WORK PLAN FOR THE SECOND EDITION OF THE HIGHWAY SAFETY MANUAL

Requested by:

American Association of State Highway
and Transportation Officials (AASHTO)

Standing Committee on Highway Traffic Safety

Prepared by:

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Instructions to Panel Members

This project is being conducted at the request of the AASHTO Standing Committee on Highway Traffic Safety as part of National Cooperative Highway Research Program Project 20-7. The report will not go through the rigorous review process established and monitored by the Transportation Research Board Executive Committee or the Governing Board of the National Research Council, and should not be described as a TRB report. It should be described as a contractor’s report requested by the AASHTO Standing Committee on Highway Traffic Safety and conducted as part of NCHRP Project 20-7.

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Executive Summary

The Highway Safety Manual Task Force (HSM TF) and its partners, the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA), worked for 10 years to produce the HSM. The implementation of the HSM began at the same time that the Task Force wanted to start work on the second edition of the HSM. There was no clear path for implementation of the Manual or for research to improve the Manual. To resolve these issues, NCHRP project 20-7(279) was conducted to prepare a work plan for the second edition of the Highway Safety Manual.

This project was conducted by gathering information from the partners (HSM TF, AASHTO, and FHWA) about additions and changes desired for the second edition. The information was obtained through telephone and personal interviews and was sorted and tabulated into 15 major topics. The *Interim Report* documents the information for each topic.

Meanwhile, the partners had begun to work separately to implement the HSM. Although they resolved many open issues, four major topics remained unresolved because these topics required significant research to develop new processes and materials. To address these four, the partners used *Interim Report* materials to develop research problem statements. Four NCHRP Problem Statements were developed in July 2010, three of which are in the NCHRP screening/review process. The next step was development of additional research statements. The HSM TF Future Directions Subcommittee developed nine new research project statements to extend roadway safety science based on the results of a previous workshop sponsored by FHWA. The AASHTO TG examined four topics from the *Interim Report* and interacted with the author to create nine new research project statements to add to the unfunded 2010 NCHRP problem statement. The 10 AASHTO projects will enhance and expand the content of the HSM.

During the Highway Safety Performance Committee business meeting at TRB's 2011 Annual Meeting, the Committee approved the prioritized research problem statements submitted by the HSM TF Subcommittee and the AASHTO TG. As a result, 22 research projects constitute the approved work plan for the second edition of the HSM. Three are now in the NCHRP screening/approval process, one is being resubmitted to NCHRP, and eighteen are new. The work plan represents a path, a starting point toward the optimum content for the second edition, but the partners are not bound to follow the plan indefinitely. Indeed, as the research gets underway and future opportunities are identified, it may be prudent to expand or redirect the plan to produce optimum results.

The *Interim Report* represents a major resource and is now on the Committee website. A second resource involves draft proposal worksheets for approved new projects. Appendix A contains information on 10 projects that expand or enhance the materials in the HSM. Appendix B contains information on nine projects that expand highway safety science.

1.0 Introduction

Background

The Highway Safety Manual (HSM) was developed through a series of National Cooperative Highway Research Program (NCHRP) projects by the Task Force on the Development of a Highway Safety Manual (HSM TF) of the Transportation Research Board (TRB). During the latter stages of this project, the HSM TF was elevated to the status of a TRB standing committee: the Highway Performance Committee (ANB25). The HSM TF worked closely with its partners: the Federal Highway Administration (FHWA) and the Joint Task Committee for the HSM (JTC) of the American Association of State Highway and Transportation Officials (AASHTO). The draft of the first edition was completed in early 2009 and delivered to AASHTO. It was successfully balloted and published in 2010. AASHTO assigned oversight of the HSM to the Safety Management Subcommittee, which assigned it to the AASHTO Task Group on Technical Documents (AASHTO TG).

The HSM TF and its partners worked for 10 years to produce the HSM. As the completion date approached, the HSM TF began to focus on implementing the HSM and conducting research to enhance the next edition. But many possible research topics had been identified, and there was a lack of consensus on which portion of the HSM to strengthen first, what new materials to add to the HSM, and what research to conduct. To help resolve these issues, NCHRP project 20-7(279) was conducted to prepare a Work plan for the second edition of the HSM.

Research Objective

The objective of this project was to develop a Work plan for the second edition of the HSM.

Research Tasks

Accomplishment of the project objectives requires completion of the following tasks:

1. Review the draft of the first edition and meet with the TRB TF and the AASHTO TG during the TRB Annual Meeting in January 2010.
2. Develop a draft work plan and timeline for the second edition, including estimated costs and time frames.
3. Meet with the TRB TF and AASHTO TG at the 2010 HSM task force mid-year meeting to review the draft work plan.
4. Based on the review comments from Task 3, complete the work plan and timeline for the second edition of the HSM.

2.0 Compiling Information for the Work Plan

Identifying the Most Important Issues

Those who prepared and funded the first edition knew more about the manual's strengths and weaknesses than anyone else. They knew where corrections were necessary, where additions were needed, and how to tailor the materials for impact. That knowledge was sought as the basis for this project.

Collecting Data

Data for the draft Work Plan for the Second Edition was based primarily on telephone interviews with more than 50 individuals, mostly conducted between October and December 2009. The interviews and email exchanges involved the individuals most involved in the development and implementation of the HSM. This included the AASHTO TG, TRB HSM TF, AASHTO, FHWA's national safety office, NCHRP, and the HSM production contractor. Within the HSM TF, interviews were conducted with the current Chair and a former Chair, all current subcommittee chairs, part managers, chapter leaders, and others. The concerns of those interviewed addressed two topics: the second edition of the HSM and the upcoming transition of the HSM TF to committee status.

Compiling the Data and Producing a Report

At this point the pressing need was to capture as many knowledgeable opinions as possible, to organize them, to convert them into readable text, and to identify the most important thoughts about the content of the second edition.

The author took notes during the interviews. These notes were typically provided to the interviewees for review and correction as needed. The comments fell under 15 broad topics thought to be most important for development of the second edition and for the transition of the HSM TF to committee status: Vision of the Future, Normal Duties of a TRB Committee, Committee Structure and Operations, Partners and Relationships, Guiding Principles, Implementation, Training, Changes and Additions, Crash Modification Factors, Predictive Models, Software, Extending Transportation Safety Science, Usability and Friendliness, Funding, and Data.

