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The When, Where and How of Mid-Block Crosswalks

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As a motorist, you may enjoy driving on a high-speed wide street with few intersections and many lanes. This type of street design, found in many suburbs and commercial areas, may enable you to get from origin to destination quickly and easily. However, if instead of driving you must walk the same route, your perception of that design may be very different. With intersections and pedestrian crossings few and far between, you may decide to cross in the middle of the block.

Crossing in mid-block creates a dangerous situation for both pedestrians and drivers. Pedestrians may put themselves in danger if they misjudge the speed of approaching vehicles and the time it takes to safely cross the street; drivers may be startled and confused by the pedestrian crossing the street, causing a driver to slam on the brakes.

A study in the early 1990s involving several states showed that mid-block events were the second major grouping of pedestrian crash types and accounted for 26.5 percent of all pedestrian crashes (Transportation Research Board). Among this group, the most common crash type (1/3 of all) was the "mid-block dash" where a pedestrian would run into the street and the motorist's view was not obstructed (Transportation Research Board). While it's unlikely that pedestrians will cross only at intersections, it is possible to help them cross roads in between intersections in a more visible and safe manner through the use of midblock crosswalks.

Midblock crossings are locations between intersections where marked crosswalks have been provided. The crosswalk may be signalized or unsignalized. They offer convenient locations for pedestrians to cross in areas without frequent intersection crossings.

Installation of midblock crosswalks acknowledges that pedestrians prefer to travel to their destination using the shortest route possible. A midblock crossing creates a safer, more visible and more direct route without requiring the pedestrian to walk to the nearest intersection or cross at a random and sometimes dangerous location.

Where to consider a midblock crosswalk

Older neighborhoods, with narrow streets, slower moving vehicles, short blocks and many controlled intersections do not typically need midblock crosswalks. However, in suburbs, long "superblocks" provide a good site for midblock crosswalks. Midblock crossings are also often placed where there is heavy pedestrian traffic near major destinations, such as schools, shopping centers, or transit stops.

Crossing design

The Federal Highway Administration (FHWA) provides various crosswalk recommendations depending on the road's classification. On roads with low traffic volume and speeds up to 30 mph, midblock crosswalks can be kept simple and do not require signals or other special traffic control devices. But when the distance between intersections increases, as well as the speed and traffic volume, midblock crosswalks may require the use of other control devices.

Medians and refuge islands. It may be necessary to add medians or refuge islands to help pedestrians cross safely.

A median is a strip of land that separates traffic moving in opposite directions, and it may run for several blocks. Refuge islands are similar to medians, but are much shorter, usually 100-250 feet in length. These two types of traffic control serve many purposes. Medians and refuge islands provide pedestrians with a place to safely stop in the middle of the road, allowing pedestrians to watch for cars coming from only one direction at a time. Medians and refuge islands can help guide pedestrians to preferred crossing locations. Refuge islands may help slow traffic, from, say, 40 mph to 30 mph. Raised medians landscaped with trees or shrubs also help to reduce traffic speed.

Signals. On streets with four lanes, traffic signals should be considered along with medians or refuge islands. According to the FHWA, traffic signals at midblock crossings are helpful or essential under the following conditions:

- On higher volume roadways.
- Where gaps are infrequent.
- In school zones.
- Where elderly or disabled pedestrians cross.
- Where speeds are high.

On roads with six or more lanes, signalization is necessary. The FHWA states that streets with this many lanes create a complex condition for pedestrians trying to cross the street. A high number of rear-end crashes can be expected, especially in areas of high density. Devices used to alert drivers must also be increased. At the minimum, pedestrian crossing signs must be 36 by 26 inches for speeds of 40 mph. Pavement word symbols can be added to enhance pedestrian visibility, and zebra or ladder style crossings should be considered. The FHWA also suggests the use of large overhead signs, flashing beacons, bulb–outs or curb extensions which reduce the distance necessary to cross the street, and even flashing overhead signs in these situations.

Design specifics

Section 3I.06 of the *Manual on Uniform Traffic Control Devices* (MUTCD) suggests referencing the American Disabilities Act *Accessibility Guidelines for Buildings and Facilities* (ADAAG) for the minimum width for refuge islands and design and placement of detectable warning surfaces. Section 4.7.11 of the ADAAG specifies raised islands in crossings shall be cut through level with the street or have curb ramps at both sides and a level area at least 48 in long between the curb ramps in the part of the island intersected by the crossings.

Another technique used to help make midblock crosswalks safer is the use of staggered, or Z-crossing treatments in which the crosswalk is split by a median and is offset on either side of the median (FHWA). The crossing path is not a straight line. This forces the pedestrian to turn while in the median and face oncoming traffic before turning again to finish crossing the street. One issue with staggered crosswalks is it presents a challenge for the visually impaired who are “thrown off course by changes in the direction of the walkway leading to the road” (FHWA). A solution is to provide railings or detectable warnings to help realign the pedestrian to the roadway just before crossing the street.

Passive and active sensors

A number of electronic technologies can be used to help pedestrians safely cross midblock crosswalks. If signals are to be used, the sensor may be active or passive.

