



# Safety Data and Analysis in Developing Emphasis Area Plans

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Aggressive Driving  
Unlicensed Drivers  
Collisions with Trees  
Head-On Collisions  
Unsignalized Intersections  
Run-Off-Road Collisions  
Horizontal Curves  
Utility Poles  
Older Drivers  
Pedestrians  
Seatbelt Use  
Signalized Intersections  
Heavy Trucks  
Drowsy and Distracted Drivers  
Enhancing Rural EMS  
Alcohol-Related Crashes  
Work Zone Collisions  
Bicycle Crashes  
Young Drivers  
Head-On Crashes on Freeways  
Safety Data & Analysis  
Motorcycle Crashes  
Speeding-Related Crashes

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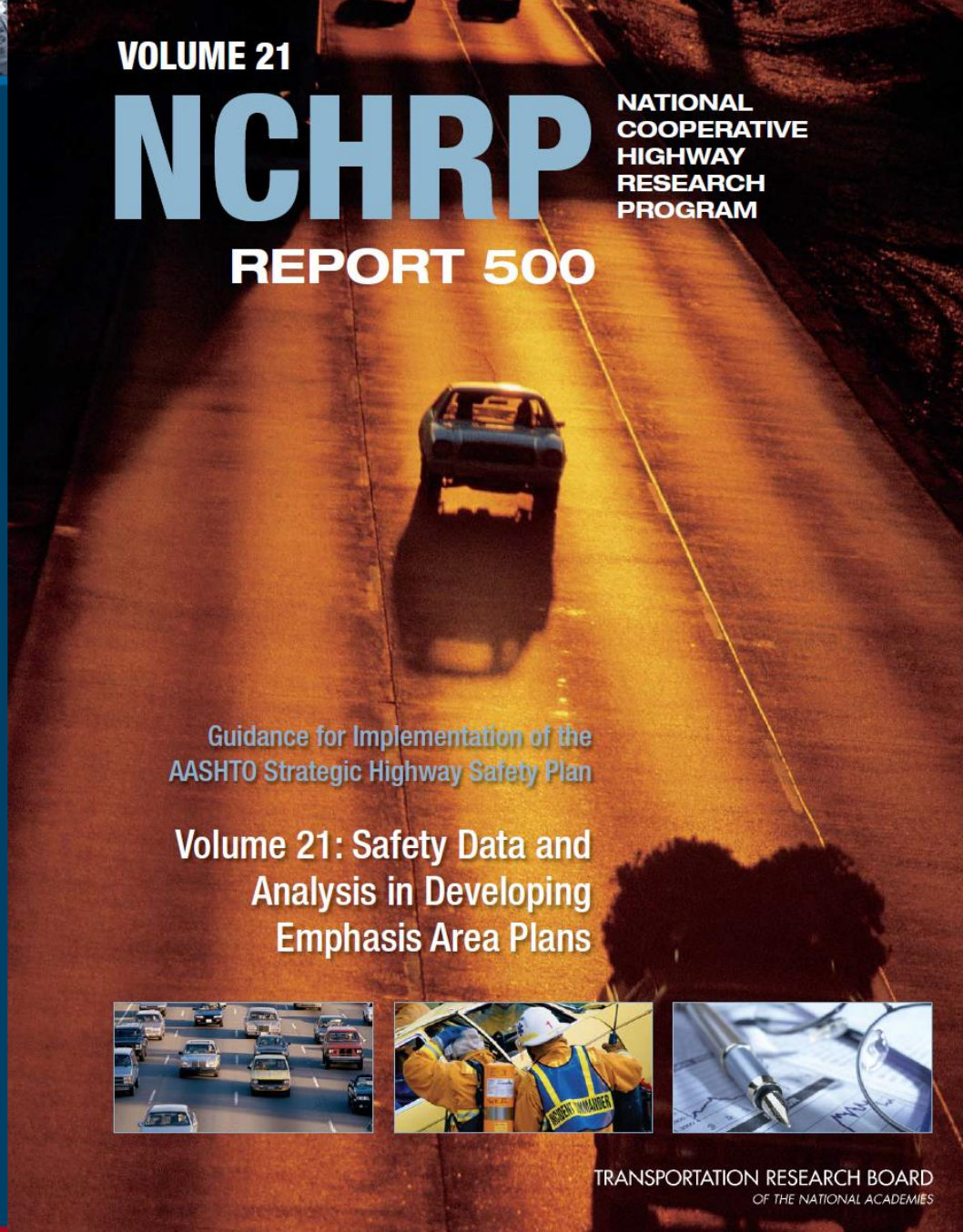
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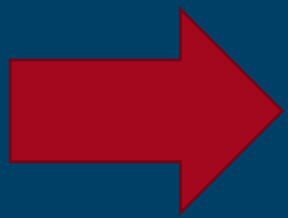
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# How this all came into being:

