Sign-related deadlines are coming: Will you be ready?

In recent years new national standards have been adopted for sign retroreflectivity, the size of letters for street signs, and the use of break-away supports in the Clear Zone. Here is a reminder about the new requirements and their deadlines for compliance.

Sign retroreflectivity. The Federal Highway Administration’s Minimum Levels of Retroreflectivity Ruling went into effect on January 22, 2008, adding new provisions regarding sign retroreflectivity to Section 2A.09 of the 2003 MUTCD, as well as a new Table 2A-3, Minimum Maintained Retroreflectivity Levels. For more information, go to http://mutcd.fhwa.dot.gov

From January 22, 2008 agencies will have:
• Four years to implement (and continue using) an assessment or management method to maintain traffic sign retroreflectivity at or above the established minimum levels (by January 2012).
• Seven years for replacement of regulatory, warning and ground-mounted signs (except street name signs) that fail to meet the established minimum levels (by January 2015).
• Ten years for replacement of street name signs and overhead guide signs that fail to meet the established minimum levels (by January 2018).

The required minimum levels of retroreflectivity mean that agencies currently using engineer grade material need to upgrade to a prismatic material for many types of traffic signs in order to meet the new retroreflectivity standards.

The National Association of County Engineers (NACE) is launching an education and grant program to aid its members in replacing traffic signs to meet new federal retroreflectivity standards recently released by the Federal Highway Administration. The NACE grant program, in partnership with 3M, is designed to assist agencies by:
• Providing financial incentive to replace non-compliant signs.
• Building awareness of the new federal minimum retroreflectivity ruling.
• Educating NACE members on compliance requirements.
• Providing training on sign assessment and management methods.
• Sharing best practices among NACE member agencies.

Each NACE member agency is eligible for one grant to purchase 3M™ prismatic reflective sign sheeting to replace signs made with engineer grade or super engineer grade beaded sheeting. Grants may be used to purchase both fabricated

continued on page 2
Sign-related deadlines, continued from page 1

signs and/or roll goods from TAPCO, an Authorized Distributor of 3M™ Traffic Safety products.

For additional information or to join NACE, visit: http://www.countyengineers.org. The deadline for submission of grants is June 30, 2009 and awarded grants need to be used within six months of the issue date.

In Kansas, the Traffic Assistance Services for Kansas Program (TASK), a joint program of KU and K-State, regularly offers workshops on the MUTCD and covers issues related to signing. Visit http://www.dce.k-state.edu/conf/task/ to view a schedule of classes. (Classes beyond May 2009 are not yet posted.) All TASK classes are listed in the Kansas LTAP Calendar as well, at http://www.ksltap.org.

Letter size on street signs. The lettering of street name signs is addressed in MUTCD Section 2D.38 and it states that on ground-mounted street name signs that are not on multi-lane streets, the letters should be at least 6 inches high where all capital letters are used, or you can use 6 inches upper-case letters with 4.5 inches lower-case letters.

For local roads with speed limits 25 mph or less, there is an option provided that allows the use of 4-inch letter height, and words such as Street, Avenue, Road, or NW may be 3-inch letter height.

The letter size of ground-mounted street name signs discussed above was originally added to the MUTCD in January 1997. A 15-year compliance period was provided. This means the compliance date for increasing the letter size of all ground-mounted street name signs on roads that are not on multi-lane streets is January 2012.

On multi-lane streets with speed limits greater than 40 mph, the lettering on ground mounted street name signs should be at least 8 inches in all capital letters, or 8 inches upper-case with 6 inches lower-case letters. This change to the MUTCD was adopted in November 2003 with a 15-year compliance period. This means the compliance date for increasing the letter size of all ground-mounted signs on multi-lane streets with speed limits greater than 40 mph is November 2018.

Breakaway posts: MUTCD Section 2A.19 states that ground-mounted sign supports shall be breakaway, yielding, or shielded if within the clear zone. This means that any of these three methods (breakaway, yielding, or shielded) are appropriate, according to FHWA. The use of crashworthy supports was added to the MUTCD in December 2000. For roads with posted speed limits of 50 mph or higher, the compliance date is January 17, 2013. There is no compliance deadline on lower speed roads, but FHWA recommends that sign supports should be upgraded whenever the sign installation requires maintenance or replacement, and crashworthy supports be used on all new sign installations.

Sources:

Can we keep our historic street signs?

The short answer is probably no, unless you illuminate them. The FHWA issued guidance on this question in a response letter to the community of Brookline, Massachusetts. Brookline has historic street signs with cast aluminum raised letters. They asked whether these signs can be retained without having issues of non-compliance. FHWA said that these signs are not in compliance with the MUTCD because all signs are required to be either retroreflective or illuminated and the signs in the Town of Brookline do not meet either of these requirements. Historic street name signs must be either a retroreflective material or illuminated in such a manner that the shape and color are visible to the road user both day and night.

Can paint or other treatment be applied to existing historic sign panels to achieve retroreflectivity? No. However, the historic sign panels may be displayed below new street name signs.

Source: http://mutcd.fhwa.dot.gov/resources/interpretations/2_603.htm

Can we keep our historic street signs?

. . . by Lisa Harris . . . . .

Street signs like this one in Austin, TX will need to be replaced, illuminated, or combined with compliant signs.

Can we keep our historic street signs?

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Street signs like this one in Austin, TX will need to be replaced, illuminated, or combined with compliant signs.
Are your roads “easy riding” for motorcycles?


The number and rate of motorcyclist deaths on U.S. roads are rising dramatically. Motorcycle rider fatalities rose 115 percent between 1997 and 2005. During the same time, fatality numbers and rates for passenger car crashes dropped. In just one year—2005—motorcycle crash-related fatalities increased by 13 percent, making motorcycle rider fatalities a leading contributor, along with pedestrian fatalities, to the slight overall increase that year in the national highway fatality rate.

Trends associated with the rising motorcyclist death toll include a dramatic increase in motorcycle ownership, particularly by riders over 40, along with changes in other factors such as motorcycle size and rider experience.

