LESSON 16

Mid-Block Crossings

16.1 Purpose

Designers often assume that pedestrians will cross roadways at established intersections. Observation of pedestrian behavior clearly indicates that people routinely cross at mid-block locations. Pedestrians will rarely go out of their way to cross at an intersection unless they are rewarded with a much improved crossing - most will take the most direct route possible to get to their destination, even if this means crossing several lanes of high-speed traffic.

Well-designed mid-block crossings can actually provide many safety benefits to pedestrians when placed in proper locations. This chapter discusses those benefits and explains several basic design principles for mid-block crossings.

16.2 Introduction

Midblock crossings are easily located on lowvolume, low-speed roadways, such as short collectors through neighborhoods.

For most of this century - since pedestrians and motorists began competing for space - safety campaigns have directed pedestrians to walk to intersections to cross roadways. This is helpful advice, especially in downtown locations where signalization is frequent, where cycle lengths are short, where blocks are long, and where intersections are small and compact. But with the advent of the modern suburb, blocks are much longer, signalization is even less frequent, some intersections are very wide, and vehicle speeds are much higher than downtown. Under these conditions, crossing at intersections becomes less practical and often more dangerous.

Today's designer is challenged to find workable crossing points to aid pedestrians across high-speed roadways. When convenient and manageable crossing points are not identified, most pedestrians cross at random, unpredictable locations. In making random crossings, they create confusion and they add risk to themselves and drivers.

This chapter addresses two ways to facilitate nonintersection crossings: medians and mid-block crossings. By placing medians along multi-lane roadways, the designer helps channel pedestrians to the best locations: where gaps are more frequent; where lighting is improved; and where motorists have the best chance to search, detect, recognize, and respond to the presence of pedestrians. Where there are medians, the pedestrian still may cross at random locations, but due to the increased frequency of acceptable gaps and greatly reduced conflicts, the pedestrian is inclined to find a longer gap and then walk (not rush) across the roadway. Mid-block crossings are an essential design tool. All designers must learn the best placement, geometrics, and operations of mid-block crossings.

16.3 Medians and Refuge Islands - Powerful Safety Tools

A median or refuge island is a raised longitudinal space separating the two main directions of traffic. Median islands, by definition, run one or many blocks. Refuge islands are much shorter than medians, and are a length of 31 to 76 m (100 to 250 ft). Medians and refuge islands can be designed to block side-street or driveway crossings of the main road and block left-turning movements. Because medians reduce turning movements, they have the ability to increase the flow rate (capacity) and safety of a roadway.

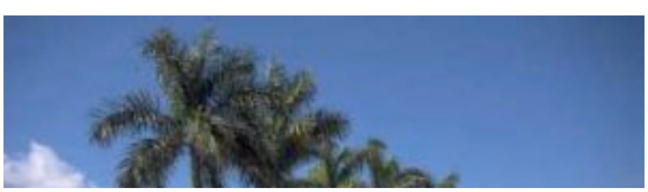
Medians are now an essential tool to minimize the friction of turning and slowing vehicles. Medians maximize the safety of the motorist and pedestrian. Medians have been extensively studied by the Georgia and Florida Departments of Transportation. Based on more than 1,000 centerline miles (1,600 km) of conversion from two-way left-turn lanes (TWLTL's) to raised medians, motorist crashes were reduced dramatically. It has also been shown through FDOT (Florida Department of Transportation) research that pedestrians are at high risk while standing in TWLTL's.

Mid-block crossings can be kept simple and are easily located on low-volume, low-speed roadways, such as short 40- to 48-km/h (25- to 30-mph) collectors through neighborhoods. When collectors are longer and handle more traffic and higher speeds, medians or refuge islands are helpful, and sometimes essential. On multi-lane minor and major arterials, refuge islands or raised medians are essential. However, when used, crosswalks must e placed with great care in these locations, especially once travel speeds exceed 64 km/h (40 mph).

16.4 Advantages of Medians

Medians separate conflicts in time and place. The pedestrian faced with one or more lanes of traffic in each direction must determine a safe gap in two, four or even six lanes at a time. This is a complex task requiring accurate decisions. Younger and older pedestrians have reduced gap acceptance skills compared to pedestrians in other age groups. Pedestrians typically have poor gap assessment skills at night. Many may predict that a car is 61 meters (200 feet) off when, in fact, it is only 31 meters (100 feet), far too close to attempt a crossing.