AASHTO  
FHWA  
NHTSA  
TRB



## Strategic Highway Safety Plan (SHSP)

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A new approach to safety:

**STRATEGIC**

**VS.**

**PIECEMEAL**

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A new approach to safety:

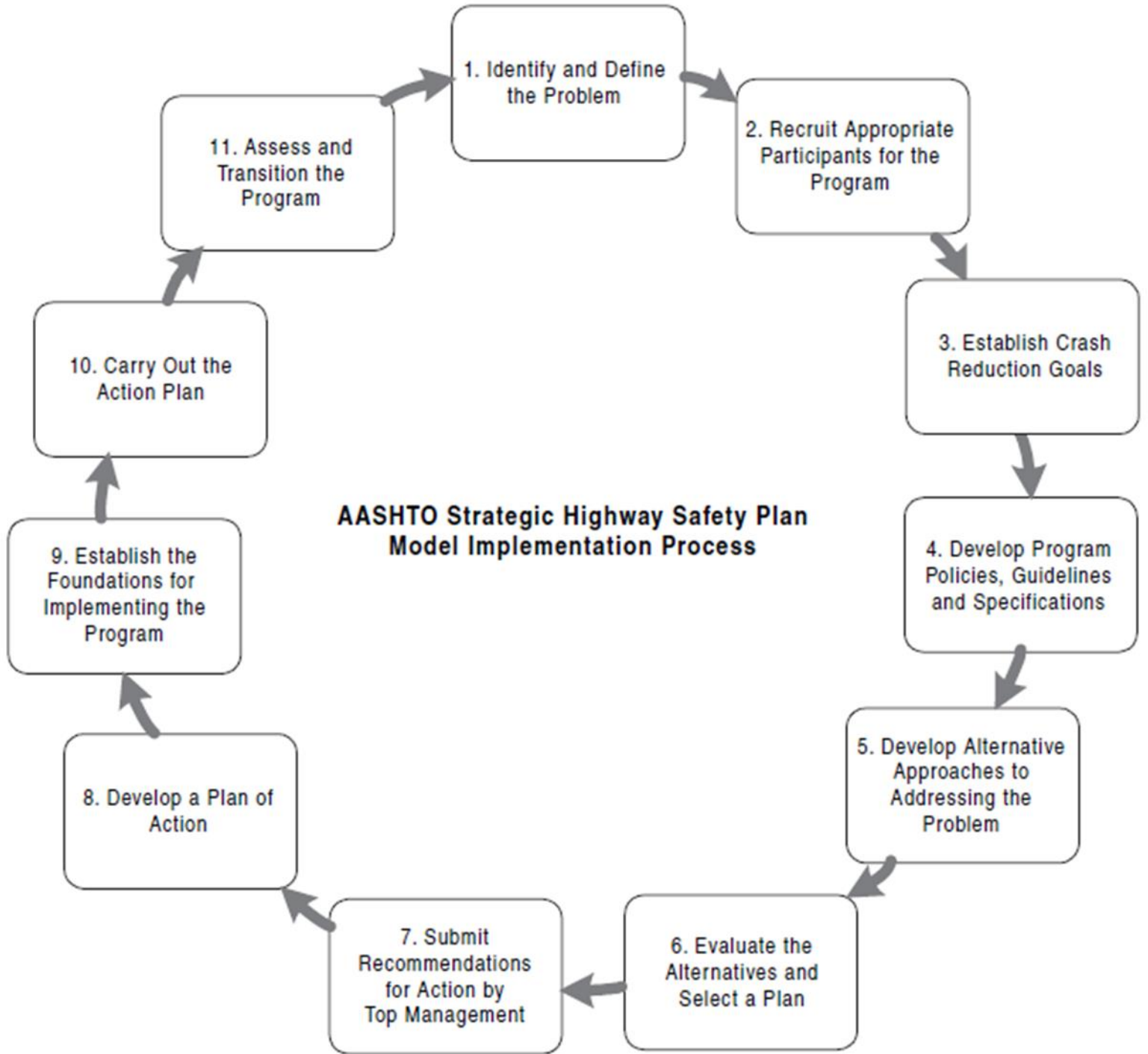
**PROACTIVE**

**VS.**

**REACTIVE**

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# Strategic Highway Safety Plan

- Engineering Strategies
- Education
- Enforcement
