Safety Tool Box of Crash Data Analysis

Road School
March 9, 2010
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## Safety Toolbox of Crash Data Analysis

- HAT
- 5% Report
- ARIES
- SHSP
- RSA’s
- HSM
- SA

- IHSDM
- FHWA DR for CRF
- CJI-CFB
- FARS
- NCHRP 500 Reports
- ELCSI-PFS
- LTAP HELPERS
- MPOs
Toolbox of Crash Data Analysis

- HAT
- Hazard Analysis Tool
Hazard Analysis Tool (HAT)

INTRODUCTION
GUIDELINES
START TOOL
SETTINGS
EXIT
Hazard Analysis Tool (HAT)

- Designed to Justify Safety Projects
  - Calculates Index of Crash Frequency
  - Calculates an Index of Crash Cost
  - Assists in drawing Crash Diagrams and Condition Diagrams
  - Module to assist in documenting problems and determining mitigation - Safety Check List
Hazard Analysis Tool (HAT)

- Designed to Justify Safety Projects (Cont’d)
  - Calculates Benefit Cost
  - Additional module which can be used to evaluate the effectiveness of implemented safety strategies
  - Program contains the user manual which has Crash Reduction Factors (CRF)
Hazard Analysis Tool (HAT)

- In the process of being updated
- Will have a specific safety performance functions for local roads
- Update Crash Costs
- New capability to calculate Benefit Cost for programmatic low cost safety improvements
- HAT is copyrighted by Purdue
- The program is available to all LPA’s
Hazard Analysis Tool (HAT)

Joint Transportation Research Program
Hazard Analysis Tool
BETA - version 2.1.79
08.07.2007

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Joint Transportation Research Program

Hazard Analysis Tool
BETA - version 2.1.79
08.07.2007

Forms Index:
F1 - Index of Crash Frequency and Cost
F2 - Collision Diagram
F3 - Safety Review Checklist
F4 - Condition Diagram
F5.1 - Benefit Cost Analysis
F5.2 - Benefit Cost Analysis
F6.1 - Estimating Crash Reduction Factor
F6.2 - Estimating Crash Reduction Factor
OPEN Existing Project
HELP
EXIT
### Index of Crash Frequency and Cost

#### INPUT

<table>
<thead>
<tr>
<th>Specification</th>
<th>Frequency</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q or Q₁ (thousand/vehicles/day)</td>
<td>14.30</td>
<td></td>
</tr>
<tr>
<td>Q₂ (thousand/vehicles/day)</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>L (miles)</td>
<td>N/A</td>
<td>6,500</td>
</tr>
<tr>
<td>BY (year)</td>
<td>2005</td>
<td></td>
</tr>
<tr>
<td>LY (year)</td>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>PD (crashes)</td>
<td>26</td>
<td>IF (crashes)</td>
</tr>
<tr>
<td>Cᵢᵢ (in 2001 $)</td>
<td>6,500</td>
<td></td>
</tr>
<tr>
<td>Cᵢᵢ (in 2001 $)</td>
<td>48,000</td>
<td></td>
</tr>
</tbody>
</table>

#### OUTPUT

**Crash Severity**
- All crashes
  - Safety Performance Function: \( a = 0.3 \times Q \)
  - \( D = 3.84 \times 0.655 \)
- PDO crashes
  - Safety Performance Function: \( a_{PD} = 0.1758 \times Q^{0.0334} \)
  - \( D_{PD} = 2.87 \times 0.645 \)
- Injury/Fatal crashes
  - Safety Performance Function: \( a_{IF} = 0.1954 \times Q^{0.723} \)
  - \( D_{IF} = 1.38 \times 0.639 \)

**Notes**
- \( a \) = typical crash frequency
- \( a_{PD} \) = typical PDO crash frequency
- \( a_{IF} \) = typical IF crash frequency
- \( BY \) = first year with crash data
- \( Cᵢᵢ \) = average cost for IF crashes ($)
- \( Cᵢᵢ \) = average cost for PDO crashes ($)
- \( D_{IF} \) = over-dispersion parameter for IF crashes
- \( D_{PD} \) = over-dispersion parameter for PDO crashes
- \( I_{CI} \) = index of crash cost
- \( I_{OF} \) = index of crash frequency
- \( L \) = road segment length
- \( Q \) or \( Q₁ \) = AADT entering an intersection or along the road segment, in thousands of vehicles per day
- \( Q₂ \) = AADT exiting the road segment, in thousands of vehicles per day
- \( Cᵢᵢ \) = cost in 2001 $
Hazard Analysis Tool (HAT)
Hazard Analysis Tool (HAT)
Hazard Analysis Tool (HAT)
Hazard Analysis Tool (HAT)
## Hazard Analysis Tool (HAT)

### Benefit Cost Analysis

<table>
<thead>
<tr>
<th>Improvement</th>
<th>CRF&lt;sub&gt;0&lt;/sub&gt; (%)</th>
<th>CRF&lt;sub&gt;f&lt;/sub&gt; (%)</th>
<th>SL (years)</th>
<th>CC ($)</th>
<th>M ($)</th>
<th>S ($)</th>
</tr>
</thead>
</table>

### Form F5.1

<table>
<thead>
<tr>
<th>Location</th>
<th>GIS:</th>
<th>Post:</th>
<th>Analyst:</th>
<th>Date:</th>
</tr>
</thead>
</table>

### Notations:
- \( a_f \): typical UF crash frequency
- \( a_{1f} \): typical PDO crash frequency
- \( BY \): first year with crash data
- \( LY \): last year with crash data
- \( C_c \): cost of an UF crash ($)
- \( C_{PDO} \): cost of a PDO crash ($)
- \( CC \): capital cost ($)
- \( CRF_{0f} \): crash reduction factor for UF crashes
- \( CRF_{f} \): crash reduction factor for PDO crashes
- \( CY \): year for which crash cost is provided
- \( F \): inflation rate
- \( GF \): total growth factor
- \( GY \): growth in traffic growth period
- \( I \): interest rate
- \( IF \): number of UF crashes
- \( IF_y \): number of IE crashes
- \( IF_y \): number of PDO crashes
- \( PO \): number of PDO crashes
- \( PY \): year of project implementation (construction)
- \( SL \): change in annual maintenance cost ($) (assumed to be 0 in this example)
- \( Z_{PDO} \): sum of two volumes
- \( Z_{PDO} \): expected volume in UF equation in Form F1
- \( Z_{PDO} \): expected volume in PDO equation in Form F1

