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Walking the Safety Walk

by Ann Do

With an estimated 78,000 pedestrians injured or killed in 2000 in motor vehicle crashes, the need for increased pedestrian safety in the United States is urgent. In 2000, a total of 4,763 pedestrians were killed in motor vehicle crashes, representing 11 percent of total motor vehicle deaths nationwide. Although statistics from the National Highway Traffic Safety Administration (NHTSA) show that the figures have declined in recent years, there is little reason for optimism. The decline is a result of a decrease in the relative number of people walking—not necessarily due to a safer walking environment. As cities continue to grow and the average vehicle miles traveled continue to increase, U.S. transportation and planning specialists have been left with a daunting challenge: to reduce pedestrian deaths and injuries while promoting increased walking.

Strollers enjoy the historic Stone Arch Bridge, which was restored in Minneapolis, MN, in 1994.

Enter the Federal Highway Administration's (FHWA) *Pedestrian Facilities Users Guide Providing Safety and Mobility*, designed to help transportation engineers, planners, and safety professionals make cities safer and more pedestrian-friendly. The *Users Guide* is one component of a larger FHWA study, "Evaluation of Pedestrian Facilities," conducted by FHWA's Pedestrian and Bicycle Safety Research Program. The *Users Guide* provides useful tools to identify the causes of pedestrian crashes, implement countermeasures to prevent future crashes, and enhance the walkability and enjoyment of communities. Individual pedestrians also may use it to improve their own safety and mobility.

More specifically, the *Users Guide* includes:

- An overview of how to create a walkable environment
- National pedestrian crash trends and the examination and classification of crash types to determine appropriate countermeasures
- More than 45 engineering improvements for pedestrians, related to roadway design, intersection treatments, traffic calming, traffic management, and signals and signs
- A simplified list of improvements to address certain broad objectives (e.g., how best to reduce vehicle speed or volume on neighborhood streets)
- Direction on setting priorities for pedestrian improvements
- Strategies for securing funds for pedestrian projects

The Big Picture

One of the key factors that affect pedestrian crash problems in the United States is alcohol impairment. Although alcohol-related fatalities have decreased by an impressive 25 percent since 1990, alcohol impairment continues to be a serious problem for pedestrians as well as drivers and passengers in motor vehicles. NHTSA estimates that alcohol was involved in 40 percent of fatal crashes and 8 percent of all crashes in 2000. In the same year, the intoxication rate for drivers in crashes where pedestrians were killed was 13 percent, while 31 percent of fatally injured pedestrians had a blood alcohol concentration of 0.10 or greater.

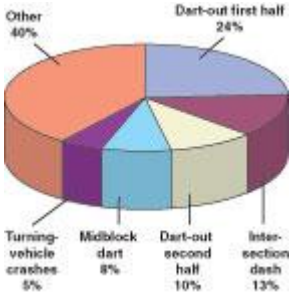
This pedestrian bridge crosses Tudor Road in Anchorage, AL.

Speeding is another contributing factor, playing a part in 29 percent of all fatal crashes involving pedestrians in 2000. At higher speeds, motorists are less likely to see a pedestrian and are even less likely to be able to stop in time to avoid hitting one. A pedestrian hit at 64.4 kilometers per hour (40 miles per hour) has only a 15 percent chance of survival, whereas a pedestrian hit at 32.2 kilometers per hour (20 miles per hour) has a 55 percent chance of survival. At 49.9 kilometers per hour (31 miles per hour), a driver will need about 61 meters (200 feet) to stop, which may exceed available sight distance; at a speed of 30.6 kilometers per hour (19 miles per hour), the stop time is halved.

The time of occurrence is another factor. Pedestrian crashes are most prevalent during morning and afternoon peak periods, when traffic volumes are highest. Fatal pedestrian crashes typically peak later in the day, between 5 and 11 p.m., when darkness and alcohol use are factors.

The type of area is a fourth key factor. In 2000, 71 percent of all fatal pedestrian crashes in the United States occurred in urban areas.