Active sensors require the pedestrian to push a button. Active sensors work best when sensors are “hot,” meaning the response is immediate. If a pedestrian hits the button and the signal does not change quickly, he or she may cross when traffic allows, without waiting for the signal to change. Then when the signal does finally change, a driver who is stopped at the crosswalk may become frustrated and disrespectful of the crosswalk when no pedestrians are visible. A slow sensor response can also cause pedestrians to avoid using crosswalk altogether. If a median or refuge island is used, a push button should be installed in the median if it is possible that some pedestrians will not be able to cross the whole street at one time (FHWA).

A passive sensor uses an infrared detector to determine the presence of a pedestrian in either the curbside area or the crosswalk. It does not require a pedestrian to push a button to activate the signal. If a pedestrian is detected in the crosswalk, the sensor can extend the time allowed for a pedestrian to cross the street. Passive signals provide an advantage over active signals by ensuring that the signal will be activated by all pedestrians, even those who are unable or unwilling to push the button.

Section 4D of the MUTCD specifies that midblock crosswalks shall not be signalized if they are located within 300 feet of the nearest traffic control signal unless the proposed traffic control signal will not restrict the progressive movement of traffic. Further, a midblock crosswalk location should not be controlled by a traffic control signal if the crosswalk is located within 100 feet from side streets or driveways that are controlled by stop signs or yield signs. The MUTCD suggests an engineering study be completed to determine the need for a control signal at a midblock crosswalk.

Crosswalk lighting

Adequate lighting helps to warn oncoming drivers of pedestrians crossing the street at midblock locations and also helps guide pedestrians across the street at night. The FHWA’s *Pedestrian Safety - Report to Congress* sites several new examples of lighting available for use at midblock crosswalks, from simple to high-tech:

In-pavement lights. These are amber lights embedded in the pavement on both sides of the crosswalk. These lights are directed towards oncoming traffic. In-pavement lights can be activated by passive or active sensors. Once activated, the lights flash at a constant rate, warning motorists of pedestrians in the vicinity. These lights are typically at crosswalks without stop control devices.

Overhead lighting. This system provides pedestrians with light to cross the street at night and warns oncoming vehicles of the potential for pedestrians. Overhead lighting can be activated passively or by pushing a button.

LED warning systems. These operate in a similar way to the overhead lighting system but provide an LED sign that warns approaching drivers that a pedestrian is crossing the street. In a study performed in Clearwater, Florida, the use of LED warning lights increased driver yielding behavior of 30 to 40 percent during the day and 8 percent at night. LED warning lights can be used in conjunction with overhead lighting for increased safety during the night.

High-intensity activated crosswalk, or HAWK. This relatively new type of signal uses both traditional traffic and pedestrian signal heads but in a different configuration. It includes a sign instructing motorists to "stop on red" and a "pedestrian crossing" overhead sign. It can be activated passively or by a pedestrian pushing a button. When activated, an overhead signal begins flashing yellow and then solid yellow, advising drivers to prepare to stop. It then switches to a solid red light and shows the pedestrian a "Walk" indication. Finally, it shows a flashing red signal indicating that motorists may proceed when safe after coming to a complete stop. The pedestrian sees a flashing "Don't Walk" sign indicating the number of seconds left to cross.

Estimated Costs for Various Crosswalk Designs

- **Crosswalk/Countdown signal:** $5,000 per intersection (this includes installation and an additional installed post). This cost can be up to $15,000 per intersection if a retrofit is done with APS devices.
- **Curb extensions:** $5,000 - $25,000
- **Simple neighborhood crosswalks with signs and markings:** $500 - $1,500
- **Enhanced crosswalk with special stencils, raised platforms, or special signage:** $5,000
- **Raised crosswalks:** $2,000 – $15,000
- **Refuge island:** $10,000 – $40,000
- **In pavement illumination:** $25,000 – $40,000 per crossing
- **Pedestrian only traffic signal:** $40,000 - $75,000
- **HAWK signal:** $40,000
- **Midblock flashing crosswalk:** $20,000 for equipment and $20,000 to install

Source: http://www.ncdot.org/bikeped/download/bikeped_planning_albemarle_AppendixE.pdf

Challenges with midblock crosswalks

Drivers do not expect to see pedestrians crossing at midblock locations. Because of this, it is important to have adequate lighting and signage to ensure drivers have the necessary time to stop. Midblock crossings that span many lanes may be a challenge for many pedestrians. As stated above, you must provide medians or refuge islands to help reduce the number of lanes that pedestrians must cross at once. Also, the use of curb extensions can reduce the distance that a pedestrian must walk to cross the street.

