Data Support

The Data Team

Kansas Dept. of Health and Environment

Mid-America Regional Council

National Highway Traffic Safety Administration

Kansas Dept. of Transportation

Federal Highway Administration

AAA Allied Group
Data

Introduction

Good crash data are the backbone of road safety management. According to the American Association of State Highway and Transportation Officials, or AASHTO, strategic highway safety plans should improve data collection and, as a result, decision making.

The data support team will provide the emphasis area teams and the Executive Safety Council, or ESC, with the data required to craft an information-based Strategic Highway Safety Plan. The data team will:

- gather and present data to the ESC,
- collect and organize data at the request of other emphasis area teams,
- assist ESC in identifying data gaps, collection and reporting weaknesses,
- assist in deciding whether a need exists for additional emphasis area teams and
- collect data from different agencies represented on the ESC.

The data team was created not only to assist in the mining and presentation of data on behalf of other emphasis area teams but also to develop performance measures, outcomes and strategies specific to data collection, storage, analysis and reporting.

The team, which first met June 15, 2009, is represented by the following agencies:

- AAA Allied Group (AAA)
- Mid-America Regional Council (MARC)
- Federal Highway Administration (FHWA)
- National Highway Traffic Safety Administration (NHTSA)
- Kansas Department of Health and Environment (KDHE)
- Kansas Department of Transportation (KDOT)
- Wichita Area Metropolitan Planning Organization (WAMPO)
Data Collection and Storage

To address highway safety problems requires data of all sorts. There are roads of many kinds with twists and turns, rises and falls. There is an array of vehicles used by drivers young and old, drunk and sober, some with cell phones, some texting, some speeding, some fully attentive. Those who design, construct and maintain the infrastructure work to make it safe. Law enforcement works at managing those who use the infrastructure and emergency services — and are called on when crashes occur. So “crash data” include roadway geometrics, vehicles, drivers, injuries and fatalities, emergency management and more. Because of the complexity of data and the need to keep it secure, it is housed in databases maintained by various agencies. The graphic below reflects this.

Below are thumbnail sketches of these data sources.

- **CANSYS** - State Highway Network Data
  This KDOT database contains information about the geometrics, condition and extent of the 10,000-plus miles of road in the state highway system, as well as a small percentage of off state system local roadways. It contains data on bridges, access permits and at-grade rail crossings and supports the work of various bureaus at KDOT, as well as of the FHWA and Kansas Legislature. CANSYS is maintained by the KDOT Geometric and Accident Data Unit, or GAD.
Traditionally, traffic record data have been housed in isolated repositories. However, in June 2005, an interagency committee, the Traffic Records Coordinating Committee, or TRCC, began developing a statewide traffic records system. The statewide traffic records system will allow state and local agencies to access data by bringing together information that is now housed in KDOT, KDHE, the Kansas Department of Revenue, or KDOR, the Kansas Bureau of Investigation, or KBI and the Kansas Board of Emergency Medical Services, or KBEMS. The result will be a more complete picture of traffic safety in Kansas.

The data team would like to work with the TRCC to promote and expand use of:

- **The Kansas Law Enforcement Reporting System, or KLER**
- **The Electronic Traffic Citation Program, or eCitations**
- **The Report and Police Impaired Drivers System, or RAPID**

Each of these systems are discussed in more detail throughout the plan.

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**NUSYS - Non-State Classified Network Data**

This KDOT database contains information about roads classified as collector and above within the 40 areas in Kansas designated as urban by the U.S. Census Bureau. NUSYS is a central repository of geometric inventory information on off state system local roadways and is used to produce required federal reports. It provides answers to questions posed by the FHWA, Kansas Legislature, KDOT management and employees, and other state agencies. NUSYS is also maintained by GAD.

**KCARS - Kansas Crash & Analysis Reporting System**

KCARS contains records of all reportable crashes in Kansas from 1990 to the present. The data in KCARS are provided to KDOT by law enforcement agencies. The data includes any field that is listed on the Kansas Motor Vehicle Accident Report and recorded by law enforcement. Like CANSYS and NUSYS, KCARS is maintained by GAD and provides answers to questions posed by the FHWA, Kansas Legislature, KDOT management and employees and other state agencies.

