

Appendix

City of De Pere Crosswalk Location Policy

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June 29, 2017

Background

Wisconsin State Statute, 346.24(1) states that 'motorists are required to yield to pedestrians at an intersection with pedestrian facilities, whether the crosswalk is marked or not'.

The purpose of marked crosswalks at intersections or midblock locations is to indicate optimal or preferred locations for pedestrians to cross a street. Marked crosswalks are intended to provide pedestrians with a feeling of confidence that it is safe to cross a street at a marked location and to give drivers adequate warning to expect that pedestrians will be in the roadway. However, marked crosswalks can also prompt many pedestrians to feel a false sense of safety when using a marked crosswalk.

This policy covers where and how to mark crosswalks, related to the following topics:

- General Crosswalk Location Principles
- Traffic Engineering Studies
- Marking Crosswalks at Unsignalized Intersections
- Marking Crosswalks at Controlled Intersections
- Marking Crosswalks at Mid-Block Locations
- Removal of Crosswalk Markings
- Crosswalk Stripping Patterns

This policy replaces the existing City Department of Public Works policy on 'Crosswalks on Through Streets', dated March 12, 2012.

General Crosswalk Location Principles

It is recognized that pedestrians are sensitive to out-of-the-way travel and that reasonable accommodations should be made to make crossings both convenient and safe allowing pedestrians to cross streets at regular intervals.

The following general principles should be considered when identifying pedestrian crosswalk locations:

1. Arterial street crosswalk locations should be consistent with the City of De Pere *Bicycle and Pedestrian Plan*. Depending on the street network configuration and intersection spacing, pedestrians in dense urban areas should not be expected to walk more than 400 feet out their way to cross a street to reach their destination.
2. Marked crosswalks should be installed where there is:
 - a. A substantial conflict between vehicle and pedestrian movements,
 - b. Where significant pedestrian concentrations occur,
 - c. Where pedestrians would not otherwise recognize the proper place to cross, and
 - d. Where traffic movements are controlled
3. Crosswalks should not be installed at locations where sidewalks do not exist.

The widely used national guideline regarding crosswalk markings is documented in the *Manual on Uniform Traffic Control Devices (MUTCD)* Section 3B-17 and 3B-18 (6). It states that crosswalks should be marked at all intersections where there is a substantial conflict between vehicular and pedestrian movements.

The Federal Highway Administration (FHWA) advises that the overuse of crosswalk markings should be avoided to maximize their effectiveness. Crosswalks and sign treatments (such as the "State Law – Yield to Pedestrians" and rectangular rapid flash beacon signs – RRFB's) should be used discriminately within a city so that the effectiveness of these treatments is not deteriorated by overuse. Although these treatments may be effective at individual locations, overuse of these treatments city-wide may lead to a decrease in their value as drivers can become desensitized to them.

National pedestrian safety research studies documented in the FHWA Report HRT-04-100, '*Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Locations*', September, 2005 concluded that there is no significant effect on pedestrian crashes between marked versus unmarked crosswalks under the following conditions:

- Two-lane streets
- Multilane streets without raised medians and ADT's below 12,000 vpd
- Multilane streets with raised medians and ADT's below 15,000 vpd

The research report also concludes that crosswalks should not be marked on 2-lane roadways with ADT's greater than 9,000 vpd, or 4-lane roadways with average daily traffic (ADT's) greater than 12,000 vpd, unless other special treatments such as median refuge islands, curb extensions, overhead lighting, pedestrian activated signals or warning lights are provided along with a Traffic Engineering Study that concludes pedestrian safety will be improved by the special treatments.

For multilane streets with ADT's above these volumes, it can be expected that there will be a significant increase in pedestrian crashes on streets with marked crosswalks, compared to streets with unmarked crosswalks (after controlling for traffic ADT and pedestrian ADT). Table 1 provides initial guidance on whether an uncontrolled location might be a candidate for a marked crosswalk and/or whether additional geometric and/or traffic control improvements are needed.

Marked crosswalks may be installed on 4-lane streets without a raised median with a 35 mph or less posted speed limit and ADT's exceeding 15,000 vpd with the installation of a pedestrian signal such as a 'High-Intensity Activated Crosswalk' (HAWK) beacon' or 'Rectangular Rapid Flashing Beacon' (RRFB's) as shown on Table 1. The installation of HAWK beacons should satisfy the *MUTCD* Warrant requirements. Figure 1 provides a Crosswalk Request and Enhancement Process Flow Chart based on the information in Table 1 and the crosswalk location principles described above.