The comments were placed into these 15 categories. Some comments were applicable to several topics; these comments were placed into all applicable categories, making it easier for a reader to find comments of interest. Some comments were edited to preserve context or to clarify intent. Similar comments were merged. Each topic's comments were analyzed for patterns, issues, and approaches, and then prioritized into work topics. The major topics and their associated comments became chapters in the initial project report. In effect, each chapter represented a

collection of resources organized to facilitate the transition of the JTC to a TRB committee and the selection of research topics for development of the second edition.

Additional information was placed in four appendices. Two appendices were devoted to Crash Modification Factors (CMFs). One tabulated the comments related to CMFs and the second identified CMFs desired for Part D of the HSM. A third appendix had a list of suggested research topics by HSM part and chapter, and the fourth contained a tabulation of interview comments about Safety Performance Functions (SPFs).

The draft HSM had been reviewed; materials had been gathered, reviewed, and sorted to identify topics to enhance the HSM; and the chapters and appendices had been compiled in the *Interim Report*. The *Interim Report* was placed on the HSM TF website and made available to all partners for review. The production of the report was a major step toward the HSM TF's smooth transition to committee status, enhancement of the HSM, and an efficient and cost-effective research program for the second edition. The next step in the project was to interact with the HSM TF and its partners to begin selecting research projects from the *Interim Report*.

3.0 Interactions with the HSM TF, AASHTO TG, and FHWA

TRB Annual Meeting 2010

There was good progress on the second edition by the 2010 TRB Annual Meeting. An AASHTO coordination committee had been created, and monthly conference calls allowed the partners to share their work processes and synthesize their efforts with one another.

Although the author did not interact directly with FHWA, FHWA representatives sat on the TF and there were constant interactions with FHWA members on the AASHTO Coordination Committee and the AASHTO TG.

During the HSM TF business meeting held during the 2010 TRB Annual Meeting, the author made a joint presentation to the HSM TF, AASHTO TG, and friends of the TF. The presentation introduced the *Interim Report* and discussed each of its 15 major topics. The presentation stressed that significant efforts would be required to transition to committee status, publish the HSM, market and implement it, and prepare a second edition. The three partners received the report well, and all three indicated that it would be useful to plan their next steps with regard to the HSM. They encouraged him to solicit further input for the work plan, meet with the partners, participate in monthly Coordination Committee calls, and begin the process of identifying research project topics for the second edition.

HSM TF Summer Meeting

The HSM TF Summer Meeting was held in July 2010. By this time the partners had settled into comfortable roles. The HSM TF was conducting research, FHWA was developing support programs to identify additional CMFs and to help implement the HSM, and AASHTO was concentrating on publishing and institutionalizing the HSM and on helping its state DOT members to practice HSM methodologies.

Based on the partners' efforts, the author reevaluated the status of the 15 key topics in the *Interim Report*. Five topics had essentially been completed. For example, HSM TF members understood the process associated with becoming a standing committee as well as the structure and activities associated with TRB committees. Four topics seemed less difficult to accomplish than anticipated. Examples include modification of the HSM TF's Guiding Principles to reflect the publication of the HSM and establishment of the future roles of the three partners. But four topics necessary to the second edition were incomplete: (1) changes and additions to the HSM, (2) CMFs, (3) SPFs, and (4) extending transportation safety science.

The day before the HSM Summer Meeting, the author made a presentation to the AASHTO TG on the four remaining major topics. Following the presentation TG members reviewed the *Interim Report* and identified four high-priority research topics for submittal as NCHRP research statements. The author gave the presentation again at the HSM TF business meeting. HSM TF

members discussed potential projects and concurred with the four suggested by the AASHTO TG. They are shown in Table 3-1.

Table 3-1. Four projects selected for NCHRP Problem Statements (July 2010)

	Research Topic	Est. $	Est. Time
1	HSM Six-Lane and One-Way Urban and Suburban Arterial Models	$600,000	24 months
2	Improved Methods for Application of CMFs	$500,000	24 months
3	Innovative Methods to Obtain Pedestrian and Bicycle Volume Data	$400,000	24 months
4	Protocol for CMF Development, NCHRP 20-7 Project	$40,000	12 months

The HSM TF Research Needs Subcommittee drafted the problem statements while at the summer meeting, and the AASHTO TG later submitted them for funding. Problem Statement 2 did not pass the initial NCHRP screening. As of this report, the other three are still in the NCHRP screening/selection process.

HSM TF Future Directions Subcommittee

In 2009 the FHWA convened a workshop on future directions for highway safety science. The objective of the meeting essentially was to identify better scientific methods for traffic-safety analyses and programs. The workshop was successful and a TRB circular was prepared. The Future Directions Subcommittee of the HSM TF used this material to develop nine research-project descriptions to enhance the science associated with development of future versions of the HSM. These projects are listed in Table 3-2.

It is important to note that the projects in Table 3-2 are basic research; that is, they will develop new research methods and new science. AASHTO tends to support applied research projects because the results can immediately be applied to current problems. That means that most "extend the science" topics are not good candidates for NCHRP project funding. However, these topics are candidates for other types of funding, such as FHWA's Exploratory Advanced Research Program.

AASHTO TG Meetings

The AASHTO TG met in Chicago in September 2010 and in Kansas City in November 2010. The author made presentations to bring TG members up to date on both occasions. At both meetings members reviewed portions of the *Interim Report* to identify additional high-priority research needs.

During the meetings, the TG identified and prioritized seven additional research projects. The first five projects were taken from the *Interim Report* and the final two were new ideas generated by TG members: (1) identify and prioritize needed CMFs, (2) develop more CMFs for Part C of the HSM so designers can closely model existing roadways and find the safety effectiveness of proposed treatments, (3) develop predictive models for crash types and crash severities, (4)

develop a calibration users' guide, (5) develop a roundabout users' guide, (6) add new intersection models, and (7) develop CMFs for system-wide applications.

