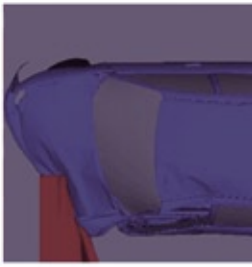
FEDERAL HIGHWAY ADMINISTRATION

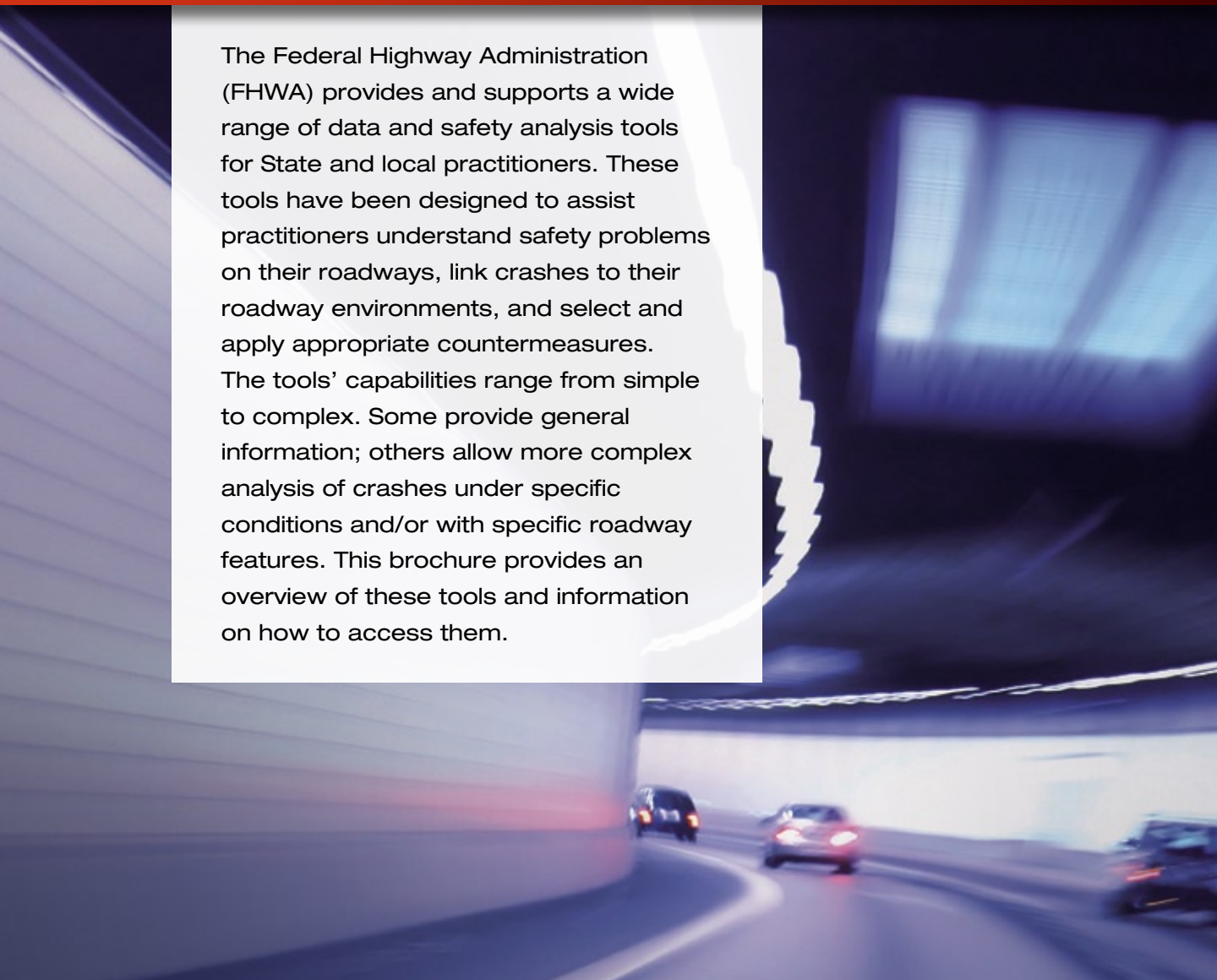
Data and Safety Analysis Tools



U.S. Department of Transportation
Federal Highway Administration

FHWA Data and Safety Analysis Tools

The Federal Highway Administration (FHWA) provides and supports a wide range of data and safety analysis tools for State and local practitioners. These tools have been designed to assist practitioners understand safety problems on their roadways, link crashes to their roadway environments, and select and apply appropriate countermeasures. The tools' capabilities range from simple to complex. Some provide general information; others allow more complex analysis of crashes under specific conditions and/or with specific roadway features. This brochure provides an overview of these tools and information on how to access them.



Data Collection and Management Tools

Model Minimum Inventory of Roadway Elements – MMIRE

Safety data are key elements to sound decisions on the design and operation of roadways. Critical safety data include not only crash information, but also roadway inventory, traffic, driver history, and citation/adjudication data. MMIRE includes a listing of roadway inventory and traffic elements essential to safety management and proposes standardized coding for each.

http://www.mmire.org

Digital Highway Measurement System – DHM

The product of 6 years of research and development by FHWA, DHM is a high-accuracy roadway and roadside data collection vehicle. The DHM vehicle is instrumented with multiple technologies, sensors, and computer analysis capabilities to collect and process raw highway data and produce readily useable, electronic data files. Using information collected on, over, and under the road, DHM enables the user to generate as-built plans, take roadside inventories, and measure pavement surface and subsurface conditions.

