Safety Edge: Reports from the Field

By Lisa Harris

In the last year, Kansas LTAP has been loaning a Safety Edge “shoe” attachment to agencies interested in trying the technology on a paving project. The shoe creates a consistent wedge on the edge of the pavement at an angle proven to help vehicles recover back to the travel lane if they veer off the pavement. Experiences using the LTAP loaner shoe have been mixed, and mostly positive. In this article we’ll profile those experiences and share lessons learned.

KDOT District 3. LTAP’s safety shoe was first used by KDOT about a year ago on a project in District 3 in Norton County. That project had some technical problems, but it provided some good lessons learned. The soil was moist and soft at the edge of pavement, which posed a problem. In order to maintain the desired paved shoulder width, the Safety Edge was placed on the soil. The paver end gate and shoe were lowered to come in contact with the soil, but both the paver end gate and the shoe plowed soil into the pavement wedge. To avoid this problem, the shoulder width was reduced so that the Safety Edge wedge would be constructed on the underlying asphalt. The edge shape was constructed satisfactorily. However, the contractor did not lower the paver’s end-gate to contact the ground due to concerns about MUTCD Revisions Affect Local Agencies

Heads-up for local governments on changes that affect locals roads and streets.

Revisions adopted last year to the 2009 Manual on Uniform Traffic Control Devices (MUTCD) include changes that make complying with the MUTCD less onerous for local agencies with limited funds. This article will review some of those changes from the original 2009 version and how they apply to your agency. This information is adapted from a memo sent by FHWA’s Office of Safety to its field offices.

On May 14, 2012, two rulemakings revising the MUTCD were published in the Federal Register. The rulemakings were published as Revisions 1 and 2 to the 2009 MUTCD. They include the revisions summarized in this article. To see the specific sections mentioned.

Continued on page 2
plowing soil, and this resulted in excess asphalt material outside the wedge (see photo at right).

Another consideration in the project was time. The project was done in the fall when paving conditions are highly variable and many times less than desirable. The contractor wanted to get as much production as possible each day, so additional fine-tuning with the shoe was not pursued.

**Miami County.** Jeff McGuire, road supervisor for Miami County, reported great success in using the safety shoe. They used it to re-lay asphalt near railroad crossings on roads with paved shoulders. This was the first time the county had used a safety edge treatment of any kind.

“The visual effect is really nice,” said McGuire. “There is no straight up and down edge.”

The only disadvantage to using the Safety Edge for Miami County, according to McGuire, is that it can’t be used on their current paver on most of their county roads, because of the narrow width of the roads. They would need a narrower paver. Their 10 ft Caterpillar paver is too wide to accommodate the extra width needed to create the edge and retain the width of the pavement in the process.

McGuire said that the shoe was easy to install on their paver and he would recommend it to any agency that has the ability to use it.

**Johnson County.** A contractor for the county, McAnany Construction, used LTAP’s safety shoe on their 8 ft Caterpillar paver for 2-1/2 weeks in July 2012 on several paving projects. The shoe installed easily on their paver. The company had used another kind of safety edge treatment in the past, but not recently.

Eric Wilson, general supervisor for the company, said their experience of using the shoe “was OK,” but he’s not a big fan. They did not add extra width to the pavement to create the edge, so they ended up making the driving surface more narrow during laydown. Wilson said he thinks that could have the effect of pulling vehicles off the road. In his opinion, it’s better to have a higher, straight drop-off on a slightly wider pavement. [Safety research says otherwise, however.]

Wilson has no particular advice for agencies considering using the shoe, and he said he would definitely use it again if it were spec’d.

**Riley County.** Riley County used the safety shoe on a county road in May 2012. Rod Meredith, assistant public works director (now retired), said the edge produced on by the shoe works well for vehicle recovery after a road departure. “I tested it several times, including a test with the county commissioners in the vehicle,” he said.

Meredith had an experience similar to Miami County with their 10 ft paver. He said “The problem with this particular model of shoe is we gain 12 inches of screed width that we can’t avoid. The [shoe] will not let us close our 10 ft screed to the minimum width we need for most of our roads. To have a little flexibility in the lane we are paving, we need to be able to bring our screed in to 10 ft to match the centerline or changes in road width. With this [shoe] we can only come in to 11 ft. That means we can only use this brand of Safety Edge shoe on roads that are wider than 24 ft. Most of ours are 24 ft wide or less.”

Meredith also noted that having two shoes would have been helpful—one on each side of the screed. “We frequently switch sides of the road to bring the lanes up equally. This is not handy to do since the brackets have to be reversed to change sides,” he said.

Riley County is looking for a Safety Edge shoe model that fits inside their screed so they can have full range of mobility.

**Coffey County.** Coffey County used LTAP’s safety shoe on all their asphalt overlay projects, about 12 miles total, this past June. Wayne Blackbourn, county engineer, is very pleased with the results and enthusiastic about the technology. He has added the Safety Edge to the county’s
In our Spring 2010 issue, we reported that the Kansas Strategic Highway Safety Plan (SHSP) will have a stronger focus on local road safety. Here’s an update on that effort.

