# 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

## October 1, 2005 to December 31, 2005

## from

## CH2M HILL

NATIONAL HIGHWAY COOPERATIVE RESEARCH PROGRAM
TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL

# PROGRESS SCHEDULE

**PHASES 1, 2, 3 AND 4, and LEAD STATE OREINTATION MEETING**

NCHRP Project No. 17-18(3) Phases 1, 2, 3, 4 and Lead State Orientation — Month December — FY 2005
Research Agency CH2M HILL
Principal Investigator Ron Pfefer, Kevin Slack, Howard Preston, Nick Antonucci, Tim Neuma

| RESEARCH TASK | 2005 J | F | M | A | M | J | J | A | S | O | N | D | 2006 J | F | M | A | M | ESTIMATED % COMPLETION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PHASE 1** | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| **PHASE 2** | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| **PHASE 3** | | | | | | | | | | | | | | | | | | |
| 1. Identify Strategies | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| 2. Meet With Experienced Practitioners | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| 3. Revise Guides | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| 4. Agency Quality Review | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| 5. Refine Materials | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | 80 |
| | 51 | 56 | 63 | 75 | 90 | 100 | | | | | | | | | | | | |
| **Phase 3 Percent Complete** | 89% | 90% | 92% | 94% | 98% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | 100% | **95.4** |
| **PHASE 4** | | | | | | | | | | | | | | | | | | |
| 1. Identify Strategies | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | | | | | | 100 |
| | 15 | 30 | 50 | 70 | 90 | 100 | | | | | | | | | | | | |
| 2. Meet With Experienced Practitioners | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ★ | | | | | | | | | 100 |
| | | 5 | 25 | 40 | 50 | 75 | 100 | | | | | | | | | | | |
| 3. Revise Guides | | | | | | | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | 100 |
| | | | | | | | 25 | 40 | 55 | 70 | 85 | 100 | | | | | | |
| 4. Agency Quality Review | | | | | | | | | ■ | ■ | ■ | ★ | | | | | | 91 |
| | | | | | | | | | 20 | 50 | 75 | 100 | | | | | | |
| 5. Refine Materials | | | | | | | | | | | ■ | ■ | | | | | | 7 |
| | | | | | | | | | | | 15 | 25 | 40 | 60 | 80 | 90 | 100 | |
| 6. Develop Data Guide | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | 72 |
| | 5 | 10 | 15 | 20 | 30 | 40 | 50 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 95 | 100 | |
| **Phase 4 Percent Complete** | 4% | 8% | 14% | 20% | 26% | 31% | 40% | 45% | 53% | 61% | 73% | 83% | 86% | 91% | 95% | 97% | 100% | **76.7** |
| **LEAD STATE ORIENTATION** | COMPLETE | | | | | | | | | | | | | | | | | 100 |
| 1. Lead State Orientation Meeting | | | | | | | | | | | | | | | | | | 100 |
| **OVERALL % COMPLETED** | 82% | 83% | 84% | 86% | 87% | 89% | 90% | 91% | 92% | 94% | 95% | 97% | 98% | 98% | 99% | 100% | 100% | 95% |

**FIG. A -- OVERALL PROJECT SCHEDULE**

■ denotes scheduled work ■ denotes progress ☆ denotes workshop

**Overall Project Financials (Includes Phases 1, 2, and 3)**

| | | | |
|---|---|---|---|
| Funds Expended (All Phases) | 90.9% | Time Expended | % 93 |
| Contract Amount | $4,051,574 | Starting Date | 1-May-00 |
| Expended This Month | $57,787 | Completion Date | 31-May-06 |
| Total Exp. To Date | $3,681,454 | | |
| Balance | $370,120 | | |

| | |
|---|---|
| Salaries and Wages Estimated This Month | $66,660 |
| Salaries and Wages Spent This Month | $57,787 |
| Accumulated Salaries and Wages To Date | $3,681,454 |

