

HSM Training Guide



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Safe Roads for a Safer Future
Investment in roadway safety saves lives

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16. Abstract <p>This guide focuses on identifying HSM training currently available to state and local agencies who are considering implementation of the HSM. The objectives of the training guide are to:</p> <ul style="list-style-type: none"> • Identify key focus groups that can be used as a basis for identifying particular training needs and sequence of training. • Present a flow chart for each of the key focus groups that outlines appropriate course modules and sequence of training. • Present a summary of different training delivery methods and specific reference to training methods given limited ability to travel costs. Present recommendations for optimal training approaches to conduct training on the advanced methods presented in the HSM. • Inform state and local agencies of available HSM and HSM-related training opportunities. <p>Several training opportunities exist for highway safety and safety analysis. The guide focuses only on courses directly applicable to content in the HSM and only those provided by NHI, FHWA and ITE.</p>			
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1. Introduction

The Highway Safety Manual (HSM) introduces a science-based technical approach that takes the guesswork out of safety analysis. The HSM provides tools to conduct quantitative safety analyses, allowing for safety to be quantitatively evaluated alongside other transportation performance measures such as traffic operations, environmental impacts, and construction costs. This guide focuses on identifying HSM training currently available to state and local agencies who are considering implementation of the HSM. The objectives of the training guide are as follows:

- Identify key focus groups that can be used as a basis for identifying particular training needs and sequence of training. This will support integration of HSM methodologies and approaches into the project development process and investment decision making processes.
- Present a flow chart for each of the key focus groups that outlines appropriate course modules and sequence of training. These flow charts support the promotion of a training program that can be customized to fit the needs of the different key focus groups (target audiences).
- Present a summary of different training delivery methods and specific reference to training methods given limited ability to travel costs. Present recommendations for optimal training approaches to conduct training on the advanced methods presented in the HSM.
- Inform state and local agencies of available HSM and HSM-related training opportunities.

Several training opportunities exist for highway safety and safety analysis. The guide focuses only on courses directly applicable to content in the HSM and only those provided by NHI, FHWA and ITE.

2. Training Review

Introduction

This section provides a review of current training opportunities offered by the Federal Highway Administration's (FHWA) Resource Center, the National Highway Institute (NHI), Institute of Transportation Engineers (ITE), and American Association of State Highway Transportation Officials (AASHTO). Unless otherwise indicated these sessions are instructor-led. In some cases, the review also included an assessment of ongoing or nearly completed projects including the NCHRP 17-38 Highway Safety Manual Course and the FHWA Highway Safety Improvement Program (HSIP) Course. Since the NCHRP 17-38 course is intended to be adaptable to various audiences, the modules of the NCHRP 17-38 training are presented as individual modules in the matrix.

The FHWA Resource Center

The FHWA Resource Center is a key partner in supporting the education and training of staff FHWA Division offices, state Departments of Transportation, Metropolitan Planning Organizations, local agencies in the Highway Safety Manual. Resource Center staff also provides expert assistance to these agencies.

The National Highway Institute

The National Highway Institute is a division of the FHWA. The main purpose of NHI is to provide training that drives improvement of the performance of the transportation industry. The NHI web site can be accessed at: <http://www.nhi.fhwa.dot.gov>.

NCHRP 17-38 Overview Training Materials for the Highway Safety Manual

NCHRP 17-38 was initiated to specifically develop overview training for the Highway Safety Manual. Once completed, the training materials (instructor and participant materials) will be available on-line through the Transportation Research Board, for use and customization by agencies, organizations and individuals. The training materials will include an example training program, an instructor guide, a comprehensive participant notebook, and Microsoft PowerPoint presentations with instructor notes. The training includes examples across each of the different chapters and parts of the HSM.

HSM and Related Training Opportunities

Exhibit 1 summarizes the HSM training opportunities as of May 2011. The training matrix presented in Exhibit 1 categorizes courses and modules by the topic and level of training with the understanding that some overlap may exist across the various parts of the HSM.

The levels of training shown in Exhibit 1 are NHI training levels: basic, intermediate, and accomplished.

At the basic level, the training can be summarized as:

- No matter what your background, this course or training event provides an overview of the subject matter.
- No pre-requisites apply to this training.
- The training event is a good opportunity for career development, cross-training or developing a new competency.

At the intermediate level, the training can be summarized as:

- Participants need to have a basic understanding of the subject matter prior to attending this level of course or training event. Some practical knowledge or previous training in the subject is needed.
- Participants that use this subject knowledge or apply it on a regular basis as a specialist, manager, or supervisor are best suited to take this training.
- The subject matter may provide a deeper knowledge to participants for something that is similar to what they are already doing, but may be a new technology or regulation that need to be incorporated into what they are already doing.

At the accomplished level, the training can be summarized as:

- Participants need to have a good understanding of the subject matter prior to attending this level of course or training event. Either deep practical/applied knowledge and skills or previous extensive training in the subject matter is needed.
- Participants that use this subject knowledge and have a demonstrated mastery of the subject as a specialist, manager or supervisor are best suited to take this training.
- The subject matter may provide a greater depth of deeper knowledge, understanding and ability to apply the knowledge and judgment to problems where solutions are not always directly applicable. Participants may also need to incorporate new technology in what they are already doing.

Note that many of the FHWA HSM webinar series were grouped into Part C (predictive method) even though the webinars also included Part D content on CMFs.