### Comments:

#### Calculations:

- \( a_{1f} = \frac{a_f}{1 + IF} \)
- \( a_{PDO} = \frac{a_{PDO}}{1 + IF} \)
- \( Z_{PDO} = C_c \cdot a_{PDO} \cdot SL \cdot (1 + GF) \cdot (1 + GY) \)

#### Form F5.1:

<table>
<thead>
<tr>
<th>FD (crashes)</th>
<th>IF (crashes)</th>
<th>CY (year)</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0334</td>
<td>1.0334</td>
<td>0.723</td>
<td>1.0334</td>
</tr>
<tr>
<td>( a_{1f} )</td>
<td>( a_{PDO} )</td>
<td>( BY )</td>
<td>( GF )</td>
</tr>
<tr>
<td>2.0</td>
<td>2.0</td>
<td>4.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>
**Hazard Analysis Tool (HAT)**

<table>
<thead>
<tr>
<th>Benefit Cost Analysis</th>
<th>Form F5.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$Y = LV - BY + 1$</td>
<td>$IY = (IV - EV + LV / 2)$</td>
</tr>
<tr>
<td>$Y_2 = (IV - EV + LV / 2)$</td>
<td>$Y_3 = P Y - CY$</td>
</tr>
<tr>
<td>$Y_4 = IV - PY$</td>
<td></td>
</tr>
</tbody>
</table>

- $C_{ped} = \frac{F_{PD} + FD}{D_{PD} \times 50}$
- $C_{mp} = \left(1 + \frac{F}{100}\right) Y_2 \times C_{mp}$
- $PW_{pd} = \frac{1}{\left(1 + \frac{F}{100}\right)^{Y_1}} \sum_{i=1}^{Y_1} \frac{C_{mp} \times X_{C_{mp}}}{100}$
- $PW_{pd} = \frac{B_{pd} \times FD}{1 + \frac{F}{100}}$
- $PW_{mp} = \sum_{i=1}^{Y_1} \frac{B_{mp} \times \left(1 + \frac{F}{100}\right)^{-Y_1}}{1 + \frac{F}{100}}$
- $PW_{mp} = \sum_{i=1}^{Y_1} \frac{B_{mp} \times \left(1 + \frac{F}{100}\right)^{-Y_1}}{1 + \frac{F}{100}}$
- $EUAB = \left(\frac{PW_{pd} + PW_{mp}}{100}\right)$
- $EUAB = \frac{1}{100}$
- $FEC = (PWCC + PWBM - PWS) \times \frac{1}{100}$
- $PWBM = PWBM_{PD} + PWBM_{IF}$
- $FWM = PWCC + PWBM - PWS$
- $NAB = EUAB - EUAC$
- $FWM = PWBM_{PD} + PWBM_{IF}$
- $PWNB = PWBM - FWM$
- $B = EUAB$
- $C = EUAC$
Hazard Analysis Tool (HAT)

### Hazard Analysis Tool (HAT) - Project 1

#### Estimating Crash Reduction Factor

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>Severity</th>
<th>Specify significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signalized intersection</td>
<td>All Crashes</td>
<td>10%</td>
</tr>
</tbody>
</table>

#### Safety Improvement

**Calculation for Treated Locations**

\[
a_{0A} = \sum a_{0, k}
\]

\[
\text{Var}(a_{0A}) = \sum \text{Var}(a_{0, k})
\]

\[
a_{1A} = \sum a_{1, k}
\]

\[
\text{Var}(a_{1A}) = \sum \text{Var}(a_{1, k})
\]

\[
\theta = \frac{a_{1A}}{a_{0A}}
\]

\[
\text{Var}(\theta) = \frac{\text{Var}(a_{1A}) + \sum \text{Var}(a_{0, k})}{(a_{0A})^2}
\]

**Calculation for Control Locations**

\[
a_{0A} = \sum a_{0, k}
\]

\[
\text{Var}(a_{0A}) = \sum \text{Var}(a_{0, k})
\]

\[
a_{1A} = \sum a_{1, k}
\]

\[
\text{Var}(a_{1A}) = \sum \text{Var}(a_{1, k})
\]

\[
\theta = \frac{a_{1A}}{a_{0A}}
\]

\[
\text{Var}(\theta) = \frac{\text{Var}(a_{1A}) + \sum \text{Var}(a_{0, k})}{(a_{0A})^2}
\]

#### Results

<table>
<thead>
<tr>
<th>Current Value</th>
<th>CRF (_1)</th>
<th>SD (_1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Value</td>
<td>CRF (_2)</td>
<td>SD (_2)</td>
</tr>
<tr>
<td>Combined Value</td>
<td>CRF</td>
<td>SD</td>
</tr>
</tbody>
</table>

#### Notation:

- \(a_{0A}\) = expected crash frequency in the period after the implementation of safety project but not after the implementation of the safety project
- \(a_{1A}\) = crash frequency during the period after the implementation of the safety project
- CRF \(_1\) = old crash reduction factor
- CRF \(_2\) = crash reduction factor for the implemented safety project
- SD \(_1\) = standard deviation of old crash reduction factor
- SD \(_2\) = standard deviation of crash reduction factor for the implemented safety project
- Var \((a_{0A})\) = Variance of \(a_{0A}\) estimation
- Var \((a_{1A})\) = Variance of \(a_{1A}\) estimation
Toolbox of Crash Data Analysis

- 5 % Report
- FHWA 5% Report – Transparency Report
Transparency Report

- Federal Requirement that all states evaluate their highway system for the 5% of locations that exhibit the highest Safety Needs