NCHRP 17-18(3) Progress Report
Figures B and C

**FIG. B -- CONTRACT FUNDS**

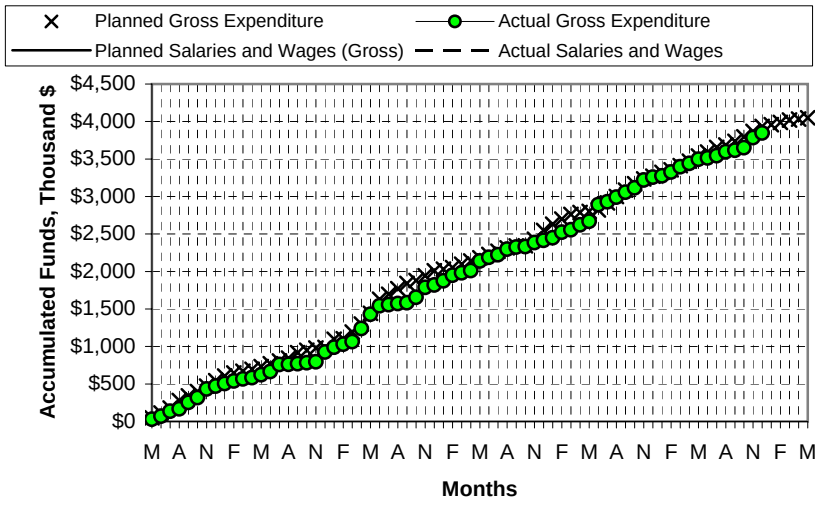
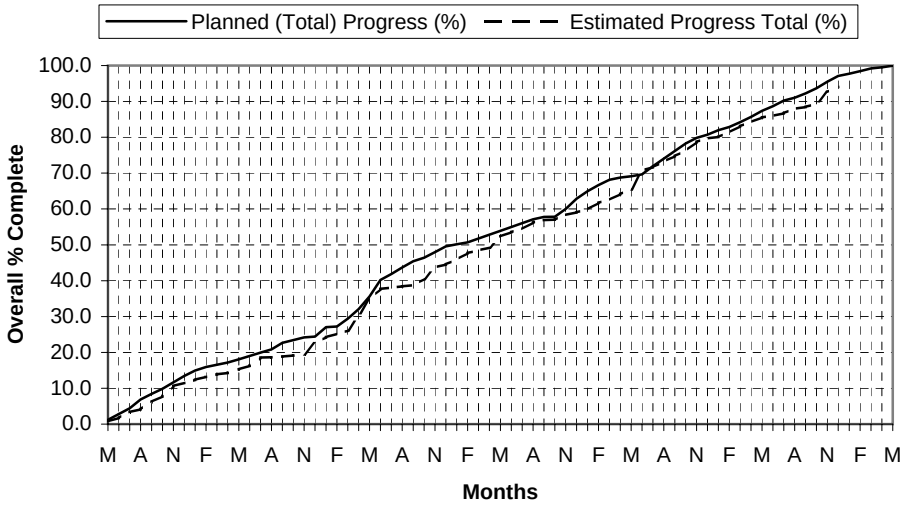



**FIG. C -- CONTRACT PERIOD**



# 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
- High and Low Speed Guides
- 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 3 and 4 of Phase 4. The following is a review of progress made as of the end of December 2005.

### Phase 3 [TPF-5(058)]

#### *Task 5. Refine Guides*

The project team received Panel comments on the draft Motorcycle guide, and the project team requested final direction on making final revisions. Work on this will begin once the project team has received the additional direction and the contract modification has been approved.

### Phase 4

#### *Task 3. Revise Draft Guide*

Each guide was revised based on the comments received from the Panel and the Task 2 workshop participants and the additional resources obtained during the workshops, as well as additional information identified by emphasis area managers.

#### *Task 4. Agency Quality Review*

A workshop to obtain comments on the guides was held at the Beckman Center in Irvine, California, on December 5th and 6th. The agenda, list of workshop attendees for each of the Phase 4 guides, and summary of breakout sessions are attached to this progress report (Appendix 1). Rather than holding a second (Task 4) workshop on the guide for reducing speeding-related fatalities on High Speed roadways, a first (Task 2) workshop was held on the guide Low Speed roadway guide.

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

CH2M HILL and emphasis area managers provided technical support related to the NCHRP Report 500 guides as requested. This included attendance at the national peer-to-peer exchange held in Phoenix in November.

# Schedule and Budget

As of December 31, for Phase 3, we estimate that we are approximately 96 percent complete and for Phase 4 we estimate that we are 74 percent complete. We are approximately 96 percent spent for Phase 3 and 43 percent spent for Phase 4.

# Plans for Next Quarter

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

## Phase 3 [TPF-5(058)]

### *Task 5. Refine Guides*

The project team will make revisions to the Motorcycle guide once additional direction and the contract modification have been 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 5. Refine Guides*

Final revisions to the guides will be made based on comments received from the NCHRP panel and Task 4 workshop participants. A summary of the changes that will be made can be found in the appendix.

### *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 Agency Quality Review Workshop December 5 and 6, 2005

CH2MHILL
Herndon, Virginia

# NCHRP 17-18(3) Phase 4 Workshops

## December 5-6, 2005

## National Academy of Sciences Beckman Center

## Irvine, California

## Agenda

### Dec. 5

| | December 5, 2005 | Room |
|---|---|---|
| 8:00 – 9:00 AM | Registration and Continental Breakfast | |
| 9:00 – 9:15 | Welcome and Introductions (Tim Neuman, CH2M HILL) | |
| 9:15 – 9:30 | Welcome and comments from NCHRP (Chuck Niessner, NCHRP) | |
| 9:30 – 9:45 | Objectives and Plan for the Workshop (Tim Neuman) | |
| 9:45 – 10:15 | Break | |
| 10:15 – 12:00 | Breakout Groups, by Emphasis Area<br>• Comments from each reviewing agency<br>• Questions and further sharing | |
| 12:00 – 1:00 | Lunch - held at the Beckman Center | |
| 1:00 – 2:30 | Breakout Session, by Emphasis Area:<br>• Critique strategy section of the guide<br>• Critique process section of the guide<br>• Identify and discuss organizational and institutional issues related to the AASHTO Plan and the use of the guides (especially technology transfer issues) | |
| 2:30 – 3:00 | Break | |
| 3:00 – 4:30 | Continuation of Breakout Session, by Emphasis Area:<br>• Critique strategy section of the guide<br>• Critique process section of the guide<br>• Identify and discuss organizational and institutional issues related to the AASHTO Plan and the use of the guides (especially technology transfer issues) | |
| 4:30 – 5:00 | Implementation Activities for the AASHTO Strategic Highway Safety Plan (Leanna Depue, NCHRP 17-18 Panel) | |

