

# Research Spotlight

## Project Information

**REPORT NAME:** Association of Michigan's Older Adult Crashes with Roadway Features

**START DATE:** October 2015

**REPORT DATE:** March 2017

**RESEARCH REPORT NUMBER:**  
RC-1653

**TOTAL COST:** \$207,621

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

## MDOT Project Manager Kimberly Lariviere, P.E. (retired)

Traffic and Safety Division  
Michigan Department  
of Transportation  
425 W. Ottawa St.  
Lansing, MI 48909

[mdot-zeroDeaths@michigan.gov](mailto:mdot-zeroDeaths@michigan.gov)  
517-373-2323



## Design enhancements make roads safer for older drivers

Aging can produce declines in the physical and psychological skills needed for driving. To help older adults maintain their independence and continue driving, MDOT in recent years has focused research on implementing engineering measures that can make driving safer and less stressful for them. As part of that effort, this project identified additional ways that MDOT can use roadway features to improve driving safety for older adults.

### Problem

By 2030, people 65 and older will represent around 20 percent of the population of Michigan and of the nation. Research has shown that per vehicle-mile traveled, drivers 65 and older are at greater risk of being involved in a crash, and are more likely to be seriously injured or killed in a crash, than are other drivers. The study described here – the latest step in MDOT's ongoing effort to improve driving safety for older adults – sought to identify the roadway features that may play a role in Michigan's older adult crashes. The findings point to improvements MDOT can make in its highway design guidance that will benefit older drivers, in particular.



Raised channelization medians better delineate intersection approaches, and retroreflective markings make curbs and lanes more conspicuous.

### Research

The researchers first conducted a comprehensive literature review to identify similar studies of crash-related roadway features and of engineering improvements that benefit older drivers. They then reviewed Michigan crash data from 2010 to 2014 to identify locations, time of day and weather conditions for crashes in which older drivers were disproportionately involved. The third step was to survey Michigan road

*“This project gave us valuable insight into how roadway features affect older drivers, and provided a template for investing limited resources to make roadways safer for them.”*

**Kimberly Lariviere, P.E.**  
(retired)  
Project Manager

users at locations such as restaurants, rest areas and libraries. Respondents were asked about their driving frequency, concerns about various roadway features and issues, road conditions they avoided, physical issues they had experienced, and alternative transportation options available to them. Survey responses were analyzed by age group.

Next, the team collected data on Michigan roadway features and analyzed safety factors. They performed statistical analyses to ascertain how roadway factors contributed to crashes and to identify the most effective engineering solutions for older drivers. Finally, the team conducted a cost-benefit analysis of potential solutions and developed roadway design guidance addressing older drivers. Researchers also compared MDOT’s current design guidance with the Federal Highway Administration (FHWA) 2014 Handbook for Designing Roadways for the Aging Population, and prepared recommendations for revisions to MDOT’s standards and guides.

## Results

This research identified opportunities for MDOT to improve safety for older adults and all drivers, such as through intersection design and use of street name signs,

road lighting and pavement markings. Specific results included:

- In the survey, drivers 65 years and older were more likely than other drivers to say that they tended to avoid driving at night, during bad weather, during rush hour and when they were alone in the vehicle. Older drivers also were more likely to report concerns with insufficient visibility and legibility (of street name signs, other signs, lane and off ramp markings, and edge lines). They were also more likely to report concerns with making left turns when an opposing vehicle blocked their view of oncoming traffic, with traversing rail grade crossings, and with choosing the proper lane in multilane roundabouts.

- The crash data showed that older drivers were more likely than other drivers to perform hazardous actions that might cause a crash at stop-controlled intersections, when turning left in an intersection (especially when the intersection was skewed at an angle less than 75 degrees), when turning left from a driveway to enter a roadway, and when going through transition areas with lane drops.

- At intersections, the presence of a raised median or an offset left-turn lane reduced the likelihood of older drivers performing a hazardous action.

- Among the engineering solutions examined, several would offer significant economic benefits. Adding retroreflectivity (the ability of a material to reflect light back to its source) to stop signs had a benefit-cost ratio (BCR) of 39.3, and adding curve warning markings had a BCR of 10.7. Using painted left-lane channelization had a BCR of 7.23, and using physical channelization for a right-turn lane on a major highway had a BCR of 8.21.

## Value

This study provides useful data on roadway features and conditions that particularly concern older drivers and play a role in crashes involving those drivers. These data,

coupled with the study’s comparison of MDOT’s current engineering standards with those in the FHWA 2014 Handbook, reveal opportunities for MDOT to enhance highway safety for older drivers. The researchers recommend that MDOT consider implementing a variety of design features, including intersections skewed at no less than 75 degrees, offset left-turn lanes, raised channelization medians, and overhead street name signs. The study results also may help MDOT make more informed decisions about where to invest resources to improve driving safety for older adults.

## Research Administration

### Principal Investigator Valerian Kwigizile, Ph.D., P.E.

Western Michigan University  
4601 Campus Drive, Room G-249  
Kalamazoo, MI 49008  
[valerian.kwigizile@wmich.edu](mailto:valerian.kwigizile@wmich.edu)  
269-276-3218

### Contact Us

PHONE: 517-636-4555

E-MAIL: [mdot-research@michigan.gov](mailto:mdot-research@michigan.gov)

WEBSITE: [www.michigan.gov/  
mdotresearch](http://www.michigan.gov/mdotresearch)

### This final report is available online at

[www.michigan.gov/documents/mdot/  
SPR-1653\\_556328\\_7.pdf](http://www.michigan.gov/documents/mdot/SPR-1653_556328_7.pdf).

Research Spotlight produced by  
CTC & Associates LLC, July 2017.