

QUARTERLY PROGRESS REPORT

to the

**NATIONAL COOPERATIVE HIGHWAY RESEARCH
PROGRAM
(NCHRP)**

on Project 17-18(3)

LIMITED USE DOCUMENT

This Quarterly Progress Report is furnished only for review by members of the NCHRP project panel and is regarded as fully privileged. Dissemination of information included herein must be approved by the NCHRP.

for period

July 1, 2005 to September 30, 2005

from

CH2M HILL

Summary of the Problem Being Researched

In the summer of 1988, the AASHTO Standing Committee on Highway Traffic Safety (SCOHTS) established a task force to develop a comprehensive highway safety strategy. The task force worked cooperatively with the TRB to produce the Highway Safety Strategic Plan: 1991-2000, in early 1990. The plan identified a number of strategies applicable to the driver, vehicle, highway environment, and traffic records. The strategies were estimated to cost \$1.46 billion annually, and to save a minimum of 64,000 lives over the coming decade.

In late 1996 and early 1997, in an effort to update and improve upon the existing plan, AASHTO, with assistance this time from FHWA and NHTSA as well as TRB, held workshops designed to arrive at a new plan. Nearly 100 individuals were involved, and they represented driver, vehicle, emergency medical service (EMS), safety management, pedestrian, and bicycle areas, as well as the areas of highway facilities and information management that are more typically identified as within the scope of AASHTO activities. It was a truly comprehensive effort, which involved several stages of development, between the invited experts and individuals acting in a "staff arm" capacity for the effort. The invitees included representatives from federal agencies and TRB, as well as many other stakeholders in the highway safety arena.

In 1998, AASHTO approved the Strategic Highway Safety Plan. The plan included strategies in 23 key emphasis areas that affect highway safety. The goal of the plan, as it moves from the research phase to the implementation phase, is to reduce fatality rate from 1.5 to 1.0 deaths per 100 million vehicle miles traveled (mvmt) by 2008.

Project Objectives

The objective of the project has been to develop and validate guidance documents to assist state and local agencies in implementing strategies to reduce the fatality rate from 1.5 to 1.0 deaths per 100 mvmt. The targeted areas are being addressed as funding becomes available. The three phases of this project focus on the following areas:

Phase 1

- Aggressive Driving
- Head-on Crashes on Two-Lane Roads
- Run-Off-The-Road Crashes on Two-Lane Roads
- Drivers With Suspended and Revoked Licenses
- Hazardous Trees
- Unsignalized Intersections

Phase 2 [SPR-2(209)]

- Older Drivers
- Unbelted Occupants
- Pedestrians

- Horizontal Curves
- Signalized Intersections
- Utility Poles
- Heavy Trucks

Phase 3 [TPF-5(058)]

- Distracted/Drowsy Drivers
- Motorcycles
- Rural Emergency Medical Services
- Work Zones
- Alcohol

Phase 4

- Head-on Crashes on Freeways [TPF-5(058)]
- Bicyclists
- Younger Drivers
- Speed Guide
- Data Needs, Sources, and Analysis

The implementation aspect of the first two phases of the project emphasizes program development, evaluation, testing, and measuring, through a demonstration process. The Phase 3 and Phase 4 guides will not be demonstrated but will undergo an additional agency review.

Accomplishment of the project objectives will require completion of seven primary tasks for Phase 1 emphasis areas (Tasks 0 through 6) and 5 tasks for Phase 2, 3, and 4 emphasis areas (Tasks 1 through 5). These tasks are outlined below with a brief description of the task objectives.

Task 0. Amplified Research Plan – Revise the research plan based on the panel’s comments to the original proposal dated October 25, 1999. This task is not required for the Phase 2, Phase 3, and Phase 4 emphasis areas.

Task 1. Identify Promising Strategies – Review appropriate reference materials and survey/interview appropriate persons to arrive at an initial list of promising strategies for each of the emphasis areas.

Task 2. Establish Recommendations for Strategies and Their Implementation – Build on the strategies identified in Task 1 through workshops and symposiums and prepare a summary report of findings and recommendations.

Task 3. Develop Draft Implementation Guides - Produce a user-friendly implementation guide that may be readily adopted and adapted by state or local agencies to implement one or more strategies in each of the emphasis areas.

Task 4. Assist Selected States with Implementation Programs and Conduct Assessments – Test implementation guides by using them to prepare implementation plans with demonstration agencies. Task 4 of Phase 3 & 4 will include an Agency Quality Review rather than this demonstration.

Task 5. Refine Guidance Documents – Produce final set of implementation guides for each emphasis area by refining the draft documents based upon what was learned in Task 4.

Task 6. Submit Final Report – Provide a report that documents the efforts and results of the entire project. This report, originally part of Phase 1, will be deferred until the end of the project, as agreed upon in the modification to the contract made in October 2002.

NCHRP 17-18(3)A Technical Support for Lead States

A separate contract was awarded to the CH2M HILL team for technical support as Lead States develop implementation plans to reduce fatalities related to the Phase 1 emphasis areas. The emphasis area managers will provide support as needed to the Lead States. This project also includes updating of materials in the web-based guides as needed, based on results of the Lead State efforts.

