

# Safety Edge paves way to safer rural roads

*It is an innovative technology that has real application on rural roads with narrow shoulders and high crash rates.*



*The Safety Edge detail replaces vertical edge drops like this with a sloped edge that helps drivers recover control after leaving the roadway.*

**PUBLIC ROAD AGENCIES** and contractors fine-tuned the method for installing the Safety Edge on a range of local road projects in Wisconsin last year. The sloped paving detail reduces the severity of run-off-the-road crashes. It is an innovative technology from the Federal Highway Administration's (FHWA) Every Day Counts (EDC) program that has real application on rural roads with high crash rates and narrow shoulders.

Through EDC, the FHWA collaborates with the transportation community nationwide on introducing and deploying Safety Edge and other ideas that improve road safety or increase project efficiency. The Wisconsin Department of Transportation (WisDOT) participated in this effort last year with pilot projects that included Safety Edge. And the Wisconsin Transportation Information Center (TIC) gave local road officials a chance to see a Safety Edge installation on a county project, partnering with the Chippewa County Highway Department in October for a Demonstration Day workshop. Representatives from ten counties and nine towns attended the workshop. The FHWA and WisDOT provided technical expertise and support.

## Test and observe

The October program included presentations on constructing the angled edge instead of the typical vertical edge on an asphalt overlay project. As the gravel shoulder erodes from this edge, it often creates an edge drop that can cause drivers to lose control when they try re-entering the roadway after wandering off. The Demonstration Day included a discussion of safety benefits and how to combine Safety Edge with other safety improvements.

One concern local agencies raise is whether the sloped edge is less durable. Steve Krebs, Chief Materials Management Engineer

with the Division of Transportation Systems Development at WisDOT, talked at the workshop about the compaction data WisDOT is gathering on Safety Edge, data he is using to benchmark densities at the edge of asphalt pavements that are constructed with the new technology.

"Testing and observing the results on our pilot projects helps us understand all the benefits of a Safety Edge installation," Krebs says. "Sloping the pavement edge may help with compaction and produce higher density readings compared to pavements built without the added material of Safety Edge. It has the potential to improve performance."

He adds that exploring Safety Edge construction in detail and improving it in the field generates valuable data to share with local governments and contractors who are ready to give the paving add-on a try.

## In the field

After presentations, the group assembled for a field demonstration featuring one of two Safety Edge projects constructed by the Chippewa County paving crew.

The Chippewa County Highway

Department said one of the roads in their Safety Edge demonstration projects had crash rates seven times the state average and many crashes were due to run-offs. Adding a 30-to-40-degree slope to the pavement edge would help prevent overcorrection and loss of control when a vehicle drifts off the pavement. The county installed the new edge along with these other safety improvements: paving a portion of the shoulder, correcting super elevations on curves and adding guardrails.

The estimated cost of adding Safety Edge to the projects averaged about a one-percent increase in asphalt material, similar to FHWA estimates.

## Judging a new idea

The demonstration day rated high among participants, says TIC Staff Engineer Ben Jordan, who asked them for feedback. The event was a good opportunity for the local public agencies that came to judge a new idea close up. Some plan to incorporate Safety Edge into future projects. Others wanted to see the impact of rollers on the stability of the sloped asphalt edge and learn more about which roads benefit most from applying Safety Edge.



*Paver places Safety Edge on Chippewa County Demonstration Day project last October.*

Research from FHWA and results from state and local projects across the country indicate Safety Edge improves safety most on roads with significant accident rates, substandard geometry, narrow lanes, unpaved shoulders and paved shoulders less than three-feet wide. Many of the 56,000 miles of town roads in Wisconsin fit this description.

Jordan stresses that the majority of local rural roads have gravel or earth shoulders and, with fewer resources for maintaining those shoulders, the Safety Edge is an improvement worth considering.

"Installing the Safety Edge on new paving and resurfacing projects can reduce the crash risk for a driver who veers onto a shoulder with an edge drop-off," he notes. "Local roads may carry less traffic but they often have more hazards. Safety Edge is an effective way to reduce crash severity for run-off-the-road accidents and improve safety."

Limited access to the Safety Edge paver attachment is an issue right now, Jordan says. But TIC is supporting the use of the Safety Edge on local road resurfacing or rehabilitation projects with the loan of a Safety Edge shoe. TIC will provide the attachment to local governments wanting to try the technology on upcoming projects and hopes to offer a second one soon.

"As costs go down and more contractors gain experience with laying down a Safety Edge, counties and towns will have more options," Jordan notes. He agrees with WisDOT engineers that in time, Safety Edge probably will become a standard that is included in paving contracts.

### More demos and tests

TIC plans a second Safety Edge Demonstration Day in collaboration with the Fond du Lac County Highway Department in the near future. It is part of a commitment

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## Good gravel, good roads

**MORE THAN 30,000 MILES** of local gravel roads in Wisconsin serve the transportation needs of communities across the state. These basic roadways connect houses and farms to main thoroughfares. They also carry school buses, garbage trucks, milk trucks, farm machinery and logging equipment. Keeping them in good condition requires good design, quality materials and attention to ongoing maintenance.

The Wisconsin Transportation Information Center (TIC) will hold a **Gravel Road Maintenance** workshop at four Wisconsin locations in April. The workshop explores cost-effective methods for maintaining gravel roads, covering topics that include how to select gravel materials, shaping the road for best drainage and dust control. See the **Calendar** on page 12 for details and register online at [tic.engr.wisc.edu](http://tic.engr.wisc.edu).