Midblock crosswalks can be difficult to use safely for those who are visually impaired. If a midblock crossing is not signalized, people with visual impairments are often unable to tell when there is a gap in traffic or whether all vehicles in approaching lanes have stopped, as the sound of one idling car can mask the sound of approaching cars. (FHWA's *Designing Sidewalks and Trails for Access*). If the crosswalk is signalized, pedestrians who are visually impaired are often unable to determine when it is their turn to cross the street because

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Sources:

- Transportation Research Board. Effectiveness of Various Mid-block Crossing Treatments. http://rns.trb.org/dproject.asp?n=13454. Accessed August 24, 2011.
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- Federal Highway Administration. Designing Sidewalks and Trails for Access. http://www.fhwa.dot.gov/environment/sidewalk2/. Accessed August 24, 2011.
- Evaluating Active and Passive Crosswalk Warnings at Unsignalized Intersections and Mid-Block Sites. October 2009. http://www.lrrb.org/pdf/200903TS.pdf

their customary cue at intersections, the surge of traffic in the street beside them, isn't present (FHWA's *Designing Sidewalks and Trails for Access*). To help, an audible indicator that provides timing information should be installed.

Costs

According to research done on unsignalized intersections and midblock crossing sites for the Minnesota Department of Transportation, the cost of passive warning crosswalk sites (roadway markings with yellow pedestrian warning signs) facing oncoming traffic typically cost no more than $500. Active warning sites, featuring these passive warnings accompanied by a flashing light attached to a roadway shoulder sign or suspended above the roadway costs from $5000 to $12,000 to install. Their study concluded that people driving towards crosswalks with the active warning systems (flashing lights) tended to drive more slowly than at the passive warning sites without lights.

On page 3, see some 2007 estimates for midblock crossing installation from the Albermarle, NC, Pedestrian Plan.

At a Glance: Recommended Practice for Midblock Crossings

- Consider providing a marked midblock crossing when protected intersection crossings are spaced greater than 400 feet or so that crosswalks are located no greater than 200 to 300 feet apart in high pedestrian volume locations, and meet the criteria below.
- Midblock crossings may be considered when there is significant pedestrian demand to cross a street between intersections, such as connecting to major generators or transit stops.
- Midblock crosswalks should be located at least 100 feet from the nearest side street or driveway so that drivers turning onto the major street have a chance to notice pedestrians and properly yield to pedestrians who are crossing the street.

Criteria

- Streets with an average daily traffic volume (ADT) of 12,000 vehicles per day or less.
- Multilane streets carrying less than 15,000 ADT if a raised pedestrian refuge median is provided.
- Operating speeds less than 40 mph.
- A minimum pedestrian crossing volume of 25 pedestrians per hour for at least four hours of a typical day.
- Adequate sight distance is available for pedestrians and motorists.

Recommendations

- Conform to Proposed Right-of-Way Accessibility Guidelines (PROWAG) guidelines for the disabled and visually impaired.
- Unsignalized midblock crosswalks should not be provided on streets where traffic volumes do not have gaps in the traffic stream long enough for a pedestrian to walk to the other side or to a median refuge. At locations with inadequate gaps that also meet MUTCD signalization warrants, consider a signalized midblock crossing.
- Consider a signalized midblock crosswalk (including locator tone and audio pedestrian signal output as well as visual pedestrian countdown signal heads) where pedestrians must wait more than an average of 60 seconds for an appropriate gap in the traffic stream. When average wait times exceed 60 seconds, pedestrians tend to become impatient and cross during inadequate gaps in traffic. If this initial threshold is met, check pedestrian signal warrants in the MUTCD.
- Provide overhead safety lighting on the approach sides of both ends of midblock crosswalks.
- Provide wheelchair ramps or at-grade channels at midblock crosswalks with curbs and medians.
- Provide raised median pedestrian refuge at midblock crossings where the total crossing width is greater than 60 feet, and on any unsignalized multi-lane thoroughfare crossing.
- Use high-visibility (ladder-style) crosswalk markings to increase visibility longitudinally.
- Provide advance stop or yield lines to reduce multiple-threat crashes.
- Provide advance crosswalk warning signs for vehicle traffic.
- Provide curb extensions at midblock crosswalks with illumination and signing to increase pedestrian and driver visibility.
- "Z" crossing configurations should be used for midblock crossings with medians wherever possible (see Figure 9.16). Provide an at-grade channel in median at a 45-degree angle toward advancing traffic to encourage pedestrians to look for oncoming traffic.

Other considerations

- A strategy to calm traffic speeds in advance of and at a midblock crossing is to raise the pavement to meet the sidewalk elevation by use of gentle ramps.
- Consider use of overhead flashing beacons.

Source: Institute of Transportation Engineers. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach. http://www.ite.org/css/online/

Conclusion

In summary, a midblock crosswalk provides pedestrians a safer and more visible way to cross a street than crossing at a random and often dangerous location. Midblock crosswalks are most useful in suburbs and areas where it's common to find long stretches without intersections. Midblock crosswalks should be located where there is heavy pedestrian traffic and major destinations, such as schools, shopping centers, or transit stops. While all midblock crosswalks must be marked, they can also be enhanced with medians, refuge islands, signals, signs, lighting and curb extensions. Before considering a midblock crosswalk, view the regulations as stated in the MUTCD to see if the midblock crosswalk is necessary and what features, such as signalization, should be used. And finally, consider elderly and disabled individuals in the design of the midblock crosswalk. The use of passive sensors instead of push buttons helps pedestrians who have trouble reaching or pushing buttons, and an audible indicator helps the visually impaired.

For more information on this topic, consult the sources for this article. ■

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