A new Local Roads Safety Team (LRST) has been formed specifically to discuss local issues in depth and develop strategies to reduce the number of fatal and severe crashes on local roads. In addition to KDOT and FHWA staff, the team includes representatives of local road agencies (city and county), local EMS, hospitals, and law enforcement.

Collaborative local safety meetings. One outcome of those discussions has been the realization that it would be very helpful for local governments to have representatives from engineering, EMS/medical response and enforcement meet periodically to review detailed information from crash reports in their jurisdiction and co-develop ideas for improved safety. The LRST will be recommending a pilot program for such meetings.

Easier access to crash report information. Another major push for the team has been making it easier for local governments to have access to information from KDOT on crash reports without having to file an open records request. The sticking point has been personal information on crash victims, such as name and Social Security number. KDOT’s legal staff have recently OK’d releasing crash report information with this personal information removed. Local governments will be able to request the information and receive it in Excel. More information will be coming from KDOT on this effort.

Mapped crashes. A related goal is to map crashes by jurisdiction for a requested time period and show the severity of the crashes. This will require geo-coding the crashes on local roads. Geo-coding has been done by KDOT for 2004-2008, but needs to be completed for 2009 to the present.

Simplified funding. Another safety strategy proposed by the team is to have a streamlined funding program for certain systemic improvements on local roads in rural and urban areas (similar to the Kansas High Risk Rural Roads Program). Examples would be tree removal in the right of way, curve signing, headwall removal, and installation of selected FHWA proven safety countermeasures. These could be installed at locations that do not necessarily have a crash history but have characteristics that indicate improvements would make a difference in safety at that location.

The local roads chapter of the SHSP will contain engineering strategies like these, and also strategies for medical response and law enforcement. The need for educating the general public and safety professionals has also been a theme at team meetings and will be addressed in the chapter.

The SHSP strategies will drive how safety funds are allocated in the state. The state’s overall goal is to cut fatal and severe injury crashes in half in 20 years.

For more information on the Safety Edge technology, visit FHWA’s webpage on the topic at http://www.fhwa.dot.gov/everydaycounts/technology/safetyedge/intro.cfm. See also the Safety Edge video listed as a resource on page 15.

Sources:
• Federal Highway Administration PowerPoint presentation on the KDOT District 3 project.
• Interviews: T. Scott 12-7-12; J. McQuire 12-10-12; E. Wilson 12-10-12; R. Meredith 7-2-12; W. Blackbourn 12-20-12.

Conclusion

LTAP’s Safety Edge shoe has been used in a variety of situations to date, with mostly positive results, and a few lessons learned. The counties and contractors that have tried it found it easy to install on their pavers. The width of the paver in relation to the road is something to consider when deciding whether to use the shoe. To give our Safety Edge shoe a try in your area, see page 15 for information about how to borrow it for free.

For more information on the Safety Edge technology, visit FHWA’s webpage on the topic at http://www.fhwa.dot.gov/everydaycounts/technology/safetyedge/intro.cfm. See also the Safety Edge video listed as a resource on page 15.

Reducing Crashes on Local Roads in Kansas: What’s the Plan?

By Lisa Harris

Team is developing local-level strategies for the statewide safety plan.
Center Line Rumble Strips

A low-cost way to alert drivers they have crossed the line.

Head-on crashes are particular deadly, and especially on two-lane roads. In Kansas almost one quarter of all fatalities in the last five years have been opposite-direction crashes and 79 percent of those have been on two-lane roads. A center line rumble strip is a low-cost safety treatment that can help keep an inattentive driver safely in the driving lane to avoid such a crash. Installed at or near the center line of a paved roadway, it is made of a series of milled or raised elements that alerts a driver through vibration and sound that the vehicle has traveled left of the travel lane. These strips have been in use for the past 20 years or so on two-lane roads and are considered an FHWA-designated proven countermeasure to reduce cross-center line crashes on any road with marked center lines. Currently there are 36 states using center line rumble strips and 17 states have written policies or guidelines for their installation, including Kansas.

This article will describe research on center line rumble strips, including research conducted in Kansas, and potential advantages and disadvantages of using the strips.

Effectiveness

Center line rumble strips have been found to be among the most cost-effective safety measures for these situations: Head-on and opposite-direction sideswipe collisions: According to the NCHRP's Report 641, sites with center line rumble strips had significant reductions for these two types of crashes; 38 to 50 percent fewer crashes on rural two-lane roads and 37 to 91 percent fewer crashes on urban two-lane roads.

Navigational aid in bad weather: Poor weather conditions, such as snow, rain and fog, can make it difficult to see painted center lines. Center line rumble strips can help drivers locate the travel lane during inclement weather. The vibration provided by rumble strips can assist drivers from unintentionally crossing the center line. Along with the vibration, there is also improved visibility of the painted stripe when the pavement marking is painted on top of the rumble strip. The vertical ridges of the center line will often still be visible under poor weather conditions.

Placement considerations

Research cited by FHWA on effective placement of center line rumble strips identified the following best practices and policies for installation.

Corridor vs. spot treatment. It is recommended that center line rumble strips be installed along corridors rather than in spot locations because of the difficulty in determining where a driver could become distracted or drowsy. Corridors can be prioritized by the frequency of opposite-direction crashes and certain crash predictors (e.g., shift workers, younger drivers).

