Kansas
LTAP Fact Sheet
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How to Address Roadside Hazards

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This article will help local agencies identify fixed-objects along the roadside that are considered potential hazards, and offer a number of suggestions to reduce the frequency and/or severity of the road departure crashes.

Based on 3-year crash data (2010– 2013) published by KDOT, on average, nearly 110 people in Kansas are killed annually and another 3,500 are injured in roadway departure crashes involving roadside fixed-objects. This accounts for nearly 30 percent of all fatalities statewide. http://www.ksdot.org/bureaus/burtransplan/prodinfo/accista.asp

When it comes to improving safety for road departure crashes, the primary objective is to keep the vehicles from leaving the road in the first place, through measures such as signage, pavement markings, delineation, and rumble strip/stripes. In reality, however, some road departures still occur. To help make the road safer for these motorists, roadsides should be designed and/or retrofitted, when possible, to have a sufficient "clear zone" with recoverable slopes— free of any hazardous fixed-objects.

Potential roadside hazards

A number of fixed-objects along a roadside can be considered potential hazards to the road users. Most typical objects include:

- Ditches
- Curbs
- Utility poles
- Median barriers
- Sign posts

What is a clear zone?

The Roadside Design Guide, 4th Edition, 2011, published by the American Association of State Highway Transportation Officials (AASHTO) defines clear zone as "the unobstructed, traversable area provided beyond the edge of the through traveled way for the recovery of errant vehicles. The clear zone includes shoulders, bike lanes, and auxiliary lanes, except those auxiliary lanes that function like through lanes." It further states that the clear zone distance varies depending on the traffic volumes, speed, and roadside geometry.

Photos courtesy of Saline County

This is an example of a clear zone with a roadside hazard. This could be made safer by installing a break-away post and switching out the alma mater logo for paint on the mailbox, or a flag.

According to the Roadside Design Guide, on a low-speed, low-volume rural roadway, the clear zone distance can be as little as 7 feet, whereas on a high-speed, high-volume freeway the distance can be as high as 46 feet or more. In urban areas, however, where the speeds are much lower and the environment is much more constrained (limited right-of-way, presence of sidewalks, on-street parking, street furniture, and etc.) the minimum lateral offset from face of the curb to the obstruction is 1-1/2 feet, although 4 to 6 feet is preferred.

ADDITIONAL RESOURCES ON ROADWAY DEPARTURES

- **Kansas Strategic Highway Safety Plan, Roadway Departure Chapter.** Contains strategies for reducing roadway departures in Kansas. pp. 44-50. http://www.ksdot.org/Assets/wwwksdotorg/bureaus/burTrafficSaf/reports/reportspdf/SHSP.pdf
- **Roadway Safety Guide: A Primer for Community Leaders,** The Roadway Safety Foundation, 2014. www.roadwaysafety.org
- **Road Safety Fundamentals,** U.S. Department of Transportation, Federal Highway Administration, FHWA SA-05-011, September 2005.
- **Safety and Trees: The Delicate Balance.** FHWA-SA-06-12. 2006.
- **Toolbox of Countermeasures and Their Potential Effectiveness for Roadway Departure Crashes,** U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-07-013, Issue Brief, August 2008.
- **Road Management and Engineering Journal,** March 2000, TranSafety, Inc. http://www.usroads.com/journals/rmej/0003/rm000301.htm
- **Time to Fix Roadside Safety Hazards,** Crossroads Newsletter, Winter 2000. Wisconsin LTAP, University of Wisconsin-Madison. http://epdfiles.engr.wisc.edu/pdf_web_files/tic/Crossroads/xrds_2000_1.pdf
- **Improving Roadside Safety – Part 1,** NYMIR Handbook, December 2003. http://contextsensitivesolutions.org/content/reading/improving-roadside-safety/resources/improving-roadside-safety/

- Guardrails
- Trees
- Fences / Gates
- Bridge rails
- Culverts ends / headwalls
- Embankments / Bridge Piers
- Mailboxes
- Edge drop-offs

What fixed objects are hit the most frequently in Kansas?

According to 2010-2013 crash data published by KDOT, the highest number of fixed-object crashes involved ditches, with an annual average of 1,480 crashes per year, followed by curbs at 1,200 crashes per year, utility poles at 1,050 crashes per year, dividers and median barriers at 1,020 crashes per year, and sign posts at 870 crashes per year. http://www.ksdot.org/bureaus/burtransplan/prodinfo/accista.asp

What to do about roadside hazards

Before you take any action on how to treat an existing fixed-object along a roadside, ask yourself the following questions:

- Is the fixed object located in the clear zone?
- Is it considered hazardous?
- Can you remove the hazard?
- Can you relocate it to where it is less likely to be hit?
- Can you reduce crash severity if the object is hit?
- If you cannot remove, relocate, or modify the hazard, is adding a guardrail feasible? If not...
- Would delineation help guide drivers around the hazard particularly at night and in low visibility conditions? Examples of delineation include retroreflective tapes on utility poles; and object markers at the end of culvert headwalls.

