MDOT
MISSISSIPPI DEPARTMENT OF TRANSPORTATION

January 2014

# Mississippi STRATEGIC HIGHWAY SAFETY PLAN

**Vision: Toward Zero Deaths**

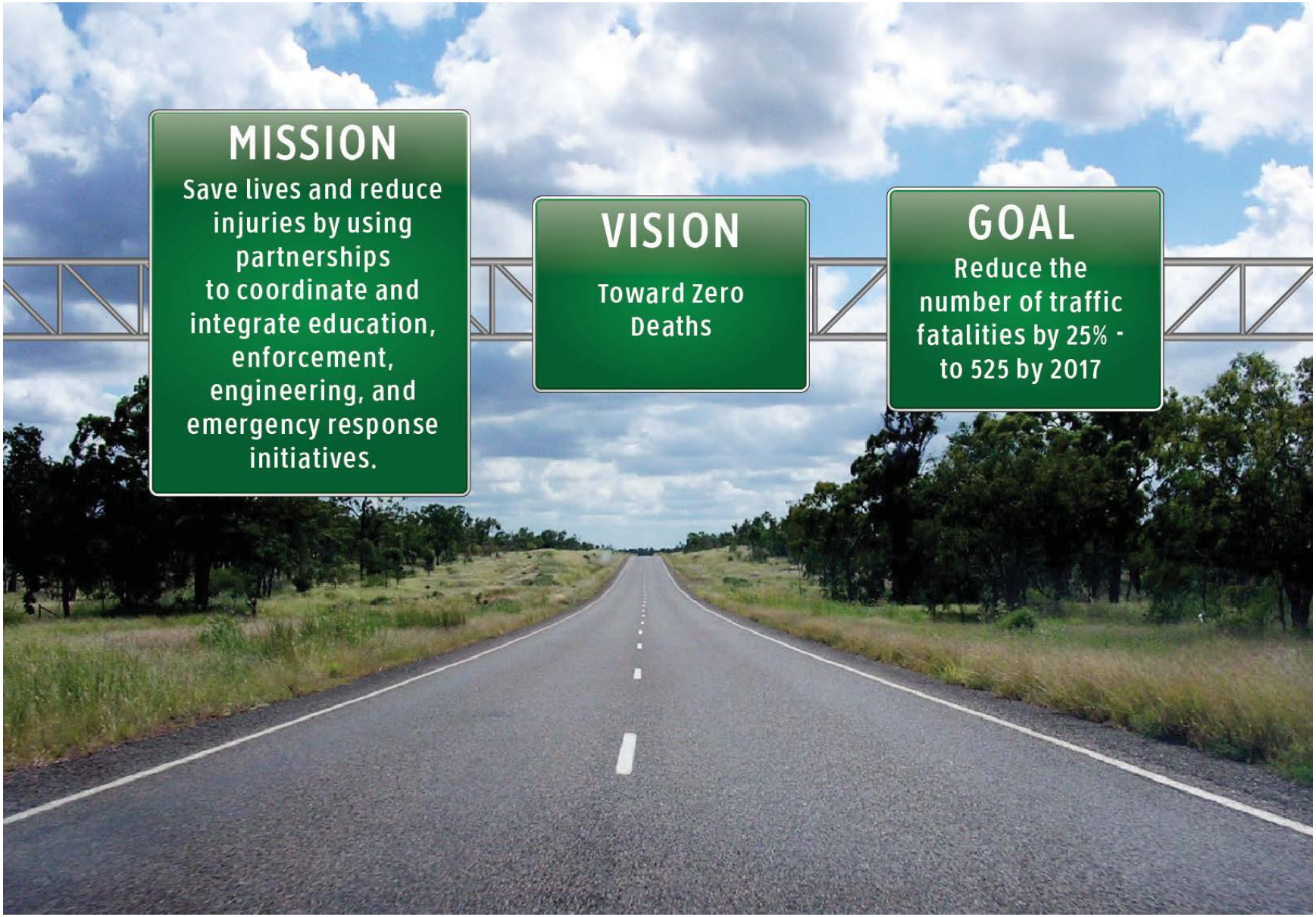
ENFORCEMENT

EDUCATION

ENGINEERING

EMS

TBG0128/214275 4RDD


MISSION
Save lives and reduce injuries by using partnerships to coordinate and integrate education, enforcement, engineering, and emergency response initiatives.
VISION
Toward Zero Deaths
GOAL
Reduce the number of traffic fatalities by 25% - to 525 by 2017

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# Acronyms and Abbreviations

| | |
|---|---|
| 4Es | Engineering, Enforcement, Education, and Emergency Medical Services |
| AASHTO | American Association of State Highway and Transportation Officials |
| ADT | Average Daily Trip |
| CEA | Critical Emphasis Area |
| DUI | Driving Under the Influence |
| EMS | Emergency Medical Services |
| FARS | Fatality Analysis Reporting System |
| FHWA | Federal Highway Administration |
| FMCSA | Federal Motor Carrier Safety Administration |
| GIS | Geographic Information System |
| HSIP | Highway Safety Improvement Program |
| JOL | Judicial Outreach Liaison |
| MADD | Mothers Against Drunk Driving |
| MDOT | Mississippi Department of Transportation |
| MDPS | Mississippi Department of Public Safety |
| MOHS | Mississippi Office of Highway Safety |
| MPH | Miles Per Hour |
| MS | Mississippi |
| NCHRP | National Cooperative Highway Research Program |
| NEMSIS | National EMS Information System |
| OSARC | Office of State Aid Road Construction |
| PI&E | Public Information and Education |
| SAMS | Safety Analysis Management System |
| SHSP | Strategic Highway Safety Plan |
| U.S. | United States |
| VPD | Vehicles Per Day |

# 1 Introduction and Background

## 1.1 SHSP History

Mississippi's 2007 Strategic Highway Safety Plan set a goal of reducing traffic-related fatalities to 700 traffic fatalities by 2011. At the time, this was considered a stretch goal because during the prior study period (2000 to 2007), Mississippi averaged almost 900 traffic fatalities per year and the trend line was flat. The new goal includes reducing annual traffic fatalities by 25 percent by 2017; this translates into 525 or fewer traffic fatalities by 2017. This is an aggressive goal, which even surpasses the national goal of reducing traffic fatalities by half over the next 20 years.

### 1.1.1 2007 Edition SHSP

The 2013 Mississippi Strategic Highway Safety Plan (SHSP) builds on the original SHSP that was completed by the Mississippi Department of Transportation (MDOT) and Mississippi Department of Public Safety (MDPS) in 2007. The result was a two-part SHSP: Volume I (January 2007) identified five critical emphasis areas, and Volume II: Implementation Plan (June 2008) identified 16 critical strategies.

### 1.1.2 Brief History of Mississippi's Highway Safety Investments

Mississippi has a long tradition of investing in all phases of highway safety. Examples of strategies and programs that have been successfully deployed to address safety along the state's highway system include:

**Engineering**

- MDOT has been deploying innovative edge treatments, including rumble stripes; wider edge lines and the use of durable marking materials; paving shoulders; and re-establishing wider clear zones.
- MDOT is performing roadway safety assessments. Typically, these audits were preformed on existing facilities with a noted safety deficiency that can be scheduled for reconstruction in the near future.
- MDOT's Safety Analysis Management System (SAMS) project was initiated in 2004 to design and develop a Web-based, geographic information system (GIS)-enabled application and supporting geospatial data repository a through which crash data can be quickly and easily analyzed. SAMS enhances the ability of MDOT users to perform both basic and advanced analyses of crash data and roadway characteristics. These analyses range from simple query of crashes and visualization of their locations on a map to comprehensive statewide analyses of high-crash locations, identification of possible safety countermeasures, benefit/cost analysis, and tracking countermeasures effectiveness. SAMS is the backbone of the Highway Safety Improvement Program (HSIP).
- The Office of State Aid Road Construction (OSARC) oversees more than 10,000 miles of county highway (about 15 percent of all local roads) construction to American Association of State Highway and Transportation Officials (AASHTO) standards; administers the Local System Bridge Replacement and Rehabilitation Program; uses edge rumble stripes and centerline high-performance raised pavement markers along with thermoplastic striping for improved safety on the county highway system; and

leads annual inspections with a team comprised of the State Aid district engineer, county engineer, and county officials to ensure striping and signing are in place and effective, identify potential roadside hazards, and plan cost-effective, preventive maintenance strategies.

- As an agency separate from MDOT but with strong ties to local highway departments, OSARC is positioned to facilitate any sharing of federal safety with local agencies. Furthermore, OSARC can also provide important assistance in educating local agencies about the new Mississippi SHSP and the priorities established within the Plan.

**Enforcement**

- On May 27, 2006, Mississippi became the 22nd state to adopt a primary safety belt law. The enforced law, coupled with a strong "Click It or Ticket" Public Information and Education (PI&E) campaign, has increased belt usage statewide from 60.8 percent in 2005 to 81 percent in 2010. The seat belt usage rate in 2012 was 83.2 percent.
- The Mississippi Office of Highway Safety (MOHS) funds enforcement activities over six blitz periods each year to conduct Saturation Patrols, Sobriety Checkpoints, and Selective Traffic Enforcement by local enforcement departments and all districts of the Mississippi Highway Patrol. The local departments are selected based on traffic records studies of crashes and citations to ensure that traffic safety activities are data-driven.
- The Federal Motor Carrier Safety Administration (FMCSA) provides grants to the Mississippi Highway Patrol, MDOT Office of Enforcement, and Mississippi Department of Revenue to conduct activities to reduce the number of commercial vehicle collisions on Mississippi's roadways. The specific activities and locations are chosen by the agencies based on the location of inspection facilities as well as commercial vehicle crash data information from the FARS system.

**Education**

- "The "Drive Sober or Get Pulled Over" PI&E campaign to address driving under the influence (DUI) has been successful in increasing DUI arrests statewide since 2006, particularly for offenders under 21. Mississippi has a strong zero-tolerance statute aimed at underage drinking and has a grant-funded DUI court-monitoring system with the Mississippi chapter of Mothers Against Drunk Driving (MADD). The percentage of traffic fatalities identified as alcohol-related in Mississippi has dropped each of the past 5 years and now stands at 35 percent.
- The MOHS is in the process of creating a Judicial Outreach Liaison (JOL) program and hiring a full-time position through grant funding to help educate judges across the state regarding impaired-driving issues.

| | |
|---|---|
| **Emergency Medical Services (EMS)** | • Statewide Trauma System has been established.<br>• Linking data between EMS, enforcement agencies, ambulance services, emergency departments, and hospitals to produce crash-outcome studies.<br>• Ensure the EMS management information system maintains the National EMS Information System (NEMSIS) Standards.<br>• Coordinated with providers of air medical services, which has resulted in establishing nine bases around the state. |
| **Data** | • Mississippi has made recent investment into data systems technology (ReportBeam and SAMS) to greatly improve data accuracy and timeliness as well as analysis capabilities. |

The 2007 SHSP set a goal to reduce the number of traffic fatalities to 700 by 2011. The implementation of these (and other) safety strategies has resulted in Mississippi meeting its goal in 2009.

## 1.2 SHSP Process

Similar to the Mississippi SHSP completed in 2007, this update of the SHSP:

- Addresses the frequency, rate and primary factors contributing to fatalities and life-changing (Type A) injuries on all roads in Mississippi, including High Risk Rural Roads, which are defined as a roadway functionally classified as a rural major or minor collector or a rural local road with significant safety risks. The process of determining these safety risks are similar to the processes and procedures used to determine safety risks on the state highway system. Requirements set forth in the Moving Ahead for Progress in the 21st Century Act (MAP-21) mandates the state to specifically track fatal and serious injuries on rural roads. This tracking is reported each year in the State's HSIP Report
- Is consistent with Federal Highway Administration (FHWA) procedural guidance
- Establishes a mission, vision, and goal for all safety partners in the State of Mississippi
- Incorporates input provided by safety partners representing national, state, and local agencies; and private safety advocacy groups
- Follows a data driven process that considers all users on all roads
- Provides a guide for future safety investments
- Addresses the 4Es of safety (engineering, enforcement, education, and emergency medical services)

Figure 1-1 shows the process used to develop the Mississippi SHSP. Beginning with the crash analysis and concluding with the SHSP report, this approach is the culmination of more than a year of working with the MDOT and its safety partners.