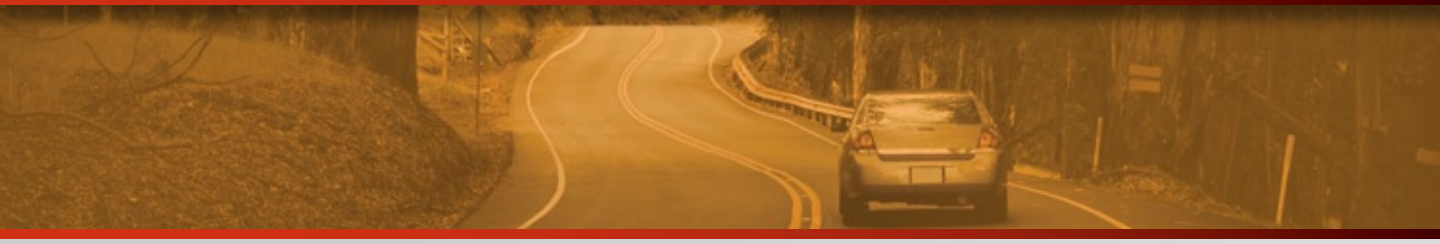
The website is currently under development. For more information, contact Lincoln Cobb, lincoln.cobb@dot.gov.

Highway Safety Information System – HSIS

HSIS is a multi-state database that contains crash, roadway inventory, and traffic volume data for a select group of States. The participating States were selected based on the quality of data available and their ability to merge data from the various files. The HSIS is used to analyze a large number of safety problems, ranging from the more basic "problem identification" issues to modeling efforts that attempt to predict future accidents from roadway characteristics and traffic factors. The HSIS is used in support of the FHWA safety research program and as input to program and policy decisions. The HSIS is also available to analysts conducting research under the National Cooperative Highway Research Program, university researchers, and others involved in the study of highway safety.

http://www.hsisinfo.org

Safety Data Analysis Tools



Highway Safety Manual – HSM

The HSM provides information and tools to assist transportation professionals in making decisions that have a positive impact on highway safety. Focusing on objective measures of safety with a primary emphasis on crash frequency and severity, the HSM includes analytical tools to quantify and predict the safety performance of the variety of elements considered in road planning, design, maintenance, construction, and operation. The HSM also includes a synthesis of validated highway research and procedures that are adapted and integrated into practice.

