



TRANSPORTATION POOLED FUND  
PROGRAM

## TECHNICAL SUMMARY

### Mn/DOT Technical Liaison:

Mike Elle  
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### Mn/DOT Administrative Liaison:

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### TOTAL STATE CONTRIBUTIONS TO DATE:

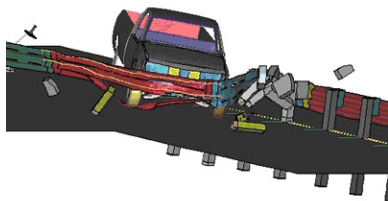
Nearly \$12,000,000

### Mn/DOT CONTRIBUTIONS TO DATE:

\$1,320,863

### PARTICIPATING STATES:

CA, CT, FL, IA, IL, KS, MN, MO,  
MT, NE, NJ, NY, OH, SD, TX, WI



Computer simulations representing real-life impacts of vehicles with roadside structures reduce development costs by detecting design weaknesses before physical testing.



## RESEARCH SERVICES

OFFICE OF POLICY ANALYSIS,  
RESEARCH & INNOVATION

# Pooling Our Research: Innovative Technologies to Improve Motorist Safety During Roadside Crashes

## Why a Pooled Fund Study?

In 1974, a small research program was created to evaluate standard roadside safety hardware used by state highway agencies. Today, this program is an international leader in the development of innovative technologies for making run-off-road crashes less dangerous; these technologies include guardrails, bridge rails, transitions, median barriers and breakaway support structures.

Hosted at the University of Nebraska's Midwest Roadside Safety Facility, the dramatic growth of the program was made possible by the cooperation of a number of other states. In 1991 it was established as the Midwest States Pooled Fund Crash Test Program, and since then the number of participating states has grown from three to 16.

Mn/DOT leverages this cooperative effort by taking advantage of the MwRSF's on-demand crash-testing services. "The MwRSF is a great resource for us," said Mike Elle, Mn/DOT design standards engineer and pooled fund study technical liaison. "We can make specific requests to have our hardware tested for a reduced cost at a state-of-the-art facility. We also benefit from the MwRSF's development of original solutions and crash testing of hardware for other states."

## What is the Pooled Fund Study's Goal?

The program is dedicated to making the roadside less hazardous to motorists by:

- Conducting performance evaluations of existing roadside safety features.
- Designing, developing and crash-testing new roadside hardware.
- Performing computer simulation modeling of vehicle impacts with roadside hardware.

## What Have We Learned?

The MwRSF has developed numerous safety features that have been adopted nationwide and several that have been adopted internationally. These features have saved the lives of countless motorists across the nation over the last decade, and include:

- The Minnesota three-beam bullnose median terminal, developed using finite crash analysis computer modeling. The MwRSF is recognized as a leader in computer simulation modeling of roadside safety features.
- The Midwest Guardrail System, developed to better accommodate high-center-of-gravity light trucks by raising the standard rail height and making several other design changes. This system earned a Roadside Safety Award from the Roadside Safety Foundation and the Federal Highway Administration.
- Numerous other guardrail terminals, crash cushions, guardrail systems, approach guardrail transition systems, bridge rails and work zone devices.

Of the many projects involved in the development of these features, 10 were performed specifically at the request of Mn/DOT. The MwRSF also provides ongoing advice to Mn/DOT engineers concerning the safety of possible design changes.