- Emphasis on Fatal and Incapacitating Injuries
Transparency Report

- Accomplished using Latitude and Longitude of Crashes to Geographically sum crashes to a network of state and local network of segments and intersections

- Uses Safety Performance Functions (SPF) to compare predicted crashes with actual to calculate Icf and Icc
Transparency Report

- Locations are qualified to be on the 5% that meet two conditions
  - A location must experience two events of a Fatal or Incapacitating Injury
  - Locations are then ranked by Icc
  - Locations are chosen until 5% of the Fatal and Incapacitating Injuries are represented
  - It is possible for a location to have a high Icc but not be chosen because the location did not experience two serious qualifying events
Transparency Report

- Indiana State Website
  - http://www.in.gov/
- Departments
  - Click more
  - Click Transportation
  - Click Publications
  - Click Other Publications
  - Scroll down until you can click on “Indiana’s 5% Report”
Transparency Report

IN.gov

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Highway Conditions Publications Modes of Transportation Doing Business with INDOT Projects / Studies Public Involvement / Media Program / Events

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Site Map

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Then Transportation

Our Mission

*INDOT will plan, build, maintain, and operate a superior transportation system enhancing safety, mobility and economic growth.*

This Website is a valuable tool in fulfilling our mission, as it is a forum for providing easy access to all

Online Services
- Traffic Conditions
- Road Conditions
- Driveway Permit
- Contractors
- Current Construction Projects
- Notice of Tolls Claim Form
- Indiana Airport Directory
- Indiana GIS Atlas
- Forest IN.gov

More Online Services » Account Center »

Stay Connected
- RSS Feeds
- Mobile

Top FAQs
1. How do I find information regarding highway road closures/construction?
2. Where can I find a current Indiana State Map?
3. Where can I get a Indiana Map (county, highway...)

Welcome to the Indiana Department of Transportation's Website!

Get Ready For Winter!

learn more WinterDrivingSafety.IN.gov

Gov. Mitch Daniels: visit his home page >>
Indiana’s Five Percent Report

As part of its ongoing effort to reduce highway crashes in Indiana, the Indiana Department of Transportation (INDOT) has updated and improved its program to identify and evaluate areas in the state’s highway network with higher than average crash rates.

Each year Indiana produces a Five Percent Report. The Five Percent (5%) Report is required under SAFETEA-LU to ensure that the states are transparent in revealing their traffic safety needs on both the state controlled and local public road systems. As such the contents of the 5% Report are posted on the federal web site and by federal law are immunized against use in tort litigation. The Office of Traffic Safety uses the annual Five Percent Report to identify previously unknown sites with safety issues for investigation and possible project programming.

The locations listed on each report account for more than five percent of all Indiana fatalities or serious injury crashes in the previous three years prior to the report year. To rank the locations for the report, analysts looked at a number of factors including crash frequency, rate and severity.

As a result of each five percent report, safety experts have or will conduct on-site safety reviews across the state. INDOT then programs projects at the locations where engineers conducting the reviews identified feasible infrastructure projects to improve safety.

Indiana’s Five Percent Report allows INDOT to identify potential solutions to roadway concerns and direct highway funding to the areas where it is most needed. INDOT has already scheduled
Transparency Report

As a result of each five percent report, safety experts have or will conduct site safety reviews across the state. INDOT then programs projects at the locations where engineers conducting the reviews identified feasible infrastructure projects to improve safety.

Indiana’s Five Percent Report allows INDOT to identify potential solutions to roadway concerns and direct highway funding to the areas where it is most needed. INDOT has already scheduled improvements for many of the locations listed on previous reports. Those locations not currently scheduled for construction undergo a safety evaluation by a team of INDOT engineers. These teams will identify possible solutions to correct any roadway deficiencies using the four E’s: engineering, education, emergency response and enforcement.

INDOT is committed to reducing crashes on Indiana’s roadways, and Indiana’s Five Percent Report is just one of several ways INDOT selects locations to receive safety reviews and programs safety projects. Other methods used to seek out candidate locations include recommendations by Indiana’s Metropolitan Planning Organizations (MPO), local transportation agencies and other highway safety partners. INDOT also analyzes statewide crash trends to locate other locations where specific safety measures would be effective.

Five Percent reports are included below for 2007 through 2009. The 2008 and 2009 reports also include listings for local roads.

For more information on INDOT’s comprehensive highway safety program, visit INDOT’s safety programs and initiatives web site.

Five Percent Report Documents
- 2009 Five Percent Report (PDF)
- 2008 Five Percent Report (PDF)
- 2007 Five Percent Report (PDF)
Transparency Report

Indiana 2009 Five-Percent Report

Prepared by
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Mik Shaful Alamin, Purdue University
Center for Road Safety
Purdue University
West Lafayette, Indiana
&
John Nagle, INDOT
Lawrence Ozoba, INDOT

Submitted By:
Office of Traffic Safety
Division of Engineering Programs
Indiana Department of Transportation

September 26, 2009

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## 2009 Five Percent State Road Segments in Indiana

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<tr>
<th></th>
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<td>0.17</td>
<td>Fort Wayne</td>
<td>Allen</td>
<td>Fort Wayne</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>23</td>
<td>6</td>
<td>9</td>
<td>3</td>
<td>3</td>
<td>3.10</td>
<td>0.30130K</td>
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<tr>
<td>0.12</td>
<td>Lake</td>
<td>Boone</td>
<td>CRAWFORDSVILLE</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>47</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>0.07</td>
<td>3.06</td>
<td>0.30036K</td>
</tr>
<tr>
<td>0.08</td>
<td>Clermont</td>
<td>Clark</td>
<td>SEYMOUR</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>13</td>
<td>12</td>
<td>3</td>
<td>3</td>
<td>4.08</td>
<td>0.30036K</td>
<td></td>
</tr>
<tr>
<td>0.06</td>
<td>New Albany</td>
<td>Floyd</td>
<td>SEYMOUR</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>18</td>
<td>18</td>
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<td>3</td>
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<td>SE 44 from 2.33 mi to 2.63 mi of the IN-11</td>
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<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>16</td>
<td>10</td>
<td>1</td>
<td>3</td>
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<td>3</td>
<td>1</td>
<td>5</td>
<td>16</td>
<td>10</td>
<td>1</td>
<td>3</td>
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<td>3</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>16</td>
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<td>4.03 mi to 4.15 mi</td>
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<td>3</td>
<td>3</td>
<td>1</td>
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<td>10</td>
<td>1</td>
<td>3</td>
<td>4.41</td>
<td>0.30036K</td>
<td></td>
</tr>
</tbody>
</table>

