Pedestrian Countermeasure Policy Best Practice Report

FHWA Safety Program

U.S. Department of Transportation
Federal Highway Administration

Safe Roads for a Safer Future
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Overview

Safety is the number one priority for the U.S. Department of Transportation (USDOT) and it's the agency's policy to provide safe and effective pedestrian accommodation wherever possible. The Federal Highway Administration (FHWA) encourages the use of specific proven pedestrian safety countermeasures that can help achieve local, State and National safety goals.

One such countermeasure is raised medians. FHWA's Safety Office has encouraged the consideration of raised medians in curbed sections of multilane roadways in urban and suburban areas, particularly in areas with a combination of high volumes of traffic,[1] a significant number of pedestrians, and intermediate or high travel speeds.[2] Another proven countermeasure is the use of walkways/paved shoulders. FHWA's Office of Safety has promoted the evidence-based safety benefits of accessible sidewalks or walkways along both sides of streets and highways in urban areas—particularly near school zones and transit locations—and where there is frequent pedestrian activity. This report highlights State departments of transportation (DOTs) that have developed policies related to these countermeasures. The provision of paved shoulders is encouraged in rural areas.

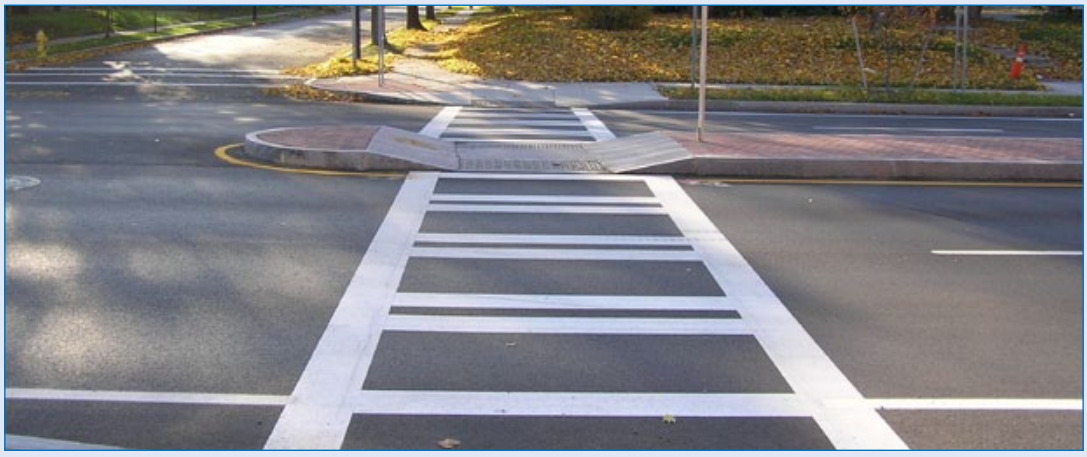

Photo Credit: Various sources from New York Sate Dept of Transportation

Medians and Refuge Islands

Florida, New York and Oregon

Medians and refuge islands are treatments that exist in all DOT roadway designers' toolboxes. Many communities are installing raised medians for traffic control reasons: to reduce crashes and to improve flow along the roadway. Other communities install medians as part of aesthetic improvement projects to provide room for landscaping. However, some are installing median islands specifically to aid in pedestrian crossings of busy roadways.

Three examples of agencies that have implemented policies and plans promoting the inclusion of median islands for pedestrians are Florida Department of Transportation (FDOT) New York State Department of Transportation (NYSDOT), and the Oregon Department of Transportation (ODOT). Florida has a policy that requires the use of median islands on all divided highways with the stated purpose of improving pedestrian safety. New York and Oregon's design documents promote, but do not require, the installation of medians for pedestrians.

Florida: Multilane Facility Median Policy

In response to research conducted on access management by the University of Florida[2] and Georgia DOT (GDOT)[3], FDOT promoted the use of raised/restrictive medians. Below is an excerpt from the FDOT *Multilane Facility Median Policy*:

> All multilane facilities shall be designed with a raised or restrictive median except four-lane sections with design speeds of 40 mph or less. Facilities having design speeds of 40 mph or less are to include sections of raised or restrictive median for enhancing vehicular and pedestrian safety, improving traffic efficiency, and attainment of the standards of the Access Management Classification of that highway system.[4]

New York: Pedestrian Refuge Islands and Medians Policy

As part of its *Highway Design Manual*, NYSDOT included a chapter on pedestrian facility design to help minimize pedestrian exposure issues. Below is an excerpt from the pedestrian facility design chapter that addresses refuge islands and medians:

