SPR RESEARCH PROGRAM
SECOND-STAGE PROBLEM STATEMENT
FY 2009-10

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I. PROBLEM NUMBER – RDDS-10-04

II. PROBLEM TITLE – Feasibility of Using "Safety Edge" in Oregon

III. RESEARCH PROBLEM STATEMENT

Lane departure crashes in which a vehicle unintentionally departs from its lane and crashes with another vehicle, rolls over, or hits a fixed object represent a substantial portion of our statewide crashes. Often these crashes involve a vehicle that runs off the road or at least has two tires that exit the highway. It is our preference for such a vehicle to safely return to the road. These run-off-road crashes, though present in urban environments, are overly represented in rural areas. In 2007, total fixed object crashes in Oregon rural areas accounted for approximately 69% of the rural crashes with an additional 12% of crashes involving an overturned vehicle. While this translates into approximately 81% of rural crashes associated with these two crash types, it is even more alarming that 89% of the rural **fatal crashes** and 89% of the rural **injury crashes** in 2007 were associated with these two specific collision types. This trend has remained consistent for many years for Oregon as well as many states that have a high number of rural roads. In 2005 the Highway Safety Engineering Committee (HSEC) allocated $7.5 million to 14 safety projects designed to reduce run off the road crashes. The 14 safety projects included installation of rumble strips, cable median barrier, durable pavement markings, precast concrete median barrier, guardrail and a curve realignment project.

These projects are now completed or nearing completion and appear to be making a difference in reducing roadway departure crashes. However, one relatively low cost solution known as Safety Edge has not been used in Oregon. Safety Edge is an asphalt paving technique that improves the angle between the roadway edge and graded shoulder to minimize the vertical drop off and improve the chance of recovery. An added advantage of the Safety Edge is that this asphalt at the edge of the road is compacted using a simple device that attaches to standard grading equipment. As a result, the Safety Edge also provides stability to the pavement edge by minimizing erosion and by protecting the edge of the road so that drainage has a direct path away from the road. The greatest "advertised" advantage of the Safety Edge is that it can minimize the likelihood of a crash occurring if the vehicle leaves the road and reduce the severity of run-off-road crashes.

The Federal Highway Administration has identified the Safety Edge to be a proven safety countermeasure and has recently selected this measure as one of nine countermeasures that Division staff have been asked to actively encourage the states to use. (Memo from Jeffrey A. Lindley, Associate Administrator for Safety, FHWA to Division Administrators: *Consideration and Implementation of Proven Safety Countermeasures*, July 2008.)

This FHWA memo was discussed at the August 26, 2008 Highway Safety Engineering Committee (HSEC) meeting. Liz Hunt, Pavement Surfaces Engineer, expressed interest in the possibility of trying the safety edge as a pilot on a future pavement preservation project.

IV. RESEARCH OBJECTIVES

The recommendation by the FHWA to deploy the Safety Edge at the state level assumes that this countermeasure is suitable. It is possible, however, that there may be circumstances under which a Safety Edge will not result in the benefits touted by the FHWA. Alternatively, there may be locations where this low-cost solution should be implemented as a standard technique due to the extreme benefits. It is important to determine where and when the Safety Edge should be constructed. A first step to achieve this is to perform an evaluation of the cost, benefit, and feasibility of utilizing Safety Edge on pavement preservation projects in Oregon. This would include a comparison of this countermeasure to other common countermeasures such as rumble strips and enhanced pavement markings with regards to cost, results, and feasibility of modifying current pavement management practices to incorporate the practice of including Safety Edge where appropriate in pavement preservation projects.

V. WORK TASKS AND DURATION

ID	Task	Month(s)
1	**Literature Review:** The literature review will identify recent reports on the Safety Edge and other comparable run-off-the road countermeasures. It will include a summary of assessments performed to date. This information will be documented in an interim report. **Estimated cost:** $10,000	3
2	**State DOT Review:** The research will include a review of State DOT practices for use of the Safety Edge to determine circumstances under which safety edge is used and to evaluate construction experiences, equipment modifications, productivity, and safety performance. Prepare Task 1 and 2 Interim Report. **Estimated cost:** $5,000	2
3	**Project Identification:** Identify one preservation project on a state highway and one County project that will be completed within the timeframe of this project that could provide an opportunity for testing safety edge. Site selection will consider crash history, roadway characteristics, and willingness of project manager and scoping team to participate in the research. **Estimated cost:** $10,000	3
4	**Field Trials:** Complete field trials on the Safety Edge and other countermeasures previously installed and analyze the results. The cost of deploying the Safety Edge is not included in the estimated cost of the field assessment. The duration of this task may vary based on construction schedules. **Estimated cost:** $55,000	9
5	**Evaluation and Recommendations:** Following the field trials in task 4 and the reviews summarized in task 1 and 2, the research team will compile observations, perform analysis, evaluated the countermeasures, and provide recommendations to ODOT about appropriate use of the Safety Edge for our region. **Estimated cost:** $25,000	3
6	**Reports:** The research team will prepare draft and final reports compiling the results of this study. If deemed appropriate, the final report will include recommended guidelines for the use of the Safety Edge and other countermeasures to reduce lane departure crashes. **Estimated cost:** $5,000.	2
7	**Project Coordination and Management:** ODOT staff time to coordinate TAC meetings, manage project, and prepare final report for publication. **Estimated cost:** $8,000.	

The estimated cost of this research project is **$118,000** with an estimated duration of **22-months**.

VI. IMPLEMENTATION

Appropriate applications for the use of the Safety Edge in Oregon are not currently defined. This project should help clarify when it is recommended to use a Safety Edge treatment and these recommended guidelines will be a product of this research effort. The research team will make presentations to the appropriate officials as deemed necessary by ODOT and the TAC in order to disseminate this information to the appropriate representatives of ODOT or other agencies.

VII. POTENTIAL BENEFITS

Safety Edge may provide a low cost solution to address lane departure crashes in certain locations. Since these crashes are numerous and severe, the potential impact is significant. In addition to the expected safety improvements, the Safety Edge will also provide an additional protective treatment to the edge of pavement that will help durability of the pavement.

VIII. SUBMITTED BY

Stage 1 Submitter	*Stage 2 Submitter*	*ODOT champion*
Tim Burks, Highway Safety Engineering Coordinator Traffic/Roadway Section ODOT 503-986-3572 Karen Dixon, Associate Professor School of Civil and Construction Engineering, OSU 541-737-6337	Karen Dixon, Associate Professor School of Civil and Construction Engineering, OSU 541-737-6337	Ed Fisher, State Traffic Engineer ODOT Traffic-Roadway Section 503-986-3606

Supplemental Information for Safety Edge Stage 2 Proposal

Common Causes of Pavement Edge Drop-Off

Source: (Hallmark, et al., 2006)

Safety Edge
Paving Technique