Medians Allow More Frequent Gaps
Medians not only separate conflicts, they also create the potential for acceptable gaps. On a standard-width four-lane roadway with a center left-turn lane (20 m or 64 feet wide, with five 12-foot lanes plus two 24-inch gutter pans), it takes an average pedestrian traveling 1.2 meters (4 feet) per second nearly 16 seconds to cross. Finding a safe 16-second gap in four moving lanes of traffic may be difficult or impossible. In any event, this may require a wait of 3 to 5 minutes. Faced with a substantial delay, many pedestrians select a less adequate gap, run across the roadway, or stand in the center left-turn lane hoping for an additional gap. If a raised median is placed in the center, the pedestrian now crosses 7.9 m (26 ft). This requires two 8- second gaps (see Figures 16-1 and 16-2). These shorter gaps come frequently. Based on traffic volume and the platooning effects from downstream signalization, the pedestrian may be able to find an acceptable gap in a minute or less.



Medians Are Cheaper to Build
The reduced construction cost of a median vs. a center left-turn lane comes as a surprise to many designers. Grass medians allow natural percolation of water, thus reducing drainage and water treatment costs. Medians do not require a base or an asphalt. Curbing is essential in urban sections

At times, it may be necessary to block mid-block access. These shrubs are dense enough to divert pedestrians to adjacent intersections.

where medians are typically raised above the level of the street. In general, however, medians average a 5-to 10-percent reduction in materials and labor costs compared to a center left-turn lane.

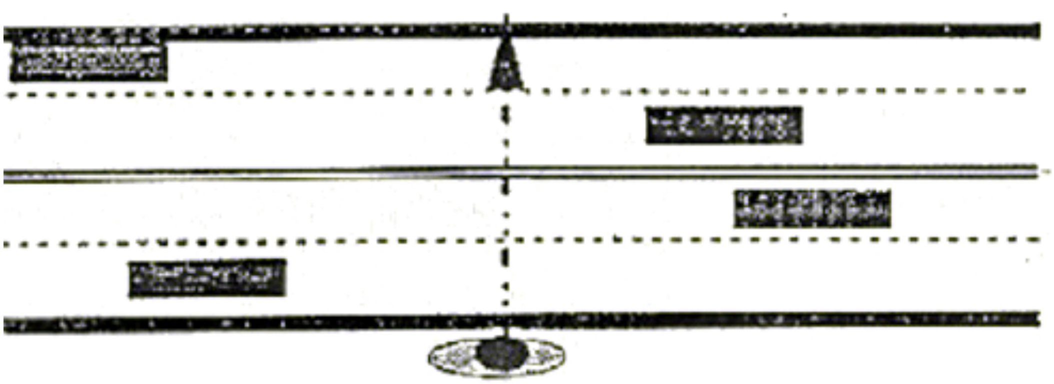
Medians Are Cheaper to Maintain

While there is only a slight savings in cost to build a raised median versus a center left-turn lane, there is a substantial savings in maintenance. A study for Florida DOT compared 6.44 km (4.0 miles) of median versus center left-turn lane maintenance costs and found that medians save an average of 40 percent of maintenance costs based on a 20-year roadway life. More frequent resurfacing, such as every 7 to 9 years would show much greater savings. This, too, surprises many designers. During the full life of the roadway asphalt, a raised median saves costs associated with the sweeping of accumulated debris, the repainting of lines, the replacement of raised pavement markers, and the resurfacing of the lane. The raised median requires infrequent cutting of grass and occasional litter clean up. If the median is dedicated by agreement or permit to the community for landscaping, then the cost to the State highway department drop to near zero.

