

## *APPENDIX A*

### *CITY OF NORTHFIELD CROSSWALK INSTALLATION*

#### *POLICIES AND GUIDELINES*

The City of Northfield receives numerous requests throughout the community for pedestrian crosswalks. Marked pedestrian crossings accomplish dual goals. They prepare drivers for the likelihood of encountering a pedestrian, and they create an atmosphere of walkability and accessibility for pedestrians. While crosswalks do provide guidance to motorists and pedestrians of crossing locations, it is important to recognize that according to the Minnesota State Statute governing pedestrian safety (Chapter 169.21) all intersections are legal crosswalks and drivers must yield the right-of-way to a pedestrian crossing the roadway within a marked crosswalk or at an intersection with no marked crosswalk in the absence of traffic control signals. The driver must remain stopped until the pedestrian has passed the lane in which the vehicle is stopped and no pedestrian shall 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 the driver to yield.

The Statute allows the local authority discretion to determine the location of crosswalks, but does not clearly identify criteria to guide local decision makers. Community guidelines for crosswalk identification are suggested to provide a process for determining appropriate crosswalk locations, markings, and signage. The purpose of the guidelines is to improve pedestrian and vehicular safety with a consistent standard that achieves safety objectives.

This document establishes a consistent standard to reply to crosswalk requests through a policy for the installation of crosswalks at signalized intersections, marked crosswalks at school crossing locations, and crosswalks at intersections controlled by a stop sign.

#### **A. RESEARCH**

Several studies have been conducted to analyze pedestrian crash rates at marked and unmarked crosswalks. The placement of crosswalks should not be expected to be equally effective or appropriate under all roadway conditions. Federal Highway Administration (FHWA) Report HRT-04-100 “Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations” recommends that pedestrian crossing problems and needs should be identified on a routine basis before deciding where to mark or not mark crosswalks. According to research studies of the safety effects of marked versus unmarked crossings, pedestrian safety is not necessarily improved by providing a crosswalk. The FHWA report and other studies conclude that a marked crosswalk does not necessarily provide a measure of safety without signage or other crossing improvements. A major contributing factor is the often unsafe

behavior of pedestrians and speeding or inattentive motorists, pointing to the need for pedestrian safety education as well.

The research is clear that determining where and how to apply crosswalks to achieve improved safety requires a varying approach depending upon the location, the amount of vehicular and pedestrian traffic and typical behaviors. The FHWA Report is a comprehensive report on the relative safety of marked and unmarked crossings. This document presents a variety of special treatment options to mitigate safety, visibility, or operational concerns at specific locations. The flowchart on p. 12 outlines the steps in identifying candidate locations for crosswalks based on the findings of the 2005 FHWA Study.

TABLE 1 – 2005 FHWA RECOMMENDATIONS FOR CONSIDERING MARKED CROSSWALKS AND OTHER NEEDED PEDESTRIAN IMPROVEMENTS AT UNCONTROLLED LOCATIONS

	≤ 9,000 ADT			> 9,000 to ≤ 12,000 ADT			> 12,000 to ≤ 15,000 ADT			> 15,000 ADT		
	≤ 30 mph	35 mph	≥ 40 mph	≤ 30 mph	35 mph	≥ 40 mph	≤ 30 mph	35 mph	≥ 40 mph	≤ 30 mph	35 mph	≥ 40 mph
<b>2 Lanes</b>												
<b>3 Lanes</b>												
<b>++4 Lanes Raised Median <sup>c</sup></b>												
<b>++4 Lanes No Median</b>												

KEY



Candidate sites for marked crosswalks. Marked crosswalks must be installed carefully and selectively. Before installing new marked crosswalks, an engineering study is needed to determine whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volume, vehicle speed, sight distance, vehicle mix, etc. may be needed at other sites. It is recommended that a minimum of 20 pedestrian crossings per peak hour (or 15 or more elderly and/or child pedestrians) exist at a location before placing a high priority on the installation of a marked crosswalk alone.



Possible candidate sites for marked crosswalks. Potential increase in pedestrian crash risk may occur if marked crosswalks are added without other pedestrian facility enhancements. These locations should be closely monitored and may be considered for enhancements as feasible.



Marked crosswalks alone are insufficient, since pedestrian crash risk may be increased due to providing marked crosswalks alone. Consider using other treatments, such as traffic-calming treatments, traffic signals with pedestrian signals where warranted, or other substantial crossing improvement to improve crossing safety for pedestrians.

