



SPR RESEARCH PROGRAM SECOND-STAGE PROBLEM STATEMENT FY 2008-09

ODOT Research Unit
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I. PROBLEM NUMBER

RDHF-09-06

II. PROBLEM TITLE

Improving operations and safety on sustained upgrades and downgrades.

III. RESEARCH PROBLEM STATEMENT

State and national forecasts estimate a significant growth in truck traffic in the next 20 years. The I-5 is a major regional and international corridor for freight movement. In southern Oregon this facility has long sections of upgrades or downgrades. On these long upgrade sections trucks tend to use the right shoulder as a de-facto climbing lane even though it is not signed as such. However, some trucks manage to keep operating speeds sufficiently high enough to pass trucks using the shoulder. This results in a reduction of operating speeds of passenger vehicles. Anecdotal evidence indicates that the often sharp decelerations coupled with high differential speeds and sometimes limited sight distance caused by median barrier or poor weather offer the potential for high severity collisions. These deficiencies in operations and the potential for high severity collisions can only be expected to increase as passenger volumes and particularly as truck volumes increase in the future. While the topography of the area makes the addition of lanes expensive and complex, other opportunities exist for effective management of truck traffic to reduce high speed differentials, improve truck speed reliability, and reduce the possibility of crashes all of which can be provided at significantly less cost than high capital additional lanes. While not as pronounced, similar issues exist with differential truck speeds on long downgrades. The relatively discrete sections of highway offer the ability to focus resources in concentrated sections of the network and make a significant improvement in operations and safety.

This research is designed to portray the nature of the problem and its likely increased seriousness in the future. This research will also then identify the consequences of a no action approach. The continued strong growth of truck traffic along with the persistent growth in passenger vehicle and recreational vehicle in the corridor will only serve to underscore the geometric deficiencies associated with the prolonged grades and occupied shoulders leading to likely increases in incidents involving rapid decelerations and the potential for high speed crashes.

IV. RESEARCH OBJECTIVES

The objective of the project is to quantify the impact of truck operations on operations and safety for long up and downgrade sections; and to identify possible low-cost measures to mitigate operational and safety concerns related to the management of differential speeds for vehicles using these sections.

V. WORK TASKS, COST ESTIMATE AND DURATION

Task 1 – Literature Review

Review literature to identify operational and safety practices that may be implemented on sustained upgrade and downgrade sections of freeways. 3 months duration, \$10,000 est.

Task 2 – Data Collection and Processing

Collect data to quantify operational and safety concerns related to freight traffic on sustained upgrade and downgrade sections of freeways. This includes data collection necessary to a) identify locations where trucks tend to enter and exit shoulders to determine whether these locations could provide insight into the provision of location specific strategies to mitigate the impact on safety and operations; b) prepare speed profiles on sustained upgrades and downgrades; and c) assess the safety of truck behavior on sustained up and downgrades. Data collection will also include conflict analysis between passenger vehicles and trucks on a selection of sites. 8 months duration, \$80,000 est

(estimate includes equipment for remote video monitoring and processing of video materials).

Task 3 – Survey

Interview and survey law enforcement and freight related groups. The focus of interviews with law enforcement would be to gain a perspective on impressions of safety and operational concerns and potential solutions, issues related to enforcement activities, and issues with continual shoulder operations. Discussions with Oregon shipper, hauler or trucker groups will deal with operational and safety concerns of truckers and insights into potential solutions. 3 months duration, \$20,000 est.

Task 4 – Evaluation of Strategies

Evaluate strategies to mitigate the safety and operational concerns related to freight traffic behavior on sustained up and downgrades. These strategies may include a) dynamic speed signing to provide real-time speed information to drivers based on truck traffic, density, and road conditions; b) Intelligent Transportation System (ITS) technologies to warn of stopped vehicles occupying shoulders, lane utilization, speeds of vehicles, and conditions on road; and c) truck specific signing to improve lane utilization in these areas. To provide maximum flexibility a matrix of solution packages will be developed. It is likely that strategies would be implemented over time as finances permit. The conditions in this corridor would lend themselves to an array of solutions (some of which are low costs and could be implemented relatively quickly) as gains could be achieved even if a comprehensive solution is not implemented. 3 months duration, \$20,000 est.

Task 5 – Final Report

Develop and submit a final report to ODOT. The report will include a summary of the literature review in Task 1; present and discuss the findings of Task 2; discuss feedback from law enforcement that was gathered in Task 3; cover findings related to the evaluation of mitigation strategies. The report will also include recommendations for the mitigation of the impact to truck traffic behavior on sustained up and downgrades in southern Oregon. 3 months duration, \$10,000 est.

Total Duration 24 Months Cost \$140,000

VI. IMPLEMENTATION

The research findings would be incorporated in future planning of improvements to sections with sustained up and downgrades. It will support the identification of locations and strategies for targeted efforts to mitigate the safety and operational impact of freight traffic on these sections.

VII. POTENTIAL BENEFITS

The potential benefits include: a) quantification of the current problem; b) reduced opportunity for high severity crashes; c) improved truck operations; and d) development of low-cost solutions that offer significant operational and safety benefit rather than a very high cost capital program to add physical lane capacity.

VIII. SUBMITTED BY

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