# NCHRP 17-18(3) Phase 4 Workshops

## December 5-6, 2005

## Agenda

### Dec. 6

| | December 6, 2005 | Room |
|---|---|---|
| 7:30 – 8:00 AM | Continental Breakfast | |
| 8:00 – 10:00 | Continuation of Breakout Session, by Emphasis Area:<br>• Critique strategy section of the guide<br>• Critique process section of the guide<br>• Identify and discuss organizational and institutional issues related to the AASHTO Plan and the use of the guides (especially technology transfer issues) | |
| 10:00 – 10:30 | Break | |
| 10:30 – 12:00 | Plenary Report-Back Session (by Emphasis Area Managers)<br>• Reports by each emphasis area on recommendations for the guides<br>• Discussion of reports<br>Closure for the Workshop (Tim Neuman) | |
| 12:00 – 1:00 | Lunch - held at the Beckman Center | |

# Attendees

## Bicycle Workshop Attendees

| Name | Agency | E-Mail |
|---|---|---|
| Darren Torbic | MRI | dtorbic@briresearch.org |
| Craig Raborn | PBIC | craig@pedbikeinfo.org |
| James Mackay | Denver Public Works | James.Mackay@ci.denver.co.us |
| Dwight Kingsbury | Florida DOT | dwight.kingsbury@dot.state.fl.us |
| Eric Glick | Nevada DOT | eglick@dot.state.nv.us |
| Charlotte Claybrooke | Washington State DOT | claybrc@wsdot.wa.gov |
| Kenneth McGuire | California DOT | ken.mcguire@dot.ca.gov |

## Head-on Workshop Attendees

| Name | Agency | E-Mail |
|---|---|---|
| Richard Albin | Washington State DOT | albind@wsdot.wa.gov |
| David Polly | Oregon DOT | david.j.polly@odot.state.or.us |
| John Nitzel | CH2M HILL | John.nitzel@ch2m.com |
| Steve Eagan | New Mexico DOT | steve.eagan@state.nm.us |
| Janice Benton | California DOT | Janice_benton@dot.ca.gov |
| Nick Antonucci | CH2M HILL | Nick.Antonucci@ch2m.com |

## Low Speed Workshop Attendees

| Name | Agency | E-Mail |
|---|---|---|
| Kelly Hardy | CH2M HILL | Kelly.Hardy@ch2m.com |
| Paul Tremont | NHTSA | Paul.tremeont@nhtsa.dot.gov |
| Anissa Williams | Iowa City | anissa-williams@iowa-city.org |
| Davey Warren | FHWA | davey.warren@fhwa.dot.gov |
| Margaret Moore | Texas DOT | mmoore1@dot.state.tx.us |
| Ingrid Potts | Midwest Research Institute | ipotts@mriresearch.org |
| Gary Modi | Pennsylvania DOT | gmodi@state.pa.us |
| Neil Lerner | Westat | Lernern1@westat.com |
| John Maczko | St. Paul Public Works | john.maczko@ci.stpaul.mn.us |
| Joel Aguilar | California DOT | joel_aguilar@dot.ca.gov |
| Ronald Lipps | Maryland SHA | rlipps@sha.state.md.us |
| H.A (Art) Acevedo | California Highway Patrol | aacevedo@chpca.gov |
| Craig Copeland | California DOT | craig.copeland@dot.ca.gov |
| Daniel Brannan | Minnesota DOT | Daniel.brennan@dot.state.mn.us |
| Steven Worley | Kansas City, Missouri | steve_worley@kcmo.org |
| Jesse Bhullar | California DOT | jesse_bhullar@dot.ca.gov |
| Thomas Welch | Iowa DOT | tom.welch@dot.iowa.gov |

## Younger Driver Workshop Attendees

| Name | Agency | E-Mail |
|---|---|---|
| Rob Foss | UNC-HSRC | Rob_foss@unc.edu |
| Bruce Ibarguen | ME DOT | Bruce.ibarguen@maine.gov |
| Kathy Kelly | California DMV | kkelly@dmu.ca.gov |
| Timothy Tomczak | Raleigh Police | timothy.tomczak@ci.raleigh.nc.us |
| Troy E Costales | Oregon DOT | troy.costales@ddot.state.or.us |
| Elizabeth Shepard | ES Consulting | Shepard.beth@gmail.com |
| Frank Weinrauch | Drivesafety | Frank.weinrauch@drivesafety.com |
| Jim Wright | NHTSA | Jim.wright@nhtsa.dot.gov |
| Arthur Goodwin | UNC-HSRC | Arthur_goodwin@unc.edu |
| Jamie Sohn | UNC-HSRC | Jamie_sohn@unc.edu |