Table 3-2. Projects to extend highway safety science

	Topic	Est. $	Est. Time
1	Road-User Adaptation to Safety Treatments	800, 000	30 months
2	Taxonomy of Crash Prediction Models	$50,000	12 months
3	Develop/Test Adequacy of Alternative Models	$300,000	18 months
4	Document State of Art in Structural Modeling	$50,000	12 months
5a	Procedures, Construct Structural Models for Safety Prediction, Part A-Scoping Study	$200,000	12 months
5b	Procedures, Construct Structural Models for Safety Prediction, Part B-Develop Procedures	$800,000	32 months
6a	Driver Behavior Models for Structural Modeling, Part A-Scoping	$200,000	12 months
6b	Driver Behavior Models for Structural Modeling, Part B-Develop Models	$800,000	32 months
7	Surrogate Scoping Project	$50,000	12 months
8a	Evaluate/Validate Candidate Surrogate Measures, Part A-Scoping	$200,000	12 months
8b	Evaluate/Validate Candidate Surrogate Measures, Part A-Surrogate research projects	$2,000,000	48 months
9	Demonstrate Application of Surrogates and Understanding of Safety Issues	$800,000	32 months

The AASHTO TG did not complete its analysis of the *Interim Report* at the two meetings, so the Chair appointed a three-person team to work with the author to complete the task. They identified four additional potential projects: (1) expand SPFs to cover all common intersections, including signalized high-speed expressways; (2) enhance the science of CMFs so that a CMF that applies in Part C of the HSM (roadway SPFs) can also be used in Part D (countermeasures); (3) develop a data users' guide; and (4) develop a data warehouse to collect and store data from ongoing research projects to for use in future research projects.

By the end of this effort, the AASHTO TG had identified 12 potential NCHRP projects. Eleven had been selected in September and November, and one, the NCHRP Research Problem Statement, had been submitted in 2010 but not funded. Potential funding had been identified for two of them. Some projects overlapped. The full AASHTO TG had yet to approve four potential projects, and the HSM TF had yet to review any of them. In addition, no scope statements, cost estimates, or time estimates had been prepared.

The Chair of the HSM TF Research Subcommittee worked with the author to review the 11 projects suggested by the AASHTO TG and the unfunded 2010 NCHRP project statement. Project statements were clarified and overlapping projects were merged in two situations, reducing the 12 projects under consideration to 10. Brief project scopes, cost estimates, and time estimates were prepared. The 10 projects then awaited TG approval before moving to the HSM TF for debate and balloting for inclusion in the second edition of the HSM.

The nine projects suggested by the HSM TF Future Directions Subcommittee (Table 3-2) were also ready for debate and balloting. This provided a total of 19 potential projects in addition to the 3 already approved and under consideration for NCHRP funding.

4.0 Approval of the Work plan for the second edition of the HSM

Approval of projects for the Work plan for the second edition of the HSM occurred in two steps during the TRB 2011 Annual Meeting. The first step involved review and approval of the draft projects by the ASSHTO TG, and the second step involved approval by the HSM TF.

AASHTO TG Approval

The AASHTO Safety Management Task Group met on Saturday prior to the 2010 TRB Annual Meeting. Its agenda called for review of the 10 projects that it would suggest to the HSM TF for inclusion in the Work Plan. Together the author and the TG reviewed the work completed since their last meeting. The completed work included the following items:

- A TG subcommittee had identified four additional projects.
- The NCHRP project description created in August 2010 but not funded by NCHRP was added to the list.
- The Chair of the HSM TF Research Subcommittee and the author reviewed the suggested projects and made several changes:
    - overlapping projects were combined in two instances, reducing the number under consideration from 12 to 10.
    - project descriptions were revised.
    - estimates were prepared for costs and time periods.
- The resulting 10 projects were prioritized.

The Task Group discussed each project and its location in the priority list and made major changes. Potential funding sources were identified for two projects – pooled fund monies for a CMF project and utilization of an ongoing FHWA for system wide CMRs. Following this discussion the Task Group approved the 10 projects listed in Table 4-1.

Approval of the HSM TF

At the business meeting of the HSM TF—now called the TRB Highway Safety Performance Committee (ANB25)—the author provided a presentation on the historical development of the draft work plan for the second edition of the HSM. This included an overview of the *Interim Report*, a review of the development of four NCHRP Research Statements in July 2010, the subsequent development of nine "extend the science" research problem statements by the HSM TF Future Directions Subcommittee, and AASHTO TG's 10 prepared "HSM development" research problem statements. The 19 proposed projects were reviewed with members and friends of committee ANB25.

ANB25 voted to accept all 19 suggested projects. The work plan for development of the second edition was complete.

Table 4-1. Projects nominated by the AASHTO TG

	Topic	Est. $	Est. Time
1	Continuous process to identify and prioritize needed CMFs *(currently partially done by CMF Warehouse)*	[2]FHWA Low Cost Safety Improvement Pool Fund and FHWA CMF Clearinghouse	
2	[1]Improved methods for application of CMFs	$500,000	24 months
3	Research to quantify high-priority CMFs identified in Item #1	TBD[3]	Multiple projects
4	Prediction models for crash types and crash severities, SPFs and distributions	$600,000	24 months
5	Calibration users guide (help with implementation now, and better data for future calibration)	$300,000	18 months
6	Data users guide - help with implementation and long term help with improved data	TBD[3]	12 months
7	Develop SPFs for common intersection types, including signalized intersections on high-speed expressways	$1,000,000	30 months
8	Roundabout model (SPF)	$600,000	30 months
9	Develop procedures to identify locations for cost-effective system wide improvements *(partly addressed in SafetyAnalyst)*	[2]Ongoing FHWA project "System wide Selection Tool" potentially covers this topic	
10	Data warehouse and archived data	[2]Short term - NCHRP can require contractors to submit their data in HSIS format	

Notes: [1]Project 2 was submitted for NCHRP funding in 2010 but did not pass initial screening.
[2]Alternative funding has been identified for projects 1, 9, and 10. [3]To be determined,

5.0 Summary

The Highway Safety Manual Task Force (HSM TF) and its partners, the American Association of State Highway and Transportation Officials (AASHTO) and the Federal Highway Administration (FHWA), worked for 10 years to produce the HSM. The implementation of the HSM began at the same time that the Task Force wanted to start work on the second edition of the HSM. There was no clear path for implementation of the Manual or for research to improve the Manual. To resolve these issues, NCHRP project 20-7(279) was conducted to prepare a work plan for the second edition of the Highway Safety Manual.