I4 Page
Transparency Report

- FHWA Website
Transparency Report

Highway Safety Improvement Program
"5 Percent Report" Requirement

This website contains reports provided by the states in response to a Federal requirement to describe at least 5 percent of the locations in each state currently exhibiting the most severe highway safety needs, in accordance with Sections 146(c)(1)(D) and 146(g)(3)(A), of Title 23, United States Code. The reports that follow represent a variety of methods utilized and various degrees of road coverage. Therefore, the reports included on this website cannot be compared to one another.

Protection from Discovery and Admission into Evidence—Under 23 U.S.C. 143(g)(4) information collected or compiled for any purpose directly relating to this report shall not be subject to discovery or admitted into evidence in a Federal or State court proceeding or considered for other purposes in any action for damages arising from any occurrence at a location identified or addressed in the reports.

Section 1401 of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (Public Law 109-59) amended Section 146 of Title 23, United States Code, to create a new Highway Safety Improvement Program (HSIP) as one of the Federal Highway Administration’s core & programs. The purpose of the HSIP is to reduce traffic fatalities and serious injuries on public roads.

As part of the new HSIP, states are required to submit an annual report describing not less than 5 percent of their highway locations exhibiting the most severe safety needs. The intent of this provision is to raise public awareness of the highway safety needs and challenges in the states.

In addition to listing the locations, the states’ reports are to include:

- Potential remedies to the hazardous locations identified.
As part of the new HSIP, states are required to submit an annual report describing not less than 5 percent of their highway locations exhibiting the most severe safety needs. The intent of this provision is to raise public awareness of the highway safety needs and challenges in the states.

In addition to listing the locations, the states’ reports are to include:

- Potential remedies to the hazardous locations identified;
- Estimated costs of the remedies; and
- Impediments to implementation of the remedies other than costs.

To assist the states in preparing these reports, the Federal Highway Administration provided guidance in April 2006 (http://safety.fhwa.dot.gov/safetynatlguide/guide040506.cfm). This guidance provided considerable flexibility and included several methods the states could use to identify their most severe safety needs.

Previous Years

- 2006 Reports
- 2007 Reports
- 2008 Reports
Toolbox of Crash Data Analysis

- ARIES
- Automated Reporting Information Exchange System
- Formerly called the Vehicle Crash Records System (VCRS)
- Indiana State Police Depository for all Crash Records
ARIES

- All crashes from January 1, 2003 to present are available
- Available to users over the WWW
- ISP intends to keep ten (10) years available
- Electronic Crash Reporting
  - Over 95% of Law Enforcement Agencies
  - Over 96% of Reports
  - Over 79% of Reports submitted within 5 days
  - Mapping percentage 90%
How to get Access

- http://crashreports.in.gov/
  - Available to INDOT, MPO, County and City Engineers
  - Requires User ID and Password
  - Complete a “Data Access Agreement for Indiana State Police Web Access”
  - Return the form to me
  - The forms are then processed and when ISP/OPS activates the account you will be notified by e-mail of your ID and Password
Data Access Agreement for Indiana State Police Web Services

This agreement concerns the conditions of use of data and documentation listed within this agreement. The data and documentation are hereafter referred to as "the materials" which will also include any additional data or documentation which are not subject of a separate agreement.

By using the Indiana State Police Web Services web site, you acknowledge that you have reviewed this agreement and agree to its terms and conditions. You agree to use ISP Web Services strictly in accordance with the terms and conditions set forth in this document knowing it may be amended from time to time. You also agree to be bound by any rules, procedures and conditions established by the Indiana State Police concerning the use of the ISP Web Services. You acknowledge that ISP may modify or discontinue the Web Services offered without any prior notice to you. In addition, ISP reserves the right to terminate your access to the Web Services or any portion thereof, in its sole discretion, without notice and without limitation, for any reason whatsoever, including but not limited to, the unauthorized use of your access passwords.

Access and Security
You agree that you are responsible for the confidentiality and use of your User ID and Password. You agree to be responsible for all requests entered through the Web Services via the use of your User ID and Password. You agree to promptly notify the Indiana State Police if you (1) become aware of the theft or unauthorized use of your User ID or Password, (2) fail to receive requested information from the Web Services.

Confidentiality
You agree that while collision information is not confidential, the source in which it is delivered to you is confidential in nature and may not be shared with anyone unless permission is obtained from the Indiana State Police.

Copyright
Copies of Collision report images are prohibited.

Terms and Conditions
You agree that any information obtained via the Indiana State Police Web Services will be used within the confines of your existing job functions. Information obtained via the Web Services will be used internally to your organization and will not be provided to the general public. You agree that any information obtained via the Web Services will not be sold.

<table>
<thead>
<tr>
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<td>INDOT Authorized Signature:</td>
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ARI ES Restrictions on Use

- **Access and Security**
  - Individual users are responsible for the confidentiality and use of their ID and Password
  - Notify ISP if you become aware of the misuse or theft of your ID
  - Notify ISP of failure to receive requested information
ARIES Restrictions on Use cont’d

- Confidentiality
  - Images of the reports are **NOT** to be distributed and only used for your agency transportation purposes
  - **The data and tables can be shared**
  - The reports are available to be purchased at [http://www.buycrash.com/](http://www.buycrash.com/)
  - $12 which is split between ISP (to support ARIES) and the originating enforcement agency
Benefits to Transportation Users

- Crash reports are Current
- Crashes available from January 1, 2003 on
- Crash information is available for summarizing and viewing from a Web Site
- Some mapping capability is provided
Welcome to ARIES!