The rate of increase in fatalities has outpaced the rate of increase in motorcycle registrations. The death and injury rates among middle-aged motorcycle riders have increased most rapidly.

Roadway factors for safer riding

Road design and maintenance factors can, and do, affect motorcycle crashes, injuries and fatalities. Those involved with roadway design and maintenance can reduce hazards to motorcyclists by doing the following:

Pavement surface

- Patch potholes promptly. Potholes are more dangerous to the operation of motorcycles than to larger vehicles.
- Specify pavement surfaces with adequate pavement friction.

Examine the friction characteristics of asphalt sealants and intersection markings. The use of thermoplastics, particularly for broad, horizontal intersection lines, can create slippery surfaces for motorcycles that stop at the intersections. Metal road surface components—either temporary or permanent—offer limited traction in many cases, and, when wet, are difficult to see.

- Reduce uneven road surfaces.

Milled surfaces, parallel paving lane joints, parallel grids on bridges, steel plates, and other uneven roadway surfaces can be especially hazardous for motorcycles.

- Require tidy crack repairs.

A motorcycle’s traction can be seriously compromised by “tar snakes”—excess asphalt or other sealants used for crack repair.

- Remove debris and fluid spills quickly and thoroughly.

Roadway debris and fluid spills pose greater hazards to the operation of motorcycles than to larger vehicles. Debris can deflect a motorcycle’s wheel or hit the motorcyclist. Fluid spills can easily cause loss of traction.

Roadside safety

- Install Safety Edges.

Untapered vertical shoulder drop-offs are even more dangerous for motorcycles than for other vehicles. Adopting a standard contract specification requiring a 30-35° angle asphalt wedge along each side of the roadway in all construction and resurfacing projects is a simple and cost-effective way to assure pavement edge safety.

- Consider motorcyclist safety when designing roadsides.

The potential impact on motorcycle riders should be considered in design and placement of roadside safety hardware, clear zones and side slopes, and other roadside safety strategies.

Visibility and warning

- Consider installing motorcyclist hazard warning signs.

Signage targeted toward motorcyclists can warn of conditions that are especially

What’s the motorcycle crash situation in Kansas?

In Kansas the number of motor vehicle crashes (all types) is on a slow decline, but motorcycle crashes have been rising over the last 10 years. In 2007 there were 70,589 crashes in Kansas, and 1,110 of those involved motorcycles. The percent of motorcycle crashes has doubled over the last 10 years from .08% to 1.6% of total vehicle crashes in Kansas. Fatalities and injuries have also increased significantly.

Out of the 1,110 motorcycle crashes, 886 resulted in injuries and 47 of them were fatal.

Helmet use is slowly increasing in Kansas—up from 21% to 37% in the last ten years. However, of the 47 fatal crashes mentioned above, 33 of those riders were not wearing helmets.

What about alcohol? While KDOT doesn’t have the statistics for alcohol-related accidents, nationally 28% of motorcycle crashes are alcohol-related with occupants having blood alcohol content (BAC) levels of .08g/dL or higher, and an additional 8% with BAC levels between .01 and .07g/dL.
KS LTAP RSA team moving along with training and safety assessments

by Mehrdad Givechi, PE, PTOE

The Kansas LTAP’s Roadway Safety Assessment (RSA) Program is in its second year. The Program consists of a team of professionals that provide training and on-site safety assessments using a specific approach. The RSA method is designed to identify effective solutions to a community’s most pressing road safety problems.

LTAP RSA team members are myself, Norm Bowers and Johnny Dahl. Here are highlights of the RSA team’s efforts, to date:

Presenting RSA training. Kansas LTAP developed and presented a two-part RSA training course, offered it seven times, and trained over 80 participants from local agencies. Part I covered the fundamentals of road safety and Part II covered the overall concept and procedure of doing an RSA. Kansas LTAP offered these courses at several locations in the state during 2007 and 2008.

The RSA team has since shortened the length of the course to one day. The revised course is part of the Kansas Road Scholar Program curriculum, as an optional course in the Level III Executive Development Program.

Getting the word out. To promote RSA Program, Kansas LTAP:
—Made a presentation to the LTAP Advisory Board members, seeking advice and direction on the Program in Kansas.
—Made a presentation about the RSA program at the Kansas Transportation Safety Conference in April 2008 and at the Annual Meeting of the Kansas County Highway Association (KCHA) in the Spring of 2008.
—Contacted local agencies directly to promote the RSA program statewide.

Selecting sites. Initially Kansas LTAP’s RSA team conducted RSAs at eight locations for three county agencies and two municipalities in Kansas for inclusion as case studies in the RSA training. Some of these sites were suggested by early RSA class participants who were encouraged to identify potential candidate site(s) in their jurisdictions.

For the first round of assessments Douglas County identified six (6) potential sites, and Wyandotte County identified a 3-mile road segment as a potential site. Both counties submitted site-specific crash data for consideration in selecting sites. The Kansas LTAP RSA Team members visited all of the sites and selected four of them for the RSA procedure. Three of these sites were horizontal curves and one was a horizontal turn, all in Douglas County.

Conducting the assessments. At each site, prior to the formal assessment of the location, a kick-off meeting between the county’s public works director and members of the RSA Team was arranged to discuss any issues of concern. RSA procedures were then conducted at these sites in Summer 2007 and results were submitted to the host county. (See an abbreviated version of report results for one of the Douglas County sites on the next page.) Results were also presented, with permission, as case studies and class exercises in the RSA course.

Since the initial RSAs, four other local agencies expressed interest in hosting the LTAP RSA team and identified several candidate sites. These agencies were:
—City of Newton
—City of Hutchinson
—Miami County
—Ellis County

The RSA Team met with county and city public works officials to discuss site-specific issues, conducted the RSA procedure, prepared a report and submitted it to the host agency for their review, consideration and potential implementation at their discretion.

Strategic planning. Last summer, a meeting was held between key personnel of the Kansas Division of FHWA, Kansas LTAP, Kansas DOT Bureau of Traffic Engineering, Kansas DOT Bureau of Transportation Planning, Kansas DOT Bureau of Local Projects and Kansas State University to discuss each agency’s individual role in RSA efforts, minimize any duplication of RSA services among agencies and promote RSAs not only at local level but also at the state level.