Activities This Quarter

Work continued on Phase 3 and Phase 4 this quarter. Progress was made on Task 5 of Phase 3 and Tasks 1 and 2 of Phase 4. The following is a review of progress made as of the end of June 2005.

Phase 3 [TPF-5(058)]

Task 5. Refine Guides

All of the Phase 3 guides, except the motorcycle guide, are in the TRB publications and CH2M HILL staff provided responses to TRB editor's questions. Responses to panel comments on the motorcycle guide will be provided when received.

Phase 4

Task 2. Meet With Experienced Practitioners

Workshops were conducted on July 18-19, 2005, at the Keck Center. A report summarizing the workshop findings and recommendations from participants is attached to this progress report (Appendix 1).

Task 3. Revise Guides

Each guide is being revised based on the comments received from the Panel and the workshop participants and the additional resources obtained during the workshops.

NCHRP 17-18(3) A Technical Support for Lead States

CH2M HILL and emphasis area managers for the Phase 1 guides provided technical support related to the NCHRP Report 500 guides as requested.

Schedule and Budget

As of September 30, for Phase 3, we estimate that we are approximately 96 percent complete and for Phase 4 we estimate that we are 41 percent complete. We are approximately 96 percent spent for Phase 3 and 36 percent spent for Phase 4.

Plans for Next Quarter

In the next quarter, work is planned on Phase 3 Task 5 and Phase 4 Tasks 3 and 4.

Phase 3 [TPF-5(058)]

Task 5. Refine Guides

The project team will respond to panel comments for Motorcycle guide when received. Once the Phase 3 guides are published and we have received the final files from NCHRP, we will begin developing the web-based versions of the guides.

Phase 4

Task 3. Revise Guides

Revisions to the guides will continue.

Task 4. Agency Quality Review

Task 4 workshops will be held in National Academies Irvine, California on December 5 and 6, 2005. Planning for the workshops will begin. EAM's will identify agencies/organizations interested in participating in the review. Main objective in identifying agencies will be their experience in developing plans for implementing strategies in a given Phase 4 emphasis area.

NCHRP 17-18(3) A Technical Support for Lead States

The project team will provide technical support as needs arise.

Problems Encountered

None to report.

Appendix - 1

**NCHRP Project 17-18(3)
Phase 4 Initial Workshop,
July 18 & 19, 2005**

July 2005

CH2MHILL
Herndon, Virginia

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Agenda

NCHRP 17-18(3) Phase 4 Workshops Keck Center of the National Academics

July 18

| Opening Session | | Room |
|--|--|--|
| 7:30 – 8:30 AM | Continental Breakfast and Registration | 1 st Floor Prefunction area |
| 8:30 – 8:45 | Welcome and Introductions (Tim Neuman, CH2M HILL) | Conference Room 100 |
| 8:45 – 9:15 | Background Information (Nick Antonucci, CH2M HILL) <ul style="list-style-type: none"> • The AASHTO Strategic Highway Safety Plan • NCHRP Project 17-18(3) • Objectives and Overview of the Workshop | Conference Room 100 |
| 9:15 – 10:15 | Review of Strategy Documents <ul style="list-style-type: none"> • Head-on Crashes on Freeways (Nick Antonucci, CH2M HILL) • Bicyclists (Craig Raborn, University of North Carolina Highway Safety Research Center) | |
| 10:15 – 10:45 | Coffee Break (1 st Floor prefunction area) | |
| 10:45 – 11:45 | Review of Strategy Documents <ul style="list-style-type: none"> • Younger Drivers (Rob Foss, University of Carolina Highway Safety Research Center) • Speed Guide(Kelly Hardy, CH2M HILL) | |
| 11:45 – 12:00 | Organize for Breakout Sessions (Kelly Hardy, CH2M HILL) | |
| Lunch | | Room |
| 12:00 – 1:00 | Held at the Keck Center | 1 st Floor Prefunction Area |
| Afternoon Working Sessions | | |
| 1:00 – 4:30 (3:00 – 3:30 coffee break) | Breakout session: <ul style="list-style-type: none"> • Brief presentation by each participant about their related program(s) <ul style="list-style-type: none"> • Overview • Share materials • Detail and Discuss Strategies <ul style="list-style-type: none"> • Head-on Crashes on Freeways (Conference Room 205) • Bicyclists (Conference Room 110) • Younger Drivers (Conference Room 109) • Speed Guide (Conference Room 100) | Break out rooms as assigned |
| 4:30 - 5:00 | Plenary Session (Tom Bryer, NCHRP 17-18 Panel Chair) <ul style="list-style-type: none"> • Implementation of the AASHTO Strategic Highway Safety Plan | Conf. Rm. 100 |