Development of a Draft Work Plan for the Second Edition of the HSM

This project was conducted by gathering information from the partners (HSM TF, AASHTO, and FHWA) about additions and changes desired for the second edition. The information was obtained through telephone and personal interviews and was sorted and tabulated into 15 major topics. The *Interim Report* documents the information for each topic.

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Approval of the Work Plan

During the Highway Safety Performance Committee business meeting held at TRB's 2011 Annual Meeting, the Committee approved the prioritized research problem statements submitted by the HSM TF Subcommittee and the AASHTO TG. As a result, 22 research projects constitute the approved work plan for the second edition of the HSM. Three are now in the NCHRP screening/approval process, one is being resubmitted to NCHRP, and eighteen are new. The work plan represents a path, a starting point toward the optimum content for the second edition, but the partners are not bound to follow the plan indefinitely. Indeed, as the research gets underway and future opportunities are identified, it may be prudent to expand or redirect the plan to produce optimum results.

Resources for Conducting the Work Plan

The *Interim Report* represents a major resource and is now on the Committee website. A second resource involves draft proposal worksheets for approved new projects. Appendix A contains draft information on 10 projects that expand or enhance the materials in the HSM. Appendix B contains draft information on nine projects that expand highway safety science.

Appendix A
Worksheets for Projects to Enhance and Expand the HSM

Work Sheets for Proposed Future Projects (D-R-A-F-T)
TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Information is provided in this appendix to assist in developing future research problem statements to conduct the following research:

1) Continuous Process to Identify and Prioritize Needed CMFs
2) Improved Methods for Application of CMFs
3) Research to Quantify High-Priority CMFs Identified in Project #1
4) Prediction Models for Crash Types and ?Crash Severities, SPFs and Distributions
5) Calibration Users' Guide
6) Data Users' Guide
7) Develop SPFs for Common Intersection Types, Including Signalized Intersections on High Speed Expressways
8) Roundabout Model (SPF)
9) Develop Procedures to Identify Locations for Cost-Effective System Wide Improvements
10) Data Warehouse and Archived Data

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs_x_ Predictive Models___ Corrections/Additions___ Extend Science___

Project Title: Continuous process to identify and prioritize needed CMFs.

Scope: On an ongoing basis, this project will inventory users to determine those CMFs that are most needed, but not available or available but weak. It appears that the "most wanted CMFs" list in the FHWA's "Guide to Developing Quality Crash Modification Factors," may be a good starting point for this project (http://www.cmfclearinghouse.org/collateral/CMF_Guide.pdf).

Project Description (can be a list of possible work steps or a paragraph):

The identification of needed CMFs and the prioritization of research to develop those CMFs appear to require an ongoing process, rather than a specific research project. The AASHTO Safety Management Subcommittee Task Group and the TRB Highway Safety Performance Committee seem appropriate organizations to manage this process as a volunteer effort, unless a funded effort, such as the FHWA Clearinghouse, is willing to take this on.

The FHWA Clearinghouse has a mechanism for asking practitioners to enter information on needed CMFs. This could be a key mechanism for capturing such information. It is suggested that once a year, there be a broadly distributed e-mail asking practitioners and researchers to suggest needed CMFs. Responses could be submitted through the FHWA Clearinghouse mechanism or directly to a designated recipient. The invitation should be written broadly to include CMFs for inclusion in both HSM Parts C and D and CMFs for design elements, countermeasures for application at spot locations, and countermeasures for system wide application.

Once a broad range of suggestions have been gathered, a questionnaire should be sent to each State (via their representative on the AASHTO Safety Management Subcommittee) and to also to local agencies, MPOs, and researchers asking respondents to prioritize the identified CMFs and, for each CMF, to prioritize the facility types for which that CMF should be evaluated. Surveys like this are now very easy to conduct with on-line software like Survey Monkey. The responses should be tabulated separately for State respondents and other categories of respondents. The responses should be available for consideration during the Summer of each year by the AASHTO Safety Management Subcommittee and the TRB Highway Safety Performance Committee, so that problem statements can be developed and so that the AASHTO Subcommittee can take appropriate action to submit problem statements for NCHRP funding consideration in the Fall. Identified needs could also be addressed through other funding sources, such as the FHWA low-cost countermeasures evaluation pooled-fund study.

Budget Estimate (can be a range): TBD

Project Length (can be a range): TBD

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X__
FHWA Low Cost Safety Improvement Pool Fund and FHWA CMF Clearinghouse

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs_x_ Predictive Models___ Corrections/Additions___ Extend Science___

Project Title: Improved Method for Application of CMFs

An NCHRP Problem Statement was prepared for this project at the Highway Safety Performance Committee 2010 summer meeting. It was subsequently submitted to NCHRP by the AASHOT Safety Management Task Group on Technical Documents.

The problem statement did not survive the NCHRP screening/selection process. It needs to be revised and strengthened, and resubmitted.

Budget Estimate (can be a range): $500,000

Project Length (can be a range): 24 months

Method of conducting project: NCHRP_x_ Committee volunteers___ Other (describe)___

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs_x_ Predictive Models___ Corrections/Additions___ Extend Science___

Project Title: Research to quantify high-priority CMFs identified by a continuous CMF expansion process

Scope: Once high-priority CMFs are identified, they can be quantified using established methods and protocols This project will develop CMFs for Part C of the HSM, so that designers can closely model existing or planned roadways and evaluate safety effectiveness while searching for optional treatments. AASHTO Safety Management Task Group members feel strongly about this new project

Project Description (can be a list of possible work steps or a paragraph):

Multiple research problem statements for CMF development would likely be developed each year as a result of the continuous process to identify high-priority CMFs. Once specific needs been identified, the Highway Safety Performance Committee envisions that there will be multiple efforts to create CMFs. At the simple end of the spectrum, transportation graduate student theses and dissertations will be a good source. It is also possible that Committee volunteers will create needed CMFs. At the high end of the spectrum, difficult CMFs or families of CMFs will be developed through the traditional NCHRP process.

