



Pedestrian Crossing Facilitation Guideline Development

TZD Conference | Melissa Barnes

October, 2017



Why?

- Minnesota Go:
 - Minnesota's multimodal transportation system maximizes the health of people, the environment, and our economy. The system:
 - Provides safe, convenient, efficient, and effective movement of people and goods
 - Is accessible regardless of socio-economic status or individual ability
- ADA, access, reasonable LOS/scale for non-motorized users
- MN Walks



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Why?

- Traditional engineering vs complete streets
- Stagnant/increased fatalities for walkers and bikers
- Health
- Equity
- “Nobody ever walks there...”



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Unsignalized Crossing Legal Review

Legal Review

- MN Statute 169.21 **Subd. 2 Rights in absence of signal**

(a) Where traffic-control signals are not in place or in operation, the driver of a vehicle shall stop to yield the right-of-way to a pedestrian crossing the roadway within a marked crosswalk or at an *intersection with no marked crosswalk*. The driver must remain stopped until the pedestrian has passed the lane in which the vehicle is stopped. 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. This provision shall not apply under the conditions as otherwise provided in this subdivision.

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Legal Review

MN Statute 169.011 Definitions **Subd. 20. Crosswalk.**

- "Crosswalk" means (1) that portion of a roadway ordinarily included with the prolongation or connection of the lateral lines of sidewalks at intersections; (2) any portion of a roadway distinctly indicated for pedestrian crossing by lines or other markings on the surface.

MN MUTCD 1A.13 Definitions 44.

- **Crosswalk** - (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, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the center line; (b) any portion of a roadway at an intersection or elsewhere distinctly indicated as a pedestrian crossing by pavement marking lines on the surface, which might be supplemented by contrasting pavement texture, style, or color.

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Legal Review

- MN Statute 169.21: **Subd. 3. Crossing between intersections.**

(a) Every pedestrian crossing a roadway at any point other than within a marked crosswalk or at an intersection with no marked crosswalk shall yield the right-of-way to all vehicles upon the roadway.

(b) Any 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 shall not cross at any place except in a marked crosswalk.

(d) Notwithstanding the other provisions of this section every driver of a vehicle shall (1) exercise due care to avoid colliding with any bicycle or pedestrian upon any roadway and (2) give an audible signal when necessary and exercise proper precaution upon observing any child or any obviously confused or incapacitated person upon a roadway.



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Legal Review

- **MN MUTCD 3B.18 Crosswalk Markings**

- Support: 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. In conjunction with signs and other measures, crosswalk markings help to alert road users of a designated pedestrian crossing point across roadways at locations that are not controlled by traffic control signals or STOP or YIELD signs. At non-intersection locations, crosswalk markings legally establish the crosswalk.

- Guidance: At locations controlled by traffic control signals or on approaches controlled by STOP or YIELD signs, crosswalk lines should be installed where engineering judgment indicates they are needed to direct pedestrians to the proper crossing path(s). Crosswalk lines should not be used indiscriminately. An engineering study should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

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Legal Review

- MN MUTCD 3B.18
- Guidance: Because non-intersection pedestrian crossings are generally unexpected by the road user, warning signs (see Section 2C.50) should be installed for all marked crosswalks at non-intersection locations and adequate visibility should be provided by parking prohibitions.



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Crosswalk Marking Placement

Crosswalk Marking Placement

- Zegeer:
 - “Marked crosswalks are one tool used to direct pedestrians safely across a street. When considering marked crosswalks at uncontrolled locations, the question should not be simply, “Should I provide a marked crosswalk or not?” Instead, the question should be, “Is this an appropriate tool for directing pedestrians across the street?” Regardless of whether marked crosswalks are used, there remains the fundamental obligation to get pedestrians safely across the street.”

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Crosswalk Marking Placement

- Famous (infamous) 2005 Zegeer Study “Safety Effects of Marked Versus Unmarked Crosswalks at Uncontrolled Locations”

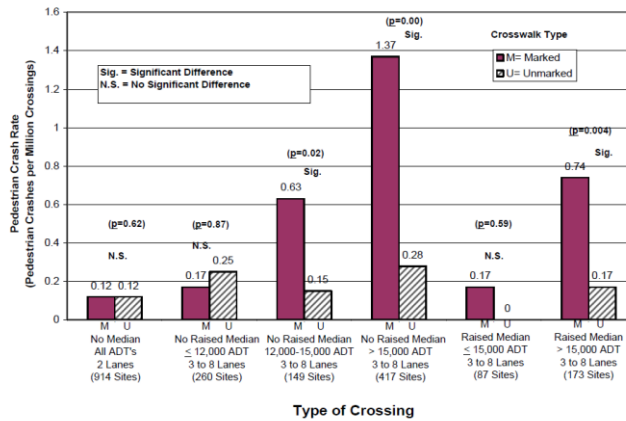


Figure 18. Pedestrian crash rate versus type of crossing.