The order in which a hazardous fixed object in the roadside clear zone should be mitigated is:

- Remove it
- Replace it
- Relocate it
- Redesign it
- Shield it
- Delineate it

The first three solutions are the preferred choices, but can be costly to do and are not always practical, especially for supports for roadway signing or lighting that need to be near the roadway to serve their intended functions.

The last option, delineation, falls in the category of low-cost safety improvement recommended as a minimum mitigation measure. The roadside hazard stays in place but it becomes easier to see.

Use a systemic approach to roadside improvements

To get the best bang for your buck, prioritize your road safety improvements using a systemic (proactive) approach to safety rather than the traditional safety method that is more site-specific (reactive). What this means is that you plan and implement improvements on your road system considering risk factors as well as crash history. The risk can be assessed based on the likelihood of crashes using factors such as:

- Roadside features;
- Prevailing speed;
- Traffic volumes; and
- Location of the obstacle (hazard)

Once higher-risk locations are identified, the local agency can be proactive and make low-cost safety improvements at these locations, whether there has been a crash at a site or it's a "crash waiting to happen."

For additional information on the systemic safety approach refer to these publications:

Developing Safety Plans: A Manual for Local Rural Road Owners, U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-12-017, March 2012. http://safety.fhwa.dot.gov/local_rural/training/fhwasa12017/

Systemic Safety Project Selection Tool, U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-13-019, July 2013. http://safety.fhwa.dot.gov/systemic/fhwasa13019/.

Conclusion

Just as roads can be dangerous if they are not well designed, so can roadsides. Local agencies should become aware of the roadside hazards in their jurisdictions and take steps to mitigate them. We hope this article provides some food for thought in getting started.

For more information, or if you have questions about a particular roadside hazard in your area, contact Mehrdad Givechi, safety engineer at Kansas LTAP at (785) 864-2593 or mgivechi@ku.edu. ■

FUNDING FOR ROADSIDE SAFETY IMPROVEMENTS

High Risk Rural Road (HRRR) funds, available from the KDOT Bureau f Local Projects (BLP), have been used for removal of fixed-objects in clear zones. Nelda Buckley, local road engineer with BLP, shared with us the following locations where removal of fixed-objects has been implemented in the past three years or so. In most cases this would involve extending culverts/boxes as part of a larger project, she said.

- Rooks County – hand rails and tree removal
- Saline County – grading, surfacing, bridges, etc.
- Sedgwick County – removal of bridge rail
- Miami County – lower roadway elevation
- Montgomery County – culvert extensions
- Butler County – realignment
- Montgomery County – new box, pipe, ditch lining

For more information on the High Risk Rural Roads Program and its application process, go to: https://www.ksdot.org/Assets/wwwksdotorg/bureaus/burLocalProj/BLPDocuments/Programmatic_FHWA_BLP.pdf

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Sources:

- KDOT's Accident Statistics. http://www.ksdot.org/bureaus/burtransplan/prodinfo/accista.asp
- Roadside Design Guide (4th Edition), American Association of State Highway and Transportation Officials (AASHTO), 2011.
- Low Cost Safety Improvements Blended Approach, National Highway Institute (NHI) Course No. 380083, U.S. Department of Transportation, Federal Highway Administration, FHWA-NHI-08-109, March 2009.
- Developing Safety Plans: A Manual for Local Rural Road Owners, U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-12-017, March 2012. http://safety.fhwa.dot.gov/local_rural/training/fhwasa12017/.
- Systemic Safety Project Selection Tool, U.S. Department of Transportation, Federal Highway Administration, FHWA-SA-13-019, July 2013. http://safety.fhwa.dot.gov/systemic/fhwasa13019/.

Some Examples of Dangerous Fixed Objects

- Ditches that are non-traversable (steeper than 3:1, horizontal:vertical).
- Sign posts that are not crashworthy (wood posts larger than 4 inch X 4 inch with no weakening holes) or not breakaway (metal posts).
- Trees with trunks 4 inches or more in diameter.
- Mailboxes with wood posts that are larger than 4 inch X 4 inch.
- Mailboxes with metal post that are embedded more than 23.6 inches in the ground and are stronger than 2 inch diameter standard strength steel.
- Pavement edge drop-off greater than 2-1/2 inches.

Source: Low Cost Safety Improvements Blended Approach. National Highway Institute (NHI) Course No. 380083. U.S. DOT Federal Highway Administration. FHWA-NHI-08-109. March 2009.