Budget Estimate (can be a range): To Be Developed Annually

Project Length (can be a range): Project Lengths Will be Determined Annually

Method of conducting project: NCHRP_x_ Committee volunteers_x_ Other (describe)_x_
The project description addresses multiple ways to develop needed CMFs.

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models_x__ Corrections/Additions___ Extend Science___

Project Title: Prediction models for crash types and crash severities, SPFs and distributions

Scope: This project will identify or compile an appropriate data base, and develop crash type and crash severity prediction models. These will replace the distribution lists found in the HSM 1st Edition.

Project Description (can be a list of possible work steps or a paragraph):

The existing HSM Part C chapters differ in the manner in which predictions for crash frequency by crash type and severities level are developed. The HSM chapters improve in the completeness of predictions by crash type and severity level in the order in which they were completed. In HSM Chapter 10 (rural two-lane highways), predictive models provide estimates for total crashes and then crashes are then allocated to crash types and severity levels based on tabulated proportions. In HSM Chapter 11 (rural multilane highways), separate predictive models are provided for total crashes, fatal-and-injury (KABC), and fatal-and-injury (KAB) crashes, with crash frequencies for property-damage-only (PDO) crashes determined by subtracting the KABC crash frequency from the total crash frequency. Crashes for any given crash severity level are then allocated to crash types based on tabulated proportions. In HSM Chapter 12 (urban and suburban arterials), separate predictive models are provided for combinations of three crash severity levels (total, fatal-and-injury, and PDO) and five crash types (multiple-vehicle nondriveway crashes, single-vehicle crashes, multiple-vehicle driveway-related crashes, vehicle-pedestrian crashes, and vehicle-bicycle crashes). Within two of the crash types (multiple-vehicle nondriveway crashes and single-vehicle crashes), predicted crash frequencies can be broken down into even more specific crash frequencies by tabulated proportions. A freeway and interchange chapter is currently under development and it is not yet known what approach that chapter will take to predictive models for specific crash types and severity levels.

To provide more consistency for users, it would be desirable for the HSM second edition to provide a more consistent approach to predictive modeling by crash type and severity level. This would require models from past research to be refit using the data bases that were used to develop those models or for new models to be developed from new data bases. Certainly, users should expect all HSM Part C chapters to use a consistent set of crash severity levels. Consensus needs to be reached in the AASHTO Safety Management Task Group and the TRB Highway Safety Performance Committee about what that consistent set of crash severity levels should be. Candidate crash severity levels from which final choices should be made include total crashes (all severity levels combined) and K, A, B, C, PDO, KA, KAB, KAB, AB, and ABC crashes. This choice involves a balance between the needs of users and sample size considerations in modeling (i.e., severity levels with very few crashes may not provide very good models).

A set of individual crash types that should be modeled needs to be developed. Users needs and sample size issues also need to be considered here. Consideration also needs to be given to variations in the importance of specific crash types by facility types. In other words, it may not be desirable to require modeling of a common set of crash types across all facility types, because some crash types are common (and, thus, easy to model) on some facility types and relative uncommon (and, thus, hard to model) on other facility types. A consistent approach, with reasonable variations by facility type, is needed for the second edition.

Once a consistent and practical set of categories for crash severity level and crash type have been defined, research should be undertaken to implement those categories throughout HSM Part C for the second edition.

Budget Estimate (can be a range): $600,000

Project Length (can be a range): 24 months

Method of conducting project: NCHRP_x_ Committee volunteers___ Other (describe)___

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions_x_ Extend Science___

Project Title: Calibration Users' Guide

Scope: Develop a "help me) guide for calibrating models for State DOTs which have expressed frustration with the processes in the HSM.

Project Description (can be a list of possible work steps or a paragraph):

A calibration manual is needed to accompany the HSM. The calibration manual should provide practical advice and examples for highway agencies that go beyond the guidance provided in the Appendix to HSM Part C. It will include background information, calibration methods applicable under various situations, data needs, desired calibration accuracy, and other important factors. It will provide guidance on how to adapt the calibration procedures to fit the needs to particular agencies. As part of the development of the manual, the research team should work with several state highway agencies to calibrate the HSM Part C models to each agency's conditions and should use the results of those demonstration efforts to prepare the calibration manual. In some ways the manual will be similar to FHWA's "Guide to Developing Quality Crash Modification Factors," http://www.cmfclearinghouse.org/collateral/CMF_Guide.pdf

Budget Estimate (can be a range): $300,000

Project Length (can be a range): 18 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)___

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions_x_ Extend Science___

Project Title: Users Guide for Data

Scope: This project would develop a user's guide for safety data. I will identify what data to collect, data formats, how to best collect and store the data, etc. It could also identify readily available sources that could help DOTs save money and time.

Project Description (can be a list of possible work steps or a paragraph):

A data guide should be developed to guide highway agencies in assembling and managing the data needed for safety analyses. The data guide should identify the minimum data set for every crash, roadway segment, intersection, and ramp on a highway agency's network to enable effective highway safety management using HSM Part B. The mandatory data set for *SafetyAnalyst* is suggested for this purpose. The data guide should also address assembly of the broader data set needed for application of the HSM Part C methods. Data in greater detail are needed for the HSM Part C procedures than for HSM Part B because such data in that greater level of detail are normally gathered as part of the project development process for individual projects. This guide would update the HDM data needs guide developed and published by NCHRP prior to publication of the HSM second edition.

At a minimum the Guide would address the stated issues, along with those in the following list.

- Minimize the time and resources used to collect the data,
- Techniques for planning efficient collection, use and storage of data,
- Incorporating technicians and IT staff as keys to good collection and use, and
- Do not overlook the importance of designing the database for long term use with interoperability with other data sets, and between different parts of an agency.

Budget Estimate (can be a range): To Be Developed

Project Length (can be a range): 12 months

Method of conducting project: NCHRP__x_ Committee volunteers___ Other (describe)___

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions_x_ Extend Science___

Project Title: Develop SPFs for Common Intersections Types, Including Signalized Intersections on High Speed Expressways

Scope: Develop a comprehensive model, or family of models, that will cover all of the commonly occurring intersection types. If possible the models will be similar in nature and will utilize similar data.