EXHIBIT 1.
HSM Training Opportunities as of May 2011

HSM Topic Area	Level of Training*		
	Basic	Intermediate	Accomplished
Part A Introduction, Human Factors, Fundamentals	Introduction Module (NCHRP 17-38) Human Factors Module (NCHRP 17-38) Fundamentals Module (NCHRP 17-38) Introductory Webinar hosted by AASHTO, FHWA, and TRB HSM Introduction & Overview (FHWA Resource Center Webinar)		
Part B Roadway Safety Management Process	Highway Safety Improvement Program Manual (NHI – 380103) Part B Overview Module (NCHRP 17-38)	HSM Practitioner's Guide for Horizontal Curves (NHI – 380088) Project Identification Using the HSM (FHWA Resource Center Webinar) HSM Applications to HSIP (FHWA Resource Center Webinar) Network Screening Module (NCHRP 17-38) Diagnosis and Countermeasure Selection Module (NCHRP 17-38) Economic Appraisal and Prioritization Module (NCHRP 17-38) Safety Effectiveness Evaluation Module (NCHRP 17-38)	New Approaches to Highway Safety Analysis (NHI – 380075) Low-Cost Safety Improvements Workshop (NHI – 380076) Intersection Safety Workshop (NHI – 380077) Using SafetyAnalyst (AASHTOWare) Empirical Bayes Analysis for Safety (FHWA Resource Center) HSIP Project Identification (FHWA under development) HSIP Project Evaluation (FHWA under development)

HSM Topic Area	Level of Training*		
	Basic	Intermediate	Accomplished
Part C Predictive Methods		HSM Applications to Two-Lane Rural Roads (FHWA Resource Center Webinar) HSM Applications to Urban/Suburban Intersections (FHWA Resource Center Webinar) HSM Applications to Rural Intersections (FHWA Resource Center Webinar) HSM Applications to Multilane Highways (FHWA Resource Center Webinar) HSM Application to Urban/Suburban Roads (FHWA Resource Center Webinar) HSM Applications to Rural Multilane Intersections (FHWA Resource Center Webinar) HSM and Pedestrians (FHWA Resource Center Webinar) HSM Applications to Horizontal Curves (FHWA Resource Center Webinar) HSM Relationship to Roadway Departure Crashes (FHWA Resource Center Webinar) Predictive Method Module (NCHRP 17-38) Calibration Module (NCHRP 17-38) Highway Safety Manual Predictive Method Application Series (ITE) Fundamentals of the Highway Safety Predictive Method (ITE) Predicting Crash Frequency on Rural Highways (ITE) Predicting Crash Frequency on Urban and Suburban Arterials (ITE)	HSM Practitioner's Guide for Geometric Design Features (NHI – 380070) HSM Practitioner's Guide for Rural Two Lane Roads (NHI – 380070A) HSM Practitioner's Guide for Multilane Highways (NHI – 380070B) Interactive Highway Safety Design Model (NHI – 380071) HSM Practitioner's Guide for Intersections (NHI – 380105)
Part D Crash Modification Factors	Application of Crash Reduction Factors – (NHI - 380093)**	Science of Crash Reduction Factors (NHI – 380094) Crash Modification Factors (NCHRP 17-38) Applying HSM Crash Modification Factors (ITE)	

* Level as defined by the NHI course level definition.

** NHI currently has task orders under way to re-design this course to reflect a shift in emphasis on the use of CMFs rather than CRFs

Key Focus Groups

An agency or organization can approach assessment of training needs for use of the AASHTO Highway Safety Manual in various different ways.

This document provides the outcome of one approach to such a training needs assessment. For the purpose of this document, safety is defined as the frequency and severity of crashes.

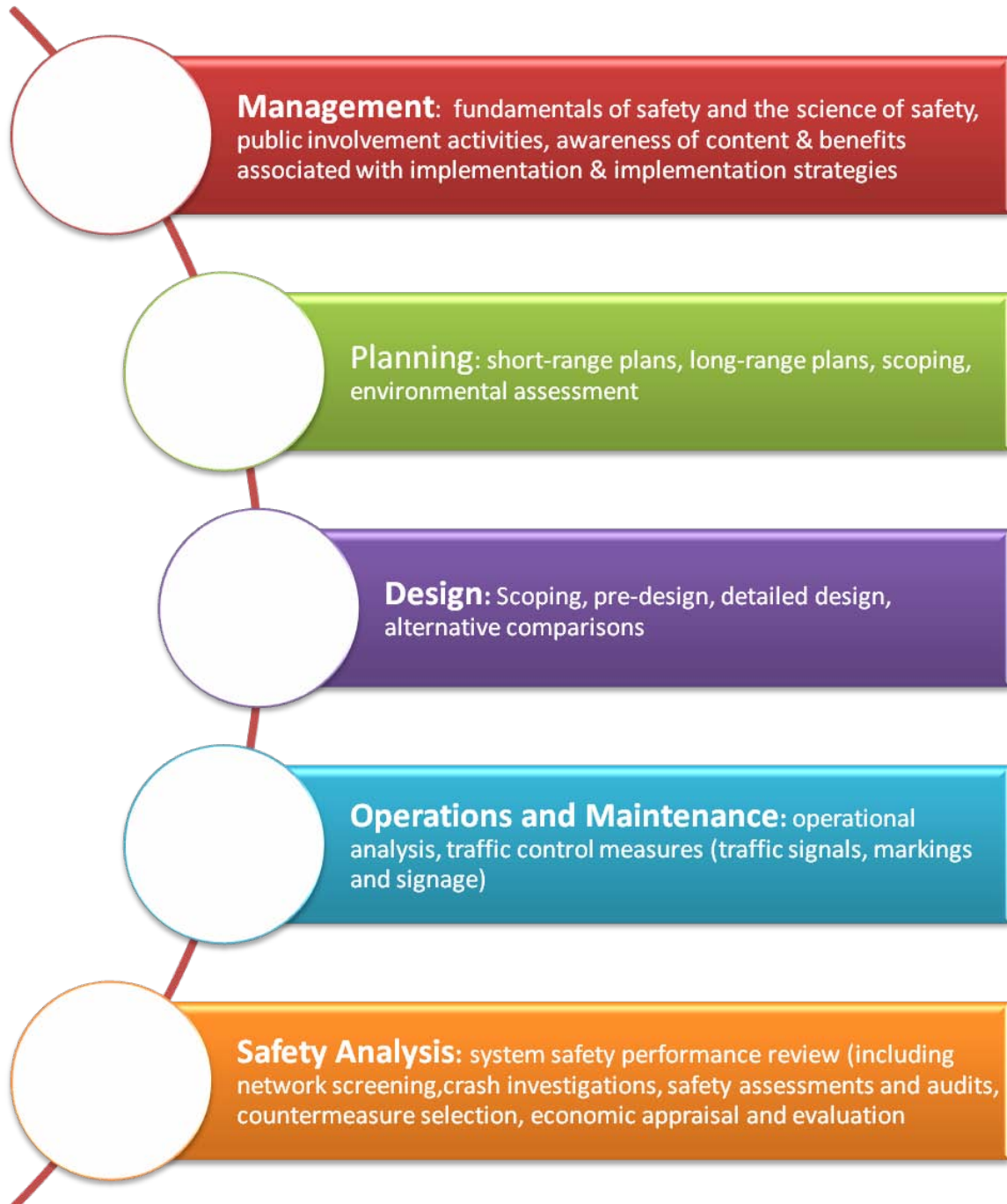
The following process was followed to identify five key focus groups and associated training needs:

