

Research Spotlight

Project Information

REPORT NAME: Study of High-Tension Cable Barriers on Michigan Roadways

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Cable median barriers: A cost-effective means to save lives

Median-crossover crashes are among the most hazardous events that can occur on freeways, often leading to serious injury or death. In recent years, high-tension cable median barriers have emerged as a cost-effective alternative to conventional barriers in preventing such crashes. MDOT began installing them on state freeways in 2008. This research project confirmed that cable median barriers are effective at reducing crossover crashes and improving freeway safety in Michigan, produced guidelines to help identify the best locations to install them, and developed content for public outreach materials explaining their benefit.

Problem

Freeway median barriers made of concrete, steel guardrail or high-tension cable are all effective at preventing crossover crashes, but they can be costly to install and maintain. Cable median barriers have lower installation costs than concrete or guardrail alternatives, though they are more easily damaged by vehicle strikes, leading to higher maintenance and repair costs. In addition, while cable barriers minimize crossover crashes, their close proximity to the roadway can lead to an increase in less severe crashes.

Based on successes in other states, in 2008 MDOT began an initiative to install



Since their installation on selected Michigan highways beginning in 2008, cable median barriers have reduced crossover crash rates in these highway segments by 87 percent.

over 300 miles of cable barriers on state highways. Research was needed to evaluate whether cable barriers have proven to be a successful, cost-effective treatment in Michigan, accounting for unique factors such as the significant snowfall that some areas of the state receive.

“This project confirmed that cable median barriers are saving lives in Michigan by preventing crossover crashes. The increase in minor, property-damage only crashes is a small tradeoff compared with the life-saving benefits of cable barrier.”

Carlos Torres, P.E.
Project Manager

Research

For each highway segment where cable median barriers were installed, researchers conducted a detailed review of crash reports in the years before and after installation. They performed statistical analyses to obtain the most accurate estimate of the barriers' effects on crash frequency and severity. They also compared the safety performance of cable median barriers, thrie-beam median guardrails and concrete median barriers.

Researchers examined the effects of several site-specific factors on the cable barriers' performance, including annual snowfall, traffic volume, median width and road geometry. From these analyses, they developed guidelines to help MDOT identify and prioritize locations best suited for cable barrier installation, where the return on investment would be greatest.

Finally, the researchers conducted an economic analysis to assess the cost-effectiveness of the cable barrier system, considering installation and maintenance costs as well as safety benefits.

Results

Cable median barriers have been highly effective at reducing crossover crashes in Michigan. After the barriers were installed, crossover crash rates on those highway seg-

ments fell by 87 percent, and the barriers successfully contained 97 percent of the vehicles that hit them.

Cable barriers have improved overall safety at the locations where they have been installed. The most serious crash types—fatal and severe injury crashes—decreased by 33 percent after cable median barriers were installed, according to rigorous statistical analysis. Since their installation, cable barriers are estimated to have saved 20 lives and prevented over 100 serious injuries in Michigan.

As expected, low-severity crashes increased following the cable barrier installation; crashes involving only property damage or minor injuries increased by 155 percent. Researchers' analysis showed that placing the cable barrier farther from the roadway (toward the center of the median) would result in fewer low-severity crashes, but this can be impractical because of soil conditions, slope grade, drainage characteristics, or increased installation and maintenance costs.

Overall, cable median barriers were slightly more prone to penetration by a vehicle than thrie-beam guardrail or concrete barrier, but they were the most effective in preventing redirection back into the travel lanes. Other findings include:

- **Motorcycles:** Cable barriers did not significantly impact motorcycle crash trends.
- **Winter roadway conditions:** Crash frequency increased in times of adverse weather and road conditions, but the cable barriers continued to contain vehicles as intended.
- **Rollovers:** Median rollover crash rates decreased by 50 percent after cable barriers were installed.

Researchers found that cable barrier is a cost-effective median treatment in Michigan. Factoring in both installation costs and maintenance costs, they calculated a time of return—the time needed for expected benefits to equal costs—of 13.4 years. Cable barrier has a design life of 20 to 25 years.

Value

This study confirms that cable median barriers are a cost-effective treatment for reducing crossover crashes, fatalities and serious injuries in Michigan. The guidelines developed through this research give MDOT a framework for determining where cable barriers are likely to have the greatest positive impact and return on investment based on crash data and site characteristics specific to Michigan. MDOT is reviewing these recommendations for possible incorporation into future updates to the department's median treatment design guidelines.

To help educate drivers about the safety benefits of cable median barriers, the researchers also developed content for public outreach messaging, including an update to MDOT's 2011 brochure on cable median barriers.

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