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Crosswalk Marking Placement

- Zegeer:
 - While overuse of marked crossings at uncontrolled locations should be avoided, higher priority should be placed on providing crosswalk markings where pedestrian volume exceeds about 20 per peak hour (or 15 or more elderly pedestrians and/or children per peak hour).



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Crosswalk Marking Placement

- Knoblauch Behavioral Studies
 - “These studies found pedestrian behavior to be, if anything, slightly better in the presence of marked crosswalks compared to unmarked crosswalks. Certainly the results showed no indication of an increase in reckless or incautious pedestrian behavior associated with marked crosswalks.”



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Crosswalk Marking Placement

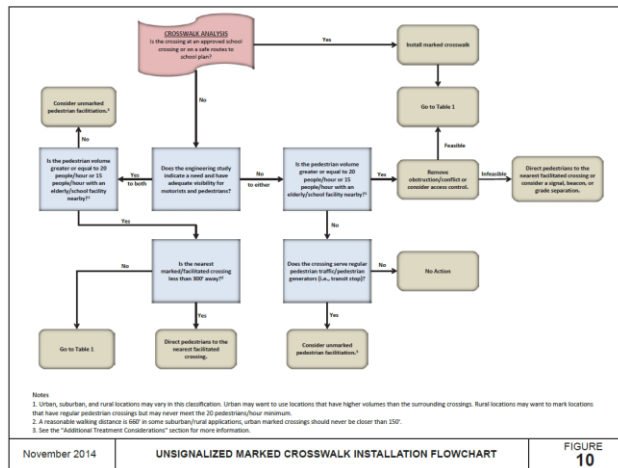
- Knoblauch Behavioral Studies
 - “The study results revealed that very few motorists stopped or yielded to pedestrians either before or after marked crosswalks were installed. After marked crosswalks were installed, there was a small increase in pedestrian scanning behavior before stepping out into the street. Also, there was approximately a 1.6-km/h (1-mi/h) reduction in vehicle speed after the marked crosswalks were installed. These behavioral results tend to contradict the false sense of security claims attributed to marked crosswalks, since observed pedestrian behavior actually improved after marked crosswalks were installed at the study sites.”

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Crosswalk Marking Placement

- Our Flowchart (See MnDOT TEM)



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Crosswalk Marking Placement

- Our table (See MnDOT TEM)
- Developed based on Zegeer study and other national studies for additional treatments (Virginia, Colorado, Washington, etc.).

Table 13-1 Pedestrian Facility Treatments

Roadway Configuration ^{1,2}	Vehicle AADT < 5000			Vehicle AADT 5001-10,000			Vehicle AADT 10,001-50,000			Vehicle AADT > 50,000						
	< 30 mph	30 mph	> 45 mph	< 30 mph	30 mph	> 45 mph	< 30 mph	30 mph	> 45 mph	< 30 mph	30 mph	> 45 mph				
1 lane (with or without a raised median)	A	A	B	D	A	A	B	D	A	A	C	D	A	B	C	D
2 lanes with raised median	A	A	C	D	A	B	C	D	A	C	C	D	B	C	C	D
2 lanes without raised median	A	B	C	D	A	B	C	D	B	B	C	D	B	C	C	D
Multilane (4 or more lanes) with raised median ³	A	A	C	D	A	B	C	D	A	B	C	D	C	C	C	D
Multilane (4 or more lanes) without raised median ³	A	C	C	D	B	C	C	D	C	C	C	D	C	C	C	D

Treatment Considerations:

A. Consider marked crosswalk and signs.
 Guidance: Consider installing marked crosswalk with advance warning signs (W12-2), use 51-2 signs for school crossings. Consider in-roadway (R2-6) or overhead (R2-9b) signs.

B. Consider marked crosswalk with enhanced signs (R5 or R5-9b) and/or geometric improvements.
 Guidance: Consider installing treatment options from Type A treatments. Add curb extensions or median refuge islands.