http://www.highwaysafetymanual.org

Interactive Highway Safety Design Model – IHSDM

IHSDM is a suite of software analysis tools for evaluating the safety and operational effects of geometric design decisions. The current version 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. Future expansion of IHSDM crash prediction capabilities to include rural multilane highways and urban/suburban arterials is planned, to match the 1st Edition Highway Safety Manual. Intended users include highway project managers, designers, and traffic and safety reviewers in State and local highway agencies and engineering consulting firms. IHSDM currently includes five evaluation modules – crash prediction, design consistency, intersection review, policy review, and traffic analysis. A beta version of a sixth module – driver/vehicle – will be included in the 2008 release.

http://www.tfhrc.gov/safety/ihsdm/ihsdm.htm
http://www.ihsdm.org (to download IHSDM software and for access to the new IHSDM Wiki)

FHWA GIS Safety Analysis Tools v.4.0

Computerized crash analysis systems in which crash data, roadway inventory data, and traffic operations data can be merged are used in many state and municipalities to identify problem locations and assess the effectiveness of implemented countermeasures. By integrating this traditional system with a geographical information system (GIS), which offers spatial referencing capabilities and graphical displays, a more effective crash analysis program can be realized. The analysis tools include five separate programs to evaluate crashes: Spot/Intersection Analysis, Strip Analysis, Cluster Analysis, Sliding-Scale Analysis, and Corridor Analysis.

http://www.hsisinfo.org/hsis.cfm?num=8&page=1

Safety Analyst

SafetyAnalyst assists State and local highway agencies to program site-specific highway safety improvements for implementation. It incorporates state-of-the-art safety management approaches in 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. With a strong basis in cost-effectiveness analysis, SafetyAnalyst can play an important role in ensuring that highway agencies receive the greatest possible benefit from each dollar spent on safety.

http://www.safetyanalyst.org

Pedestrian and Bicycle Safety Tools

Pedestrian and Bicycle Crash Analysis Tool – PBCAT

PBCAT is a software application designed to assist State and local pedestrian and bicycle coordinators, planners, and engineers address pedestrian and bicyclist crash problems. PBCAT helps users create a database of details associated with crashes between motor vehicles and pedestrians or bicyclists, analyze the data, produce reports, and select countermeasures to address problems identified.

http://www.walkinginfo.org/facts/pbcat/index.cfm

Pedestrian Safety Guide and Countermeasure Selection System – PEDSAFE

PEDSAFE provides practitioners with the latest information available for improving the safety and mobility of those who walk. This online tool gives users a list of possible engineering, education, and/or enforcement treatments to improve pedestrian safety and/or mobility based on user input about a specific location.

http://www.walkinginfo.org/pedsafe/index.cfm

Bicycle Countermeasure Selection System – BIKESAFE

BIKESAFE provides practitioners with the latest information available for improving the safety and mobility of those who bicycle. BIKESAFE's resources include an overview of bicycling in today's transportation system and information about bicycle crash factors and analysis and selecting and implementing bicycling improvements. BIKESAFE's tools allow users to select appropriate countermeasures or treatments to address specific bicycling objectives or crash problems.

http://www.bicyclinginfo.org/bikesafe

Pedestrian and Bicycle Geographic Information System (GIS) Safety Tools

GIS software turns statistical data (such as accidents) and geographic data (such as roads and crash locations) into meaningful information for spatial analysis and mapping. In this suite of tools, GIS-based analytical techniques have been applied to a series of pedestrian and bicycle safety issues, including safe routes for walking to school, selection of streets for bicycle routes, and high pedestrian crash zones. Users downloading these tools must meet minimum GIS software requirements.

http://www.hsisinfo.org/hsis.cfm?num=9&page=1

Intersection/ Interchange Safety Analysis Tools

Interchange Safety Analysis Tool – ISAT

ISAT provides design and safety engineers with an automated tool for assessing the safety effects of basic geometric design at typical existing interchange and adjacent roadway network. ISAT can also be used to predict the safety performance of design alternatives for new interchanges and prior to reconstruction of existing interchanges. The primary outputs from an analysis include: the number of predicted crashes for the entire interchange area, the number of predicted crashes by interchange element type, the number of predicted crashes by year, and the number of predicted crashes by collision type.

