# Wyoming Rural Roads Safety Program

## *Focusing Locally on High-Risk Segments*

KHALED KSAIBATI, MATT CARLSON, AND DON BEARD

*Ksaibati is Director, Wyoming Technology Transfer Center, Local Technical Assistance Program, University of Wyoming, Laramie; Carlson is Highway Safety Engineer, Wyoming Department of Transportation, Cheyenne; and Beard is Director, Laramie County Public Works.*

A five-step procedure, including field evaluations, helps Wyoming counties obtain funding to improve the safety of rural roads.

Rural roads are critical links in the U.S. transportation system, serving the travel and commerce needs of approximately 60 million Americans. Approximately 80 percent of the nation's roadway miles traverse rural areas. Identifying high-risk rural road segments and determining the safety countermeasures that are most appropriate is an efficient and cost-effective way to improve highway safety.

### Problem

Many rural roads are experiencing traffic growth as a result of energy-related economic development; in Wyoming and North Dakota, for example, traffic volumes have increased significantly with drilling activities for oil and gas. Many of these rural roads, however, lack important safety features and experience a far higher rate of serious traffic accidents than other highways.

Approximately 60 percent of traffic fatalities nationwide occur on rural highways. Two-lane roads have the highest fatality rates per vehicle mile of travel.

### Solution

The University of Wyoming developed the Wyoming Rural Road Safety Program (WRRSP) to help counties identify high-risk rural roadways and develop a strategy to obtain funding to reduce crashes on the riskiest segments. The Mountain–Plains Consortium (MPC) and the Wyoming Department of Transportation (DOT) funded the development of the WRRSP in cooperation with the Federal Highway Administration (FHWA). A Local Road Safety Advisory Group, with representatives from Wyoming DOT, the Wyoming Local Technical Assistance Program (LTAP), the Wyoming Association of County Engineers and Road Supervisors, the Wyoming Association of Municipalities, and FHWA, supplied guidance for the program.

The pilot phase of the research involved data collection with the participation of Carbon, Laramie, and Johnson counties. The data collected included historical crash data and field conditions. The researchers and counties applied a five-step procedure, involving

1. Crash data analysis;
2. A Level I field evaluation, which examines the roadway's geometric design and its traffic control devices, producing a score of 0 to 10 in five categories;
3. A ranking system to identify potential high-risk locations, with the findings from Steps 1 and 2;
4. A Level II field evaluation to identify problem areas in each road section and determine appropriate countermeasures; and
5. A benefit–cost analysis.

Analysis of the crash data identified segments with proportionately higher crash rates during a 10-year period. A Level I field evaluation revealed deficiencies in geometric conditions and in the roadway shoulders, as well as in pavement markings and signage.

Roadway segments were ranked on a scale of 0 to 10 in five risk categories after the field evaluation:

1. General,
2. Intersection and railroad crossings,
3. Signage and pavement markings,
4. Fixed objects and clear zones, and
5. Shoulder and right-of-way.

PHOTO: WYOMING DOT

**TABLE 1 Crash Data and Crash Rankings for Laramie County**

| Total Crashes | Road No. | Milepost | Crash Ranking |
|---|---|---|---|
| 9 | 210-1 | 5.01–6.00 | 1 |
| 9 | 215-3 | 2.01–3.00 | 1 |
| 9 | 109-1 | 1.01–2.00 | 1 |
| 8 | 124-2 | 1.01–2.00 | 4 |
| 8 | 215-3 | 0.00–1.00 | 4 |
| 7 | 162-2 | 9.01–10.00 | 6 |
| 7 | 215-3 | 1.01–2.00 | 6 |
| 6 | 210-1 | 4.01–5.00 | 8 |
| 6 | 203-1 | 17.01–18.00 | 8 |
| 6 | 212-7 | 3.01–4.00 | 8 |
| 5 | 210-1 | 6.01–7.00 | 11 |
| 5 | 102-1 | 3.01–4.00 | 11 |
| 5 | 209-2 | 1.01–2.00 | 11 |
| 5 | 143-2 | 0.00–1.00 | 11 |
| 5 | 120-1 | 4–5, 8–9 | 11 |
| 5 | 207-1 | 2.01–3.00 | 11 |
| 4 | 136-1 | 3.01–4.00 | 17 |
| 4 | 109-1 | 6.01–7.00 | 17 |
| 4 | 164-1 | 11.01–12.00 | 17 |

Combining the rankings from crash data and field evaluations identified the segments with the highest potential crash risks. Tables 1, 2, and 3 summarize the rankings for Laramie County. A comprehensive analysis of each high-risk segment sought to identify low-cost safety countermeasures for the high-risk segments. A benefit–cost analysis was performed to distinguish the most cost-effective safety measures.

## Application

With the success of the pilot study, the Local Road Safety Advisory Group approved the WRRSP procedure for improving the safety of rural roads in Wyoming. A county that completes the five-step procedure has assembled the information necessary for developing a plan to fund safety improvements under the High-Risk Rural Road Program or through other sources of funding. Wyoming DOT is funding some of the counties' safety requests—an incentive for other counties to establish local safety programs.

