

## General Resources

- NEW [Strategic Intersection Safety Program Guide](#)
- [Key Intersection Safety Resources](#)
- [Intersection Safety Strategies Brochure](#)
- [Intersection Safety Individual Guide Sheets](#)
- **AASHTO Strategic Highway Safety Plan** [[PDF](#) 1.20 MB]  
The AASHTO Strategic Highway Safety Plan contains 22 emphasis areas. This plan is built on existing safety programs, such as the National Safety Council's (NSC's) National Agenda for Safety Records, the Strategic Plan for Improving Roadside Safety—a program developed through the National Cooperative Highway Research Program (NCHRP) and the Emergency Medical Services (EMS) Strategic Plan.
- [Access Management Manual](#), ISBN: 0-309-07747-8, Transportation Research Board, The National Academies, 2003.  
This TRB Manual provides technical information on access management techniques, together with information on how to develop and administer effective access management programs. It presents access management—the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway—comprehensively, in an effort to integrate planning and engineering practices with the transportation and land use decisions that contribute to access outcomes.

To order the Access Management Manual, contact the TRB Business Office at 202-334-3213 or [TRBSales@nas.edu](mailto:TRBSales@nas.edu)

- [Appendix A: Summary of Intersection Safety Studies](#)  
Appendix to Safety Effectiveness of Intersection Left and Right Turn Lanes. D.W. Harwood, et. al., FHWA-RD-02-089, July 2002.
  - Complete Report [[PDF](#) 1.49 MB]
- **Comprehensive Intersection Resource Library CD Version 3.** A compilation of resources about traditional signalized and unsignalized intersections, roundabouts, highway/rail grade crossings and other innovative intersection designs. For copies of the CD, call Ed Rice at the Federal Highway Administration at (202) 366-9064.
- **Florida Intersection Design Guide for New Construction and Major Reconstruction of At-Grade Intersections on the State Highway System** [[PDF](#) 3.58 MB]  
The chapters within this document contain the following: (1) Introduction; (2) Intersection Design Concepts; (3) Geometric Design; (4) Signalization; (5) Signs and Markings; and (6) Objects and Amenities.
- [NHI Course FHWA-NHI-380074 Designing and Operating Intersections for Safety](#)  
Through numerous interactive discussions, exercises, and case studies, this course examines various aspects of design and operations and how they affect the safety of an intersection and its various users. The full course contains a total of six modules: Users and Intersections, Diagnostics and Countermeasures, Geometric Design, Unsignalized Intersections, Signalized Intersections, and Case Studies.
- **Crash Reduction Factors Desktop Reference** [[PDF](#) 834 KB]
- **FHWA Report Summaries**

- Roundabouts: An Informational Guide (2000) [[DOC](#) 44 KB]
- Signalized Intersections: Informational Guide (2004) [[DOC](#) 44 KB]
- Innovative Intersection Safety Improvement Strategies and Management Practices - A Domestic Scan (2006) [[DOC](#) 47 KB]
- Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running, An Informational Report (2003) [[DOC](#) 46 KB]
- Field Guide for Inspecting Signalized Intersections to Reduce Red-Light Running (2005) [[DOC](#) 46 KB]
- Red Light Camera Systems Operational Guidelines (2005) [[DOC](#) 44 KB]
- Safety Evaluation of Red-Light Cameras (2005) [[DOC](#) 44 KB]
- Toolbox on Intersection Safety and Design (2004) [[DOC](#) 44 KB]
- Railroad-Highway Grade Crossing Handbook (2007) [[DOC](#) 44 KB]
- [Intersection Safety Issue Briefs, Second Edition](#)

This resource is a series of *Issue Briefs* on various intersection safety-related topics. Many products have developed over the past 5 years to help practitioners evaluate causes of intersection crashes and potential solutions. The issue briefs provide practitioners with a substantial number of references and resources for subsequent review and consideration. The topics that are included within this intersection safety communications kit include:

1. **Introduction**
2. **The National Intersection Safety Problem**
3. **Traffic Control Devices: Uses and Misuses**
4. **Stop Signs**
5. **Signals**
6. **Engineering Countermeasures to Reduce Red-Light Running**
7. **Red-Light Cameras**
8. **Intersection Safety Countermeasures**
9. **Pedestrian Safety**
10. **Older Drivers**
11. **ADA Considerations at Intersections**
12. **Human Factors**
13. **Access Management**
14. **Roundabouts**
15. **Road Safety Audits**
16. **Work Zones**
17. **Resources**

**NCHRP Report 486: Systemwide Impact of Safety and Traffic Operations Design Decisions for 3R Projects** [[PDF](#) 3.85 MB]

Existing knowledge of the safety and traffic-operational effects of geometric improvements has not previously been sufficiently organized and evaluated to assist highway agencies in assessing the trade-offs between these competing goals. TRB *Special Report 214* and the design policies of several states provide general guidelines for improving intersections in 3R projects. In particular, TRB *Special Report 214* recommends that State highway agencies develop consistent procedures and checklists for evaluating intersection improvements on 3R projects.

