 23 Section 1057 **Duty toward Blind Persons** sets forth the requirement for drivers to stop for persons guided by a guide dog or displaying a white or white tipped with red cane and requires that only blind persons may use those.

Title 23 Section 1058 **Duties of pedestrians** states:

> All pedestrians shall obey the instructions of all traffic control devices which are applicable to them, and all instructions of enforcement officers relating to control of traffic.

Title 23 Section 1104(a)(2)(C) **Stopping Prohibited** states:

> Except when necessary to avoid conflict with other traffic, or in compliance with law or the directions of an enforcement officer or official traffic-control device, no person may stand or park a vehicle, whether occupied or not, except momentarily to pick up or discharge a passenger, within 20 feet of a crosswalk at an intersection.

2.0 Design of Marked Crosswalks

2.1 Pavement Markings:

Crosswalk markings must conform to the MUTCD. It is also recommended that a municipality select just one of the marking patterns below for exclusive use within its jurisdiction. VTrans has adopted the block pattern as its preferred crosswalk marking pattern due to greater visibility and reduced wear due to traffic. Crosswalks should be marked as close to perpendicular to traffic as possible.

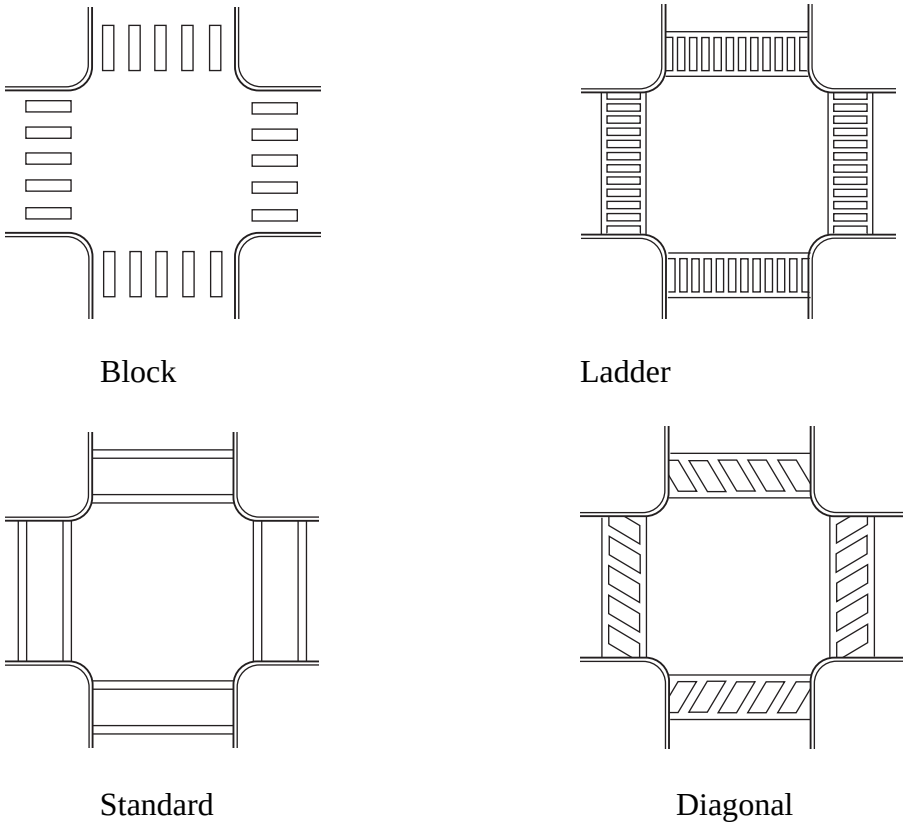

Figure 1: Allowable crosswalk marking patterns

2.1.1 MUTCD Standards and Guidance:

MUTCD Section 3A.02 contains the standard for pavement marking retroreflectivity:

> **"Markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible."**

MUTCD Section 3B.17 provides standards and guidance for the design of crosswalks. Those portions specifying the design of the pavement markings are excerpted as follows:

> **"Standard:**
>
> **When crosswalk lines are used, they shall consist of solid white lines that mark the crosswalk. They shall be not less than 150 mm (6 in) nor greater than 600 mm (24 in) in width.**
>
> Guidance:
>
> If transverse lines are used to mark a crosswalk, the gap between the lines should not be less than 1.8m (6 ft). If diagonal or longitudinal lines are used without transverse lines to mark a crosswalk, the crosswalk should not be less than 1.8 m (6 ft) wide. *[Note: VTrans Standards call for a minimum crosswalk width of 2.4m (8 ft).]*
>
> Crosswalk lines, if used … should extend across the full width of pavement or to the edge of the intersecting crosswalk to discourage diagonal walking between crosswalks.
>
> Option:
>
> For added visibility, the area of the crosswalk may be marked with diagonal lines at a 45-degree angle to the line of the crosswalk or with white longitudinal lines parallel to traffic flow.
>
> When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. This type of marking may be used at locations where substantial numbers of pedestrians cross without any other traffic control device, at locations where physical conditions are such that added visibility of the crosswalk is desired, or at places where a pedestrian crosswalk might not be expected.
>
> Guidance:
>
> If used, the diagonal or longitudinal lines should be 300 to 600 mm (12 to 24 in.) wide and spaced 300 to 1500 mm (12 to 60 in.) apart. The marking design should

avoid the wheel paths, and the spacing should not exceed 2.5 times the line width."