## Data Guide Workshop Attendees

| Name | Agency | E-Mail |
|---|---|---|
| Forrest Council | BMI-SG | forrestbmi@mindspring.com |
| Barbara DeLucia | Data Nexus | bdelucia@data-nexus.com |
| John Joyce | Maryland MVA | jjoyce@mdot.state.md.us |
| Donald McNamara | NHTSA-Great Lakes Region | donald.mcnamara@nhtsa.dot.gov |
| Robert Pollack | FHWA | Robert.Pollack@fhwa.dot.gov |
| Raymond Peck | RC Peck & Associates | Homepeck@aol.com |
| Patrick Brady | Florida DOT | Patrick.Brady@dot.state.fl.us |
| Michael Griffith | FHWA | mike.griffith@fhwa.dot.gov |
| Normand Cressman | Georgia DOT | norm.cressman@dot.state.ga.us |
| Timothy Erskine | Ohio Public Safety | terskine@dps.state.oh.us |
| Michael Curtit | Missouri DOT | Michael.Curtit@modot.mo.gov |
| Ronald Pfefer | Consultant | rpfefer@compuserve.com |
| Kerry P. Childress | FWHA | kerry.childress@fhwa.dot.gov |
| Douglas Harwood | MRI | dharwood@mriresearch.org |
| Michael Pawlovich | Iowa DOT | Michael.Pawlovich@dot.iowa.gov |

# Younger Driver Guide

## Summary of Suggested Changes

A1: Leave alone. Clarify what would be included in a good GDL, so that if a state were to want to implement a GDL system, they would have a guide from which to work. Also, simplify some of the language and make this section less academic-sounding. State that all restrictions should be printed on the license for easier enforcement.

A2: Change the word "supervised" to "monitored" in appropriate location(s)

A3: Emphasize that the night restriction is not a curfew for the teens, *per se*, just a cut off as to how late the teen should be allowed to drive. Currently, most states have seen this as a curfew, but the point isn't that at all – the point is just that they shouldn't be driving after that time of night.

Nighttime driving restriction should be a primary enforcement provision. This should be notated on the back of the license. Information on this (and other) restrictions should be easily decipherable in the DMV computer data the officers see when they run a license, not simply numeric codes (which they won't likely recognize).

A4: No changes.

A5: No changes.

B1: Add lunchtime checkpoints to the high visibility checkpoint times.

B2: No changes.

B3: Make seatbelt violations count against the GDL license.

C1: No changes

C2: No changes (other than addition of material from C3)

C3: Eliminate this as a separate strategy and fold the material into C2.

D1: Incorporate suggestions given at the meeting regarding content of a model driver's education program i.e., follow general strategy taken in Oregon.

E1: Check to see what the actual cost of this would be to determine whether it really is a low cost strategy

E2: No changes

# Bicycle Guide

## Summary of Suggested Changes

- In the Introduction material, add a section covering "Treatments to Avoid." The reviewers' group felt that identifying these early and prominently would help prevent them from being selected.
- Avoid the use of the word "consider" and where appropriate replace it with the word "accommodate". In some cases the word consider could be interpreted that bicycle issues should be considered in the design of a facility, but in the end nothing may be done to accommodate bicyclists. The reviewers thought that "accommodate" is better in most instances because on all facilities where bicyclists are permitted by law, the facility should "accommodate" bicyclists. (This also better matches FHWA policy.)
- Throughout the guide, use the word "motor vehicle traffic" rather than "traffic" in general terms.
- For each of the strategies, try to indicate the percentage of crashes that may be impacted by the given strategy.
- Provide a consistent set of units (i.e., English, metric, or both) throughout the guide.

**Section I – Executive Summary**

- Not discussed during workshop

**Section II - Introduction**

- Provide a section on design practices that should be avoided.
- Indicate the need for better crash data, especially bicycle only (i.e., loss of control) crashes that do not show up on motor vehicle crash reports.
- Make reference to the Data and Analysis Guide concerning the need for better crash data.
- Indicate the need for better exposure data to perform more reliable safety analyses of bicycle crashes.

**Section III - Types of Problem Being Addressed**

- Not discussed during workshop

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

- Not discussed during workshop

**Section V- Description of Strategies**

- <u>Objective A – Reduce Bicycle Crashes at Intersections</u>
    - Strategy A1 – Improve Visibility at Intersections
        - Several lists are discussed in paragraph form. Present these lists in bullet form.

- Note this strategy could be a double-edge sword. Improving the visibility at intersections may increase the speed of motor vehicle traffic through the intersection which could be detrimental to bicycle safety.
- Pg V-3 last paragraph – Clarify this paragraph to indicate that the racks are installed on the street. It is also logical that bulbouts could be installed in conjunction with this type of treatment.