Project Description (can be a list of possible work steps or a paragraph):

Research is needed to expand the range of intersection types addressed in predictive methods in Chapters 10, 11, and 12 in HSM Part C. Predictive methods are needed to address all common intersection types not already addressed by the existing procedures. The intersection types to be addressed should include intersections on high-speed expressways and any common types of at-grade crossroad ramp terminals for freeway interchanges that are not being addressed in NCHRP Project 17-45. The predictive method should include safety performance functions, crash modification factors (CMFs), and calibration factors in a format for consistency with the existing HSM Part C procedures and any updates to those procedures planned for the HSM second edition, including specific crash severity levels and crash types to be addressed. The predictive method should be developed from data on existing intersections and/or improvement projects for existing intersections. The predictive method should be sensitive to the traffic volumes on the intersecting roads and streets and to the design decisions that engineers and planners need to address during the project development process for intersections. Roundabouts will not be addressed in this research, as a separate project on roundabouts is planned.

Budget Estimate (can be a range): $1,000,000

Project Length (can be a range): 30 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)___

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models_x__ Corrections/Additions___ Extend Science___

Project Title: Roundabout Prediction Model

Scope: This project will develop a prediction model, or models, for roundabouts. The model will be suitable for inclusion in IHSDM, and the project will develop a draft chapter for the HSM.

Project Description (can be a list of possible work steps or a paragraph):

A predictive method for roundabouts should be developed to become part of HSM Chapter 12 on urban and suburban arterials. The predictive method should include safety performance functions, crash modification factors (CMFs), and calibration factors in a format for consistency with the existing HSM Chapter 12 procedures and any updates to those procedures planned for the HSM second edition, including specific crash severity levels and crash types to be addressed. The predictive method should be developed from data on existing roundabouts and/or projects in which existing conventional at-grade intersections have been converted to roundabouts. The predictive method should be sensitive to the traffic volumes on the roads and streets entering the roundabouts and to the design decisions that engineers and planners need to address during the project development process for roundabouts.

Budget Estimate (can be a range): $600,000

Project Length (can be a range): 30 months

Method of conducting project: NCHRP_x_ Committee volunteers___ Other (describe)___

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs_x__ Predictive Models___ Corrections/Additions___ Extend Science___

Project Title: Develop CMFs for Systemwide Application

Scope: Develop procedures to identify locations for inclusion in cost-effective areawide, regionwide, or systemwide improvement programs for particular countermeasures.

Project Description (can be a list of possible work steps or a paragraph):

To clarify the nature of needed research, there are no current countermeasures that are inherently or exclusively systemwide in application. All countermeasures are implemented at individual locations. CMFs for specific countermeasures are developed from research on groups of individual projects that implement such countermeasures. However, some countermeasures (particularly low-cost countermeasures) lend themselves to application in areawide, regionwide, or systemwide programs. Procedures are needed to identify locations for inclusion in cost-effective areawide, regionwide, or systemwide improvement programs for particular countermeasures. Even in broadly based programs, some locations inherently have high priority than others for application of particular countermeasures based on traffic volumes, geometrics, and crash history.

Research is needed to establish such procedures. The current FHWA effort may provide results that serve this purpose, although it is not known whether the results of this effort will consider traffic volumes, geometrics, and crash history for individual implementation sites. The *SafetyAnalyst* software can be used, with a series of separate computations, to identify sites for such programs. The FHWA *SafetyAnalyst* development effort, prior to the transfer of the *SafetyAnalyst* software to AASHTO, developed a functional specification for software improvements to automate such analyses in an integrated fashion (without user assistance). However, resources to implement that functional specification for software improvements were never identified. The first phase in the research should be to review these separate efforts and to formulate the best approach to managing systemwide countermeasure programs. The second phase should implement the recommended approach.

Budget Estimate (can be a range): not applicable, see below

Project Length (can be a range): not applicable, see below

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_

May be completed as part of ongoing FHWA project "System Wide Selection Tool"

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions_x_ Extend Science___

Project Title: Data Warehouse and Archived Data

Scope: This project develops a systematic method to collect and archive research data to begin building a national data base for use in future research projects.

Project Description (can be a list of possible work steps or a paragraph):

Two potential needs for warehousing and archiving data are evident and need to be investigated. First, it would be desirable, over time, for highway agencies to capture and retain in a data warehouse, the detailed data that is gathered in the project development process and used in application of HSM Part C. Future applications of both HSM Parts B and C would be improved if any data previously gathered and analyzed were available to future analyses. Data warehousing procedures would need to be developed, because they are not generally available at present. It would also be desirable to develop better procedures for archiving data from past research projects. Researchers typically retain such data, but there are particular concerns in making those data available to other researchers. Highway agencies typically require researchers to whom they release data to promise that those data will not be released to any third party. This is normally the case when crash data are involved, because of tort liability concerns of highway agencies. It would be desirable to create a data archive so that data from one research project can be used by other researchers in the future, but such an archive would need to be carefully managed to respect the confidentiality of the data and the agreements under which the data were provided to the original researchers.

Budget Estimate (can be a range): Not applicable, see below

Project Length (can be a range): Not applicable, see below

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
In the short term, NCHRP can require contractors to submit their data in HSIS format.

Date this Form Completed: January 18, 2010

Person Submitting Form: Doug Harwood

Contact Information: TRB Highway Performance Committee
Research Subcommittee Chair

Other comments:

Appendix B
Worksheets for Projects to Extend Highway Safety Science

Work Sheets for Proposed Future Projects (D-R-A-F-T)
TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Information is provided in this appendix to assist in developing future research problem statements to conduct the following research:

11) Road-User Adaptation to Safety Treatments
12) Taxonomy of Crash Prediction Models: Strengths, Weaknesses, Applications
13) Framework for Developing and Testing the Adequacy of Alternative Models or Modeling Methods
14) Document the State of the Art in Structural Modeling
15) Develop Procedures for Constructing Structural Models for Safety Prediction
    - Project A: Scoping Study
    - Project B: Develop Procedures
16) Development of Driver Behavior Models for Structural Modeling
    - Project A: Scoping Study
    - Project B: Develop Procedures
17) Surrogate Scoping Effort – Definition, Criteria, Needs and Priorities
18) Evaluate and Validate Candidate Surrogate Measures
    - Project A: Scoping Study
    - Project B: Develop Procedures
19) Demonstrate Application of Surrogates and Understanding of Safety Issues

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Road-User Adaptation to Safety Treatments

Project Description:

One of the principal roadblocks for developing theory-based safety prediction models is the limited amount of knowledge about how road users adapt to interventions and to design and operational changes (i.e., treatments). Especially important is knowledge about driver adaptation to changes in speed limit and, more generally, driver adaptation to any treatment that is intended to change driver speed. Research is needed in the area of road-user adaptation.