MUTCD Section 3B.16 provides standards and guidance for the placement of Stop and Yield lines. The guidance as it applies to crosswalks is as follows:

"Guidance:

If used, stop and yield lines should be placed a minimum of 1.2m (4 ft) in advance of the nearest crosswalk line at controlled intersections, except for yield lines at roundabout intersections as provided for in section 3B.24 and at midblock crosswalks.

If used at an unsignalized midblock crosswalk, yield lines should be placed adjacent to the Yield Here to Pedestrians sign located 6.1 to 15 m (20 to 50 ft) in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield line and the crosswalk."

MUTCD Section 3B.24 provides guidance for the placement of crosswalk markings at roundabouts:

"Guidance:

Where crosswalk markings are used, these markings should be located a minimum of 7.6 m (25 ft) upstream from the yield line, or if none, from the dotted white line."

2.2 Other Issues:

2.2.1 ADA Compliance:

Where crosswalks provide access to sidewalks, curb ramps that meet the ADA Accessibility Guidelines (ADAAG) must be provided at both ends of the crosswalk. Truncated domes are also required at curb ramps. (See VTrans Standard C-3A and C-3B for curb ramp construction details.) If a crosswalk leads to a paved shoulder, it should meet ADAAG regarding width (minimum 900mm (36 in)) and cross-slope (maximum 2%) to the extent feasible.

2.2.2 Shared-Use Paths:

Where shared-use paths cross roadways, crosswalks may be marked as for mid-block crossings. Cyclists are expected to dismount and cross the roadway as pedestrians to be afforded the same legal status as pedestrians.

Crosswalk markings should only be used at shared use path road crossings where needed to raise motorists' awareness of the presence of a crossing or to provide path users with

additional crossing guidance, such as when the continuation of the shared use path on the other side of the road is unclear. Provision of a marked crosswalk for a shared use path crossing is dependent on: anticipated path volume, traffic volume of the road being crossed, number of lanes being crossed, posted speed of road, anticipated types of path users (e.g. high pedestrian volumes). Crosswalks at shared use paths are most appropriate in urban and village areas where pedestrian traffic is expected. Refer to the Vermont Pedestrian and Bicycle Facility Planning and Design Manual for further information.

2.2.3 Colored and Textured pavement:

In village and downtown centers, colored and textured pavement may be used to enhance the aesthetics of crosswalks. These options have not been proven to substantially improve the safety, or visibility to the driver, of the crosswalk.

The most common treatment is a terra-cotta colored, brick pattern that is stamped into newly laid asphalt. In accordance with the MUTCD, white, yellow, blue, or red shall not be used for this purpose.

Transverse white crosswalk markings must be used in addition to the colored or textured pavement in order to legally establish the crosswalk.

2.2.4 Use of Fluorescent Yellow-Green Signs:

MUTCD Section 2C.41 provides standard and guidance for crossing signs. The following excerpts relate to use of Fluorescent Yellow-Green Signs:

> "Option:
>
> Pedestrian, Bicycle, and School signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.
>
> Guidance:
>
> When a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green within a selected site area should be avoided."

It is VTrans "practice to specify fluorescent yellow-green sheeting for all school zones signs. Additionally, if an evaluation of sight distances at pedestrian or bicycle crossings shows that the sight distances are less than the stopping sight distance for the posted or prevailing speed a that location, the fluorescent yellow-green sheeting may be used. This sheeting should not be used indiscriminately for all pedestrian or bicycle crossing signs but shall be restricted to the situations described above." *[per 3/27/01 guidance memo from David Scott, Director of Program Development.]*

2.2.5 In-street pedestrian crossing signs

In-street pedestrian crossing signs must be approved by VTrans for use on state highways, by obtaining a permit from the Traffic Operations Section. Permits for use of reflectorized cones or barrels for this purpose will no longer be issued. One sign per crosswalk location may be permitted. The sign should be placed at the roadway centerline adjacent to the crosswalk, not within the crosswalk itself. If a central island is provided, the sign should be placed on the island.

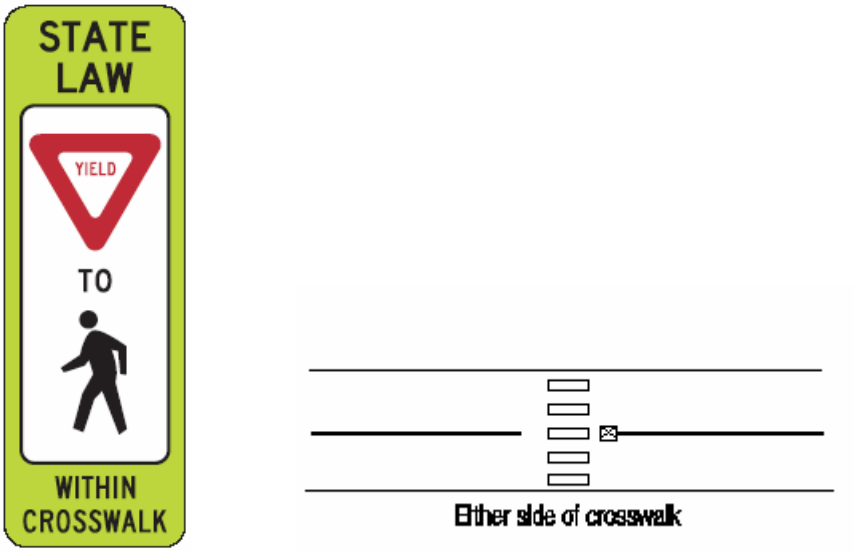

Figure 2: In-Street Pedestrian Crossing Sign

MUTCD Section 2B.12 provides standards and guidance for the use of in-street pedestrian crossing signs.