**Vital Statistics - Death Certificates**

The Office of Vital Statistics within the KDHE supplies KDOT, at KDOT’s request, with records that permit the coding of fatal crashes. The information helps researchers understand the cause and nature of injuries suffered in crashes, and the time that elapses between injury and death. To query vital statistic data go to: [http://kic.kdhe.state.ks.us/kic/death.html](http://kic.kdhe.state.ks.us/kic/death.html)

**Driver Records**

The Driver Records database is hosted by the Kansas Department of Revenue Division of Motor Vehicles (DMV). It contains the records of all licensed drivers in Kansas. The file depends on many sources. For example, KDOT provides crash records to the database and the court system supplies adjudication information. At this writing, the DMV was revising the database. When the database is finished it will provide those interested in traffic safety with a more complete picture of specific drivers. It is anticipated that this information will improve public safety and maximize the impact of traffic-safety resources.

**eCitations - Statewide Electronic Traffic Citations Program**

The Kansas Criminal Justice Information System (KCJIS) and the Kansas Traffic Records Coordinating Committee (TRCC) have identified the
need for a design and plan for implementing a statewide electronic traffic citations program; commonly referred to as “eCitations”.

Electronic Traffic Citations, or eCitations, are the way of the future for the issuance of traffic citations, the storage of related information, and the dissemination to numerous authorized users. It contemplates a near-paperless, seamless process from the time of the traffic stop through court disposition of the traffic citation. Briefly, the law enforcement officer making the stop records information on the driver and the driver’s vehicle, either through a scanner or manually, into a laptop or handheld computer. Driver and vehicle information is uploaded (populated) into a citation form on the officer’s computer, either from information scanned from the barcodes and/or magnetic stripes on the driver’s license and vehicle registration or an external source such as the KDOT/KDMV, KBI, or NCIC. Time and location information can be imputed through the use of drop down menus, search words, or automatically populated from GPS or other location software. Officer and court information can be populated into the citation automatically from defaults pre-set by the officer at the start of the officer’s shift. This leaves only a few pieces of information to be entered by the officer, such as the violation(s), code number(s), and fine amount(s).

An eCitation system provides a multitude of benefits to each of the agencies identified above and to the public at large including decreasing the time of traffic stops and issuance of traffic tickets, increasing the accuracy of the data collected, eliminating the need for the LEAs, the Courts, and the Prosecutors’ offices to each enter the same citation data into their RMSs, and the automatic collection and analysis of data used to improve public safety and the roadways.

- **RAPID - Report and Police Impaired Drivers**
  
  In 2009, the Kansas DUI Commission, a multi-disciplinary state commission tasked with studying driving under the influence (DUI), recommended the creation of a tracking system to consolidate access to an offender’s DUI history as well as modifications to existing systems to facilitate this tracking.

  The goal of the system to Report and Police Impaired Drivers (RAPID), is to enhance available data sharing mechanisms and make improvements enabling a better and more efficient process for prosecutors, courts and law enforcement to prosecute and track DUI offenders from arrest through prosecution, sentencing, probation and monitoring. This system must leverage existing criminal history repositories at Kansas Bureau of Investigation (KBI), resources available in the Kansas Criminal Justice Information System (KCJIS), and other existing state repositories to deploy a secure web-based system for improving DUI prosecution in the state of Kansas.

- **KLER - Kansas Law Enforcement Reporting System**
  
  The Kansas Highway Patrol (KHP) developed KLER, a field-based reporting system, which incorporates data from more than 15 reports, including KDOT crash forms, KBI incident forms and KDOR insurance forms. Law-enforcement officials use it to complete and view critical records on mobile laptop computers in their cars during traffic and crash stops. Eventually, KLER will include in its records a new statewide uniform traffic e-citation system. To learn more about the KLER System and its benefits, go to [http://portal.kstrs.org/Shared%20Pages/KLER.aspx](http://portal.kstrs.org/Shared%20Pages/KLER.aspx)

  The SHSP data support team would like to work with the TRCC in promoting and expanding use of KLER. The expansion would require additional training and education for law enforcement officers and administrators emphasizing the importance of electronic crash reporting.