The objective of the research is to identify the factors that influence road-user response and adaptation to treatments over time and to quantify their effect. The research should also develop procedures for measuring adaptation and techniques for incorporating it in safety prediction models.

An initial research task should be to identify types of road-user adaptation. It should also identify the types of treatments for which the safety effect is likely to be influenced by adaptation. Inasmuch as speed adaptation seems to be a common way in which road users react to change, its examination should be considered a priority of this project.

Due to its fundamental influence on many of the aforementioned research components and theme areas, it is recommended that research on road user adaptation be undertaken as an early activity in the program of advanced safety research outlined in this document.

Budget Estimate: $800,000

Project Length: 30 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
The FHWA's Exploratory Advanced Research Program (EARP) is well suited to be a potential funding mechanism for the proposed research plan.

Date this Form Completed: 11/2010

Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Taxonomy of Crash Prediction Models: Strengths, Weaknesses, Applications

Project Description:

The objective of this research project is to develop a synthesis document that catalogs the various forms of models that are used for predicting crash frequency. It would describe the theoretical or practical basis for each model form along with its strengths and weaknesses. Guidance would be provided for developing robust predictive models based on theory and empirical data. The guidance should identify appropriate techniques for evaluating alternative models and validating the selected model. Guidance should be provided for selecting the appropriate statistical analysis method for model calibration based on consideration of model form and study design.

The information obtained through this research will likely be of value to researchers developing safety prediction models for the 2nd edition of the Highway Safety Manual. Therefore, this research component should be an early activity in the program of advanced safety research outlined in this document.

Budget Estimate: $50,000

Project Length: 12 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)__
Possible NCHRP Synthesis topic.

Date this Form Completed: 11/2010

Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Framework for Developing and Testing the Adequacy of Alternative Models or Modeling Methods

Project Description:

With highway safety data, cause-and-effect conclusions obtained through the use of existing statistical methods are unreliable. Better methods and modeling approaches are evolving and may lead to more reliable conclusions. How will we know that the conclusions reached with any method or approach is reliable? The extent to which an approach to modeling succeeds in detecting cause-and-effect relationships is often difficult, and at times impossible, to determine.

What is missing is a tool for assessing the extent to which a new statistical method or modeling approach succeeds in identifying the cause-effect relationship in the data. However, there may be a way by which to judge the success of a proposed method or approach. The first step is to create a few artificial realistic data sets (ARDs) that incorporate plausible and reasonably complex cause-and-effect relationships and noise. Various levels of complexity can be used. The cause-and-effect structure behind the data is kept secret. The next step is to make the data available to researchers who want to try their approach to discovering the causal relationships. The third step is to judge the success of an approach by comparing what the researcher discovered to the assumed causal structure.

The objective of this project is to develop and validate the ARD tool. It would consist of developing a framework for constructing artificial realistic data and a procedure for using this data to evaluate candidate statistical methods and modeling approaches. The use of the Internet as a means of making the tool widely available should be explored. Recommendations on alternative mechanisms to maintain and support the tool should be developed.

This tool will be valuable during later projects to evaluate new statistical methods and modeling approaches. Therefore, this research component should be an early activity in the program of advanced safety research outlined in this document.

Budget Estimate: $300,000

Project Length: 18 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
The FHWA's Exploratory Advanced Research Program (EARP) is well suited to be a potential funding mechanism for the proposed research plan.

Date this Form Completed: 11/2010
Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Document the State of the Art in Structural Modeling

Project Description:

Statistical forecasting is a powerful methodology, but by its nature cannot be used to prove causality. Structural modeling has been proposed as an approach to crash analysis that can identify how and why crashes occur. Insight into crash causation will provide a theory-based foundation for the development of robust and transferrable safety prediction models. These models will, in turn, provide practitioners with the insight needed for effective highway investment decisions.

The objective of this research project is to document the state-of-the-art in areas related to structural modeling. Topics of investigation should include: methods for aggregating safety information, margin of safety analysis, vehicle crash mechanics, road-user behavior models, safety surrogates, and statistical methods for model calibration.

This research should be conducted early in the program of advanced safety research to provide a knowledge base for subsequent research projects.

Budget Estimate: $50,000

Project Length: 12 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
Possible NCHRP Synthesis topic

Date this Form Completed: 11/2010

Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Develop Procedures for Constructing Structural Models for Safety Prediction

Project Description:

Statistical forecasting is a powerful methodology, but by its nature cannot be used to prove causality. Structural modeling has been proposed as an approach to crash analysis that can identify how and why crashes occur. Insight into crash causation will provide a theory-based foundation for the development of robust and transferrable safety prediction models. These models will, in turn, provide practitioners with the insight needed for effective highway investment decisions.

The objective of this project is to develop procedures for constructing structural models for safety prediction. The research should develop techniques for constructing a graphical representation of the driver-vehicle-environment system and then using this representation to define mechanism models and empirical models as part of a causal chain. Probability models are sometimes used in a structural model to replicate specific random events when the causal chain for these events is unknown. This combined use of models should be investigated and guidelines developed describing the best use of probability models in a structural model.

Two structural modeling approaches have emerged for the evaluation of safety treatments; the research should address both approaches. One approach is to start with reconstruction of actual crashes, and then model how the treatment would have affected the outcome of each crash. The other approach is to include mechanism-based models as an integral part of a traffic simulation model. The SHRP 2 Safety program may provide some of the knowledge needed to implement the simulation-model approach.

The knowledge and skills needed to construct comprehensive structural models are likely to require expertise in several disciplines that are not usually covered in civil engineering graduate education. Therefore, this research component should include a series of educational opportunities and workshops that demonstrate the benefit of structural modeling and describe the procedures for constructing them.

Budget Estimate: Initial scoping project: $200,000. Project to develop procedures: $800,000.

Project Length: Initial project 12 months Second project: 32 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
The FHWA's Exploratory Advanced Research Program (EARP) is well suited to be a potential funding mechanism for the proposed research plan.

Date this Form Completed: 11/2010
Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Development of Driver Behavior Models for Structural Modeling

Project Description:

Statistical forecasting is a powerful methodology, but by its nature cannot be used to prove causality. Structural modeling has been proposed as an approach to crash analysis that can identify how and why crashes occur. Insight into crash causation will provide a theory-based foundation for the development of robust and transferrable safety prediction models. These models will, in turn, provide practitioners with the insight needed for effective highway investment decisions.

The objective of this project is to develop realistic representations of road-user behavior for use in structural models, with consideration given to all road users, including drivers, pedestrians, and motorcyclists. The focus should be on driver behaviors that are associated with infrastructure design, traffic control, and vehicle operation (e.g., reaction time, visual acuity, speed choice, etc.). Challenges to advancement in this area are recognized to be significant. Demographic variations in driver behavior will be a major challenge.

An initial scoping project is envisioned that would identify the scope of the second research project, its modeling priorities, and potential challenges. A research problem statement should be developed to describe the work needed and the recommended tasks for the second project.

Budget Estimate: Initial scoping project: $200,000. Project to develop models: $800,000.

Project Length: Initial project 12 months Second project: 32 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
The FHWA's Exploratory Advanced Research Program (EARP) is well suited to be a potential funding mechanism for the proposed research plan.

Date this Form Completed: 11/2010

Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Surrogate Scoping Effort – Definition, Criteria, Needs and Priorities

Project Description:

Surrogate safety measures provide an important means of evaluating alternative safety treatments, especially when these treatments do not lend themselves to evaluation with crash data. Surrogates allow engineers to assess facility safety in a shorter time period and at a lower cost, than would otherwise be required to when using crash data. Evaluation of surrogate measures could also provide insight into the crash causation process.

The objective of this project is to conduct a state-of-the-art review of knowledge in the area of surrogate safety measures and synthesize the findings. The synthesis should identify and define candidate surrogate measures. It should also establish criteria to assess the validity of alternative surrogate measures. The criteria should consider the use and usefulness of each measure in road safety evaluation. Thereafter, research is needed to identify potential roles for each candidate measure (e.g., for countermeasure evaluation, or as an independent variable in a safety prediction model).

This research should be conducted early in the program of advanced safety research to provide a knowledge base for subsequent research projects.

Budget Estimate: $50,000

Project Length: 12 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
Possible NCHRP Synthesis topic

Date this Form Completed: 11/2010

Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Evaluate and Validate Candidate Surrogate Measures

Project Description:

Surrogate safety measures provide an important means of evaluating alternative safety treatments, especially when these treatments do not lend themselves to evaluation with crash data. Surrogates allow engineers to assess facility safety in a shorter time period and at a lower cost, than would otherwise be required to when using crash data. Evaluation of surrogate measures could also provide insight into the crash causation process.

This research component would consist of a series of separate research projects. Each project would evaluate and validate one candidate surrogate safety measure or one specific class of related measures (e.g., surrogates from simulation modeling, surrogates from field studies). A key element of this evaluation is to quantify the strength of the relationship between the surrogate measure, crash frequency, and crash severity.

Each project should also identify the potential applications and best use of each surrogate measure. For example, is the measure appropriate for the evaluation of specific roadway types, vehicle types, and geographic areas. Alternative methods for measuring a surrogate in the field should be evaluated and a recommended method described. The level of effort required to collect each surrogate measure in the field should also be addressed.

An initial scoping project is envisioned where candidate surrogate safety measures are identified and evaluated for suitability as the topic of one of the subsequent research projects. A prioritized list will be developed to guide in the determination of the surrogates to be selected for subsequent research. A research problem statement should be developed for each surrogate to describe the research objectives and recommended research tasks.

Budget Estimate: Initial scoping project: $200,000. Surrogate research projects: $2,000,000. (allocation to specific projects to be estimated following the initial scoping project) Multiple contractors

Project Length: Initial project 12 months. Second project: 48 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
The FHWA's Exploratory Advanced Research Program (EARP) is well suited to be a potential funding mechanism for the proposed research plan.

Date this Form Completed: 11/2010
Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee

TRB Committee on Highway Safety Performance – HSM 2nd Edition Work Plan

Work Sheet for a Proposed Future Project

Topic: CMFs___ Predictive Models___ Corrections/Additions___ Extend Science_X_

Project Title: Demonstrate Application of Surrogates and an Understanding of Safety Issues

Project Description:

Surrogate safety measures provide an important means of evaluating alternative safety treatments, especially when these treatments do not lend themselves to evaluation with crash data. Surrogates allow engineers to assess facility safety in a shorter time period and at a lower cost, than would otherwise be required to when using crash data. Evaluation of surrogate measures could also provide insight into the crash causation process.

This research component would follow the previous project, titled "Evaluate and Validate Candidate Surrogate Measures." This project would consist of a series of separate research projects. Each project would focus on one of the surrogate safety measures evaluated in the previous research project and identified as having the most promise.

It is envisioned that each research project will have two key objectives. One objective will be to demonstrate the application of the surrogate safety measure (or class of related surrogate measures) for safety evaluation. The findings from this research will represent a feedback loop that provides a basis for further refinement of the surrogate measure's definition, role, application, data collection method, and utility.

A second objective will be to evaluate the ability of each safety surrogate (or class of related surrogate measures) to describe facility safety, or to quantify the safety effect of a treatment. Also evaluated will be the potential use of surrogates in structural models and safety prediction models.

Budget Estimate: $800,000 (to be divided among the surrogate measures identified in the previous project).

Project Length: 32 months

Method of conducting project: NCHRP___ Committee volunteers___ Other (describe)_X_
The FHWA's Exploratory Advanced Research Program (EARP) is well suited to be a potential funding mechanism for the proposed research plan.

Date this Form Completed: 11/2010

Person Submitting Form: J. Bonneson on behalf of Future Directions Subcommittee