16.5 Design Considerations for Medians

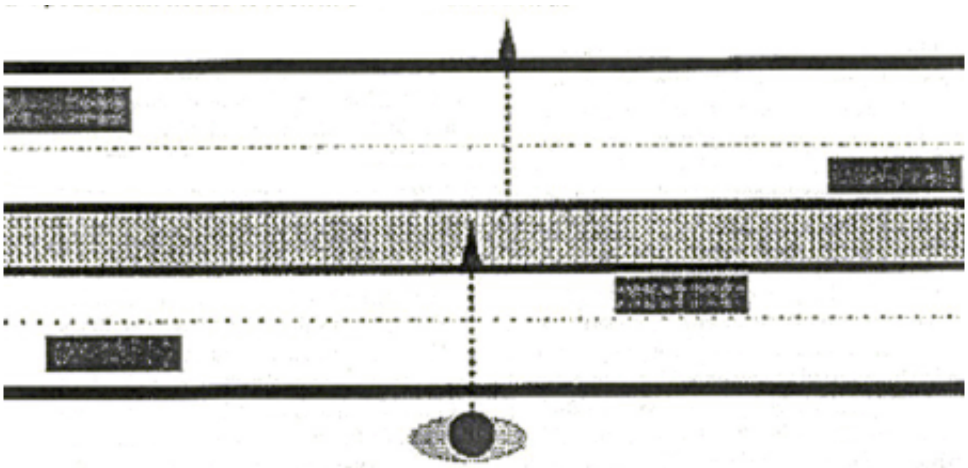
Ideally, a median should be at least 2.4 meters (8.0 feet) wide to allow the pedestrian to wait comfortably in the center, 1.2 m (4 ft) from moving traffic. A wider median is necessary if it must also serve the purpose of providing a left-turn bay for motor vehicle traffic at intersections. If the desired 2.4 meters (8.0 feet) cannot be achieved, a width of 1.8 meters (6 feet), 1.2 meters (4 feet), or even 0.6 meters (2 feet) is better than nothing. To find the needed width, especially in a downtown or other commercial environment, consider narrowing travel lanes to an appropriate width. In most locations, this reduction in travel lanes can only be made to 3.4 meters (11 feet), but in many other locations, where speeds are in the 32-to 48-km/h (20- to 30-mph) range, the reduction to 3.1 meters (10 feet) or even 2.7 meters (9 feet) is possible, and may even be desirable.

Figure 16.1. Mid-block crossing without median - the pedestrian must look in both directions.



- ***Requires one 16-second gap.***
- ***Pedestrian must look in both directions and find a gap in both directions. The wait will be considerable because statistically, two 8-second gaps are more likely than one 16-second gap.***

Figure 16.2. Mid-block crossing without median - the pedestrian needs to look in only one direction at a time.



- ***Requires two 8-second gaps.***
- ***Pedestrian only has to look in one direction.***

Medians typically have an open flat cut and do not ramp up and down due to the short width. If the island is sufficiently large, then ADA-approved ramps (1:12 grade) should be used. It is best to provide a slight grade (2 percent or less) to permit water and silt to drain from the area.

16.6 Mid-Block Crossings by Roadway Classification

Mid-block crossings are located and placed according to a number of factors, including roadway width, traffic volume, traffic speed and type, desire lines for pedestrian movement, and adjacent land use. Guidance for median placement on various types of roadways appears below.

Local Roads
Due to their low traffic speed and volume, local roadways rarely have median treatments. Some exceptions may apply, especially around schools and hospitals, where traffic calming is desired, and in other unique locations.

Collector Roads
Two-lane collector roads occasionally have medians or refuge islands to channel pedestrians to preferred crossing locations. Used in a series, these refuge islands have a strong visual presence and act as significant devices to slow motorist travel through the corridor. A 16-km/h (10-mph) speed reduction (from 64 km/h to 48 km/h [40 mph to 30 mph]) has been achieved. Pedestrians crossing at these midblock refuge islands with marked crosswalks (who also make their intent to cross known) achieve a nearly 100-percent favorable response from motorists.

When collector roads are widened to four lanes (not recommended), raised medians may be essential. A boulevard-style street with tree canopies is recommended. This canopy effect helps reduce travel speeds.

Mid-block crossing curb extensions may be considered where there are pedestrian generators on both sides of

the road.

Multi-Lane Arterial Highways With Four Lanes
Suburban crossings of four-lane roadways are greatly improved when medians and mid-block crossings are used (see figure above). On lower volume roadways, it is best to not use signalization.

Signalization may be helpful or even essential under the following conditions:

- On higher volume roadways.
- Where gaps are infrequent.
- In a school zone.
- Where elderly or disabled pedestrians cross.
- Where speeds are high.
- When a number of other factors are present.