Pavement width. Some studies have shown that the presence of center line rumble strips can result in vehicles traveling slightly further away from the center line than they would otherwise. As a result of this, the FHWA states that the strips may not be appropriate to install on very narrow pavements. However, a 2012 study at Kansas State University found otherwise—see sidebar on next page.

Co-installation with shoulder rumble strips. Some agencies are installing both center line and shoulder rumble strips along the same segments of road. Total pavement width will affect a decision to install both. It’s important to be able to accommodate and serve all road users, particularly in no-passing zones. A comparative study of the installation of different combinations of rumble strips with wider pavement markings during resurfacing showed the greatest reduction in serious injury crashes when both center line and edge line rumble strips were installed on the same segment of roadway.
Research in Kansas on Center Line Rumble Strips

Are you interested in reading more about research on center line rumble strips? Start in Kansas. Kansas State University has conducted three K-TRAN research projects for KDOT on center line rumble strips since 2006.

Reducing Crossover Accidents on Kansas Highways Using Milled Centerline Rumble Strips (September 2006). The researchers surveyed other states on their experiences using center line rumble strips and developed a research design to evaluate KDOT test installations.

Promoting Centerline Rumble Strips to Increase Rural, Two-Lane Safety (December 2010). This research had several components and findings. The researchers found that:

- Installing center line rumble strips reduced head-on and opposite-direction side swipe types of accidents and reduced the total number of crashes.
- The level of noise generated by traveling over center line rumble strips depends on speed (the lower the speed, the lower the noise), type of vehicles (heavier vehicles tend to produce more noise), and distance the vehicle is traveling (the greater the distance, the lower the noise).
- Retroreflectivity of painted stripes over center line rumble strips decreases over time in a linear manner and not faster than typical pavement markings.
- Both patterns for milled center line rumble strips tested in the study performed well. They were tolerably loud and provided plenty of vibration to drivers. (The report shows photographs of the patterns.)

Study of Kansas Department of Transportation Policy on Lane and Shoulder Minimum Width for Application of Centerline Rumble Strips. (August 2012). This project also had several components. The researchers found that:

- In a before-and-after safety effectiveness study of center line rumble strip installations in Kansas, cross-over crashes were reduced by 67 percent and correctable crashes involving fatalities and injuries were reduced by 34 percent.
- Drivers tend to drive CLOSER to rumble strips (center line or edge) than when the lines are not milled. These findings contradict other research on this topic, and suggest that installation of centerline rumble strips would not pose an added danger for narrower roads.
- 200 ft. should be the minimum distance from buildings for installation of centerline rumble strips (because of noise).

Go online to the KDOT Research Reports Catalog and search for “centerline” to view the reports described above. The link is http://www.ksdot.org/burmatrres/kdotlib2.asp. KDOT’s specs for center line rumble strips are in Section 813 of their Standard Specifications. For more information on KDOT’s use of center line rumble strips, contact Steven Buckley, state highway safety engineer, at (785) 296-1148 or buckley@ksdot.org.

Complications caused by normal crown.

When milling into crowned pavements, agencies should be aware of several challenges. First, the milling machine should be equipped with a vertical alignment guide to orient the rumbles on the horizontal rather than tilted level with the crown on one side of the joint or the other. Second, because the rumble strip depth will vary transverse to the roadway, an agency should specify the desired maximum and minimum depth. Project documents should clearly indicate where the rumble strip depth will be measured, and acceptable tolerances.

Types of road users. When considering using center line rumble strips, it is important to keep in mind other types of vehicles such as bicycles, motorcycles and larger trucks.

Although bicyclists will rarely cross a center line rumble strip, the presence of these strips can cause vehicles passing bicyclists in the same lane to stay to the right of center to avoid driving on the rumble strip and thereby travel closer to the bicyclist. If a bicycle and vehicle are to share a lane, it is recommended that 14 feet of pavement beyond the edge of the center line strips be maintained so both the car and bicycle can travel safely.

Awareness of the rumble strip by the motorcyclist is important for maintaining control of the motorcycle.

To alert a truck driver crossing the center line, the length, width and depth of the rumble strip is critical and should not be reduced. Consideration of noise also should be taken into account at curves or at segments with both center line and edge rumble strips due to the potential for off-tracking.

Potential limitations

Characteristics that can limit the desirability or effectiveness of rumble strips include low average speeds, noise for adjacent residences, and significant amounts of turning movements across the center line (creating noise and driver discomfort).

The noise that comes from crossing over a center line rumble strip can be very loud. See the sidebar at left for research conducted by Kansas State on noise and recommended distance of the strips from residences.

Maintenance is also a concern. Center line rumble strips are typically milled over a longitudinal joint. If the joint is poorly constructed, milled strips can sometimes allow

Continued on next page
Center line rumble strips  Continued from page 5

water to pool and penetrate the pavement which can lead to early pavement deterioration. The potential for this can be mitigated by placing an asphalt fog seal over the milled strips.

Conclusion
Center line rumble strips are a proven measure to reduce the risks of cross center line crashes, keep vehicles on the roadway, and reduce the severity of the crashes that do occur. Compared to shoulder rumble strips, they are a newer technology, and research continues to prove their effectiveness and refine best practices for installation.