- Emergency Response



# Strategic Highway Safety Plan

Identified 22 emphasis areas in these 6 categories:

- Drivers
- Vehicles
- Special Users
- Highways
- Emergency Medical Services
- Management

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- Motorcycle Crashes
- Speeding-Related Crashes

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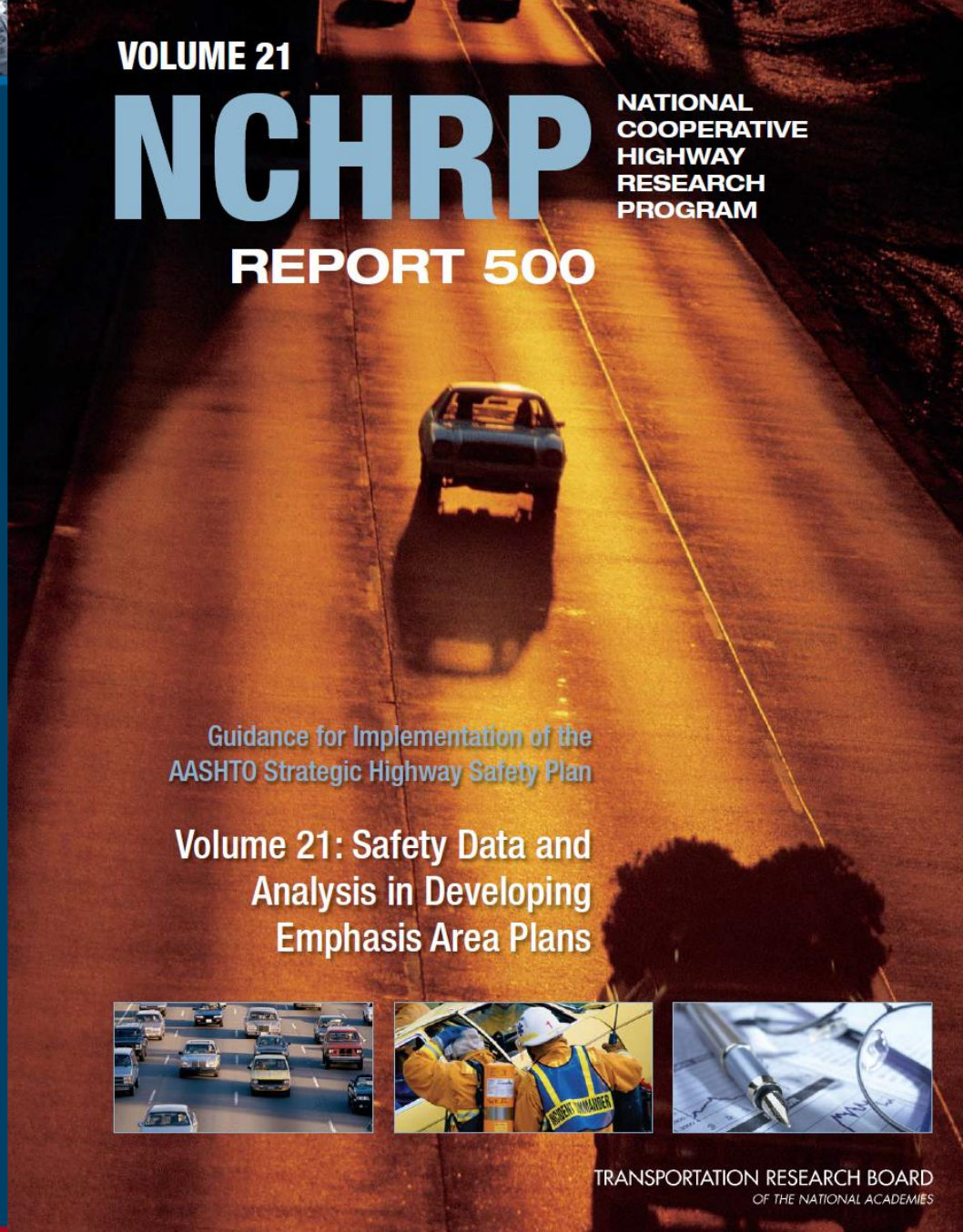
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### **Integrated Safety Management Process**

