

# The Center Line

Local Technical Assistance Program  
North Dakota Transportation Technology Transfer Center

A Service for Local Transportation Agencies  
North Dakota State University

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## The Safety Edge: Pavement Edge Treatment

As our LTAP field staff travel around the state we continue to see the problem of sharp drop-off at the edge of pavement that can be a danger to the motoring public. More and more of our aging highways and streets are being rehabilitated with asphalt overlays. This rehabilitation is usually sorely needed. Yet, be very cautious about the risk to your department

from constructing a new pavement with a vertical drop-off at the edge. This can also be a personal liability risk to you as a manager or elected official who could be held

responsible for the decisions to construct or repair pavements in an unsafe manner. Tort liability claims resulting from pavement edge drop-offs cost highway agencies millions each year. In one case, the court awarded \$6 million for injuries caused by a low, defective shoulder drop-off.

The single greatest cause of crashes on local, low volume, two-lane roads is run-off-the-road incidents. These crashes often occur at high speed and at night. While there may be other contributing causes, once a vehicle leaves the pavement, a

vertical or near vertical edge makes it very difficult to safely recover control of the vehicle. Too often one of two things happens. The driver will try to bring the vehicle back onto the roadway and when the right front tire contacts the vertical edge it will "scrub" the edge for a short distance and then suddenly climb back onto the pavement causing the vehicle to abruptly swerve and roll over. The second scenario is very similar except the vehicle does not roll over, but climbs

back onto the pavement and, in the process of over steering, the driver swerves into the path of oncoming traffic in the opposite lane resulting in a head-on crash. Either scenario is often deadly.

According to a Federal Highway

Administration (FHWA) publication titled, *The Safety Edge: Preventing Crashes Caused by Unsafe Pavement Edge Drop-offs*, an estimated 11,000 Americans suffer injuries and 160 die each year in crashes related to unsafe pavement edges, at a cost of \$1.2 billion. And, these figures likely underestimate the problem since the role of a hazardous pavement edge in the sequence of events leading to a crash is often not documented. We don't want our LTAP friends to be part of these statistics.



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### Routing Slip

Don't file this newsletter too quickly. Read it, photocopy what you want, sign below, and please pass it on — especially to the front-line troops.

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“The Safety Edge” can save lives, reduce tort liability, reduce maintenance expenses, and costs less than 1% of a typical pavement resurfacing budget.



An edge taper or “fillet” at the edge of pavement is a great safety feature. A taper of 45 degrees enhances safety, but 30 degrees is better.



An unsafe pavement edge.



Unsafe pavement edge drop-offs cause crashes.

### What is an Unsafe Pavement Edge?

An edge drop-off of four or more inches is considered unsafe if the roadway edge is at a 90 degree angle to the shoulder surface. Near vertical edge drop-offs of less than four inches are still considered a safety hazard to the driving public and may cause difficulty upon reentry to the pave surface.

### How to Prevent Unsafe Edges

So what is the solution? The simple solution may be to put a taper of 45 degrees or more on the edge of the pavement. Studies have shown this to be remarkably effective in reducing the danger to motorists.

Another solution is to place aggregate shouldering at the edge of the new pavement. However, in some cases there may not be an adequate existing shoulder width on which to place the new aggregate. In that case, some shoulder reconstruction may have to be done to fix the problem.

Adopting a standard contract specification that minimizes the hazard of steep pavement edges for all construction and resurfacing projects is a simple and cost-effective way to assure pavement edge safety. The solution to the pavement edge drop-off hazard is two-fold:

- Require a “Safety Edge,” an angled asphalt edge, or fillet, that slopes 30-35 degrees from the pavement surface to the shoulder, as a contract specification in all pavement construction and resurfacing projects.
- Routinely resurface shoulders when roadways are resurfaced.

### Information Resources

There are some good technical resources available to help you. One is the FHWA publication referenced earlier. Call us and we will send a copy or you should be able to access

it on the Internet by searching for FHWA Publication FHWA-RC-BAL-04-0015.

Another resource is a recent publication by the Transportation Center at the University of California-Berkeley titled, The Safety Edge: Pavement Edge Treatment. You can access this on-line at [www.techtransfer.berkeley.edu/newletter/05-3/paveedge-pix.php](http://www.techtransfer.berkeley.edu/newletter/05-3/paveedge-pix.php).

The Center for Transportation Research and Education at Iowa State University has released a report that examines the magnitude and severity of run-off-the-road collisions, evaluates federal and state guidance regarding when edge drop-offs should be addressed, and explores measures for the quantity and depth of edge drop-offs on representative rural two-lane roadways. This study was funded by the AAA Traffic Safety Foundation, [www.ctre.iastate.edu/reports/edge\\_dropoff\\_aaa.pdf](http://www.ctre.iastate.edu/reports/edge_dropoff_aaa.pdf).