> A pedestrian refuge island is located in or near a pedestrian crossing to aid and protect pedestrians crossing a roadway. On wide streets, a median refuge can provide a safe location for those who begin crossing too late or are only capable of walking exceptionally slow… Pedestrian refuge islands or medians can also be used at intersections or midblock locations with shorter crossing distances, where a need has been recognized.
>
> Medians that are intended as pedestrian refuge islands must be accessible to all pedestrians, including those with disabilities. The dimensions of a pedestrian refuge island should be determined by the expected pedestrian storage and crosswalk level of service criteria.[5]

Oregon: Raised Medians Policy

In response to the FHWA report, *Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Intersections*,[6] which supported the efficacy of midblock crossings to enhance pedestrian safety, ODOT developed the *Oregon Bicycle and Pedestrian Plan*[7] which included recommendations for raised medians. Below is an excerpt from the Oregon Bicycle and Pedestrian Plan:

> These [raised medians] benefit pedestrians on two-way, multilane streets, as they allow pedestrians to cross only one direction of traffic at a time: it takes much longer to cross four lanes of traffic than two. Where raised medians are used for access management, they should be constructed so they provide a pedestrian refuge. Where it is not possible to provide a continuous raised median, island refuges can be created between intersections and other accesses.
>
> These should be located across from high pedestrian generators such as schools, park entrances, libraries, parking lots, etc. In most instances, the width of the raised median is the width of the center turn-lane, minus the necessary shy distance on each side. Ideally, raised medians should be constructed with a smooth, traversable surface, such as brick pavers. If a median is landscaped, the plants should be low enough so they do not obstruct visibility, and spaced far enough apart to allow passage by pedestrians.[8]

The Impetus for the Policies

In Florida, the DOT was responding to research showing that the crash rates where there were restrictive medians on urban multilane highways was 25% lower than those with center turn lanes in an evaluation. A GDOT study confirmed the safety advantage of raised medians over two-way left turn lanes—it reviewed crash statistics for all of the divided highways on the State Highway System and found that overall (intersections plus midblock locations) raised medians had 78 percent fewer pedestrian fatalities per 100 miles of road.[9]

New York State DOT (NYSDOT) implemented a design policy to help minimize pedestrian exposure issues as well as to conform to the American Association of State Highway Transportation Officials (AASHTO) *Guide for the Planning, Design, and Operation of Pedestrian Facilities (Pedestrian Guide)*. The *AASHTO Pedestrian Guide* discusses the benefits of providing pedestrian median refuge islands at signalized and unsignalized intersections and at midblock locations.

As mentioned above Oregon DOT (ODOT) adopted its policy on the basis a University of North Carolina Highway Safety Research Center report entitled *Safety Effects of Marked versus Unmarked Crosswalks at Uncontrolled Intersections*.[10] In this report, it was found that the presence of a raised median provided significantly greater protection on both marked and unmarked crossings on multi-lane roads compared to no median, reducing pedestrian crashes almost 50% on roadways with 15,000 ADT.

Overcoming Resistance to the Policies

At FDOT, resistance to implementing the policy was reported in two different ways. When the policy was being implemented, there was concern that projects already in the pipeline would have to 'go back to the drawing board.' This concern was mitigated by deciding that the policy would be implemented for future projects, not projects already in process.

The other challenge to installing medians comes from businesses owners who are concerned about reduced access to their businesses. FDOT has taken a very strong position to coordinate with the public and affected business owners as much as possible during the planning of restrictive medians.

To assist in policy implementation once it was adopted, FDOT added the median design standards directly into the *Plans Preparation Manual*.[11] This has proven to be much more beneficial than to simply make it part of an access management program because it puts it "in the book" designers use on all of their design projects. FDOT also included language that supports putting in median portions even where it's not possible to put in full medians. This makes the inclusion of raised medians automatic and failure to include them requires a reason.

ODOT has had some challenges to implementing their median policy; these challenges have been primarily in response to impacts on motor vehicle operations, specifically wide load vehicles in the trucking industry. Oregon has found that medians have a 'break in' period of acceptance. A new median generates about six months of opposition and complaints then the community gets used to it and it is viewed as a positive addition. Oregon has found an effective way to foster acceptance of the treatment is to install one and let the community experience it. Once experienced, it is easier to encourage other communities to install them, as they understand the benefits first hand.

Funding

Funding for medians comes in a variety of forms. In Oregon, if the median is part of the normal capital improvement program it is included as part of the budget. If it is being added as a separate project, other sources of funds are used, such as bike/pedestrian money, Transportation Enhancement (TE) money or Federal Highway Safety Improvement Program (HSIP) funds. In New York, highway improvement and HSIP funds are used, and these projects compete with all other improvements. In Florida, most medians are constructed using the same funds as roadway construction.