This website is developed and maintained by Holt, Sheets & Associates to serve as a portal to the State of Indiana's repository for traffic collision and surveillance reports completed by Indiana law enforcement agencies.
Client Logon

Note: Both the user id and password are case sensitive. You must type the user id and password in the upper and/or lower case as assigned. If you do not have a login account and want to request membership, click here.
Welcome to ARIES!

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Welcome to ARIES!

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### Find a Document

**Collision Reports**

- **Master Rec Nbr:**
- **Local Code:**
- **Date of Collision:**
  - From: [MM/DD/YYYY]
  - To: [MM/DD/YYYY]

**Individual Information**

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First Name</th>
<th>License Plate Number</th>
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**Location of Collision**

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<tr>
<th>Roadway Name</th>
<th>County</th>
<th>Agency</th>
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</thead>
</table>

**Find**
Welcome to ARIES!

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Welcome to ARIES!

This website is developed and maintained by Holt, Sheets & Associates to serve as a portal to the State of Indiana's repository for traffic collision and surveillance reports completed by Indiana law enforcement agencies.

Don't forget to sign out! The number of logins under your account is limited, and the security associated with your id should be released while not using the site.

Note: Closing the browser will not immediately sign you out.

For a list of frequently asked questions, click here.

Send all comments, suggestions and/or feedback to the ARIES.
Welcome to ARIES!

This website is developed and maintained by Holt, Sheets & Associates to serve as a portal to the State of Indiana’s repository for traffic collision and surveillance reports completed by Indiana law enforcement agencies.
Generated Reports & Extracts

- Collisions by Month: 7/19/2008, WEB CHARLES LINVILLE SOUTHPORT, Weekly
- Year-to-Date Fatalities: 7/19/2008, WEB TIM MARKER INDOT, Weekly
- Collisions by Damage Estimate: 7/19/2008, WEB BARB SMITH BOONE SD, Weekly
- High Accident Locations: 7/19/2008, WEB HAROLD GOODLETT CLARK SD, Weekly
- Collisions by Agency: 7/19/2008, WEB WILLIAM PATerson LAKE SD, Weekly
- Collisions by Agency: 7/19/2008, WEB MERVIN NOLot MPO, Weekly
- High Accident Locations: 7/19/2008, WEB DOUGLAS SHELTON ISPGHQ, Weekly
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<td>591</td>
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<tr>
<td>URBAN</td>
<td>277</td>
<td>266</td>
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</table>

Year to Date Total: 947, 857
Welcome to ARIES!

This website is developed and maintained by Holt, Sheets & Associates to serve as a portal to the State of Indiana's repository for traffic collision and surveillance reports completed by Indiana law enforcement agencies.
Collision Data
Criteria Selection

Criteria Specified

Criteria Selection List

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<tr>
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<td>The Construction Indicator</td>
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<td>The Number Injured</td>
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Add
Collision Data
Results

Criteria: The Date of Collision is between 1/1/2007 and 12/31/2007 And The County is one of: TIPPECANOE And The Number Dead is greater than 0

<table>
<thead>
<tr>
<th>Total Collisions found:</th>
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</thead>
<tbody>
<tr>
<td>Collisions w/injury:</td>
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<tr>
<td>Total injuries:</td>
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<tr>
<td>Total fatalities:</td>
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Generate Map
View Details
Create Extract
Spatial Analysis
Collision Data

Results

Criteria: The Date of Collision is between 1/1/2007 and 12/31/2007. And The County is one of: TIPPECANOE And The Number Dead is greater than 0.

<table>
<thead>
<tr>
<th>Total Collisions found:</th>
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<tbody>
<tr>
<td>Collisions w/injury:</td>
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Generate Map

View Details

Create Extract

Spatial Analysis
Collision Data

Results

Criteria: The Date of Collision is between 1/1/2007 and 12/31/2007. And The County is one of: TIPPECANOE And The Number Dead is greater than 0

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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Generate Map

View Details

Create Extract

Spatial Analysis
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### Collision Data
#### Results

**Criteria:** The Date of Collision is between 1/1/2007 and 12/31/2007  
And  
The County is one of: TIPPECANOE  
And  
The Number Dead is greater than 0

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<tr>
<th>Description</th>
<th>Count</th>
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<td>Total injuries:</td>
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</tr>
<tr>
<td>Total fatalities:</td>
<td>22</td>
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</tbody>
</table>

* ![Generate Map](image)  
  ![View Details](image)  
  ![Create Extract](image)

* ![Spatial Analysis](image)*
Criteria: The Date of Collision is between 1/1/2007 and 12/31/2007 AND The County is one of: TIPPECANOE AND The Number Dead is greater than 0.
Collision Data

Results

Criteria: The Date of Collision is between 1/1/2007 and 12/31/2007. And The County is one of: TIPPECANOE. And The Number Dead is greater than 0.

Total Collisions found: 20
Collisions w/injury: 0
Collisions w/fatality: 20
Collisions w/property damage: 0
Total injuries: 23
Total fatalities: 22

Create Extract
Collision Data Results

Criteria: The Date of Collision is between 1/1/2007 and 12/31/2007 And The County is one of: TIPPECANOE And The Number Dead is greater than 0

Total Collisions found: 20
Collisions w/injury: 0
Collisions w/fatality: 20
Total injuries: 23
Total fatalities: 22

Success! Click Download to retrieve your Extract file.

