

Pedestrian Treatments

(1 of 2)

INTERSECTIONS

DESCRIPTION AND DEFINITION

The purpose of pedestrian safety strategies is to:

- Reduce potential vehicle conflicts by reducing pedestrian crossing distance and time
- Improve lines of sight
- Reduce vehicle/pedestrian conflicts at crosswalks

Some of the **PROVEN** effective strategies include:

- Medians
- Curb extensions
- Sidewalks
- High-intensity activated crosswalks (HAWKS)

TRIED (but promising) strategies include:

- Leading pedestrian intervals—the pedestrian walk is up 2 to 3 seconds ahead of the vehicle green, allowing pedestrians a head start and the ability to enter the crosswalk before right-turning vehicles can turn into the crosswalk
- Countdown pedestrian timers



Median Refuge Near Intersection

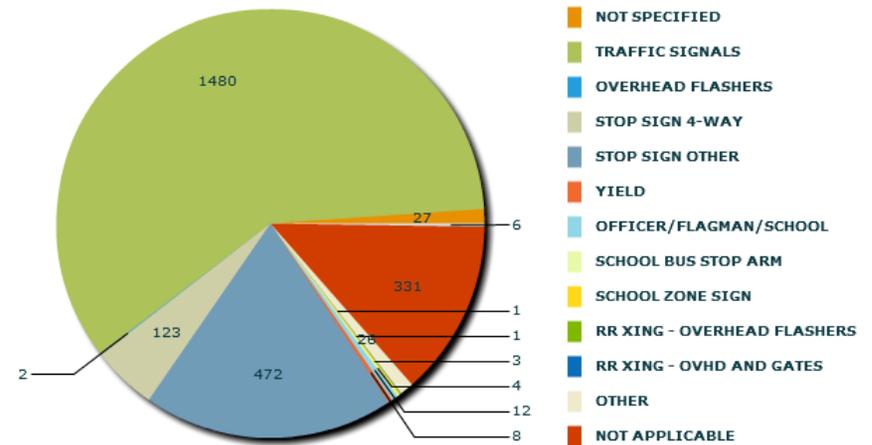
Only pedestrian signs and markings have been found to be **INEFFECTIVE**.

SAFETY CHARACTERISTICS

Review of the over 4,000 pedestrian/vehicle crashes in Minnesota between 2006 and 2010 found that over half of the crashes occurred at intersections. Of the intersection crashes, 59 percent occurred at signalized intersections. The Leading Pedestrian-Vehicle Interval (LPI) is the latest strategy for reducing crashes at signalized intersections. A 2010 study in the *Journal of the Transportation Research Board* found an up to 60 percent reduction in pedestrian/vehicle crashes at intersections that use the LPI strategy.

Multiple studies have reviewed the use of crosswalks at uncontrolled intersections and found that they are not always a safety strategy. In some areas, there are more pedestrian crashes at marked crosswalks than in unmarked crosswalks (even when adjusted for exposure). It appears that the least effective crosswalks are at uncontrolled intersections along multi-lane arterials.

A Federal Highway Administration 2005 study of unmarked crosswalks provides guidance on when an uncontrolled intersection may be a candidate for a crosswalk based on roadway speed, roadway geometry, and traffic volumes. Locations with higher speeds (greater than 40 mph) and high volumes (greater than 15,000 vehicles per day) are not candidates for crosswalks. Also, multi-lane roadways without a median are not candidates for crosswalks. Locations with low speed (35 mph or less) with two or three lanes of traffic are candidates, but other treatments such as curb extensions, medians, street lighting, and roadway narrowing should also be considered before a crosswalk is installed.



Minnesota Crash Data – 2006-2010, Pedestrian/Vehicle Crashes – Type of Intersection Control
Source: Minnesota Crash Mapping and Analysis Tool (MnCMAT)

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INTERSECTIONS

PROVEN, TRIED, INEFFECTIVE, OR EXPERIMENTAL

- **PROVEN:** Medians, curb extensions, and sidewalks
- **TRIED:** LPIs and countdown timers
- **INEFFECTIVE:** Pedestrian signs and markings only

TYPICAL CHARACTERISTICS OF CANDIDATE LOCATIONS



Median Refuge Near Intersection



Curb Extensions and Sidewalks

Consideration of maintenance issues, such as snow removal, and operational issues, such as transit usage and large vehicle maneuvering, should be considered before implementing curb extensions and medians.

TYPICAL COSTS

Implementation Costs:

- Install median = \$10,000 to \$15,000
- Curb extensions = \$15,000 per corner
- Pedestrian countdown = \$10,000 per intersection
- Install LPIs = No cost

DESIGN FEATURES

Strategies for signalized intersections:

- Signal cycles should be kept short (ideally, 90 seconds maximum) to reduce pedestrian delay, considering traffic volume needs
- Countdown timers should be added
- LPIs should be implemented
- Pedestrian phases should come up automatically if pedestrian traffic is frequent
- Signals should be visible to pedestrians

BEST PRACTICE

Crosswalks should be considered at all signalized intersections where an engineering study finds the presence of pedestrian activity because of the benefits, which include making it clear to vehicles where they should stop and delineating a path for pedestrians. Crosswalks at uncontrolled intersections should be limited and include other features, such as medians and curb extensions, when possible.