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# Strategic Highway Safety Plan

FLORIDA STRATEGIC HIGHWAY  
**SAFETY PLAN**

OCTOBER 2016

DRIVING DOWN FATALITIES

The main graphic features a dark green silhouette of Florida on the right side. Below it, a grey road with white dashed lines winds across the center. Several colorful map pins are placed on the road, each containing a different image: a green pin with a blurred road scene, an orange pin with two cyclists, a yellow pin with a woman in a car, a blue pin with hands holding a glass of beer, a red pin with a motorcyclist, a purple pin with a sheriff holding a stop sign, and a green pin with an elderly man in a car seat. In the bottom right corner, there is a small graphic of a road with an arrow pointing down and the text 'DRIVING DOWN FATALITIES'.

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# NCHRP 500 Volume 21

## Safety Data and Analysis in Developing Emphasis Area Plans

- Section 1 – Three-stage process
  - Identifying emphasis areas
  - Setting a fatality (injury) reduction goal
  - Defining treatments towards that goal
- Section 2 – Types of data required for good safety decisions
- Section 3 – Details of the three-stage process





# NCHRP 500 Volume 21

## Safety Data and Analysis in Developing Emphasis Area Plans

- Section 4 – Roadway Segments
- Section 5 – Junctions (intersections)
- Section 6 – Special Road Users
- Section 7 – Illegal Driver Actions
- Section 8 – Unsafe Driver Actions
- Section 9 – Special Vehicles
- Section 10 – Work Zones
- Section 11 – EMS Services
- Section 12 – Improve Data



# Section 1 – Three-stage Process

1. Define / Choose Issue(s) / Emphasis Areas
  - You should have more than one
  - Based on crash patterns and history
2. Set Fatality, Injury, or Crash Reduction Goal
  - Make it realistic, but not too easy
3. Define the Treatments and the Subpopulation for Each Treatment That Are Required to Reach Goal



# Section 2 – Data Types

- Crash data are required as a minimum
  - Crash summary tables
  - Hard copy of crash reports is better
  - Crash data must be “location-coded”
- Additional data often useful
  - Roadway inventory data
  - Traffic volume data
  - Driver citation data



# Section 2 – Data Types

NHTSA reports, “...various sources suggest that about half of the motor vehicle crashes in the country are not reported to police.”



# Section 2 – Data Types

Crash data depend heavily on the subjective judgements of the officers who attempt to describe the crash after the fact. These judgements cannot be error-free since the officer does not see the crash occur, and must rely on physical evidence and driver and witness statements to draw conclusions.



## Section 2 – Data Types

Data sources:

- Fatal Analysis Reporting System (FARS)
  - Maintained by NHTSA
- Crash Data Management System (CDMS)
  - Maintained by District 7
- Your local crash data system?
  - Maintained by you or your law enforcement officers



# Section 3 – Details of Three-stage Process



- Stage 1 – Define / Choose One or More Issues / Emphasis Areas
  - Use the 22 critical safety issues / emphasis areas that were developed for AASHTO’s Strategic Highway Safety Plan
  - Choice of emphasis areas is based on a “problem identification” process of crash and other safety-related data



# Section 3 – Details of Three-stage Process



- Stage 2 – Set a Crash, Injury or Death Reduction Goal for an Emphasis Area
  - Stage 1 analysis should help identify the following:
    - How big a problem you have in that emphasis area
    - How over-represented certain crash outcomes may be
  - This data then helps you develop an initial goal of what you would hope to achieve
    - Be realistic – but stretch yourself beyond what is typical