Recently the team trained a group of KU graduate students in Engineering and Urban Planning how to conduct RSAs. The purpose of that training is to help orient new professionals to RSA and the value to improving roadway safety.

Coming up. In 2009 Kansas LTAP will contact local agencies throughout the state to select as many as 12 sites. The RSA Team will conduct assessments at all the sites and share the findings with host agencies.

In addition, the new, one-day RSA course was taught as pre-conference session at the Kansas APWA/Kansas County Highway Association joint meeting in Wichita in May. The course will be offered again later this year—see page 14.

For more information, or if you have a site that you would like to have considered for a Road Safety Assessment, contact Mehrdad Givechi at Kansas LTAP at (785) 864-2593 or mgivechi@ku.edu.
RSA profile: Horizontal curve in Douglas County

Here is an example of the type of information gathered and generated by an RSA (shared with permission from Douglas County, KS). The lead RSA team member for this project was Norm Bowers.

The study area for this assessment is a curve on an otherwise relatively straight stretch of road. There are five driveways in the study area, two with less than desirable sight distance. There have been five reported crashes since the year 2000.

The site’s observed issues were:

• Deer (two crashes in five years).
• Speeds exceeding design speed and ball bank indicator (one lost control in five years). Less than designed super elevation.
• Farm equipment (two rear end collisions in five years).
• Driveways for 859 & 867 have inadequate sight distance.
• Pavement lip (drop off) on west shoulder.
• Bicycles on road.

Seven changes were suggested by the RSA team:

1. Cutting limbs and brush within the right-of-way will increase visibility of deer and increase sight distance at driveways.

2. On west side, add dirt to flatten foreslope and eliminate dropoff at the pavement edge.

3. A SHARE THE ROAD sign could be added for southbound at the end of the widened section about 1/4 mile north of curve.

4. Consider decreasing chevron spacing to make curve appear sharper and extend chevrons past the point of curvature and point of tangent.

5. Consider rumble strips at curve sign to call attention to the sign.

6. Consider checking and adjusting super elevation at the curve.

7. If funds were available, curve could be reconstructed to 55 mph design speed with paved shoulders.

Motorcycle safety, continued from page 3

hazardous for them. These might include uneven pavement surfaces, rumble strips or crosswinds.

• Ensure visibility of signs and roadway markings. Keep in mind that many motorcycles have only a single head lamp for illumination.

Safer roads are just a small part of the solution to reducing the alarming trend toward increased motorcyclist injuries and fatalities.

Motorcyclists should equip themselves with helmets and other protective clothing and equipment, get professional driving training, maximize their conspicuity through lighting and apparel, obtain the proper motorcycle license, and absolutely never drink and ride.

Motorcycles should be properly maintained and operated. All road users, including drivers, motorcycle riders, and pedestrians need to obey the rules of the road and respect the rights of all. Only by addressing the problem from all angles can we achieve the desired result of safer roadways for all users.

For more information, contact Dr. Morris Oliver, FHWA, Office of Safety Programs at (202) 366-2288. http://safety.fhwa.dot.gov/mac
Nine **proven** safety countermeasures

Looking for some ideas for safety improvements that really work? Below are nine tools the Federal Highway Administration’s Office of Safety Programs has identified as being particularly effective in improving safety. Some are relatively low cost. Consider how they could be implemented in your jurisdiction to reduce the likelihood of crashes on your roads and streets.

### #1. Road Safety Audits

Road Safety Audit (RSA) is a safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. Crash reduction percentages from 20-80 percent have been recorded on past projects where an RSA was done. Lifecycle costs are reduced because safer designs often carry lower maintenance costs. Societal costs of collisions are reduced by safer roads and fewer severe crashes. Generally very low cost, in the form of time and team coordination. More information at: [http://safety.fhwa.dot.gov/rsa/](http://safety.fhwa.dot.gov/rsa/).

### #2. Rumble Strips and Rumble Stripes

Rumble strips are ground into the pavement outside of the travel lane. Rumble stripes are ground into the pavement and painted over with the appropriate striping. This application provides an audible warning and physical vibration to alert drivers they are leaving the roadway. Rumble stripes or strips have shown good results in reducing run off the road (JOR) crashes. Generally low cost, depending on the application. Prices range between $0.20 and $3.00 per linear foot. More information at: [http://safety.fhwa.dot.gov/roadway_dept/rumble/index.htm](http://safety.fhwa.dot.gov/roadway_dept/rumble/index.htm).

### #3. Median Barriers

Median Barriers separate opposing traffic on a divided highway and are used to redirect vehicles striking either side of the barrier. Cross-median crashes can be some of the most severe and most result in a serious injury or death. Median barriers have been found to significantly reduce the occurrence of cross-median crashes and the overall severity of median-related crashes. Medium to high cost, depending on the material used. Cable barrier systems can be installed on average for $76,500 per mile. More information at: [http://safety.fhwa.dot.gov/tools/median_barrier.htm](http://safety.fhwa.dot.gov/tools/median_barrier.htm).

### #4. Safety Edge

“Safety Edge” is a paving technique where the interface between the roadway and graded shoulder is paved at an angle to eliminate vertical drop-off. Research between 2002-2004 shows that pavement edges may have been a contributing factor in as many as 15-20 percent of ROR crashes. When a driver drifts off the roadway and tries to steer back onto the pavement the action may result in oversteering. Safety Edge minimizes that occurrence by reducing the vertical angle between the shoulder and pavement. Very low cost: The technique requires a slight change in the paving equipment (approximately $1,200). More information at: [http://safety.fhwa.dot.gov/roadway_dept/docs/sa07023/](http://safety.fhwa.dot.gov/roadway_dept/docs/sa07023/).