- Strategy A2 – Improve Signal Timing and Detection
  - Make reference to the MUTCD.
  - Make mention of SPUIS and coordinated signals.
  - Indicate bicycle signal heads could be installed with pedestrian heads, potentially in conjunction with pedestrian count down signals.
  - Provide guidance on when/where bicycle detection pavement markings should be placed.
  - Under Associated Needs, indicate that it would be desirable to develop warrants.
  - Under Keys to Success (first paragraph), clarify the need to accommodate bicyclists in some way so that they can safely cross an intersection.
  - Under Potential Difficulties, remove the bullet pertaining to false sense of security for bicyclists.
  - Under Potential Difficulties, clarify the last 2 paragraphs.
  - Under Appropriate Measures and Data, add item c) percentage of bicyclists who can clear the intersection based on clearance interval.
  - Update Exhibit V-4 with photo showing a bicyclist next to the sign.

- Strategy A3 – Improve Signing
  - Provide additional photos of signs.
  - Exhibit V-9 – Add graphic of "Ahead" placard.
  - Concerning laws that permit bicyclists to treat stop signs as yield signs, indicate this may train young bicyclists who ultimately become drivers of motor vehicles to ignore traffic control devices.

- Strategy A4 – Improve Pavement Markings at Intersections
  - Under Potential Difficulties, note that it may be difficult to install bicycle boxes at intersections with offset left-turn lanes.
  - Under Potential Difficulties, note that colored pavement markings may reduce skid resistance.
  - Under Potential Difficulties, remove bullet associated with false sense of security.
  - Under Legislative Needs, laws may be required to allow bicycles in right-turn lanes.

- Strategy A5 – Improvements to Geometry
  - Update this Exhibit V-25
  - Provide a comment on SPUIS.

        - Under Potential Difficulties (last paragraph), make reference to Exhibit V-27.

    - Strategy A6 – Restrict Right-Turn-on-Red (RTOR) Movements During Specified Hours of the Day
        - Change title of strategy to "Restrict Right-Turn-on-Red (RTOR) Movements" but in the discussion indicate that restricts could be throughout the entire day or for just portions of the day.

    - Strategy A7 – Accommodate Bicyclists through Roundabouts
        - Make reference to the MUTCD.

    - Strategy A8 – Provide an Overpass or Underpass
        - Under Expected Effectiveness, the Florida bicycle guide provides guidance on reasonable distances that bicyclists will go out of their way to access over/underpasses.
        - Provide photos of good designs.
        - Under Associated Needs, indicate the need to accommodate maintenance and emergency vehicles.

    - Strategy A9 – Provide Medians and Median Islands
        - Incorporate material into Strategy A5.
        - Cite the AASHTO Ped Guide which provides guidance on roadway widths where median islands should be required.
        - Comment that retroreflective material could be installed along rails located within the median island to improve visibility.

- <u>Objective B – Reduce Bicycle Crashes along Roadways</u>

    - Strategy B1 – Provide Safe Roadway Facilities for Parallel Travel
        - First paragraph, check percentage to which this strategy applies.
        - Clarify first paragraph under Bicycle Lane Striping.
        - Clarify/address inconsistencies between Exhibit V-36 and V-38.
        - Exhibit V-37 – provided an updated photo.
        - Indicate that shared lane markings are good for way finding.
        - Clarify second paragraph under Paved Shoulder.
        - Clarify issues related to buffer zones under Expected Effectiveness and Keys to Success.
        - Under Costs Involved, remove second bullet.

    - Strategy B2 – Provide Contraflow Bicycle Lanes
        - Under Keys to Success, comment on the need for signal heads and visibility.
        - Under Potential Difficulties, comment on the effect of parked cars and head lights.
        - Clarify the section on Potential Use of Sidewalks.

- Strategy B3 – Improve Bicyclists' Visibility
  - Mention that silhouette lighting is preferred for pedestrians.
  - Under Targets, this strategy is particularly applicable for left-turn crashes.
  - Under Potential Difficulties, indicate that some agencies may not want to improve visibility because it may encourage nighttime riding, which some agencies may view as undesirable.
  - Under Legislative Needs, indicate that state laws require the use of head lights on bicycles at night.
- Strategy B4 – Improve Roadway Signage
  - Update/modify Exhibit V-46.
  - Under Expected Effectiveness, comment on how route signs can benefit bicyclists.
  - Under Keys to Success (2nd paragraph), clarify and make sure it is consistent with the MUTCD.
  - Make reference to WSDOT Design Manual.

- Strategy B5 – Install Bicycle-Tolerable Rumble Strips
  - Change title to "Install Bicycle-Tolerable Shoulder Rumble Strips"
  - Discuss transverse rumble strips and leaving a gap for bicyclists
  - Under Keys to Success, indicate that some states such as Florida are using edgeline rumble strips to better accommodate bicyclists.
  - Discuss possibly reducing the length of rumble strips to 4" to better accommodate bicyclists.
  - Under Appropriate Measures and Data, mention CODES.

- <u>Objective C – Reduce Vehicle Speeds</u>

  - Strategy C1 – Implement Traffic Calming Techniques
    - Page V-80 – Provide more information concerning 2nd bullet item

- <u>Objective D – Reduce Bicycle Crashes at Midblock Locations</u>

  - Strategy D1 – Improve Driveway Intersections
    - Clarify 3rd bullet on Page V-82.
    - Exhibit V-55 – Recommend the apron should extend 50 - 100 ft.
    - Under Potential Difficulties, discuss issues associated with crossing solid lines distinguishing a bicycle lane. Also reference the Florida Bicycle Guide which provides guidance on when to skip stripe across driveways.

  - Strategy D2 – Implement Access Management
    - Page V-85 (2nd paragraph), list the access management techniques in bullet form.
    - Under Expected Effectiveness, clarify 2nd and 4th bullets and delete 5th bullet.

- Objective E – Improve Safety Awareness and Behavior

  - Strategy E1 – Provide Bicyclist Education
    - In presenting this information, need to distinguish between programs that A) improve riding skills, B) improve awareness, and C) change/modify behavior.

  - Strategy E2 – Improve Enforcement of Bicycle-Related Laws
    - Clarify 2nd paragraph.
    - Make reference to a Law Enforcement Guide.
    - Under Keys to Success, discuss bicycle registration programs.
    - Under Potential Difficulties, discuss ID issues.

- Objective F – Increase Use of Bicycle Safety Equipment

  - Strategy F1 – Increase Use of Bicycle Helmets (P)
    - No major changes

  - Strategy F2 – Increase Rider and Bicycle Conspicuity
    - Clarify first paragraph under Lights on Bicycle.
    - Under Potential Difficulties, discuss issues related to removal of equipment, no enforcement, and installation of lights.
    - Discuss volunteer programs where police distribute bicycle lights for free.

- Objective G – Reduce Influence of Hazards

  - Modify title of Objective to "Reduce Effect of Hazards"

  - Strategy G1 – Fix or Remove Surface Irregularities (T)
    - Discuss vertical offsets associated with rail crossings.
    - Under Potential Difficulties, discuss maintenance issues.
    - Modify Exhibit V-67.

  - Strategy G2 – Provide Routine Maintenance of Bicycle Facilities
    - Discuss issues associated with pavement overlays and ruts in streets.
    - Discuss the need to maintain shoulders. Everyone does not recognize shoulders as bicycle facilities.
    - Page V-112, clarify bullet associated with "Debris"
    - Page V-112, change bullet title from "On-Road Bicycle Signs" to "Roadway Bicycle Signs"
    - Page V-112, change bullet title from "On-Road Bicycle Markings" to "Pavement Markings for Bicycles"
    - Page V-112, include bullets for snow removal and replacing signs in kind.

- Under Keys to Success, discuss programs in Nevada and Florida that provide opportunities for bicyclists to notify agencies about deficiencies in the system.
- Under Keys to Success, engineers should consult bicycle experts/groups during the design process.

# Freeway Head-On Crash Guide

## Summary of Suggested Changes

1. Discussion of Avoidance maneuvers – should it include issues other than debris and wildlife. Several issues were discussed: 1) Review Florida study that looked at the impact of interchanges (never published – NCHRP study); 2) Investigate the need for a median barrier at "high risk" locations such as interchanges and known wildlife (animal) crossings. The group suggested pulling this out of the guide due to lack of information (unless more is identified) or mention/include in the E strategies (Coordination of Agency Safety Initiatives) for the guide.
2. Discussion of median barriers. State experiences, insights, new information, and updates.
    - WSDOT is doing a study of a section where median barriers are present. This will be available shortly.
    - California is using concrete barrier, or thrie-beam, for median barrier. Cable barrier is available only through special request. California has a volume/width warrant for use of barrier. Median width alone determines the type of barrier. (already referenced in guide).
    - Oregon is going towards 60 feet as a barrier warrant based on work done in other states. They are currently looking at their crash data to determine problem areas.
    - General comments. 1) Maintenance and law enforcement turnarounds are important considerations when deciding to use a continuous type barrier. 2) Environmental issues are becoming more of a concern with barrier placement. 3) Use of proprietary items is a major issue for states, various related issues were discussed and noted.
3. Wrong-way Movements. Should head-on crashes from wrong-way movements be considered and included? At this time there are no definitive details relating crash data to support that wrong-way head-on crashes is a substantial part of the problem on a national level. Sentiment is to keep it in the guide in the interest of completeness as this is an issue that most states deal with.
4. Edit comments. Clarify that the intent of the guide is for fully access controlled facilities (freeways and expressways). Need to discuss in summary statistics. Need to clarify the breakdown of where crashes occur on freeway facilities from FARS analysis in Section III. Eliminate charts that are not "significant" data pieces.
5. VI. Discussion of strategies – days 1 and 2.
    - Shoulder rumble strips. Various application details discussed. Should be considered a tried strategy as no direct study of effectiveness of inside lane rumble strips is available.

