Michigan Department of Transportation
RESEARCH Administration

RESEARCH SPOTLIGHT

Project Information

REPORT NAME: Evaluation of an Active Traffic Management System with Part-Time Use of the Inside Shoulder

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Evaluating safety and traffic improvements along Michigan's first flex route

The Michigan Department of Transportation (MDOT) opened the state's first flex route in 2017 along an 8.5-mile stretch of US-23 near Ann Arbor. By monitoring traffic flow and allowing drivers to use the inside shoulder lane during peak travel times, traffic control operators can alleviate traffic congestion and improve safety for all road users. Researchers surveyed drivers and compared operational and crash data before and after the addition of the flex route to evaluate its success and inform recommendations for similar routes in the future.

PROBLEM

The nearly 9-mile corridor of US-23 north of Ann Arbor is prone to fluctuating traffic volumes depending on the time and day of the week. On weekdays, an influx of commuters routinely clog the four-lane divided highway during the morning and afternoon rush hours, while traffic on weekends is often minimal. To increase the road's capacity during peak times without the expense, delay and environmental impact of constructing an additional permanent lane, MDOT created the state's first flex route along the stretch in 2017. This intelligent and dynamic traffic management system uses cameras and other technology to help dispatchers in MDOT's Statewide Transportation Operations Center determine when the median shoulder in either direction should become a temporary third lane and alert drivers to its availability through digital signs along the roadway.

In a flex route, MDOT authorizes the use of the interior shoulder lane during peak traffic times to alleviate congestion, reduce crashes and improve safety.

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"The data show the flex route has successfully reduced traffic delays and crashes, and costs significantly less than adding a permanent third lane."

Jason Firman, P.E.
Project Manager

To learn the effectiveness and success of the flex route, MDOT looked to assess the system's operational and safety performance since its implementation, gauge public perception and identify potential improvements for future routes.

RESEARCH

To evaluate the performance of Michigan's flex route, researchers began by reviewing the best practices and lessons learned reported by other transportation agencies that have used part-time shoulders in the United States and around the world.

Researchers next gathered historical and recent traffic data, comparing average speed, travel times and crash data collected from the US-23 corridor before MDOT installed the flex route and compared it with measurements taken after installation. Notably, the COVID-19 pandemic reduced the amount of usable data for this study as fewer drivers and faster average speeds contributed to anomalies that made the 2020 data unusable for comparison purposes.

Finally, the research team surveyed hundreds of drivers and residents living near the roadway to gauge users' experience and level of satisfaction with the flex route's performance. The researchers also conducted focus groups with drivers and catalogued comments users made on social media to better understand public perception.

RESULTS

The researchers hailed the flex route as a success story and a model for future congestion-prone roadways in Michigan. The data showed that travel on US-23 has generally improved since the flex route became operational in November of 2017. Average travel speeds increased substantially during peak weekday hours, resulting in fewer delays and shorter travel times in both directions.

The route's safety-related data was similarly positive, with crashes reduced overall by nearly 17 percent. While the southbound lanes saw a greater improvement in the number of crashes, travel on the northbound lanes did get better with the addition of the flex route and MDOT anticipates even more safety and performance improvements for travelers heading north once a planned extension of the flex route is complete. The research showed the flexible third lane also improves safety by guiding traffic around crashes or roadside debris, allowing emergency personnel to respond to crashes and clear roadside incidents more quickly.

Users were overwhelmingly happy with the changes, with almost 70 percent of US-23 drivers saying they were satisfied or very satisfied with the flex route and would support expanding the current route and adding additional routes throughout the state. While most of the feedback received was positive, some drivers reported being confused by some of the overhead messages and offered solutions to improve the clarity of communications.

The researchers compiled a list of recommendations for MDOT to consider when designing future flex routes, including:

- Adding additional sensors, cameras and other technology to capture traffic volume, speed data, road capacity, and shoulder availability for better traffic management and enforcement.
- Configuring the termination of flex routes to avoid bottlenecks.
- Notifying drivers at least 3 miles in advance of a lane change or merge to support a smooth transition and reduce crashes.

IMPLEMENTATION

With data showing the flex route's success by just about every metric, MDOT has a proven and cost-effective strategy for mitigating congestion on other roadways in the future.

Research Administration

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