To learn more information about center line rumble strips, visit the links listed below. The FHWA Technical Advisory also lists several other research reports on the topic.

Sources:
• FHWA Technical Advisory: Center Line Rumble Strips, November 7, 2011.
  http://safety.fhwa.dot.gov/roadway_dept/pavement/rumble_strips/t504040/
• Evaluating the benefits of centerline rumble strips on rural highways. Research Spotlight. Michigan DOT Research Administration.

MUTCD revisions affect local agencies  Continued from page 1

Programmatic deviations from Standard provisions, such as in a State MUTCD, Supplement, or policy, continue to be prohibited. (Kansas does not have its own MUTCD.)

Clarification about the use of engineering judgment – and definition of Standard (Sections 1A.09 and 1A.13). Certain language about the use of engineering judgment in the 2003 MUTCD that was removed from the 2009 edition and has been restored (see Paragraph 3 of Section 1A.09).

In another section, the definition of “Standard” has been revised to remove the sentence that said the Standards could not be modified through engineering judgment or study (Section 1A.13).

These two revisions* define the conditions under which deviation from a Standard provision in the MUTCD can be justified based on engineering judgment or study. Now, in limited, specific cases, deviation from a Standard provision is still allowed at a location (or at other locations with the same conditions) provided that the engineering reasons for the deviation are fully documented.

All compliant devices, as determined by the assessment dates, should be brought into compliance through routine maintenance or a systematic replacement process.

Some compliance dates rescinded. Some compliance dates were removed from Table 1-2 in the MUTCD’s Introduction. If a compliance date no longer appears in Table 1-2, it means that there is no longer a specific compliance date associated with that provision. Even if a former compliance date has already expired, if the date no longer appears in the Table, it is considered to have been rescinded retroactively and no longer applies to existing devices that have not yet been brought into compliance. When there are no compliance dates, signs are to be brought into compliance through routine maintenance or a systematic replacement process.

Some compliance dates retained. If a compliance date appears in Table 1-2, then it still applies and all existing devices must be brought into compliance by the date listed. Even if a date has already expired, but the date still appears in the Table, that compliance date remains in effect. Devices that do not meet the corresponding MUTCD provisions are non-compliant.

Sign retroreflectivity (Section 2A.08). The compliance dates for replacing existing signs not meeting the minimum retroreflectivity levels in Chapter 2A, Table 2A-3, have been rescinded. However, a compliance date by which an assessment or management method must be implemented and in use to maintain minimum retroreflectivity levels of regulatory and warning signs has been extended to June 13, 2014. Other types of signs are to be added to the method as agency resources allow.

Because there is no compliance date by which signs not meeting the minimum retroreflectivity levels must be replaced, replacement of these devices must be prioritized based on engineering considerations and agency resources. It is important to note that signs with retroreflectivity below the minimum levels are considered to have exceeded their service life because they no longer serve the needs of the nighttime driver. Accordingly, such signs might demand a higher priority for replacement over non-compliant signs that are replaced by systematic upgrading or routine maintenance schedules.
Historic Street Name Signs exempted from some provisions (Section 2D.43). A new provision has been adopted that exempts historic Street Name signs on lower speed roadways in locally-identified historic districts from complying with the provisions for retroreflectivity, letter height and case, color, and placement.

Federal code (36 CFR 60.4) provides criteria for evaluating a district to be identified as a historic district and for evaluating a system of structures, such as Street Name signs, to be identified as historic structures.

The term “lower speed” is not defined in the MUTCD. It is up to the agency having jurisdiction over the roadway to make this determination, as that agency ultimately assumes the risk of tort liability.

This revision assumes that the vast majority of historic Street Name signs meeting the criteria will be on local roads with speed limits of 25 m.p.h. or less. If a community decides to use the new Option to retain existing historic Street Name signs on lower speed roadways within a historic district, it is important for the community to ensure that the signs provide at least some degree of utility as navigational devices for road users.

This Option applies only to historic Street Name signs in historic districts meeting the eligibility criteria of 36 CFR 60.4 and does not apply to other types of traffic signs or devices, nor to locations outside of historic districts.

In sum, Revisions 1 and 2 of the (current) 2009 MUTCD contain changes relevant to local agencies. They address several concerns that were raised with the adoption of the 2009 edition.

New Website Promotes Systemic Safety Improvements

Highway safety improvement projects are designed to improve safety by minimizing or eliminating risk to roadway users. Rather than managing risk at certain locations, a systemic approach takes a broader view and looks at risk across an entire roadway system. A system-based approach acknowledges crashes alone are not always sufficient to determine what countermeasures to implement, particularly on low volume local and rural roadways where crash densities are lower, and in many urban areas particularly those where there are conflicts between vehicles and vulnerable road users (pedestrians, bicyclists, and motorcyclists).

FHWA’s Office of Safety recently launched a new website dedicated to the systemic approach to safety. The website, A Systemic Approach to Safety – Using Risk to Drive Action, is now available at http://safety.fhwa.dot.gov/systemic. The website:

• outlines the step-by-step systemic safety planning process with supporting examples
• offers a list of potential risk factors,
• presents case studies of the systemic approach to safety in practice, and
• provides additional resources to support systemic planning efforts, including information on upcoming events.