July 19

| Morning Working Session | | Room |
|--------------------------------|--|--|
| 7:30 – 8:30 | Continental breakfast | 1 st floor prefunction area |
| 8:30 – 8:45 | Plenary session to organize for the day (Hardy) | Conf. Rm. 100 |
| 8:45 – 10:15 | Breakout Session 1 (Breakout sessions are organized by emphasis area) <ul style="list-style-type: none"> • Additional Coverage of Strategies • Discussion of Implementation Issues (e.g., problem identification, data needs, measures of effectiveness, effectiveness of strategies, organizational and institutional considerations, cost and time to implement) | Break out rooms: 100, 109,.110, 205 |
| 10:15 – 10:45 | Coffee break | 1 st floor prefunction area |
| 10:45 – 12:15 | Breakout Session 2 (Breakout sessions are organized by emphasis area) <ul style="list-style-type: none"> • Additional Coverage of Strategies • Discussion of Implementation Issues (e.g., problem identification, effectiveness of strategies, organizational and institutional considerations, cost and time to implement) | Break out rooms: 100, 109,.110, 205 |
| Lunch | | |
| 12:15 – 1:15 | Held at the Keck Center | 1 st floor prefunction area |
| Plenary Session | | Room |
| 1:15 – 2:15 | Report-back Session (Antonucci) <ul style="list-style-type: none"> • Workshop evaluation form • Presentations on breakout sessions | Conf. Rm. 100 |
| 2:15 – 3:00 | Final discussion and resolution of outstanding issues (Neuman) | |

Attendees

Bicycle Workshop Attendees

| Name | Agency | E-Mail |
|-----------------|--------------|----------------------------|
| Darren Torbic | MRI | dtorbic@briresearch.org |
| Craig Raborn | PBIC | craig@pedbikeinfo.org |
| Jesse Blatt | NHTSA | Jesse.blatt@nhtsa.dot.gov |
| Ann Do | FHWA | Ann.do@fhwa.dot.gov |
| Carol Tan | FHWA | Carol.tan@fhwa.dot.gov |
| Richard Moeur | Arizona DOT | rmoeur@azdot.gov |
| Jim Sebastian | DC DOT | Jim.sebastian@dc.gov |
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| Tamara Redmon | FHWA | Tamara.redmon@fhwa.dot.gov |
| Gihon Jordan | Consultant | Gihon.jordan@verizon.net |

Head-on Workshop Attendees

| Name | Agency | E-Mail |
|--------------------------|-------------------------------|--------------------------------|
| Kavita Boddu | CH2M HILL | Kavita.Boddu@ch2m.com |
| Norm Cressman | Georgia DOT | Norm.cressman@dot.state.ga.us |
| Tom Welch | Iowa DOT | Tom.welch@dot.state.ia.us |
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| Shawn A. Troy | NC DOT | stroy@dot.state.nc.us |
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| Xiao Qin | University of Wisconsin | xqin@engr.wisc.edu |
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| David Polly | Oregon DOT | David.j.polly@odot.state.or.us |
| Nick Antonucci | CH2M HILL | Nick.Antonucci@ch2m.com |
| John Milton | Washington DOT | miltonj@wsdot.wa.gov |

Speed Workshop Attendees

| Name | Agency | E-Mail |
|----------------|---------------------------|--------------------------------|
| Kelly Hardy | CH2M HILL | Kelly.Hardy@ch2m.com |
| Paul Tremont | NHTSA | Paul.tremeont@nhtsa.dot.gov |
| Stephen Read | Virginia DOT | Stephen.Read@VDOT.virginia.gov |
| Ray Krammes | FHWA | Ray.krammes@fhwa.dot.gov |
| Tom Bryer | SAIC | tebryer@yahoo.com |
| Keith Sinclair | FHWA-AASHTO | Ksinclair@ashto.org |
| Gary Modi | Pennsylvania DOT | gmodi@state.pa.us |
| Neil Lerner | Westat | Lernern1@westat.com |
| Leanna Depue | Mo Safety Center | depue@cmsu1.cmsu.edu |
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| AJ Nedzesky | FHWA | Aj.nedzesky@fhwa.dot.gov |
| John Nitzel | City of Santa FE | jjnitzel@ci.sante-fe.nm.us |
| Glenn Hansen | Howard County Police | ghansen@co.ho.md.us |
| Jason Compton | NHTSA | Jason.compton@nhtsa.dot.gov |
| Pamela Chapman | NHTSA | Pamela.chapman@nhtsa.dot.gov |
| Jon Rees | CH2M HILL | Jon.Rees@ch2m.com |
| Doug Harwood | MRI | dharwood@mrisearch.org |
| Joe Farrow | California Highway Patrol | jfarrow@chp.ca.gov |

Younger Driver Workshop Attendees

| Name | Agency | E-Mail |
|----------------------|--|--|
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| Bruce Ibarguen | ME DOT | Bruce.ibarguen@maine.gov |
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| Cheryl Neverman | NHTSA | Cheryl.neverman@nhtsa.dot.gov |
| Jim Hedlund | Traffic Safety North | jkedlund@sprgnet.com |
| Allan Williams | Insurance Institute of Highway Safety | awilliams@ichs.org |
| Lorrie Laing | Government's Highway Safety Office | llaing@dps.state.oh.us |
| Tricia Robers | DE DOT | Tricia.roberts@state.de.us |
| Jim Wright | NHTSA | Jim.wright@nhtsa.dot.gov |
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| Max Donath | University of Minnesota | donath@me.umn.edu |

NCHRP Project 17-18(3)

Report on Phase 4 Initial Workshop

This report provides a summary of the workshop held as part of Task 2 for the NCHRP 17-18(3) Phase 4 project.