- Step 1: Assess the roles, responsibilities, fundamental safety knowledge and skill set necessary for staff working in the area of project development, roadway safety management, and transportation administration. This specifically refers to the kind of activities necessary within the particular area to integrate safety into everyday decision-making.
- Step 2: Identify key focus groups for categorizing training needs. In this case, five key focus areas were identified: Management, Planning, Design, Operations and Maintenance, and Safety Analysis. Exhibit 2 outlines these five key focus groups for training.
- Step 3: Determine the particular knowledge and associated skill sets necessary for each of the key focus areas to integrate the methods and approaches of the HSM into decisions in their particular focus area.
- Step 4: Identify available training opportunities, distinguishing between different levels of outcomes (basic, intermediate, and accomplished). For an agency-specific assessment, step 4 could include identification of agency-specific training needs that available training opportunities do not currently meet. In some cases, a full assessment of cost and resources necessary to develop and maintain fundamental knowledge and skills to successfully implement HSM methods and analysis approaches could be of value.

The five key focus groups are as follows:

- The Management focus group represents professionals and management that are not intricately involved in the planning, design, and operations and maintenance activities (e.g., transportation administration and decision makers).
- The Planning Focus Group includes those involved in the development of long- and short-range plans, corridor studies, environmental assessments, and alternatives assessment.
- The Design Focus Group includes those involved in project scoping, preliminary design, and final design, including alternative comparisons.
- The Operations and Maintenance Focus Group includes those who conduct operational analysis and develop traffic control plans.
- Safety Analysis: This focus group includes those who are responsible for collecting and analyzing roadway safety data, system safety performance reviews, crash investigations, safety assessments and audits, and/or countermeasure selection.

EXHIBIT 2
Key focus groups identified for HSM training



The training for the Management key focus group covers fundamental knowledge and familiarity necessary to support successful implementation of the HSM including transportation administration. The HSM training module content and sequence for each of the focus groups will need to address issues such as differences in current level of knowledge and skills related to the HSM.

A key consideration in training is to provide specific practical sessions that may be of value to each of the key focus groups. For example, in design, a practical session highlighting how the HSM can add value to the alternative comparison and evaluation process would be of particular benefit. For the safety analyst, demonstrating differences in priorities identified with the more advanced statistical approaches and the improvement of accuracy would be beneficial.

Ultimately, it is critical that those participating in training will be able to implement what they have learned in a meaningful way. It is foreseen that the recommended content for each of the key focus groups will also include particular focus on strategies for implementing and institutionalizing the HSM.

The next subsection provides the results of a chapter-by-chapter assessment of the HSM for each of these key topic groups and a more detailed discussion of an approach to the training of each of these groups.

An Approach to the Training of the Key Focus Groups

Exhibit 3 presents an example of an assessment of each HSM chapter and its applicability to each of the five key focus groups.

The remainder of this subsection provides a summary of each of the key focus groups and a modular approach to the training of each of these groups.

The sequencing of training topics for each of these focus groups does not represent the sequencing of chapters within the HSM. During the course of the development and piloting of the NCHRP 17-38 overview training, it became evident that the HSM chapter sequence does not offer an appropriate sequence for training. By sequencing the training as presented for each of the focus groups, participants are able to better integrate new concepts in the HSM with their existing background in safety. Where the science of safety in the HSM represents a change from the existing approaches and beliefs a particular focus group may hold, the sequencing offers opportunity early on to deal with these paradigm shifts that are necessary for successful implementation of advanced methods and approaches in the HSM. When reviewing the sequencing of topics, the reader can refer to section 4 where descriptions are provided for each of the different modules within the NCHRP 17-38 training materials.

EXHIBIT 3
Applicable HSM Chapters for Key Focus Groups

Applicable Chapters of HSM	Management	Planning	Design	Operations & Maintenance	Safety Analysis
Part A – Introduction, Human Factors, and Fundamentals					
1 – Introduction & Overview	X	X	X	X	X
2 – Human Factors	X	X	X	X	X
3 – Fundamentals	X	X	X	X	X
Part B – Roadway Safety Management Process					
4 – Network Screening		X			X
5 – Diagnosis		X		X	X
6 – Select Countermeasures		X	X	X	X
7 – Economic Appraisal		X	X	X	X
8 – Prioritize Projects		X			X
9 – Safety Effectiveness Evaluation				X	X
Part C - Predictive Method					
10 – Rural Two-Lane, Two-Way Roads		X	X		X
11- Rural Multilane Highways		X	X		X
12- Urban and Suburban Arterials		X	X	X	X
Part D – Crash Modification Factors					
13 – Roadway Segments		X	X	X	X
14- Intersections		X	X	X	X
15 – Interchanges		X	X	X	X
16 – Special Facilities and Geometric Situations		X	X	X	X
17 – Road Networks		X	X	X	X

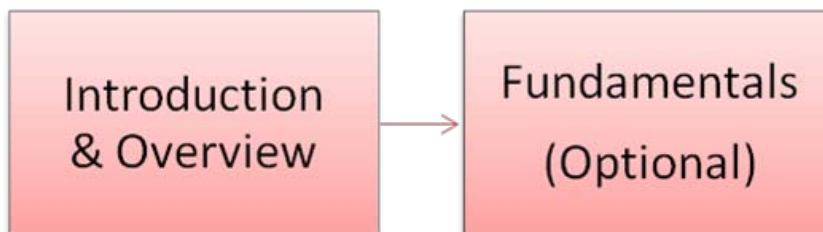
Management Focus Group Training Needs

The Management focus group represents professionals and management that are not intricately involved in the planning, design, and operations and maintenance activities (e.g., transportation administration and decision makers).

This group would benefit most from a general overview and reviewing the benefits of implementing the HSM, as seen in Exhibit 4.