One of the case studies comes from our neighbor, Missouri, that has allocated almost two-thirds of its HSIP funds to system-wide improvements. Projects include installation of shoulder and centerline rumble strips/stripes; improving roadway visibility features (pavement markings, signs, lighting, etc); adding roadway shoulders; removing and/or shielding fixed objects along roadside right of way; and improving curve recognition through the use of signs, markings, and pavement treatments.

At the FHWA website, a systemic safety project selection tool is currently under development and will be available in Spring 2013. The tool will include a method for balancing systemic and spot safety improvement projects – and a mechanism to quantify systemic safety improvement benefits.

FHWA is encouraging state and local agencies to share their experiences implementing systemic safety improvements at http://rspcb.safety.fhwa.dot.gov/noteworthy/default.aspx.

If you have any questions about the website, contact Karen Scurry, P.E., FHWA Office of Safety, at (609) 637-4207 or karen.scurry@dot.gov.

Source: Karen Scurry, FHWA

Sources:
A Leg Up

New Resource for Pedestrian Safety Focuses on Local Planning and Development Tools

By Chris Wichman

A new publication, *NCHRP Synthesis 436: Local Policies and Practices that Support Safe Pedestrian Environments*, documents various tools and strategies for communities to improve the safety, convenience, and accessibility for pedestrians. The report contains about 40 case studies of successful policies and practices from communities large and small, ranging from The Big Apple to a city with a population of less than 10,000. This article will provide an overview of the Synthesis and offer a few key insights from the particular case studies most relevant to cities in Kansas looking for ways to improve their local pedestrian environments.

What’s inside?

The Synthesis is structured around information drawn from planning documents and through interviews with key staff in local agencies. It focuses on regulatory, administrative and financial tools. Best practices are categorized as follows:

• public right-of-way engineering and design guidelines;
• architectural and urban design guidelines;
• planning and land development regulations;
• financing mechanisms; and
• operations, maintenance, and enforcement measures.

Examples of development tools

The following examples from smaller communities provide an indication of what can be found in the Synthesis.

**Salisbury, NC Sidewalk Program (pop. 33,662).** Salisbury, a city in rural Rowan County, North Carolina, adopted a land development ordinance that requires developers to construct sidewalks along both sides of any new or existing street associated with their project. The ordinance allows developers the option to pay a fee toward construction of sidewalks elsewhere in the city rather than constructing the sidewalk with their project. Salisbury has developed a “Sidewalk Priority Index” to identify the most appropriate projects to fund with the collected fees. This ordinance was passed in 2007 in accordance with the city’s long-range vision for providing a continuous, seamless network of sidewalks around town. Initially the ordinance was met with opposition from the local development community. To overcome this, the city engaged elected officials, the planning department, residents and the development community to refine the policy. After nearly four years of collaborative input and many drafts, the sidewalk ordinance was eventually passed with widespread support.

**Big Lake, MN Downtown Design Standards (pop. 9,422).** The Big Lake Downtown Framework Plan and Design Guidelines were adopted in 2004 which included specific regulations for pedestrian streetscape improvements. The standards address aesthetics, safety and network connectivity. Examples of aesthetic standards include attractive streetscapes, and pedestrian-scaled street lighting for the downtown area. Also, street-facing parking lots are discouraged due to their visual impact on the area and to avoid the breaks in sidewalks caused by curb-cuts for vehicle entrances and exits. Parking is instead designated to the side and back of buildings. Proposed projects are required to provide convenient connections to the existing sidewalk network.

Main takeaways

The NCHRP synthesis contains the following key takeaways for initiating local pedestrian policies and regulations:

• **Support from high-ranking agency leaders and elected officials is crucial.** A local champion with some authority, such as the city engineer or a planning commissioner, was found to make the political process easier to navigate. Such leadership will reinforce with city staff that pedestrian safety is a community priority.

• **Formal policy guidance serves an important role in backing up development regulations.** This guidance can be delivered in comprehensive plans, action plans, policy statements, or other documents that provide departments and their staff with clear direction. As seen in the Salisbury example, shifts in policy can be difficult to craft and implement, but once in place can lead to positive outcomes. Setting and implementing a new policy often relies on cooperation among various city departments. Public works, parks and recreation, and planning and development may all be involved in setting policy and priorities. A good working relationship and common goals among various city departments is important.

• **The importance of public outreach in developing pedestrian-related policy cannot be over-emphasized.** Meaningful participatory processes with the general public can become the driving force in implementing new local pedestrian
Traffic-Activated Signs Flash a Warning About Approaching Cross Traffic

By Lisa Harris and Nora Fairchild

Let's say you are trying to improve safety at a two-way intersection in a rural area. The through-road has a speed limit higher than 45 mph and the intersection has low visibility or a history of severe crashes. You may want to consider installing a **Through-Route Activated Warning System**. This system is designed to reduce right-angle collisions and create safer stop-controlled intersections.

The warning system goes beyond customary signs and markings; it uses Intelligent Transportation System (ITS) technology to alert drivers on the through-route that a vehicle is about to cross at an approaching intersection. Vehicles about to cross the route trigger flashing LED lights on a sign on the through-route for extra visibility. The sign may say “Watch for Entering Traffic” or something similar.