### Nighttime Sign Inspection: A South Dakota Story

In one of the sessions at the 2005 Region 8 County Road Conference, Greg Schertz of the U.S. Federal Highway Administration (FHWA) made a presentation on retro-reflectivity of traffic signs. Greg reminded everyone that the Manual on Uniform Traffic Control Devices (MUTCD) requires nighttime inspection of signs to evaluate how visible traffic signs are in the darkness. Since the MUTCD is the national standard for selecting, placing and maintaining all traffic control devices, all levels of government are expected to comply with its standards. While a few of our larger counties and cities are doing scheduled night inspections, many of our local departments have not done so.

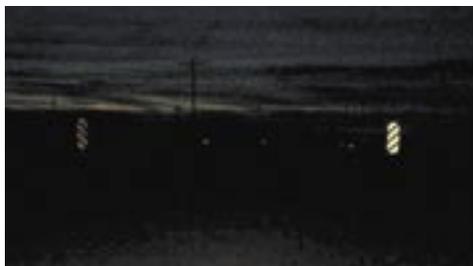
Ron Schulte, Turner County Highway Superintendent, and Merl Hanson, Hamlin County Highway Superintendent, took this to heart. Here is a brief account of how each highway superintendent reacted. Ron gave the matter a lot of thought as he traveled home from the conference. During the next county commission meeting he presented a plan to the commissioners to conduct a complete inspection of all signs on the county road system at night. They gave their approval.

A date was selected, the weather cooperated, and every sign, bridge marker, delineator or any other sign on the county highway system was inspected in one night! Here is how it was done. At the regular quitting time of 4:30PM, the entire crew clocked out. Ron purchased some food at a local supermarket and the crew sat down and ate together. At 5:30PM, all crew members clocked back in and began preparation for inspection. They were divided into teams of two and Ron instructed one person to drive and the other to record sign conditions on the specific roads they traveled. The teams were given a certain area of the county to inspect which was about 50 to 55 miles per team. They were asked to collaborate as they approached each sign to make a joint evaluation. The inspection was completed by about 10:00PM.

The project was easier than expected. In most cases, the contrast was quite clear between signs that had acceptable retro-reflectivity and those that did not. In all, 27 signs were noted as needing replacement in the near future. Ron was surprised that some of the signs performed so poorly at night. He mentioned one object marker at a bridge which was nearly invisible at night. When he returned to look at it in the daytime, it appeared to be perfectly good. This points out the need to do nighttime inspection.

Merl addressed the issue in a different way. He took it upon himself to inspect all of the signs on the Hamlin County highway system. This took a period of time, but Merl has also completed his nighttime inspection. His method was to rise extremely early and begin inspection at about 2:00AM. As daybreak came he would go to the office and resume the normal work day. Merl devised his own method of rating signs with a point system from one to five. He gave the following examples. Those rated "five" were in need of immediate replacement. Those rated "four" are to be replaced next year. Those rated "one" are new signs and so on. He discovered 48 signs needed replacing.

We urge all of our readers to do nighttime inspection of signs if you are not currently doing so. Routine daytime inspection is fine and is necessary to maintain signs. However, retroreflectivity is extremely hard to judge in daylight, so occasional night inspection is needed. In addition to making your roads safer, it also brings your department into compliance with the MUTCD, which can be extremely important in managing risk.



An example of two object marker signs that look virtually identical in daylight, but appear very different at night. //

### **Low Cost Local Road Safety Solutions Released at NACE 2006**

A new joint publication released by NACE and the American Traffic Safety Services Association (ATSSA) titled, "Low Cost Local Road Safety Solutions," was made available to NACE members April 9-13 during the 2006 NACE Annual Conference in Grand Rapids, MI. The 39-page booklet contains 16 examples of numerous low-cost solutions that address roadway safety issues such as signs and pavement marking improvements, rumble strips, longitudinal channelizers and roadside cable barriers. The concise studies were compiled by the Texas Transportation Institute. The booklet also contains a section titled, "How Can I Conduct a Crash Study," as well as a list of current resources on the overall topic. To view on the Internet visit: [www.atssa.com/galleries/default-file/LowCostLocalRoads.pdf](http://www.atssa.com/galleries/default-file/LowCostLocalRoads.pdf)

NACE members may obtain a free copy of the full-color publication by contacting Trish Hall by e-mail at [TrishH@atssa.com](mailto:TrishH@atssa.com) with "NACE/ATSSABOOK" in the subject line.

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The Transportation Technology Transfer Program is a nationwide partnership under the Local Technical Assistance Program (LTAP) of the Federal Highway Administration, state departments of transportation, universities, and others. The program's purpose is to translate into understandable terms the latest transportation research and technologies. This information is made available to local officials transportation personnel in towns, cities, counties and townships.

Federal support for operation of the North Dakota TTT Center at North Dakota State University (NDSU) is matched by the North Dakota Department of Transportation, NDSU, the North Dakota Insurance Reserve Fund and the ND TTT Center. Guidance for the ND TTT Center is provided by an Advisory Board composed of members representing the federal, state, local and private sector transportation community. This newsletter is designed to keep you informed about new publications, videos, innovative technologies and training opportunities that will be helpful to you and your local unit of government.

The use of product brand names in newsletter articles does not constitute any endorsement of those products by the ND TTT Center.

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## Reader's Response

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