- a. These guidelines include intersection and midblock locations with no traffic signals or stop signs on the approach to the crossing. They do not apply to school crossings. A two-way center turn lane is not considered a median. Crosswalks should not be installed at locations that could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, a substantial volume of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone will not make crossings safer, nor will they necessarily result in more vehicles stopping for pedestrians. Whether or not marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic-calming measures, curb extensions), as needed, to improve the safety of the crossing. These are general recommendations; good engineering judgment should be used in individual cases for deciding where to install crosswalks.
- b. Where the posted speed limit or 85th percentile speed exceeds 40 mph, marked crosswalks alone should not be used at uncontrolled locations.
- c. The raised median or refuge island must be at least 4 ft. (1.2 m) wide and 6 ft. (1.8 m) long to adequately serve as a refuge area for pedestrians.

## B. CROSSWALK INSTALLATION GUIDELINES

These guidelines are developed based off of the City of Stockton, CA “Pedestrian Safety and Crosswalk Installation Guidelines,” FHWA Report HRT-04-100, and the Minnesota Department of Transportation (Mn/DOT) “Guidance for Installation of Pedestrian Crosswalks on Minnesota State Highways.” The guidelines are intended to supplement the most current Minnesota Manual on Uniform Traffic Control Devices (MMUTCD).

The design and planning of all pedestrian facilities should be consistent with the following manuals and guides.

- Minnesota Manual on Uniform Traffic Control Devices (MMUTCD)
- FHWA Oversight Role in Accessibility: *Memorandum to attention of HCR-1-HIF-1*
- *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, American Association of State Highway and Transportation Officials (AASHTO) July 2004.
- The Federal Highway Administration's Pedestrian Safety Information *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations: Final Report and Recommended Guidelines*, September 2005, FHWA HRT-04-100
- Minnesota State Aid for Local Transportation Guidelines and State Aid Rules  
Pedestrian facilities that use state-aid funding are required to follow Minnesota State Aid design standards.
- *Mn/DOT Bikeway Facility Design Manual*, March 2007
- The United States Access Board Guidance on how to design and construct accessible pedestrian facilities.
- *Pedestrian Access to Roundabouts : Assessment of Motorists' Yielding to Visually Impaired Pedestrians and Potential Treatments to Improve Access*, May 2006, FHWA HRT-05-080
- *FHWA Designing Sidewalks and Trails for Access*, September 2001  
Part 1: Review of Existing Guidelines and Practices  
Part 2: Best Practices Design Guide
- Environmental Justice
- *Characteristics of Emerging Road and Trail Users and their Safety*, September 2004, FHWA HRT-04-104
- *Guidance for Installation of Pedestrian Crosswalks on Minnesota State Highways*, Mn/DOT, October 2005

## C. IDENTIFYING CROSSWALK LOCATIONS

The first step in identifying candidate crosswalk locations is to identify the places people would like to access through walking. This is directly related to local land uses (homes, schools, parks, commercial establishments, etc.) and the location of transit stops. This information forms a basis for identifying pedestrian crossing improvement areas and prioritizing such improvements, thereby creating a convenient, connective, and continuous walking environment. The second step is identifying where it is safest for people to cross. Of all road users, pedestrians have the highest risk because they are the least protected. Pedestrian collisions occur most often when a pedestrian is attempting to cross the street at an intersection or mid-block location.