Spatial Analysis
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CRASH ANALYSIS

July 13, 2006

ACCESS THE VEHICLE CRASH RECORDS SYSTEM (VCRS) THROUGH THE WEBSITE:
http://crashreports.in.gov

SELECT CLIENT LOGON (LEFT SIDE OF THE SCREEN)

TYPE IN USER ID AND PASSWORD
SELECT LOGIN

SELECT COLLISION DATA
ADD THE CRITERIA YOU THINK WOULD GIVE YOU THE BEST RESULT

EXAMPLE:
FROM THE PROPERTY PULL-DOWN SELECT THE ROADWAY INTERSECTION
YOU MAY WANT TO TYPE THE ROADWAY IN TWICE, WITH AND WITHOUT A
SPACE, TO ENSURE THAT YOU GET THEM ALL. SELECT THE INS BUTTON
BETWEEN EACH ENTRY. YOU MAY ALSO WANT TO ADD INTERSECTIONS.
OPERA AND SELECT CONTAINS
SELECT ADD

ARIES Best Practices
By: Jeremy L. VanVleet, P.E.
November 20, 2009

Purpose: Due to the varying methods used to build a query inside of ARIES, this best practices
文献 was created to try to standardize the process of building queries in ARIES for different
types of projects. This will be an evolving document as new practices may be shared or started
with the evolution of ARIES.

Procedure for Querying into ARIES:
1. ARIES website: http://crashreports.in.gov
2. Select Client Login or click on the Sign In button
3. Insert your issued user name and password in the appropriate spaces
4. Click Collision Reports
5. Click Collision Data
6. Click Yes on the pop up screen

Procedure for Building a Query for a specific intersection’s crash records:
1. Check the Show All box.
2. Enter time frame for crash data
   a. Crash date begins with 1/1/2003
   b. Maximum crash time is per search is 2 months
   c. The maximum number of records that can be obtained at 1 time is 5,000;
      therefore in some instances it may be necessary to break the query down by year.
      In some cases it may even be necessary to break the query down into quarters or
      month to month depending upon the number of crashes queried.
3. Click Add
4. Select The County option from the drop down list under Property and use an Operator of is
   one of: Then choose the county that pertains to the intersection in question. After this is set
   then click the Add button.
5. If you want to narrow down the search criteria you can also click on The Township and
   leave the operator as is as well and then you can choose the township from the drop down
   list.
6. Select The Roadway/Intersections from the drop down list under Property. The
   Operator should be set to Contains and the Reverse Lookup box needs to be checked.
   a. Insert the major road name in the provided space—After the road name is inserted click on the
      find button.
   b. Insert the intersecting road name in the provided space—After the
      intersecting road name is entered click on the find button.
   c. It is also important to insert multiple variations to the names of the
      roadways as shown below.
Toolbox of Crash Data Analysis

- SHSP
- Strategic Highway Safety Plan
Strategic Highway Safety Plan

- FHWA requirement
- Data Assessment of State Safety Needs
- Data Driven Identification of Indiana Safety Emphasis Areas
- Projects must fit into one of these Emphasis Areas to be Eligible for HSIP Funding

http://www.in.gov/indot/files/shsp.pdf
Toolbox of Crash Data Analysis

- RSA
- Roadway Safety Audits
Roadway Safety Audits

- Performed by a team independent of the project
- Performed by a multi-disciplinary team
- Considers all potential road users
- Generates a formal RSA Report
- Qualitative in nature
- Provides a proactive approach
Roadway Safety Audits are NOT

- NOT a means to critique design work
- NOT a check of compliance with standards
- NOT a means of ranking or justifying one project over another

Roadway Safety Audits

- Step 1 Identify project to be audited
- Step 2 Select RSA Team
- Step 3 Conduct a pre-audit meeting to review project information
- Step 4 Perform field observations
- Step 5 Conduct Audit analysis and prepare report findings
- Step 6 Present audit findings to Project Owner/Design Team
Roadway Safety Audits

- Step 7 Project Owner/Design Team prepares formal response
- Step 8 Incorporate findings into the project when appropriate

- INDOT is using a RSAs as part of the HSIP application process to determine safety issues and counter measures
- Training has been provided through LTAP
Toolbox of Crash Data Analysis

- HSM
- Highway Safety Manual
- http://www.highwaysafetymanual.org/Home/Home.html
Highway Safety Manual

OUTLINE OF THE HSM

- **Part A**
  - Introduction, Human Factors, and Fundamentals

- **Part B**
  - Roadway Safety Management Process

- **Part C**
  - Predictive Method

- **Part D**
  - Accident Modification Factors
Highway Safety Manual

PART A
INTRODUCTION, HUMAN FACTORS, & FUNDAMENTALS

Chapter 1  Introduction and Overview
Chapter 2  Human Factors
Chapter 3  Fundamentals
Highway Safety Manual

PART B
ROADWAY SAFETY MANAGEMENT PROCESS

Network Screening  Countermeasure Selection  Prioritization of Improvement Projects

Diagnosis  Economic Appraisal  Safety Effectiveness Evaluation
**Highway Safety Manual**

**PART C**
**PREDICTIVE METHOD**

| Two-Lane Rural Roads | • Methodology  
| Urban/Suburban Arterial Highways | • Applications  
| Rural Multilane Highways | • Safety issues not explicitly addressed by the methodology  
| Special Part C Common Procedures | • Example problems  
| | • References  
| | • Calibration  
| | • Combining predicted with observed crashes  

**Indiana Department of Transportation**
**PART D**

ACCIDENT MODIFICATION FACTORS

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<th>Roadway Segments</th>
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<td>CHAPTER 15</td>
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<td>CHAPTER 16</td>
<td>Special Facilities and Geometric Situations</td>
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<td>CHAPTER 17</td>
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### Highway Safety Manual

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Toolbox of Crash Data Analysis

- SA
- Safety Analyst
- http://www.safetyanalyst.org/
Safety Analyst

Safety Analyst Tools

The **Network Screening Tool** identifies sites with potential for safety improvements.

The **Diagnosis Tool** is used to diagnose the nature of safety problems at specific sites.

The **Countermeasure Selection Tool** assists users in the selection of countermeasures to reduce accident frequency and severity at specific sites.

The **Economic Appraisal Tool** performs an economic appraisal of a specific countermeasure or several alternative countermeasures for a specific site.