FIGURE 1-1
**Mississippi SHSP Update Development Process**

## 1.3 Partners

The 2013 Mississippi SHSP was developed through coordination with a variety of stakeholders from public and private agencies. Stakeholders outside of the traditional safety planning process (such as planning organizations, non-profit agencies, universities, and cities) were included when countermeasures were developed to address specific safety issues. Individuals representing the 4Es were also invited to participate in the SHSP process. Those representing other modes of transportation—bicycle, pedestrian, commercial vehicles, motorcycles, etc.—were also asked to participate. The complete list of safety partners who participated in development of the SHSP are shown in Table 1-1.

TABLE 1-1
**Mississippi Safety Partners**

| | |
|---|---|
| Office of the Lieutenant Governor | Mississippi Sheriffs' Association |
| Office of the Attorney General | Harrison County Sheriff's Office |
| Office of the Speaker of the House | Hinds County Sheriff's Office |
| State Legislators | Warren County Sheriff's Office |
| Mississippi Department of Transportation | Panola County Sheriff's Office |
| Mississippi Department of Public Safety (including Planning and State Patrol) | Mississippi Police Chiefs' Association |
| Mississippi Department of Health | Meridian Police Department |

TABLE 1-1
**Mississippi Safety Partners**

| | |
|---|---|
| Mississippi Department of Mental Health | Pearl Police Department |
| Mississippi Department of Education | Oxford Police Department |
| Mississippi Department of Vocational Rehabilitation | Mississippi Judicial College |
| Governor's Office of Highway Safety | Mississippi Association of Supervisors |
| Mississippi Office of State Aid Road Construction | County Supervisors |
| Central Mississippi Planning and Development District | Panola County Road Department |
| Federal Highway Administration | Harrison County Road Department |
| National Highway Traffic Safety Administration | Mississippi Municipal League |
| Federal Motor Carrier Safety Administration | City of Ridgeland |
| Mississippi Trucking Association | City of Jackson |
| Mothers Against Drunk Driving | Metropolitan Planning Organizations |
| American Automobile Association (AAA) | Mississippi Road Builders Association |
| AAA Ambulance Services | Mississippi Association of Highway Safety Leaders |
| American Traffic Safety Services Association | Mississippi Emergency Medical Association |
| Mississippi Operation Lifesaver | Mississippi Brain Injury Association |
| Mississippi Safe Kids | American Academy of Pediatrics |
| University of Southern Mississippi | Mississippi Center for Technology Transfer |
| Mississippi State University—Social Science Research Center | Mississippi State University—Center for Advanced Vehicular Systems |
| Mississippi Historically Black Colleges and Universities (HBCUs) | K & J Foundation |
| Moto-Steps-Motorcycle Awareness | MAC-Motorcycle Awareness Campaign |
| DREAM | Alcohol Services |
| American Railroad Association | Mississippi Center for Technology Transfer |
| Mississippi Judicial College | Mississippi Municipal League |
| Mississippi Operation Lifesavers | Sobriety Trained Officers Representing Mississippi (STORM) |
| Mississippi Law Enforcement Liaison Program | |

## 1.4 National Context – Renewed Focus on Severe Crashes

The FHWA and AASHTO have placed a renewed focus on the most severe crashes—those crashes resulting in a fatality and/or life-changing injuries—using a data-driven process. The agencies have also placed a renewed emphasis on the 4Es.

The FHWA and AASHTO have set a goal to reduce the number of traffic fatalities by half over the next 20 years. The FHWA has determined that this goal will only be reached if they partner with individual states. Partnering will lead to more successful project implementation and result in programs that target the factors that contribute to the greatest number of severe crashes.

### 1.4.1 AASHTO's Strategic Highway Safety Plan and Critical Emphasis Areas

AASHTO published a nationally focused SHSP in 1997, which was updated in 2004. This national SHSP focused on 22 specific highway safety challenges, or emphasis areas, that are divided into the following six parts or categories (Table 1-2):

1. Drivers
2. Special Users
3. Vehicles
4. Highways
5. Emergency Services
6. Management

TABLE 1-2
AASHTO Strategic Highway Safety Plan's 22 Emphasis Areas

| | |
|---|---|
| **Part 1: Drivers**<br>1. Instituting Graduated Licensing for Young Drivers<br>2. Ensuring Drivers are Licensed and Fully Competent<br>3. Sustaining Proficiency in Older Drivers<br>4. Curbing Aggressive Driving<br>5. Reducing Impaired Driving<br>6. Keeping Drivers Alert<br>7. Increasing Driver Safety Awareness<br>8. Increasing Seat Belt Usage and Improving Airbag Effectiveness | **Part 4: Highways**<br>14. Reducing Vehicle-Train Crashes<br>15. Keeping Vehicles on the Roadway<br>16. Minimizing the Consequences of Leaving the Road<br>17. Improving the Design and Operation of Highway Intersections<br>18. Reducing Head-On and Across-Median Crashes<br>19. Designing Safer Work Zones |
| **Part 2: Special Users**<br>9. Make Walking and Street Crossing Safe<br>10. Ensuring Safer Bicycle Travel | **Part 5: Emergency Medical Services**<br>20. Enhancing Emergency Medical Capabilities to Increase Survivability |
| **Part 3: Vehicles**<br>11. Improving Motorcycle Safety and Increasing Motorcycle Awareness<br>12. Making Truck Travel Safer<br>13. Increasing Safety Enhancements in Vehicles | **Part 6: Management**<br>21. Improving Information and Decision Support Systems<br>22. Creating More Effective Processes and Safety Management Systems |

Source: *AASHTO Strategic Highway Safety Plan*, 1997 and 2004

The AASHTO SHSP noted that individual state efforts had not effectively lowered the number of fatal crashes and that state efforts were not focused on the primary causes of fatal crashes. Many state projects that were being implemented were not based on the results of a data-driven process that linked crash causation to effective mitigation strategies. The SHSP recommended developing a safety programming process that included disaggregation of system-wide crash data into the 22 emphasis areas.

Disaggregating crash data helps identify safety priorities based on crash analysis of a highway agency's transportation system. This step also reduces the universe of safety strategies to only those associated with the most common types of crashes occurring on an agency's transportation system. Finally, crash data disaggregation and identification of emphasis areas helps agencies to select the most effective strategies for reducing crashes and to determine where limited funds should be invested to have the most positive impact. For the disaggregation of Mississippi crash data, see Table 2-1.

# 2 Critical Emphasis Areas

## 2.1 Crash Data Overview

### 2.1.1 National and State Context—Traffic Fatalities

Fatal and life-changing injury (severe) crashes are a major public health issue in the United States. In 2010, latest estimates show 32,855 people were killed in traffic crashes—an average of 90 people killed every day, with an additional 2.5 million people injured.

From a peak of 54,589 fatalities in 1972, there has been a trend of significant reductions in traffic-related fatalities in the U.S. (Figure 2-1). This trend was interrupted between the early 1990s and early 2000s as traffic fatalities began to increase. However, since the mid-2000s, traffic fatalities have decreased dramatically, to the lowest number of fatalities in recent history—32,855—recorded in 2010.

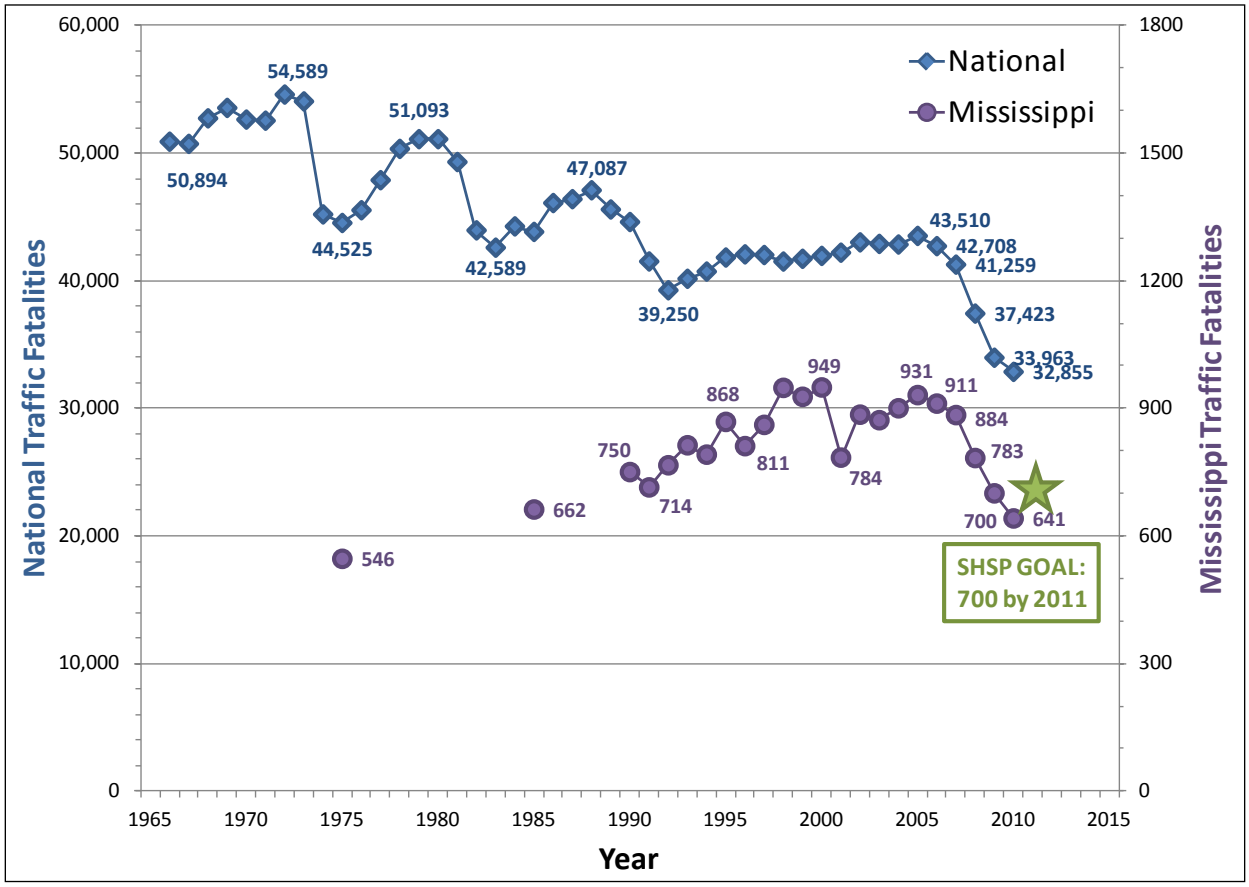


FIGURE 2-1
**Historic Number of Fatalities—National and Mississippi**

### 2.1.2 Mississippi's Safety Planning Efforts and Goal

Since the early 1990s, Mississippi has followed the national trend relative to the numbers of traffic-related fatalities. As shown in Figure 2-1, the number of traffic fatalities in Mississippi grew steadily until 2005. Mississippi traffic fatalities peaked at 949 in 2000, dropped dramatically to 784 in 2001, and then

climbed to 931 fatalities by 2005. However, between 2005 and 2010, traffic fatalities in the state dropped every year, to a low of 641 in 2010; a 31-percent reduction in traffic fatalities in 6 years.

The original, 2007 Mississippi SHSP included a goal of reducing traffic fatalities to 700 or fewer by 2011. Figure 2-1 shows that the state's goal was met 2 years early in 2009. Figure 2-2 shows the achievement of the original Mississippi SHSP goal as well as the new goal. ***The new goal includes reducing annual traffic fatalities by 25 percent by 2017; this translates into 525 or fewer traffic fatalities by 2017.*** This is an aggressive goal, which even surpasses the national goal of reducing traffic fatalities by half over the next 20 years.

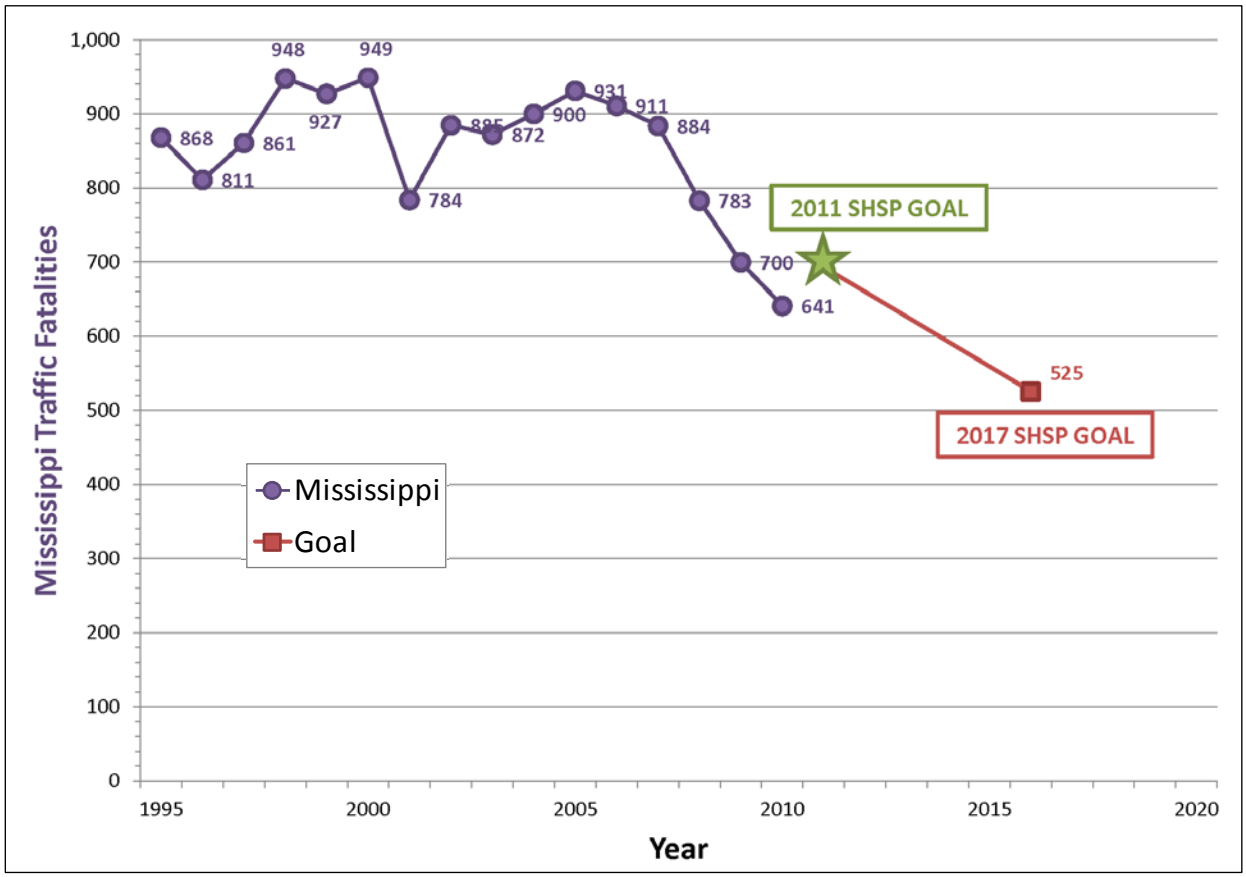


FIGURE 2-2
**Current Mississippi SHSP Safety Goal**

## 2.1.3 Data Overview—Severe Crashes on Mississippi's Roads

There are 74,883 miles of public streets and roadways in Mississippi, of which 10,984 MDOT-maintained miles make up the designated state highway system. According to detailed analysis, it was determined that 58 percent of the statewide traffic fatalities occur on the state system, making roads under the state's jurisdiction the most at-risk part of Mississippi's entire roadway system. Even though fatal crashes predominantly occur on state roads, Mississippi understands the importance of creating a SHSP that covers the safety of all road users on all roads in the state.

### Mississippi's State Highway Critical Emphasis Areas

Mississippi's crash data for severe crashes was analyzed and then disaggregated into AASHTO's critical emphasis areas (summarized in Table 1-2). This analysis identified the number of severe crashes in each critical emphasis area (CEA), along with the percentage represented of the total number of crashes (Table 2-1). Based on the results shown in Table 2-1, the top CEAs for Mississippi are as follows:

- Unbelted Drivers
- Impaired Drivers
- Unlicensed Drivers
- Road Departure Crashes
- Intersection Crashes

The key conclusion is that a focus on these safety emphasis areas represents the greatest potential to significantly reduce the number of severe crashes throughout Mississippi.

## 2.1.4 State of Mississippi Detailed Crash Overview

A more detailed analysis of fatal and severe injury crashes was conducted to provide a complete overview of the highway related crash types that represent both the greatest need for safety investment as well as the greatest opportunity to reduce crashes. This analysis was completed using data from SAMS.

The data used for this analysis consisted of 5 years (2005 to 2009) of crash records, which includes 6,677 severe crashes.[1] The data shows that Mississippi averages approximately 1,335 severe crashes per year on all roads—the majority of these crashes occurred on the state's roadway system (68 percent, or approximately 780 severe crashes per year) and in rural areas (77 percent, or approximately 600 severe crashes per year).

A more detailed description of the characteristics associated with each of the CEAs is provided in the following sections and the historic trend lines are documented in Figures 2-3 and 2-4.

### Driver Behavior Emphasis Areas

**Seat Belts.** Between 2005 and 2009, there were 2,448 traffic fatalities involving unbelted drivers and vehicle occupants—an average of 490 fatalities per year. On May 27, 2006, Mississippi became the 22nd state to implement a primary safety belt law. Since passage of this law, the safety belt usage rate in Mississippi has risen from an average of 62 percent prior to the law to an average of 75 percent after (including an 81 percent usage rate in 2010, which is a 5-point increase over 2009; the seat belt usage rate for 2012 was 83.2 percent).

In addition to an increase in safety belt usage rate, the annual number of traffic fatalities associated with unbelted drivers and occupants has continued to drop over the same period. In the 3 years prior to passage of the law, there was an average of 560 fatalities per year. In the 3 years following passage of the primary seat belt law, the average dropped to 440 unbelted fatalities per year (including a low of 380 unbelted fatalities in 2009), a decrease of more than 20 percent. However, 62.4 percent of people killed in traffic crashes in Mississippi are unbelted.

[1] Ideally, a safety analysis will include as many years as necessary to produce a data set that will provide statistically reliable results. Including more than 1 year of data in safety analyses reduces the possibility of examining a year that is unusual; using too many past years introduces the possibility of including locations where conditions may have changed (for example, reconstructed roads, addition of STOP signs, changed speed limits, etc.). A data set covering 5 years with over 6,600 crashes is sufficient to provide a desired level of statistical reliability.

TABLE 2-1
Mississippi Fatal and Severe Crashes by AASHTO Emphasis Areas, Based on Crash Data Analysis (2005 to 2009)

| Emphasis Area | | State (All Roads) | | State Roads (Interstate, U.S., Mississippi) | | County Roads | | City Streets | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Percent | No. | Percent | No. | Percent | No. | Percent | No. | Percent | No. |
| **Drivers** | Young drivers (under 21) | 17% | 1,122 | 15% | 578 | 21% | 376 | 18% | 153 | 14% | 15 |
| | Unlicensed drivers | 22% | 1,468 | 21% | 813 | 24% | 428 | 24% | 207 | 18% | 20 |
| | Older drivers (over 64) | 12% | 773 | 14% | 534 | 7% | 127 | 12% | 105 | 6% | 7 |
| | Aggressive driving and speeding-related | 16% | 1,053 | 13% | 515 | 21% | 381 | 16% | 144 | 12% | 13 |
| | Drug- and alcohol-related | 35% | 2,337 | 37% | 1,425 | 35% | 628 | 29% | 249 | 32% | 35 |
| | Inattentive, distracted, asleep drivers | 3% | 196 | 4% | 148 | 2% | 29 | 2% | 16 | 3% | 3 |
| | Safety awareness[1] | – | – | – | – | – | – | – | – | – | – |
| | Unbelted vehicle occupants[1,2] | 69% | 2,672 | – | – | – | – | – | – | – | – |
| **Special Users** | Pedestrians crashes | 6% | 380 | 5% | 201 | 2% | 42 | 13% | 117 | 18% | 20 |
| | Bicycle crashes | 1% | 56 | 1% | 21 | 1% | 13 | 3% | 22 | 0% | 0 |
| **Vehicles** | Motorcycles crashes | 7% | 446 | 6% | 219 | 7% | 134 | 10% | 85 | 7% | 8 |
| | Heavy vehicle crashes | 10% | 697 | 15% | 565 | 4% | 77 | 5% | 48 | 6% | 7 |
| | Safety enhancements[1] | – | – | – | – | – | – | – | – | – | – |
| **Highways** | Train-vehicle collisions | 1% | 38 | 0% | 7 | 1% | 10 | 2% | 15 | 6% | 6 |
| | Road departure crashes | 50% | 3,330 | 46% | 1,776 | 66% | 1,192 | 36% | 311 | 47% | 51 |
| | *Consequences of leaving the road (a subset of road-departure crashes)* | *11%* | *753* | *6%* | *226* | *21%* | *372* | *15%* | *132* | *21%* | *23* |
| | Head-on and sideswipe-opposing crashes | 11% | 729 | 11% | 436 | 10% | 179 | 13% | 111 | 3% | 3 |
| | Lane-Departure Subtotal = road-departure and head-on/ sideswipe-opposing crashes | 61% | 4,059 | 57% | 2,212 | 76% | 1,371 | 49% | 422 | 50% | 54 |
| | Intersection crashes | 24% | 1,606 | 63% | 1,013 | 14% | 256 | 37% | 324 | 12% | 13 |
| | Work zone crashes | 2% | 120 | 2% | 94 | 1% | 15 | 1% | 11 | 0% | 0 |

TABLE 2-1
Mississippi Fatal and Severe Crashes by AASHTO Emphasis Areas, Based on Crash Data Analysis (2005 to 2009)

| Emphasis Area | | State (All Roads) | | State Roads (Interstate, U.S., Mississippi) | | County Roads | | City Streets | | Other | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Percent | No. | Percent | No. | Percent | No. | Percent | No. | Percent | No. |
| **EMS** | Enhancing emergency capabilities[1] | – | – | – | – | – | – | – | – | – | – |
| **Management** | Information and decision support systems[1] | – | – | – | – | – | – | – | – | – | – |
| | More effective processes[1] | – | – | – | – | – | – | – | – | – | – |
| **Total Severe (Fatal and Life-Changing Injury) Crashes** | | **6,677** | | **3,888** | | **1,807** | | **873** | | **109** | |

Notes:

[1] The Mississippi crash data records do not contain fields that allowed the identification of related severe crashes for this emphasis area.

[2] Unbelted vehicles occupants data from the Fatality Analysis Reporting System (FARS) Encyclopedia.

Top 5 critical emphasis areas by jurisdiction.

Numbers in this table do not add up to total crash numbers because one crash may be categorized into multiple emphasis areas. For example, one crash may involve a young driver at an intersection and therefore be included in both of these emphasis areas.

The top five in each category were chosen. Due to rounding, numbers in dissimilar categories may appear to be the same.

Source: Mississippi crash data records, 2005 to 2009

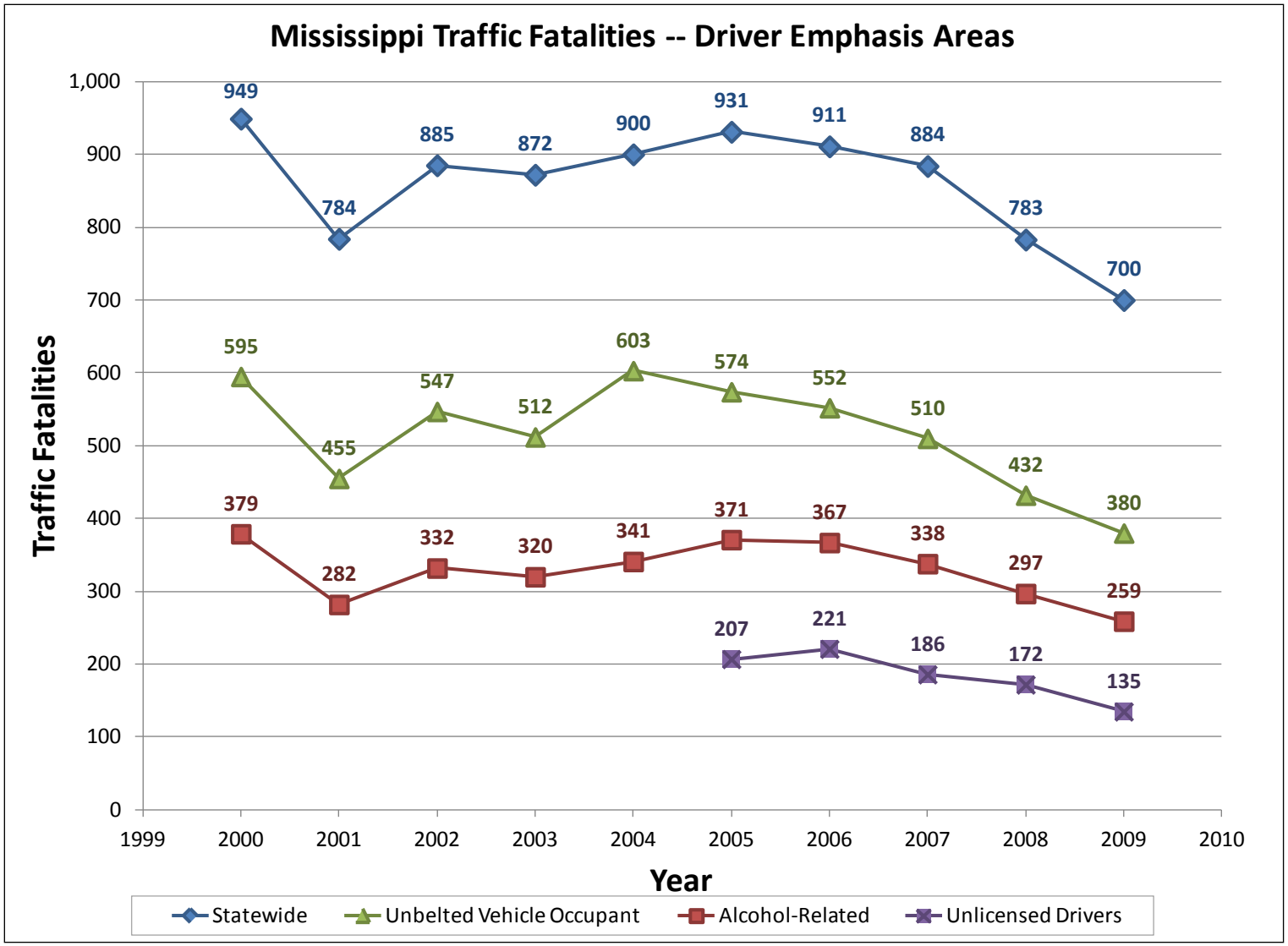


FIGURE 2-3
**Mississippi Traffic Fatalities by Driver Emphasis Areas—Trends**
*Note: "Unlicensed Drivers" includes expired, no license, improper driver's license, suspended, and suspended-DUI.*

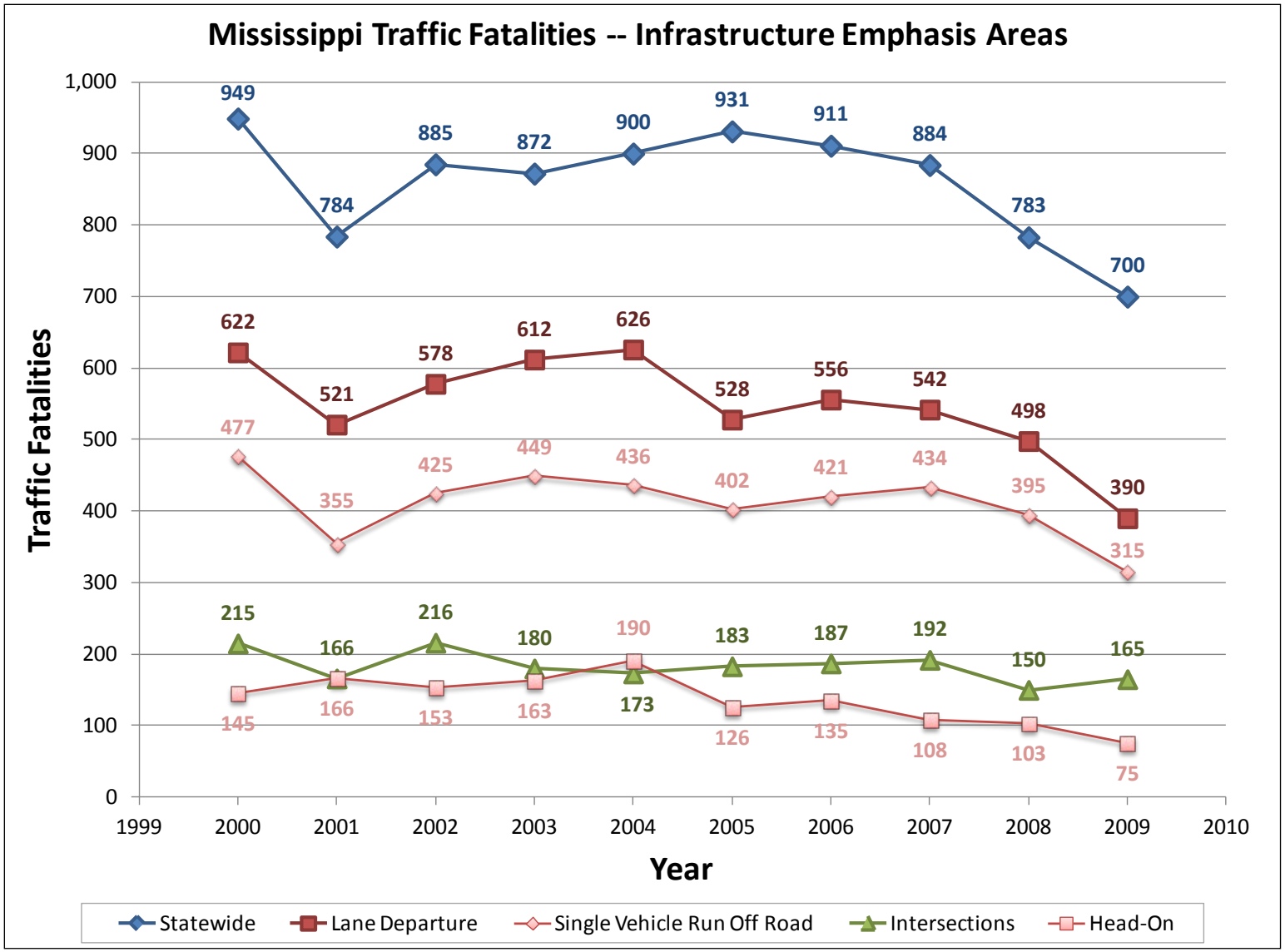


FIGURE 2-4
Mississippi Traffic Fatalities by Infrastructure Emphasis Areas—Trends

**Alcohol and Drugs.** Between 2005 and 2009, 2,337 severe crashes involving drivers under the influence of alcohol or drugs occurred on Mississippi roadways; this accounts for 35 percent of all severe crashes in the state during the same period. Alcohol-related crashes resulted in 1,632 fatalities, which is an average of 326 fatalities per year, or 39 percent of all traffic fatalities during the 5 years from 2005 to 2009.

Key facts associated with the severe alcohol- and drug-related crashes include the following:

- 1,554 severe crashes (66 percent) occurred in rural areas.
- 1,425 severe crashes (61 percent) involving alcohol or drugs occurred on state highways—on a combination of rural and urban roadways. The second-highest number of severe crashes (628 crashes, or 27 percent) occurred on county roads. Only 12 percent occurred on city streets (Table 2-2).
- Road surface conditions are not a significant factor—86 percent of these crashes occurred on dry pavement.
- 58 percent of severe alcohol- and drug-related crashes occurred during nighttime driving conditions.)

TABLE 2-2
**Severe Crashes Involving Drivers Impaired by Alcohol or Drugs by Roadway Classification and Rural or Urban Area (2005 to 2009)**

| Roadway Classification | Rural | Urban |
|---|---|---|
| State Highways | 1,080 | 345 |
| County Roads | 438 | 190 |
| City Streets | 29 | 219 |
| Other | 7 | 29 |
| Total by Area Type | 1,554 | 783 |

Note:
The information in this table is based on information in the Mississippi Crash Record System.

**Unlicensed or Suspended Licensed Drivers.** Between 2005 and 2009, 1,468 severe crashes involving unlicensed drivers or drivers with a suspended license occurred on Mississippi roadways. This number accounts for 22 percent of all severe crashes in the state during the same period. Fatal crashes involving a driver with no license or a suspended license resulted in 921 fatalities, which is an average of 184 fatalities per year.

Key facts associated with severe unlicensed-driver crashes include:

- 985 severe unlicensed-driver crashes (67 percent) occurred in rural areas.
- More than half of severe unlicensed-driver crashes (813 crashes, or 55 percent) occurred on state highways—on a combination of rural and urban roadways. The second highest number of severe crashes (428 crashes, or 29 percent) occurred on county roads. Only 14 percent of the crashes occurred on city streets.
- Road surface condition is not a significant factor—86 percent of these crashes occurred on dry pavement.

## Highway Emphasis Areas

The severe lane-departure and intersection crashes on the state highway system are detailed in Figure 2-5.

**Lane Departure Crashes.** Between 2005 and 2009, there were 4,049 severe lane-departure crashes, including:

- 3,330 road-departure crashes
- 570 head-on crashes
- 159 sideswipe crashes

These crashes resulted in 2,514 fatalities—an average of 503 fatalities (47 percent) per year of all traffic fatalities during the 5-year study period. These crashes are divided as follows:

- 1,967 road departure fatalities
- 470 head-on fatalities
- 77 sideswipe fatalities

Key facts associated with severe lane-departure crashes include the following:

- Severe lane-departure crashes occurred primarily in rural areas (67 percent).
- 1,800 severe lane-departure crashes (44 percent) took place on rural state highways. 54 percent of severe lane-departure crashes were on state highways. County roads had the next-highest number of severe lane-departure crashes, at nearly 34 percent (Table 2-3).
- 1,193 severe lane-departure crashes (29 percent) occurred on a horizontal curve.
- 77 percent of severe lane-departure crashes occurred on roads with speed limits between 45 miles per hour (mph) and 60 mph.
- Road surface condition was not a significant factor—85 percent of these crashes occurred on dry pavement.
- 49 percent of severe lane-departure crashes occurred during nighttime driving conditions.

TABLE 2-3
**Severe Lane-Departure Crashes by Roadway Classification and Rural or Urban Area (2005 to 2009)**

| Roadway Classification | Rural | Urban |
|---|---|---|
| State Highways | 1,800 | 412 |
| County Roads | 903 | 468 |
| City Streets | 410 | 12 |
| Other | 5 | 49 |
| Total by Area Type | 2,720 | 1,339 |

Note:
The information in this table is based on information in the Mississippi Crash Record System.

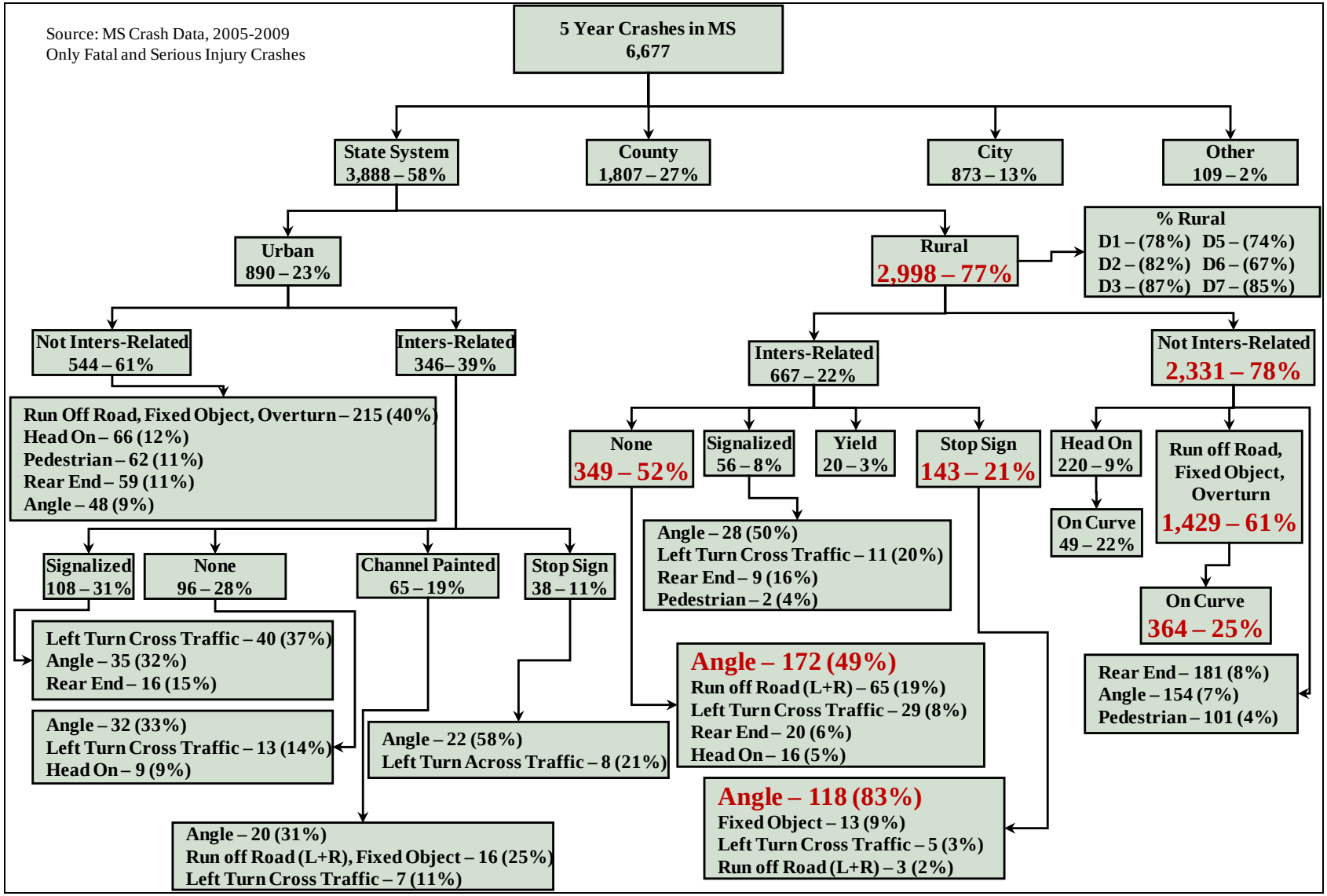


FIGURE 2-5
Mississippi Crash Data Overview

**Intersections.** Between 2005 and 2009, 1,606 severe crashes occurred at an intersection on Mississippi roadways. This accounts for 24 percent of all severe crashes in the state during the same period. Intersection crashes resulted in 877 fatalities, which is an average of 175 fatalities per year (21 percent) of the traffic fatalities during the 5-year period.

Key facts associated with severe intersection crashes include the following:

- Severe crashes at intersections occurred more frequently in rural areas (57 percent) than in urban areas (43 percent).
- The most common crash type at both stop- and signal-controlled intersections is right angle.
- Road surface condition was not a significant factor—88 percent of these crashes occurred on dry pavement.
- 43 percent of severe intersection crashes occurred during nighttime driving conditions.
- 1,013 severe intersection crashes (63 percent) occurred on state highways—in both rural and urban areas (Table 2-4). Rural state highways accounted for the greatest number of severe intersection crashes (667 crashes, or 42 percent)
- 779 severe intersection crashes (49 percent) occurred on two-lane highways. Another 559 severe crashes (35 percent) occurred on divided four-lane highways.
- 67 percent of severe intersection crashes occurred on roadways with a speed limit between 45 mph and 60 mph.
- Where traffic control type was reported, severe intersection crashes were fairly evenly split between stop/yield-controlled intersections (20 percent) and traffic signal-controlled intersections (15 percent). (It should be noted that reporting accuracy might be an issue—over 40 percent of intersection crashes were reported as occurring at uncontrolled intersections).

TABLE 2-4
**Severe Intersection Crashes by Roadway Classification and Rural or Urban Area (2005 to 2009)**

| Roadway Classification | Rural | Urban |
|---|---|---|
| State Highways | 667 | 346 |
| County Roads | 180 | 76 |
| City Streets | 70 | 254 |
| Other | 4 | 9 |
| Total by Area Type | 921 | 685 |

Note:
The information in this table is based on information in the Mississippi Crash Record System.

## 2.1.5 Distracted Driving and Data Improvements

Recently, there has been a nationwide focus to raise awareness of crashes involving distracted driving to reduce resulting traffic fatalities and injuries. Distracted driving can include many actions that take the drivers attention away from the task of driving, but using cell phones to talk or text is currently one of the more problematic distractions and a focus for the national campaign against distracted driving.

Mississippi's crash data was reviewed in an attempt to quantify and document the effects of distracted driving, but, currently, the crash data does not allow the identification of distracted driving with the current crash report form. However, distracted driving may still be a contributing factor in many severe crashes. Data could be under reported for several reasons, including lack of self-reporting by crash survivors, under reporting by officers, etc.

Recognizing the importance of reducing distracted driving, due to the national priority set on the topic, but a lack of supporting data within Mississippi, this SHSP recognizes that improvement is needed in the following four key areas:

- Improving data quality with respect to identifying and reporting distracted driving. This may include officer training to recognize distracted driving or revisions to reporting processes and forms to better capture related crashes.
- Reviewing status of related laws, especially laws limiting cell phone use for specific driver groups (for example, young drivers, commercial drivers, etc.) or all drivers to determine if changes are needed.
- Setting a greater emphasis on education and enforcement campaigns to reduce distracted driving. This might include building on existing programs or calling for additional programs in some areas.
- Increasing the rate of implementation of infrastructure countermeasures, such as centerline, edge line or shoulder rumble strips, which bring a driver's attention back to the task at hand. This may include focused deployment on corridors where distracted driving is a known issue, or widespread use to address general trends.

### 2.1.6 Commercial Vehicle Safety

In Mississippi, the Governor has appointed the Mississippi Department of Public Safety, Motor Carrier Safety Division (MCSD) as the lead for the Motor Carrier Safety Assistance Program for Mississippi. The Department of Public Safety has partnered with the Mississippi Department of Transportation, Office of Enforcement to provide commercial vehicle-safety-related enforcement programs in the state.

Strategies used by Mississippi include the use of passenger carrier strike team details and outreach programs within the industry and MOHS, as well as traffic enforcement details conducted in high-crash corridors. When these strategies are used in conjunction with an aggressive commercial vehicle inspection program conducted roadside and at fixed facilities throughout the state, the result has been a significant reduction in commercial-motor-vehicle-related crashes.

In 2010, there were 1,100 crashes involving commercial motor vehicles in Mississippi. In 2011, that number was reduced to 923 crashes, a 16-percent decrease. The number of commercial motor vehicle injury crashes decreased by 24 percent in the same timeframe.

In 2008, 52,436 roadside inspections were performed in Mississippi. In subsequent years, the number of these roadside inspections climbed to nearly 65,000 per year, an increase of approximately 12 percent. This emphasis on FMCSA highway safety regulations has helped to reduce crashes, injuries, and fatalities involving commercial motor vehicles.

In an effort to reduce the number of commercial-motor-vehicle-related crashes statewide, Mississippi has a goal to increase the number of commercial motor vehicle inspections initiated by traffic enforcement stops by 10 percent during 2013.

# 3 Priority Safety Strategies

## 3.1 Background

Following the identification of the critical emphasis areas, a comprehensive list of potential safety improvement strategies was assembled for each Emphasis Area, and a prioritization exercise was conducted at Mississippi's Safety Workshop. The source of the initial list of potential safety strategies is the National Cooperative Highway Research Program (NCHRP) *Report 500: Guidance for Implementation of the AASHTO Strategic Highway Safety Plan*. This series of guides was developed to assist state and local highway agencies reduce the number of crashes in targeted safety emphasis areas. The guides correspond to the emphasis areas outlined in AASHTO's *Strategic Highway Safety Plan*. Each guide contains a "best practices" list of strategies with value added information including relative implementation costs and the expected safety effectiveness. The expected safety effectiveness of each strategy is assigned into one of the following categories:

- Proven—widely deployed, subject to a rigorous statistical testing, and consistent results from statistical tests
- Tried—widely deployed but either lacking the statistical testing or with inconclusive results
- Experimental—too narrowly deployed to provide statistically significant results

The information about implementation costs and effectiveness are key components in the development of statewide safety programs.

## 3.2 Safety Strategies Workshop

A multi-agency and multidisciplinary workshop was organized to assist with identification and prioritization of a comprehensive set of strategies. The workshop provided the lead agencies, the MDOT and MDPS, with direct feedback on stakeholders' viewpoint on important strategies and programs to implement. Overviews of the process and prioritization results are provided in the following sections.

### 3.2.1 Workshop Details

On September 30, 2010, MDOT, MDPS, and safety stakeholders, such as FHWA, Mississippi State Patrol, EMS providers, local law enforcement, and public works departments, participated in a Safety Strategies Workshop. The meeting was held at the Regency Hotel and Conference Center in Jackson, Mississippi. The agenda for the safety strategies workshop is provided in Table 3-1.

### 3.2.2 Results of the Safety Strategies Workshop

The two primary objectives of the workshop were sharing updated crash trends with the participants and engaging the participants in a facilitated discussion of the safety strategies. This process began with presentations in the morning that provided information on the safety planning process, crash data to support the safety strategies, and presentations from experts in emergency and driver education.

Participants were then divided into two groups—one focused on infrastructure strategies, the other focused on driver behavior strategies. Each group was tasked with prioritizing the strategies and identifying those they considered a high priority. The workshop culminated with an exercise where each participant voted on their preferred safety strategies that were determined to be a high priority by the breakout groups. The voting results for all strategies classified as a high priority by the breakout groups are listed in Table 3-2.

TABLE 3-1
**Agenda for Safety Strategies Workshop Held September 30, 2010**

| | | |
|---|---|---|
| 8:00 – 9:00 | Coffee and Registration | |
| 9:00 – 9:20 | Introduction and Welcome | Larry L. "Butch" Brown, MDOT<br>Dr. Billy White, MDPS Planning |
| 9:20 – 9:40 | SHSP Overview | Howard Preston, CH2M HILL |
| 9:40 – 10:30 | Mississippi's New Safety Goal | Jim Willis, MDOT<br>Ron Sennett, MOHS |
| 10:30 – 10:45 | Break | |
| 10:45 – 11:15 | Emergency and Driver Education Speakers | |
| | Mississippi Emergency Medical Services Information System (MEMSIS) | Donna Smith, EMS |
| | Trauma Registry | Carrie McFarland, MSDH |
| | Mississippi Alcohol Safety Education Program (MASEP) | Bill Henderson, MSU |
| 11:15 – 11:30 | Mississippi's Safety Emphasis Areas & Safety Strategies | Howard Preston, CH2M HILL |
| 11:30 – 12:15 | Lunch | |
| 12:15 – 2:30 | Breakout Discussions of Safety Strategies | |
| | Infrastructure: Lane Departure & Intersections | Will O'Reilly, MDOT<br>Richard Storm, CH2M HILL |
| | Driver Behavior: Impaired Driving, Belt Usage and Unlicensed Drivers | Robin Layton, MOHS<br>Christy Milbourne, MDOT |
| 2:30 – 2:45 | Break | |
| 2:45 – 3:00 | Wrap Up | Howard Preston, CH2M HILL |

TABLE 3-2
High-Priority Safety Strategies Ranked by Voting Results

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation | Priority | Voting Results | Emphasis Areas |
|---|---|---|---|---|---|---|---|
| Maximize use of occupant restraints by all vehicle occupants | Increase seat belt and child seat fines, make law for back seat passengers, and outlaw riding in backs of trucks. Enhance child-passenger safety law. | | | | High | 24 | Seat Belts |
| Reduce the likelihood of a head-on vehicles collision | Install cable median barrier for medians on multi-lane divided roads | Moderate to High | Proven | Medium | High | 23 | Lane Departure |
| Choose appropriate intersection traffic control to minimize crash frequency and severity | Provide roundabouts at appropriate locations | High | Proven | Long | High | 16 | Unsignalized Intersection |
| Control high-blood alcohol content (BAC) and repeat offenders | Require ignition interlocks as a condition for license reinstatement on first offenders | Moderate | Proven | Medium | High | 13 | Impaired |
| Reduce Distracted Driving | Distracted driving was a very high priority in discussion. Need more data and research and should be at some point included in the plan. | | | | High | 13 | Distracted |
| Maximize use of occupant restraints by all vehicle occupants | Conduct highly publicized enforcement campaigns to maximize restraint use. | Moderate to High | Proven | Medium | High | 11 | Seat Belts |
| Improve driver awareness of intersections as viewed from the intersection approach | Improve visibility of intersections by providing enhanced signing (including larger regulatory and warning signs), delineation, and rumble strips on intersection approaches. | Low | Tried | Short | High | 10 | Unsignalized Intersection |
| Improve sight distance at unsignalized intersections | Clear sight triangle on stop- or yield-controlled approaches to intersections | Low | Tried | Short | High | 9 | Unsignalized Intersection |

TABLE 3-2
High-Priority Safety Strategies Ranked by Voting Results

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation | Priority | Voting Results | Emphasis Areas |
|---|---|---|---|---|---|---|---|
| Keep vehicles from encroaching on the roadside | Apply shoulder treatments<br>*Eliminate shoulder drop-offs<br>*Shoulder edge<br>*Widen and/or pave shoulders<br>*Maintain gravel shoulders | Low | Experimental to Proven | Medium | High | 8 | Lane Departure |
| Enforce DUI laws | Enhance DUI detection through special DUI patrols and related traffic enforcement | Low | Tried | Short | High | 7 | Impaired |
| Enforce DUI laws | Publicize and enforce zero-tolerance laws for drivers under age 21 | Moderate | Proven | Short | High | 7 | Impaired |
| Keep vehicles from encroaching on the roadside | Install edge line "profile marking," edge line rumble strips, or modified shoulder rumble strips on sections with narrow or no paved shoulders | Low | Experimental | Short | High | 7 | Lane Departure |
| Reduce frequency and severity of intersection conflicts through traffic control and operational improvements | Employ emergency vehicle preemption | Moderate | Proven | Medium | High | 7 | Signalized Intersection |
| Reduce the frequency and severity of intersection conflicts through geometric design improvements | Restrict or eliminate turning maneuvers by providing channelization or closing median openings | Low | Tried | Short | High | 7 | Unsignalized Intersection |
| Apply special enforcement practices | Routinely link citations to driver record | Low | Tried | Short | High | 6 | Unlicensed |
| Keep vehicles from encroaching on the roadside | Provide enhanced shoulder or delineation and marking for sharp curves | Low | Tried/Proven | Short | High | 6 | Lane Departure |

TABLE 3-2
High-Priority Safety Strategies Ranked by Voting Results

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation | Priority | Voting Results | Emphasis Areas |
|---|---|---|---|---|---|---|---|
| Improve access management near signalized intersections | Restrict access to properties using driveway closures or turn restrictions | Low | Tried | Short | High | 6 | Signalized Intersection |
| Prosecute, impose sanctions on, and treat DUI offenders | Eliminate diversion programs and plea bargains of alcohol-related offenses to non-alcohol offenses | Moderate | Tried | Long | High | 5 | Impaired |
| Keep vehicles from encroaching on the roadside | Install shoulder rumble strips | Low | Tried | Short | High | 4 | Lane Departure |
| Reduce excessive drinking and underage drinking | Increase the state excise tax on beer and liquor | Low | Tried | Long | High | 3 | Impaired |
| Enforce DUI laws | Conduct regular well-publicized DUI checkpoints | Moderate to High | Proven | Short | High | 3 | Impaired |
| Maximize use of occupant restraints by all vehicle occupants | Provide enhanced public education to population groups with lower-than-average restraint use rates | Low | Proven | Short | High | 3 | Seat Belts |
| Improve driver awareness of intersections and signal control | Improve visibility of signals (overhead indications, 12-inch lenses, background shields, LEDs) and signs (mast-arm-mounted street names) at intersections | Low | Tried | Short | High | 3 | Signalized Intersection |
| Improve access management near signalized intersections | Restrict cross-median access near intersections | Low | Tried | Short | High | 3 | Signalized Intersection |
| Choose appropriate intersection traffic control to minimize crash frequency and severity | Provide all-way stop control at appropriate intersections | Low | Proven | Short | High | 3 | Unsignalized Intersection |
| Minimize the likelihood of crashing into an object or overturning if the vehicle travels off the shoulder | Remove/relocate objects in hazardous locations | Moderate to High | Proven | Medium | High | 2 | Lane Departure |

TABLE 3-2
High-Priority Safety Strategies Ranked by Voting Results

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation | Priority | Voting Results | Emphasis Areas |
|---|---|---|---|---|---|---|---|
| Reduce frequency and severity of intersection conflicts through traffic control and operational improvements | Optimize clearance intervals | Low | Proven | Short | High | 2 | Signalized Intersection |
| Improve sight distance at unsignalized intersections | Eliminate parking that restricts sight distance | Low | Tried | Short | High | 2 | Unsignalized Intersection |
| Prosecute, impose sanctions on, and treat DUI offenders | Incarcerate offender/house arrest | Moderate to High | Proven | Long | High | 1 | Impaired |
| Control high-BAC and repeat offenders | Incarcerate offenders | Moderate to High | Proven | Long | High | 1 | Impaired |
| Apply special enforcement practices | Increase enforcement in selected areas | Low | Tried | Short | High | 1 | Unlicensed |
| Insure that restraints, especially child and infant restraints, are properly used | Conduct high-profile “child restraint inspection” events at multiple community locations. Target most effective times of year. | Low | Proven | Short | High | 1 | Seat Belts |
| Improve sight distance at unsignalized intersections | Clear sight triangles in the medians of divided highways near intersections | Low | Tried | Short | High | 1 | Unsignalized Intersection |
| Improve driver awareness of intersections as viewed from the intersection approach | Provide a stop bar (or provide a wider stop bar) on minor-road approach(es) | Low | Tried | Short | High | 1 | Unsignalized Intersection |

## 3.3 Selected High Priority Safety Strategies

Following the Safety Strategies Workshop, MDOT and MOHS staff evaluated and screened the initial comprehensive lists of safety strategies using crash data, effectiveness, implementation cost, and the input provided by the participants in the Safety Strategies Workshop (that is the voting results, Figure 3-1). The result of this effort is a final list of recommended safety strategies for each critical emphasis area (Tables 3-3 through 3-7.) The implementation of these high-priority safety strategies will be the focus of safety investments in the near term and represents the greatest opportunity for Mississippi to continue reducing the number of severe crashes on its roadways.

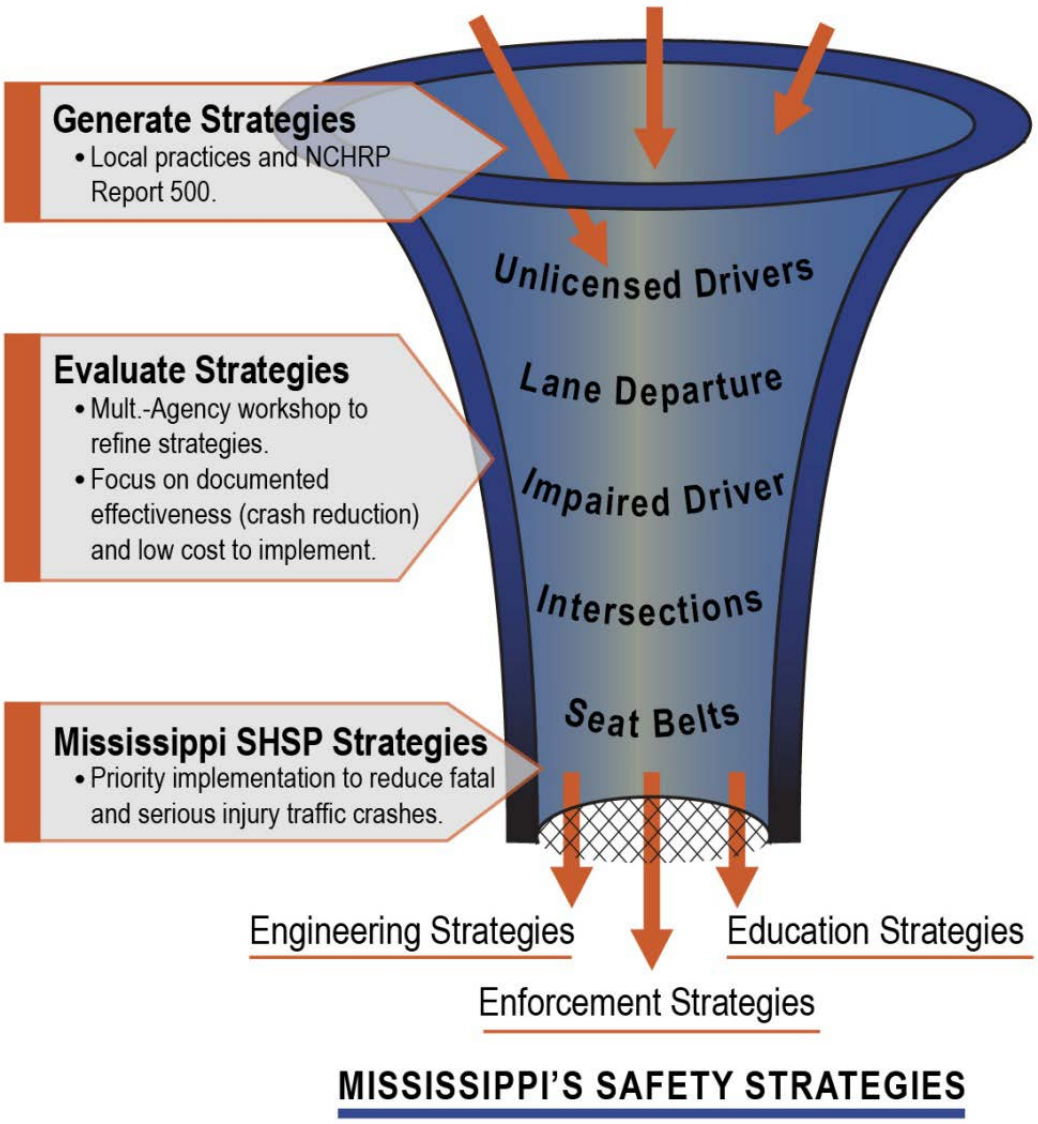


FIGURE 3-1
**Screening of Initial Safety Strategies for Mississippi**

TABLE 3-3
Seat Belt Usage: High-Priority Safety Strategies

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation |
|---|---|---|---|---|
| **A –** Maximize use of occupant restraints by all vehicle occupants | **A1 –** Conduct highly publicized enforcement campaigns to maximize restraint use. | Moderate to High | Proven | Medium |
| | **A2 –** Provide enhanced public education to population groups with lower-than-average restraint use rates. | Low | Proven | Short |
| **B –** Insure that restraints, especially child and infant restraints, are properly used | **B1 –** Provide community locations for instruction in proper child restraint use, including both public safety agencies and health care providers, which are usually available. | Low | Tried | Short |
| | **B2 –** Conduct high-profile "child restraint inspection" events at multiple community locations. | Low | Proven | Short |
| | **B3 –** Train law enforcement personnel and other strategic partners to check for proper child restraint use in all motorist encounters. | Moderate | Tried | Short |
| **C –** Provide access to appropriate information, materials, and guidelines for those implementing programs to increase occupant restraint use | **C1 –** Continue to provide materials that offer guidance in implementing programs to increase restraint use. | Moderate | Experimental | Medium |

Notes:

Short = <1 year

Medium = 1 to 2 years

Long = >2 years

Source: NCHRP *Report 500* Series

TABLE 3-4
Impaired-Driving: High-Priority Safety Strategies

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation |
|---|---|---|---|---|
| **A –** Enforce DUI laws | **A1 –** Conduct regular well-publicized DUI checkpoints | Moderate to High | Proven | Short |
| | **A2 –** Enhance DUI detection through special DUI patrols and related traffic enforcement | Low | Tried | Short |
| | **A3 –** Publicize and enforce zero-tolerance laws for drivers under age 21 | Moderate | Proven | Short |
| **B –** Prosecute, impose sanctions on, and treat DUI offenders | **B1 –** Suspend driver's license administratively upon arrest | Low | Proven | Medium |
| | **B2 –** Establish stronger penalties for BAC test refusal than for test failure | Low | Tried | Long |
| | **B3 –** Eliminate diversion programs and plea bargains of alcohol related offenses to non-alcohol offenses | Moderate | Tried | Long |
| | **B4 –** Incarcerate offenders | Moderate to High | Proven | Long |
| | **B4 –** Create a Judicial Outreach Liaison (JOL) program and hire a JOL to educate judges across the state regarding impaired-driving laws and issues | Moderate | Proven | Medium |
| **C –** Control high-BAC and repeat offenders | **C1 –** Seize vehicles or vehicle license plates administratively upon arrest | Moderate | Proven | Medium |
| | **C2 –** Require ignition interlocks as a condition for license reinstatement on first offenders | Moderate | Proven | Medium |
| | **C3 –** Monitor all convicted DUI offenders closely | Moderate to High | Proven | Long |
| | **C4 –** Incarcerate offenders | Moderate-High | Proven | Long |
| | **C5 –** Create ignition interlock vendor programs across the state | High | Proven | Long |

Notes:

Short = <1 year

Medium = 1 to 2 years

Long = >2 years

Source: NCHRP *Report 500* Series

TABLE 3-5
Suspended/Unlicensed Drivers: High-Priority Safety Strategies

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation |
|---|---|---|---|---|
| **A –** Apply special enforcement practices | **A1 –** Increase enforcement in selected areas | Low | Tried | Short |
| | **A2 –** Routinely link citations to driver record | Low | Tried | Short |
| **B –** Restrict mobility through vehicle modification | **B1 –** Immobilize/impound/seize vehicle | Moderate | Proven | Medium |
| | **B2 –** Install ignition interlock device (IID) | Moderate | Proven | Medium |
| | **B3 –** Create ignition interlock vendor programs across the State | High | Proven | Long |
| **C –** Restrict mobility through direct intervention with offender | **C1 –** Monitor electronically | Moderate | Proven | Medium |
| | **C2 –** Incarcerate | Moderate to High | Proven | Long |

Notes:

Short = <1 year

Medium = 1 to -2 years

Long = >2 years

Source: NCHRP *Report 500* Series

TABLE 3-6
Lane-Departure: High-Priority Safety Strategies

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation |
|---|---|---|---|---|
| **A –** Keep vehicles from encroaching on the roadside | **A1 –** Install various types of rumble strips, including shoulder, edge line "profile marking," and edge line rumble strips or modified shoulder rumble strips on sections with narrow or no paved shoulders. | Low | Proven/Tried | Short |
| | **A2 –** Where appropriate, enhance pavement in curves; including improved highway geometry for horizontal curves and enhanced shoulder or delineation and markings for sharp curves. | Low to Moderate | Proven/Tried | Short to Long |
| | **A3 –** Provide enhanced pavement markings | Low | Tried | Short |
| | **A4 –** Provide skid-resistance pavement surfaces | Moderate | Proven | Medium |
| | **A5 –** Apply shoulder treatments<br>*Eliminate shoulder drop-offs<br>*Shoulder edge<br>*Widen and/or pave shoulders | Low | Experimental to Proven | Medium |
| **B –** Minimize the likelihood of crashing into an object or overturning if the vehicle travels off the shoulder | **B1 –** Remove/relocate objects in hazardous locations | Moderate to High | Proven | Medium |
| **C –** Reduce the likelihood of a head-on vehicles collision | **C1 –** Install centerline rumble strips for two-lane roads | Low | Proven | Short |
| | **C2 –** Install cable median barrier for medians on multi-lane divided roads | Moderate to High | Proven | Medium |

Notes:
Short = <1 year
Medium = 1 to 2 years
Long = >2 years

Source: NCHRP *Report 500* Series

TABLE 3-7
Unsignalized Intersections: High-Priority Safety Strategies

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation |
|---|---|---|---|---|
| **A –** Improve management of access near unsignalized intersections | **A1 –** Implement driveway closures, relocations, and turn restrictions | Low to Moderate | Tried | Short to Medium |
| **B –** Reduce the frequency and severity of intersection conflicts through geometric design improvements | **B1 –** Provide left-turn and right-turn lanes at intersections, including offset turn lanes | Moderate | Proven | Medium |
| | **B2 –** Restrict or eliminate turning maneuvers by providing channelization, closing median openings, or using indirect left-turn treatments to minimize conflicts at divided highway intersections | Low to Moderate | Tried | Short to Medium |
| | **B3 –** Close or relocate "high-risk" intersections | High | Tried | Long |
| | **B4 –** Realign intersection approaches to reduce or eliminate intersection skew | High | Proven | Medium |
| **C –** Improve sight distance at unsignalized intersections | **C1 –** Clear sight triangle on stop- or yield-controlled approaches to intersections or in the medians of divided highways near intersections, and eliminate parking that restricts sight distance | Low | Tried | Short |
| **D –** Improve driver awareness of intersections as viewed from the intersection approach | **D1 –** Improve visibility of intersections by providing enhanced signing (including larger signs and flashers), delineation (such as extended left edge lines for continuity across the median opening at divided highway intersections), rumble strips on intersection approaches, install or enhance lighting, adding pavement markings (including adding stop bar or increasing its size; adding STOP AHEAD message), for both major and minor road approaches | Low to Moderate | Tried/Proven | Short to Medium |
| | **D2 –** Install splitter islands on the minor road approach(es) to an intersection | Moderate | Tried | Medium |
| | **D3 –** Install pole-mounted or sign-mounted flashing beacons at stop-controlled intersections | Low | Tried | Short |
| **E –** Choose appropriate intersection traffic control to minimize crash frequency and severity | **E1 –** Provide appropriate intersection operation countermeasure to avoid use of signals, for example, all-way stop or roundabout | Low to High | Proven/Tried | Short to Long |

Notes:
Short = <1 year
Medium = 1 to 2 years
Long = >2 years
Source: NCHRP *Report 500* Series

TABLE 3-8
Signalized Intersections: High-Priority Safety Strategies

| Objectives | Strategies | Relative Cost to Implement and Operate | Effectiveness | Typical Timeframe for Implementation |
|---|---|---|---|---|
| **A –** Reduce frequency and severity of intersection conflicts through traffic control and operational improvements | **A1 –** Deploy and optimize multi-phase signal operation, coordination and clearance intervals along a corridor or route. Restrict or eliminate turning maneuvers (including right turns on red or permitted left turns). | Low to Moderate | Proven/Tried | Short to Medium |
| **B –** Reduce frequency and severity of intersection conflicts through geometric improvements | **B1 –** Provide/improve left-turn and right-turn channelization | Moderate | Proven | Medium |
| **C –** Improve sight distance at signalized intersections | **C1 –** Clear sight triangles, including restricting or eliminating parking on intersection approaches | Low | Proven/Tried | Short |
| | **C2 –** Redesign intersection approaches | High | Proven | Long |
| **D –** Improve driver awareness of intersections and signal control | **D1 –** Improve visibility of intersections on approach(es) | Low | Tried | Short |
| | **D2 –** Improve visibility of signals (overhead indications, 12-inch lenses, backplates, LEDs) and signs (mast-arm-mounted street names) at intersections | Low | Tried | Short |
| | **D3 –** Provide enhanced or refresher "Rules of the Road" driver education. | Low | Tried | Short |
| **E –** Improve driver compliance with traffic control devices | **E1 –** Supplement conventional enforcement of red-light running with confirmation lights | Low | Tried | Short |
| **F –** Improve access management near signalized intersections | **F1 –** Restrict access to properties using driveway closures or turn restrictions | Low | Tried | Short |
| | **F2 –** Restrict cross-median access near intersections | Low | Tried | Short |
| **G –** Improve safety through other infrastructure treatments | **G1 –** Provide skid resistance in intersection and on approaches | Moderate | Tried | Medium |

Notes:

Short = <1 year

Medium = 1 to 2 years

Long = >2 years

Source: NCHRP *Report 500* Series

# 4 At-Risk Elements Analysis

Severe crashes on Mississippi's state highways tend to be dispersed across a large network. Consider severe crashes in horizontal curves: Using 2005-to-2009 state highway crash records capable of being mapped in a GIS, only one curve was identified with three severe crashes in the 5-year study period. Additionally, there were only 28 horizontal curves across all state highways with two severe crashes, and 358 horizontal curves with a single severe crash. That means most horizontal curves (likely thousands of curves) on the state highway system had no severe crashes during these 5 years. Similarly, MDOT provided a list of intersections with three or more severe crashes from 2005 to 2009. The list identifies only 51 intersections out of thousands of total intersections within the state highway system. With severe crash "clusters" relatively rare, the challenge is distinguishing the locations that have a greater potential for a future severe crash from all other sites.

Severe crash locations constantly move around the system; therefore, improving locations because of one or more historic severe collisions often results in a trend commonly called "chasing fatals." In other words, sites improved because of a severe crash the previous year(s), may not have had a severe crash the following year even if no improvement was made. As a result, the investment is not the most efficient use of the state's resources. Instead, an approach addressing locations based on risk or potential for a future crash, in addition to historic safety performance, provides increased opportunity to prevent future crashes.

The challenge is understanding which elements of the system have an increased risk for a future crash. Individually, severe crashes often appear to be at random locations, but in aggregate, there may be patterns in the locations' characteristics. These characteristics can be viewed as surrogates for future crash potential, indicating which locations have greater potential for a severe crash in the future. This should not be interpreted to mean that the characteristic or surrogate "caused" the collision, but simply that the presence was noted at these locations. Surrogates combined with systemic countermeasure implementation – wide use of low-cost effective countermeasures that address the predominant collision type – are evolving to create new approach to location prioritization and safety investment.

This SHSP identifies priority crash types (Chapter 2) and countermeasures (Chapter 3) for Mississippi. Of these, the severe lane-departure and intersection crashes are prime candidates for systemic treatment because specific locations rarely have multiple severe crashes year after year. Furthermore, many of the identified countermeasures are appropriate for systemic treatment, in that they are low-cost and effective at addressing these crash types. The missing element is an understanding of what parts of the highway system have a greater risk for a severe crash. To supplement MDOT's use of countermeasures, this analysis identifies trends where severe crashes occurred, especially for several key countermeasures. This information can be used to help distinguish and prioritize projects when developing a capital improvement program.