### #5 Roundabouts

Roundabouts are circular intersections with specific design and traffic control features that ensure low travel speeds (<30mph) through the circulatory roadway. Roundabouts offer substantial safety advantages and can reduce the occurrence of right angle crashes and have the potential to reduce fatal and injury crashes from 60–87 percent. Geometric features provide a reduced speed environment and excellent operational performance. High cost: Installations may require additional right-of-way. A reduction in serious crashes may justify the costs. More information at: [http://www.tfhrc.gov/safety/00068.htm](http://www.tfhrc.gov/safety/00068.htm).

### #6 Left- and Right-Turn Lanes

Dedicated left- and right-turn lanes (Countermeasure #6) may help reduce rear-end collisions.

Rear-end crashes are the most frequent type of collisions at intersections. Adding turn lanes provides separation between turning and through traffic and reduces these types of conflicts. Installation of turn lanes reduces crash potential, motorist inconvenience, and improves operational efficiency. It is desirable to offset opposing left-turn lanes to increase visibility of approaching vehicles. Medium to high costs, as some installations may require additional right-of-way. More information at: [http://safety.fhwa.dot.gov/intersections/intersectionsap.htm](http://safety.fhwa.dot.gov/intersections/intersectionsap.htm).

### #7 Yellow Change Intervals

Yellow change intervals that are not consistent with normal operating speeds create a dilemma zone in which drivers can neither stop safely nor pass through the intersection before the signal turns red. Increasing yellow time to meet the needs of traffic can dramatically reduce red light running. Yellow change intervals should be appropriate for the speed and distance traveled at a signalized...

**#8 Median and Pedestrian Refuge Areas.** Median and pedestrian refuge areas provide additional protection for pedestrians and lessen their risk of exposure to oncoming traffic. Providing raised medians or pedestrian refuge areas has demonstrated a 46 percent reduction in pedestrian crashes. Raised medians or refuge areas are especially important at multi-lane intersections with high volumes of traffic. Low cost for retrofits, and even lower costs for new roadway projects. More information at: http://safety.fhwa.dot.gov/ped_bike/univcourse/swless15.htm.

**#9 Walkways Pathways, Sidewalks, or Paved Shoulders.** “Walking along road” pedestrian crashes are approximately 7.5 percent of all pedestrian crashes. The presence of a path, sidewalk or paved shoulder can provide a significant reduction in this type of pedestrian crash. These facilities should be provided wherever possible, especially in urban areas and near school zones where there are high volumes of bikes and pedestrians. Medium to high cost, based on the amount and type of application. More information at: http://www.fhwa.dot.gov/environment/bikeped/design.htm#d4.


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Need to upgrade a RR crossing?

*Guidance is available to increase highway-rail safety.*

If you are looking to add or upgrade a railroad crossing, there’s an excellent resource called Guidance on Traffic Control Devices at Highway-Rail Grade Crossings (FHWA 2002) created to improve communication between highway agencies, railroad companies, local elected officials, and other government agencies. The guide provides a “toolbox” for highway-rail safety. It’s not a quick read, but it has a lot of information useful to local governments.

The guide was developed by a Technical Working Group with members from the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), Federal Transit Administration (FTA), and National Highway Traffic Safety Administration (NHTSA).

**The driver’s perspective**

To ensure a safe crossing, drivers have specific design needs. For example, a driver should be able to see if a train is approaching when stopped at a crossing. This critical factor relies on the driver’s line of sight. According to the guide, a driver should be able to stop 15 feet short of the nearest rail when traveling at the posted speed limit.

A combination of poor road geometry and topographical obstructions can create a poor sight triangle, and the sight triangle is an important factor in a driver’s decision to proceed through the railway crossing.

For crossings that have no control devices, sight distance and appropriate selection of the design vehicle(s)* can be the biggest factors in maintaining safety. For crossings that have control devices, the design engineer(s) should keep in mind driver ability to comprehend and follow them, which depends on education and enforcement. The report advises that traffic engineers should make full use of the various traffic control devices prescribed in the Manual on Uniform Traffic Control Devices (MUTCD) to convey a clear, concise and easily understood message to the driver.

**Using traffic control devices at railroad crossings:**

There are two types of control devices—passive and active. These are fairly self-explanatory, but passive and active control devices can be used separately and together.

Passive control devices are signs and pavement markings (if appropriate to the roadway surface) that are not activated by trains. This includes

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*Design vehicles* are vehicles with representative weight, dimension, and operating characteristics used to establish highway design controls for accommodating vehicles of designated classes, of which there are 4 types: passenger cars, buses, trucks, and recreational vehicles.
the old staple, the stop sign. It’s been helping with crossings and intersections for decades, and it’s fairly effective too. But, as time has gone by, some other signage has made its way to center stage. This is because each RR crossing is unique, and what developed is more specific signage for a variety of situations design engineers must accommodate.

A required device like the CROSSBUCK sign (MUTCD #R15-1) must always be present, but if there’s a spot where queuing occurs, the DO NOT STOP ON TRACKS sign (MUTCD sign #R8-8) might be a good choice to improve safety. Passive devices are used at every crossing, but active devices might also be needed for more populated areas with a steady flow of traffic through crossings.

Active devices give warning of an approach or presence of a train. These devices can come with all the bells and whistles too, literally. One common active device is the Flashing-Light Signal, which consists of two red lights in a horizontal line that flash alternately, facing oncoming highway traffic. When there is road traffic approaching from both directions, the MUTCD states that flashing light signals shall be installed back-to-back, facing oncoming traffic.

For better visibility on multilane approaches, the Cantilever Flashing-Light Signal would be more useful. Automatic gates can also provide supplemental visual warning to the driver and a physical barrier.

Active devices are also appropriate for places where sight distance is restricted while approaching the crossing. Advanced Warning Signs with flashers can be placed on roadways prior to the crossing in places of restricted sight due to topography or geometry. The flashers on such devices can either be on all the time or connected to the railroad circuitry and flash only when a train is approaching.

### Train detection at crossings

There are three main types of detection systems:

1. **Motion Sensitive Devices**
   - Operate within the approach circuit, and will detect trains regardless of speed. If a train stops within the approach circuit but not near the crossing, the devices will turn off until the train resumes motion towards the crossing.

