

University of Tennessee Studies Pavement Marking Materials

by Matt Cate

The University of Tennessee Center for Transportation Research has begun work on a unique research project for the Tennessee Department of Transportation. This new project will study several different types of pavement marking materials over the course of more than two years. The end result of this research effort will be to determine the retroreflective properties of the marking materials throughout their service life, the duration of the service life for each material, and the cost effectiveness of each material to be studied.

Each pavement marking under consideration will be studied under a variety of conditions. Sites will vary with respect to traffic volume, pavement surface type, and geographic location within the state. The study will also seek to determine if white and yellow markings behave differently. Each site will be measured at four month intervals to

track the combined effects of traffic exposure and weather. While on site, team members will use a retroreflectometer to measure the markings under three unique circumstances. The first measurement is performed with dry pavement. The second measurement is made in a state of continuous wetting in order to simulate performance in heavy rain. Finally, the stream of water is stopped and standing water is al-

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UT graduate student Godswill Nsofor takes retroreflectivity readings on the yellow edge line of Interstate 40 near Knoxville.

Sign Grant Program Cut

The Sign Grant Program, established in 1983, has assisted towns and cities with populations less than 5,000 and counties with populations less than 30,000 to install new and replace damaged or missing regulatory signs. Unfortunately, the program did not receive funding for next year's program through usual channels. Therefore, the program will be on hiatus for a period of at least one year while the Tennessee Department of Transportation (TDOT) researches alternate funding sources. Every effort is being extended to get the Sign Grant Program back on track as soon as possible. Future updates will be published in this newsletter.

If you have any questions, please contact Matt Cate at 865-974-5255.

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ROADTALK

is a publication of the Tennessee Transportation Assistance Program (TTAP). TTAP is part of a nationwide Local Technical Assistance Program (LTAP) financed jointly by the Federal Highway Administration (FHWA) and Tennessee Department of Transportation (TDOT). Its purpose is to translate into understandable terms the latest state-of-the-art technologies in the areas of roads, bridges, and public transportation to local highway and transportation personnel.

The views, opinions, and recommendations contained within this newsletter are those of the authors and do not necessarily reflect the views of FHWA and TDOT.

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From the Director

We're in the middle of a wonderful fall season here in east Tennessee. The weather has been unseasonably warm and dry, with about the only downside as far as I'm concerned being the muted colors of the autumn leaves. The absence of rain has been a problem for our shrubbery, but at least it's cut down the need for mowing.

As we in Tennessee wind down from the busy summer maintenance season and look forward to a hopefully uneventful winter, we might take time to think about our colleagues in the Gulf states. The 2005 hurricane season has been a record, and the battering of Katrina, Rita, and other major storms has left record damages to homes, businesses, and public infrastructure. By now, we all have seen many pictures and heard or read stories about the massive damage done throughout the region. I have not seen the area firsthand, but friends and relatives in the area have told me that the damages defy belief, and the TV and print media accounts cannot portray the true extent.

A big story regarding these disasters has been the slow response by government relief agencies, and the resulting fingerpointing among responsible officials. Subsequent investigation will have to address claims of responsibility. What is obvious, however, is that the storms dealt a near knockout blow to the transportation infrastructure in the region. Without functioning transportation – roads, railroads, airports, waterways – delivering meaningful quantities of relief supplies just isn't possible. The pictures of storm damage I saw showed fallen trees and debris on rights-of-way, washed out embankments, flooded facilities, collapsed or missing bridges, destroyed signs, signals and communications facilities, and a host of other damages, all on a colossal scale. When you look at the response in the days following the storm, and I'm convinced that history will show delivery of supplies on a staggering scale, remember that none of it would have been possible without heroic struggles by transportation agencies and companies to restore access. Thousands of unsung heroes struggled to get our railroads, highways, airports, and waterways back in service so that relief supplies could be transported.

A key lesson here, I think, is that those of us responsible for maintaining transportation systems need to have a plan for responding to disasters. In Tennessee, we may not experience hurricane force winds, but our history includes tornadoes, severe flooding, and a major earthquake, so the forces of nature cannot be discounted. Are you prepared to handle such an event? What needs to be done to prepare your department for a response? Perhaps this should be a topic of thought during the next few months.

Best wishes for the rest of your Fall! Call us if we can help you in any way.

David

Ten Commandments for Snow Fighters

(Used with permission from Kansas LTAP, Produced by the National LTAP Association in partnership with the Salt Institute, 2005. Source: Rural & Urban Roads, 1980.)



Winter is approaching! Since our snow events are few and far between, a few reminders are in order.