Table 1: Guidelines for Installing Marked Crosswalks and Other Needed Pedestrian Safety Improvements at Uncontrolled Locations*

Roadway Type (Number of Travel Lanes and Median Type)	Vehicle ADT < 9,000			Vehicle ADT >9,000-12,000			Vehicle ADT >12,000-15,000			Vehicle ADT >15,000		
	Speed Limit (mph)**											
	<30	35	40	< 30	35	40	< 30	35	40	<30	35	40
Two lanes	C	C	P	C	C	P	C	C	N	C	P	N
Three lanes	C	C	P	C	P	P	P	P	N	P	N	N
Multilane (4 of more lanes) with raised median***	C	C	P	C	P	N	P	P	N	N	N	N
Multilane (4 or more lanes) without raised median	C	P	N	P	P	N	N	N	N	N	N	N

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 as 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 crossing safer, nor will they necessarily result in more vehicles stopping for pedestrians. Whether marked crosswalks are installed, it is important to consider other pedestrian facility enhancements (e.g., raised crosswalks, traffic signal, roadway narrowing, enhanced overhead lighting, traffic taming measures, curb extensions), as needed to improve the safety of the crossing. These are general recommendations, good engineering judgement should be used in individual cases for deciding where to install crosswalks.

** Where the speed limit exceeds 40 mph marked crosswalks alone should not be used at unsignalized locations.

The Legend for Table 1 is as follows:

C = Candidate sites for marked crosswalks. Marked crosswalks must be installed safely 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 hour (or 15 elderly and/or child pedestrians) exist at a location before placing a high priority on the installation of a marked crosswalk.

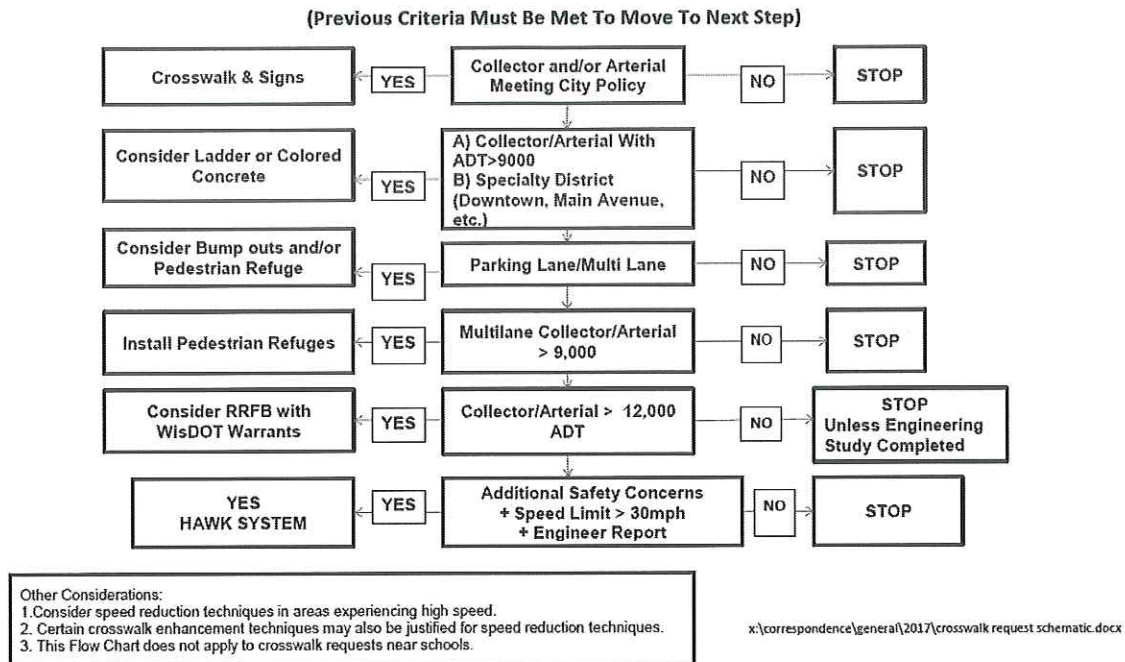
P = Possible increase in pedestrian crash risk may occur if crosswalks are added without other pedestrian facility enhancements. These locations should be closely monitored and enhanced with other pedestrian crossing improvement measures, if necessary, before adding a marked crosswalk.

N = Marked crosswalks alone are not sufficient, since crash risk may be increased due to providing a marked crosswalk alone. Consider using other treatments, such as traffic taming treatments, traffic signals with pedestrians signals where warranted, or other substantial crossing improvements to improve crossing safety for pedestrians.