[National Agenda for Intersection Safety](#)

The National Agenda for Intersection safety was developed as a result of the information, data

and discussions that occurred at the National Intersection Safety Workshop held in Milwaukee, WI on November 14-16, 2001. The National Agenda for Intersection Safety should be viewed as a “living document”, and as such, will be modified periodically based on comments received and actions implemented by transportation and safety agencies.

[Manual on Uniform Traffic Control Devices](#)

[A Policy on Geometric Design of Highways and Streets, 5th Edition](#), *AASHTO Green Book*.

[Sample Intersection Safety Action Plan](#)

This Sample Intersection Safety Action Plan provides guidance, at a state level, on how to identify and systematically deploy cost-effective, publicly acceptable safety strategies that will result in a substantial statewide reduction of intersection fatalities and serious injuries.

[Traffic Control Devices Handbook](#)

The *Traffic Control Devices Handbook* provides guidance and information to implement the provisions of the MUTCD. The objective of the Handbook is to bridge the gap between the MUTCD requirements and field applications. Additional guidance is provided on the new MUTCD requirements to clarify these Manual provisions. ITE, 2001, 521 pp., ISBN No: 0-935403-66-3

**Toolbox on *Intersection Safety* and Design**

This informational report (1) demonstrates practical design measures and tools that will improve *intersection safety*, balanced with intersection operational capacity, (2) provides examples of effective applications, and (3) discusses experiences with innovative solutions. Many of these measures, tools, applications and innovative solutions were presented and discussed during the ITE 2004 Technical Conference and Exhibit, “*Intersection Safety: Achieving Solutions Through Partnerships*.” ITE 2004. ISBN No: 0-935403-91-4.

**Traffic Safety Toolbox: A Primer on Traffic Safety**

The following topics are covered: Safety Management; Traffic Planning; Traffic Control Devices; Tort Liability, Risk Management and Sign Inventory Systems; Geometric Design; One-Way Streets and Reversible Lanes; Roadside Safety; Enforcement; Automated Enforcement of Red Light Running; Infrastructure Maintenance: Traffic Control Devices; Work Zone Traffic Management; Designing for Pedestrians; Bicycling Element; Driver Behavior and Qualification; Traffic Calming; Teaching Safety; Before-After Evaluations in Highway Safety; Statistical Approach to the Analysis of *Intersection Safety*; Safety Improvements and Secondary Roadways; Low-Cost Safety Improvements; Safety Impacts of Roundabouts; Road Safety Audit. ITE, 1999. ISBN 0-935403-43-4

**Driver Attitudes and Behaviors at Intersections and Potential Effectiveness of Engineering Countermeasures**, FHWA-HRT-05-158, March 2006. [[HTML](#), [PDF](#) 289KB]

Research was conducted to provide FHWA with information about key attitudes and behavioral influences in intersection driving performance, perceptual and cognitive bottlenecks, and constraints that can have a negative impact on intersection safety. The research also addresses engineering or educational countermeasures for intersection

safety that have the greatest likely impact on performance and safety. This research includes a task analysis of driver performance at intersections, a literature review on human factors research as it relates to highway infrastructure and focus group discussions that explore driver attitudes and behaviors at intersections.

**Innovative Intersection Safety Improvement Strategies and Management Practices; A Domestic Scan**, FHWA-SA-06-016, September 2006. For a copy, email the FHWA Report Center at [report.center@dot.gov](mailto:report.center@dot.gov); or call 301-577-1321.

A primary objective was to identify and document selected innovative intersection treatments implemented at intersections in the United States and that demonstrate, or have the potential to improve safety at intersections. Another objective was to identify and document selected comprehensive safety processes and procedures that have been implemented by transportation agencies specifically to improve transportation safety. The five locations visited during this scan were: Southeastern, Michigan; North Central, Texas; North Central, Oregon; Charlotte, NC; and West Palm Beach, FL. This report provides a discussion on the successes and challenges to enhancing safety for highway users.

**NCHRP Report 457: Evaluating Intersection Improvements: An Engineering Study Guide**, 2001. [[PDF](#) 3.33 MB]

This is a guide to the engineering study of intersections having operational problems. It describes a process for evaluating the operational effectiveness of various intersection improvements and also shows how capacity analysis and traffic simulation models can be used to assess the operational impacts of those improvements. Junior traffic engineers, especially, will find the guide enhances the decision-making process and can reduce inappropriate traffic control signal installations. The Texas Transportation Institute developed the report for NCHRP.