- **SafetyNet and KCrash**
The KHP maintains SafetyNet and KCrash for federal reporting purposes and state use. KHP supplies data on inspections and collisions to SafetyNet. SafetyNet was developed, and is supported, by the Federal Motor Carrier Safety Administration (FMCSA). The KHP is the lead agency for state participation in the Motor Carrier Safety Assistance Program, which focuses on roadside inspections. The KHP is also required to document federally reportable collisions. There are three criteria for these: a fatality involving a commercial motor vehicle (CMV); an injury collision involving a CMV that requires immediate medical attention away from the scene; or a collision with a CMV resulting in disabling property damage to at least one unit.

The KCrash program has accelerated the filing of collision reports with FMCSA. It facilitates the electronic filing of SafetyNet reports, in place of paper forms. The KHP receives electronic copies of all collision reports involving a CMV to determine whether they meet federal reporting requirements. Paper copies of collision reports involving a CMV are converted to an electronic format by KDOT. KCrash screens all state highway system crash reports in order to populate the required SafetyNet fields before they are forwarded to FMCSA.

- **Observational Seat Belt Survey and Observational Distracted Driving Survey**
  
  Every year, KDOT Traffic Safety section and its partners collect data across the state on seatbelt usage rates and driver distraction rates.

  **Methodology of Adult Survey** - based on the federal guidelines in the Uniform Criteria manual. The Kansas survey is now performed at 544 sites on 3 different road types in 35 randomly selected counties which encompass 85% of the population of Kansas. The survey is conducted in June and July. The 2011 survey observed more than 65,000 drivers and passengers.

  **Methodology of Child Survey** - based on the guidelines used in the adult survey. The Kansas survey is performed at 350 sites where children are transported (i.e. day cares, department stores, elementary and middle schools) in 20 randomly selected counties which encompass 85% of the population of Kansas. The survey is conducted in March, April and May. The 2011 survey observed more than 19,000 children.


- **Trauma Registry**
  
  The trauma registry system is organized to facilitate a multidisciplinary response to those who suffer trauma related injuries during car crashes or other events. The trauma registry houses data on trauma patients from all Kansas hospitals. The data guide systemic improvements that reduce morbidity and mortality related to traumatic events. Registry data are used by emergency medical service personnel, hospital staff and the KDHE staff to identify injury trends, prioritize needs, and implement and evaluate prevention strategies. For more information on KDHE’s Trauma Program go to: [http://www.kstrauma.org/](http://www.kstrauma.org/)

- **KEMSIS - The Kansas EMS Information System**
  
  KEMSIS is data system that captures the condition of patients and the treatments they receive before they arrive at a hospital. KEMSIS is a voluntary reporting system whose elements mirror those in the National Emergency Medical Service Information System dataset. Services utilize this information for quality improvements, equipment decisions, staffing adjustments, unit locations and treatment modalities. The system also provides an electronic patient care report for hospitals. As of June 2010, 55 emergency medical services and 23 hospitals were filing reports with KEMSIS. For more information, go to: [http://www.ksbems.org/ems/?page_id=1603](http://www.ksbems.org/ems/?page_id=1603)

- **FARS - Fatality Analysis Reporting System**

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Strategic Highway Safety Plan

November 2012
FARS is a database funded by the NHTSA and open to the public on its website. It contains records of all fatal crashes in Kansas. To be included in FARS, a crash must involve a motor vehicle traveling on a trafficway customarily open to the public and result in the death of a vehicle occupant, or of a non-motorist, within 30 days of the crash. The FARS file contains descriptions of each fatal crash reported. Each case has more than 150 coded data elements that characterize the crash, the vehicles and the people involved. To view fatality data, go to 
The Five Percent Solution

KDOT’s approach to reduce the number of fatal or disabling crashes is to start by identifying those stretches of roadways that produce the highest incidence of them.