Introduction

The Task 2 workshop was designed to receive input from people knowledgeable in the four Phase 4 emphasis areas regarding the materials developed to date. The workshop followed the same format as the Task 2 workshops held during Phase 1, Phase 2, and Phase 3 of the project.

Purpose of Report

This report documents the process and results from a workshop conducted by the project team July 18 and 19, 2005, at the Keck Center of the National Academics, Washington D.C. The workshop was held as part of Task 2 work under Phase 4 of NCHRP Project 17-18(3).

Included in this report is an overview of planning activities and workshop content, as well as a summary of findings.

NCHRP Project 17-18(3) has as its primary objective the development and demonstration of guides designed to assist states and other agencies that wish to implement elements of the AASHTO Strategic Highway Safety Plan (SHSP). Task 1 centered on the gathering and synthesizing of information regarding each of the emphasis areas upon which this phase of the project is focusing. Task 2 has as its primary objective the gathering of feedback from experienced practitioners on materials developed to date for each of the following emphasis areas:

- Bicycle
- Head-on Crashes on Freeways
- Speed
- Younger Driver

Per the approved work plan and contract for NCHRP 17-18(3), a workshop was to be held for each of the emphasis areas as part of Task 2. The July 18-19 workshop combined the first four emphasis areas listed above into one event.

During the course of Task 1 work, contacts were made with several people knowledgeable in each of the emphasis areas. The persons contacted are considered to have developed a level of experience and expertise in the area that needed to be captured in the strategy document, as well as in the guidebook to be developed in Task 3.

An objective of Task 2 was the interaction of the project team with these persons for the purpose of improving the strategy documents. Another objective was to receive useful

materials for others who may be considering implementation of strategies from one of the emphasis areas.

Organization of Report

This report is organized as follows:

- Process for planning and conducting the workshop
- Summary of findings from workshop
- Conclusions

An attendance roster from the workshop and an agenda are attached to this report.

Process for Planning and Conducting the Workshop

The planning and conducting of the Phase 4 workshop followed the general procedure used for the Phase 1, Phase 2 and Phase 3 workshops, but with several efficiencies gained based on experiences with these two previous phases.

Selection of Dates and Meeting Arrangements

Dates were established to coordinate schedules of the project team, the invitees, and the panel members. The workshops were held at the Keck Center of National Academics, Washington, D.C.

Identification and Recruitment of Attendees

A key initial task concurrent with location and schedule planning was the identification of potential attendees at the workshops. Objectives were to identify three to five attendees for each workshop subject area. The overriding criterion for selection of a potential attendee was demonstrated experience in addressing the emphasis area through development and application of one or more strategies. Therefore, focus was on individuals within agencies such as state DOTs or departments of motor vehicles.

Each emphasis area manager (EAM) was responsible for making initial contact (by telephone or e-mail) with potential attendees. NCHRP and FHWA personnel also identified potential attendees. Formal invitation letters or electronic messages with instructions on making travel arrangements were sent to the invitees.

Before the workshops, people who had verified their attendance were e-mailed an emphasis area-specific draft document for their review prior to the workshop.

Development of an Agenda

Lessons learned from the similar workshops conducted as part of Phase 1, Phase 2 and Phase 3 were applied to the planning for this phase. The agenda used during the Phase 3 Task 2 workshop was used for this workshop, as it had been successful in allowing the project team to obtain the feedback needed.

Plenary sessions were planned in order to provide overviews of the project and emphasis areas. Discussions were scheduled to obtain the information and feedback the project team

needs as it develops the implementation guides. The majority of information exchange was planned for breakout sessions, which separated participants and discussion topics by emphasis area.

Presentations were prepared by members of the project team. EAMs discussed topics and content in advance with the rest of the project team to assure a coordinated and complete session.

The final agenda for the workshop is attached to this report.

Conduct of the Workshop

The workshop was conducted over a two-day period (Monday and Tuesday). In general, combining emphasis areas into a concurrent workshop allowed for plenary discussions on topics of common interest to those in attendance.

The Project Executive was responsible for leading the workshop, presenting project and Strategic Highway Safety Plan overview information, and facilitating plenary discussions about the draft guides. The emphasis area managers were responsible for planning overviews and discussion of specific emphasis areas. CH2M HILL was responsible for coordinating the workshops, and working with the project team, TRB, and attendees to plan the events. All logistics of the workshops, including room arrangements, computer and audio-visual equipment, meals, as well as travel arrangements for the attendees, project team, and Panel, were handled by TRB, working with CH2M HILL staff.

Results of the Workshop

Findings from the breakout sessions for each emphasis area are summarized below. These represent a sampling of the major findings. More detailed notes are on file as compiled by each of the EAMs. The reader is referred to the draft guides prepared prior to the workshops.

