

The Suburban Pedestrian Crossing Dilemma



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The following is another article in a series based on the findings of National Cooperative Highway Research Program Project 20-19, *Pedestrian Convenience and Safety on Suburban and Rural Highways*. The objectives of the project were to develop a planning and implementation methodology to assist planners, designers, decision makers, and the public in providing convenient and safe pedestrian movement for suburban areas that have a heavy traffic corridor with adjacent pedestrian magnets and for rural areas that are in transition to suburban areas. The final report on the first phase of this project was published in two volumes, NCHRP Report 294A (1) and NCHRP Report 294B (2).

Following completion of the second phase of research in 1991, the NCHRP panel guiding the project determined a need to further disseminate the findings to a wider audience through preparation of a series of short articles for various periodicals, a training course, and a video.

During the 1980s increased attention was paid to the nature and problems of suburban development in major mixed-use activity centers in both emerging and redeveloping suburban areas. In concept, at least, concentrating development activity improves opportunities for the use of modes of travel other than the single-occupant automobile, for both commuting and midday travel. Higher-density mixed-use development should theoretically enable walk trips to replace trips that would otherwise be taken by automobile, as well as allow more efficient transit service and provide more opportunities for ridesharing.

Although pedestrian orientation may not be the primary objective of mixed-use developments, it provides a greater propensity for pedestrian travel in these areas because of the closer proximity of land uses. Restaurants and hotels can be located across the street from office buildings, shopping centers near apartment buildings, and so on. Although the level of pedestrian activity in these areas may never equal that of central cities, pedestrian linkages will represent an important circulation element and more effective commuting options will become possible.

The pedestrian is also present in other areas of suburbia. Bus stops are located along many major arterial highways, convenience stores, banks, or fast food restaurants act as magnets to attract residents and employees from nearby buildings, and people frequently walk or jog along highways for recreational purposes. It can be observed that pedestrians and automobiles come into conflict at the numerous driveways associated with automobile-oriented development and that pedestrians cross at scattered locations from the strip commercial developments still prevalent along major highways.

The transportation engineer is continually faced with the dilemma of how to allow for convenient and safe pedestrian crossings and maintain traffic capacity. The issues that make this problem particularly difficult include

- Traffic signals are much farther apart in suburban settings than they are in urban areas as a result of modern development patterns. Although pedestrians are advised to cross at the nearest signal, this is impractical along many suburban highways because of the distances between signalized intersections.
- Pedestrian crossing locations are also more scattered than they are in urban areas as a result of the increased dispersion of land use activities.
- Arterial streets in suburban areas are typically wider, making crossing them more difficult.
- Pedestrians are often hard to see along arterial streets at night because of headlight glare and lower levels of lighting. Of the approximate 8,000 annual pedestrian fatalities, about half take place at night.

The focus of this article is the crossing dilemma and the important role that medians, pedestrian refuge islands, and spot lighting play in maintaining pedestrian mobility and safety in suburban areas. Although pedestrian issues may not have received adequate attention from the traffic engineering community in the past, the needs to reduce traffic congestion and improve pedestrian safety demand that every mode of transportation, including pedestrian travel, be examined.

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Medians

Benefits

The American Association of State Highway and Transportation Officials' *A Policy on Geometric Design of Highways and Streets* (often referred to as the "Green Book") (3) states, "A median is a highly desirable element on all arterials carrying four or more lanes." The Green Book suggests seven functions of medians, but none of these makes reference to pedestrians. Medians (raised or flush) can add significantly to pedestrian mobility and safety on multilane highways in suburban areas. This is particularly true for cases in which distances between signalized intersections are great. Pedestrians cannot be expected to walk 1,000 feet or more to the nearest traffic signal when their destination is only a couple of hundred feet directly across the street. The multilane highways typically found in suburban areas impose significant barriers for pedestrians attempting to cross them.

Medians greatly simplify the pedestrian's task of crossing the street and at the same time provide positive benefits for traffic movement. Unfortunately, medians still are not being included in many suburban areas where pedestrian activity occurs. The primary benefit of a median to pedestrian mobility is that it divides the crossing of a street into two manageable parts. The pedestrian need only look in one direction to cross to the median and then in the opposite direction to cross from the median to the far side of the street. The ability to segment the crossing into two simpler parts reduces the delay to the pedestrian and increases the safety of the crossing. On a typical four-lane arterial street without a median, the delay to a pedestrian waiting for an adequate gap in traffic would typically be four to five times longer than it would for a street with a median refuge area.