# Section 3 – Details of Three-stage Process



- Stage 3 – Define Treatment Strategies and Target Populations
  - Identify strategies that will help you reach the goal
    - NCHRP 500 Series will help you do just that
    - HSM and CMF Clearinghouse also are helpful
  - Identified populations could include:
    - Humans (drivers, pedestrians, bicyclists, elders, teens, etc.)
    - Vehicles (trucks, motorcycles, etc.)
    - Roadway sites (intersections, segments, corridors, etc.)



# Section 3 – Details of Three-stage Process



- Stage 3 – Defines Four Procedures:
  - Procedure 1 – Choosing Roadway-Based Treatments and Target Populations When Treatment Effectiveness Is Known, and Both Crash and Non-Crash Data are Available
  - Procedure 2 – Choosing Roadway-Based Treatments and Target Populations When Treatment Effectiveness Is Known and Crash Data Are Available, but Detailed Inventory Data Are Not Available



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# Section 3 – Details of Three-stage Process

- Stage 3 – Defines Four Procedures (cont.):
  - Procedure 3 – Choosing Driver, Vehicle or Roadway Treatments and Target Populations When Treatment Effectiveness in Terms of Crash/Injury Reduction Is Not Known
  - Procedure 4 – Choosing Treatments and Target Populations in Emphasis Areas for which Some Candidate Treatments Have Known Effectiveness Estimates and Other Treatments Do Not



# Section 4

## Roadway Segment Programs

Implementing the procedures described above for roadway segments



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# Roadway Segment Programs

Planning Programs Related to Reducing Crash Types Including Run-Off-Road, Head-On (Including Head-Ons on Freeways), Curve, Utility Pole, and Tree-related Crashes



# Resources – NCHRP 500:

- Volume 3: A Guide for Addressing Collisions with Trees in Hazardous Locations
- Volume 4: A Guide for Addressing Head-On Collisions
- Volume 6: A Guide for Addressing Run-Off-Road Collisions
- Volume 7: A Guide for Reducing Collisions on Horizontal Curves
- Volume 8: A Guide for Reducing Collisions Involving Utility Poles
- Volume 20: A Guide for Reducing Head-On Crashes on Freeways



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# Section 5

## Roadway Junctions

Implementing the procedures described in Section 3 for roadway junctions



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# Roadway Junctions

## Planning Programs Related to Reducing Crashes at Signalized and Unsignalized Intersections



# Resources – NCHRP 500:

- Volume 5: A Guide for Addressing Unsignalized Intersection Collisions
- Volume 12: A Guide for Reducing Collisions at Signalized Intersections




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### Volume 5: A Guide for Addressing Unsignalized Intersection Collisions



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# From NCHRP 500 – Volume 5

## EXHIBIT I-3 Objectives and Strategies for Improving Safety at Unsignalized Intersections

Objectives	Strategies
17.1 A—Improve management of access near unsignalized intersections	17.1 A1—Implement driveway closures/relocations (T)*
	17.1 A2—Implement driveway turn restrictions (T)
17.1 B—Reduce the frequency and severity of intersection conflicts through geometric design improvements	17.1 B1—Provide left-turn lanes at intersections (P)
	17.1 B2—Provide longer left-turn lanes at intersections (T)
	17.1 B3—Provide offset left-turn lanes at intersections (T)
	17.1 B4—Provide bypass lanes on shoulders at T-intersections (T)
	17.1 B5—Provide left-turn acceleration lanes at divided highway intersections (T)
	17.1 B6—Provide right-turn lanes at intersections (P)
	17.1 B7—Provide longer right-turn lanes at intersections (T)
	17.1 B8—Provide offset right-turn lanes at intersections (T)
	17.1 B9—Provide right-turn acceleration lanes at intersections (T)
	17.1 B10—Provide full-width paved shoulders in intersection areas (T)
	17.1 B11—Restrict or eliminate turning maneuvers by signing (T)
17.1 B12—Restrict or eliminate turning maneuvers by providing channelization or closing median openings (T)	
17.1 B13—Close or relocate "high-risk" intersections (T)	