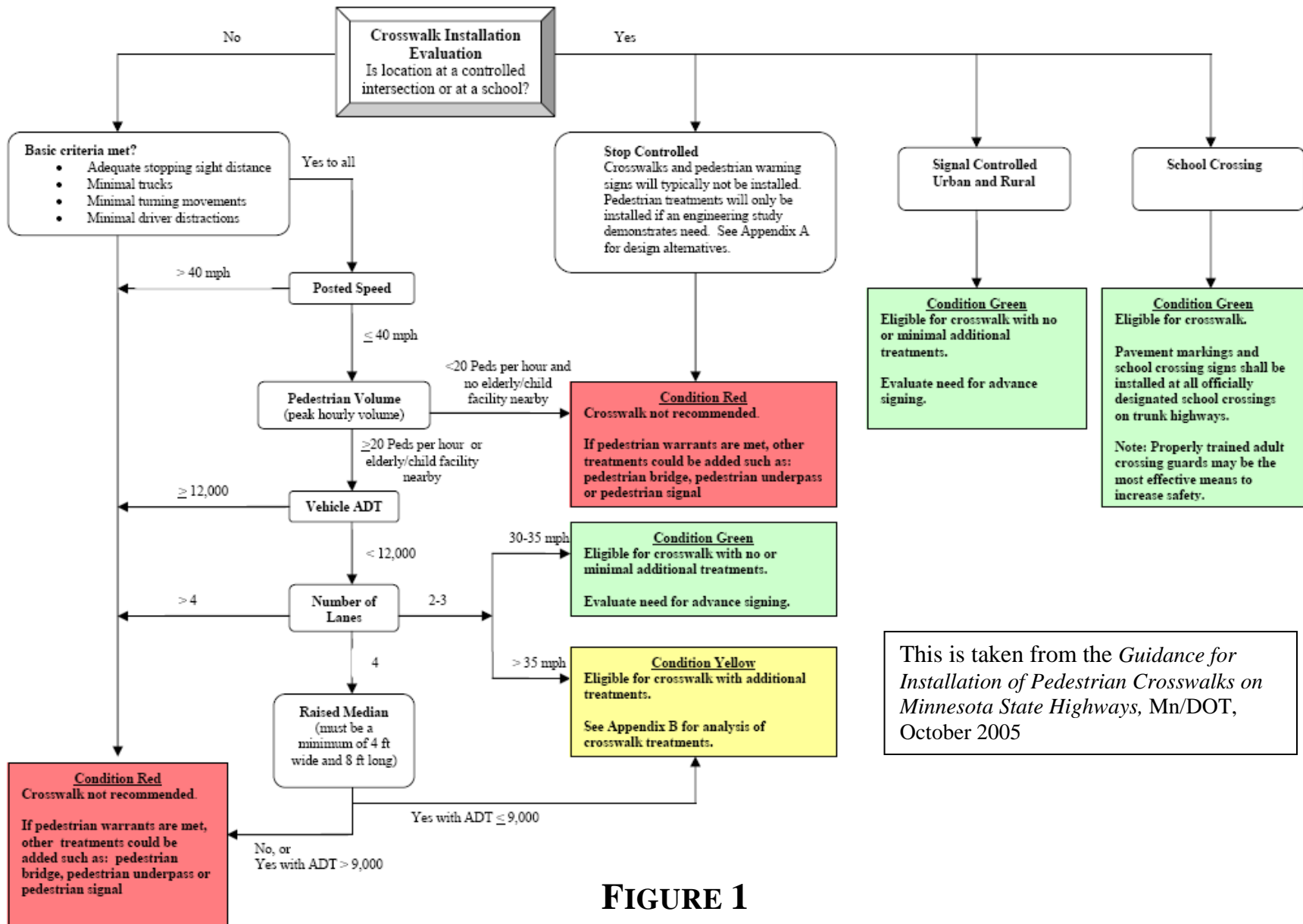
## D. DECISION-MAKING PROCESS

The objective of the decision-making process is to determine where marked pedestrian crosswalks are appropriate and when additional treatments should be used. An engineering study should be used to determine the necessity of a pedestrian crosswalk and should include the following detailed information.

- Geometrics
- Motorist sight distance
- Traffic volume data
- Pedestrian volume data
- Site characteristics and observations
- Posted speed limits
- Crash history

Mn/DOT has developed a flowchart (see Figure 1) to help decision makers determine whether or not a crosswalk is warranted. The following conditions must be met at all potential pedestrian crosswalk locations.

- Adequate stopping sight distance for motorists
- Minimal truck traffic
- Minimal vehicle turning movements
- Minimal driver distractions



## E. MARKED CROSSWALK STANDARDS

The following are the standards for consideration and installation of marked crosswalks within the City of Northfield. The sections following provide additional detail and options.

- Where marked crosswalks are installed at controlled intersections, transverse markings should be used except as noted below.