SOURCES

Safety Effectiveness of Leading Pedestrian Intervals Evaluated by a Before-After Study, Transportation Research Board of the National Academies, ISSN 0361-1981, Volume 2198, 2010.

Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines, FHWA, FHWA-HRT-04-100, September 2005.

Association Between Roadway Intersection Characteristics and Pedestrian Crash Risk in Alameda County, California, Transportation Research Board of the National Academies, ISSN 0361-1981, Volume 2198, 2010.

Best Practices for Traffic Control at Regional Trail Crossings, Collaborative Effort of Twin Cities Road and Trail Managing Agencies, July 26, 2011.

Bicycle and Pedestrian Toolbox, Minnesota Local Road Research Board, Report 200602, 2006.

How To More Safely Accommodate Pedestrians Through An Intersection With Free Flow Legs, Minnesota Local Road Research Board, Report 200424, 2004.

Evaluating Active and Passive Crosswalk Warnings at Unsignalized Intersections and Mid-Block Sites, Minnesota Local Road Research Board, Report 200903TS, 2009.

Warning Efficacy of Active Versus Passive Warnings for Unsignalized Intersection and Mid-Block Pedestrian Crosswalks, Minnesota Local Road Research Board, Report 200903, 2009.



Pedestrian Treatments Policy (1 of 2)

INTERSECTIONS

POLICY PURPOSE/INTRODUCTION

The purpose of this policy is to establish uniformity and consistency in the application and installation of pedestrian crosswalks on *<Insert Agency>*'s roadway system.

One of the common strategies requested by the public as a mitigation measure for pedestrian crashes is the installation of a marked crosswalk. However, a research study involving thousands of intersections in dozens of cities across the nation found that marked crosswalks at unsignalized intersections are NOT safety devices.

A separate study found that pedestrian crash rates were actually higher at marked crosswalks and this effect is greatest for multi-lane arterials with volumes greater than 15,000 vehicles per day. This study also identified three strategies that were proven to improve pedestrian safety: sidewalks, median islands, and curb extensions. Sidewalks provide pedestrians with opportunities to separate themselves from vehicular traffic. The median islands and curb extensions provide pedestrians with safe places to wait for gaps in traffic, improve lines of sight for both pedestrians and drivers, and reduce walking distances—and therefore the amount of time pedestrians are exposed to traffic.

The implementation of countdown timers at traffic signals along urban arterials is also considered a proven safety strategy, and a recent study found that the use of a leading pedestrian indication resulted in a reduction in conflicts and pedestrian crashes.

DEFINITIONS

Median Island—A raised island in the center of the roadway provides a safe place for pedestrians to stop before crossing the second half of the roadway.

Curb Extensions—An extension of the sidewalk at an intersection that reduces the width of the roadway and adds space to the sidewalk so pedestrians are more visible in the crosswalk and also encourage vehicles to slow down when turning the corner or passing through the intersection.

Countdown Timers—A countdown timer is displayed at the same time as the flashing “Don’t Walk” or upraised hand to inform pedestrians of the amount of time remaining for them to cross the street.

Leading Pedestrian Indication—A leading pedestrian indication brings up the WALK indication 2 to 5 seconds prior to the GREEN ball for vehicles. This technique does require a longer ALL RED interval and will cause a slight increase overall intersection delay.

High-Intensity Activated Crosswalk (HAWK)—A traffic signal used to stop road traffic and allow pedestrians to cross safely. It is also known as a “pedestrian hybrid beacon.” The purpose of a HAWK beacon is to allow protected pedestrian crossings by stopping road traffic only as needed.

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INTERSECTIONS

POLICY

<Insert Agency> will continue to provide painted crosswalks at signalized intersections because they are an integral part of the intersection design and provide important guidance for both pedestrians and drivers.

At existing locations with marked crosswalks, an evaluation will be conducted at each location prior to refurbishing any of the markings. At specific locations, the evaluation process will determine if there is a need for pedestrian amenities based on identifying safety deficiencies. MnDOT's *Guidance for Installation of Pedestrian Crosswalks on Minnesota State Highways* or the Federal Highway Administration's *Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations Final Report and Recommended Guidelines* will be referred to for information on criteria for crosswalks at uncontrolled locations, such as traffic volumes, roadway speed, and number of pedestrians. Some of the criteria for uncontrolled locations include:

- Location must meet basic criteria such as adequate stopping sight distance, local roadways and collectors where there are lower levels of truck and turning traffic, and minimal driver distractions.

- No crosswalks for speeds greater than 40 mph, traffic volumes greater than 15,000 vehicles a day, roadways with more than 4 lanes of traffic, and crosswalks with fewer than 20 pedestrians per day.
- Crosswalks along with other improvements may be installed at locations with speeds between 35 and 40 mph, roadways with 2 to 3 lanes of traffic, and crosswalks with more than 20 pedestrians per day.

If a need is established, consideration will be given to refurbishing the crosswalk markings in conjunction with adding a center median, curb extensions, or both. If it is determined that a center median and curb extensions are not feasible, consideration will be given to not refurbishing the crosswalk.

In response to new requests to provide marked crosswalks, an evaluation of the specific location will be conducted. If a need to provide additional pedestrian safety measures is established, a marked crosswalk will only be considered if it is part of a response that also includes a center median, curb extensions, or both. Sidewalks should be considered as well as crosswalks to assist in facilitating safe pedestrian movements along the roadway.