In 2005, federal legislation, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, or SAFETEA-LU, created the Highway Safety Improvement Program, or HSIP. Its goal was to raise public awareness of highway safety needs and challenges and reduce fatalities and serious injuries. HSIP required Kansas, starting in 2007, to submit an annual report describing no less than 5 percent of its highway system that, according to crash data, was in the greatest need of safety improvement.

<table>
<thead>
<tr>
<th>County</th>
<th>City</th>
<th>Route</th>
<th>Start Location County Reference Post</th>
<th>End Location County Reference Post</th>
<th>Location Description</th>
<th>Site Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bourbon</td>
<td>Fort Scott</td>
<td>US Highway 69</td>
<td>9.797</td>
<td>10.083</td>
<td>US 69 (I-96 &amp; I-240) From 23rd St to W 16th St</td>
<td>Rural Multilane</td>
</tr>
</tbody>
</table>

For KDOT, this Report is more than just a federal requirement, but a useful list of locations across the state that can lead to further traffic studies, road safety audits, and even projects. This list is posted annually on the FHWA’s website and shared with relevant roadway owners.

For the state’s most recent Five Percent Report, issued in 2012, KDOT divided the Report into three sections, each with its own methodology and results: non-state rural routes, segments, and intersections (rural intersections, urban intersection & ramp terminal intersections). The final list includes 16 rural county routes, 84 miles from the state highway system, and 60 intersections.

To view the 2012 Five Percent Report, go to http://safety.fhwa.dot.gov/hsip/fivepercent/
Data Analysis

Two tools are particularly useful for analyzing the data found in state and federal databases.

- **SafetyAnalyst: Network Screening Tool**
  
  KDOT and 20 other state transportation departments pooled funds to develop SafetyAnalyst, a software that can analyze safety data. KDOT and many of its peers are now in the process of implementing the software, which includes a network screening tool, diagnosis tool, countermeasure selection and evaluation tools, economic appraisal tool and priority ranking tool.

  The Network Screening Tool identifies sites with potential for safety improvement. Network-screening algorithms are used to identify locations of the following types of sites with potential for safety improvement:

  - Sites with higher-than-expected accident frequencies which may indicate the presence of safety concerns that are potentially correctable in a cost-effective manner, and
  - Sites whose accident frequencies are not higher than expected, given the traffic volumes and other characteristics present at the site, but which nevertheless experience sufficient numbers of accidents that may potentially be improved in a cost-effective manner.

  In addition, the network screening tool can identify sites with high accident severities and with high proportions of specific accident or collision types. The network screening algorithms focus on identifying spot locations and short roadway segments with potential for safety improvement, but also include the capability to identify extended route segments. Network screening and all other SafetyAnalyst algorithms can consider specific accident severity levels (fatalities and serious injuries, fatalities and all injuries, property-damage-only) or all severity levels combined.

  At this time, SafetyAnalyst can only analyze safety data for the 10,000-plus miles in the state highway system.

- **Local Roadway Analysis**

  This is a method for discovering stretches of road off the state highway system with high crash rates.

  KCARS supplies the data, and KDOT uses an analytical method that’s compatible with the data available. The method has allowed it to rank counties in terms of the number of crashes from 2007 to 2011 on the three rural functional classifications of road outside the state highway system.

  Barriers to a fine-grained analysis of crashes on local roads come from incomplete or inconsistent data. Mapping a crash location requires one of two data points: a linear referencing system (LRS) location or a latitude and longitude. KDOT is responsible for 10,000 miles of state highway. The
Data Support

State system's crash records include LRS data. Many of the 130,000 miles of local roads managed by individual cities, counties and townships lack locational data because they have neither county mile posts nor a geo-coded road inventory.

This results in analytical challenges.

- For the local roads that do not have a local referencing system, KDOT must assign each crash a latitude and longitude manually.
- Through the years, many off-system roads have accumulated multiple names. Different agencies and local residents refer to roads by different names. New roads are added every year, and it's a challenge to maintain a complete inventory.