### Exceptions

- At school crossing locations, longitudinal (zebra) markings should be used with appropriate signing as according to the MMUTCD.
  - In the downtown areas, longitudinal (zebra) markings should be used with minimal to no additional signing.
- Where marked crosswalks are installed at uncontrolled intersections, longitudinal (zebra) markings should be used.
  - The maintenance cost for crosswalks shall be weighed against the frequency of use and associated risk. Engineering judgment should be used in determining where the marked crosswalks are installed. If the pedestrian crossing traffic is minimal or the number of conflicting vehicles is minimal, consideration should be made for not installing the marked crosswalk. The general rule is to not install marked crosswalks at stop controlled crossings in residential neighborhoods unless they are known to be significant pedestrian routes.
  - Crosswalks should be placed on minor street approaches onto higher functional classified streets with higher traffic volumes and also in downtown areas with higher pedestrian activity.
  - Consideration should be made to not provide marked crosswalks on approaches that do not have adequate pedestrian facilities, (ie. sidewalk, bike path).
  - Where marked crosswalks are installed at controlled intersections, stop bars shall be installed in advance of the crosswalk.
  - Marked crosswalks shall be installed at crossing guard locations.
  - Where the accident data or observations of conflicts identify a crosswalk of particular concern, consider special treatments.
  - The width for marked crosswalks should not be less than 6 ft.
  - The crosswalk lines should extend the full length of the crossing.

- Transverse crosswalk line markings shall consist of solid lines 12 inches wide unless otherwise directed by City staff. The markings shall not be less than 6 inches wide nor greater than 2 ft wide.
- Longitudinal markings should be 1 to 2 ft wide and spaces 1 to 5 ft apart.
- All crosswalk markings shall be white, per the MMUTCD.

## F. CONTROLLED LOCATIONS

The following represents the best practices and special treatments.

### 1. BEST PRACTICES

The following is the recommended, or best practice, for pedestrian treatments in crosswalks at signalized intersections or stop-controlled approaches (i.e., vehicles stop at approach in question).

- Pedestrian signals should be timed for a pedestrian travel speed of 3 to 3.5 feet per second. If there are special land uses such as senior centers or schools within 100 feet of the intersection, slower walking speeds (2.5 feet per second) may be considered.

The following two situations are exceptions to the policy of marking crosswalks on all approaches.

- Crossing locations with heavy right- or left-turn volumes that occur during the same signal phase as the conflicting pedestrian movement where protected signal phasing for the heavy movement or other solutions are infeasible.
- Intersections with inadequate sight distance of pedestrians. Elimination of crosswalks in these instances should only occur after other solutions have been deemed infeasible.

### 2. SPECIAL TREATMENTS

There are a number of innovative treatments for pedestrians at signalized intersections, mostly related to pedestrian signals. At locations with high pedestrian volumes and pedestrian-vehicle conflicts, the following measures are means to enhance the safety of pedestrian crossings.

## 2.1 HIGH NUMBERS OF TURNING VEHICLES

The Animated Eye Light Emitting Diode (LED) Signal is a tool for reminding pedestrians to watch for turning vehicles. It would normally be used at intersections with large numbers of turning vehicles (vehicles turning left or right into the crosswalk).

Early Release or pedestrian lead-time, allows pedestrians to establish themselves in the crosswalk, reducing conflicts between pedestrians and turning vehicles.

Special Pavement stencils such as “Pedestrians Look Left” or “Watch Turning Vehicles” stencil are used in Salt Lake City, Halifax, N.S., Canada, and the UK to remind pedestrians to be watchful. These stencils, used in conjunction with special signage, significantly reduced the number of pedestrians not looking for threats at intersections. Additionally, high-visibility crosswalks help channelize pedestrians.

Other special treatments include “Yield to Pedestrians” signs, and reduced corner radii to slow the speeds of right-turning vehicles. The curb radius should accommodate the expected amount and type of traffic for safe turning speeds. As the curb radius increases, incomplete stops become more frequent and drivers make turns at higher speeds.

Whenever possible, especially at locations adjacent to pedestrian generators, intersections should be designed without “free rights” for vehicles unless the operations necessitate the inclusion of “free rights.”. When “free rights” are necessary, the standards set forth by the American Association of State Highway and Transportation Officials (AASHTO) for the recommended design will be followed.

## 2.2 HIGH NUMBERS OF PEDESTRIANS

Pedestrian “scramble” phases, so called because pedestrians have a walk signal in every direction while vehicles have a red light on all approaches. This treatment may be considered in central business districts where pedestrian volumes are exceptionally high.

