

KDOT Proposal for Systematic Use of HRRR Funds

BACKGROUND INFORMATION

Since the passage of the SAFETEA-LU legislation, KDOT has attempted to effectively use the allotment provided for the High Risk Rural Roads (HRRR) program in Kansas while allowing the counties to propose projects that address what they believe are their most pressing needs for safety. At the start, it was understood from the direction given by FHWA Kansas Division that this program was to be used for projects to address site-specific issues, supported by documented crash records that indicate a history of fatal and severe injury crashes that exceed the statewide average for similar roads. In addition, the funding could not be used to make low-cost corridor improvements without data to indicate that proposed improvements would be likely to result in reduction in fatalities and severe injuries. It was also suggested that we set a funding cap so that the money could be distributed across the state.

KDOT has attempted to administer this program for the past several years by focusing efforts on addressing site-specific safety issues. Counties who want to participate in the program are required to apply for a project and provide supporting documentation. A method for evaluating each project individually was set up with weighted scoring for: 1) meeting the intent of HRRR (25%); 2) addressing existing crash patterns (25%); 3) cost effectiveness/ low cost improvement (20%); 4) corridor improvement (10%); 5) rural/local impact (10%); and 6) ineligibility for other funding (10%). Although we received forty nine project proposals since the beginning of our HRRR program, only twenty five have been deemed to have adequately met the merits for receiving HRRR funding, due in large part to the lack of site-specific data and the randomness of crashes on the county road system. As a result, KDOT has not been able to fully utilize all of the HRRR funds that have been made available.

To determine whether it would be possible to pinpoint specific eligible sites, KDOT used data of eligible HRRR crashes from our accident database to manually plot several counties to attempt to determine whether a pattern could be identified. However, it was found that in nearly every instance a discernable crash pattern could not be recognized. When KDOT hired a data analyst to work specifically on safety related issues, a process was developed to statistically identify which counties should be included in the Transparency (5%) report. However, even with this new information, existing correctable crash patterns are rarely evident. The attached state map showing the locations of crashes on non-state roads demonstrates the randomness of the occurrences. Drilling deeper into the data shows that very few of the crashes occur on the same road, let alone at the same site.

Since this information is now available and part of the Transparency report, KDOT has begun to offer a Road Safety Assessment (RSA) to counties for identified corridors as part of the HRRR program. Based on the mixed response we have received from the counties on performing RSAs and the limited number of viable projects received, there continues to be a need to develop another approach that will allow use of the HRRR funds but reduce the burden of having to produce site-specific data to support an action. It appears that, without taking a different approach, we will continue to struggle with utilizing the available funding and making safety improvements to the rural roads of the state. As a result, KDOT is requesting FHWA Kansas Division's approval of a systematic approach to address the crash conditions that most commonly result in fatalities or severe injuries on the county roads of the state.

The statutory definition for HRRR can be found in 23 U.S.C. §148(a)(1). States are required to identify these roadways (and expend the HRRR funds) according to the following definition:

"...any roadway functionally classified as a rural major or minor collector or a rural local road --

- A. on which the accident rate for fatalities and incapacitating injuries exceeds the statewide average for those functional classes of roadway; or
- B. that will likely have increases in traffic volume that are likely to create an accident rate for fatalities and incapacitating injuries that exceeds the statewide average for those functional classes of roadway."

A FHWA memorandum by Jeffrey A. Lindley, Associate Administrator for Safety dated May 19, 2006, provided guidance to implementing a HRRR program. It states in part b. ii. 2. of IV. Two Step Process: Identify Eligible Roadways and Analyze the Highway Safety Problem: STEP TWO: Analyze the Highway Safety Problem With Available Tools and Information, “Corridor analyses that identify systematic safety improvements. For instance, where crash and/or roadway data suggest that many crashes occur given a certain type roadway feature, a State may systematically implement an appropriate countermeasure that would improve safety conditions on the respective roadways.”

Following is a summary of KDOT’s proposal for a systematic HRRR program to address roadway departure crashes on rural county roads.