> "Option:
>
> The In-Street Pedestrian Crossing (R1-6 or R1-6a) sign may be used to remind road users of laws regarding right of way at an unsignalized pedestrian crossing. The legend STATE LAW may be shown at the top of the sign if applicable. The legends STOP FOR or YIELD TO may be used in conjunction with the appropriate symbol. *[Note: Vermont State Law specifies that drivers must YIELD TO pedestrians in crosswalks.]*
>
> Guidance:
>
> If an island is available, the In-Street Pedestrian Crossing Sign, if used, should be placed on the island.

Standard:

The In-Street Pedestrian Crossing sign shall not be used at signalized intersections.

The STOP FOR legend shall only be used in States where the state law specifically requires that a driver must stop for a pedestrian in a crosswalk.

If used, the In-Street Pedestrian Crossing sign shall have a black legend (except for the red STOP or YIELD sign symbols) and border on either a white and/or fluorescent yellow-green background. *[Note: It is VTrans practice to require that the background color of the In-Street Pedestrian Crossing sign match the color of the associated pedestrian crossing signs, which may be yellow, fluorescent yellow, or fluorescent yellow-green. This has been approved by FHWA.]*

If the In-Street Pedestrian Crossing sign is placed in the roadway, the sign support shall comply with the breakaway requirements of the latest edition of AASHTO's "Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals"

Option:

The In-Street Pedestrian Crossing sign may be used seasonably to prevent damage in winter because of plowing operations, and may be removed at night if the pedestrian activity at night is minimal." *[Note: It is VTrans practice to require the removal of these signs at night by the permit holder.]*

3.0 Marked Crosswalks at Intersections

3.1 Signalized Intersections:

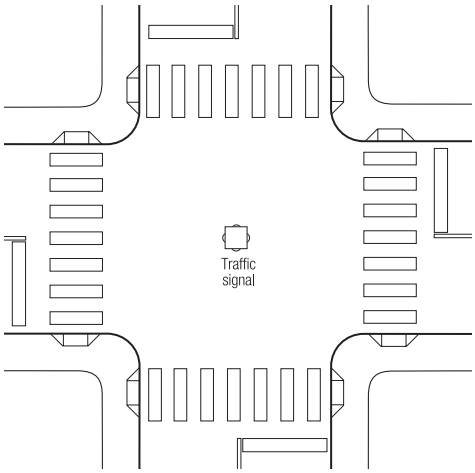

Figure 3: Traffic Signal Controlled Intersections

3.1.1 Criteria for installation:

Exclusive or Concurrent Pedestrian Phase:
Intersections with a traffic signal timed for concurrent pedestrian movements shall have crosswalks applied on the roadway approaches that have sidewalks on both sides of the approach. Crosswalks should not be installed in the absence of sidewalks unless adequate shoulders exist for use by pedestrians. The determination of adequate shoulder should be based upon an assessment of traffic volumes, adjacent land use patterns and other site specific conditions.

No pedestrian timing:
Intersections with a traffic signal which is not timed to accommodate concurrent or exclusive pedestrian movements, or have traffic signal heads that cannot be seen by the pedestrian, shall have no crosswalks applied on the roadway approaches which might be used by the pedestrian.

3.1.2 No parking zone:

In accordance with state law, parking spaces shall not be marked within 6 m (20 ft) of a marked crosswalk at an intersection, as measured by the gap between the parking space and the closest crosswalk marking. The MUTCD recommends a 9 m (30 ft) minimum no parking zone for signalized intersections. On state highways, VTrans Standard E-193 requires a 9 m (30 ft) minimum no parking zone in advance of crosswalks at signalized intersections.

3.1.3 Pedestrian Warning Signs:

In accordance with the MUTCD, there shall be no pedestrian crossing signs installed at the marked crosswalks nor shall advance pedestrian warning signs be installed on the approaches to a signalized intersection.

3.2 Unsignalized Intersections – Stop or Yield Sign Controlled Approaches:

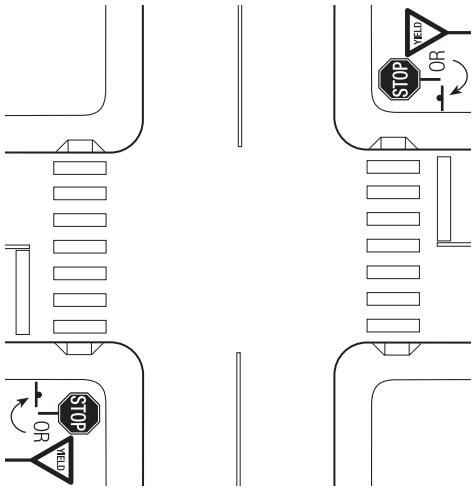

Figure 4: Stop or Yield controlled approach

3.2.1 Criteria for installation:

A crosswalk may be placed across an approach controlled by a stop or yield sign if a sidewalk exists on both sides of the roadway approach controlled by the stop or yield sign. Crosswalks should not be installed in the absence of sidewalks unless adequate shoulders exist for use by pedestrians. The determination of adequate shoulder should be based upon an assessment of traffic volumes, adjacent land use patterns and other site specific conditions.