“No Right Turn on Red” restrictions for vehicles reduce pedestrian-vehicle conflicts at locations with high numbers of pedestrians, but make vehicle circulation less convenient and may cause traffic diversions. This type of treatment needs to be considered on a case-by-case basis. Traffic signal service levels need to remain at acceptable levels.

Advance stop lines or yield lines are stop or yield bars placed four feet in advance of the crosswalk. Advance stop lines or yield bars should be considered based on pedestrian volumes, generators and safety concerns relevant to a specific crossing.

### 2.3 WIDE INTERSECTIONS

Countdown signals are to be used at all new signalized locations where pedestrian activity is maintained. The countdown signal effectively communicates the amount of time left to cross the street. At wide streets with medians, there should be adequate crossing time for the pedestrian to traverse the entire distance.

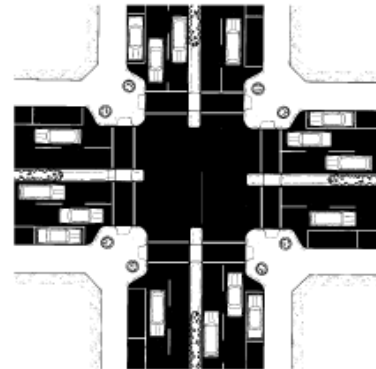
Pedestrian Refuge Islands should extend through the crosswalk, with a curb cut for wheelchair accessibility. Refuge islands should be clear of obstructions and have adequate drainage. They should be at least 6 feet long or the width of the crosswalk (whichever is greater) and 60 feet square. At actuated pedestrian signals, an accessible pedestrian push button should also be located in the median. Recommended refuge island widths are as follows.

TABLE 2 – RECOMMENDED REFUGE ISLAND WIDTHS

Speed	Minimum Width *
25-30 mph	5 feet
30-35 mph	6 feet
35-45 mph	8 feet

\* Where bikes are expected to use the crosswalk, medians should be at least six feet wide, the length of an average bike.

Curb Extensions/Bulbouts are appropriate at locations with usable space next to the curb. Consider bulbouts at intersections of three or more lanes. Bulbouts should not extend further than six feet into the street adjacent to parallel parking, or 12 feet adjacent to diagonal parking. At locations with no on-street parking, bulbouts should not impede bicycle travel.



Medians and bulbouts create short pedestrian crossings

## 2.4 PEDESTRIAN ACTUATED SIGNALS

At pre-timed signals, pedestrians get the signal to walk on every crossing, in every signal cycle. However, many signals are not pre-timed, meaning vehicles activate them. These signals have pedestrian push-buttons, which pedestrians must push in order to get a walk signal and adequate time to cross the street.

- At locations where pedestrian activation is registered for greater than 75 percent of the peak hour signal cycles, signals could be set to accommodate pedestrian crossings in every peak period cycle.
- At locations that are not on a direct path to a generator with low side-street volumes, signals should be partially-actuated, meaning that pedestrians crossing the side streets get a WALK signal on every cycle, but pedestrians crossing the main street must use the pedestrian push button.
- At locations that do not satisfy the location warrants above, where peak hour vehicle congestion and high vehicle volumes occur on all approaches, signals should be fully-actuated.



When pedestrian push buttons are used, they should be well-marked, visible, and accessible to all pedestrians from a flat surface, consistent with the Minnesota MUTCD and recommendations from the U.S. Department of Transportation's Designing Sidewalks and Trails for Access.

## G. UNCONTROLLED LOCATIONS

This section describes best practices for considering the installation of crosswalks at uncontrolled intersections and mid-block locations, safety considerations, and special treatments in locations where special consideration is recommended.

### 1. WHEN TO INSTALL CROSSWALKS AT UNCONTROLLED INTERSECTIONS

The following is the recommended or best practice, for pedestrian treatments at uncontrolled approaches to intersections that are not controlled by traffic signals or stop signs (the most common crosswalk of this type will be at intersections where a minor side street has a stop sign and a major street is uncontrolled).

Crossings should be marked where all of the following occur.