- 1** Thou shalt present thyself to thy job physically and mentally fit and properly clothed for any emergency in order to withstand the rigors of thy task.
- 2** Thou shalt never enter thy cab without inspecting thy lights, windshield wipers, defrosters, flares, and other safety equipment.
- 3** Thou shalt know thy spreading and plowing routes, as well as the performance of thy spinner and the life of thy plow blade.
- 4** Thou shalt faithfully remain alert in order to avoid guardrails, headers, stalled cars, manhole covers, railroad tracks and mailboxes. Otherwise thee may smite thy windshield with thy head.
- 5** Thou shalt contain thy temper even though cars and trucks pass thee on both sides and tailgate thee too close for comfort. Anger only multiplies thy prospects of coming to grief by accident.
- 6** Thou shalt use thy radio as briefly as possible, if thee is fortunate enough to have one. Remember thy fellow workers may need to communicate in an emergency.
- 7** Thou shalt interrupt the flow of power to thy spreader before attempting to free any foreign objects or blockages if thee treasure thy fingers.
- 8** Thou shalt render thy truck and spreader out of gear and stoutly set thy brakes before dismounting from thy cab.
- 9** Thou shalt govern thy speed according to conditions, else thee may wind up with thy truck upside down.
- 10** Thou shalt mind thy manners on the roadway, clearly signal thy intentions, and remember that it is more blessed to give than to receive.

Add to these - frequent breaks – to help fight fatigue; hot food – to fight the chill.

STAY SAFE!

The Safety Edge: Pavement Edge Treatment

(Reprinted with permission from Tech Transfer, Summer 2005, the quarterly newsletter of the California LTAP Center.)

According to the Federal Highway Administration, an estimated 11,000 Americans suffer injuries and 160 die in crashes related to unsafe pavement edges, with losses totaling \$1.2 billion annually. 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.

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.

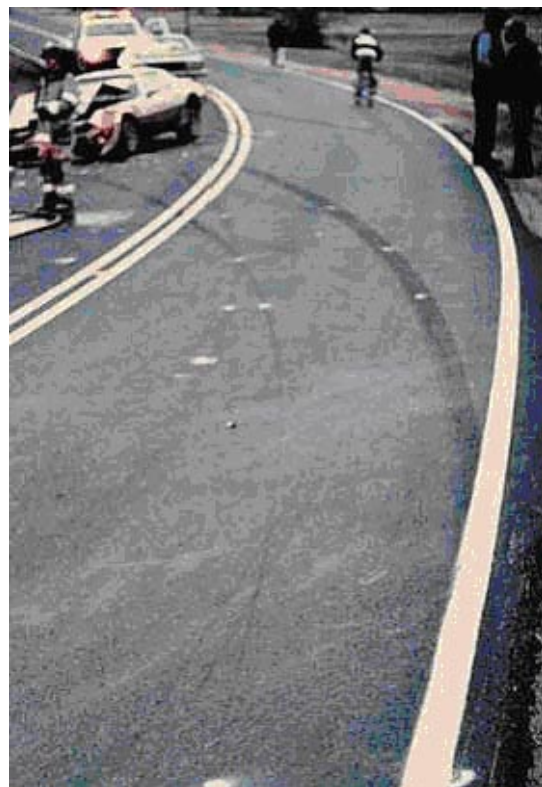
“The Safety Edge” can save lives, reduce tort liability, reduce maintenance expenses, and costs less than 1% of a typical pavement resurfacing budget.



An unsafe pavement edge

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 paved surface.



Unsafe pavement edge drop-offs cause crashes

How Do Unsafe Edges Cause Crashes?

Drivers who slip off a resurfaced road onto an unimproved shoulder are likely to lose control as they attempt to climb back onto the roadway. The pavement edge creates a “scrubbing” condition that a driver must overcome by oversteering. As drivers oversteer to reenter the roadway, they are prone to lose control of the vehicle. Compounding the danger, the rear wheel may catch the edge of the shoulder, swinging the car around. This may cause the car to veer into the adjacent lane, where it may collide or sideswipe oncoming cars, overturn, or run off the road and crash.