In Missouri these signs have cut stop-controlled intersection crash rates in half and have reduced severe crashes by 77 percent at those locations. The technology is also used in North Carolina where it has been reliable and easy to maintain. Similar devices have been installed at a few locations in Kansas.

Some states are trying a new system that communicates with side-traffic instead, alerting drivers to vehicles approaching on the through-route. It is important to note that both types of systems indicate when it is unsafe to proceed, not when it is safe to proceed. Driver judgement is still needed.

A simple Through-Route Activated Warning System without camera detection costs between $15,000 to $35,000 per intersection to install. For questions about this technology, contact Rosemarie Anderson, FHWA Office of Safety, (202) 366-5007, or individuals in the states that have implemented the technology. Their contact information is in the FHWA fact sheet listed at right.

The Kansas Experience

We asked KDOT’s, Brian Gower (785-296-1181) if there are any Through-Route Activated Warning Systems in Kansas, and if yes, how they are working. Gower said Kansas has 3 similar systems in place along 4-lane divided Kansas highways.

One example is at K-10 and the East Hills Business Park near Lawrence, KS. If a vehicle is on the side street, in the median or left turn lane, beacons are activated on cross-road warning signs indicating to drivers along K-10 there is crossing activity at the intersection. Camera detection is used at this location.

Another example is along US-75 at Mayetta, KS. Two locations, 158th and 162nd, have systems installed. If a vehicle is on the side street or in the median, beacons are activated on cross-road warning signs indicating to drivers along US-75 there is crossing activity at the intersection. In-pavement puck detectors are installed at these two locations.

KDOT has seen no significant change in the frequency of crashes at K-10 and East Hills Business Park, but there has been a significant change in crash severity. “Side swipe and fixed object crashes have occurred, but no major angle crashes to our knowledge,” Gower said. “We need to update our crash analysis to determine the crash history for more recent years.”

Gower said it is too early to tell about the Mayetta locations. It has taken a number of months to determine and work through issues to get the system to function properly. The system has been functioning as expected over the last few months, he said.

In general, KDOT is pleased with the systems they have in place. “There are more complicated systems introduced at locations throughout the nation which we have not pursued to this point. Cost, and making sure these systems work as expected, can be a challenge,” said Gower.

Source:

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Sources:
Over the last several years, the Kansas LTAPs Roadway Safety Assessment (RSA) team has performed safety assessments at several sites in several counties in Kansas. One of those, Douglas County, has implemented low-cost safety treatments suggested by the team at three of their sites. These improvements were made in late November 2009—nearly 2½ years ago—enabling us to conduct a before-and-after assessment to evaluate the effectiveness of the RSA-suggested treatments at these test sites. This article will review the results.

Safety concerns and treatments
The improved sites are at combined horizontal-vertical curves that were experiencing roadway-departure crashes, sometimes with injuries.

The RSA team suggested low-cost safety treatments such as installing chevron signs, realigning and/or modifying the existing warning signs, and more. The team also included some pricier alternatives, such as improving the cross-section of ditches and the roadway itself, and even reconstruction to flatten the horizontal curves—all to provide a range of safety solutions that might fit the county's budget. The County decided to implement the low cost improvements at first, to assess the improvements provided by those solutions before considering more expensive options.

The results
Following is the crash history for the 9-year period prior to the implementation of the safety improvements at each improved site (2001–2009), along with the reduction in crashes experienced at those sites during a 2½ year period after completion of the suggested safety improvements (January 2010 through June 2012).

- At Site #1, the annual average number of crashes was 1.0 per year for all crashes and 0.56 per year for injury crashes; This site has had a 60 percent reduction in total number of crashes with a 100 percent reduction in number of injury crashes.

- At Site #2, the annual average number of crashes was 0.89 per year for all crashes and 0.11 per year for injury crashes; This site has had a 10 percent reduction in total number of crashes with a 100 percent reduction in number of injury crashes.

- At Site #3, the annual average number of crashes was 1.22 per year for all crashes and 0.56 per year for injury crashes; This site has had a 100 percent reduction in crashes, including injury crashes.

Based on this simple crash analysis, implementation of the RSA-suggested improvements appears to have not only reduced the total number of crashes, but also the severity of the crashes that occur at each of these sites.

Would you like to see results like this in your jurisdiction? Kansas LTAP's RSA Program is available to any local government in Kansas. It is a free service. For more information, contact Mehrdad Givechi, RSA team leader, at mgivechi@ku.edu or (785) 864-2593.

At the site below, the county replaced the object markers and directional arrow with a series of chevrons to alert drivers to a sharp curve at the top of the hill.
Here, a T-intersection sign was replaced with a sign that indicates a road intersects the curve ahead. The new sign does a better job of alerting drivers to the approaching blind curve.

This angled intersection was re-designed using a low-cost grass median to create a more conventional right-angle intersection. An arrow sign was added to indicate that vehicles should turn to approach the intersection.

Report from MINK

By Darryl Lutz, Butler County Director of Public Works

MINK 2012 was not the same MINK conference that I have been used to attending ... because it keeps getting better ... the best I have attended. The agenda this year offered numerous practical programs on real issues that County road officials deal with every day. It seemed like virtually every program provided something that I can actually take back home and use. And when I use the term “practical,” I mean that the programs offered beneficial, easy-to-use or low-cost ideas for the things that we do every day as County road and bridge officials.