The **Priority Ranking Tool** provides a priority ranking of sites and proposed improvement projects based on the benefit and cost estimates determined by the economic appraisal tool.

The **Countermeasure Evaluation Tool** provides the capability to conduct before/after evaluations of implemented safety improvements.
Safety Analyst

- Developed as an FHWA Pooled Fund Study
- Has now become an AASHTOware product
- Includes
  - Administrative Software
  - Data Management Software
  - Analysis Software
Toolbox of Crash Data Analysis

- IHSDM
- Interactive Highway Safety Design Model
Interactive Highway Safety Design Model

IHSDM Overview

The Interactive Highway Safety Design Model (IHSDM) is a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on highways.
Interactive Highway Safety Design Model

IHSDM currently includes six evaluation modules (Crash Prediction, Design Consistency, Intersection Review, Policy Review, Traffic Analysis, and Driver/Vehicle). This Web site summarizes the capabilities and applications of the IHSDM evaluation modules. It also provides a library of the research reports documenting their development.
Interactive Highway Safety Design Model

IHSDM is a decision-support tool. It checks existing or proposed highway designs against relevant design policy values and provides estimates of a design’s expected safety and operational performance. IHSDM results support decision making in the highway design process. Intended users include highway project managers, designers, and traffic and safety reviewers in State and local highway agencies and engineering consulting firms.
Toolbox of Crash Data Analysis

- DR for CR
- Desktop Reference for Crash Reduction Factors
- AMF
- Accident Modification Factors
Desktop Reference for Crash Reduction Factors

U.S. Department of Transportation
Federal Highway Administration
Publication No. FHWA-SA-07-015

September 2007
Desktop Reference for Crash Reduction Factors

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September 2007
### Desktop Reference for Crash Reduction Factors

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</table>
Desktop Reference for Crash Reduction Factors
Toolbox of Crash Data Analysis

- CJ I-CFB
- Criminal Justice Institute – Crash Fact Book
Criminal Justice Institute

- Traffic Safety Division of CJII
- Traffic Records Coordinating Committee (TRCC)
- Grants Relating to Behavior such as aggressive driving and impaired driving
- Publish Crash Summaries on the Web
- Following are examples and how to find them
Criminal Justice Institute
Criminal Justice Institute
Criminal Justice Institute

Traffic Records

Vehicle Crash Records General Information

To obtain public vehicle crash records or contact the ARIES Help Desk, call (217) 216-5000 or fax (217) 215-2217.

To submit paper reports or request a report purchase:
- Open Portal Solutions
- IAIS Vehicle Crash Records
- 374 Mandolin Plaza, Suite 8
- Greenwood, Indiana 46142

Traffic Records Evolution Report

About the Traffic Records

The Traffic Safety division’s Traffic Records program is responsible for the improvement of traffic records. It is strongly encouraged that all law enforcement agencies in the State utilize the electronic crash report submission system. The Automated Reporting Information Exchange System (ARIES) provides an electronic crash reporting system to all Indiana Law Enforcement agencies at no cost. The website for obtaining this program can be found at http://aries.in.gov.
Criminal Justice Institute

INDIANA TRAFFIC SAFETY FACTS

COUNTY PROFILES 2008
Criminal Justice Institute
### Counties, 2008

Understanding the spatial distribution of traffic collisions and fatalities can assist officials in developing policies and targeting resources to address the regions where collisions occur. A number of factors may influence where and when traffic collisions occur, including the size and makeup of the population and the types of roads and streets present. This document shows which counties are the highest in total collisions as well as which counties are highest in fatalities.

In 2008, 267,633 traffic collisions occurred in Indiana, 77% of which were total collisions.

- The mean number of total collisions per county was 2,838, while the mean number of total fatalities per county was 1.

- Huron County had 99% in total collisions, but 1% in total fatalities as a percent of total collisions.

- Richland County had 9% total collisions, but 26% in total fatalities as a percent of total collisions.

#### Table 1: Counties, 2008

<table>
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<th>County</th>
<th>Total Collisions</th>
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</table>
Criminal Justice Institute
Toolbox of Crash Data Analysis

- HELPERS
- Hazard Elimination Project for Existing Roads and Streets
HELPERS

- Local Transportation Assistance Program – LTAP
- Assistance for Counties and Towns to justify Safety projects for federal funding
HELPERS

The Indiana LTAP HELPERS (Hazard Elimination Project for Existing Roads and Streets) is a project that targets Class III and Class IV local street, highway and/or engineering departments in Indiana to assist in identifying their most hazardous locations, determining the types of crashes most likely to occur at those locations, and suggesting countermeasures to reduce the number and/or severity of those crashes. In many cases, this project also assists these local agencies in requesting federal aid money to implement the suggested countermeasures. In other cases, the road safety audit review (RSAR) performed by LTAP provides the local public agency (LPA) with a list of countermeasures that may be implemented with local forces as time and funding permit.

Documents

- Call for Projects Dec '09
- HELPERS Road Handouts
- HELPERS RSAR Presentations
- HELPERS Request for Assistance

The site is optimized for modern browsers. The browser you are using is out-of-date. Please upgrade to the latest version of Internet Explorer, Firefox, or Opera.
Toolbox of Crash Data Analysis

- FARS
- Fatal Accident Reporting System
FARS

- FARS contains data on all fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico
- The FARS Query System enables users to perform their own custom requests
FARS

Fatality information is derived from the Fatality Analysis Reporting System (FARS). FARS includes motor vehicle traffic crashes that result in fatality to a vehicle occupant or nonmotorist, from injuries resulting from a traffic crash, that occur within 30 days of the crash. The final FARS file is normally completed around Memorial Day, at which time the final quality control procedures are implemented. When these procedures are completed, NCSA can begin to create our fact sheets and release the new data. When the 1999 data are available, it will be announced on this page.