### Economic good sense

Workshop Instructor William Heiden, who has decades of experience in road construction and maintenance in the private sector and as a county road engineer, specializes in rural roadway problems, especially

dust control and soil stabilization on gravel roads. Heiden says he uses much of what he has learned over the years to show why regular, careful maintenance of gravel roads makes good economic sense. "Improper maintenance of gravel roads costs money," he notes, recounting how one county reduced its budget for managing unpaved roads by 60 percent with better planning and training.

The workshop offers a general overview of roadway shape, how that affects drainage and the way a road wears over time. Heiden concurs with recommendations in the TIC fact sheet on gravel roads that it is important to have enough crown on the road to allow water to drain away. This prevents water from standing on the surface, saturating and weakening the road structure as moisture is absorbed. This situation eventually causes potholes or a washboard effect.

Well-graded and compacted shoulders support the edge of a gravel road and provide an area to pull off or regain control. They also direct water run-off to adjacent ditches and away from the road. Even where there is little room for a shoulder, its shape should not

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*Example of a road with an adequate layer of good-quality gravel.*

## Gravel Road Maintenance Workshop

*Reshape and maintain local gravel roads.*

### Dates & locations

April 19 Richland Center  
April 23 Trego  
April 25 Marathon  
April 26 Crandon

*Keeping gravel roads in good condition requires good design, quality materials and attention to ongoing maintenance.*



## Safety Edge for safer rural roads

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to giving local governments more exposure to technologies that meet their needs.

Jerry Zogg, Chief Roadway Standards Engineer with WisDOT, says they want to implement Safety Edge on more state roads over the next two years and also demonstrate this technology for more local road officials and contractors. The department will do at least two Safety Edge projects in each region of the state in 2012 and five to ten projects per region in 2013. There are plans to test the application on a concrete pavement project in the near future.

### Research findings

Research is another aspect of the WisDOT/FHWA Safety Edge collaboration. The Construction and Materials Support Center (CMSC) at the UW-Madison is studying the pilot projects to monitor methods and measure outcomes. Tom Martinelli, an engineering consultant working with CMSC, conducted field observations of the WisDOT 2011 Safety Edge pilots. CMSC issued its findings at the end of 2011 in a report titled *Constructability Review of the Safety Edge Construction Technique*, co-authored by Martinelli and Gary Whited of CMSC.

Martinelli surveyed project engineers and contractors about their initial experience with the Safety Edge equipment. They told him the attachment was easy to install but required periodic adjustments to keep the proper shape and slope. Martinelli found that some contractors waited to roll the 6-to-12 inches of asphalt mat along the edge of the road surface last, giving the edge material more time to cool and hold its shape.

Wisconsin's current acceptable slope for the edge—at 29-to-40 degrees, broader than FHWA's standard 30-to-35 degrees—came from the CMSC recommendations. The researchers found that where achieving a tight tolerance was difficult, creating a reasonable angle at the edge was better than none at all. New performance specifications from WisDOT define the target range for state projects. Local road officials can contact Erik Emerson, WisDOT Standards Development Engineer, for a copy of the construction specifications or download them from the TIC website at [tic.engr.wisc.edu](http://tic.engr.wisc.edu).

WisDOT will issue a detailed construction note on Safety Edge for subscribers to the state's *Construction Materials Manual*.

### The edge holds

The pilot projects are helping WisDOT and CMSC spot problems and discuss solutions with the project engineers and contractors. A good example in 2011 was the occasional presence of longitudinal cracking at the edge break point during rolling operations. Martinelli says the engineers and paving crews corrected this problem by preparing a wider compacted base to support the Safety Edge.

The *Constructability Review* also reports on the condition of a Safety Edge project from 2010, State Highway 55 in Menominee County. Martinelli returned a year later and found it in good shape. There was routine erosion of the aggregate shoulder. But the Safety Edge held up well, providing drivers who leave the road a safe and durable return to their driving lane.

Early indications for the 2011 projects are promising. "We saw no negative impact on the paving operations," says Martinelli. "The more knowledge people in the industry gain, the closer we'll be to Safety Edge as a routine add-on to many resurfacing and reconstruction projects."

## Potential for safer roads

Zogg agrees the state's Safety Edge installations are a success and a source of useful data. He anticipates putting WisDOT's complete design policy into effect in 2013 and implementing Safety Edge statewide in 2014. "The vast majority of our road system in Wisconsin consists of two-lane roads with three-foot shoulders so the policy will cover most projects on most roads," Zogg explains. "As contractors get more experience installing Safety Edge and the equipment becomes available, we see the potential for growth in the application of this technology. And safer roads as a result."

Watch for more about TIC's upcoming Fond du Lac County Safety Edge Demonstration Day and details on how to participate. Local governments can contact Ben Jordan or Steve Pudloski at TIC for information about borrowing the agency's Safety Edge attachment for a local road resurfacing or rehabilitation project. ■

### Resources

*FHWA Every Day Counts* intro page on Safety Edge technology includes background information, case studies and links to other resources.

[www.fhwa.dot.gov/everydaycounts/technology/safetyedge/intro.cfm](http://www.fhwa.dot.gov/everydaycounts/technology/safetyedge/intro.cfm)

*Construction and Materials Support Center* link to current reports, including the *Constructability Review* on Safety Edge in Wisconsin.

<http://cmsc.engr.wisc.edu/reports.html>

Link to April 2011 *Safety Evaluation of the Safety Edge Treatment* report on FHWA site.

[www.fhwa.dot.gov/publications/research/safety/11024/](http://www.fhwa.dot.gov/publications/research/safety/11024/)



Crews roll the asphalt mat along the edge of the road on a Safety Edge installation.

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