The specific location is the final major contributor. Sixty-five percent of crashes involving pedestrians occur at areas other than intersections. This type of incident is particularly true for young pedestrians (under age 9), primarily because of dart-outs into the street. For ages 45 to 65, pedestrian crashes are approximately equal for intersections and non-intersections, while those over age 65 are more likely to be struck at intersections than non-intersections.



Source: FHWA

Based on an analysis of more than 8,000 crashes from six States, the most frequent crash types are dart-out first half (i.e., the pedestrian is struck in the first half of the street being crossed)(24 percent), intersection dash (13 percent), dart-out second

half (10 percent), midblock dart (8 percent), and turning-vehicle crashes (5 percent).

Paving the Way to Safety

A key focus of the Users Guide is the identification of locations for safety treatments here pedestrian crashes have occurred in the past and are likely to occur in the future. The guide encourages planners and engineers to consider problem-identification methods, such as convening interactive public workshops, surveying pedestrians and drivers, and talking with police to identify safety problems in a given area.

Patterns of unsafe walking locations also may be identified by using geographic information systems (GIS) software to map reported crash locations. Once these high-crash and high-risk locations are identified, safety improvements can be targeted to appropriate neighborhoods, intersections, or street sections.

Another tool that can be used to analyze cases where data on the sequence of events leading to a crash are unavailable is the Pedestrian and Bicycle Crash Analysis Tool (PBCAT). This software, sponsored by FHWA and NHTSA, enables the user to develop and analyze a database on pedestrian and bicyclist crash types. The software groups more than 60 specific pedestrian crash types into 13 general classifications. Based on the classifications, the software selects appropriate countermeasures to address the problems identified.

The PBCAT software and user's manual may be obtained from the Pedestrian and Bicycle Information Center (PBIC), a clearinghouse for information about health and safety, engineering, advocacy, education, enforcement and access, and mobility. For more information on PBCAT, please visit http://www.walkinginfo.org/pc/pbcat.htm.

Federal and local funding built this 366-meter (1,200-foot)-long pedestrian boardwalk along the Chesapeake Bay in North Beach, MD. The project is located adjacent to MD 261 and is part of an overall development plan that includes fishing piers, a bike lane, a landscaped median, stone revetment, lighting, benches, and trash receptacles.

The 13 general classifications are included in the Users Guide. For each crash type, a matrix of pedestrian engineering and operational countermeasures is provided. The matrix is a convenient tool to help users select appropriate corrective actions to address specific problems in their communities.

Livable, Walkable Cities

The *Pedestrian Facilities Users Guide* is an effective tool for selecting measures to increase the aesthetic beauty of communities and enhance city living. Cities should aim to accommodate pedestrians and increase pedestrian activity. To this end, environments must be safe, comfortable, and inviting. For example, a safe walking environment should include sidewalks that are well-maintained and neighborhoods that are well-lit.

Another important feature to accommodate pedestrians is accessibility for all, including those with disabilities. Public transport should be provided with careful consideration given to how people will get from the transit stop to their destinations. Public transport trips should be as seamless as possible, and transit stops should be friendly

and comfortable. To assist people with disabilities, designers and maintenance personnel need to avoid the placement of poles and signs in the middle of sidewalks, steeply sloped driveways, and broken or missing sidewalk sections.

To encourage people to walk, the *Users Guide* explains that planners must create interest in the environment. Sterile environments, even those with well-designed sidewalks and crosswalks, will not entice walkers and therefore will not reach maximum usability. The guide provides readers with creative ideas for producing such environments. Urban design elements and street furniture such as benches, bus shelters, trash receptacles, and water fountains enhance areas for pedestrians and enliven commercial districts by fostering community life.

Traffic volume is another key factor influencing walkability. High volumes of traffic can inhibit a person's feeling of safety and comfort, and also can affect community life. One San Francisco study showed that people living on a street with light traffic (2,000 vehicles per day) have three times as many friends and twice as many acquaintances on the street as do people living on a street with heavy traffic (16,000 vehicles per day). By designing streets that accommodate lower speed limits or by using traffic-calming approaches (e.g., curb extensions or roadway narrowing), designers and engineers can make streets more pedestrian-friendly. These changes also will benefit motorists and cyclists by creating streets that are safer.