C. Consider marked crosswalk with signs, geometric improvements, and pedestrian-activated warning devices⁴.
 Guidance: Consider installing a raised median refuge island if one is not present. Consider installing marked crosswalk and appropriate crossing signs along with a pedestrian-activated device.

D. Do not install marked crosswalks.⁵
 Guidance: Consider pedestrian hybrid beacon, pedestrian traffic signal, or grade-separated crossing.

Specific Notes:

- Advanced stop lines and signing (R5-9 or C) should be used whenever possible if a multiple-threat crash issue is present. Overhead signing, W19s or other overhead treatments should be used to mitigate multiple-threat crash risks.
- Do not install a marked crosswalk where there are 3 or more through lanes per direction. Consider a pedestrian hybrid beacon, pedestrian traffic signal, or grade-separated crossing.
- Traffic calming treatments should be considered to reduce speed.
- If a median LaneKee bar or is not currently installed go to Treatment Type D.
- Minimum acceptable median width to provide a refuge is 6 feet.

General Notes:

- Adding crosswalks alone will not make crossings safer, result in more vehicles stopping for pedestrians, nor will they necessarily create a false sense of security.
- Crosswalks have not been proven to create a false sense of security – research shows that pedestrians can feel more secure at marked crosswalks.
- Whether a crosswalk is marked or not, additional crossing enhancements should be considered. See the "Additional Treatment Considerations" section.
- See MUTCD Section 8B.23 for additional guidance on using this table.
- Lanes are total cross section.

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Unsignalized Intersection Curb Ramp Placement

Unsignalized Curb Ramp Placement

- Legally, every intersection is a crossing
 - Low speed, urbanized roads should be easy
 - Some roads are high speed, high motor-vehicle volume, low pedestrian volume
 - Facilitate pedestrian crossings where people cross, think land use. This should be a broad look at need (think of parks, schools, fishing, restaurants, hotels, equity, bored junior high kids on bikes in the summer). The default should be to provide a crossing, prove lack of need.
 - Do not use crosswalk markings unless we can meet the criteria recommended in the table.

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Unsignalized Curb Ramp Placement

- We've created a lot of sidewalk and shared-use path "highways."
 - Long stretches of use, but no way to get on and off
- Lack of curb ramps creates:
 - Tripping hazards
 - Barrier to any wheeled user (wheelchairs, rollerblades, bikes, strollers)
 - Even bigger barrier in the winter
 - Safety concern with users spending more time in the road navigating curbs, snow, boulevards that are not friendly
- A lack of facility on a road means that the shoulder or road itself is the pedestrian facility.
- We should be allowing easy and safe access to all to our sidewalk and path systems

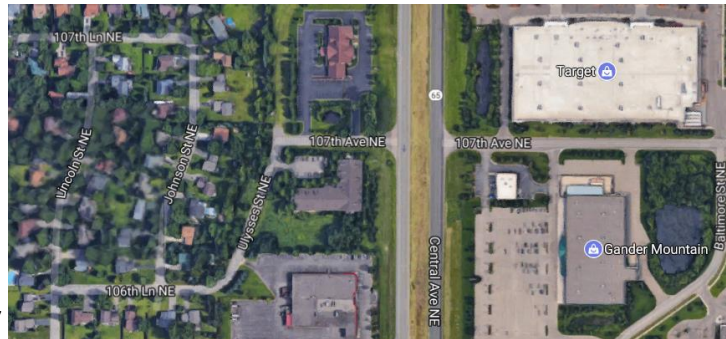


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Unsignalized Curb Ramp Placement

- Even if there are no facilities any road, sometimes we are the barrier to destinations (innovative intersections, access control). Consider pedestrian and bicycle crossing needs at all intersections – they do not operate like motor vehicle traffic and should not be treated as such. Connect destinations.



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Signalized Intersection Crossings

Signalized Intersection Crossings

- Going beyond ADA and connecting destinations regardless of connection beyond signal eliminates barriers, increases safety, improves LOS, reduces exposure (both types), and provides access.
- Unsubstantiated myth: Crossing only 1 leg of a trunk highway has safety benefits
- Fact: One of the top three causes of pedestrian-vehicle crashes is pedestrian failure to obey the traffic control device.
- Connecting sidewalks and paths is usually pretty straightforward.
- Where occasional pedestrian traffic is expected, never strand a pedestrian in a quadrant....

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The End!

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