Bicyclists

Summary of Main Outcomes and General Discussion

- Need to be careful on use of “exposure” versus “risk”
 - Change objectives’ titles from “exposure” to “crashes” (discussion was also given to changing to “risks”)
 - Reduce Crashes at Intersections
 - Reduce Crashes along Roadways
 - Reduce Crashes at Midblock Crossings
 - Reduce Vehicle Speeds
 - Improve Safety Awareness and Behavior
 - Reduce Influence of Hazards
 - [NEW] Increase Use of Bicycle Safety Equipment

- Concern over the “implied” safety effectiveness of strategies
 - In general, ensure that strategy discussions throughout include acknowledgement of limitations in known or expected outcomes based on any available research
 - Ensure that expected results are clearly described
 - Also acknowledge shortcomings in evaluation data
- Add New Objective
 - Increase Use of Bicycle Safety Equipment
 - Increase use of bicycle helmets
 - Increase Rider and Bicycle Conspicuity
 - Identify potential others
- Scope to address Bicycle-Motor Vehicle Crashes
 - Rather than bicycle-only and/or shared-use path locations
 - Also reduce severity of injuries from crashes
- Emphasize Comprehensive Approach
 - Consider both physical and behavioral strategies
- Include discussion of land use issues as part of comprehensive effort to improve safety
 - New development provides opportunities to implement best practices
- Provide Matrix of Crash Types and Appropriate Strategies

Specific Recommendations from the Workshop Participants

Title: Change “Collisions” to “Crashes”

Section II - Introduction

- Scope of Guide
 - Focus on bicycle/motor vehicle crashes
 - Guide will not address bicycle only crashes along trails
 - Guide will address crashes at intersections of trails and roadways
 - Guide will address bicycle-only crashes along roadways
 - Applies to Objective F
 - Could also apply to bicycle-only crashes resulting from the interaction of motor vehicles and bicycles but not necessarily a collision between the two vehicles.
- Bicycle needs should be addressed in land use planning
 - Not necessarily long term when considering subdivision developments, new construction, etc.

Section III - Types of Problem Being Addressed

- Discuss difference in proportion of fatal and injury crash types
- Address alcohol/impaired bicyclists

- Table cross referencing crash types with strategies

Section IV – Index of Strategies by Implementation Timeframe and Relative Cost

- Not discussed during workshop

Section V- Description of Strategies

- Objective A – Reduce bicyclists’ exposure at intersections
 - Modify to read as “Reduce Bicycle Crashes at Intersections”
 - Strategy A1 – Improve Visibility
 - Modify to read “Improve Visibility at Intersections”
 - Some confusion over whether strategy dealt with sight distance/sight lines or conspicuity.
 - Strategy cross references objectives/strategies from other guides
 - Provide several illustrations of examples
 - Maryland has examples of in pavement lights at path/roadway intersections
 - Contact Michael Jackson for more information
 - Strategy A2 – Improve Signal Timing and Detection
 - Strategy focuses on providing:
 - Adequate clearance intervals
 - Leading bicycle phase or bicycle-only phase
 - Bicycle detection
 - Add New Strategy that focuses on bicycle priority
 - Note: This new strategy will be researched for inclusion in next draft.
 - Need greater detail of potential difficulties
 - Bicycle signals are not an accepted traffic control device in MUTCD
 - Refer to Section A1.10 for using traffic control devices that are not adopted in the MUTCD
 - A blanket statement should probably be provided somewhere in the document on this issue.
 - Referred to agencies implementing this strategy
 - Denver and Tucson (Richard Moeur to provide contact info)
 - Strategy A3 – Improve Signing
 - Focuses on several types of signing
 - Also focuses on changing signing (e.g., STOP Sign to YIELD Sign)
 - Research is needed for support
 - Need to look at realistic practice
 - Maryland installs street signs at path/roadway intersections

- Contact Michael Jackson (Maryland) for more information
- Strategy A4 - Provide Innovative Pavement Marking Treatments (T)
 - Modify to read "Improve Pavement Markings at Intersections"
 - Change from "Proven" to "Tried"
 - Focuses on
 - Advance stop line (or bicycle box)
 - Combined bicycle lane/right turn lane
 - Colored bicycle lanes
 - Should address marking of bicycle lanes at intersections
 - Provide illustrations from Bicycle Guide
 - Revise existing illustrations
 - Referred to several current studies of colored bicycle lanes
 - Information to be provided by Richard Moeur
 - Check with City of Philadelphia
- Strategy A5 - Improvements to Geometry
 - Focuses on
 - Reducing crossing distance
 - Eliminating skew
 - Facilitating bicycle movements near interchange ramps
 - Refuge islands
 - Referred to study on past/current study (Theo Petritsch)
- Strategy A6 - Restrict Right-Turn-on-Red (RTOR) Movements During Specified Hours of the Day
 - Mention the need to perform conflict analysis
 - May be especially applicable near schools
- Strategy A7 - Accommodate Bicyclists through Roundabouts
 - Limited information provided
 - Recommended contacting Gene Russell and others roundabout experts for their input
 - Need to educate bicyclists
- Strategy A8 - Provide an Overpass or Underpass
 - No modifications
- Objective B - Reduce Bicyclists' Exposure along Roadways
 - Modify to read "Reduce Bicycle Crashes along Roadways"
 - Need to address "Wide Curb Lanes" somewhere within existing strategies or as a new strategy.
 - Strategy B1 - Provide Marked Roadway Facilities