In general, installation of 'parallel' crosswalks across the throat of driveways or minor side roads is not recommended unless there is a high potential for vehicle/pedestrian conflict that will be mitigated by a marked crosswalk.

3.2.2 Installation of Stop or Yield Line:

When a crosswalk is installed at a stop or yield controlled approach, a stop or yield line should also be installed. In accordance with the MUTCD, stop or yield lines should be marked a minimum of 1.2 m (4 ft) in advance of the nearest crosswalk line, as measured by the gap between the stop bar and the closest crosswalk marking.

3.2.3 No parking zone:

In accordance with state law, parking spaces shall not be marked within 6 m (20 ft) of the marked crosswalk, as measured by the gap between the parking space and the closest crosswalk marking.

3.2.4 Pedestrian Warning Signs:

There shall be no pedestrian crossing signs installed at the marked crosswalks nor shall advance pedestrian warning signs be installed on the stop or yield controlled approaches to an intersection.

3.3 Unsignalized Intersections – Roundabout:

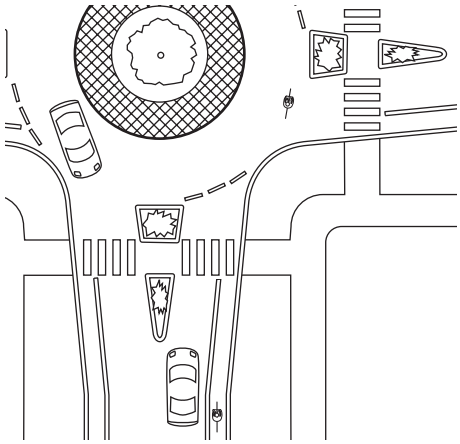

Figure 5: Roundabout approach

3.3.1 Criteria for installation:

A crosswalk may be placed across a roundabout approach if a sidewalk exists on both sides of the approach. Crosswalks should not be installed in the absence of sidewalks unless adequate shoulders exist for use by pedestrians. The determination of adequate shoulder should be based upon an assessment of traffic volumes, adjacent land use patterns and other site specific conditions.

In accordance with the MUTCD, where crosswalks are marked on roundabout approaches, they shall be marked a minimum of 7.6 m (25 ft) in advance of the yield line, or if none, from the edge of the circulating lane.

3.3.2 No parking zone:

In accordance with state law, parking spaces shall not be marked within 6 m (20 ft) of the marked crosswalk, as measured by the gap between the parking space and the closest crosswalk marking.

3.3.3 Pedestrian Warning Signs:

Pedestrian warning signs (W11-2 with downward arrow plaque W16-7P) shall be installed at each end of the crosswalk location. At either end, the sign shall be placed in advance of the crosswalk from the perspective of the driver in the adjacent travel lane, facing the driver.

Advance pedestrian warning signs (W11-2) shall be installed at a distance of at least 45 m (150 ft) but not exceeding 210 m (700 ft) in advance of the crosswalk, from the perspective of the driver approaching the roundabout. No advance warning sign is required within the roundabout. Advance warning signs will not be required in urban areas where pedestrian activity is an expected feature of the driving environment.

Advance pedestrian warning signs (W11-2) may be supplemented with supplemental plaques with the legend "AHEAD" (W16-7P) or "XXX FEET" (W16-2 or W16-2a).

3.4 Unsignalized Intersections – Uncontrolled Approaches:

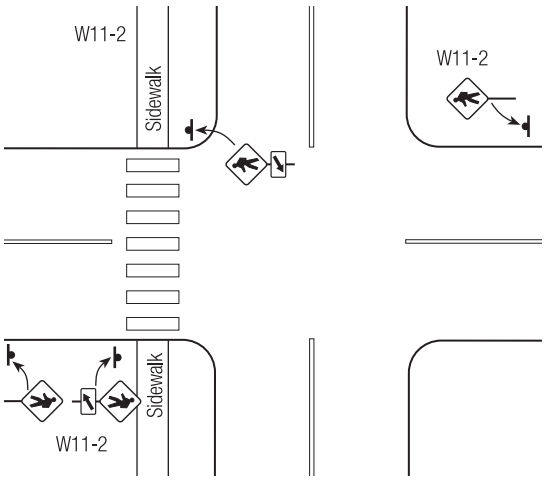

Figure 6: Uncontrolled intersection approach

3.4.1 Criteria for installation:

A crosswalk should not be installed at an intersection on a roadway approach that is not regulated by a traffic signal, a stop sign, or a yield sign unless all of the following criteria are met:

1. The speed limit is 40 mph or less, and;

2. There are 20 or more pedestrians using the crossing per hour during the vehicular A.M. and P.M. peak periods (lesser volumes may be considered if a large percentage of the pedestrian population consists of young, elderly, or disabled pedestrians), and;

3. The AADT (annual average daily traffic) for the roadway (both directions combined) exceeds 3000 vehicles per day, and;

4. A sidewalk or adequate shoulder for use by pedestrians (as determined by traffic volumes, adjacent land uses and other site specific considerations) exists on both sides of the roadway approach, and;

5. There is not another crosswalk across the same roadway within 60 m (200 ft) of the intersection, and;

6. Adequate sight distance (equal to or exceeding the stopping sight distance for the posted speed) is available in both directions. At a minimum, a driver must be able to see either the crosswalk or the pedestrian warning sign. It is recommended that sight distance be measured from the driver's perspective to the outer edges of the traveled lanes, to ensure that an approaching driver can see a pedestrian at any point on the crosswalk within the traveled way.

