



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

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## I. PROBLEM NUMBER

RDHF-09-05

## II. PROBLEM TITLE

**Calibrating the Future Highway Safety Manual Predictive Methods for Oregon Highways**

## III. RESEARCH PROBLEM STATEMENT

AASHTO, FHWA, and TRB have combined efforts to develop a document similar to the Highway Capacity Manual known as the Highway Safety Manual (HSM). This document will be published by AASHTO and is expected to be used as a supporting document in the design and assessment of highway facilities in the United States. The manual is targeted for release in 2010; however, there is expected to be a NCHRP Synthesis released in 2009 so that agencies can see the recommended procedures and know how to prepare for these changes in safety assessment.

The first edition of the HSM will include a section known as "Predictive Methods" that will provide science-based analytical procedures for estimating the safety of a road and how modifying certain road characteristics will influence the safety of a facility. These predictive models can then be used so that a designer, for example, can evaluate different road scenarios (lanes widths, shoulder widths, turn lanes, etc.) and determine the expected resulting safety benefits unique to these features. This approach provides a proactive method of design rather than the reactive method of evaluating historic site crash data in use today. The predictive methods need to be calibrated to local conditions as the original models were developed for a specific state and should be adjusted to accommodate varying design standards, weather trends, mode mix, or similar conditions that can be unique to a region.

Due to their active participation on the TRB task force for developing the HSM, Oregon researchers already have full access to the procedures that will be included in the HSM and can initiate calibration of these procedures for the State of Oregon so that Oregon will be prepared to use the document to its fullest potential upon release. Without calibration of the predictive procedures for local conditions, the HSM methods can provide misleading recommendations that could result in inappropriate investment of safety funds.

## IV. RESEARCH OBJECTIVES

The goal of this research effort is to prepare Oregon for the changing national safety assessment procedures for corridor or site-specific projects. Without this research, Oregon will be ill equipped to use the HSM predictive methods and their proactive analysis strategy. With this research, Oregon will continue to establish itself as a national leader in transportation safety. The funding of this research project in FY09 will enable project completion that will correspond with release of the manual and Oregon will be able to immediately achieve safety benefits from the HSM.

## V. WORK TASKS, COST ESTIMATE AND DURATION

Successful completion of this proposed research effort will include the following tasks:

1. **Literature Review:** The literature review for this task will be limited to a brief review of the HSM procedures, and an evaluation of calibration issues appropriate for determining adequate sample size and variable representation. **Estimated cost:** \$10,000
2. **Data Collection and Formatting:** The HSM includes predictive methods for rural, two-lane roads; rural, multilane highways; and urban and suburban arterial highways. Each of these predictive methods is based on unique assumptions or crash trends. This proposed research effort will use local conditions (crash data, road geometry information, traffic volume data, etc.) to calibrate the HSM predictive procedures for Oregon facilities.

To do this, the research team will need to identify characteristics of the source models included in the HSM and verify that, at a minimum, the representative Oregon samples encapsulate the conditions included in the companion predictive models. This crash data will then be formatted using multiple years of data, varying Oregon regions, and, where possible, varying highway ownership. Upon completion of task 1 and 2, the research team will prepare an interim report. **Estimated cost:** \$25,000

3. **Model calibration:** The calibration effort will be divided into three specific model categories consistent with the three HSM predictive method road conditions indicated in task 2. The research team will use crash data calibration to determine how the HSM predictive models should be adjusted for use in Oregon. In addition, accident modification factors included with the HSM predictive models will be compared and contrasted to current Oregon factors in an effort to minimize confusion regarding the use of these safety adjustment values and assure consistent and accurate future use of the HSM manual in Oregon. An interim report will be prepared. **Estimated cost:** \$85,000
4. **Recommendations:** Following the model calibration and accident modification factor evaluation, the research team will determine specific calibration factors that should be used so that the HSM procedures can be directly applied to Oregon highways. Included in this effort will be a companion document for dissemination that will identify how to apply the HSM procedures to Oregon roads. This document will include example problems demonstrating the use of these procedures. **Estimated cost:** \$10,000
5. **Reports.** The research team will prepare draft and final reports compiling the results of the interim reports as well as final recommendations. **Estimated cost:** \$10,000

The total project cost estimate is \$130,000 with an 18-month schedule.

## VI. IMPLEMENTATION

The results of this research effort can be widely used in Oregon by transportation designers or safety evaluators in determining predicted crashes at a corridor or site. The companion document proposed for task 4 will be made available in an electronic format for use by various agencies so that they will be able to easily use the HSM predictive methods for their specific Oregon jurisdictions and to understand any limitations of using those methods if so identified during the calibration process. The document can be provided on either the ODOT web site, the HSM national web site, or a site created specifically for the project so that it can be easily acquired by any interested party. In addition, the research team expects to present their findings at a regional or national safety meeting or conference.

## VII. POTENTIAL BENEFITS

The greatest benefit of this research effort is that Oregon agencies can readily use the predictive methods in the new HSM to immediately and proactively improve the safety of our transportation facilities. This will enable accurate results and insure appropriate safety investment decisions based on the HSM predictive procedures. AASHTO will be the agency ultimately responsible for the publication of this document and it is expected that the HSM will serve as a companion document to the AASHTO Green Book and the AASHTO Roadside Design Guide for the safe design of roads in the United States. As a result, it is likely that the HSM will quickly become a standard in the United States.

## VIII. SUBMITTED BY

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