The conference has an ideal format that allows for easy travel. The St. Joseph location is easy to get to from just about anywhere in the 4-state region with just a few hours travel and one night of hotel. The hotel/venue is very affordable and accommodates the guests and attendees very well.

I look forward to next year’s conference and highly recommend all of my counterparts with the Kansas County Highway Association to put this conference on your “Must Attend List” for next year.

Kansas by far had the best showing among the MINK states, but it was nice to hear from and share with our counterparts from Missouri, Iowa and Nebraska as well as from the presenters.

Kudos to Gary Rosewicz, Riley County, KS, for the work he does to promote this conference and for serving on the planning committee to help make sure MINK has good programs that make it worth the time to attend. I appreciate the work of Kansas LTAP and its counterparts for organizing and hosting this conference. And thanks to the Kansas County Highway Association for financially supporting and promoting attendance at this conference.
Got a Safety Problem? Get Some Free Help

By Lisa Harris

What if your local agency needs an engineering study for a traffic safety problem, and your engineering department is short-staffed? Or you don’t have an engineer on staff or the funds to hire one. Or you need an outside study on a controversial traffic safety issue. KDOT can help. Through “TEAP,” its Traffic Engineering Assistance Program, KDOT can arrange to have the study conducted for you at no cost to you other than minimal staff time in collecting pertinent data for the consultant (plans, crash records, etc.). The program is available to any city, county or township in Kansas that needs special assistance with a traffic engineering study.

A wide range of traffic safety and operations problems are eligible for study, including but not limited to:

- crash analysis
- traffic counts
- speed surveys
- traffic-calming analysis
- minor traffic generation studies
- parking problems
- capacity analysis
- lighting and visibility analysis
- railroad crossing issues
- traffic signal progression and delay problems
- alignment and sight distance problems
- pavement marking analysis
- school signing and markings
- traffic control device needs study
- major street operational analysis
- limited transit analysis

Over the last five years, TEAP has funded 82 safety studies, performed statewide. We interviewed a few recipients to share their experiences using the program.

Comments from some TEAP recipients

Barton County has used TEAP many times over the years. Clark Rusco, public works director, also used the program when he was city engineer for Great Bend.

Barton County has had TEAP safety studies for corridors, traffic control devices, railroads crossings, and intersections, to name a few. Several studies were conducted near the community college, an area that sees higher traffic.

For Rusco, one especially memorable study was regarding signs in a township in Barton County. Rusco learned that the township was being sued over one of their stop signs—placed without the benefit of an engineering study. In fact, none of the townships 90+ stop signs had an engineering study, which is required by law. So the county applied for a TEAP study to determine which signs were warranted. The study recommended removing many of the signs.

The City of Hays has had five TEAP studies conducted in the last dozen years, and even more before that, said John Braun, assistant public works director. Some studies have analyzed safety and access on the city’s main commercial corridor, Vine Street.

Several studies around the city were conducted on whether to add, upgrade or remove signals. An example is in their historic downtown area which used to have more commercial traffic than it does now. The existing signals are no longer warranted, and the TEAP study suggested that the signals be removed. The city typically adopts TEAP recommendations, but this is one case when it did not. “There seems to be some nostalgia about those signals; the commissioners do not want to remove them,” said Braun.

Douglas County has an engineering division and does not normally need help for routine work. But an outside opinion can be helpful for a unique situation. Terese Gorman, engineering division manager, said the county had a TEAP study done at a 4-legged intersection where the intersecting roads have stop signs and the county road is a through route. What makes the intersection unique is that the county route has a 90 degree turn at that location. The county had received reports of close calls at that intersection, and there was one serious crash there. The study was done, and the county is considering the consultant’s recommendations. Gorman said she appreciates the opportunity to have a traffic engineer look at a project and perhaps suggest something the county had not thought of.

Jackson County has received TEAP funding for several studies, many of them related adding stop signs or changing stop to yield signs. One such study was in response to a request to change the stop signs at a 2-way stop from east-west to north-south, because a business has closed in the area and the traffic pattern had changed. Jackson County determined that the change was not necessary, and the TEAP study backed that up.

Randy Pool, road and bridge administrator, said it’s helpful to have an outside study in such cases, especially because the county has no engineer on staff. “It gives us better justification for why we do something,” he said.

Jackson County also had a TEAP study performed after a fatal run-off-the-road crash to see if there was anything wrong with the road. The study concluded that, although the bridge box at that location could be wider, the road did not need to be redesigned. (The crash involved excessive speed.)

The City of Salina had a TEAP study done this past summer at an intersection with congestion and a crash history. The city provided the surveying and some other work for the study.

Dan Stack, city engineer, said Salina does not have a specially-trained traffic engineer on staff, and it was good to get a 35-yr veteran with traffic expertise to do the study and make recommendations. The consultant gave the city three alternatives to consider, and they chose the middle-ground option. Salina received transportation safety funding from KDOT to help improve the intersection.
Bridge Quiz Part 2

By Lisa Harris

In our last issue, Part 1 of our Bridge Quiz had you match bridge-structure names with their photographs. This time we’re testing your knowledge about certain types of bridge structures on our local roads. See results on page 14.