When a proposed crosswalk is associated with a new development, change in land use, or new pedestrian facilities, an engineering study may be used to predict whether these criteria will be met once the development or facility has been constructed.

Crosswalks should not be marked on 3 or 4 lane roadways with AADT greater than 9,000 vehicles per day unless other safety features, such as raised median refuges, traffic calming measures, or overhead lighting are included, and an engineering study concludes that pedestrian safety will be enhanced.

3.4.2 No parking zone:

In accordance with state law, parking spaces shall not be marked within 6 m (20 ft) of a marked crosswalk, as measured by the gap between the parking space and the closest crosswalk marking.

3.4.3 Pedestrian Warning Signs:

Pedestrian warning signs (W11-2 with downward arrow plaque W16-7P) shall be installed at each end of the crosswalk location. At either end, the sign shall be placed in advance of the crosswalk from the perspective of the driver in the adjacent travel lane, facing the driver.

Advance pedestrian warning signs (W11-2) shall be installed at a distance of at least 45 m (150 ft) but not exceeding 210 m (700 ft) in advance of the crosswalk, in either direction. Advance warning signs will not be required in urban areas where pedestrian activity is an expected feature of the driving environment.

Advance pedestrian warning signs (W11-2) may be supplemented with supplemental plaques with the legend “AHEAD” (W16-7P) or “XXX FEET” (W16-2 or W16-2a).

At locations along an established route to school, School Crossing signs (S1-1) may be used in place of the Pedestrian Warning signs (W11-2).

4.0 Marked Crosswalks at Mid-Block Locations

4.1 School Crossings:

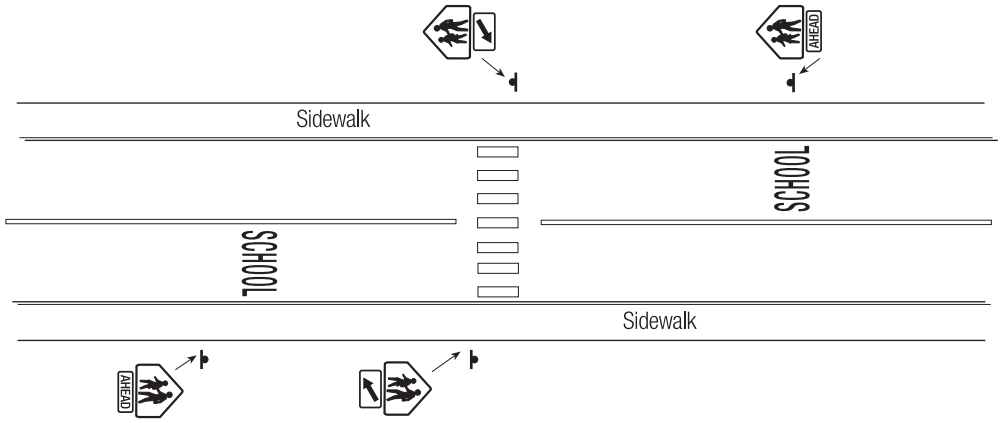

Figure 7: School Crossing

Crosswalks should be marked at locations on established routes to a school (if the school has established a school route plan) where there is a conflict between vehicles and school children, or where students would not otherwise know the proper place to cross. The following guidance is specific to locations adjacent to the school.

4.1.1 Criteria for installation:

All of the following criteria should be met prior to installing a crosswalk.

1. The speed limit is 40 mph or less, and;

2. A sidewalk or adequate shoulder for use by pedestrians (as determined by traffic volumes, adjacent land uses and other site specific considerations) exists on both sides of the roadway approach, and;

3. There is not another crosswalk across the same roadway within 60 m (200 ft), and;

4. Adequate sight distance (equal to or exceeding the stopping sight distance for the posted speed) is available in both directions. At a minimum, a driver must be able to see either the crosswalk or the school crossing sign. It is recommended that sight distance be measured from the driver's perspective to the outer edges of the traveled lanes, to ensure that an approaching driver can see a pedestrian at any point in the crosswalk within the traveled way.

There is no minimum pedestrian volume for a school crossing.

It is recommended that a trained crossing guard be present at the times when there is crossing activity by students.

When a proposed crosswalk is associated with a new development, change in land use, or new pedestrian facilities, an engineering study may be used to predict whether these criteria will be met once the development or facility has been constructed.

4.1.2 No parking zone:

Parking spaces should not be marked within 6 m (20 ft) of a marked crosswalk, as measured by the gap between the parking space and the closest crosswalk marking. If a bulbout is used, the gap may be reduced to 3 m (10 ft). Parents should be discouraged from using the area adjacent to the crosswalk for pickups and dropoffs.

4.1.3 School Crossing Signs:

1. The School Advance Warning Assembly consists of the School Crossing sign (S1-1) and a supplemental plaque with the legend "AHEAD" (W16-7P) or "XXX FEET" (W16-2 or W16-2a) to provide advance notice to road users of crossing activity.

    a. The School Advance Warning assembly shall be installed no less than 45 m (150 ft) nor more than 210 m (700 ft) in advance of any installation of the School Crosswalk Warning Assembly, and;

    b. The School Advance Warning Assembly shall be installed in advance of the first installation of the School Speed Limit sign assembly (if used).

    c. Pavement markings with the legend SCHOOL may be used in conjunction with the School Advance Warning Assembly.