- Change to “Provide Safe Roadway Facilities for Parallel Travel”
- Change from “Proven” to “Tried”
- Clarify second paragraph in General Description
- Need to stress studies are based upon stress/comfort not crash data
- Modify/Revise Exhibit V-23 to eliminate first example
- Richard Moeur will investigate more the bicycle lane program in Phoenix
- Remove reference to Chicago Bike Lane Design Guide
- Note the shared-lane marking is experimental
- Referred to recent study in Cambridge (MA)
 - Study available on City of Cambridge website
- Bicycle-tolerable rumble strip section should be made a new strategy
 - Need to consider whether this is still applicable based upon target accidents as defined in Introduction
 - Refer to current NCHRP study
- Strategy B2 – Provide Separated Facilities
 - Clarify and revise discussion on separated facilities
 - Provide different photo in Exhibit V-27
 - Contraflow bicycle facilities
 - Maryland will provide illustrations
 - Stress big concern of driver reaction time at intersections
 - Median bicycle paths
 - Recommend taking out (or include as potential concern of separated facility)
- Strategy B3 – Improve Bicyclists’ Visibility
 - May need to revise strategy title based upon new safety equipment objective/strategy.
 - Will focus on visibility, rather than conspicuity
- Strategy B4 – Improve Roadway Signage
 - Remove or modify Bicycle Route Signage
 - These are generally informational rather than safety-related; if they stay in, discuss them as elements of creating a safer roadway environment rather than as a countermeasure
 - Share the Road signs
 - Clarify that they should be provided at pinch points
 - Discuss concerns about over-use
 - Remove Exhibit V-31; instead refer to established signs

- Objective C – Reduce Vehicle Speeds
 - Strategy C1 – Implement traffic calming techniques
 - Modify City of Palo Alto bullet so it does not read like advocacy statement
- Objective D – Reduce Bicyclists’ Exposure at Midblock Locations
 - Modify to read “Reduce Bicycle Crashes at Midblock Locations”
 - Strategy D1 – Improve Driveway Intersections
 - No major modifications
 - Strategy D2 – Provide bicycle-friendly parking treatments
 - Remove this strategy.... Weak link to safety
 - Strategy D3 – Provide medians and median islands
 - Move discussion on Objective A
 - Strategy D4 – Implement access management
 - No major modifications
- Objective E – Improve Safety Awareness and Behavior
 - Strategy E1 – Provide Bicyclist Education
 - Change from “Proven” to “Tried”
 - NHTSA provided additional information for inclusion in Technical Attribute Table
 - Reference to “Program Assessment Kit”
 - Methodology to assess the usefulness of programs
 - Bicycling has distinct populations:
 - The Guide needs to emphasize different education materials for kids, adults, and minorities
 - Appropriate Measures
 - Changes in behavior
 - Changes in knowledge
 - Changes in crashes
 - Address impaired bicyclists (if any research can be found)
 - Five top things to know (include in Technical Attribute Table)
 - Liability issues need discussion (especially on-road)
 - New Strategy – Motorist Education/Awareness
 - Referred to several resources
 - Truck/Bus/Fleet Drivers (Brochures/video/training)
 - Under Potential Difficulties
 - People already feel like they know how to ride a bicycle

- Strategy E2 – Improve Enforcement of Bicycle-Related Laws
 - Need to address separately
 - Enforcement of bicycle laws vs. enforcement of motorist-related laws
 - Page V-54, move last sentence of first paragraph to front (emphasize)
 - Move/remove/modify paragraph starting “Trained, adult crossing guards...” (Page V-54)
- Strategy E3 – Increase Use of Bicycle Helmets (P)
 - Emphasize education not proven but legislation is
 - NHTSA will provide additional references (Marv Levy)
 - Helmet vouchers
 - Move strategy under new objective related to safety equipment
- Objective F – Reduce Influence of Hazards
 - Strategy F1 – Fix or Remove Surface Irregularities (T)
 - Check with US Access Board on flange filler issue/exhibit
 - Strategy F2 – Provide Routine Maintenance of Bicycle Facilities
 - Last bullet item – remove reference to diamond markings
 - Add driveway lips
- **New Objective – Increase Use of Bicycle Equipment that Will Reduce Crashes**
 - Helmets
 - Increase Rider and Bicycle Conspicuity
 - Use of reflective clothing
 - Head Lamps/Lights
 - Reflectors on bikes
 - Use of review mirror
 - Racks on bicycles

Head-on Crashes on Freeways

The group, represented by variety of backgrounds, provided positive feedback on the content and the direction of guide. Feedback from the group identified additional references to consider. Primary modification suggested by the workshop participants are summarized below:

Install Edge-Line Rumble Strips

Additional references were identified which needs to be explored. It was suggested to change the title of this strategy to shoulder rumble strips and also encourage the use of milled rumble strips. As most states are using and also this has better response to the driver relative to a rolled rumble strip. Also it was suggested to reference technical advisory on the rumble strips provided by the FHWA.

