

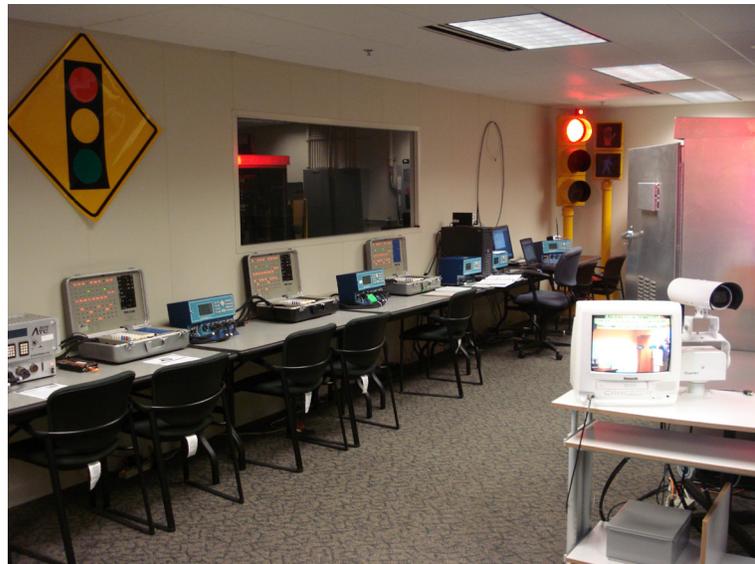
New TTAP Workshops for Fall 2010

by Dr. Airton G. Kohls

In the Fall of 2010, TTAP will be launching the first of a series of Traffic Signal Workshops: Introduction to Traffic Signals. The objective is to reach out to the Traffic Signal community, providing valuable information on current requirements and on application of design principles for safer operations. The introductory workshop will be focused on the history, justification for traffic signals, the terminology used, operational characteristics, equipment and, fundamentals of coordination and preemption. It will serve as the foundation for the subsequent workshops to be offered in 2011:

- ▶▶ **MUTCD and Signalized Intersections;**
- ▶▶ **Signal Timing;**
- ▶▶ **Traffic Signal Controller Programming;**
- ▶▶ **Advanced Topics in Signal Timing;**
- ▶▶ **Traffic Signal Installation.**

Watch our website at ctr.utk.edu/ttap for training updates and workshop details



The University of Tennessee Traffic Signal Laboratory will be available as a teaching facility to support the hands-on experience necessary for professional development. The laboratory provides state-of-the-art technology including the ability to explore the control system using traditional NEMA suitcase testers and hardware-in-the-loop simulation. While on the road, selected workshop topics will provide the participant the opportunity to interact with a traffic signal controller on a virtual environment.

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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

I'm writing this in August, and it's still blazing hot in East Tennessee. Is global warming in play? Personally, I don't think so. Climate isn't static, whether short term or long term. We like for things to stay the same, but nature just doesn't work for our convenience. At any rate, temperatures will probably be cooler by the time you read this, and that will be a relief.

I've been thinking a lot over the past few months about the sustainability of our roadway network. The cost of maintaining highways is increasing, yet available funding is flat or declining. This is not news to most of you, but it does seem to finally be reaching the public consciousness. The July 17, 2010 Wall Street Journal featured an article titled "Roads to Ruin: Towns Rip Up The Pavement." It describes the difficulties rural highway agencies are facing in maintaining aging roads. Thirty-eight counties in Michigan, for example, have recently converted paved roads back to a low type surface. Counties in North Dakota are struggling to maintain a highway "given" to them by the state, with at least 30 miles reverted back to gravel. Closer to home, a February 2, 2010 article in the Chattanooga Times Free Press titled "City engineers battle to keep roads paved" pointed out that the city's needs for road maintenance greatly outstripped available funding. We've gotten used to having a world class road network in this country. It's hard to imagine our road network being downgraded on a large scale, but in a resource constrained environment, we may face some hard decisions. If you think it can't happen, talk to a career railroader. Since 1969, nearly one-third of rail route-miles have been abandoned, with significant additional mileage downgraded in some fashion to cut costs.