The ISAT user manual is available from http://www.tfhrc.gov/safety/pubs/07045/index.htm. The ISAT tool is available in Excel spreadsheet format. For more information contact Wei Zhang, wei.zhang@dot.gov, or Joe Bared, joe.bared@dot.gov.

Surrogate Safety Assessment Module – SSAM

SSAM is a tool for traffic engineers to perform comparative safety analysis of highway design alternatives using traffic simulation models. The software combines traffic microsimulation and automated conflict analysis. It is designed to be compatible with as many traffic simulation models as possible, such as VISSIM, Paramics, AIMSUN, and TEXAS. SSAM uses the best possible surrogate measures (i.e., most representative of crash propensity) that are observable in simulation models. It also supports flexible analysis (e.g., different aggregations of statistics, different visualization types).

http://www.tfhrc.gov/safety/pubs/08049/index.htm (Techbrief)

Additional SSAM documentation is available in two FHWA reports, which can be found at http://www.tfhrc.gov/safety/intersect.htm.

- Surrogate Safety Assessment Model and Validation: Final Report, FHWA-HRT-08-051.
- Surrogate Safety Assessment Model (SSAM): Software User Manual, FHWA-HRT-08-050.

The SSAM software and open source code is available from Siemens Energy and Automation at http://www.itssiemens.com/research/ssam.

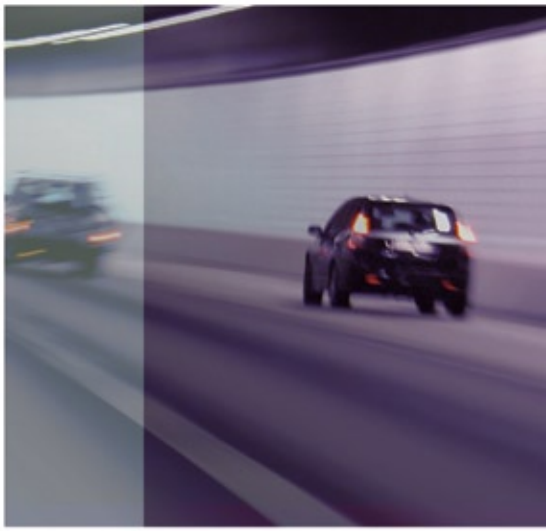
Crash Simulation and Vehicle Dynamics Tools

Finite Element Analysis – FEA

FEA is an efficient and cost-effective tool to assist in the design of safer highway guardrails, bridge supports, sign-posts, and other roadside structures. Roadside safety feature FEA involves analyzing the computer-simulated impact of two bodies – a model of a specific motor vehicle colliding into a model of a specific roadside safety structure. Using FEA, researchers and engineers can study the complex interactions associated with crashes in ways which are not possible using actual crash tests. http://www.tfhrc.gov/safety/crash/index.htm

Vehicle Dynamics Analysis – VDA

VDA, another type of digital simulation, is much less demanding of computer resources than FEA. VDA looks only at the effects of uneven terrain on the trajectory of a vehicle driving over it. For a particular median profile and barrier location, VDA can indicate whether a particular vehicle at a give speed and impact angle is likely to go over the barrier, to underride the barrier, or properly engage the barrier. For more information, contact Ken Opiela, kenneth.opiela@dot.gov.



For more information about data and safety analysis tools, contact:

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Safe Roads for a Safer Future
Investment in roadway safety saves lives

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