Despite these barriers, KDOT is producing a list of potential sites for improvement for the annual Five Percent Report: [http://safety.fhwa.dot.gov/hsip/fivepercent/](http://safety.fhwa.dot.gov/hsip/fivepercent/)
Goals and Strategies

The data support team has chosen five goals as the focus of its efforts. It seeks to

1. Coordinate the Data Needs of the Kansas Strategic Highway Safety Plan
2. Improve data analysis capability to better inform decision makers
3. Train those who create, input and utilize crash data
4. Map all crashes statewide using GIS tools
5. Systematic Reporting

The challenge is to identify the strategies that will have the greatest impact on improving the availability, accuracy, and efficiency of data and data analysis.

Goal 1: Coordinate the Data Needs of the Kansas Strategic Highway Safety Plan

New Strategy:

- Identify and analyze outstanding variables related to crashes that occur away from intersections and don’t involve animals, using the Kansas 2010 Five Percent Report
  - Background: KDOT is required by SAFETEA-LU to report annually on the top five percent of state highway miles linked to fatal or serious injury crashes. When the reports from 2007 through 2010, each referencing 1,500 locations, were compared, about 700 locations recurred. Of these 700, 146 do not include an intersection. The crashes at those 146 locations may have resulted from roadway departure. Plans are to analyze those crashes to see whether that’s true.
  - Method: research
  - Costs: none
  - Lead agency and contact: KDOT, Highway Safety Unit
  - Challenges: securing accurate and timely data
  - Target date: ongoing

Future Strategies:

- Link crash data to the trauma registry
- Pursue implementation of a Crash Outcome Data Evaluation System
- Develop a tool that helps local jurisdictions and regional safety coalitions to access and analyze crash data
- Develop a methodology to identify high-frequency crash corridors on local roadways
Goal 2: Improve data analysis capability to better inform decision makers

New Strategies:

- Create an intersection inventory to support crash analysis
  - Background: The FHWA defines an intersection as “a planned point of conflict in the roadway system.” A quarter of all crash fatalities in Kansas occur at intersections, but there is too little data on existing intersections. One problem is that there’s no identification system for individual intersections. Creating unique identifiers for intersections would allow better crash reporting and data collection.
  - The only intersections we have reliably identified and coded are system to system intersections, such as where one state highway intersects another. GIS allows the mapping of intersections, but that information can’t be integrated with other data without a linear referencing system. Such data gaps impede our ability to analyze intersection crashes.
  - GAD has begun identifying and collecting data about specific intersections, using KDOT’s video-log. The goal is to identify and characterize all intersections in terms of more than 25 data elements, including the type of traffic control present at the intersection, the number of legs, directions of travel and pavement type.
  - Method: project
  - Costs: additional staff
  - Lead agency and contact: KDOT, GAD Unit
  - Challenges: ensuring additional staff
  - Target date: fall 2013

- Create a horizontal curve inventory to support crash analysis
  - Background: According to the FHWA, horizontal curves are those that change the alignment or direction of the road (as opposed to vertical curves, which change the slope). More than 25 percent of fatal crashes are associated with a horizontal curve, and the vast majority of these crashes involve roadway departure. The average crash rate for horizontal curves is about three times that of other types of highway segments.
  - However, available data on existing curves is not thorough. As with intersections, the problem is that there’s no identification system for individual curves. Creating unique identifiers for curves would allow better crash reporting.
  - Once curves are identified in this way, data can be collected.
  - All the curves to be identified are part of the state highway system. Data collected include curve location, length, advisory speed (if present) and radius. GIS allows the mapping of curves, but the mapping of curves can’t be integrated with other data without a linear referencing system. Such data gaps impede the ability to analyze crashes at curves.
  - Method: project
  - Costs: additional staff
Lead agency and contact: KDOT, GAD Unit
Challenges: ensuring additional staff
Target Date: fall 2013

Use SafetyAnalyst to couple data analysis with engineering solutions

Background: In addition to SafetyAnalyst's ability to scan the highway system for crash “hot spots” through the Network Screening Tool, SafetyAnalyst, using statistical techniques, can perform detailed crash analysis recommend possible engineering countermeasures for specific locations.