One other note, I recently attended a Transportation Research Board meeting where highway funding was a key topic of discussion. All in attendance seemed to hold the view that the motor fuel tax was problematic as a long-term funding source. Current tax levels are too low to meet needs, and elected officials are reluctant to either increase the fuel tax or index it to inflation. Increased vehicle energy efficiency and use of alternative energy sources such as electricity adversely affect fuel tax revenues. Finally, it is difficult to distribute fuel taxes in an equitable fashion to the different jurisdictions where the vehicles travel. Tolls as a revenue source are politically unacceptable in many jurisdictions (including Tennessee) and may not be supportable where alternate free routes are available. Weight-distance and vehicle-mile schemes have been proposed, but are difficult to implement and politically unpopular. High-tech schemes to track vehicle use automati-

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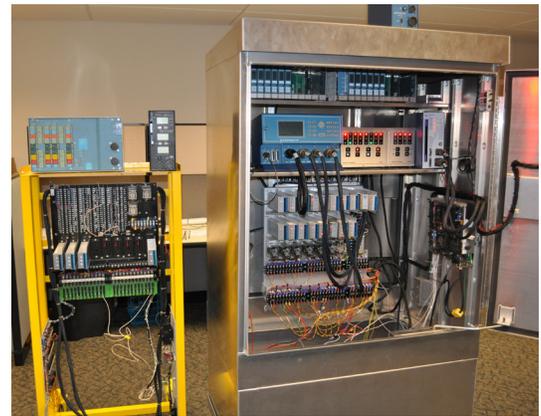
cally and send motorists a tax bill are technically possible, but raise significant implementation and privacy concerns.

The bottom line is that we have some real challenges, and it's going to take good leadership and some fortitude to work through the problems. One thing all this sure points to is a need to work smarter to make the best use of limited resources. That's something I hope that TTAP can help with. As always, please feel free to contact us for technical assistance, training, or information. We look forward to serving you.



What about Traffic Signals?

Simply put: quality of life. The 2007 National Traffic Signal Report Card by the National Transportation Operations Coalition gave an overall grade of "D" to the nation's traffic signal operations. Often we experience frustrations due to the operation of traffic signals. Trained personnel should continuously address delay reduction and safer intersections as well as exploring innovative technology for better solutions. It is important to recognize that Continuing Education workshops like TTAP should be seen as an investment that



can provide the edge necessary to achieve the optimization of today's scarce funding. Bringing people together to a learning or training environment generates a multilevel interaction of knowledge and produces "win-win" results.

Free Online Resources Available

Training

The National Highway Institute (NHI) and the Transportation Curriculum Coordination Council (TCCC) have made three new web-based Commercial Driver's License (CDL) training courses available:

- ▶▶ 381004 TCCC CDL Series – General Knowledge.
- ▶▶ 381005 TCCC CDL Series – Air Brakes.
- ▶▶ 381006 TCCC CDL Series – Pre-Trip Inspection

All three courses are free, but do not offer CEU's. Being web-based, they offer the participant the ability to work on their own and be able to leave the program

and return, using a book-marking feature, if necessary. To find these and other NHI courses go to http://www.nhi.fhwa.dot.gov/training/train_catalog.aspx

Publications

- ▶▶ Maintenance of Signs and Sign Supports: A Guide for Local Highway and Street Maintenance Personnel (January 2010). http://safety.fhwa.dot.gov/local_rural/training/fhwas09025/
- ▶▶ Maintenance of Drainage Features for Safety: A Guide for Local Street and Highway Maintenance Personnel (July 2009). http://safety.fhwa.dot.gov/local_rural/training/fhwas09024/

- ▶▶ W-Beam Guardrail Repair: A Guide for Highway and Street Maintenance Personnel (August 2008). http://safety.fhwa.dot.gov/local_rural/training/fhwas08002/

Videos

- ▶▶ Modern Roundabouts: A Safer Choice (2010, 11 min.) <http://safety.fhwa.dot.gov/intersection/roundabouts/>
- ▶▶ Road Safety Audits (2009, 11 min.) <http://safety.fhwa.dot.gov/rsa/video2009>

Houston County Utilizes Low-Cost Safety Improvements

by Jonathan P. Watson, E.I.

One of the core objectives of the Tennessee Transportation Assistance Program (TTAP) is to provide technical assistance to counties and towns across Tennessee, with a focus on improving safety along roadways. We recently had an opportunity to work with the Houston County Highway Department to address one such issue. At the request of Superintendent of Roads Jimmy Felts, we made the trip from Knoxville to Erin to look at a section of Ellis Mills Road.

While there have not been any serious crashes reported at this location in recent years, several local residents have expressed concerns to Mr. Felts about safety issues along this section of roadway. Ellis Mills Road narrows for approximately 2500 feet as it parallels Yellow Creek. The roadway width measured from fifteen to seventeen feet with little or no shoulder and a steeply banked slope down to the creek along the east side of the roadway. The west side of the roadway is directly adjacent to a cut slope of soil and rock from the adjacent ridgeline. There are also several utility poles immediately adjacent to the paved surface on the east side of the roadway that would pose as hazards to an errant vehicle.

The steep slope down to the creek poses a significant hazard to errant vehicles because of the extreme side slope and the elevation difference between the roadway surface and the creek below. Recent roadway resurfacing and widening projects have increased speeds along the roadway, further adding to concerns that an inattentive driver could run off the road or force another vehicle off the roadway. The combination of a narrow roadway, increased speeds, and no shoulder potentially make this eastward slope a hazard to a single vehicle and to vehicles passing in opposite directions.

Typically, a narrow roadway with edge drop-off concerns could be treated with countermeasures such as edge lines and guardrails. However, the chip seal surface and extremely limited clear zone on Ellis Mills Road prevented the effective use of either treatment. In this instance the most feasible and efficient approach to improve safety was to increase delineation by placing white retroreflective post delineators at a uniform interval along the eastern edge of the roadway.



Prior to the installation of safety improvements, two vehicles pass slowly on a narrow section of Ellis Mills Road in Houston County.



After improvements to Ellis Mills Road, flexible delineators improve edge delineation and object markers highlight the presence of utility poles.

In addition to the delineators, the highway department placed Type 3 object marker paddles on the approach side of the utility poles closest to the roadway. These markers heighten awareness of the roadside objects and help further delineate the eastern edge of the roadway. Finally, 30" by 30" "ROAD NARROWS" signs with "NO SHOULDER" supplemental plaques were placed on each approach to this section of Ellis Mills

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Road to warn drivers of the changing roadway geometry.

Based on the observations from the field visit, the previously mentioned safety improvements have helped to make drivers more aware of the potential hazards along this section of Ellis Mills Road. Mr. Felts has been very pleased with the roadway's increased delineation during both daytime and nighttime conditions. He has received no complaints about Ellis Mills Road since implementing these safety improvements in February, and only one of the white delineators has been replaced over the past five months. For an investment of only a few hundred dollars, these safety improvements have successfully improved safety in this truly challenging section of Ellis Mills Road.

We also discussed the impact of May's floods on Houston County. While there were no roadway fatalities in Houston County during the storm, more than 900 locations were damaged. The highway department is working with FEMA to secure funding for repairs, but in many cases work cannot begin without prior approval. Temporary repairs have been made at many locations until FEMA-funded permanent repairs can be finalized. On top of all this flood-related activity, the department has had to deal with the flooding of its own maintenance facilities and administrative offices.

**Call us at
1-800-252-7623
for technical
assistance, training
or information.**

Good Gravel Roads

by Jacob Bustad

A good gravel road starts with good gravel. More than half of the problems that occur on gravel roads stem from using the wrong kind of gravel. Learn what makes "good" gravel and other tips about effective gravel road maintenance.

While interstate and other highway systems may see more traffic day to day, in reality the system of gravel roads throughout the United States provides a transportation resource for millions of Americans. In fact, more than half of the roadways in the U.S. are gravel surfaces. We depend on them to transport goods, access services, and for traveling to and from locations off of the highway system. This dependence makes the proper construction and maintenance of gravel roads critical to the nation's overall road system.

Gravel road maintenance requires continuous attention, often starting in the spring but occurring throughout the year. Read below for further information on gravel maintenance, including safety aspects and a general explanation of maintenance techniques.

Use the right kind of gravel

The importance of having good surface gravel cannot be understated. It is estimated that more than half of the problems that occur on gravel roadways stem from using ineffective gravel. Gravel roadways should avoid "base gravel," which is less fine and more drainable, but erodes much faster. Instead, crushed surface gravel should be used. Crushed gravel has different sizes of particles and sand, plus eight to 15 percent "fines," or gravel dust, that acts as the glue holding the bigger pieces together. This type of gravel allows the road to bond well, but also allows for proper drainage.

Maintain good drainage

Gravel road maintenance is aimed at making sure that the driving surface, as well as the shoulder, are both designed and maintained in a manner that allows for proper drainage.

If a roadway is allowed to have poor drainage, erosion of both the driving surface and the underlying structure of the road can occur. So, in addition to potholes and other damage to the driving surface, the integrity of the roadway can be compromised. In extreme cases, this can lead to no other option except completely rebuilding the road. This is an expensive option, and most agencies do not have the time or money to take on such a task. Instead, they should concentrate on proper maintenance.

To ensure good drainage, the gravel roadway should maintain a four percent slope on either side of the crown of the roadway. This equates to about a half inch drop per foot on a 24 ft-wide roadway. If the slope is flatter than four percent, rainwater will accumulate on the driving surface and cause potholes and erosion. If the slope is over

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four percent, water will drain from the roadway but will also wash away the fines that hold a gravel road together.

An easy way to spot whether or not a roadway's crown and slope are appropriately maintained is to check the wheel tracks from vehicles on the road. If wheel tracks are concentrated to the middle of the road, the crown may be too high and the slope more than 4 percent. Under these conditions, vehicles traveling in both directions may tend to drive in the center of the road, creating a safety hazard.

There are several instances when the roadway should not have a crown—specifically, when a roadway intersects another roadway or train track. When a gravel road meets a railroad crossing, bridge crossing, or intersection with another gravel road or paved road, the crown should be removed as to not cause drainage on to the intersecting element.

Curves on gravel roads also require a different tactic: Instead of a crown and four percent slope, the curve should be graded so that the collected sediment is distributed from the outside of the curve to the inside, meaning the curve will not be too steep for vehicle traffic.

Aside from maintenance of the driving surface and shoulders, other maintenance may be necessary to keep the roads in good condition. For instance, debris and sediment will need to be cleaned from ditches or culverts on a periodic basis to keep water flowing and prevent it from backing up onto the road.

Fix high shoulders

A “high shoulder” refers to the tendency for sediment and loose

gravel to collect near the edges of gravel roads. Loose gravel can cause vehicles to lose traction. Loose, flying gravel, kicked up by passing vehicles, can also break windshields.

A high shoulder also interferes with the proper drainage of the road.

High shoulders are caused by water draining off the road (even on roads that have the appropriate four percent slope), by passing vehicle traffic, by snowplows during winter maintenance, and inadvertently by road graders while maintaining the roadway.



To address high shoulders, road grader operators should set the grader blade correctly to eliminate the high shoulder, or can use a “shouldering disc”—similar to the disc attachment used in farming to break up the soil.

Set the blade properly

The mowboard should be set to an appropriate angle and appropriate tilt for whichever maintenance task you are undertaking. This will be different, for instance, if you are working to maintain a four percent slope or are breaking up a high shoulder. When working on a four percent slope, keep an eye on the slope gauge to make sure you really are at or around four percent. For more information on setting

a blade, see the resources at the bottom of this page.

Go slow!

Most importantly, GO SLOW. The maximum speed for correct grading is 3-5 miles per hour; anything faster than this will risk “washboarding,” where the mowboard only contacts the road intermittently. This creates a situation where the road is extremely bumpy, and can compromise the drainage of the roadway as well.

Consider safety aspects

At the work site, think about both your safety and that of vehicles using the roadway. Use your flashing warning lights, have a “slow moving” or “keep back” sign on the back of the grader, attach red flags to the front of the grader, and wear a safety vest for when you will be outside the grader on or near the roadway.

Take care of your grader

Before leaving for the work site, give the grader a thorough inspection, including tire pressure and an inspection of the mowboard underneath the grader. The mowboard will naturally wear down, so be sure that it is in good condition, otherwise proper road maintenance will be much more difficult.

Source

- Minnesota LTAP, Gravel Roads Maintenance: Meeting the Challenge. 2006. <http://www.mnltap.umn.edu/Publications/Videos/Gravel-RoadMaintenance/>
- US EPA, http://water.epa.gov/pollution/nps/gravelroads_index.cfm

(Reprinted with permission from the Spring 2009 issue of the Kansas LTAP Newsletter, a service of the Kansas Local Technical Assistance Program at the Kansas University Transportation Center.)

The Safety Edge

Reprinted from the Fall 2009 Safety Compass, FHWA

What Is It?

The Safety Edge is a specific asphalt paving technique where the interface between the roadway and graded shoulder is paved at an optimal angle to provide a safer roadway edge. A Safety Edge shape can be readily attained by fitting resurfacing equipment with a device that extrudes the shape of the pavement edge as the paver passes. This mitigates shoulder pavement edge drop-offs immediately during the construction process and over the life of the pavement. This technique is not an extra procedure but merely a slight change in the paving equipment that has a minimal impact on the project cost. In addition, the Safety Edge improves the compaction of the pavement near the edge. Shoulders should still be pulled up flush with the top of the pavement at project completion.

New and resurfaced pavements improve ride quality but can be a detriment to safety if the edges are left near vertical. Drivers trying to regain control after inadvertently dropping a tire over the edge frequently have difficulty with a vertical edge and may lose control of the vehicle, possibly resulting in severe crashes. Making the adjacent non-paved surface flush with the paved surface alleviates this problem, but a vertical edge may appear due to erosion or wheel encroachment, especially along curves. Installing the Safety Edge during a paving project provides a surface that can be more safely traversed.

Safety Edges Are Effective!

Recent studies have shown that crashes involving pavement edge drop-offs greater than 2.5 inches are more severe and twice as likely to be fatal than other roadway departure crashes. An effective countermeasure is to implement a pavement wedge as referenced in the AASHTO Roadside Design Guide, Chapter 9. Research in the early 1980's found a 45 degree pavement wedge effective in mitigating the severity of crashes involving pavement edge drop-offs. During the Georgia DOT Demonstration project, evaluation of wedge paving techniques found it beneficial to flatten the wedge to a 30 to 35 degree angle resulting in a pavement edge referred to as the Safety Edge. Subsequent research has shown this design to be approximately 50 percent more effective than the original 45 degree wedge.

Safety Edge and Edge Drop-off on the Web

FHWA Safety Edge Web Page

http://safety.fhwa.dot.gov/roadway_dept/pavement/safedge

AAA Foundation for Traffic Safety, Safety Impacts of Pavement Edge Drop-offs
http://www.aafoundation.org/pdf/pedo_report.pdf

Q&A - Safety Edge

Q: My agency pulls up gravel shoulders as part of resurfacing projects. Is there still a benefit to using the Safety Edge?

A: Yes. Over time, unpaved shoulders can erode, either through runoff or from vehicles using the shoulder, and research has shown that this can occur within a few months. The Safety Edges provides a "safety net" of sorts until the shoulders can be regraded.

Q: Is obtaining compaction on the Safety Edge a concern?

A: The typical paving process does not compact the pavement edge, and often raveling and pavement edge deterioration occurs. The current safety edge shape of 30 to 35 degrees is an important safety characteristic; however, without consolidation, the Safety Edge is also susceptible to deterioration. With an appropriate screed attachment shoe, such as the one developed by Georgia DOT or one that is available commercially, adequate consolidation is attained via extrusion of the material. The high degree of compaction required in the wheel path is not necessary on the edge. Compaction of concrete is, of course, not an issue.



The safety edge provides a 30 to 35 degree slope at the edge of the pavement surface to reduce the severity of pavement edge drop-offs.

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TALK TO TTAP

We are always looking for your comments, ideas and suggestions to help make the TTAP Program more useful to you. Please fill out and fax the form below to TTAP at (865) 974-3889 or mail to TTAP; Suite 309 Conference Center Building, Knoxville, TN 37996-4133.

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.

Name _____

Address _____

Title _____

Organization _____

Phone _____ Fax _____

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Are you currently on TTAP's mailing list?

___ yes ___ no

Do you wish to be on the mailing list?

___ yes ___ no