- Enhanced pavement markings—need to provide additional discussion of types available (including raised profile for increased retro-reflectivity, etc.). Need to make sure the MUTCD allows the use of raised pavement markers on pavement edge lines.
- Improved pavement surfaces – no substantive comments from the group.
- Wider medians – cost and potential for implementing are a concern. Discuss as a range of widths.
- Improve median design. Need to highlight potential environmental and design concerns and check for studies mentioned. Try to incorporate new Roadside Design Guide information which is now in balloting. Provide information in case studies relating to all types of barriers. Contact other states for information – several contacts were provided.
- Discussion of wrong-way strategies. Implement channelization as design option, Caltrans is active in this area and will send wrong-way monitoring details.
- Tom Welch provided one page of handwritten comments.
- Add examples of awareness campaigns as part of "best practices".
- Improve design and application of barrier/attenuation systems – include additional state experiences in selection of barrier type and system as appropriate. Provide a summary table similar to other strategies. Placement issues should be highlighted and discussed.
- Enforcement strategies don't provide direct link to cross-median crashes , but are part of a comprehensive approach to highway safety.
- Automated enforcement measures – should wrong may movement sensors be included here?
- Designate highway safety corridors. Add additional details regarding state programs.
- Public information and education campaigns should ensure there is a cross-pollination of ideas with other improvement strategies.
- P, T, E discussion. Draft classifications for all strategies were suggested recognizing there were a few that were proven, most tried and a few experimental.

# Speed-Related Crashes on Low-Speed Roadways

## Summary of Suggested Changes

Workshop participants identified many additional references, studies, and programs which the emphasis area team will explore and consider for inclusion in the guide. Key additions and enhancements to the Low Speed guide are discussed by Objective below:

### Set Appropriate Speed Limits

- A strategy on variable speed limits will be added

### Heighten Driver Awareness Of Speed-Related Safety Issues

- Additional ways to communicate with drivers will be added, such as creative messages on signs (on billboards, signs in residents' yards), encouraging physicians to emphasize driving safe speeds during routine medical exams
- Include in public information campaigns information on the economical and or environmental benefits of lower speeds

### Improve The Effectiveness Of Speed Enforcement Efforts

- Strategy discussions will be expanded to cover stricter penalties for younger drivers, and provision of "drag racing" locations to move this activity from public streets
- A strategy on combined education and enforcement campaigns (such as Smooth Operator and zero- or low-tolerance programs) will be added
- Publication of names of repeat/severe offenders in local newspapers will be mentioned

### Communicate Appropriate Speeds Through Use Of Traffic Control Devices

- In addition to in- or on-pavement measures to encourage people to drive at the appropriate speeds, vertical elements (example: landscaping) that make travel ways feel closed in, will be discussed
- Use of law enforcement vehicles as pace cars during inclement weather will be discussed

### Ensure Roadway Design And Traffic Control Elements Support Appropriate And Safe Speeds

- European concepts of self-organizing roads will be discussed, as will limiting the distance between slow points (intersections)
- On street parking will be discussed in the Traffic Calming strategy
- Roundabouts will be discussed in the strategy related to intersection design
- Intelligent transportation systems, such as active truck rollover warnings and signal ahead signs, will be discussed in the context of effecting safe speed transitions

- Restricting turns and converting two-way streets to one-way will be discussed as ways to improve traffic flow on arterials and reduce neighborhood cut-through traffic
- A new strategy on converting reducing the number of lanes through a low-speed area will be added (4-lane to 3- or 2-lane conversion).

# Safety Data and Analysis Guide

## Summary of Suggested Changes

The following comments on the preliminary draft of the Safety Data and Analysis Guide were discussed at the workshop held in Irvine, California on December 5 and 6, 2005. In addition to the discussions at the workshops, the research team comments from the NCHRP project panel that will also be considered in revising the draft Guide.

**General**

1. The workshop participants generally agreed with the research team's ideas concerning the scope of the Guide and the procedures in it.

2. Some examples or case studies should be added.

3. More "call-out" boxes should be used to highlight tips for those that don't read the full Guide carefully.

4. An Executive Summary should be included.

5. The Summary or Introduction should illustrate how this Guide fits within the overall process depicted in the NCHRP Report 500 Guides or NCHRP Report 501.

6. A question was raised as to whether the Guide should address emphasis area plan development in situations in which no crash data were available. The research team responded that our guidance from the panel was that the Guide was only to address the use of crash data to develop plans and that situation sin which no crash data were available were outside the scope of the Guide. (It would then be something other than a "data guide.") A consensus was reached that the guide should identify instances in which plans often have to be developed without crash data (e.g., pedestrian and bicycle safety), but not address in detail how to develop such plans.

7. A question was raised about whether the Guide should address process evaluation activity. The research team responded that this would not be covered in the Guide, but that the guide would refer the reader to NCHRP Report 501.

8. A workshop participant suggested that the Guide should say more about potential data improvement needs. The research team agreed to consider this. In particular, there need to be references to the Model Minimum Uniform Crash Criteria (MMUCC) and the proposed Minimum Inventory of Roadway Elements (MIRE).

**Section II – Data Types Used in Preparing the Safety Plan**

9. A Workshop participant recommended that Section II address trauma registry data, and EMS data.

10. A workshop participant suggested that citation data be taken out of the "other" category and be made a data type of its own.