- Sufficient demand exists to justify the installation of a crosswalk (see Demand Considerations below)
- The location is 300 feet or more from a controlled crossing location
- The location has sufficient sight distance (sight distance in feet should be greater than 10 times the speed limit), and/or sight distance will be improved prior to crosswalk marking
- Safety considerations do not preclude a crosswalk (see Safety Considerations at Uncontrolled Locations below)

Uncontrolled crossings should be identified as a candidate for marking if there is a demonstrated need for a crosswalk. Need can be demonstrated by

- 20 pedestrians per hour during the peak hour or 60 pedestrians total for the highest consecutive four hour period
- or:
- The crossing is on a direct route to or from a pedestrian generator, such as a school, library, senior center, shopping center, park, or employment center

## 2. WHEN TO INSTALL CROSSWALKS AT MID-BLOCK LOCATIONS

Mid-block crossings should be marked where the following occur.

- Sufficient demand exists to justify the installation of a crosswalk (see Demand Considerations below)
- The mid-block location is 300 feet or more from another crossing location (most of the downtown area has blocks that are 300 feet in length)
- The mid-block location has sufficient sight distance (sight distance in feet should be greater than ten (10) times the speed limit)
- Provision of a crossing would channelize potential jay-walkers to a suitable crossing location
- Safety considerations do not preclude a crosswalk (see below, Safety Considerations at Uncontrolled Locations)

Where mid-block crosswalks are installed, the default design should be with high-visibility pavement treatments. The installation of mid-block crosswalks requires approval of the City Council. Candidate locations for marked pedestrian crossings at mid-block locations should meet one of the following criteria:

- 40 pedestrians during a one-hour period or 25/hour for four consecutive hours
- A pedestrian generator is less than 300 feet away at a location mid-way between signal or stop-controlled intersections, or there are significant pedestrian trip generators on both sides of the street

### 3. SAFETY CONSIDERATIONS AT UNCONTROLLED LOCATIONS

The flowchart on p. 13 and corresponding tables on p. 14-17 should be used to determine if special treatments are needed to ensure safe crossing at uncontrolled locations (see below for examples of special treatments). Where safety concerns would continue even with special treatments, pedestrian signal warrants, established in the current Minnesota Manual on Uniform Traffic Control Devices (MMUTCD), should be tested to determine whether the crossing warrants a signal. In the event that a signal is determined to be inappropriate, the crosswalk should not be marked.

At all uncontrolled intersections where marked crosswalks are installed at intersections or mid-block, appropriate signing as identified in the current MMUTCD shall be installed. The current 2005 MMUTCD suggests a W11-2 sign in advance of the crosswalk and a W11-2 sign with a down arrow plaque to be installed at the crosswalk.

A crosswalk should not be installed if sight distance in feet is less than ten times the speed limit. For example, if an intersection has an approach speed of 25 miles per hour, the unrestricted view of pedestrians by motorists should be at least 250 feet.

### 4. SPECIAL TREATMENTS FOR UNCONTROLLED LOCATIONS

Where marking a crosswalk is deemed appropriate at an uncontrolled crossing location on either a multi-lane street (three or more lanes) or on two-lane streets with ADT greater than 12,000 or where the posted speed limit exceeds 30 miles per hour then the crossing should be a high-visibility style. This may include such options as additional lighting, in pavement reflectors, or higher reflectivity markings.

Additional special treatments can be considered at areas with heightened safety concerns. See the noted manuals on page 13 for guidance on choosing crosswalk treatments for different street types, with crosswalk treatments chosen from level one, two and three devices outlined below.

## 4.1 LEVEL ONE

Median installation - On multi-lane streets with ADT of less than 15,000 and 85th percentile speeds of less than 35 miles per hour, the FHWA research described earlier in these guidelines concludes that provision of a median can address safety concerns.

Split Pedestrian Crossover (SPXO) – The SPXO is a pedestrian refuge that channels pedestrians, using railings, to cross one half of the street; enter the island at one end; walk towards the flow of traffic; and exit at the other end to cross the second half of the street. SPXOs can improve pedestrian safety on streets with ADTs below 45,000, with advance yield markings (triangles 16 inches wide by 24 inches long separated by 9 inches located 30 to 50 feet in advance of the crossing), “Yield to Pedestrians” signage, and good visibility, especially at night. This special treatment is primarily used at mid-block locations.

Curb Extensions/Bulbouts (intersection crossing) – Each corner of the intersection is extended into the intersection by approximately seven to eight feet to shorten the crossing distance for pedestrians and raise their visibility to motorists.

Curb Extensions/Bulbouts (mid-block crossing) – Curbs are extended into the street by approximately seven to eight feet to shorten the crossing distance for pedestrians and raise their visibility to motorists.