It has been well documented that the majority of pedestrian accidents are caused by errors in pedestrian judgment. Those who design facilities used by pedestrians need to be aware that some designs can make it more difficult for pedestrians to exercise good judgment. Simplifying the crossing task for the pedestrian reduces the

probability of judgment errors. The heavier the traffic volume, the more important a median becomes in facilitating street crossings. Although it is recognized that medians clearly simplify the pedestrian crossing task, reliable data on the benefits and criteria for where they should be used have not been developed.

Although it is usually preferable from the pedestrian point of view that medians be raised, flush medians can provide essentially the same benefits in cases in which raised medians are deemed not to be practical or economical. In one such case, in Phoenix, Arizona, lanes were narrowed slightly and pavement markings used to create a median (see Figure 1). Local engineers reported that this design eliminated previous complaints by crossing pedestrians. One of the concerns about flush medians is the increased difficulty drivers have in seeing the pedestrian in the middle of the street, particularly at night. To address this concern, a special refuge island delineation can be used as observed in Washington, D.C. (Figure 2). Raised medians are still preferred for pedestrian safety, however.

Objections

One argument often raised in objection to medians is that their presence encourages



FIGURE 1 Retrofitted striped median used to solve a pedestrian crossing problem in Phoenix, Arizona.

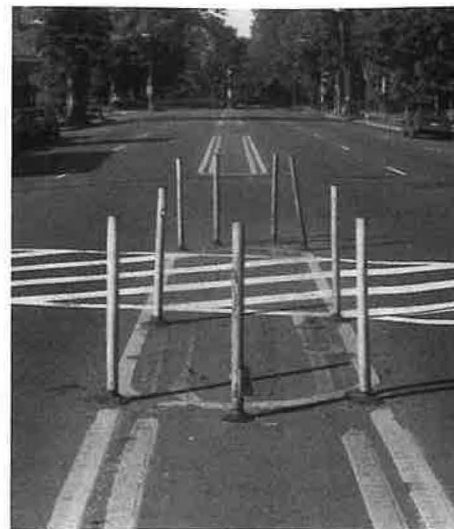


FIGURE 2 Street-level median with special refuge island delineation.

street crossings at locations other than signalized intersections. It is argued that, by making the mid-block crossings more difficult, pedestrians are more likely to cross the road at a signal, where it is supposedly easier and safer. The major flaw in this argument is that it ignores typical pedestrian behavior patterns. It has long been recognized that pedestrians seek the most direct route between points. Although the perception of risk may alter the paths of some pedestrians, observation of pedestrian behavior suggests that most pedestrians will increase their risk to make their route shorter. The solution is not to attempt to discourage this behavior by increasing the risk, but to accommodate observed pedestrian tendencies and to make street crossing more convenient and less dangerous.

Another problem can occur with medians on roadways with many driveway access points, which can hinder direct access to abutting properties. Controlling the number of access points should be a primary objective, because it benefits both pedestrians and vehicles. Even if many driveways are present, however, periodic median breaks can still provide for adequate vehicular access and regimentation of traffic flow while enhancing pedestrian convenience and safety. One example (see Figure 3) provides a short median allowing periodic openings for vehicular access. A

six-lane undivided street, by comparison, constitutes a barrier that is virtually impenetrable by the pedestrian.

Designing arterials to specifically accommodate U-turns is, perhaps, one of the most underused access-control strategies available, and may allow for safe and efficient site access where direct site access cannot be accommodated. Several methods of incorporating U-turns into highway design are described in the AASHTO Green Book (3).

Two-way left-turn lanes, which have been shown to be an effective traffic engineering design for many conditions, could also be provided in place of a raised or flush median. The concern from the pedestrian point of view, however, is that there is exposure to vehicles from two directions simultaneously, and no specific attention directed toward the pedestrian. This can increase the probability of errors in judgment for both the pedestrian and the driver. Again, no specific safety statistics or design criteria that consider the pedestrian are available. In locations where pedestrians are likely to cross, consideration should be given to striping refuge areas, particularly in sections where few turning vehicles are anticipated.

Another objection to raised medians is the cost of construction and maintenance. The construction of a median may not require increased amounts of pavement, but it may necessitate greater lengths of curb, additional drainage structures, and greater right-of-way width. Where developers cover the initial costs, maintenance

costs become a concern to public agencies. Maintenance costs result from the need to mow grass, trim shrubs, and maintain other landscape features. Despite the additional cost, raised and landscaped medians are often viewed as positive features in the image of the community for aesthetic reasons. A number of city and state highway agencies have taken advantage of these community concerns for aesthetics. For example, Boulder, Colorado, has an Adopt a Median program, in which property owners or organizations can take responsibility for median landscaping and maintenance. A written agreement is executed between the city and participants to transfer this responsibility. Other public agencies have programs for median plantings and control of maintenance. This can substantially relieve the highway agency of the maintenance costs associated with a raised median. Landscaping and tree plantings can also be effective methods of providing median delineation, as long as good sight lines are maintained.