PROPOSAL

In order to provide for the prudent use of HRRR funds and to build a successful HRRR program at KDOT, we have researched the most common problems that lead to fatalities and disabling injuries on our non-state rural roads. The data that we have compiled for the years 2005-2008 indicates that the most common rural non-state fatality crash type is collision with a fixed object. Also, the top two locations for fatalities are non-intersection and the roadside. [See Figures 1 & 2]

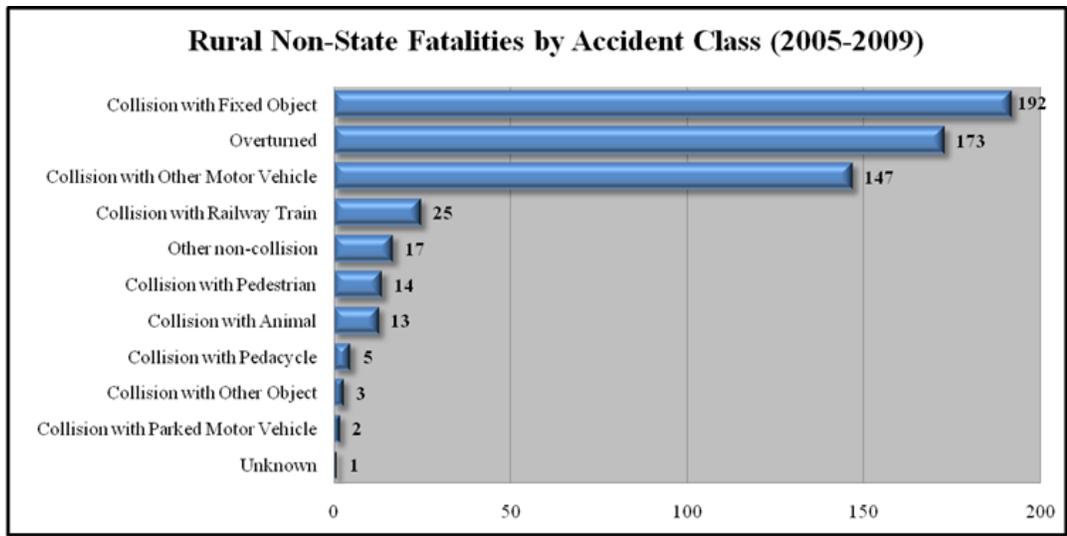


Figure 1

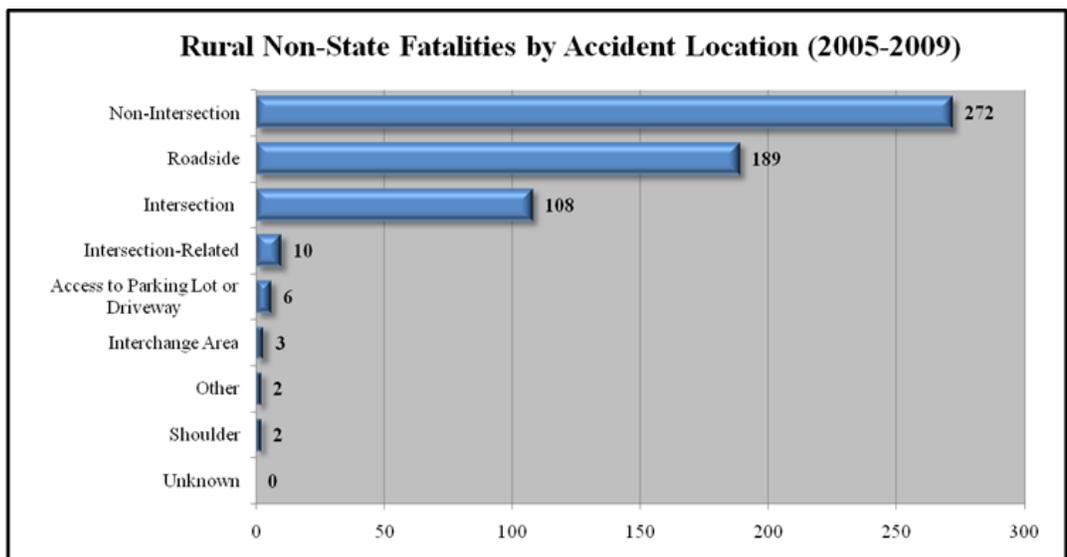


Figure 2

We request FHWA’s approval for KDOT to use a systematic approach for using HRRR funds to reduce the risk of a vehicle colliding with a fixed object when it leaves a roadway on rural collector roads. This systematic approach would allow use of the funds without the need for site-specific data for each project location. This proposal was developed by KDOT working with the Kansas County Highway Association (KHCA).

The focus of this effort will be to mitigate the results of roadway departures by making the roadside more recoverable and to address some of the fixed objects most frequently impacted resulting in a fatality. Figure 3 lists the different fixed object collisions and their frequency, along with the fatality frequency, for the years 2000-2008 (A numerical breakdown of this graph is attached to this request). The top seven categories for crashes and fatalities are: trees; embankments; ditches; utility poles; barriers; fences/gates; and culverts. In looking at the frequency of fatalities, these seven categories of fixed objects account for 91.7% of the fatalities. It should also be noted that these collisions tend to be more severe, as these are only 87.2% of the total crashes.

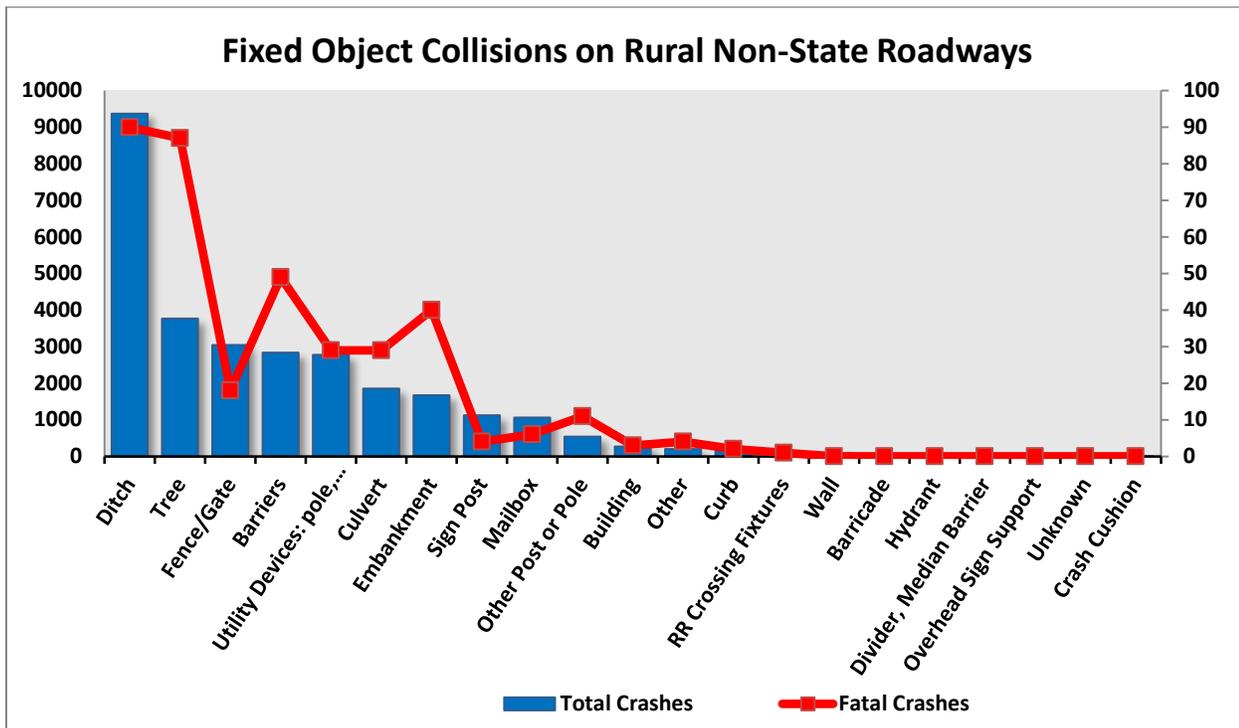


Figure 3

For this program, we propose to approach improvements concerning clear zones targeting three categories that account for 44.2% of fatalities: Trees (23.3%), Barriers (13.1%), and Culverts (7.8%). We believe these categories can be addressed with projects of reasonable cost. At this time we feel that it would not be a practical use of the HRRR funding to include in a systematic approach to address Embankments and Ditches because of potential environmental impacts and need for acquisition of rights of way. Also, Utilities and Fences/Gates are generally located at the edge of the rights-of-way and owned by another party, so incurring costs to relocate these items is not recommended for a state-wide program. However, excluding these four categories from our systematic request would not affect selection of these improvement projects on an individual basis.

The recommended approaches for the four categories selected to improve the roadside clear zone, which include removal of certain fixed objects and construction of edge treatments in order to make roadsides more recoverable, are explained and illustrated in more detail in the following paragraphs.

Edge Treatment

Pavements improve ride quality but can reduce a driver's ability to safely redirect the vehicle back onto the road if the edges are left near vertical. Drivers trying to regain control after inadvertently dropping a tire over the edge frequently have difficulty with a steep vertical edge and may lose control of the vehicle, possibly resulting in severe crashes. Making the adjacent non-paved surface flush with the paved surface alleviates this problem, but a vertical edge may appear due to erosion or wheel encroachment, especially along curves. We propose to allow use of HRRR funding to pay for the cost attributed to constructing safety edge and/or rumble strips/stripes on paved county roads that have evidence of vehicle departures. Adding the safety edge as a countermeasure to the HRRR program will allow a smoother transition back into the travel lane to be constructed, reducing the likelihood of a collision with a fixed object. Rumble strips/stripes provide both auditory and sensory feedback to the driver that the vehicle is beginning to depart from the driving lane. Alerting the driver to the pending exit from the roadway provides an opportunity for redirection of the vehicle back to the intended path.



Trees

Second only to ditches in both fatalities and total crashes on the Kansas local system, trees could be one of the least expensive problems to rectify while possibly providing for a large reduction in fatal crashes. Trees are one of the most disproportionate statistics for on the local system with 23% of the fatalities, but only 13% of the total crashes. When comparing the amount of collisions with trees with the state system, a greater proportional comparison is found. The local system had around 3769 tree crashes resulting in 87 fatalities from 2000-2008, but the state system had about half as many tree crashes as the rural off-system. A program to allow for clearing and grubbing of trees will also have a secondary benefit of reducing animal collisions by removing cover adjacent to the roadway and allowing drivers to react to the animal sooner. We propose to allow use of HRRR funding for a county to execute a corridor-wide project to remove trees within a reasonable clear zone that will be determined on a project-by-project basis.



Barriers

Barriers are the third most common object impacted in rural ran-off-road (ROR) fatalities. They are also disproportionate like trees when comparing fatalities with total crashes. Collisions with barriers are 13% of fatalities, but are only 10% of the total crashes. Many times on the local system, a roadside barrier such as a culvert

headwall or substandard guardrail poses a greater risk to drivers and passengers in errant vehicles than impacting the area that the barrier was originally designed to protect. Removing headwalls and improving deficient guardrail by either upgrading or removing it is a relatively low-cost solution that can dramatically improve the safety of a corridor. We propose to allow use of HRRR funding for a county to develop and execute a corridor-wide project to address their existing deficient barriers. The primary references for decision-making in this area will be two K-TRAN projects, completed in the 1990s, that provide guidance on guardrails and bridge/culvert rails on lower volume rural roads based on cost-effective analysis.



Culvert Modification

While crashes with culverts consist of only 6% of the total crashes, they also have a higher percentage of fatalities than crashes (8%). These culverts may be across the road or may be located on an intersecting roadway or entrance. In areas where it may not be feasible to remove guardrail or headwalls on a crossroad culvert due to height or length, extending it may be a more prudent option. Although not as much of a low-cost solution to alleviating deaths and injuries as



are tree and barrier removal, lengthening culverts to allow for drivers to recover can help reduce the sixth most common reason for ROR fatalities. Another alternative would be to install traversable grates over the end of the culvert.



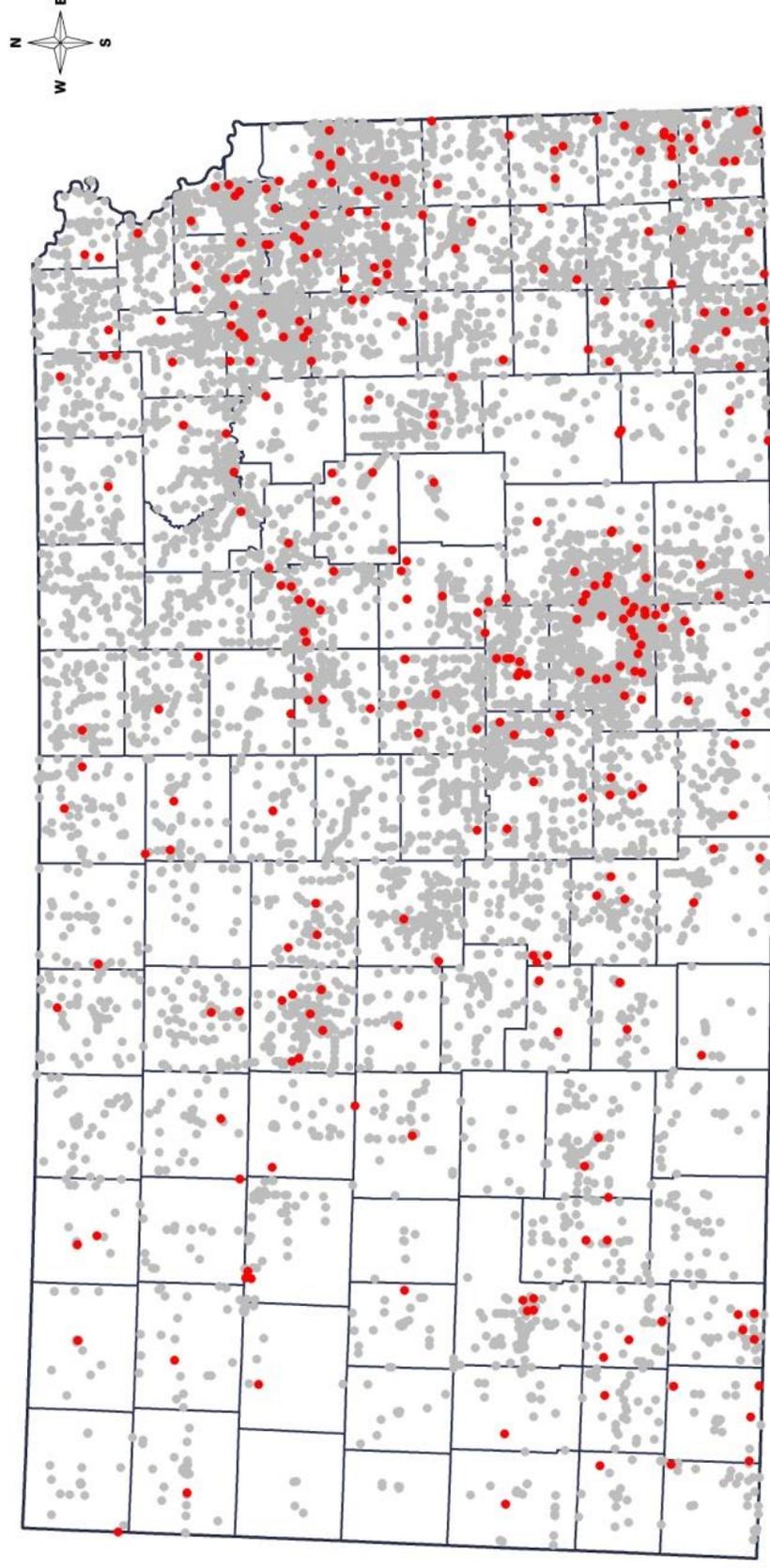
Many of the culverts on intersecting roads and entrances represent essentially a blunt object when impacted by a vehicle. These “parallel” culverts can be mitigated by either relocation to a location where it is less likely to be impacted or installation of a traversable grate. For this category we propose allowing use of HRRR funding for a county to address culvert issues, either on a corridor-wide or site-specific basis, without being required to provide site-specific crash data.

In order for our HRRR program to be effective with systematic projects, we will need to be able to set parameters for the selection of projects. In many cases, a generic acceptance of a project, such as total clearing of the R/W, may not be a practical solution. We would like to start our program with limiting these projects to rural roads classified as collectors. We would also use the Roadside Safety Analysis Program (RSAP) to verify that the expenditure of HRRR funds for the projects is a beneficial use of the money. The systematic nature of this proposal is not intended to substitute for routine practical maintenance, but is instead meant to provide initial intense means to reduce severe and fatal crashes while providing a basis for keeping the roadway maintained.

**DATA EXAMINED: RURAL NON-STATE CRASHES BETWEEN 2000 AND 2008
INVOLVING A LANE DEPARTURE AND COLLISION WITH FIXED OBJECT**

Rural/Urban	State/Non	Total Crashes	Fatal Crashes	Fixed Object
R	N	9367	90	Ditch
R	N	3769	87	Tree
R	N	3046	18	Fence/Gate
R	N	2830	49	Barriers
R	N	2770	29	Utility Devices: pole, meter, etc.
R	N	1849	29	Culvert
R	N	1669	40	Embankment
R	N	1117	4	Sign Post
R	N	1058	6	Mailbox
R	N	533	11	Other Post or Pole
R	N	270	3	Building
R	N	194	4	Other
R	N	171	2	Curb
R	N	120	1	RR Crossing Fixtures
R	N	79	0	Wall
R	N	66	0	Barricade
R	N	60	0	Hydrant
R	N	30	0	Divider, Median Barrier
R	N	12	0	Overhead Sign Support
R	N	10	0	Unknown
R	N	4	0	Crash Cushion

2008 Non-State Rural Motor Vehicle Crashes



Legend

- Rural Non-State Fatal Crashes
- All Rural Non-State Crashes