## 4.2 LEVEL TWO

Overhead signs and flashing beacons – Various signs showing the universal pedestrian symbol, including both standard yellow, fluorescent yellow, and LED displays, hang from a mast arm that extends over the street.

In-pavement flashers – Installed with a flashing sign at the crosswalk and advanced flashing sign. Installed with audible warning, advance signs, rumble strips, and single sided indication, per MMUTCD requirements.

## 4.3 LEVEL THREE

Pedestrian- actuated signal at locations where pedestrian volumes warrant a signal.

## H. TRAIL CROSSINGS

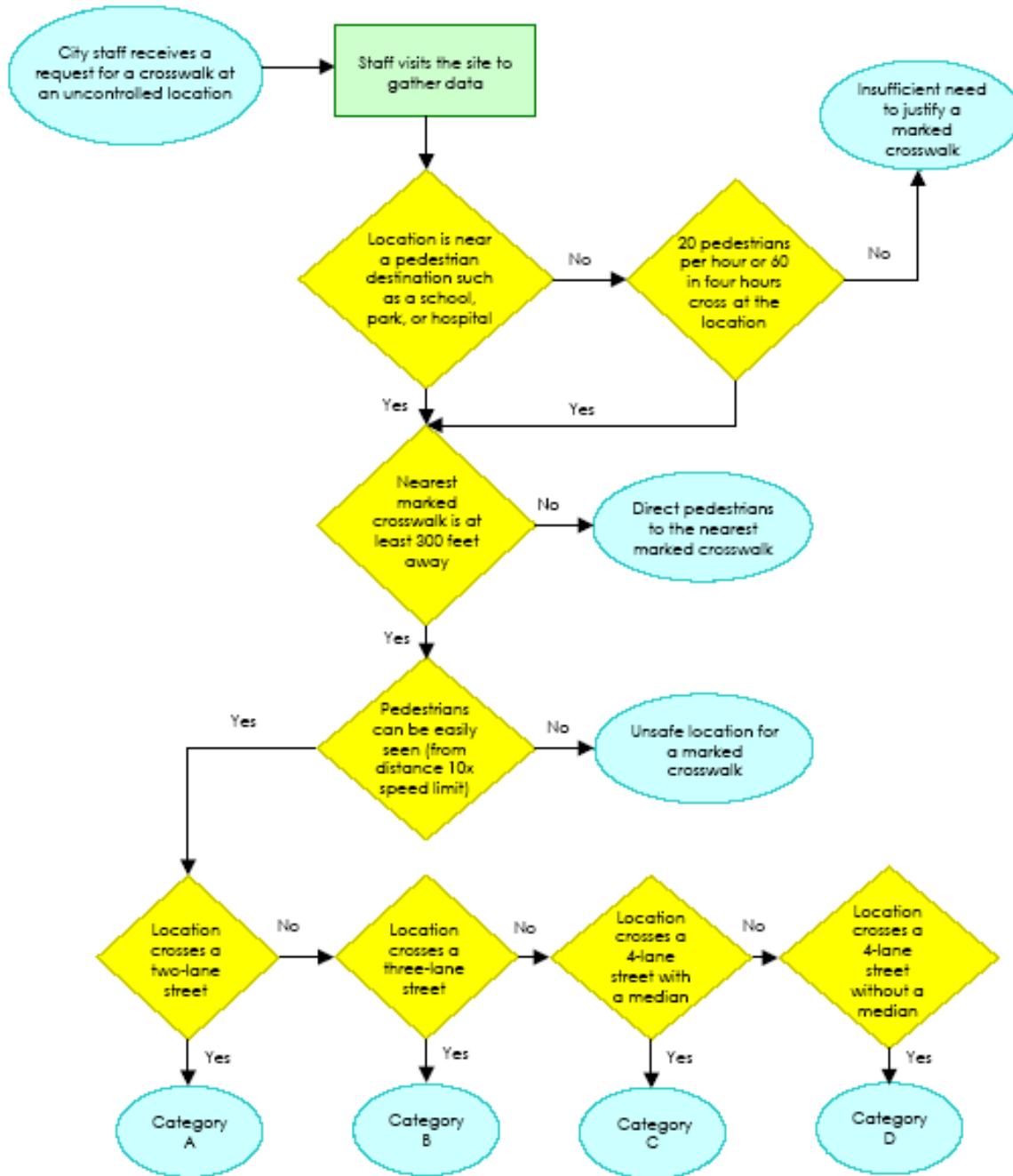
At locations where a multi-use trail crosses a street, the location of the crossing (mid-block or intersection) should determine what type of safety considerations are used to determine whether or not to mark a crosswalk. The standards set in the Mn/DOT Bikeway Facility Design Manual will be followed as needed.