Of utmost importance to this group is training that provides an Introduction and Overview to the HSM. The content of the FHWA Resource Center HSM Introduction & Overview webinar can serve the basic needs of this group. Training on Fundamentals would provide a better understanding of the science behind the HSM but is likely not as critical for this particular focus group.

EXHIBIT 4
Management Focus Group Training Needs



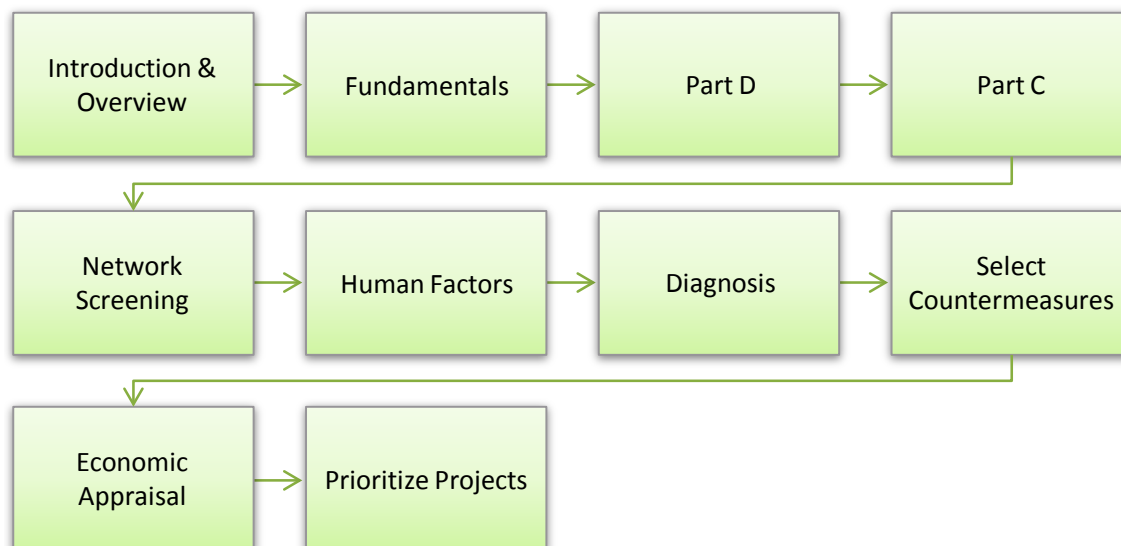
Planning Focus Group Training Needs

The Planning Focus Group includes those involved in the development of long- and short-range plans, corridor studies, environmental assessments, and alternatives assessment.

There are several opportunities for this focus group to apply the HSM to job activities including the applications from Parts B, C, and D. The training needs of this group may vary based on level of experience. Someone who is newer to transportation planning may not be intricately familiar with the roadway safety management process and may benefit from a training program that covers all of Parts B, C, and D. However, those that have been in transportation planning for a period of time and are more familiar with the roadway safety management process and traditional applications of the network screening process would benefit most from a training program focused on Parts C and D of the HSM and how these concepts tie into the network screening process.

For a training program designed for the planning group and the remaining focus groups, it is essential to provide a foundation for the training with a course covering an introduction and overview of the HSM, as well as fundamentals. As shown in Exhibit 5, the recommended logical training flow would include courses on Parts D and C followed by training on network screening (Chapter 4) to facilitate comprehension of the applications of the various performance measures for network screening. For those more familiar with the roadway safety management process, this might suffice for training needs. For those less familiar with the process, it would be ideal to include courses focused on human factors (Chapter 2), diagnosis (Chapter 5), countermeasure selection (Chapter 6), economic appraisal (Chapter 7, and project prioritization (Chapter 8).

EXHIBIT 5
Planning Focus Group Training Needs



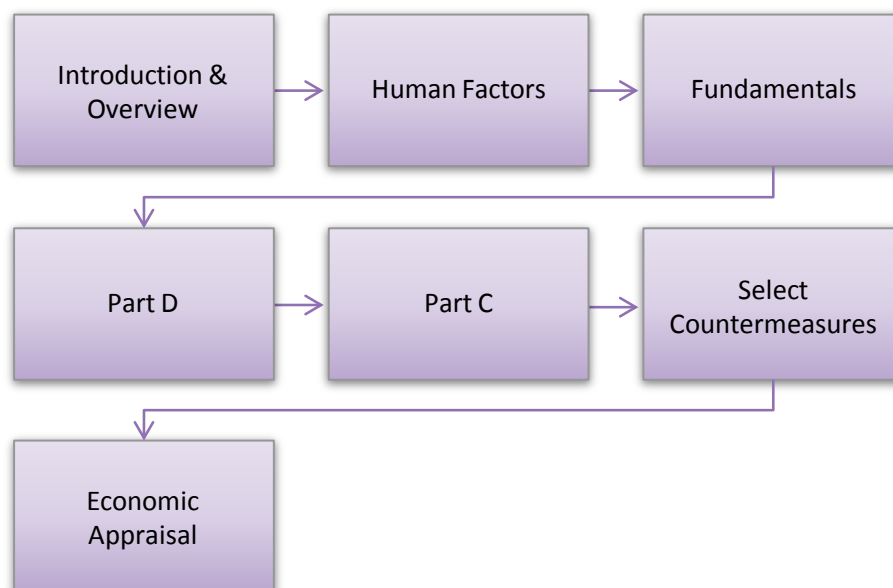
Design Focus Group Training Needs

The Design Focus Group includes those involved in project scoping, preliminary design, and final design, including alternative comparisons. This group will assess the safety performance of different design alternatives and variation in particular design parameters or roadway features.

It is critical that this group understands Parts C and D. This group should be able to assess the safety performance of various design alternatives using the Predictive Methods in Part C and to assess the safety impacts of changes to roadway features using Part C and Part D upon completion of the training.

Exhibit 6 presents the flow diagram for a typical training program for this focus group. The recommended flow starts with courses providing an introduction, overview and fundamentals. While this focus group will not typically be involved in diagnosing safety problems, a course on human factors will set a foundation for human factor-related considerations throughout the design process. Once a foundation has been set, the recommended training program should focus on Parts D and C. This focus group would also greatly benefit from the NHI course on the Interactive Highway Safety Design Model. The concepts in Part B are not as critical for this focus group, but a training course on selecting countermeasures and economic appraisal could be useful. Training on the topic of human factors is necessary to support design approaches and alternatives that reduces user error and reduces the outcomes of user error.