Multi-Lane Arterial Highways With Six or More Lanes
On multi-lane arterials with six or more lanes, merging is occurring, lane-changing increases, and there is a greater tendency for motorists to speed and slow. This creates highly complex conditions to be interpreted by the pedestrian.

At mid-block, where vehicle speeds are high, signalization may be the only practical means of helping pedestrians to cross unless it is part of a signal coordination scheme. At high speeds, and with infrequent signal calls, high numbers of rear-end crashes can be anticipated. It is best not to allow urban area roadways to achieve high corridor speeds. This is especially true in areas where land use supports higher densities. The higher the speed, the greater the engineering challenge to cross pedestrians safely. If a pedestrian crossing is needed, the designer must increase the devices used to alert the motorist. The standard pedestrian crossing and advanced crossing symbols with 0.9- x 0.7-meter (36- x 26-inch) signs are an absolute minimum for speeds of 64 km/h (40 mph) or greater. Pavement word symbols can be used as further enhancement. An enhanced crosswalk marking such as a zebra or ladder-style crossing should be considered. Large overhead signs, flashing beacons, bulb-outs, and even flashing overhead signs have been successfully used in some locations.

16.7 Mid-Block Crossing Design

The design of mid-block crossings makes use of warrants similar to those used for standard intersections. Stopping sight distances, effects of grade, cross-slope, the need for lighting, and other factors all apply. The design considerations for medians are covered earlier in this lesson. However, there are a number of added guidelines that must be followed.

Connect Desire Lines
All other factors considered, pedestrians and bicyclists have a strong desire to continue their intended path of travel. Look for natural patterns. A parking lot on one side connecting a large office complex on another virtually paints the desired crossing location. Use of a high-angle video timelapse camera to map pedestrian crossings quickly paints this location, if it is not already well known.

Lighting
Motorists need to see pedestrians standing waiting to cross and those that are crossing. Either direct or backlit lighting is effective. Some overhead signs, such as in Portland, Oregon and Seattle, Washington, use overhead lights that identify the pedestrian crossing and also shine down on the actual crosswalk.

Grade-separated crossings at mid-block or intersection grade-separated crossings are effective in a few isolated locations. However, due to their cost and their potentially low use, engineering studies should be conducted by experienced designers. If given a choice, on most roadways, pedestrians generally prefer to cross at grade.

16.8 Mid-Block Signals

The placement of mid-block signals is called for in some locations. The warrants provided in the *Manual on Uniform Traffic Control Devices* (MUTCD) should be followed. But even more caution needs to be provided for signalized mid-block locations. Pedestrians feel frustrated if a signal is holding them back from crossing when there is an ample gap.

Many will choose to cross away from the crossing, while others will dutifully push the activator button, not get an immediate response, and cross when there is a sufficient gap. A few seconds later, the approaching motorists must stop at a red signal for no reason, which can encourage motorist disrespect for the signal in the future.

Thus, the best signal setup for a mid-block crossing is a hot (nearly immediate) response. As soon as the pedestrian call actuator button is pushed, the clearance interval should be activated. This minimal wait time is a strong inducement for pedestrians to walk out of their way to use the crossing. Hot responses can often be used if the nearby signals are not on progression, or a hot response may be permitted in off-peak hours. Mid-block signals should be part of a coordinated system to reduce the likelihood of rear-end crashes and double cycles, i.e., two pedestrian cycles per one vehicle cycle at intersections to reduce pedestrian delay.

If a mid-block signal system is used, it is important to place a pedestrian push button in the median. There will be times when some pedestrians start too late, or when older pedestrians lack time, even at 0.9 meters (3.0 feet) per second to cross. In these rare instances, the pedestrian needs to reactivate the signal.

16.9 Exercise

Choose an urban site that would be a good candidate for a mid-block crossing with a pedestrian refuge island. Document the reasons that people often cross at this site (or would cross, given the opportunity). Photograph the site and prepare a sketch design solution.

16.10 References

Text and graphics in this lesson were derived from:

Florida Department of Transportation, *Florida Pedestrian Planning and Design Guidelines*, 1996.

For more information on this topic, refer to:

ITE, *Design and Safety of Pedestrian Facilities - A Recommended Practice of ITE*, 1998.

Oregon Department of Transportation, *Oregon Bicycle and Pedestrian Plan*, 1995.

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