INTRODUCTION

Purpose

• To provide understanding of causes of crashes and their mitigation
Objectives

- To analyze crash experience and severity for various roadway conditions
- To present updated statistical analysis methods of accident potential and severity
- To understand safety cost benefit analysis
- To understand effectiveness of safety countermeasures

Current National Safety Activities

- “Highway Safety Manual” development
- “AASHTO Strategic Highway Safety Plan”
- “National Agenda for Intersection Safety,” FHWA
1. Background
2. Safety Improvement Decision Maker
   - Network screening tool
   - Diagnosis tool
   - Countermeasure selection tool
   - Economic appraisal tool
   - Priority ranking tool
   - Evaluation tool

AASHTO 1998

- Developed AASHTO Strategic Highway Safety Plan
- Goal to reduce annual highway deaths, by 5000-7000 per year
AASHTO/TRB Strategic Safety Plan Guidebooks

• NCHRP Report 500
  – “Guidance for Implementation of the AASHTO Strategic Highway Safety Plan”
  – 22 volumes addressing strategies in 22 key emphasis areas

http://www4.trb.org/trb/crp.nsf/all+projects/nchrp+17-18(3)
National Agenda for Intersection Safety

Results of a national workshop provide direction for further efforts

http://safety.fhwa.dot.gov/fourthlevel/intersafagenda.htm

• Website provides
  – What’s in place now?
  – Where do we go from here?
  – Document organization
  – The National Intersection Safety Program

Professional Roadway Safety Training

• Website provides information on workshops, resources for safety, and supporting organizations

http://safety.fhwa.dot.gov/training/prst.htm
## Workshop Agenda

- Introduction
- Background
- Human Factors and Safety
- Alignment & Cross Section
- Medians and Two-Way Left-Turn Lanes
- Unsignalized Intersections
- Signalized Intersections
- Run-off Road and Roadside Features
- Pedestrian Collisions
- Elderly Driver Collisions
- Statistical Methods to Analyze Accident Potential
- Safety Cost Benefit Analysis
- Post-Evaluation of Crash Improvements

## Types of Accidents

- Roadside elements/obstacles
- Pavement problems
- Geometrics
- Driver behavior / traffic operations
- Intersection-related
- Access-related
- Traffic control failure
- Pedestrian and bicyclists
Integrated National Safety Analysis and Evaluation

- National Highway Safety Manual provides structure, analysis and evaluation modules for safety programs
- NCHRP Report 500 provides strategies, countermeasures and implementation measures

Highway Safety Manual

- “SAFETYANALYST”, software tools for safety management of specific highway sites
  - Provides screening, analysis and evaluation methodology
Highway Safety Improvement Planning (HSIP)

Network Screening or Site Selection → List of Sites for Review

Detailed Engineering Study → Document the Analysis

Project Selection, Implementation, & Evaluation → Document the Evaluation

What is Network Screening?

- Highway network system made up of segments and intersections
- Network screening is a systematic examination of all entities
- Purpose: To rank all entities, based on selected criteria, in order to conduct detailed safety studies

Money should go where it achieves the greatest effect in terms of preventing crashes and reducing their severity

Source: NHI, 2005
Six Steps in the Crash Mitigation Process

1. Identify sites
2. Collect crash experience
3. Gather field conditions
4. Identify contributing factors and countermeasures
5. Assess and select countermeasures
6. Evaluate and implement

Source: NHI, 2005

Safety Analyst Tools

- Network screening to identify sites with promise for safety improvement
- Diagnosis of safety concerns
- Selection of countermeasures
- Economic appraisal of countermeasures
- Priority ranking of countermeasures
- Evaluation of implemented projects

Source: NHI, 2005
Conventional Screening

- Conventional techniques of screening use are known to have difficulties in identifying 'unsafe' sites:
  - Crash counts = bias to high volume sites
  - Crash rates = bias to low volume sites
  - Crash rates' assumption of linearity is invalid
  - Regression-to-mean (RTM) effect if sufficient allowance is not made for random errors

Source: NHI, 2005

PSI_{Index} Approach

- New and different approach to identify the Potential for Safety Improvement (PSI)
- Application of Safety Performance Functions (SPFs) for each crash severity class for different reference groups
- PSI values for fatal, injury and PDO crashes combined = PSI_{Index}
- Weights (relative cost) are applied to PSI values

Source: NHI, 2005
PSI Index Screening

- $\text{PSI}_{\text{Index}}$ is estimated for each location
- Locations are ranked in descending order of $\text{PSI}_{\text{Index}}$ values
- Locations with largest $\text{PSI}_{\text{Index}}$ values have most potential for crash reduction

Source: NHI, 2005

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Step 1: Identify Sites with Potential Safety Problems

Crash Information Methods:

- Total Number of Crashes
- Crash Density (Crashes per mile)
- Crash Rate (Crashes per million vehicle miles)
- Number Quality Control
- Rate Quality Control
- Crash Severity
- Severity Index
- Crash Index

Source: NHI, 2005