*TPF-5(193): Midwest States Pooled Fund Crash Test Program. Now in its 19th year, this multistate pooled fund study is dedicated to making roadsides less hazardous to motorists by evaluating roadside safety hardware such as guardrails and median barriers.*

*“The service provided by the MwRSF is excellent. When we wanted to develop a new bridge railing standard, we received prompt and detailed advice from the MwRSF based on its crash-test data.”*

**–Paul Rowekamp,**  
Mn/DOT Bridge  
Standards & Research  
Engineer

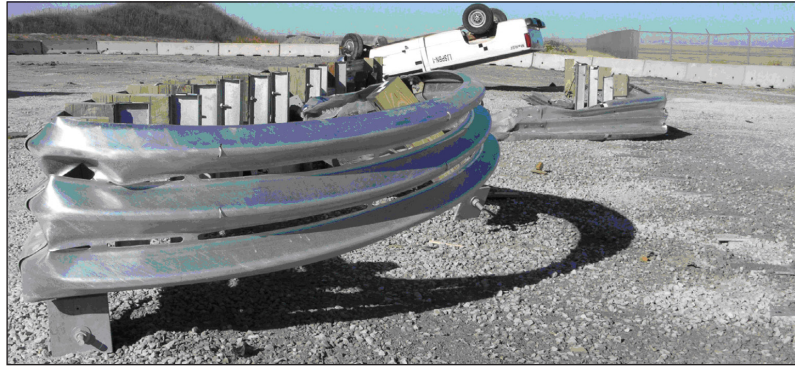
*“The safety products and crash-testing services produced by this effort will continue to benefit Minnesota, saving lives and money.”*

**–Mike Elle,**  
Mn/DOT Design  
Standards Engineer

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At Mn/DOT’s request, the MwRSF currently is developing a guardrail with a breakaway steel post. The purpose of such posts is to make the impact of a vehicle less severe than it would be with a completely rigid object. While the guardrail failed in the test pictured above, the system passed a more recent test.

### What’s Going On Now?

The MwRSF is currently working on 20 pooled fund projects that may lead to changes in Mn/DOT standards:

- One project was requested by Mn/DOT to test breakaway steel posts for guardrails. Two others involve the development of breakaway supports for luminary and pedestrian signal poles, and may help Mn/DOT evaluate manufacturer safety standards.
- Six projects involve the development of the Midwest Guardrail System. This could help to resolve some roadside safety problems associated with the low-height system currently used.
- One project tested numerous roadside system hardware components that are used by Mn/DOT for its roadside safety projects.
- Two projects tested and evaluated the safety performance of vertical, F-shaped and temporary concrete barriers widely used in Mn/DOT work zones to separate the flow of traffic within a construction area.
- Three projects involve the development of a nonproprietary high-tension cable system for crashes involving vehicles crossing medians into oncoming traffic. Cable systems are one of the most cost-effective measures for reducing highway fatalities. Mn/DOT will use the results of this study to develop its own cable system design standards.
- Two projects evaluated roadside safety measures using a cost-effectiveness methodology that Mn/DOT may consider when selecting a roadside system evaluation method.
- Two projects evaluated precast concrete bridge railing systems and may affect Mn/DOT bridge design standards.
- One project tested nonproprietary box beam guardrail terminals, which may significantly reduce the cost and enhance the use of box beam guardrails in Minnesota.

### What’s Next?

Since its inception, the MwRSF has received more than \$14 million in research funding, including support from the National Cooperative Highway Research Program. Under the NCHRP, the MwRSF is currently developing guidelines for the safety performance evaluation of roadside features; establishing warrants for the use of roadside safety structures; and conducting a long-term accident investigation study to better understand the causes of injuries and fatalities in run-off-road crashes.

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*This Technical Summary pertains to the ongoing Pooled Fund TPF-5(193), Midwest States Pooled Fund Crash Test Program, continuing the project initiated under SPR-3(017). Details of this effort can be found at <http://pooledfund.org/projectdetails.asp?id=418&status=4> and <http://engineering.unl.edu/specialty-units/mwrsf>.*

*For more than 25 years, FHWA’s Transportation Pooled Fund Program has been providing state DOTs and other organizations the opportunity to collaborate in solving transportation-related problems. The TPF Program is focused on leveraging limited funds, avoiding duplication of effort, undertaking large-scale projects and achieving broader dissemination of results on issues of regional and national interest.*