Broad sidewalks and bicycle lanes provide facilities for all modes of travel and improve safety on this street in North Carolina.

Pulling It All Together

After laying down the basics on pedestrian and bicyclist safety and walkability, the Users Guide details 47 specific roadway and engineering improvements that can be made to the design of pedestrian facilities, roadways, and intersections, as well as traffic-calming measures, traffic management, and signals and signs. Ideas range from better design of sidewalks and curb ramps to improved roadway lighting, pedestrian overpasses, raised pedestrian crossings, roundabouts, and landscaping.

Real-World Design for Safe, Walkable Cities

The Users Guide provides nearly two dozen case studies that demonstrate that the sky is the limit when it comes to enhancing pedestrian facilities. With a defined goal in mind and a little creativity, planners and engineers can design neighborhoods to suit the needs of the community. The case studies of intersection design in Portland, OR, and a midtown neighborhood transportation plan in Sacramento, CA, are two examples.

The Springwater Corridor in Portland, OR, is a former railroad right-of-way converted by the city into a multi-use trail that goes through three communities (Portland, Milwaukee, and Gresham) and two counties (Multnomah and Clackamas). The corridor is 21 kilometers (13 miles) long, 3 to 3.5 meters (10 feet to 12 feet) wide, and receives heavy use by pedestrians, bicyclists, and equestrians for transportation and recreational purposes. Several road crossings are located along the trail, from small residential streets to four-lane arterials. To make the crossings as safe as

possible, some of the shortest crossings were designed with ladder-style crosswalks, while the largest intersections have pedestrian crossing islands and signals that face both motorists and pedestrians. The signals are equipped with three activation methods to accommodate all users: (1) pedestrians can use a traditional pushbutton; (2) bicyclists activate a loop embedded in the path; and (3) equestrians can activate a higher pushbutton. Thanks to these creative designs, all trail users enjoy a much safer environment.

Residents of the Midtown and East Sacramento neighborhoods of Sacramento, CA, were tired of drivers using their neighborhoods as a shortcut to downtown. In response, the City Council hired a consulting firm to work with the community to develop a plan for traffic movement within the area. Although the consultants provided guidance, the plan was created entirely by the community members. With only minor adjustments, the plan was approved by the city and then implemented by the Department of Public Works. The improvements totaled just over $1.2 million, and included:

- Conversion of two one-way streets with parking to two-lane, two-way streets with parking on each side
- Five new traffic signals
- Several additional stop signs
- Crosswalks
- Pedestrian crossing islands at intersections
- Traffic mini-circles
- Half-closures (i.e., use of semi-diverters to close or block one direction of motor vehicle travel)

The result is a much more livable and safe environment for residents of those Sacramento neighborhoods.

For each improvement strategy, the *Users Guide* offers practical information on the associated benefits, planning considerations, and estimated costs. The guide also provides useful tables that recommend specific improvements to achieve a variety of broad objectives, such as eliminating behaviors that lead to crashes or reducing motor vehicle speed. In this way, users can quickly identify the options that are available to achieve desired goals.

An extensive list of case studies is provided to illustrate practical applications of the *Users Guide* (see "Real-World Design for Safe, Walkable Cities").

The *Users Guide* also comes complete with ideas on how to involve the community in developing priorities, strategies for construction, and raising funds for improvements. For further information, the guide includes a bibliography of suggested readings and useful Web sites. The end result is a comprehensive guide for identifying, prioritizing, and addressing pedestrian and bicyclist safety, plus walkability problems for any neighborhood, town, or city.

A pedestrian walkway in Benicia Vista Point, CA, located on Route 680.

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Source: NC DOT Crash Reports, 10/1/94 to 9/30/99

Total Campus Area Pedestrian Crashes: 57

Kernel Density Search Radius: 500 feet

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To obtain copies of the Pedestrian Facilities Users Guide Providing Safety and Mobility, contact Ann Do at 202-493-3319 or ann.do@fhwa.dot.gov.