Benefits of Medians

Adding medians and refuge islands can increase both pedestrian and motor vehicle safety, helping to solve multiple challenges faced by DOTs. They do this by allowing pedestrians to cross one direction of traffic at a time—often allowing them to focus on just two to three lanes rather than having to anticipate traffic for the entire width of the road. They also provide a space to install improved lighting at pedestrian crossing locations. Improved lighting has been shown to reduce nighttime pedestrian fatalities at crossings by 78 percent.[12]

Raised medians provide additional benefits above and beyond reducing pedestrian crashes, including the following:

- Reducing motor vehicle crashes by 15 percent[13]
- Decreasing delays (>30%) for motorists
- Increasing capacity (>30%) of roadways[14]
- Reducing vehicle speeds on the roadway[15]
- Providing space for landscaping within the right-of-way

Walkways and Shoulders

New York and Oregon

For most State DOTs, sidewalks are the preferred pedestrian treatment. Shoulders are used primarily in rural areas. For States that do have policies requiring paved shoulders, many cite operational, maintenance and safety benefits as reasons for the shoulder policies. Oftentimes, paved shoulders are required as bicycle accommodations. Two examples of agencies with policies and plans promoting walkways and shoulders are the NYSDOT and ODOT.

New York: Shoulder Policy

In New York, Pedestrians are permitted to use the shoulders of most State highways, with the exception of interstates, parkways, and other similar controlled-access highways where they are specifically prohibited. Below is an excerpt from the pedestrian facilities design chapter that defines when shoulders should be included:

> When accommodation of pedestrian travel is warranted, then pedestrian facilities should be provided. The preferred facility for pedestrian travel along a road is a sidewalk.
>
> Shoulders are not substitutes for a well-designed pedestrian facility. However, there may occasionally be a need to design shoulders as walkways where roadside space is constrained…When shoulders will be used as pedestrian facilities, the designer should decide whether it is practicable for pedestrians to walk facing traffic or if provisions should be made for them to walk in either direction along one side of the road. The decision should be based on safety, e.g., the ability to cross the road safely, and other considerations.[16]

Oregon: Walkway Policy

In 1971, the State of Oregon legislature passed the "Bike Bill"[17] ushering in a new era of non-motorized facility construction. The following is an excerpt from the Oregon State Bicycle and Pedestrian plan on the different types of walkways:

Rural Walkways
In sparsely populated areas, the shoulders of rural roads usually accommodate pedestrians. There are, however, roadways outside urban areas where the urban character creates a need for sidewalks…Where sidewalks are not provided, shoulders should be wide enough to accommodate both pedestrians and bicyclists.

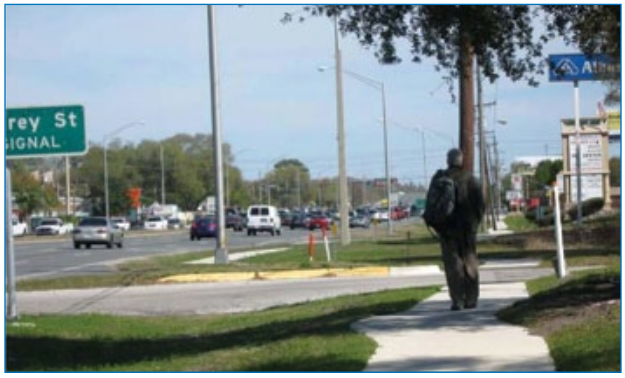

Photo Credit: Jennifer Bartlett

Urban Walkways
The appropriate facilities for pedestrians are sidewalks. A sidewalk provides positive separation from traffic, an all-weather surface and access for the disabled. They are readily identifiable by both pedestrians and motorists.

Arterials and Major Collectors
Sidewalks must be provided on both sides of all arterial and collector streets, unless there are physical limitations and land use characteristics that render a sidewalk unsuitable on one side.

Minor Collectors and Local Streets
Sidewalks on both sides of the street are the appropriate facility. There is a point below which sidewalks on both sides of a local street may not be critical: e.g. on short dead-end streets with few potential residences and with no access to other facilities.[18]

In addition NYSDOT and ODOT have policies and plans promoting walkways, Pennsylvania Department of Transportation (PennDOT) has adopted design standards specifically to make shoulders accessible. Along some roadways, sidewalks are not feasible and pedestrian use is expected to be only occasional. While some transportation agencies install paved shoulders along these roadways, PennDOT is going the extra mile for pedestrians. To better provide for pedestrians who may need to walk on these shoulders, PennDOT is constructing the shoulders to be compliant with the (draft) Public Rights-of-Way Accessibility Guidelines.[19] Cross slopes are being kept to a 2% maximum and detectable warning strips are being installed at crosswalks.