2. The School Speed Limit Assembly (if used) consists of a sign with the legend "SCHOOL" (S4-3) on top of a Speed Limit sign (R2-1), with a supplemental plaque below the speed limit sign, which indicates when the school speed limit is in effect. Typical supplemental plaques are:

    a. HOURS during which the School Speed Limit is in effect (S4-1)

    b. WHEN CHILDREN ARE PRESENT (S4-2)

    c. WHEN FLASHING (If the assembly is supplemented by a flashing beacon.) (S4-4)

3. The School Crosswalk Warning Assembly (SCWA) consists of the School Crossing Sign (S1-1) with a diagonal downward ARROW (W16-7P) below it.

    a. The SCWA shall be installed at each end of the crosswalk location. At either end, the sign shall be placed in advance of the crosswalk from the perspective of the driver in the adjacent travel lane, facing the driver.

    b. The SCWA shall not be used at marked crosswalks other than those adjacent to schools or those on established school routes.

    c. The SCWA shall not be installed at intersection approaches controlled by a stop sign or a traffic signal.

4. All School Warning Signs should have a fluorescent yellow-green background with a black legend and border.

Note: the School Advance Warning Assembly and the School Speed Limit Assembly may be used where warranted, with or without a marked school crossing.

4.2 Non-School Crossings:

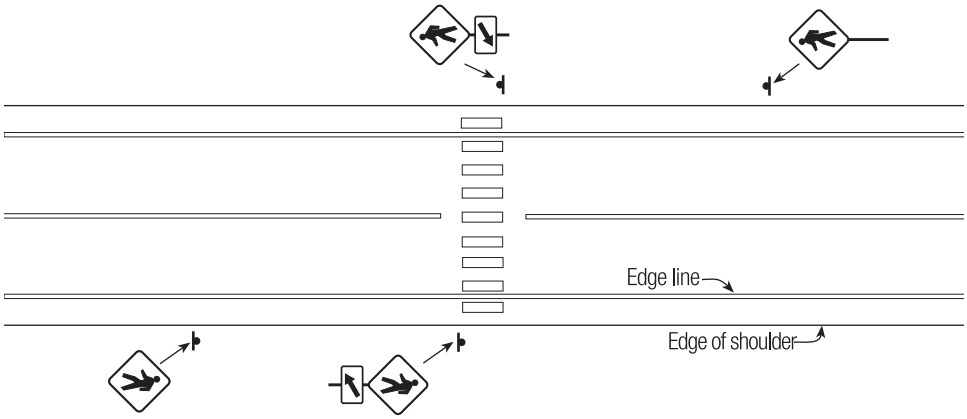

Figure 8: Mid-Block Crossing

Mid-block crossings may be used to facilitate pedestrian access and to concentrate pedestrian crossing activity in a safe location.

4.2.1 Criteria for installation:

All of the following criteria should be met prior to installing a crosswalk.

1. The speed limit is 40 mph or less, and;

2. There are 20 or more pedestrians using the crossing per hour during the vehicular A.M. and P.M. peak periods (lesser volumes may be considered if a large percentage of the pedestrian population consists of young, elderly, or disabled pedestrians), and;

3. The AADT (annual average daily traffic) for the roadway (both directions combined) exceeds 3000 vehicles per day, and;

4. A sidewalk or adequate shoulder for use by pedestrians (as determined by traffic volumes, adjacent land uses and other site specific considerations) or other pedestrian destination, such as a recreation field, where there is low potential for vehicle/pedestrian conflicts exists on both sides of the roadway, and;

5. There is not another crosswalk across the same roadway within 60 m (200 ft), and;

6. A determination has been made that the pedestrian shall have the right of way over the vehicular traffic, and;

7. Adequate sight distance (equal to or exceeding the stopping sight distance for the posted speed) is available in both directions. At a minimum, a driver must be able to see either the crosswalk or the pedestrian warning sign. It is recommended that sight distance be measured from the driver's perspective to the outer edges of the traveled lanes, to ensure that an approaching driver can see a pedestrian at any point on the crosswalk within the traveled way.

When a proposed crosswalk is associated with a new development, change in land use, or new pedestrian facilities, an engineering study may be used to predict whether these criteria will be met once the development or facility has been constructed.

Crosswalks should not be marked on 3 or 4 lane roadways with AADT greater than 9,000 vehicles per day unless other safety features, such as raised median refuges, traffic calming measures, or overhead lighting are included, and an engineering study concludes that pedestrian safety will be enhanced.

4.2.2 No parking zone:

Parking spaces should not be marked within 6 m (20 ft) of a marked crosswalk, as measured by the gap between the parking space and the closest crosswalk marking. If a bulbout is used, the gap may be reduced to 3 m (10 ft).