EXHIBIT 6
Design Focus Group Training Needs



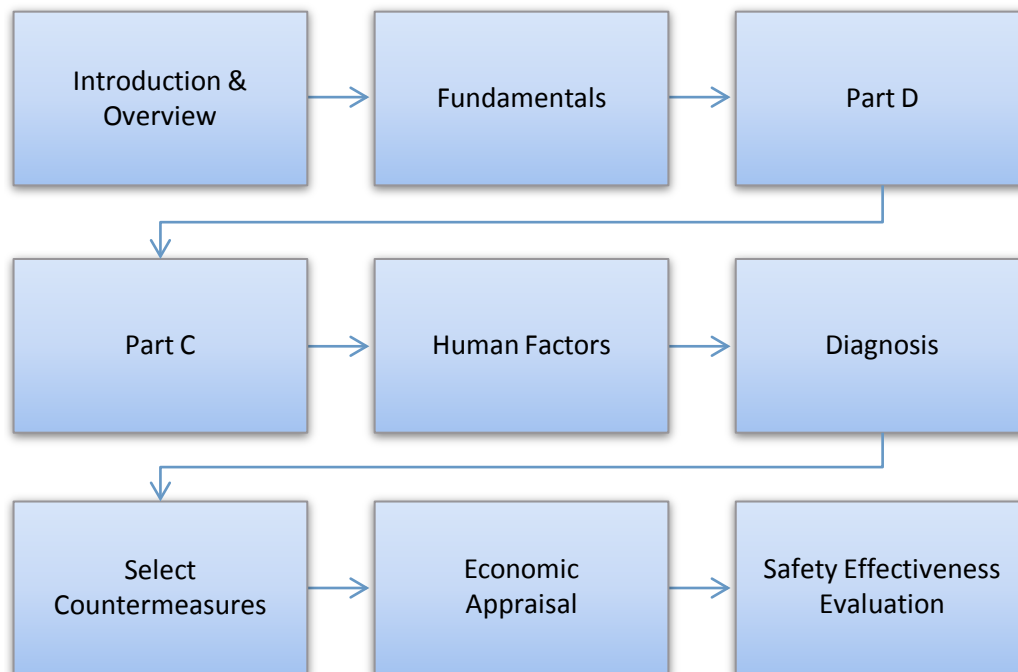
Operations and Maintenance Focus Group Training Needs

The Operations and Maintenance Focus Group includes those who conduct operational analysis and develop traffic control plans. It is most likely that this group will use the HSM to assess the impacts on safety of signal timing adjustments, lane modifications, and roadway mitigations.

This focus group will benefit most from a training program that focuses on Parts B and D of the HSM. Once again, this training program for this focus group should begin with an introduction and overview of the HSM, followed by the fundamentals, as shown in Exhibit 7. The training program should then include a course on Part D followed by Part C, human factors (Chapter 2) and the applicable concepts in Part B: including diagnosis (Chapter 5), countermeasure selection (Chapter 6), economic appraisal (Chapter 7), and safety effectiveness evaluation (Chapter 9). Inclusion of Part C in the training is essential to support safety quantification of the impact of changes to the existing network, performing benefit-cost analysis of alternative countermeasures, and conducting before-after studies using advanced methods.

EXHIBIT 7

Operations & Maintenance Focus Group Training Needs



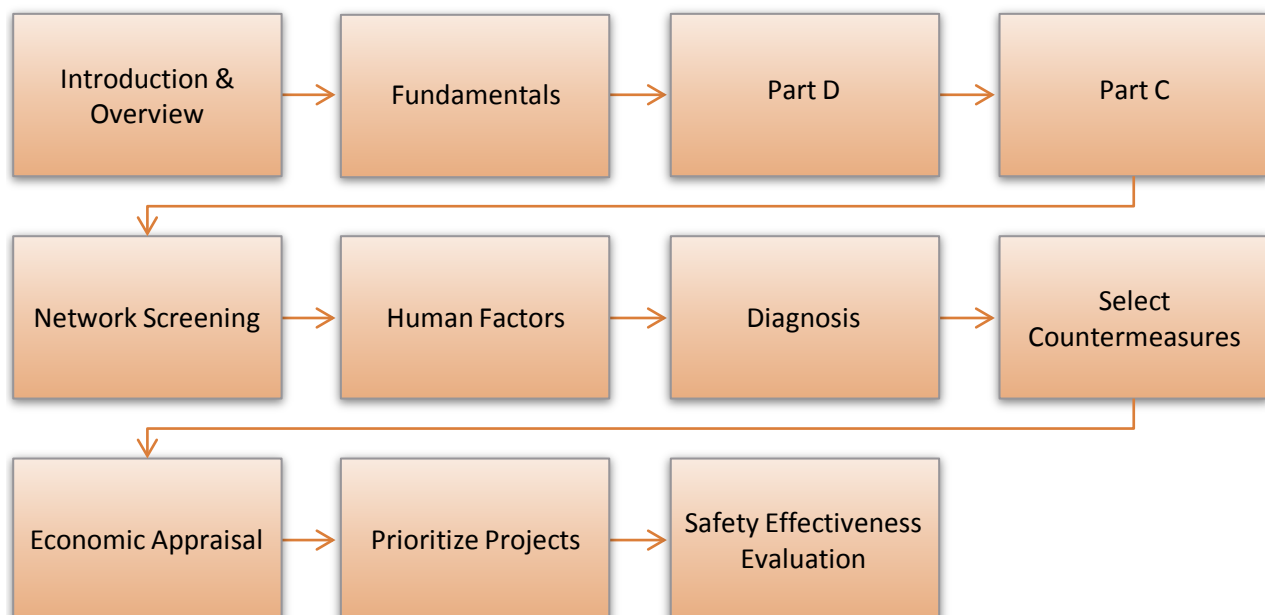
Safety Analysis Focus Group Training Needs

The Safety Analysis focus group includes individuals who are primarily responsible for safety. This may include those involved in system safety performance review, crash investigations, safety assessments and audits, and/or countermeasure selection.

