Best Practices for Pedestrian and Bicycle Safety

What Was the Need?
A growing number of people are choosing to travel by bicycle or on foot. Because bicyclists and pedestrians are vulnerable roadway users, safe facilities are important in transportation networks designed primarily for cars. As a result, bicycle and pedestrian advocates often approach engineers with requests for improved facilities. Advocates typically support their requests with strategies, survey results and research. It can be challenging for engineers to determine whether requests are based on solid research.

Local agencies needed a resource to help them address these public requests and to design safe transportation systems for bicyclists and pedestrians.

What Was Our Goal?
The goal of this project was to synthesize research about the safety strategies engineers are most likely to be asked to evaluate so that they can more effectively address each strategy based on local conditions. The ultimate goal is to reduce the number of crashes involving pedestrians and bicyclists on roadway systems.

What Did We Do?
Researchers developed Minnesota’s Best Practices for Pedestrian/Bicycle Safety based on current research related to bicycle and pedestrian facilities. They identified 19 strategies and considerations that are frequently requested. The guide collects current information that is useful in evaluating such requests, including a description and safety characteristics; whether the strategy is proven, tried or experimental; typical characteristics of candidate locations for the strategy; typical costs; design features that should be considered; and best practices.

The guide bases its determination of whether a strategy is proven, tried or experimental in part on the Federal Highway Administration’s Crash Modification Factors (CMF) Clearinghouse, FHWA’s Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes and NCHRP Report 500: Guidance for Implementation of the AASHTO Strategic Highway Safety Plan Transportation Research. The guide is not, however, intended to provide a standard. It is a tool to aid in decision-making, but it does not set any requirements and does not supersede Minnesota’s Manual on Uniform Traffic Control Devices; AASHTO manuals; or a local agency’s experience, culture and practices.

The guide categorizes strategies in four areas:

- **Pedestrian Safety Strategies**: sidewalks, crosswalks and crosswalk enhancements, median and crossing islands, curb extensions, pedestrian hybrid beacon systems, rectangular rapid-flashing beacons, crosswalk lighting and traffic signals.
- **Pedestrian and Bicycle Safety Strategies**: grade separated crossings, crossing guards, and shared space and Complete Streets.
- **Bicycle Safety Strategies**: road diets, on-road bicycle lanes, shared (paved) shoulder bicycle lanes, bicycle boulevards and bicycle boxes.

This project created a guide synthesizing current research about 19 strategies for improving bicycle and pedestrian safety. The guide will help engineers assess the true benefits and costs of each strategy to improve the safety of the transportation network for users in all modes.
Pedestrian and Bicycle Considerations: roundabouts, bicycle-friendly edgeline rumbles and speed reduction measures. 

The guide summarizes current information for each strategy and provides citations that allow engineers to easily find more details as needed.

What Did We Learn?
In synthesizing the current state of knowledge for each safety strategy, the guide reveals that many of these strategies, even those that are highly regarded, have not been conclusively proven to effectively improve safety. The impact on safety has been well documented for only nine strategies—fewer than half of the methods in the guide. Advocates’ claims regarding some strategies are not currently well-supported by research. For example, on-road bike lanes have shown mixed results: Studies are almost equally divided between installations where bike crashes increased versus where they decreased.

Researchers also spent significant time discussing crosswalks due to the high potential for pedestrian collisions. While crosswalks are considered a proven strategy, the guide emphasizes that simply marking a crosswalk does not necessarily create a safe crossing; enhancements appropriate to the location need to be considered.

What’s Next?
The guide is complete and ready for distribution. MnDOT plans to distribute 1,000 printed copies, including two to each county, one to each state-aid city (population greater than 5,000), and the state Non-Motorized Transportation Advisory Committee. Feedback from cities and counties has already been positive, with many planning to utilize the guide.

The guide is also available to the general public. Several advocates have expressed their appreciation for the insight the guide gives into the framework local agencies use in their decision-making.

An upcoming LRRB-funded project, Highway Capacity Manual Unsignalized Pedestrian Crossing Training, will build upon this work. That project is focused on pedestrian levels of service (a means of measuring the capacity and comfort of an active pedestrian space), but its scope has expanded to include training, outreach and testing strategies based on this guide.

Curb extensions, which reduce pedestrian crossing distance by extending the sidewalk into the roadway, are one of many strategies for improving pedestrian safety at crosswalks featured in the report.

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