# Three classifications of strategies

1. Proven

2. Tried

3. Experimental



# From NCHRP 500 – Volume 5

**EXHIBIT IV-1**  
Index of Strategies by Implementation Timeframe and Relative Cost

Timeframe for Implementation		Relative Cost to Implement and Operate			
		Low	Moderate	Moderate to High	High
Short (less than a year)	17.1 A2—Implement driveway turn restrictions	✓			
	17.1 B4—Provide bypass lanes on shoulders at T-intersections	✓			
	17.1 B11—Restrict or eliminate turning maneuvers by signing	✓			
	17.1 B12—Restrict or eliminate turning maneuvers by providing channelization or closing median openings	✓			
	17.1 C1—Clear sight triangles on stop- or yield-controlled approaches to intersections	✓			
	17.1 C2—Clear sight triangles in the medians of divided highways near intersections	✓			
	17.1 C4—Eliminate parking that restricts sight distance	✓			
	17.1 D3—Retime adjacent signals to create gaps at stop-controlled intersections	✓			



# Section 6 - Special Road User Populations

Implementing the procedures described in Section 3 for special user population groups



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# Special Road User Populations

Planning Programs Related To  
Reducing Crashes Involving Older  
Drivers, Younger Drivers,  
Pedestrians And Bicyclists





# Resources – NCHRP 500:

- Volume 9: A Guide for Reducing Collisions Involving Older Drivers
- Volume 10: A Guide for Reducing Collisions Involving Pedestrians
- Volume 18: A Guide for Reducing Collisions Involving Bicycles
- Volume 19: A Guide for Reducing Collisions Involving Young Drivers




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### Volume 9: A Guide for Reducing Collisions Involving Older Drivers



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# Section 7

## Illegal Driver Actions

Implementing the procedures described previously for illegal driver actions



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# Illegal Driver Actions

**Planning Programs Related to Reducing Crashes Involving Aggressive Drivers, Alcohol-Impaired Drivers, and Unlicensed or Suspended/Revoked Drivers**



# BIG PROBLEM!

Data for estimating precise CMF's, CRF's and B/C ratios for many of the driver-oriented strategies **DO NOT EXIST!**



# References – NCHRP 500:

- Volume 1: A Guide for Addressing Aggressive-Driving Collisions
- Volume 2: A Guide for Addressing Collisions Involving Unlicensed Drivers and Drivers with Suspended or Revoked Licenses
- Volume 16: A Guide for Reducing Alcohol-Related Collisions



# Section 8

## Unsafe Driver Actions

Implementing the procedures described previously for unsafe driver actions



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# Unsafe Driver Actions

**Planning Programs Related to Reducing Crashes Involving Distracted and Fatigued Drivers and Unbelted Vehicle Occupants**





# BIG PROBLEM!

Data for estimating precise CMF's, CRF's and B/C ratios for many of the driver-oriented strategies **DO NOT EXIST!**



# References – NCHRP 500:

- Volume 11: A Guide for Increasing Seatbelt Use
- Volume 14: A Guide for Reducing Crashes Involving Drowsy and Distracted Drivers



# Section 9

## Special Vehicles

Procedures for crashes involving special vehicle types



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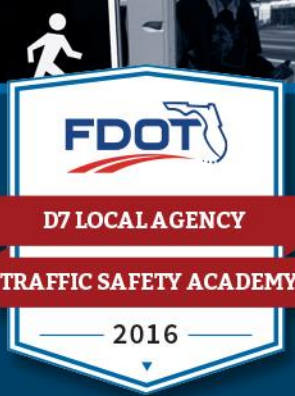
# Special Vehicles

Planning Programs Aimed at  
Reducing Crashes Involving Large  
Trucks and Motorcycles



# References – NCHRP 500:

- Volume 13: A Guide for Reducing Collisions Involving Heavy Trucks
- Volume 22: A Guide for Reducing Collisions Involving Motorcycles



# From Section 9 – Crash Costs

Crash Severity	Speed Limit Category	Comprehensive Cost/Crash*
Fatal (K)	≤ 45 mph	\$3,622,200
	≥ 50 mph	\$4,107,600
Serious Injury (A)	≤ 45 mph	\$195,700
	≥ 50 mph	\$222,300
Moderate Injury (B)	≤ 45 mph	\$62,200
	≥ 50 mph	\$91,600
Minor Injury (C)	≤ 45 mph	\$40,100
	≥ 50 mph	\$49,500
No Injury (O)	≤ 45 mph	\$7,000
	≥ 50 mph	\$7,800

\* Crash Cost in 2001 dollars (22)

***Exhibit IX-3. Crash cost by crash severity and posted speed limit.***



# Section 10

## Reducing Crashes in Work Zones



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# References – NCHRP 500:

- Volume 17: A Guide for Reducing Work Zone Collisions





# Section 11

## Reducing Death and Injury Consequences Through Improved Rural EMS Services



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# References – NCHRP 500:

- Volume 15: A Guide for Enhancing Rural Emergency Medical Services



# Section 12

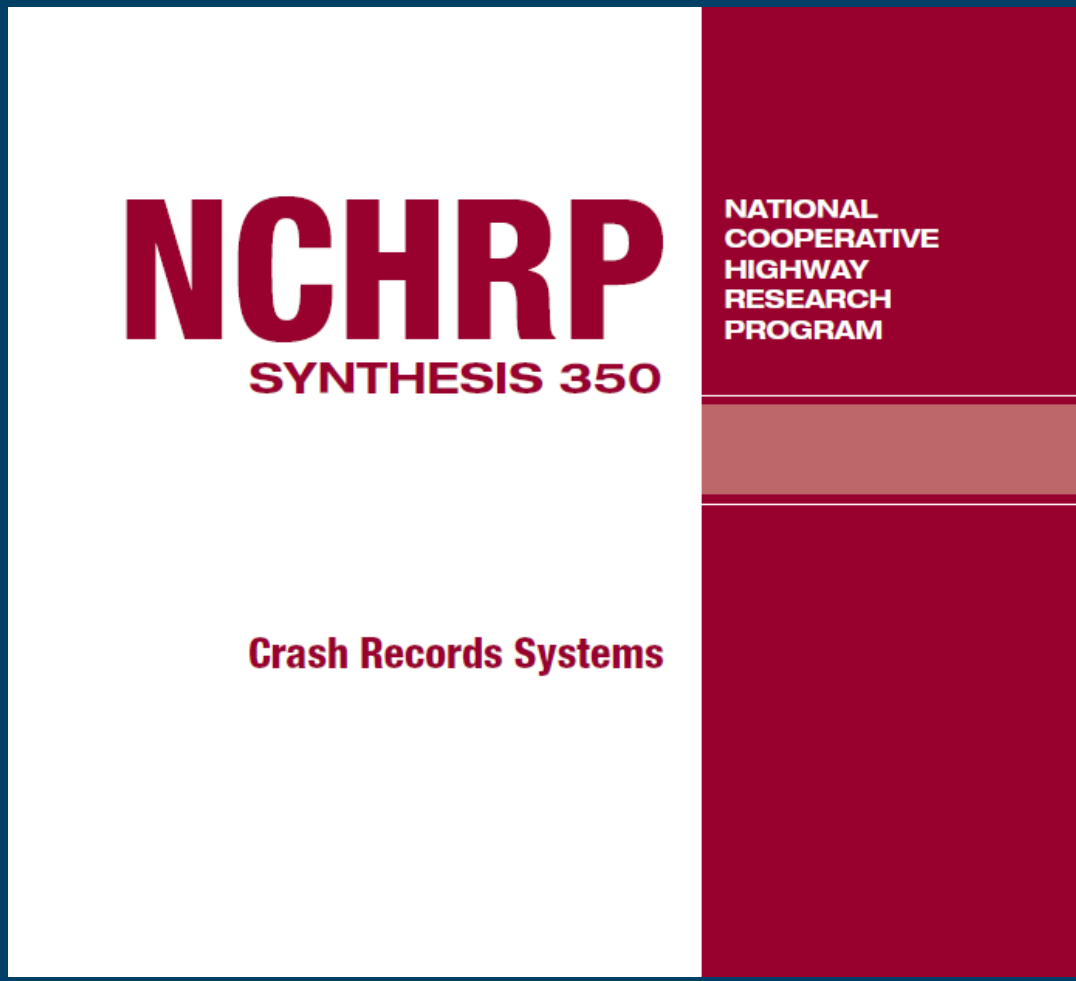
## Data Improvements and What They Can Do for You