This focus group should be familiar with the entire contents of the HSM. It is recommended that this focus group follow a training sequence very similar to those in the planning focus group, but that this training program also include a course on safety effectiveness evaluation, as shown in Exhibit 8. This group would benefit from courses on Parts D and C, followed by Part B of the HSM. The HSIP courses currently under development on Project Identification and Project Evaluation would be ideal to cover Part B of the HSM as described within the context of the HSIP.

The NCHRP 17-38 HSM Overview Training Modules can be tailored to address the training needs of target focus groups. This would allow for an intermediate depth of knowledge, followed by more in-depth (advanced) training course(s) to address the critical knowledge for each focus group.

EXHIBIT 8
Safety Analysis Focus Group Training Needs



3. Summary of Delivery Methods

Training accessibility is essential to reach the largest audience and support successful implementation of the HSM. Highway agencies operate on limited budgets and opportunities for training personnel may be limited because of travel restrictions. Potential delivery formats may include, but are not limited to: instructor-led workshops, webinars, webinar discussions supported with advance materials, or on-line self-paced training.

With instructor led workshops, the instructor and the students are located in the same facility. This style of training allows for the most interaction between the instructor and the students and provides opportunities for group activities. It also provides students with the opportunity to network with other students in their field and hear various perspectives on how to incorporate the knowledge. While this method may be the best for keeping students engaged in the learning, it may be more expensive if participants are required to travel to attend the training.

Web-based training delivers training through the computer using any combination of video, text, and audio delivery of concepts. The biggest advantage of web-based training is that it allows a student to take a course on-line at his or her own pace and convenience. This delivery method has the greatest potential to reach the largest audience. Unfortunately, this method does not allow for interaction with an instructor and the participant has the responsibility to contact individuals during or after the training if there are any questions. Participants also do not benefit from the discussions typically generated by the questions of attendees at on-site instructor-led workshops. Another disadvantage is that this learning method leads to understanding at the lower cognitive level. In other words, the participants are only able to recall facts (e.g., what is regression to the mean), rather than being able to perform synthesis and evaluation tasks (e.g., conducting an EB analysis and interpreting results).

The success of web-based training is highly dependent on the course design and interface followed for the particular training material. With web-based training, it is also important to consider how different learning styles will be accommodated and whether participants will have a means to engage in discussions and active learning exercises during and after the training session(s). It is important to note that these types of activities are usually not included in traditional web-based training because of the significant resources required to develop the materials.

4. Training Course Descriptions

This section provides a compilation of training course descriptions for training that is available from the National Highway Institute (NHI), the Federal Highway Administration's (FHWA) Resource Center, Institute of Transportation Engineers (ITE), and American Association of State Highway Transportation Officials (AASHTO).

The section also includes a description of the NCHRP 17-38 HSM Overview Training and each of the modules in the training. The NCHRP 17-38 instructor and participant materials will be available in the public domain shortly.

Unless otherwise noted, these courses are instructor-led and costs are subject to change (costs current as of May 2011).

National Highway Institute

This section lists available courses from NHI along with the duration and instruction-type for courses related to the HSM.

HSM Practitioner's Guide for Geometric Design Features (380070) – 2-day

This course provides the HSM methodology for the safety performance of geometric design decisions on both two-lane and multi-lane rural highways. The crash prediction models for total crashes and cross-section related crashes based upon lane width, shoulder width, roadside hazard, traffic volume (exposure) and other characteristics are presented. Examples of safety performance prediction are presented for highway segments and intersections. Discussion of research and the interactive effects of lane and shoulder widths, hazard rating, and access density (driveways) on safety performance are presented.

Course 380070A covers only two-lane highways and Course 380070B covers only multi-lane rural highways.

HSM Practitioner's Guide for Rural Two Lane Roads (380070A) – 1-day

This course presents the HSM crash prediction models for total crashes on rural two-lane roads and crashes based upon lane width, shoulder width, roadside hazard, traffic volume (exposure) and other characteristics. Examples of safety performance prediction are presented for highway segments and intersections. Discussion of research and the interactive effects of lane and shoulder widths, 'roadside hazard rating', and access density (driveways) on safety performance are presented.

HSM Practitioner's Guide for Multilane Highways (380070B) – 1-day

This course provides the HSM methodology for the prediction of safety performance of geometric design decisions for multilane highways. The crash prediction models for total crashes based upon lane width, shoulder width, roadside hazard, traffic volume (exposure) and other characteristics are presented. Examples of safety performance prediction are presented for highway segments and intersections. Discussion of research and the interactive effects on safety performance for median width and barriers, of access (driveways) and side streets and intersection turning lanes are presented.

Interactive Highway Safety Design Model (380071) – 2-day

This course instructs highway design project managers, planners, designers, and traffic and safety reviewers in the application of the Interactive Highway Safety Design Model (IHSDM) software and provides guidance on interpretation of the output. Participants gain hands-on experience with the software.

New Approaches to Highway Safety Analysis (380075) – 3-day

The primary purpose of this course is to help attendees gain an understanding of the Highway Safety Improvement Program (HSIP) process, safety engineering principles and human factors issues related to traffic and road safety. It also provides the participant with an explanation of the latest methods for identifying collision causes and selecting cost-effective safety improvements. Also, this course serves as a prerequisite for those who will be utilizing SafetyAnalyst, a set of software tools available through AASHTOWare designed to assist state and local agencies to improve the decision making process in implementing safety improvement projects.

Low Cost Safety Improvements Workshop (380076) – 1-day

This course provides a comprehensive presentation of low-cost, ready-to-use improvements that enhance the safety of highways. The course covers a synthesis of countermeasures and their associated crash reduction factors as identified in the "AASHTO Strategic Highway Safety Plan -- NCHRP 500 Guidebooks." Countermeasures for specific areas of highway safety, including roadside hazards; signing, markings, and lighting; traffic control devices; intersections; traffic signals; and railroad grade crossings are discussed. The course also introduces low-cost safety improvements that have been recently developed by States and local engineers. Through exercises, participants learn how to analyze highway safety situations and apply appropriate countermeasures to those situations.