*** The raised median or crossing island must be at least 4 feet wide and 6 feet long to adequately serve as a refuge area for pedestrians in accordance with MUTCD and American Association of State Highway and Transportation Officials (AASHTO) guidelines.

Source: *Guidance for Installation of Pedestrian Crosswalks on Minnesota State Highways*, October, 2005

Figure 1: Crosswalk Request and Enhancement Process Flow Chart



Traffic Engineering Studies

A traffic engineering study is required to determine if the guidelines in this Policy and *MUTCD* warrants are satisfied for the installation of a marked crosswalk at a particular location. The components of a Traffic Engineering Study will vary by location, but typically should include consideration of:

- Speed and volume on the street involved
- Pedestrian volume, age and level of mobility
- Location of pedestrian origins and destinations and crossing patterns
- Existing sidewalk network and sidewalk ramps
- Adequacy of sight distances and absence of sight obstructions
- Street characteristics including grade, curvature, pavement markings, pavement widths, number of vehicle and bicycle lanes
- Location of adjacent driveways
- On-street parking
- Street lighting
- Location of drainage structures
- Distance to nearest marked crossing
- Traffic signal progression
- Potential for rear-end crashes

Crosswalk Markings at Unsignalized Intersections

Pedestrian crosswalks should not be installed at street intersections that are not controlled by a traffic signal, a STOP sign or a YIELD sign unless all of the following criteria are met:

- The speed limit is 40 mph or less; and
- There are 20 or more pedestrians using the crossing per hour during the peak morning and evening traffic time periods (lower volumes may be considered if a large percentage of the pedestrians consist of young, elderly or disabled pedestrians; or 15 or more pedestrians per hour during multiple hours throughout the day; and
- The two-way traffic ADT for the street exceeds 4,000 vpd; and
- A sidewalk or adequate shoulder is provided for use by pedestrians on both sides of the street approach; and
- There is not another crosswalk across the same roadway within 400 feet of the intersection; and
- Adequate stopping sight distance (equal to or exceeding that for the posted speed) is available in both directions as determined in accordance with guidance contained in the American Association of State Highway and Transportation Officials (AASHTO) '*Policy on the Design of Highways and Streets*'.

Additional design treatments such as crosswalk signing, pedestrian median refuge islands, advance stop bars, HAWK beacons or RRFB's should be considered for crosswalks on streets with four or more moving traffic lanes. The installation of HAWK or RRFB's should satisfy the following criteria.

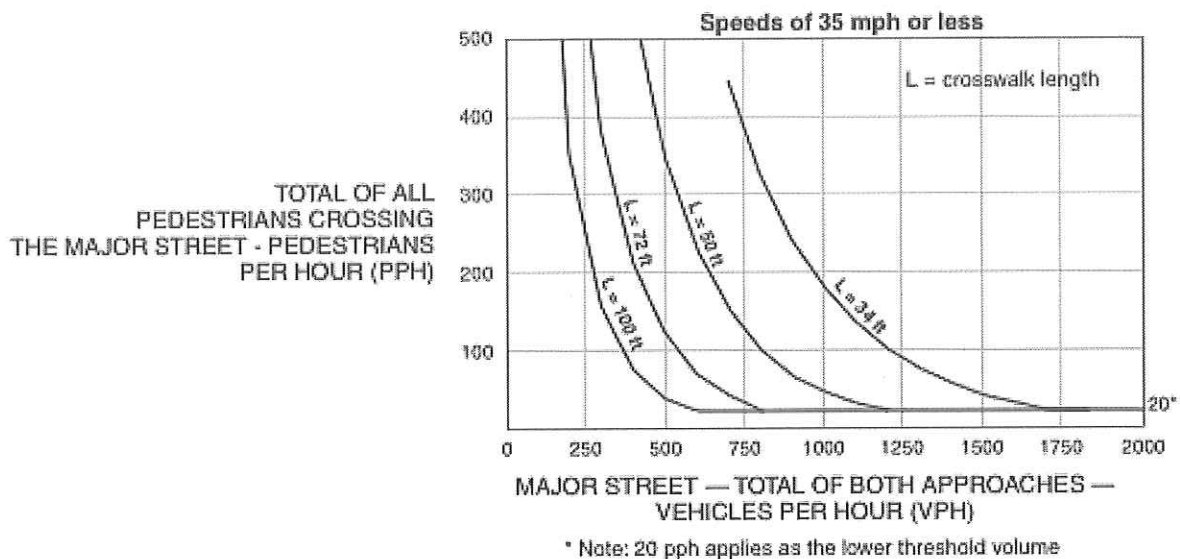
HAWK beacons can be evaluated for marked crosswalk locations with significant pedestrian demand that satisfy the *Manual on Uniform Traffic Control Devices (MUTCD)* traffic speed and volume warrants. In general, they should be used if:

- 1) There are an insufficient number of gaps in traffic to permit pedestrians to cross;
- 2) Vehicle speeds on the major street are too high to permit pedestrians to cross safely; or
- 3) Pedestrian delay is excessive.