Trail crossings should be well-lit and well-signed. At all uncontrolled at-grade trail crossings, traffic calming and signage within 150 to 200 feet of the crossing should be considered. Warning signs should be installed within 30 to 50 feet of the crossing.

If the crossing does not meet the demand or safety considerations for installation of a marked crosswalk and the nearest signalized crossing location is: 300 feet or more away on an arterial street; 200 feet or more away on a collector street; or 100 feet or more away on a local street, signage and landscaping should be used to direct both cyclists and pedestrians to the adjacent signalized crossing. However, if the nearest signalized crossing is greater than 150 feet away and the location does not meet safety considerations for a marked crosswalk, and other at-grade treatments are infeasible, a grade-separated bicycle-pedestrian crossing should be considered.

The flowchart on p. 13 and corresponding tables on p. 14-17 provide guidelines for choosing appropriate treatment options for pedestrian crossings at uncontrolled locations, based on number of travel lanes, average daily traffic (ADT) and other factors.

CROSSWALK PLACEMENT FLOWCHART FOR UNCONTROLLED LOCATIONS



**FIGURE 2**

Source: This is taken from the City of Stockton, CA “Pedestrian Safety and Crosswalk Installation Guidelines”

The following charts summarize the type of crossing treatments appropriate for uncontrolled crossing locations within each category

TABLE 3 – CATEGORY A: TWO-LANE STREETS

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	Standard Crosswalk	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000			
12,000 to 15,000	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	Pedestrian signal (Level 3 device) or bridge
15,000 or more			

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

TABLE 4 – CATEGORY B: THREE-LANE STREETS\*

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	High Visibility Crosswalk	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000		High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	
12,000 to 15,000	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	Pedestrian signal (Level 3 device) or bridge	Pedestrian signal (Level 3 device) or bridge
15,000 or more			

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

\* Refers to streets with one lane in each direction and a center two-way left-turn lane.

TABLE 5 –CATEGORY C: FOUR OR MORE LANES WITH A RAISED MEDIAN

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	High Visibility Crosswalk	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000		High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	
12,000 to 15,000	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices		Pedestrian signal (Level 3 device) or bridge
15,000 or more	Pedestrian signal (Level 3 device) or bridge		

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

TABLE 6 – CATEGORY D: FOUR OR MORE LANES WITHOUT A RAISED MEDIAN

Number of Cars Per Day (Average Daily Traffic)	Posted Speed		
	30 miles per hour or less	35 miles per hour	40 miles per hour or more
9,000 or fewer	High Visibility Crosswalk	High Visibility Crosswalk plus a pedestrian refuge or other Level 1 device	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices
9,000 to 12,000	High Visibility Crosswalk plus a pedestrian refuge or other Level 1 device	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices	Pedestrian signal (Level 3 device) or pedestrian bridge
12,000 to 15,000	High Visibility Crosswalk plus a pedestrian refuge, overhead flashing beacons, or other Level 1 or 2 devices		
15,000 or more	Pedestrian signal (Level 3 device) or pedestrian bridge	Pedestrian signal (Level 3 device) or pedestrian bridge	

Source: This is taken from the City of Stockton, CA "Pedestrian Safety and Crosswalk Installation Guidelines"

## I. CURB RAMPS

The State of Minnesota maintains definitions and standards for curb ramp installation. Curb ramps provide street and sidewalk access to pedestrians using wheelchairs. The current standards require a minimum of a single curb ramp at each corner and the use of truncated domes. Dual ramps are preferable to a single ramp design and should be provided as right-of-way and crosswalks allow. Dual ramps are desirable to direct pedestrians to the correct alignment of the crosswalk, and where feasible, opposing curb ramps should align.

The correct placement and design of the curb ramps shall be based on the requirements located within the American Disabilities Act, the MMUTCD, and the Minnesota Department of Transportation standard plates 7036F1: Pedestrian Curb Ramp for the Handicapped and 7036F2: Detectable Warning Detail for the Handicapped.