Intersection Safety Workshop (380077) – 1-day

Beginning with an introduction to intersection and crash characteristics, this course provides information on ready-to-use, direct-application safety measures for rural unsignalized and signalized intersections. Participants are presented with a synthesis of countermeasures and their associated crash reduction factors as identified in the "AASHTO Strategic Highway Safety

Plan - NCHRP 500 Guidebooks." The course focuses on the application of these countermeasures and design and safety operations best practices for substantive improvements to intersection safety. During the course, participants have the opportunity to present intersection safety situations that they are currently facing and discuss appropriate countermeasures and best practices to address those situations.

HSM Practitioners Guide for Horizontal Curves (380088) – 1-day

This course provides participants with some tools for evaluating the safety performance of horizontal curves along with suggestions for countermeasures that could improve safety performance. Topics covered in this course include crash experience in locations under study, tools for identifying and prioritizing horizontal curve safety, low cost maintenance countermeasures, and a discussion of engineering countermeasures.

Applications of Crash Reduction Factors (380093) – 3-hour (blended on-line course)

This course focuses on the application of Crash Reduction Factors (CRFs) to select countermeasures. The course covers the project development cycle (starting from network screening and site selection for safety review), diagnostics of safety concerns, cost-benefit evaluation, and countermeasure selection.

NHI currently has task orders under way to update this course to reflect a change in emphasis on the use of CRFs to Crash Modification Factors (CMFs).

Science of Crash Reduction Factors (380094) – 2-hour (blended on-line course)

This course focuses on the application of CRFs to select countermeasures. The course covers the project development cycle (starting from network screening and site selection for safety review), diagnostics of safety concerns, cost-benefit evaluation, and countermeasure selection.

NHI currently has task orders under way to re-design this course to reflect a shift in emphasis on the use of CMFs rather than CRFs.

Highway Safety Improvement Program Manual (380103) – 2-day

This course introduces safety professionals to new procedures and technologies, and provides information on topics ranging from core safety concepts to detailed discussions of technical methods for data-driven safety planning which will enhance HSIP efforts.

HSM Practitioner's Guide for Intersections (380105) – 1-day

This course provides participants with some tools for evaluating the safety performance of intersections along with suggestions for countermeasures that could improve safety performance. The course is intended for State and local transportation planners, designers, and safety engineers involved in the design of intersections.

FHWA Resource Center

Empirical Bayes Analysis for Safety

This workshop reviews terminology and concepts related to before-after highway safety data analysis techniques. These types of analyses are illustrated and applied via examples and work problems. This workshop also includes a hands-on application of Empirical Bayesian (EB) statistics procedures to overcome the effects of the regression to the mean phenomenon. By the end of this workshop, students will be capable of applying the EB approach to Highway Safety Data.

HSM Webinar Series (available at www.highwaysafetymanual.org)

During 2010, the FHWA Resource Center presented a series of HSM webinars. Recording of these webinars are available on-line at the AASHTO HSM web site:

<http://www.highwaysafetymanual.org/Pages/FHWAResourceCenterHSMWebinarSeries.aspx>.

- HSM Introduction and Overview – HSM introduction, purpose, summary of content, and marketing and deployment initiatives. HSM and Pedestrians – HSM applications to pedestrians.
- HSM Applications to HSIP – HSIP examples utilizing the network screening, project prioritization, and program evaluation tools in the HSM.
- Project Identification Using the HSM – HSM applications that aid in the project identification process.
- HSM Applications to Two-Lane Rural Roads – HSM predictive methods and crash modification factors for two-lane rural road segments.
- HSM Applications to Rural Intersections – HSM predictive methods and crash modification factors for two-lane rural road intersections.
- HSM Applications to Horizontal Curves – HSM applications to horizontal curves.
- HSM Applications to Multilane Highways – HSM predictive methods and crash modification factors for multilane rural highway segments.
- HSM Applications to Urban and Suburban Intersections – The HSM predictive methods and crash modification factors for urban and suburban intersections.
- HSM Applications to Urban and Suburban Roadways – HSM predictive methods and crash modification factors for urban/suburban roadway segments.
- HSM Relationship to Roadway Departure Crashes – HSM applications to roadway departure crashes.

Additional Courses under Development

FHWA HSM Train-the-Trainer Workshops

FHWA will be presenting train-the-trainer workshops in the spring of 2012. Details are forthcoming. For more information, please contact Mshadoni Smith from FHWA at mshadoni.smith@dot.gov. Train-the-trainer workshop course material will also be made available on the HSM web site in the future.

FHWA Web-based Training

FHWA will be developing HSM web-based training based on the NCHRP 17-38 course material but customized to the key practitioners focus groups. The modules will be posted free of charge on the NHI web site in 2012.

FHWA HSM for Local Agencies

FHWA designed this course for local transportation agencies. The material provides a snap shot of highway safety statistics, a brief introduction to the AASHTO Highway Safety Manual, and shows how safety can be incorporated into practice through proven safety countermeasures and low cost safety improvements. This course has been piloted as a webinar and is available on request from the Resource Center. For more information, please contact Hillary Isebrands at Hillary.Isebrands@dot.gov.

HSM Roadway Safety Management Process

The course is an overview of the HSM with emphasis on the Roadway Safety Management Process (Part B). The target audience is transportation professionals who are involved with assessing sites within a corridor that could benefit from safety treatments in reducing crash frequency or severity. An overview of the HSM crash prediction methodology is also provided. For more information, please contact Gene Amparano at Gene.Amparano@dot.gov.

NHI: IHSDM Web-based training (380100)

IHSDM web-based training is currently under development – refer to the NHI web site for updates.

HSM Overview Training Modules (NCHRP 17-38)

The NCHRP 17-38 was initiated to specifically develop overview training for the Highway Safety Manual. Once completed, the training materials (instructor and participant materials) will be available on-line through the Transportation Research Board, for use and customization by agencies, organizations and individuals. The training will also be available through NHI as a one day practitioner's course (*NHI 380106*) in early 2012. The training is modular and intended to be used for training on modular basis or as an overview course if the training covers all the modules.

This course provides an overview of the HSM. The intended audience is state and local transportation planners, designers, and safety engineers who are involved with the project development process and the roadway safety management program.