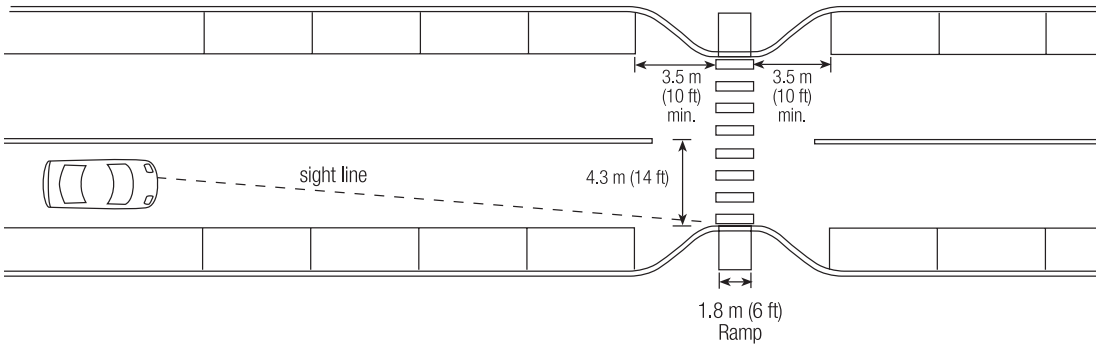

Figure 9: Mid-block Bulbout Example

4.2.3 Pedestrian Warning Signs:

Pedestrian warning signs (W11-2 with downward arrow plaque W16-7P) shall be installed at each end of the crosswalk location. At either end, the sign shall be placed in advance of the crosswalk from the perspective of the driver in the adjacent travel lane, facing the driver.

Advance pedestrian warning signs (W11-2) shall be installed at a distance of at least 45 m (150 ft) but not exceeding 210 m (700 ft) in advance of the crosswalk, in either direction. Advance warning signs will not be required in urban areas where pedestrian activity is an expected feature of the driving environment.

Advance pedestrian warning signs (W11-2) may be supplemented with supplemental plaques with the legend “AHEAD” (W16-7P) or “XXX FEET” (W16-2 or W16-2a).

4.3 Stopping Sight Distance Chart:

The following stopping sight distances for each posted speed are referenced from the AASHTO "Green Book", 2001 edition, page 112.

Posted Speed (mph)	Required Sight Distance (ft) *	Required Sight Distance (m) *
25	155	50
30	200	60
35	250	75
40	305	95
45	360	110
50	425	130

* downgrades require longer stopping distances

Figure 10: Stopping Sight Distances

5.0 Unmarked Crossings

When the criteria for a marked crosswalk are not met, pedestrian warning signs may be installed to alert road users to locations where unexpected entries into the roadway by pedestrians might occur. There does not have to be a specific volume of pedestrians, merely crossing activity. These signs do not give the pedestrian the right of way over vehicular traffic, but serve as warning devices.

Passing zones should not be marked within 150 m (500 ft) of the crossing area.

5.1 Case A – Long Distance (150 m – 1.6 km (500 ft to 1 mile)):

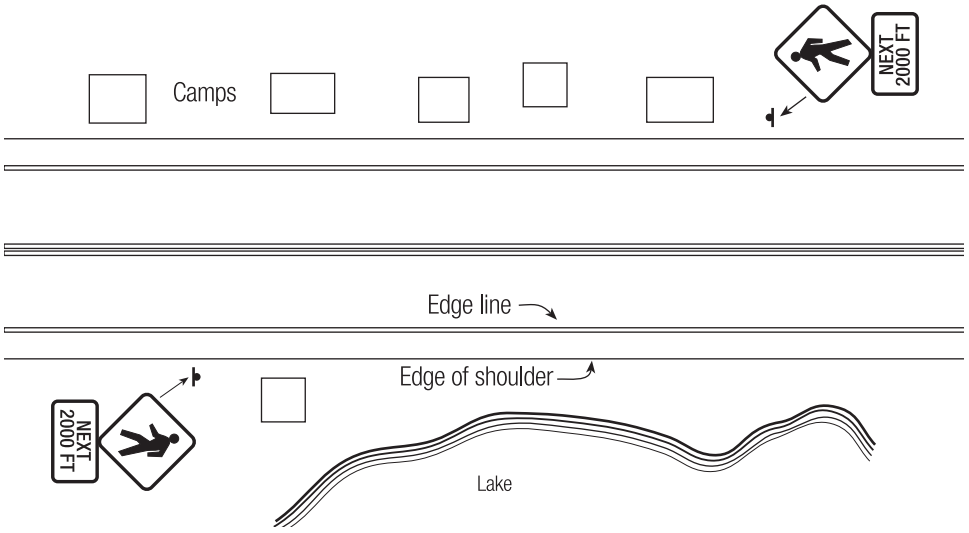

Figure 11: Unmarked Crossings – Long Distance

This situation tends to occur where highways are adjacent to lakes and ponds, where summer camps and associated activities occur, connections for a hiking trail require travel along a highway, or where tourist oriented businesses such as museums encourage crossing the highway for scenic viewing.

5.1.1 Pedestrian Warning Signs:

A pedestrian warning sign (W11-2) and a supplemental distance plaque “NEXT XXX FEET” (W16-4) should be installed at either end of the crossing area. The distance indicated should not exceed one mile.