KDOT has begun to use SafetyAnalyst to:
- view detailed site analysis summarizing crash patterns and overrepresented crash variables
- view diagnoses that recommend engineering countermeasures;
- suggest cost/benefit appraisals of proposed countermeasures;
- suggest project prioritization

Method: software
Costs: annual license fees
Lead agency and contact: KDOT, Highway Safety Unit
Challenges: importing, processing and calibrating Kansas crash, roadway and traffic volume data for SafetyAnalyst use
Target date: ongoing

Future Strategies:
- Educate transportation professionals about the Highway Safety Manual published by AASHTO
Goal 3: Train those who create, input and utilize crash data

Current Strategies:

- Continue to provide training to law enforcement on the use and importance of the crash reporting form
- KDOT’s Geometric and Accident Data (GAD) Unit is currently working on:
  - continued enhancements to the Accident Coding Manual
  - continued ad hoc (personal) consultation via phone and email
  - continued communication via Facebook and Twitter concerning accident coding
  - development of a training video
  - continued communication through the quarterly newsletter: http://www.ksdot.org/burtransplan/prodinfo/lawinfo.asp
- Continue to provide training for officials in local government so they can understand and use crash data in their safety-related decision making [See more information in the Local Roads Support Chapter]
- Continue to promote electronic reporting of crash reports at city and county level
  - Approximately 60,000 crash reports are processed annually, with 50% submitted in paper form and 50% submitted electronically. Paper reports, however, require 85% of the resources with electronic requiring 15% of the resources. There are approximately 500 law enforcement agencies in the state, yet at this time only 101 agencies submit reports electronically. While this does not represent 50% of the agencies it is close to being 50% of the reports sent to KDOT.
The TRS estimates the paper reports at $7.25/record and electronic reports at $1.50/record. This means that each electronic submission saves the State of Kansas $5.75. With approximately 30,000 crash reports still being submitted in paper-form each year, the savings for the state and taxpayers are significant.

Parties interested in becoming KLER users or wishing further details are encouraged to contact the following: **KHP IT Helpdesk** at 1-877-317-4597

**Future Strategies:**
- If additional funding were to become available, KDOT would like to offer live training to law enforcement around the state
Goal 4: Map all crashes statewide using GIS tools

Current Strategies:

- Complete geo-coding (assignment of latitude and longitude) of crashes on local roads
  - Background: The GAD Unit at KDOT has been working to geo-code and geo-locate all crashes in Kansas. While CANSYS is able to support the geo-location of crashes on state highways, another method is being developed to geo-code crashes located on non-state highways and locally administered roads. The geo-coding of crashes relies on information provided by crash reports. Unfortunately, at this time, longitude and latitude are not initially captured in crash reports and must be inferred or found indirectly.

At the time this chapter was being written, the geo-coding of crash data for 2004, 2006, 2007 and 2008 was complete. Geo-coding must still be completed for 2005 and 2009 to-date.
Goal 5: Systematic Reporting

Current Strategies:

- Create and post Quarterly Dashboard Report
  - Background: The quarterly Dashboard Report contains year-to-date preliminary (not officially closed out) fatality data for the following quarters:
    - Quarter One: January 1st through March 31st
    - Quarter Two: January 1st through June 30th
    - Quarter Three: January 1st through September 30th
    - Quarter Four (Annual Report): January 1st through December 31st

The annual Dashboard Report contains annual preliminary fatality data from January 1st through December 31st. The Report can also be generated ad-hoc as requested by the Executive Safety Council (ESC).

The Report presents either quarterly or annual fatality counts compared to the previous year. These figures are then further broken down statewide and at the district level by the emphasis areas outlined in the SHSP or as requested by the ESC.

Dashboard Reports can be viewed here: