

Research Spotlight

Project Information

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Optimizing Pedestrian and Bicycle
Safety and Vehicle Mobility

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Comprehensive guidance for pedestrian and bicycle safety improvements

Planners and designers at every level of government look for ways to make Michigan roads safer for pedestrians and bicyclists. A wide range of improvement options at intersections and along corridors offers the potential for safer streets. MDOT undertook research to evaluate these safety solutions and provide practical, comprehensive guidance for safety engineers in Michigan.

Problem

Between 2005 and 2010, more than 750 pedestrians and 150 bicyclists were killed in automobile crashes in Michigan, and nearly 7,000 pedestrians and 5,500 bicyclists were injured. While these types of crashes are on the decline, it remains a straightforward and important goal for highway agencies to make roads safer for pedestrians and bicycles.

The challenge comes in balancing safety improvements with mobility considerations for all transportation users, including motorized vehicles as well as pedestrians and bicycles. There is often the perceived notion that potential safety improvements have a negative impact on traffic flow, although these perceptions are not based on documented facts. Added to this, every safety improvement comes at a cost, and budgets are finite.

Research

Given the many new safety improvements developed and deployed across the United



MDOT's *Best Design Practices for Walking and Bicycling in Michigan* will help Michigan road agencies large and small weigh the wide variety of safety solutions.

States in recent years, MDOT sought to establish research-based guidance to help planners and safety engineers assess these treatments. Investigators conducted a multipart research program that included:

- An analysis of crashes involving pedestrians and bicyclists in Michigan.
- Case study analysis at five roadway improvement projects in Michigan and the associated crash impacts.

“When the Best Design Practices guide was completed, I was pleasantly surprised to see that the vast majority of the improvements did not have a negative effect on mobility for pedestrians, bicycles or vehicles. In many cases, mobility was improved.”

Deirdre Thompson, P.E.
Project Manager

- A review of emerging safety design innovations provided by the National Association of City Transportation Officials.
- A review and summary of current roadway improvements, their impacts on reducing crashes and their potential impact on mobility for all users.

Results

The key product from this research is an MDOT publication titled *Best Design Practices for Walking and Bicycling in Michigan*. It presents 40 different safety improvements in three categories:

Signalized intersection improvements. Proper walking speeds; fixed-time signals or pedestrian push-buttons; pedestrian countdown signals; leading pedestrian intervals; pedestrian-only phases (scrambles); exclusive lefts (leading/lagging); flashing yellow arrows; prohibited left turns (Michigan left); prohibited right turns on red; advance stop bars; pork chop islands; bulb-outs; roundabouts; bicycle signal detection; intersection bike crossing markings; bike boxes; two-stage bike left turns; combined bike/turn lanes; and bicycle signals.

Unsignalized pedestrian crossing improvements. Marked crosswalks;

advance yield markings; in-roadway yield signs; pedestrian/bicycle refuge islands; rectangular rapid flash beacons; pedestrian hybrid beacons; midblock signals; roadway illuminations; and overpasses or underpasses.

Corridor improvements. Sidewalks and paved shoulders; road diets; raised medians; on-street parking; rear-in diagonal parking; bike lanes; shared lane markings; buffered bike lanes; colored bike lanes; contra-flow bike lanes; left side bike lanes; and cycle tracks.

The guide details each improvement and indicates its potential impact on crash rates and mobility for motor vehicles, pedestrians and bicyclists. The guide also characterizes the relative cost of each improvement and discusses its status in the federal or Michigan Manual on Uniform Traffic Control Devices.

The complementary reports from this research project provided findings that assisted in developing the guide and will aid users in making the most of it. For example, the case studies helped investigators identify which improvements had the potential to reduce crashes on the types of roads common to Michigan, such as the wide, multilane roadways prevalent in the state’s urban areas.

Another useful finding was that corridor improvements appeared to perform better in reducing crashes than intersection improvements. Intersection improvements also have much more of an impact when implemented at multiple crossings along a corridor instead of at solitary intersections.

Value

MDOT has already begun making use of the research results. For example, two improvements discussed in the guide are being put in place on Northwestern Highway in Farmington Hills. MDOT is taking advantage of an existing 12-foot shoulder to install a corridor improvement: a buffered bike lane to separate bicycles from motorized traffic. In addition, MDOT

will add bicycle lanes painted green at intersections along the route to alert motorists to bicycle traffic.

Beyond implementing these and other improvements, MDOT is also actively spreading the word about the guide. Starting this fall, researchers will begin sharing research findings with MDOT offices and local agencies around the state. The message is that many of these improvements can be added to existing roadways quickly and easily, for a low cost, and often with little or no impact on mobility.

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The *Best Design Practices* guide is available online at

www.michigan.gov/documents/mdot_MDOT_Research_Report_RC1572_Part6_387521_7.pdf.

The final report is available online at

www.michigan.gov/mdot/0,4616,7-151-9622_11045_24249-279311--,00.html.

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