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# References – Crash Data





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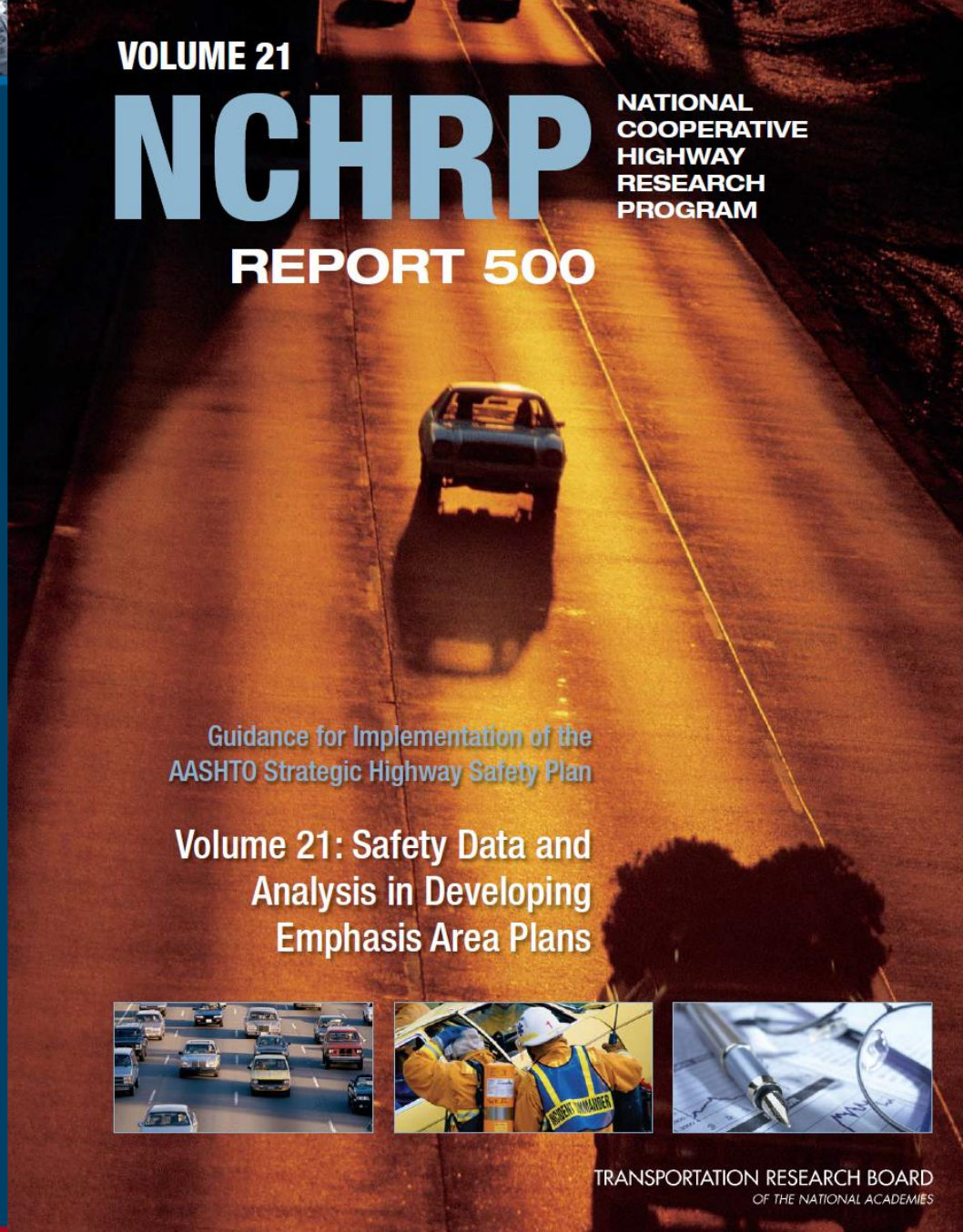
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# Questions?



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