How To Prevent Unsafe Edges

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:

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An inexpensive way to assure safe pavement edges is to specify a 30 degree to 35 degree angle asphalt fillet “Safety Edge” on all road construction and resurfacing

Other States’ Experiences

The Georgia Department of Transportation (GDOT), working with the FHWA, has demonstrated the ability to construct the “Safety Edge” with no impact on production and at less than 1% additional material costs. Based on the successful performance after one year in



Resurfacing a roadway with a “Safety Edge”

▶ 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

The angled asphalt edge, or fillet, provides a safer roadway edge, and a stronger interface between the roadway and the shoulder. The cost of providing an asphalt fillet is minimal in comparison to the total amount of the resurfacing contract, and pays back in countless dollars saved from reduction of fatalities, injuries, property damage and lawsuits. The fillet ties the existing shoulder into the resurfaced roadway and allows a vehicle to reenter the roadway safely. Highway agencies are able to restore the shoulder after the resurfacing project is completed.



A special edging device on resurfacing equipment creates the “Safety Edge”

service, GDOT intends to incorporate the “Safety Edge” design into all resurfacing projects beginning in 2005. Local city and county governments in Georgia, such as Gwinnet County, are also making the safety edge part of their routine overlay design. The Indiana and New York Departments of Transportation are implementing the safety edge on several pilot projects in 2005.

(You can find out more about Road Safety on this website:

http://safety.fhwa.dot.gov/roadway_dept/index.htm)



Education and training opportunities are available through the University of Tennessee Center for Transportation Research (CTR), Southeast Transportation Center (STC), and Tennessee Transportation Assistance Program (TTAP). This listing of courses currently available includes both TTAP and TATE courses that are offered in conjunction with the University of Tennessee Department of Civil and Environmental Engineering and the Tennessee Section of the Institute of Transportation Engineers. Local roadway departments can benefit from all of the workshops. Because of this, we ask that you please share this listing with others who might be interested in our workshops. The Center for Transportation Research is always eager to meet your research and training needs. If you have a special course in mind or would like a course held on site especially for your employees, please contact Annette Jones at 1-800-252-ROAD.

***CEU and PDH credit hours available.**

Title	Date	Location	Instructor/s
TDEC/NPDES Issues	November 8	Chattanooga	Chlarson
TDEC/NPDES Issues	November 15	Nashville	Chlarson
TDEC/NPDES Issues	November 16	Jackson	Chlarson
Traffic Engineering 1	December 7-9	Nashville	Wegmann/ Chatterjee/Han
Work Zone/Flagging	December 9	Johnson City	Brewer
TDOT Funding for Cities & Counties	December 13	Nashville	Hayzlett
TDOT Funding for Cities & Counties	December 15	Jackson	Hayzlett

We are making plans for workshops in 2006! If you have any suggestions or have a particular interest in adding a new workshop topic, contact Frank Brewer. (His email is fbrewer1@utk.edu or call him at 1-800-252-ROAD.)

Workshop Topics:

Trench Safety Competent Person

Drainage Rehabilitation

Backhoe/Loader Training

**2-Lane Geometric Design
Signs & Pavement**

**Geotechnical Engineering
Markings**

MUTCD

Work Zone Traffic Control/Flagging

..... and more

Save these dates - May 21-23, 2006!



Look out for more information on the 10th Southeast Local Roads Conference scheduled for May 21-23, 2006 in Chattanooga, Tennessee in the mail and on our website <http://ctr.utk.edu/ttap/default.html>

Vendors who are interested in participating in this conference can contact Jenny Jones at gohjones@utk.edu or call her at 865-974-6549.

TALK TO TTAP

We are always looking for your comments, ideas and suggestions to help make the TTAP program more useful to you.

1. Please send me more information on the following articles mentioned in this newsletter.

2. Please list any additional training workshops you would be interested in attending.

3. Please list topics for videos you would like TTAP to obtain.

4. Please list any other ideas or suggestions on how TTAP could assist you.

5. Please list your name and organization to verify for TTAP's mailing list.

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University of Tennessee Studies Pavement Marking Materials, *continued from page 1*

lowed to drain away. This final reading measures the performance of the wet marking, as would be found after a rainfall. This combination of measurements allows us to determine the performance of the marking under both ideal and inclement conditions.

While this project is being performed for TDOT, the project results will be applicable to all roads in Tennessee. While most local agencies use painted markings, many could benefit from the increased durability and retroreflectivity offered by ther-

moplastic and tape markings. Another potential factor to influence the use of pavement markings is the incorporation of minimum retroreflectivity requirements into the Federal Highway Administration's *Manual on Uniform Traffic Control Devices (MUTCD)*. While this change has yet to occur, any such requirement could greatly impact the use of pavement marking materials on all roadways. We will share with our readers other *MUTCD* news and research findings in future issues of *Roadtalk*.



Godswill Nsofor takes measurements on Interstate 40 with the assistance of Tom Talbert, Rick Johnson and Marshall Anderson from TDOT's Region 1 Headquarters.

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