The Impetus for the Policies

New York State Department of Transportation's (NYSDOT) *Highway Design Manual* includes considerations that designers need to make for pedestrian friendly shoulders when shoulders will be used as pedestrian facilities. The policy and its implementing design standards are intended to address the requirements of the Title 23 CFR 652.5 which requires pedestrians to be given full consideration on all Federal Aid projects.

The goal of Oregon's "Bike Bill"[20] was to create safer bicycling facilities across the state but the Bill also requires the construction of sidewalks or walkways when a road is built or rebuilt.

Overcoming Resistance to the Policies

In New York, there were two primary concerns: availability of required right-of-way and cross-slope. Resistance to implementing the policy came from the regional designers who are responsible for designing the shoulders. In some cases, where there is very limited right-of-way and significant slopes to swales adjacent to the roadway, it is felt to be impractical to add pavement. When such a determination is made, the New York policy states the reasons should be fully documented in the Project Scoping Report/Design Report. There were also drainage concerns as the cross slope for a paved shoulder is typically six percent but when the shoulders are being installed for pedestrian use, the allowed cross slope is two percent. There was concern that the minimal cross slope could impede water flow across the shoulder allowing sediment to accumulate resulting in the loss of a usable shoulder. These operational concerns have been mitigated over time with implementation of two percent as the standard across the country.

In Oregon, resistance has been primarily budgetary. When a roadway is being resurfaced, only the travel lanes may be repaved. Resurfacing or pavement preservation projects are tracked using dollars/mile. Adding or resurfacing shoulders decreases the miles of resurfacing that can be implemented within the available budget. Likewise, the policy of maintenance paving offers no incentive to add shoulders. If lane miles paved is one of an agency's performance measures, and adding shoulders does not increase miles paved, the agency is essentially penalized for paving shoulders. While these budgetary concerns are quite valid, they can be overcome by the wide range of benefits that paved shoulders and walkways can provide—such as reducing pedestrian crashes and reducing shoulder maintenance requirements.

Funding

These countermeasures are funded on all levels, using local, state and federal money as appropriate. In New York, roadway resurfacing is funded by standard highway funds and shoulders are included as routine elements for design and inclusion in projects.

The bulk of the money funding projects for ODOT goes to pavement preservation, not new facilities, and resurfacing jobs do not typically add sidewalks. Sidewalk facilities are often funded by grants from the agency and the agency will favor communities that include sidewalks in their plans and show an emphasis on pedestrian safety.

It seems also that the cost of including shoulders in design plans is accepted as part of the project. The exception to this is circumstances where there is pressure to cut budgets or where performance measures may penalize the inclusion of the facility.

Benefits of Walkways and Shoulders

Walkways and shoulders create safer pedestrian environments. Pedestrians killed while "walking along the roadway" account for almost 8 percent of all pedestrians killed in traffic crashes.[21] Many of these tragedies are preventable. Providing walkways separated from the travel lanes could help to prevent up to 88 percent of these "walking along roadway" crashes.[22] Widening paved shoulders also provides numerous safety benefits for motorists as well as benefits for pedestrians including:

- Reducing numerous crash types[23]
  - » Head on crashes (15%-75% reported reduction)
  - » Sideswipe crashes (15%-41%)
  - » Fixed object crashes (29%-49%)
  - » Pedestrian "walking along roadway" crashes (71%)
- Improving roadway drainage
- Increasing effective turning radii at intersections
- Reducing shoulder maintenance requirements
- Providing emergency stopping space for broken down vehicles
- Providing space for maintenance operations and snow storage
- Providing an increased level of comfort for bicyclists[24]

For more information and resources on pedestrian and bicycle safety, please visit:

http://safety.fhwa.dot.gov/ped_bike/

Endnotes

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13 Ibid.

14 Ibid.

15 M. King, "Pedestrian Safety through a Raised Median and Redesigned Intersections," (paper presented at the TRB 2003 Annual Meeting held in Washington, DC, 2004).

16 New York State Department of Transportation, "Ch 18.6.2 Use of Shoulders as Pedestrian Facilities," in *Highway Design Manual*, (Albany, NY: 2006), p. 18-20. https://www.nysdot.gov/divisions/engineering/design/dqab/hdm/hdm-repository/chapt_18.pdf

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For More Information:

For more information, visit http://safety.fhwa.dot.gov/ped_bike

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