**Safety Effectiveness of Intersection Left- and Right-Turn Lanes**, FHWA-RD-02-089, July 2002. [[HTML](#), [PDF](#) 1.48 MB]

Report presents results of research that performed a well-designed before-after evaluation of the safety effects of providing left- and right-turn lanes for at-grade intersections. Geometric design, traffic control, traffic volume, and traffic accident data were gathered for a total of 280 improved intersections, as well as 300 similar intersections that were not improved during the study period. The types of improvement projects evaluated included installation of added left-turn lanes, added right-turn lanes, and extension of the length of existing left- or right-turn lanes. An observational before-after evaluation of these projects was performed using several alternative evaluation approaches. The three contrasting approaches to before-after evaluation used were the yoked comparison or matched-pair approach, the comparison group approach, and the empirical Bayes approach. The research not only evaluated the safety effectiveness of left- and right-turn lane improvements, but also compared the performance of these three alternative approaches in making such evaluations. The research developed quantitative safety effectiveness measures for installation design improvements involving added left-turn lanes and added right-turn lanes. The research concluded that the empirical Bayes method provided the most accurate and reliable results.

**TechBrief: Safety Effectiveness of Intersection Left- and Right-Turn Lanes**. [[HTML](#), [PDF](#) 668 KB]

**Validation of Accident Models for Intersections**, May 2005, FHWA-RD-03-037. [[HTML](#), [PDF](#) 1.61 MB]

**[Safety Analyst](#)** is envisioned as a set of software tools used by state and local highway agencies to improve their programming of site-specific highway safety improvements. **Safety Analyst** will incorporate state-of-the-art safety management approaches into computerized analytical tools for guiding the decision-making process to identify safety improvement needs and develop a system wide program of site-specific improvement projects. **Safety Analyst** will have a strong basis in cost-effectiveness analysis.

#### **[Interactive Highway Safety Design Model \(IHSDM\)](#)**

IHSDM is a suite of software analysis tools for evaluating safety and operational effects of geometric design decisions on two-lane rural highways. IHSDM is a decision-support tool. It checks existing or proposed two-lane rural 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. IHSDM currently includes five evaluation modules (Crash Prediction, Design consistency, Intersection Review, Policy Review, and Traffic Analysis). A sixth module (Driver/Vehicle) is under development. The linked Website also provides a library of the research reports documenting their development.

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## Statistical Analysis Resources

- **Statistical Model of At-Grade Intersection Accidents-Addendum**, FHWA-RD-99-094, March 2000. [[PDF](#) 343 KB].
- **Validation of Accident Models for Intersections**, May 2005, FHWA-RD-03-037. [[HTML](#), [PDF](#) 1.61MB].
- **Method for Prioritizing Intersection Improvements**, Washington State Transportation Center (TRAC), January 1997. [[PDF](#) 163 KB].
- **Intersection Decision Support Project Seeks to Prevent Broadside Crashes**. [[HTML](#), [PDF](#) 271 KB].

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## Policy & Guidelines

- **Intersection Collision Avoidance Using ITS Countermeasures Final Report: Performance Guidelines**, September 29, 2000. [[PDF](#) 3.44 MB]

The Intersection Collision Avoidance Using ITS countermeasures program addresses the intersection crash problem and applies technology to prevent or reduce the severity of intersection crashes.

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## Research

### Active Projects

- [\*\*Causal Factors for Intersection Crashes in Northern Virginia\*\*](#)

Start date: 2006/2/1: End date: 2008/12/31

Index Terms: Intersections, Crash injury research, Motor vehicles, Databases, Accident data, Research projects, Northern Virginia

Source Organization: Virginia Transportation Research Council

- [\*\*High-Speed Expressway Intersections Study of Crash Risk Factors\*\*](#)

Start date: 2005/11/1

Source Organization: Iowa State University, Ames

## Recent Projects

- [\*\*FHWA RD&T Intersection Safety\*\*](#)

## State DOT Reports

- **Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects. Final Report**, State of Florida Department of Transportation, April 2005. [[PDF](#) 2.33 MB].
- **Safety Evaluation of Left-Turn Lane Width at Intersections with Opposing Left-Turn Lanes**, University of Nebraska, SPR-PI(03) P554, December 2004. [[PDF](#) 2.53 MB]

## Best Practices Resources

- **Michigan Intersection Safety Strategy and Near-Term Action Plan**. January 2006. [[PDF](#) 294 KB]  
Michigan's intersection crash data parallels the national data. In 2002, the Governor's Traffic Safety Advisory Commission (GTSAC) identified Intersection Safety as one of its three main issues to address. The GTSAC created an Intersection Safety Action Team and using the National Agenda as a guide developed the Michigan Intersection Safety Action Plan (ISAP). Issues and strategies from the National Agenda were carried forward into the Michigan Plan, as well as other issues and strategies not mentioned in the National Plan.
- [\*\*Case Study 5 – Preliminary Design Stage Audit: Route 22/Spring Street Intersection – Upgrade; Westbrook, Maine\*\*](#)