FARS contains data on all fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico. The data system was conceived, designed, and developed by the National Center for Statistics and Analysis (NCSA) to assist the traffic safety community in identifying traffic safety problems, developing and implementing vehicle and driver countermeasures, and evaluating motor vehicle safety standards and highway safety initiatives.
NCHRP REPORT 500

- NCHRP REPORT 500
- National Cooperative Highway Research Program – Report 500
- Guidance for Implementation of the AASHTO Strategic Highway Safety Plan
- 19 publications about key emphasis areas that affect highway safety
NCHRP REPORT 500

- Volume 01: A Guide for Addressing Aggressive-Driving Collisions
- Volume 02: A Guide for Addressing Collisions Involving Unlicensed Drivers and Drivers with Suspended or Revoked Licenses
- Volume 03: A Guide for Addressing Collisions with Trees in Hazardous Locations
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- Volume 04: A Guide for Addressing Head-On Collisions
- Volume 05: A Guide for Addressing Un-signalized Intersection Collisions
- Volume 06: A Guide for Addressing Run-Off-Road Collisions
- Volume 07: A Guide for Reducing Collisions on Horizontal Curves
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- Volume 09: A Guide for Reducing Collisions Involving Older Drivers
- Volume 11: A Guide for Increasing Seat Belt Use
NCHRP REPORT 500

- Volume 12: A Guide for Reducing Collisions at Signalized Intersections
- Volume 14: Reducing Crashes Involving Drowsy and Distracted Drivers
- Volume 15: A Guide for Enhancing Rural Emergency Medical Services
NCHRP REPORT 500

- **Volume 16**: A Guide for Reducing Crashes Involving Alcohol
- **Volume 17**: A Guide for Reducing Work Zone Collisions
- **Volume 18**: A Guide for Reducing Head-On Crashes on Freeways
- **Volume 19**: A Guide for Collecting and Analyzing Safety Highway Safety Data
Toolbox of Crash Data Analysis

- ELCSI-PFS
- Evaluation of Low Cost Safety Improvements – Pooled Fund Study
Evaluation of Low Cost Safety Improvements – Pooled Fund Study

- ~ 26 State Pooled Fund Study
- FHWA Strategic Highway Safety Plan Effort
- Purpose is to Estimate the Safety Effectiveness for Several of the Low Cost Strategies Identified in the 500 Reports
Evaluation of Low Cost Safety Improvements – Pooled Fund Study

- STOP Signs with Increased Retro-reflectivity
- Flashing Beacons
- STOP AHEAD Pavement Markings
- Two-Way Left-Turn Lanes
Evaluation of Low Cost Safety Improvements – Pooled Fund Study

- Offset Left-Turn Lanes,
- Advance Street Name Signing
- Curve Treatments
- Lane-Width/Shoulder-Width Combinations
- More
Safety Evaluation of Lane and Shoulder Width Combinations on Rural, Two-Lane, Undivided Roads

FHWA Publication No.: FHWA-HRT-09-032
FHWA Contact: Roya Amjadi, HRDS-06, (202) 493-3383, roya.amjadi@fhwa.dot.gov

This document is a technical summary of the Federal Highway Administration report, Safety Evaluation of Lane and Shoulder Width Combinations on Rural, Two-Lane, Undivided Roads (FHWA-HRT-09-031), which will be available online at http://www.fhwa.dot.gov/safety.

Objective

The Federal Highway Administration (FHWA) organized a pooled fund study of 26 States to evaluate low-cost safety strategies. The purpose of the FHWA Low-Cost Safety Improvements Pooled Fund Study is to evaluate the safety effectiveness of several low-cost safety strategies presented in the National Cooperative Highway Research Program (NCHRP) Report 500 Series. Although not identified in the NCHRP Report 500 Series, one of the strategies selected for evaluation in the pooled fund study was the allocation of lane and shoulder width for fixed pavement widths on rural, two-lane, undivided roads (i.e., given a fixed roadway width for a rural, two-lane, undivided road, is it safer to provide wider shoulders or wider lanes?). The safety effectiveness of various allocations of total paved width had not previously been thoroughly documented, and this study is an attempt to provide an evaluation through scientifically rigorous procedures.

Introduction

State and local agencies are often faced with a decision of how to enhance safety on rural, two-lane roads when the total paved width is to remain the same. More than 42,000 fatalities occur

Simulator Evaluation of Low-Cost Safety Improvements on Rural Two-Lane Undivided Roads: Nighttime Delineation for Curves and Traffic Calming for Small Towns

FHWA Publication No.: FHWA-HRT-09-002
FHWA Contact: Roya Amjadi, HRDS-06, (202) 493-3383, roya.amjadi@fhwa.dot.gov

This document is a technical summary of the Federal Highway Administration report, Simulator Evaluation of Low-Cost Safety Improvements on Rural Two-Lane Undivided Roads: Nighttime Delineation for Curves and Traffic Calming for Small Towns, FHWA-HRT-09-001.

Objective

The Federal Highway Administration (FHWA) organized 26 States to participate in the FHWA Low Cost Safety Improvements Pooled Fund Study as part of its strategic highway safety plan support effort. The purpose of the pooled fund study is to estimate the safety effectiveness of several of the proven low-cost safety strategies identified in the National Cooperative Highway Research Program (NCHRP) Report 500 Series. One of the strategies chosen to be evaluated for this study is improved curve delineation, which is intended to reduce the frequency of curve-related crashes by providing more conspicuous signing and lane markings.

In this study, a driving simulator experiment was conducted to evaluate two sets of alternative low-cost safety improvements for rural areas based on Technical Advisory Committee recommendations from the 2007 Annual Meeting. The first set of improvements was directed toward enhancing the visibility of curves on rural two-lane undivided roads at night. It focused on achieving advanced detection and speed reduction in such curves. The second set of improvements was directed toward slowing traffic on rural two-lane undivided roads in small towns during the day by focusing on traffic calming within the towns.
Toolbox of Crash Data Analysis

- MPO’s
- Metropolitan Planning Organizations
MPO’s

- All the MPO’s analyze safety data to various extents
- Have dedicated safety funding
- Are a resource for safety information
Safety Toolbox of Crash Data Analysis

Questions?