Different types of rumble strips dimensions needs to be discussed. As bikes are allowed on interstate facilities in some states; need to consider this issue as part of the discussion.

Provide Enhanced Pavement Marking and Median Delineators

It was suggested to provide a discussion on the tradeoffs between providing better quality vs. wider strips pavement markers. A discussion on raised pavement markings, flexible delineators or delineators on the barriers, special markings on the curves needs to be provided.

Provide Skid-Resistant Pavement Surfaces

It was suggested to add some discussion on hydroplaning and hydrodynamic drag, elimination of rutting, pavement drainage. WSDOT did a wet weather study work to identify and break out issues associated with skid resistant pavements. Georgia does a wet weather evaluation where crashes relating to pavement occur. Need to reference these programs. It was mentioned that the strategy name be revised to improve pavement surface.

Improve Visibility Conditions (Interstate Lighting) - Removed

This strategy was found to have a very limited applicability in rural areas. This strategy address the wrong way movement problem rather than the head-on crashes. After a lot of discussion it was found more appropriate to remove this strategy.

Reduce Avoidance Maneuvers - Added

This is a new strategy that has been added during the workshop. Research needs to be done to check if the avoidance of wildlife and roadway debris are an issue with cross-median crashes.

Improve Median Design for Vehicle Recovery

Need to include paving the shoulder as a strategy. It was suggested to capture the pros and cons of slope vs. median barrier and also flattening slope vs. barrier type discussion.

Construct Berm and Place Low-Severity Plantings or Landscaping in Medians - Removed

Workshop participants told their experiences in using berms as median barriers. It was seen that states are trending away from their use. The main drawback that was found with this was that they do not have any re-directional capability except at low speeds and flat angles and they tend to launch vehicles. Oregon tried using plantings but it has not been effective. They were concern that plantings would lead to further loss of control. It was decided to remove this strategy.

Implement Channelization, Signing and Striping Improvements at Interchanges Susceptible to Wrong-Way Movements – Additional Research Needed

More research needs to be done to check the magnitude of the problem. Based on that it will be decided whether to include in the guide or not. Wrong way crashes are more of an interchange issue.

Improve Design and Application of Barrier and Attenuation Systems

It was suggested to refer to new version of Chapter 6 of Roadside Design Guide.

Speed

Workshop participants identified many additional references, studies, and programs which the emphasis area team will explore and consider for inclusion in the guide.

Discussion included several items that apply to all objectives and strategies in the document. These are:

- **Combination of strategies:** The use of strategies in combination with each other will be discussed, and example programs described. The need to combine strategies will be discussed in the introductory part of Section V (Description of Strategies), and safety corridor programs will be included in this discussion.
- **High-level support:** the need to try to gain support from high-level people inside organizations with responsibility for highway safety programs, as well as from prominent politicians and others in the public eye, will be discussed.
- **Regional coalitions and multi-jurisdictional task forces:** these will be discussed as they relate to improving the implementation of the strategies.
- **Cross references:** other guides in the NCHRP Report 500 series, especially the Younger Driver and Aggressive Driving volumes, will be referenced.

Changes proposed to materials in the discussion of the objectives include:

Heighten Driver Awareness of Speed-related Safety Issues

- Example public information and education campaigns will be discussed, including European and/or Australian programs.
- Penalties in addition to fines (points) for speeding convictions will be discussed.
- Discussion of speeding and other behavioral factors (alcohol use, driver age) will be discussed.

Improve the Effectiveness of Enforcement Efforts

- Emphasis will be placed on the need for enforcement efforts to be highly visible.
- The effectiveness of radar drones and of making radar detectors illegal will be explored.
- A detailed discussion of domestic, European and Australian automated enforcement efforts will be provided.
- Use of citation data to understand speeding problem will be discussed.

Communicate Appropriate Speeds Through Use of Traffic Control Devices

- Many additional references and pilot programs were identified for these strategies, and these will be explored further.
- These strategies will reference the strategy on setting appropriate speed limits.

- The strategy on installing lighting at high speed intersections will be moved to the last objective, Ensure Roadway Design and Traffic Control Elements Support Appropriate and Safe Speeds.

Set Appropriate Speed Limits

- This objective will be moved to the beginning of the list, which will help better frame the discussion of the rest of the strategies.
- A detailed discussion on evaluating existing speed limits will be provided along with the discussion of setting speed limits on new roadways.
- FHWA's efforts on rational speed limits will be discussed.
- The need for credible advisory speeds will be discussed.
- Discussion of legislation enabling variable speed limits will be provided.
- The research team will explore additional studies to determine whether differential speed limits for heavy vehicles shows any promise as a safety strategy; this strategy may be removed or may be discussed in another context (as part of another strategy).

Ensure Roadway Design and Traffic Control Elements Support Appropriate and Safe Speeds

- The strategies in the objective will be organized in a more logical manner, and the titles will be clarified to better reflect their content.
- Many references and pilot programs were identified by the workshop participants, and these will be explored further.

Younger Driver

The workshop attendees represented a variety of perspectives, including state traffic safety program coordinators, NHTSA young driver program representatives, NCHRP panel members and the top university, private and governmental young driver researchers in the U.S. As a result of this diversity of experience and perspective, the discussions were highly productive.

In the course of the discussions, relatively few changes were made to the original *content* of the draft guide. One strategy (improve young driver testing) was dropped. Two new strategies were tentatively added (reduce crash risks and exposure around high schools and re-establish/improve monitoring and regulation of driver training programs). A number of refinements were made, expanding some draft strategies and altering or sharpening the focus several others.

The structure of the draft guide was modified somewhat by moving strategies around a bit to more logical locations. We were able to obtain near or total consensus from the workshop attendees on whether to add or delete each of the strategies as well as the appropriate focus of each strategy.

A great deal of discussion focused on specific elements of the various strategies. We were able to obtain substantial feedback from panel members regarding details for the write-ups

of several strategies. For most of the strategies, potential problems were identified, keys to success were enumerated and the likely effectiveness was discussed.

The substantive alterations made at the panel's suggestion to the draft strategies are listed below (changes are in italics):

EXHIBIT V-1

Objectives and Strategies to Reduce Young Driver Crashes

| Objectives | Strategies |
|--|--|
| xx.x A – Implement or improve graduated driver licensing (GDL) systems | xx.x A1 – Require at least 6 to 12 months of supervised driving for beginners |
| | xx.x A2 – Implement a night driving restriction that begins at 9 or before 10 p.m. |
| | xx.x A3 – Implement a teenage passenger restriction allowing no more than one teenage passenger <u>young passengers</u> |
| | xx.x A4 – Require Novice Drivers to Earn Unrestricted Driving Privileges (Move to beginning of list) |
| | Modified E2 (Reduce young driver distractions) and moved to objective A: <i>xx.x A5 – Prohibit cell phone use by drivers with any level GDL license</i> |
| xx.x B – Publicize, enforce <i>and adjudicate</i> laws pertaining to young drivers | xx.x B1 – GDL restrictions |
| | xx.x B2 – Underage drinking and driving |
| | xx.x B3 – Seat belt laws |
| xx.x C – Assist parents/adults in managing teen driving | xx.x C1 – Facilitate parental supervision of learners |
| | xx.x C2 – Facilitate parental management of intermediate drivers |
| | xx.x C3 – Encourage selection of safer vehicles for young drivers |
| | xx.x C4 – Employ emerging technologies to improve young driver safety (e.g., in-vehicle monitoring) (Incorporated into C2) |
| xx.x D – Improve young driver training | xx.x D1 – Discontinue policies & practices that allow some drivers to escape GDL provisions (Incorporated into A4) |
| | xx.x D2 – Improve young driver testing (Dropped) |
| | xx.x D3 – Address young driver overconfidence with insight training |
| | Expanded to: |
| | xx.x D1 – <i>Improve content of young driver training to focus on important cognitive training (hazard perception, decision-making) rather than simply on vehicle control skills</i> |
| Added: | |
| <i>xx.x D2 – Improve/re-establish monitoring/oversight of young driver training programs</i> | |
| xx.x E – Other options | xx.x E1 – Eliminate early morning high school start times |
| | xx.x E2 – Reduce young driver distractions (Modified and moved to A5) |
| | Added: |
| <i>xx.x E2 – Reduce exposure and crash risk around high schools</i> | |

Observations on the Operation and Use of Workshop Format

Organization and Logistics

The procedure for planning the workshop and inviting people worked well. Holding the workshop in the Washington, D.C., area reduced travel costs and made available key resources in the area on relatively short notice. Because of the lessons learned during the Phase 1, Phase 2 and Phase 3, organizing the workshop took less effort than originally expected. However, there was still significant time spent in assembling lists of potential invitees and making contacts. Many of the same procedures, and some similar materials, were used from the workshops in the previous phases.

Workshop Operation

With the assistance of TRB staff, the workshops ran very smoothly. In particular, Adrienne Blackwell of NCHRP staff provided significant support during the workshop in addition to having done most of the workshop planning.

Format

The agendas developed for the workshop generally worked well. From the workshop, information was obtained to help improve the strategies for each emphasis area. The agendas allowed for much discussion on this, the primary goals of the workshop.

The schedule was designed to maximize flexibility of the time used to cover the various topics in the agenda. This gave each EAM the maximum discretion for using their time with the participants. It allowed for exchange to occur on important topics, to the extent appropriate for each emphasis area.

Value

The workshop format has been proven to be a very valuable tool for eliciting information from a wide variety of persons who come from various regions of the country and have both field and research experience. The Phase 4 experience once again showed that it was a highly efficient means for acquiring information, materials, and ideas, and resulted in what are anticipated to be valuable contacts for obtaining further input as work proceeds. It can be concluded that the objectives for the workshop were fully achieved.

Conclusions

While there are a number of detailed conclusions, which are documented elsewhere in this report, it can be concluded in general that:

- The workshop format continues to work well, and the objectives were fully met.
- There is a definite need for these guides.
- There was confirmation that the guides will be useful not only to state DOTs, but also local and regional agencies.
- The guides are at the right combination of comprehensiveness and brevity, and should be designed to be dynamic, so that they are easily updated.