Michigan Department of Transportation
RESEARCH Administration

RESEARCH SPOTLIGHT

Project Information

REPORT NAME: Effective Pedestrian/ Nonmotorized Crossing Enhancements Along Higher-Speed Corridors

START DATE: October 2021

REPORT DATE: July 2023

RESEARCH REPORT NUMBER: SPR-1734

PROJECT COST: $195,400

COST SHARING: 20% MDOT, 80% FHWA through the SPR, Part II, Program

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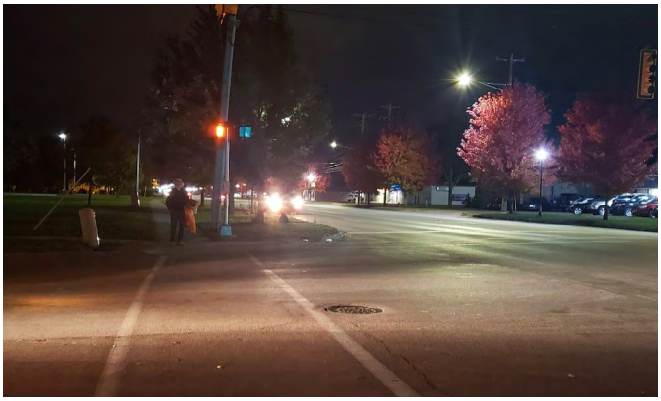
Making high-speed corridors safer for pedestrians and cyclists

Many serious pedestrian and bicycle crashes occur along higher-speed roads in Michigan. To reduce the occurrence of these serious crashes, the Michigan Department of Transportation (MDOT) undertook research to identify and analyze common locations of these crashes and then develop mitigation strategies. Following on-site visits and analyses, researchers evaluated and recommended appropriate countermeasures. These included increasing the amount of lighting at intersections, using high-visibility markings and installing traffic control devices. Coordinated use of such tools will help MDOT reduce the occurrence of these crashes and make traveling safer for pedestrians and other road users.

PROBLEM

High-speed roads are associated with more serious accidents for all road users, but particularly pedestrians, cyclists and other nonmotorized users. Roads with a speed limit of 45 mph or greater are considered higher speed for these users, and the severity of pedestrian and bicycle crashes on higher-speed roads increases at night. To better ensure the safety of the traveling public, MDOT needed to understand the many factors leading to these higher-speed nighttime crashes and evaluate the effectiveness of potential countermeasures to reduce the incidence of these crashes.



Partially or poorly lit intersections can make higher-speed roads particularly hazardous for pedestrians.

RESEARCH

Researchers reviewed literature related to crash-reducing countermeasures on high-speed roads in six other states with weather conditions similar to those in Michigan.

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"The results of this research will be used to cost-effectively address the factors that are creating dangerous conditions for bicyclists and pedestrians along high-speed corridors in Michigan."

Mark Bott, P.E.
Project Manager (Ret.)

Federal guidelines and previous related research further informed this review. Findings showed that the other states had similar approaches to addressing pedestrian safety on high-speed roads, including the use of traffic signals, flashing lights to alert drivers to the presence of pedestrians, and grade separation.

A hot-spot analysis of crash data using geographic information system technology provided a better understanding of the primary factors that caused crashes on Michigan's high-speed roads (but not state freeways). Analysis of the data indicated serious crashes occurred in clusters along urban and suburban high-speed corridors but were more randomly dispersed along rural corridors. Results from this evaluation were used to identify nine sites that were among those with the highest concentration of crashes.

RESULTS

Site analysis of nine hot-spot locations revealed several factors that contributed to these crashes. The most significant and common factor was the time of day of the crash, with 69.5 percent of crashes occurring at night. To further analyze the nighttime crashes, the team measured the crash site's nighttime light intensity in lux (a unit of illumination). While federal studies indicate that 25 lux is an appropriate level of light to see a pedestrian crossing at night, light levels at many of the crash sites measured extremely low, ranging from 0.1 to 5.2 lux. In these conditions, pedestrians and bicyclists appear as shadowy figures.

A key product of this research was a cost-benefit tool developed to evaluate the comparative cost-effectiveness of possible countermeasures. This tool examines the relationship between the cost of a given countermeasure, the annual frequency of the type of crash it aims to mitigate and its likelihood to reduce those crashes. The cost-benefit tool, used in combination with identified hot spots, led to a number of recommended countermeasures based on crash locations:

- **Traffic signal locations:** Increasing LED lighting, tightening the turning radii, using a leading pedestrian crosswalk interval, and installing high-visibility crosswalk markings.
- **Crosswalks with no signals:** Installing traffic control devices that alert drivers to pedestrians (such as a pedestrian hybrid beacon), solar-powered lighting, refuge islands, and high-visibility crosswalk markings.
- **Improvements throughout the corridor:** Widening shoulders, adding solar-powered speed feedback signs and installing additional LED lighting for crosswalks and streetlights.

IMPLEMENTATION

MDOT plans to pursue the recommended countermeasures detailed in the research findings. However, because parts of some corridors are not state freeways, the agency may have to pursue alternative sources to fund the recommended countermeasures. Additionally, the cost-benefit tool developed for this project will be provided to MDOT staff to assist them in determining the most effective use of funds for their future transportation projects and needs.

Another MDOT research project recently began that is more specifically studying the use of additional light (such as light type and placement) along high-speed corridors to help ensure the effectiveness of added lighting elements. The results of this project will be valuable for successful implementation of lighting improvements when they occur.

Research Administration

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Final report and related materials are available online at MDOTjboss.state.mi.us/TSSD/tssdResearchAdminDetails.htm?keyword=SPR-1734.

Research Spotlight produced by
CTC & Associates LLC, January 2024.