1. What is the most common type of bridge structure on the local road system in Kansas?
   a. concrete slab
   b. steel stringer/girder
   c. concrete culvert

2. What is the second most common type?
   a. concrete slab
   b. steel stringer/girder
   c. concrete culvert

3. How many steel through-truss bridges are in Kansas?
   a. About 200
   b. About 400
   c. About 600

4. How many timber/stringer bridges are in Kansas?
   a. About 500
   b. About 700
   c. About 900

5. How many steel culvert structures are in Kansas?
   a. Less than 25
   b. About 225
   c. More than 550

6. Masonry bridge structures are relatively rare in Kansas. Do we have more masonry bridges or (bridge length) masonry culverts in our state?
   a. bridges
   b. culverts

7. Which material is more common in stringer/girder bridges in Kansas?
   a. steel
   b. concrete

8. Bonus question: Name that bridge! What structure type is shown above and what is its common name?

   KDOT’s Bureau of Local Projects has developed a Powerpoint presentation that lists the top 12 most prevalent types of off-system bridges in Kansas and show several different photographs of each type. This is a good resource for your bridge crew. A PDF of that presentation is posted at the Kansas LTAP website at http://www.ksltap.org under “What’s New” and “Resources to Download.”

Sources:
- Interviews: Lynn Berges 8-16-12, John Braun 12-13-12, Clark Rusco 12-13-12, Terese Gorman 12-17-12, Randy Pool 12-17-12, Dan Stack 12-19-12.
MORE

By Lisa Harris

See download / ordering information on next page.

Best Practices: Crack Filling/Sealing
A best-practice tutorial on crack filling and sealing, including safety precautions to follow while on the job. Ohio DOT, 2011. DVD. 18 minutes.

Asset Management and Safety Peer Exchange Report
A report on a national peer exchange hosted by FHWA and AASHTO to address how to improve safety through better asset management, how to effectively manage safety assets, and how to budget for them. Includes discussion of sign management systems. 53 pages. FHWA, September 2011.

Roadway Safety+: A Road Construction Industry Consortium Training Program
Provides an overview of common hazards in road construction and simple prevention measures. It is designed for use by supervisory personnel to orient new workers as they arrive on the job site. In English, Spanish, and Portuguese. CD-ROM.

ANSWERS TO BRIDGE QUIZ ON PAGE 12:
1=C (3757 concrete slab, 5784 steel stringer/girder, 5994 concrete culvert); 2=B; 3=B (472); 4=C (980); 5=B (229); 6=A (127 bridges, 41 culverts); 7=A (5784 steel, 823 concrete); 8=Reinforced Concrete Thru Arch, Tied (RTAT) – or Rainbow Marsh Arch bridge.

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FREE ROAD & BRIDGE RESOURCES

Check off your selections, fill in the bottom portion, and return this form to:
Kansas LTAP Materials Request, 1536 W. 15th St., M2SEC Building, Room G520, Lawrence, Kansas 66045 or fax to 785/864-3199

TRAINING GUIDES & REPORTS
You are free to keep these unless otherwise noted. Or you can download at the links provided.

Best Practices: Crack Filling/Sealing
❑ request DVD for loan.

Asset Management and Safety Peer Exchange Report

Roadway Safety+: A Road Construction Industry Consortium Training Program
See description on page 14. FHWA, AASHTO and industry partners. CD-ROM. Download at http://www.workzonesafety.org/training/courses_programs/rsa_program or ❑ request DVD to keep.

Safety Edge: Your Angle for Reducing Roadway Departure Crashes
This video introduces a cost-effective treatment for helping vehicles recover to the travel lane if they have drifted off the side of the road. FHWA, 9 minutes. Watch at www.youtube.com/watch?v=asy33BGQwUw or ❑ request DVD to keep.

EQUIPMENT LOANS
We offer the following items for loan to local highway agencies. Contact mgivechi@ku.edu for counter boards and weaver@ku.edu for the Safety Edge shoe. There could be a waiting list for these items.

Safety Edge Paving Shoe. This Advant-Edge shoe attaches to a paver with a universal bracket, provided with the shoe.

Turning Movement Counter Board DB-400, Jamar Technologies, Inc. A basic model for recording turning movements at intersections. The board is lightweight and comes with its own case.

Turning Movement Counter Board TDC-8, Jamar Technologies, Inc. Can be used to do turning movement counts, classification counts, gap studies, stop-delay studies, speed studies, and travel time studies. The board is lightweight and comes with its own case.

Our library of free reports and training videos is searchable online. Visit http://www.ksltap.org. Click on the “Lending Library” to search the catalog and place your order.

REQUEST FORM
❑ send materials indicated ❑ address correction ❑ add to LTAP Newsletter mail list ❑ send Road Scholar Program brochure
❑ add to KS LTAP email discussion list

Name ___________________________________________ Phone number ________________________________

Position __________________________________________ E-mail address _______________________________

Agency ______________________________________________________________________________________

Street Address __________________________________________________________________________________

City __________________________ State ______________ Zip + 4 __________________________

*For requests outside the United States: After receiving your request, we will notify you of the postage cost and will send materials after receiving payment for postage.