The following list provides a brief description of each of the modules in the NCHRP 17-38 Overview training:

- *Introduction* - Provides a framework for the purpose and general organization of the HSM. Topics include the purpose of the manual, the target audience, the legal context, advantages of implementing the HSM, the structure and content of the manual, and how to integrate the HSM into the project development process.
- *Fundamentals* - Introduces fundamental concepts that are necessary to understand the road safety management techniques and crash estimation methods in the HSM. The topics include using crashes as the basis for measuring safety in the HSM, data needs for the HSM, the evolution of crash estimation methods, overview of predictive methods in Part C, and evaluating safety effectiveness.
- *Human Factors* - Provides an overview of implications of human factors in roadway safety. Topics include human factors role in road safety, impact of road design on the driver, and human factors and HSM integration.
- *Part B Overview* - Provides an overview of the roadway safety management process including the purpose, structure, and steps. The module also describes how to use Part B and the benefits of the process.
- *Network Screening* - Describes the steps in the network screening process: establish focus; identify network and establish reference populations; select performance measures; select screening method; and screen and evaluate the results. It identifies strengths and weaknesses of different performance measures.
- *Diagnosis and Countermeasure Selection* - Covers the diagnosis and countermeasure selection process. Topics include the diagnosis process, crash and supporting data, field evaluation, contributing crash factors, and countermeasure identification.
- *Economic Appraisal and Prioritization* - Covers methods for conducting an economic evaluation. Topics include an overview of project benefits and costs, economic

evaluation methods, non-monetary considerations, prioritization methods, and applications.

- *Safety Effectiveness Evaluation* – Describes methods used to evaluate the safety effectiveness of treatments and projects, and their importance in the safety management process. An overview of the various evaluation study designs including the benefits, limitations, and data needs is included.
- *Predictive Methods* – Explains the predictive method and the analysis process. The module identifies data requirements for basic and supplemental analysis and compares the differences among predictive methods based on characteristics of roadway types.
- *Calibration* – Presents the specialized procedures associated with Part C's predictive methods. The module includes the procedure for calibrating SPFs for local conditions, guidance in the HSM for development of SPFs for local conditions, how and when to replace default values in the HSM with local values, and the use of the Empirical Bayes method to combine predicted and observed crash frequencies.
- *Crash Modification Factors* – This module presents information on Crash Modification Factors, safety trends, and unknown effects of various treatments. The topics include general information regarding crash modification factors and a discussion on CMFs for roadway segments, intersections, interchanges, and special facilities, geometric situations, and roadway networks.

AASHTOWare: Using SafetyAnalyst

SafetyAnalyst provides a set of software tools for use by state and local highway agencies for the roadway safety management process. These tools can be used to develop programming for site-specific highway safety improvements following the process and procedures introduced in Part B of the Highway Safety Manual (HSM). Training on the use of SafetyAnalyst is available to SafetyAnalyst licensed states. More information is available at <http://www.safetyanalyst.org>. Safety Analyst is also available for licensing through AASHTO at the following address: <http://www.aashtoware.org/Pages/SafetyAnalyst.aspx>.

Institute of Transportation Engineers

The Institute of Transportation Engineers is currently presenting the Highway Safety Manual Predictive Method Application Series as a series of webinar briefings. The series consists of four 1.5 hour sessions at the following cost: \$500 ITE member/\$625 non-member/\$250 student member. HiSafe, a commercial software product, is used to demonstrate results from the predictive method during the webinars.

The Highway Safety Manual (HSM) web seminar series demonstrates the predictive method capabilities within the new Highway Safety Manual in context of actual problems, solutions and integrating HSM predictive method software HiSafe to demonstrate results. The series consists of the following briefings:

- Applying HSM Crash Modification Factors (web seminar/briefing) – 1.5 hour \$250 ITE member/\$325 non-member/\$125 student member - This web seminar introduces fundamentals of crash modification factors and provide case study examples applications including how crash modification factors might be integrated into the design process.
- Fundamentals of the Safety Predictive Method (web seminar/briefing) – 1.5 hour \$250 ITE member/\$325 non-member/\$125 student member - This web seminar introduces the fundamental concepts involved in applying the predictive method including: safety performance functions, crash modification factors, calibration factors, and the Empirical Bayes method. The HiSafe software is used to teach the predictive method.
- Predicting Crash Frequency on Urban/Suburban Arterials (web seminar/briefing) – 1.5 hour \$250 ITE member/\$325 non-member/\$125 student member - This web seminar introduces the method and present case study examples on applying the HSM predictive method on urban and suburban arterials segments and intersections. The HiSafe software is used as a tool to demonstrate applications.
- Predicting Crash Frequency on Rural Highways (web seminar/briefing) – 1.5 hour \$250 ITE member/\$325 non-member/\$125 student member - This web seminar introduces the method present case study examples on applying the HSM predictive method on rural road segments and rural intersections. The HiSafe software is used as a tool to demonstrate applications.

5. Additional Safety Analysis Training Resources

NCHRP 20-07 (Task 290) Highway Safety Training Synthesis/Roadmap

NCHRP 20-07(290) developed a highway safety training synthesis and roadmap that may be useful in reviewing training needs for the HSM and the broader topic of highway safety. The project was recently completed as part of research for the AASHTO Standing Committee on Highways. The project developed a database of highway safety related courses. This database can be accessed at <http://www.USRoadSafety.org>.

AASHTO Highway Safety Manual Web Site

The AASHTO HSM web site at <http://www.highwaysafetymanual.org> is periodically updated to reflect the most up to date opportunities for training offered by FHWA and NHI.

Safety Portal of the AASHTO Subcommittee on Safety Management

The American Association of State Highway and Transportation Officials (AASHTO) Subcommittee on Safety Management administers a safety portal at <http://www.USRoadSafety.org>. Besides accessing the course database referenced in section 5.2, the web site also posts information on education in highway safety. Visitors can sign up for RSS feeds of site updates by topic area.

FHWA Office of Safety Web Site

The FHWA Office of Safety web site lists opportunities for highway safety training, education, curricula, workforce planning and development and can be accessed at <http://safety.fhwa.dot.gov/training>.

National Highway Institute Web Site

The National Highway Institute web site lists all training available for highway transportation professions, including the HSM related courses listed in this guide. It can be accessed at <http://www.nhi.fhwa.dot.gov/>.



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