5.2 Case B – Short Distance (150 m (500 ft) or less):

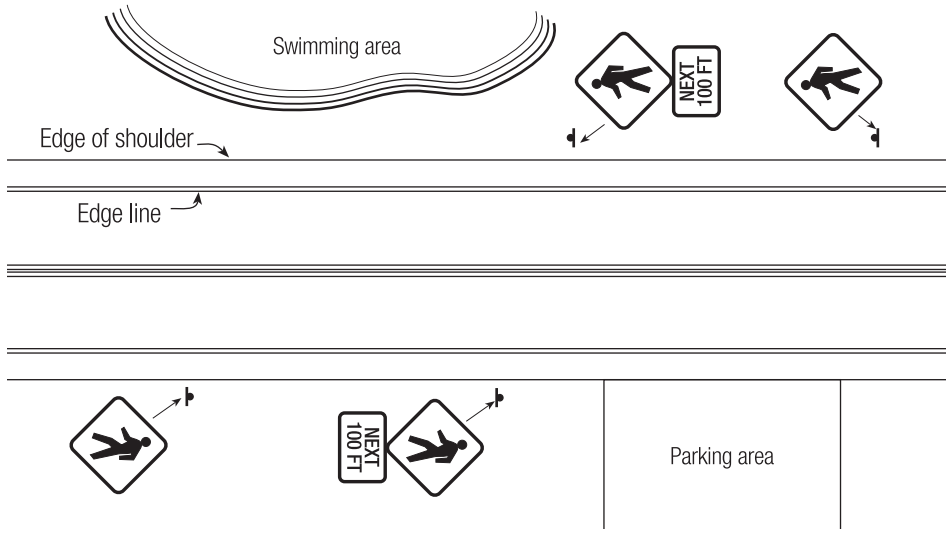

Figure 12: Unmarked Crossings – Short Distance

This situation tends to occur at seasonal locations or locations of activity during certain days. Cases to consider would be locations where some attraction or activity, such as fishing or swimming, occur on one side of the highway and parking occurs on the other.

5.2.1 Pedestrian Warning Signs:

A pedestrian warning sign (W11-2) with a supplemental distance plaque "NEXT XXX FEET" (W16-4) should be installed at either end of the crossing area. If the crossing area is in a high speed location or sight distance is limited, advance pedestrian warning signs (W11-2) may be installed 45-210 m (150-700 ft) in advance of the crossing area. Advance pedestrian warning signs (W11-2) may be supplemented with supplemental plaques with the legend "AHEAD" (W16-9P).

5.3 Case C – Specific Site:

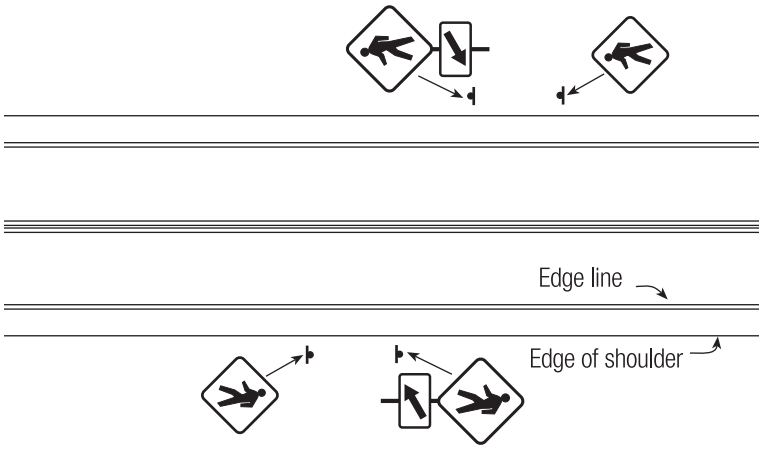

Figure 13: Unmarked Crossings - Specific Site

This situation occurs when there is a location of concentrated pedestrian activity which does not meet the criteria for marked crossings.

5.3.1 Pedestrian Warning Signs:

A pedestrian warning sign (W11-2) with a supplemental arrow plaque (W16-7P) should be installed on either side of the pedestrian crossing location. Advance pedestrian warning signs (W11-2) should be installed 45-210 m (150-700 ft) in advance of the crossing location. Advance pedestrian warning signs (W11-2) may be supplemented with supplemental plaques with the legend “AHEAD” (W16-9P) or “XXX FEET” (W16-2 or W16-2a).

6.0 Glossary

SHALL - a *mandatory* condition**.** Where certain requirements in the design or application of the devices are described with the "shall" stipulation, it is mandatory, when an installation is made, that these requirements be met.

SHOULD - an *advisory* condition. Where the word "should" is used it is considered to be advisable usage, recommended but not mandatory.

MAY - a *permissive* condition. No requirement for design or application is intended.

STANDARD - a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. *The verb <u>shall</u> is typically used*. Standards are sometimes modified by options.

GUIDANCE - a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. *The verb <u>should</u> is typically used* Guidance statements are sometimes modified by options.

OPTION - a statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to Standard or Guidance. *The verb <u>may</u> is typically used.*

SUPPORT - an informational statement, that does not convey any degree of mandate, recommendation, authorization, prohibition or enforceable condition. *Should, Shall and May are not used in support statements.*

7.0 Resources and References

Manual on Uniform Traffic Control Devices (MUTCD)
Federal Highway Administration, 2003
http://mutcd.fhwa.dot.gov/pdfs/2003/pdf-index.htm

Motor Vehicle Laws of Vermont
LexisNexis, 2002
http://www.leg.state.vt.us/statutes/statutes2.htm

Vermont Pedestrian and Bicycle Facility Planning and Design Manual
Vermont Agency of Transportation, 2003
http://www.aot.state.vt.us

Americans with Disabilities Act Accessibility Guidelines (ADAAG)
US Department of Justice
http://www.access-board.gov/

A Policy on Geometric Design of Highways and Streets (aka "AASHTO Green Book")
American Association of State Highway and Transportation Officials, 2001
http://www.transportation.org