Bus stop and school crossings are frequently good locations to consider HAWK beacons.

Figure 2 from the *MUTCD* identifies threshold criteria for the installation of HAWK beacons, shown with curves, for various crosswalk lengths based on the number of pedestrians and traffic volume for streets with traffic speeds of 35 mph or less. If pedestrian and traffic volumes exceed the threshold curve criteria, a HAWK beacon may be considered.

Figure 2: MUTCD Recommended Traffic Thresholds for HAWK Beacon Consideration



The WisDOT *Traffic Guidelines Manual*, Section 4-5-2 indicates that RRFB's may be considered based if the following conditions exist:

- Location is an uncontrolled pedestrian crossing.
 - Minimum volume* thresholds should be met:
 - 20 or more pedestrians during a single hour (any four consecutive 15-minute time periods) of an average day, or
 - 18 or more pedestrians during each of any two hours of an average day, or
 - 15 or more pedestrians during each of any three hours of an average day.
- *Young (<12), elderly (>85) and disabled pedestrians count 2X toward volume thresholds. Additionally, seasonal day volumes can be used in place of average day volumes if the crossing is a known tourist area.
- A minimum vehicle volume of 1,500 vehicles per day.
 - Maximum of four lanes crossed, unless there is a raised median, in which case it can be five lanes.
 - There exists a minimum of 300 feet between the subject crossing and the nearest controlled pedestrian crossing or intersection traffic control device on the state trunk highway system. Consideration should be given to extending this distance beyond 300 feet if the proposed crosswalk location falls within an auxiliary turn lane for the nearby intersection or if the standing queue from the intersection extends over the proposed crosswalk location.
 - The approach speed is posted at 40 mph or less.
 - Adequate stopping sight distance exists based on FDM 11-10-5 or greater than 8 times the posted speed limit.

Crosswalk Markings at Controlled Intersections

Unless a pedestrian crossing is prohibited, marked crosswalks should be provided at all intersection approaches controlled by traffic signals. Intersection approaches controlled by STOP signs can be recommended for marked crosswalks if any of the following conditions apply:

- Crosswalk is located in a school area; or
- Elderly or disabled pedestrian volumes of 20 or more per hour are expected during the peak hour of pedestrian demand; or
- Pedestrian volumes of 60 or more are expected during the peak hour of pedestrian demand and traffic volumes of 6,000 vpd are expected to cross over the crosswalk; or
- Safety or efficiency reasons dictate directing pedestrians to a particular leg of an intersection; or STOP sign approach on a major or minor arterial street.

Crosswalk Markings at Mid-Block Locations

Mid-block crosswalks should only be installed if marked and established by a Traffic Engineering Study and approved by City Council action. Midblock crossings should only be installed at locations where pedestrians would be expected to need to cross the street. Because mid-block pedestrian activity is not expected by drivers, additional safety measures including signage, parking restrictions and HAWK beacons or RRFB's should be installed. Other pedestrian safety measures can include curb bulbouts. Mid-block crosswalks should only be installed if the following conditions exist:

- Mid-block crosswalks should be considered only if there is sufficient demand according to the following criteria:
 - Pedestrian volumes exceed 40 or more during the peak hour of pedestrian demand; or
 - Significant pedestrian trip generators (such as schools, parks or commercial buildings) are on both sides of the street between controlled intersections.
- The location is more than 300 feet from a controlled intersection;
- Adequate stopping sight distance exists between approaching motorists and pedestrians starting to cross the proposed crosswalk;
- The crosswalk location has adequate street lighting; and
- Safety considerations attributed to roadway configuration, traffic volumes or speeds do not preclude establishing a crosswalk.

Removal of Crosswalk Markings

These guidelines should not be used to justify removal of existing crosswalk markings. In most circumstances, additional safety measures should be considered prior to removal of crosswalk markings.

In general, removal of existing crosswalks should be avoided. In exceptional cases, closing a crosswalk or keeping a crosswalk closed may be justified even if a crosswalk meets the criteria outlined elsewhere in this Policy.