2. **Constant Warning Time**
   - Systems are able to measure a train’s speed and distance from the crossing, and activate the control devices based on the warning time that was set. CWT Systems also deactivate the control devices if the train stops after the approach circuit but outside of the crossing.

3. **Grade Crossing Island and Approach Circuits**
   - (DC, AC-DC or AFO) are basic detection circuits based off batteries or transmitters located on a section of track and relay on one end, and with a receiver or diode at the other end. When a train is on the section of the affected track it will jolt the circuit and de-energize the relay. All of these systems are available to pair with active control devices.

### Concerns about active devices

There are, however, some concerns when active devices are implemented, having to do with creating a false sense of security. One such concern is “system credibility,” which refers to how accurately the system detects and communicates the presence of a train, and provides a reasonable warning time to drivers. The only way to gain credibility is through reasonable and consistent warning times. Research has shown that drivers will attempt to drive around gates that have too long a warning time; setting a reasonable warning time will lower the likelihood of drivers going around gates. Also, trains that change speed within the approach circuit can cause inaccurate warning times. To help with appropriate selection of the detection system, the TWG recommends joint study and evaluation between the highway agency and the railroad.

Another problem with train detection is false activation either through poor track circuitry, detection equipment, or maintenance practices. These problems should be avoided so that the driver’s perception of the system’s integrity remains sound. The maintenance of the railroad is the responsibility of the FRA, but in some cases funding and maintenance of active control devices, such as gate arms, are the responsibility of the local agency and the FRA.

### Preemption and interconnection at crossings

Heavily populated areas might consider preemption/interconnection as a possibility to improve credibility. This involves implementing detection systems on the tracks and connecting traffic lights to that system. The MUTCD says this about the appropriate time to interconnect: “When a highway-rail grade is equipped with a flashing-light signal system and is located within 60cm (200 ft) of an intersection or mid-block location controlled by a traffic control signal, the traffic control signal should be provided with preemption in accordance with Section 4D.13.”

There are also some other factors to consider. Interconnection requires joint agency coordination between the FRA and the local agency, extended advance warning times, second train circuitry at multiple track crossings, and possible pre-signals to prevent queuing. Pre-signals are used before a track crossing to prevent queuing that would occur at a stop light after the tracks, which keeps the traffic from backing up onto the tracks. The signal is connected to the detection system and turns red prior to the gate arms activating, and this helps prevent an unsafe situation.

Coordination between the highway agency and railroad company is required when making the decision to interconnect a railroad with a traffic signal with active railroad control devices. Engineering stud-
ies at interconnection locations will determine the minimum preemption warning time. Special attention should be given to crossing designs whenever warning times increase to over 45 seconds, which is usually the case in areas where trains cross at higher speeds either in rural areas or when passenger trains are running on the tracks.

Crossings with multiple tracks and second trains will have a network of circuitry that will run the control devices for both tracks appropriately. The warning times for these types of crossings can be tricky, and the same can be said for diagonal railroad crossings. Pre-signals may be implemented to help control traffic at approaching highway-rail grade crossings. They will have their displays integrated into the railroad preemption program, and another engineering study is recommended by the TWG to evaluate the different elements involved in a pre-signal. When pre-signals are present, drivers will see the signal go red and the lighted displays come on well before the train crosses the tracks.

After all options have been explored, there’s one still left over: traffic separation. In the City of Olathe, Kansas, traffic separation has been on their minds for years. See our next issue of this newsletter for what they are doing there.

Guidance on Traffic Control Devices at Highway-Rail Grade Crossings has seven major sections: 1) existing laws, rules, regulations and policies, 2) highway-rail grade crossing perspective, 3) traffic control devices, 4) alternatives to maintaining the crossing, 5) new crossings, 6) guidance, and 7) traffic control device selection procedure. The report also has a glossary, appendix, and a list of tables and figures.

You can download the report from http://cms.transportation.org/sites/scote/docs/twgreport.pdf.

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Should speed limits be lowered on Kansas gravel roads?

Adapted from a K-State press release by Kristin Hodges, April 20, 2009.

By state law, gravel roads in Kansas have a speed limit of 55 mph, though local governments are allowed to reduce the speed limit within their jurisdictions. Most of the state’s 105 counties maintain the 55 mph speed limit and don’t post the limit on gravel roads.

One exception is Johnson County, where the gravel road speed limit has been reduced to 35 mph and signs are posted. Sunanda Dissanayake, associate professor of civil engineering at Kansas State University, said this creates problems since the county is the only one in the area with that speed limit. For instance, when driving on a gravel road in adjacent Miami County, the speed limit is 55 mph, and it’s not posted. However, when staying on the same road and passing into Johnson County, signs alert drivers that the speed limit is 35 mph.

Dissanayake co-authored a recent K-TRAN study for KDOT about the method of setting speed limits on gravel roads. The researchers looked to see if there was a difference between actual driving speeds and the speed limit. The project only looked at straight sections of roadways and avoided curves, slopes, bridges and other factors that likely would affect the drivers’ speeds.

The researchers found that people drove faster when gravel roads were sandier and when they were wider. They also found that heavy vehicles drove faster than smaller vehicles. However, when it came to actual speeds driven, the difference was not significant between roads with speed limits of 35 mph or 55 mph.

In fact, while Johnson County’s speed limit is 35 mph and posted, the average actual speed of 37.5 mph was higher than the average actual speed of 35.8 mph in Miami County, where the speed limit is 55 mph and not posted.

“Johnson County does not gain anything by lowering the speed limit and posting it,” she said. “Spending money on posting and maintaining signs in this aspect is pointless, really,” she said. The study shows that people drive at a speed at which they are comfortable. She said an additional factor is that people know gravel roads are not highly enforced by police.

In addition, the study found no safety benefit to posting speed limit signs or reducing the speed limit on gravel roads, as there was not a large difference in the number of crashes or the types of crashes.

The researchers recommend that the practice of lowering speed limits and posting signs on gravel roads in Kansas not be adopted in new situations. However, Dissanayake said the researchers have not made recommendations for past practices, such as in Johnson County.

“I can’t say there is any harm in the posting,” she said. “The only thing is that you might lose the respect of the drivers. The majority are driving under the speed limit, so why do you need to lower it?”