In the project's second phase, MPC and Wyoming DOT are facilitating statewide implementation of the WRRSP. The University of Wyoming is providing technical assistance and training to counties interested in the program. To date, the university has helped more than one-third of the state's 23 counties implement the program.

Several low-cost safety projects have been approved for funding on roads with the highest risk levels, and 20 safety improvement projects have received funds. The state expects all counties eventually to follow the five-step procedure for identifying high-risk rural road segments and the safety countermeasures.

When the program is fully implemented, the Wyoming Safety Management System Committee will rank the funding requests from the counties to optimize the distribution of available funding. In three years, the University of Wyoming will perform a follow-up study on each of the improved sections, to determine the program's effectiveness in reducing crashes and fatalities. Three years is the minimum time after the installation of safety improvements to obtain meaningful results on the benefits.

## Benefits

The methodology developed in this project was presented at the Transportation Research Board's 2009 Annual Meeting and at the annual conference of the National LTAP Association. In addition, workshops and presentations have introduced the process in Wyoming and throughout the Mountain–Plains region. Other states can apply the procedure when considering the distribution of funds to improve the safety of high-risk rural roads. North Dakota has initiated a study similar to the WRRSP.

The program has made $1.5 million available for low-cost safety improvements for local governments

**TABLE 2 Level I Field Scores and Rankings for Laramie County**

| Level I Field Score | Road No. | Milepost | Level I Ranking |
|---|---|---|---|
| 16 | 210-1 | 5.01–6.00 | 1 |
| 17 | 136-1 | 3.01–4.00 | 2 |
| 18 | 124-2 | 1.01–2.00 | 3 |
| 18 | 109-1 | 6.01–7.00 | 3 |
| 19 | 210-1 | 4.01–5.00 | 5 |
| 19 | 164-1 | 11.01–12.00 | 5 |
| 20 | 210-1 | 0.00–1.00 | 7 |
| 20 | 102-1 | 0.00–1.00 | 7 |
| 20 | 124-2 | 2.01–3.00 | 7 |
| 21 | 102-1 | 2.01–3.00 | 10 |
| 21 | 109-1 | 3.01–4.00 | 10 |
| 21 | 124-2 | 0.00–1.00 | 10 |
| 21 | 102-1 | 1.01–2.00 | 10 |
| 22 | 210-1 | 6.01–7.00 | 14 |
| 22 | 162-2 | 5.01–6.00 | 14 |
| 22 | 203-1 | 7.01–8.00 | 14 |
| 22 | 136-1 | 0.00–1.00 | 14 |
| 23 | 102-1 | 3.01–4.00 | 18 |
| 23 | 209-2 | 1.01–2.00 | 18 |

**TABLE 3 Combined Rankings for High-Risk Segments in Laramie County**

| Road No. | Milepost | Overall Score | Combined Ranking |
|---|---|---|---|
| 210-1 | 5.01–6.00 | 2 | 1 |
| 124-2 | 1.01–2.00 | 7 | 2 |
| 210-1 | 4.01–5.00 | 13 | 3 |
| 136-1 | 3.01–4.00 | 19 | 4 |
| 109-1 | 6.01–7.00 | 20 | 5 |
| 164-1 | 11.01–12.00 | 22 | 6 |
| 210-1 | 0.00–1.00 | 24 | 7 |
| 210-1 | 6.01–7.00 | 25 | 8 |
| 102-1 | 2.01–3.00 | 27 | 9 |
| 109-1 | 3.01–4.00 | 27 | 10 |
| 124-2 | 0.00–1.00 | 27 | 11 |
| 102-1 | 3.01–4.00 | 29 | 12 |
| 209-2 | 1.01–2.00 | 29 | 13 |
| 162-2 | 5.01–6.00 | 31 | 14 |
| 162-2 | 9.01–10.00 | 31 | 15 |
| 203-1 | 7.01–8.00 | 31 | 16 |

in the state of Wyoming. In addition, the program will provide steady funding for safety improvements on local roads. Supplying local governments with a funding source for safety improvements is important for ensuring that safety factors are considered at the local level.

As part of the WRRSP, a statewide sign program is being implemented for local governments. Half of the counties in the state have submitted requests for signs at high-risk locations. Wyoming DOT will purchase and distribute more than 1,200 signs for installation by counties, to provide the driving public with advance warning of high-crash locations. The Wyoming LTAP center will conduct a follow-up study to quantify the effectiveness of the improvements.

The program has been a success, demonstrating that local governments can work closely with Wyoming DOT and FHWA to improve the safety of rural roads. For the first time in Wyoming, local governments are able to apply for safety funding by following a systematic procedure.

*For more information, contact Khaled Ksaibati, Director, Wyoming Technology Transfer Center, University of Wyoming, 1000 East University Avenue, Department 3295, Laramie, WY 82071; 307-766-6230; Khaled@uwyo.edu.*

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