11. A workshop participant suggested that the Guide discuss the time dimension of data, not just current data. As an example, another workshop participant pointed out that when a driver dies, the individual's driving record disappears from the current data file and could only be obtained from historical files.

12. Workshop participants suggested that customer service data (complaints from the public) and maintenance data be included as a data type.

13. A workshop participant suggested the inclusion of aerial photographs (orthophotos) as a data source.

14. A workshop participant suggested that asset management data be included as a data type. The research team indicated that this would be appropriate if the data were linkable to crash data.

15. A workshop participant suggested the need to make a better distinction between roadway segment inventory and intersection inventory data.

16. A reviewer (not at the workshop) suggested that public opinion surveys be added as a data type. A second reviewer was more specific in noting NHTSA's requirement for telephone surveys to measure the effect of media-based public information programs.

**Section III – Details of the Three Stage Process**

17. A workshop participant recommended the Guide be changed to use a cost-effectiveness process, rather than a benefit-cost process. This individual did not want the process to use monetary estimates of crash costs. The research team responded that our instructions from the panel were to use a process similar to that in the examples previously developed by Tom Bryer. Also, it would be quite time consuming to change to a cost-effectiveness process now that the key sections of the Guide have been written using a benefit-cost process. A consensus was reached that the Guide should mention cost-effectiveness analysis as a potential alternative to benefit-cost analysis, but that the benefit-cost procedures already developed should be retained.

18. A workshop participant requested that the term "sliding window" be defined or illustrated.

19. A workshop participant requested that case studies or examples be developed for all four procedures.

20. A workshop participant asked the research team to consider whether, if intersection crashes are identified by the name of the intersection, they aren't effectively mileposted.

21. A workshop participant recommended the Stage 1 discussion be strengthened and that, specifically, the Stage 1 discussion should elaborate on the need to decide on funding allocation between emphasis area.

22. A workshop participant requested that the Guide state that the user should exhaust funding opportunities under Procedures 1 and 2 before using Procedure 3.

23. Two workshop participants had comments related to consideration of Items a, b, and c on page 29 of the draft guide, as they relate to Procedures 3 and 4. One participant recommended a scheme in which values are assumed for Items b and c and then a breakeven point for Item a is back calculated. Another participant thought it inconsistent to assume effectiveness values for tried treatments in Procedure 4, but not in Procedure 3. A consensus was reached to include a back calculation procedure for determining Item a and that the research team would give consideration to alternatives based on Item b without treatment effectiveness (i.e., as described on p. 29 of the draft Guide) and to including treatment effectiveness (i.e., as described in Procedure 4, Item 3 on p. 33).

**Section IV—Roadway Segment Programs**

24. A workshop participant recommended that the table near the top of p. 38 of the draft Guide be presented earlier in the Guide (in Section III), but also be left here as well.

25. A workshop participant recommended less emphasis on systemwide approaches and more emphasis on site-specific projects at high-crash locations. A consensus was reached to put added emphasis on the last paragraph on p. 37.

26. It was agreed that Procedures 3 and 4 in Section IV would be rewritten to reflect the decision reached concerning Comment 17 in Section III of the Guide.

27. A workshop participant recommended mentioning GIS analysis, as well as spreadsheet approaches, in the discussion of Procedure 1 on p. 43 of the draft Guide.

28. A workshop participant requested that the term "sliding window" be generalized to "network screening" or something similar.

**Section V—Roadway Junctions**

29. A workshop participant suggested that a recommended data set for intersections be based on the list of SafetyAnalyst data elements or a preliminary version of the MIRE data element list.

**Section VI—Special Road User Populations**

30. A workshop participant recommended that this section address ADA issues.

31. A workshop participant recommended that DMV records and, specifically, DMV driver history data be addressed.

32. For this and all driver-oriented sections, it should be noted that estimating the cost of a program is often difficult. What is often not included are the one-time start-up costs and the indirect/administrative costs in addition to direct cost.

**Section X—Reducing Crashes in Work Zones**

33. A workshop participant recommended that the MMUCC variables be mentioned

34. A workshop participant recommended that the term "flag" be replaced by some other term such as "variable".

35. A workshop participant suggested that the Guide emphasize the important of having an explicit check box for work ones, rather than a check box as an element under "roadway defects".

36. In Table X.4 on page 98 of the draft Guide, it was recommended that the Iowa DOT logo be covered and the table made generic.

**Section XI—Rural EMS Services**

37. A workshop participant recommended going beyond crash data and including trauma center data to highlight high-severity crashes that require hospitalization

38. The addition of a third level of data was recommended. This level would include coverage area for EMS agencies, types of equipment available, and capabilities of responders, as well as response timed.

39. Under data needs on p. 102 of the draft Guide, the use of the term "types of data", rather than "levels of data", was recommended.

40. The statement on p. 102 that begins "A compounding factor…" is true, but is changing. There is a national standard on nomenclature being developed.

41. A workshop participant recommending that improving travel time from the crash site to the hospital should be addressed.

42. On p. 104 of the draft Guide in the first sentence of Step 4 change "without oversight" to "with minimal oversight".