County engineers may find this study helpful when they face complaints from their county residents who ask for the speed limit to be lowered. For the complete report, go to http://www.ksdot.org/burmatrres/kdotlib2.asp and type in “gravel road.”

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A Leg Up

Consider pedestrians in RR crossing design

... by Matthew Barnett .........

Highway-rail crossings can be dangerous for pedestrians without the proper safety measures put in place. Pedestrian traffic, pedestrian accident history, sight distance, and site specifics relating to geometry, train operations, and traffic signal preemption requirements are all important keys to designing a crossing with pedestrian safety in mind.

Two especially important factors are expected pedestrian usage and expected train operations. And these questions are important, too:

- Will there be spikes in volume of pedestrians because the rail crossing is by a bus stop, school, residential communities, or retail centers?
- How fast will most trains be traveling?
- How many trains per day?
- Are there multiple tracks?

All of these play a part in determining appropriate safety measures.

A useful decision tree is included California Public Utilities Commission’s Guidance on Pedestrian Rail Crossing Design In California, found at http://docs.cpuc.ca.gov/published/Graphics/67815.PDF.

The pedestrian’s point of view

A pedestrian relies on many factors before making the decision to cross. Clear sight distance plays a significant role in crossing safety, especially if the crossing is not equipped with any devices to assist in making the decision. The pedestrian has to analyze the train speed, crossing width, and their own walking speed. Each individual has a different perception and reaction time.

The pedestrian sight triangle, a mathematical representation of a safe crossing, is made up of three parts: A) the travel path of the pedestrian, B) the travel path of the train, and C) the diagonal line connecting the ends of A and B, which is a representation of the line of sight from the pedestrian to the approaching train. The pedestrian sight triangle should be used to help evaluate whether control devices should be implemented. If the sight distance is insufficient for a pedestrian to make a safe decision to cross, additional passive and active control devices should be considered while designing the crossing.

Control devices at crossings

Passive devices: Swing gates, signage, and channel design are all examples of passive controls that can be implemented to decrease risk for pedestrian crossings. Appropriate signage for pedestrian crossings can be found in the MUTCD, which includes standard signs such as the “STOP HERE ON RED” #R10-6, “LOOK” #R15-8, and “RR” #W10-1.

Swing gates generally have two functions: entry/exit gates and emergency exit gates. Entry/exit gates are designed to open from the track area and close after use. These gates encourage pedestrians to take a look before crossing because they are placed across from the pedestrian’s pathway and must be opened before entering the track area. Emergency exit swing gates are used with an automatic pedestrian gate, an active device, to provide an exit for pedestrians caught between the tracks and the lowered, automatic gate arm.

Channel design is used for higher volume crossings, and it is useful for areas where unsafe pedestrian behavior is known to occur. Fencing is used when there are no physical barriers (buildings or walls) near the crossing. To determine the appropriate fence type, the designer(s) should consider each of these factors: vandal resistance, difficulty of climbing, and cost. Wire mesh fencing, steel tubular fencing, security fencing, and chain link fencing all can be used, and each has its pros and cons.

Active devices: Automated pedestrian gates, audible warning devices, and flashing light signals are all good examples of active controls for pedestrian crossings. Automated pedestrian gates act as a positive barrier to discourage pedestrians from entering the...
right-of-way during train movements, and they can be used in conjunction with emergency swing gates. Audible warning devices can be used in conjunction with pedestrian gates and are typically placed at the top of the mast. Audible warning devices, such as mechanical or electronic bells, usually accompany a flashing light signal as well.

**Other treatments:** In-roadway lights, pavement markings, and mirrors can also be used for pedestrian crossings, but they are less commonly used. In-roadway warning lights are used when there is no signage or traffic signal present. Although they are experimental, they have been used for motorists in California and at subway platforms in Washington, D.C. The lights are embedded flush to the pavement.

Pavement markings are also used to warn pedestrians at crossings. Markings are unique patterns in the pathway or painted signs on the pathway.

Mirrors are a simple and cost effective way to provide pedestrians with greater visibility. They can be mounted on any already existing control devices, such as flashing light signals and pedestrian gates. They are especially useful to pedestrians when a second train is approaching.

**Resources**

A useful resource, used as a reference for this article, is FHWA’s *Guidance on Traffic Control at Highway-Rail Grade Crossings*. [http://cms.transportation.org/sites/scote/docs/twgreport.pdf](http://cms.transportation.org/sites/scote/docs/twgreport.pdf)


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National Web site shows fatal crashes in the U.S. — including your community

Researchers in the Center for Excellence in Rural Safety (CERS) in Minnesota have mapped out every fatality in the nation with details on each death, so now you and your citizens and elected officials can see the “dead man’s curve” and those high-crash intersections in your community. To view a video about the mapping feature, go to [http://www.saferoadmaps.org](http://www.saferoadmaps.org) and click on “Tutorials.”

CERS officials hope the tool will educate the public about road fatalities, especially those that live in rural areas. U.S. Census figures show that 21 percent of Americans live in rural areas and the Federal Highway Administration has found that 57 percent of highway deaths happen on rural roads.

“When drivers type in their most common routes, they’re shocked how much blood is being shed on it,” said Tom Horan, research director for CERS. “When it’s the route you or your loved ones use, the need to buckle up, slow down and avoid distractions and drinking suddenly becomes much more personal and urgent.”

To use the site, enter an address at [http://www.saferoadmaps.org](http://www.saferoadmaps.org) and you will see a map or satellite image of all of the road fatalities that have occurred in the area. Plus, users have the ability to narrow down their search to see the age of the driver, whether speeding or drinking was a factor, and if the driver was wearing a seat belt.

One of the most important aspects of the new tool also illustrates which life-saving public policies, such as strong seat belt laws, are in the chosen area.

“This tool sheds light on the importance of strong public policy that helps save lives in states across the nation,” said Lee Munnich, director of CERS. “When you can visually see how many lives can be saved, it really changes how the public and policy makers see our roads.”

For more information, visit [http://www.saferoadmaps.org](http://www.saferoadmaps.org) or contact Gina Baas, Center for Transportation Studies at the University of Minnesota, (612) 626-7331.

Adapted from UMNews release: “University of Minnesota researchers map out America’s deadliest roads,” July 23, 2008.
KDOT Korner

Ready to rumble?

... by Matthew Barnett . . . .

One-third of all traffic fatalities in the U.S. are run-off-road crashes, and two-thirds of those are in rural areas. A primary cause for run-off-road (ROR) crashes is driver fatigue. Fatigue can be caused by many reasons, including alcohol and drugs, but mostly it’s drowsy drivers who push themselves to make it to their destination. Other causes for driver fatigue are weather conditions and what’s known as “highway hypnosis” (a condition where pavement markings on long, monotonous stretches of road can mesmerize drivers). Nationwide, ROR crashes have an estimated annual cost of $80 billion dollars, not to mention the emotional distress and family disruption caused by lost lives.

What can be done? Fatal-to-driver ROR crashes can be reduced by installing rumble strips. In fact, studies done to assess the effectiveness of shoulder rumble strips indicate that it is possible to decrease the amount of crashes anywhere from 15-70 percent, which translates to fewer deaths and injuries.

Rumble strips, according to the FHWA, are raised or grooved patterns constructed on or in travel lane and shoulder pavements, creating a texture different from the road surface. When vehicles’ tires pass over rumble strips, they vibrate, which produces a rumbling sound, and that sound warns motorists when they are leaving the travel lane.

Rumble strips are primarily used three different ways:
— in the centerline between travel lanes (centerline rumble strips),
— on the edge of the travel lane (edgeline rumble strips), and
— in the shoulder (shoulder rumble strips).

Rumble strips have been used mostly on expressways, interstate highways, and parkways. However, some are being installed with good results on 2-lane rural roads that have a high number of crashes.

Rumble strips in Kansas
The Kansas DOT uses milled rumble strips in a variety of situations. They have found milled rumble strips easy to install on new or existing asphalt, Portland cement, concrete pavements, and shoulders.

Section 813 of the KDOT Special Provision to the Standard Specifications, Edition 2007, has outlined the materials, the construction requirements, and the measurement and payment for the installation of rumble strips along Kansas roads. See http://www.ksdot.org:9080/burConsMain/specprov/specifications.asp

The public’s concerns
Despite the safety-related benefits of rumble strips, there are some valid concerns about them. Some questions have been raised about noise, bicycle safety, and maintenance issues faced by road crews.

Residents who live close to rumble-stripped areas have complained about the noise level, especially for milled rumble strips. One possible solution is to eliminate the use of rumble strips near residential neighborhoods. When that not a possible, some agencies have installed sound barriers to reduce noise. Another way to reduce noise is to move edgeline rumble strips or shoulder strips farther away from the travel lane. However, the farther the strips are from the travel lane, the less time drivers have to react after driving over them, because there is less room left on the roadway.

Bicyclists have also complained about the use of rumble strips. Their main concern lies with the ability to control their bikes if they need to ride on top of the rumble strips.

Most concerns about rumble strips with regard to road maintenance (deterioration, cracking from the freeze-thaw cycle, etc.) have proven to be less of a problem than initially thought. According to the FHWA, deterioration does not occur more quickly when pavement is milled to create rumble strips. The only concern lies with milling rumble strips into roads that already show high degrees of deformation and/or cracking distress. The FHWA advises against creating rumble strips on these roads.

Existing projects
Steven Buckley, Kansas’s State Transportation Safety Engineer, advocates the use of rumble strips. He mentioned that a K-TRAN study is being conducted by Kansas State University along portions of US-50 and US-40. The research is funded by KDOT.

“I’m looking forward to seeing the results from that study,” said Buckley. [The results are expected this summer.] KDOT will be looking for effects of center-line rumble strips on “preventable” crashes: side swipe
opposing, head on, etc. KDOT will also be looking at how the strips affected motorcyclists and how much noise is generated by drivers as they pass over the strips.

Lyn Berges, Traffic Safety Engineer for KDOT’s Bureau of Local Projects, also advocates the use of rumble strips and describes their effects as “audible learning”—they help drivers be aware of where the road is, and isn’t.

Paul Gripka, Field Engineering Administrator for KDOT, said that it’s common practice for KDOT to advise implementation of rumble strips whenever sections of state highway are under construction. Gripka, from KDOT’s Bonner Springs Office, said some areas along K-7 and US-73 in Leavenworth and Wyandotte Counties were not previously chosen to have rumble strips installed, but because they were slated for maintenance, KDOT decided to have strips milled-in. Strips will be milled into the median shoulder because it is a four lane highway with no barrier separation. Strips will also be milled into the outside shoulder, which is large enough (more than three feet wide) for bicyclists to still ride on the shoulder and avoid riding on the 13 inch wide rumble strips. Gripka said that KDOT does not generally install rumble strips in places where the shoulder isn’t wide enough to accommodate bicyclist’s ability to travel.

Gripka believes that milled strips are more consistent and uniform than pressed strips.

KDOT generally contracts out the work to companies like Dustrol Inc., which did the work along US-50 for the K-TRAN study, and Diamond Surface Inc., a company based in Minnesota, that will be completing a $32,015 project along US-73 and K-7.

The Cost
Ron Wilson, Dustrol Inc., estimated what a rumble strip project might cost. The work breaks down into five main parts: traffic control, cutting, sweeping, labor, and machine cost. Traffic control costs an estimated 3-4 cents a foot, and the cutting costs an estimated 2 cents a foot. Dustrol Inc., completed a contract with KDOT at just under $40,000 for a 28-mile stretch of road. With the cost of ROR crashes being $80 billion nationwide, it’s easy to see how cost effective rumble strips can be to help reduce those crashes.

The KDOT Strategic Highway Safety Plan [http://www.ksdot.org/burTrafficSaf/ksshsp.pdf] and FHWA’s Safety Programs Web site [http://safety.fhwa.dot.gov/roadway_dept/rumble/] are both good resources for more information on rumble strips; some of the information for this article was taken from those sites. Another good resource is a DVD called *Rumble Strips: A Sound Investment*, by FHWA, 2007. It is available from http://www.ksltap.org. Click on Lending Library.

Citizen complaints about rumble strip noise prompts action and policy changes

When Carver County, MN, installed 10 miles of rumble strips along the edge of Hwy. 10 in the summer of 2007, they certainly did their job. They created a sudden and urgent noise anytime a car ventured onto the edge of the road. Trouble was, they also annoyed residents, who complained loudly to the county.

“We thought it would save lives,” Carver County Administrator Dave Hemze said. But the rumble strips were way too loud, the residents said. And when county officials checked for themselves, they had to agree.

“The noise was unbelievable,” Hemze said. “You could hear it for about two miles.”

Part of the problem, Hemze said, was that the county tried something relatively new. Instead of placing the rumble strips outside the edge line, the county placed the strips at the edge line and painted on top of it, creating rumble stripes. A benefit of this approach is that the edge line is raised and more visible, especially in rainy weather. However, a lot more motorists were hitting the strips, especially at curves. And just months after the $12 million highway renovation project was completed, the county paid another $40,000 to fill in the strips. Ouch. Hemze said the road is so winding that the county felt it best to fill them in.

About the same time, Wright County, MN, officials faced a similar situation. The county also had created rumble stripes along Hwy. 35, and residents complained about the noise they created. One out of 10 drivers was hitting the rumble strips.

Wright County’s solution: Instead of filling in the rumble strips, they moved the edge line in about 8 inches along 2,900 feet of curved roadway, so drivers aren’t as likely to drift out as far as the rumble strips, according to Wayne Fingalson, the county engineer. The cost: $500.

“We put [the rumble strips] in for a reason. They do work,” Fingalson said. “Our County Board felt very strongly that they needed to stay.”

Despite the problems, both counties said they will continue to use the rumble strips, especially along straight roadways. They also will look for ways to minimize the problems in other areas, especially if there are homes nearby.

“Keeping people between the white lines—that’s what it’s all about, said Hemze. “We just have to tweak our criteria a little bit.”

Source: “Rumble strips are raising grumbles” by Heron Marquez Estrada, Minneapolis-St. Paul Star Tribune, November 9, 2008.
What’s New

... by Lisa Harris

Roadway Safety for Motorcycles

Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes
4 pages, FHWA, May 2008. This “toolbox” documents estimates of the crash reduction that might be expected if a specific countermeasure or group of countermeasures is implemented with respect to pedestrian crashes. The crash reduction estimates are presented as Crash Reduction Factors (CRFs). Traffic engineers and other transportation professionals can use the information contained in this toolbox when trying to figure out which countermeasures would be effective in improving safety at a certain type of location. (such as a signalized intersection). http://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/index.cfm

KS LTAP Resource Catalog 2009
68 pages, Kansas LTAP, 2009. The latest version of Kansas LTAP’s catalog of training videos and free technical publications for local government road and bridge and public works agencies. Listings in this catalog are also online and searchable at http://www.ksltap.org. Click on Lending Library.

Safer Streets: The Measured Effectiveness of Hartford’s Citywide Traffic Calming Program
11 pages, Institute of Traffic Engineers (ITE), 2007. The City of Hartford, Connecticut made an innovative move in 2005 when it developed a comprehensive citywide traffic calming master plan—the first of its kind in the United States. This research paper examines the varying effectiveness of “road diets” on several city streets, and in which circumstances this road treatment appears to be more cost effective. http://www.ite.org/traffic/documents/AB07H3401.pdf

Safer Sign Supports: Are Yours Breakaway Yet?

Calendar

See our Web site for even more calendar listings. Go to www.ksltap.org and click on “View the LTAP Calendar.”

*August 4-5
Introduction to GIS

*August 6
Advanced ArcGIS

*Legal Permitting and the Regulatory Process ▲M
September 9 – McPherson
September 10 – Topeka

*Project Planning & Management ▲M
September 15 – Hays
September 16 – Hutchinson
September 23 – Topeka

Gravel Road and Street Maintenance ▲T
September 29 – Great Bend
September 30 – Emporia
October 1 – Manhattan
October 2 – Atchison

*Asset Management & Cost Accounting ▲M
October 7 – Great Bend
October 8 – Wichita
October 9 – Emporia

*Snow and Ice Control ▲T
October 13 – Garden City
October 14 – Great Bend
October 15 – Wichita
October 16 – Topeka

October 13-14
MINK-9 Local Roads Meeting in St. Joseph, MO
Call Lisa Harris at KS LTAP 785/864-2590

Concrete Road and Street Maintenance ▲T
October 21 – Great Bend
October 23 – Topeka

*Bridge Maintenance
November 3 – Hays
November 4 – Wichita
November 5 – Chanute
November 6 – Lawrence

*Road Safety Assessment ▲M
(This is an elective course for the Master Road Scholar)
November 10 – Garden City
November 11 – Colby
November 12 – Great Bend

*Risk and Liability Issues ▲M
2 locations TBD
dates TBD

*Asset Management & Cost Accounting ▲M
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2 locations TBD
dates TBD

*For information on calendar items indicated with an * or to suggest a topic for a KS LTAP workshop, contact: Kristin Kelly, Training Coordinator, 785/864-2594, kkbkelly@ku.edu.

▲T = KS Road Scholar Program—Level 1
Technical skills required course

▲S = KS Road Scholar Program—Level 2
Supervisory skills courses are provided by the Kansas Association of Counties. Go to http://www.kansascounties.org and click on “Education Program.”

▲M = KS Road Scholar Program—Level 3
Master Road Scholar required course
Free Resources

Check off your selections, fill in the bottom portion, and return this form to:
KUTC Materials Request, 1530 W. 15th St., Room 2160, Lawrence, Kansas 66045
or fax to 785/864-3199

Publications
You are free to keep these unless otherwise noted. Or you can download at the links provided.

Roadway Safety for Motorcycles

Toolbox of Countermeasures and Their Potential Effectiveness for Pedestrian Crashes

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