Median Versus No Median

An illustration of the benefits of a median can be seen in contrasting two adjacent sections of International Drive in Orlando, Florida. One section was developed in the traditional strip commercial style, without a median. Crossing this busy arterial is difficult at best. A pedestrian signal was installed in one section, but this accommodates only a small portion of the pedestrians wishing to cross.

In contrast, another section of International Drive was developed with a median

and has a completely different appearance and improved operational characteristics. Even though there are still a substantial number of driveways, pedestrian crossings are easier and traffic flow less interrupted. Site access was accommodated through the provision of special U-turn bays in addition to the normal median breaks.

Refuge Islands

Although channelization islands are a common treatment used to separate traffic movements at intersections, mid-block refuge islands are seldom considered as a

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pedestrian treatment in the United States. Their use in European countries is much more prevalent, and special efforts are made to install and delineate them. When thoughtfully applied, refuge islands can be effectively integrated into a highway design to benefit pedestrians in the same way that a median provides benefits over a section of highway.

Pedestrian refuge islands should be considered where there is a concentration of pedestrian crossing activity and a full median cannot be provided. Typical applications would be at a transit stop or between a major pedestrian generator and attractor on opposite sides of the street. Isolated refuge islands should not normally be used on high-speed facilities (typically over 45 mph) because of the hazards to both vehicular traffic and pedestrians. It is essential that the refuge island and the crossing it serves be well lit, to minimize the probability that it will be struck by a vehicle and improve the visibility of pedestrians at night. Guidelines in the *Manual on Uniform Traffic Control Devices for Streets and High-*



FIGURE 3 Application of short median segments to a wide arterial street.

ways (4) for delineating fixed objects provide an indication of how refuge islands should be delineated. In the United Kingdom, a jagged line on the approaches to refuge islands is used to warn vehicles of the crossing ahead. Similar treatments could be considered in the United States. Because refuge islands are relatively low in cost and have limited impact on vehicular delay and safety, they have substantial potential for at least partly solving the pedestrian crossing dilemma.

Spot Lighting

The magnitude of the nighttime pedestrian accident problem has already been mentioned. Although improved reflectivity for pedestrians themselves (putting reflectors on clothing, for example) would go a long way toward solving this problem, major changes are not likely to occur in the near future. Pedestrians are still often unaware of how difficult it is for a driver to see them, despite safety campaigns to enlighten them.

The engineer can contribute to pedestrian safety by providing supplementary lighting in areas of nighttime suburban pedestrian activity. Higher-intensity lighting improves pedestrian conspicuity. This requires the engineer to go beyond the routine application and consider the special situations that may occur along a highway.

Summary and Conclusions

The suburban pedestrian crossing dilemma can be summarized as follows:

- Suburban pedestrian activity can be expected to increase as higher-density major suburban activity centers are developed.
- Concentration of pedestrian activity can also be expected at spot locations, such as those near transit stops, convenience food stores, and community facilities.
- The greater distances between pedestrian magnets in suburban areas run contrary to the pedestrian's desire to minimize walking distances.

Many suburban highway facilities have been constructed without considering these



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dilemmas, but there are ways to address them.

- Medians are an important element of the highway cross-section design where pedestrian crossings occur or are anticipated. They simplify the pedestrians' crossing task without adversely affecting arterial traffic flow, as would occur with traffic signal installations. From the pedestrians' point of view, raised medians are preferred, but flush medians are acceptable.

- Refuge islands should be seriously considered as a solution to spot pedestrian crossing problems. Clear delineation and good lighting must accompany these installations.

- Higher-intensity lighting should be installed at the more active suburban pedestrian crossing locations.

Before completing plans for highway construction, signing, striping, or lighting, the designer should consider whether pedestrian accommodations have been incorporated into the design. This usually takes only a few extra minutes, and can sometimes avoid problems and additional costs later on. Although walking will never again be the dominant mode of travel it once was, people still walk, and pedestrians can be found in both suburban and rural set-

tings. As suburban areas grow, engineers should ensure that facilities are conducive to walking for those who wish to or must do so.

A picture is often painted of the vehicle and the pedestrian in irresolvable conflict: what is done for one hurts the other, and vice versa. The use of medians, refuge islands, and spot lighting to address the suburban pedestrian crossing dilemma provides at least one case in which this is not true. The vehicle and the pedestrian can coexist, even in the suburbs, and they will need to coexist even more as suburban development intensifies.

Acknowledgments

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