Systemic deployment of countermeasures is an evolving concept in infrastructure-based safety. However, driver behavior programs have long applied the basic concept in developing targeted driver education or enforcement campaigns. The programs are often created by first identifying demographic, time, or location characteristics that are overrepresented in severe crashes. In response, the education and enforcement campaigns are developed to target these overrepresented characteristics.

## 4.1 Methodology

The analysis completed for the infrastructure application for the Mississippi state highways began with the 2005-through-2009 severe crashes that could be located in a GIS system. The GIS allowed the road

and traffic characteristics from a highway layer (maintained by MDOT) to be combined with the crash records. From this combined data source, descriptive statistics were used to identify patterns in the location characteristics. Patterns identified include locations that represented a large proportion of the severe crashes, or possibly, where the characteristic was overrepresented in comparison to the entire system. Lack of access to GIS network for local roads limited the analysis to state-maintained highways.

In several instances, the highway GIS layer did not contain details that warranted investigation, such as curve radius or intersection channelization. In these instances, sampling of locations with severe collisions was used instead of a system-wide analysis. As a result, identified patterns are based on a much smaller sample and should be carefully weighed with respect to prioritizing projects. The infrastructure-based review was focused on lane-departure crashes (Section 4.2), lane-departure crashes on horizontal curves (Section 4.3), and intersection crashes (Section 4.4).

A review of commonly identified characteristics of driver-behavior-related contributing factors is presented in Section 4.5. These potential factors were identified during planning-level analysis shared with Safety Strategies Workshop participants (see Chapter 3) that prioritized the countermeasures. Additional information from MDPS's *Mississippi Highway Safety Performance Plan* and *2012 Seat Belt and Motorcycle Helmet Survey* were used to supplement the findings from the SHSP crash data analysis.

## 4.2 Lane-Departure Crashes

Lane-departure crashes represent the largest pool of severe crashes from all of the emphasis areas. Of those crashes located within a GIS network, 85 percent occurred on rural roads and the majority was on rural, two-lane highways. Considering that interstates and rural expressways are more likely to have 12-foot lanes, paved shoulders, rumble strips, and other treatments to address lane-departure collisions, the focus of the analysis became rural, two-lane highways.

The intent was to divide the analysis between paved and gravel shoulders. However, due to problems with roadway characteristics information associated with shoulder surface typing, only a small sample size was available and, therefore, was deemed statically insignificant. Due to such a small sample of roads with paved shoulders, the analysis was not separated by shoulder surface type. The analysis performed considered average daily trips (ADTs), shoulder width, and lane width for all lane-departure crashes and fixed object crashes.

### 4.2.1 All Severe Lane-Departure Crashes

There were 871 lane departure crashes identified (694 run-off-the-road and 177 across centerline) on rural two-lane highways. The total road network analyzed included 7,134 miles of rural, two-lane highways. The analysis identified the following results:

- The percentage of run-off-the-road collisions is noticeably underrepresented in comparison to the road miles at ADTs below 750 vehicles per day (vpd). Run-off-the-road crashes are most concentrated for 750 to 2,250 ADTs. However, at ADTs above 2,250 is where the percentage of crashes exceeds the percentage of miles (Figure 4-1). Crash density (severe crashes per mile) increases as traffic volumes increases (Figure 4-2). This is to be expected because it is typical that increased exposure results in more collisions. However, at volumes above 2,250 vpd, the crash density exceeds the average density for all roads.
- The percentage of across-centerline collisions is noticeably underrepresented in comparison to the road miles at ADTs below 2,250 vpd. At ADTs above 3,000 vpd, the percentage of crashes exceeds the percentage of miles (Figure 4-1). The single largest peak for across-centerline collisions is above 6,000 vpd. As with run-off-the-road collisions, crash density generally increases as ADTs increase and

crash density exceeds the average density at 2,250 vpd (Figure 4-2). Additionally, a noticeable increase in the crash density occurs at 4,500 vpd, suggesting that the highest-volume roads may be the most at-risk (in aggregate) for across-centerline collisions.

- When severe lane-departure crashes were compared to miles of road by shoulder width, the proportion of miles and crashes both tended to be approximately equal. Roads with shoulder widths between 2 and 6 feet represented both the highest proportion of road miles and severe crashes (Figure 4-3).
- Severe lane-departure crashes tend to be slightly overrepresented for roads with 12-foot lanes. However, these roads typically have higher volumes compared to roads with 10- or 11-foot lanes (Figure 4-4). Consequently, it may be that the crash pattern is really due to traffic volume instead of lane width.

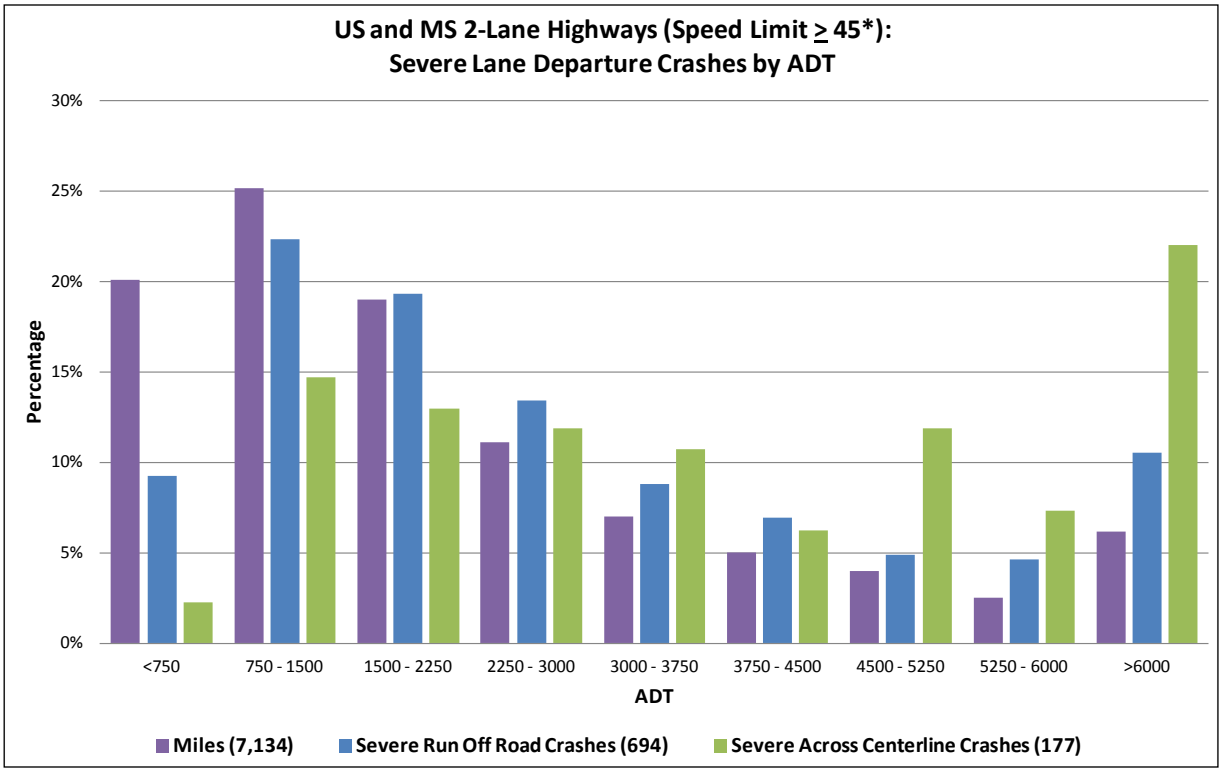


FIGURE 4-1
Severe Lane-Departure Crashes by Average Daily Trip (ADT)

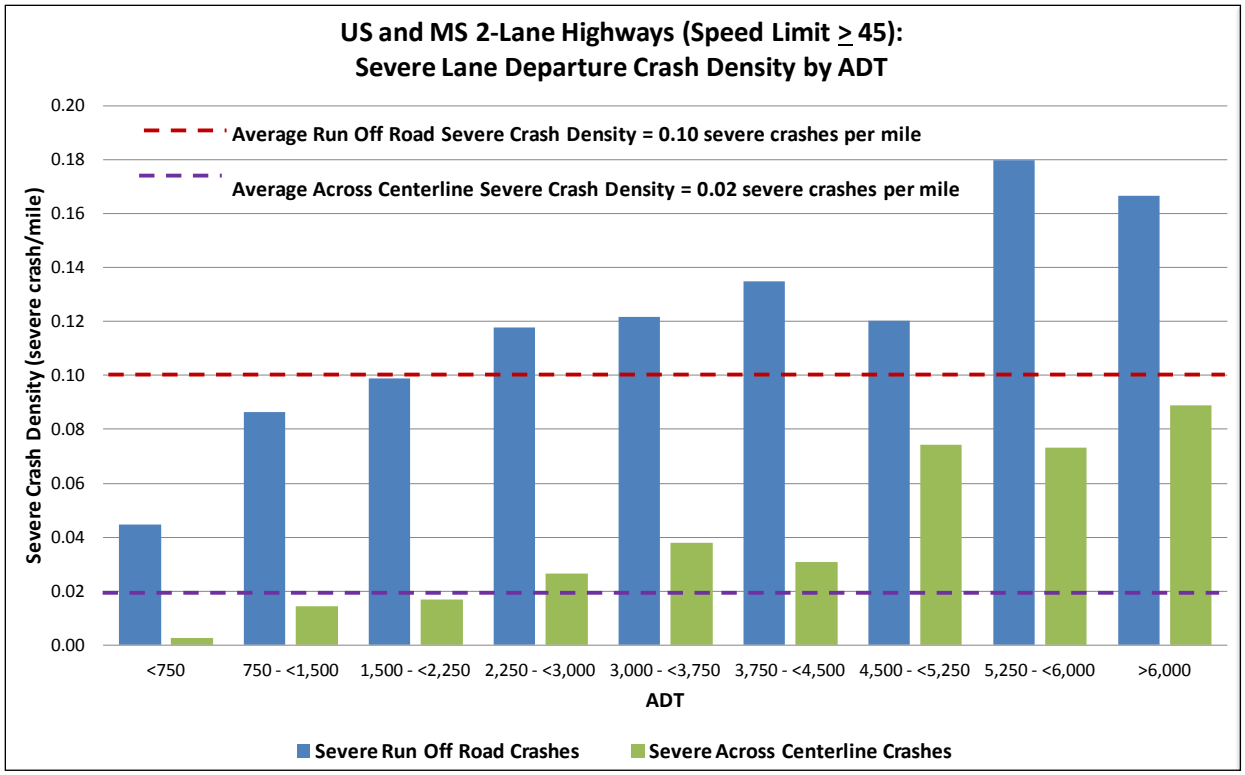


FIGURE 4-2
Severe Lane-Departure Crash Density by Average Daily Trip (ADT)

### 4.2.2 Severe Lane-Departure Crashes Involving a Fixed Object

Of the severe lane-departure collisions, 479 severe crashes were identified involving a fixed object. Like all severe lane-departure crashes, ADT, shoulder width, and lane width were compared to the distribution of crashes. The patterns for collisions involving a fixed object were found to be identical to the run-off-the-road collisions.

## 4.3 Lane-Departure Crashes in Horizontal Curves

Lane-departure crashes in horizontal curves represent a subset of collisions of a unique nature and often addressed through different strategies in comparison to tangent segments. For this reason, a separate analysis was completed for the curve-related crashes.

The MDOT highway layer does not explicitly identify horizontal curves or curve attributes, such as curve radius. However, a law-enforcement-officer-reported field indicates if a collision occurred in a horizontal curve. Therefore, two approaches were used to review the conditions of curve-related collisions. First, curve crashes that could be mapped in GIS were matched with the appropriate highway segment. This allowed a statewide review for severe curve crashes on the state highway system. Like the segment analysis, this review was focused on lane-departure crashes and rural two-lane highways.

The second analysis was a sampling of 50 curves. This included all 29 curves that could be identified with multiple severe crashes and an additional 21 curves with a single severe crash. This included six curves on interstate facilities and six curves on a multi-lane, divided facility. The remaining curves were on rural, two-lane highways.

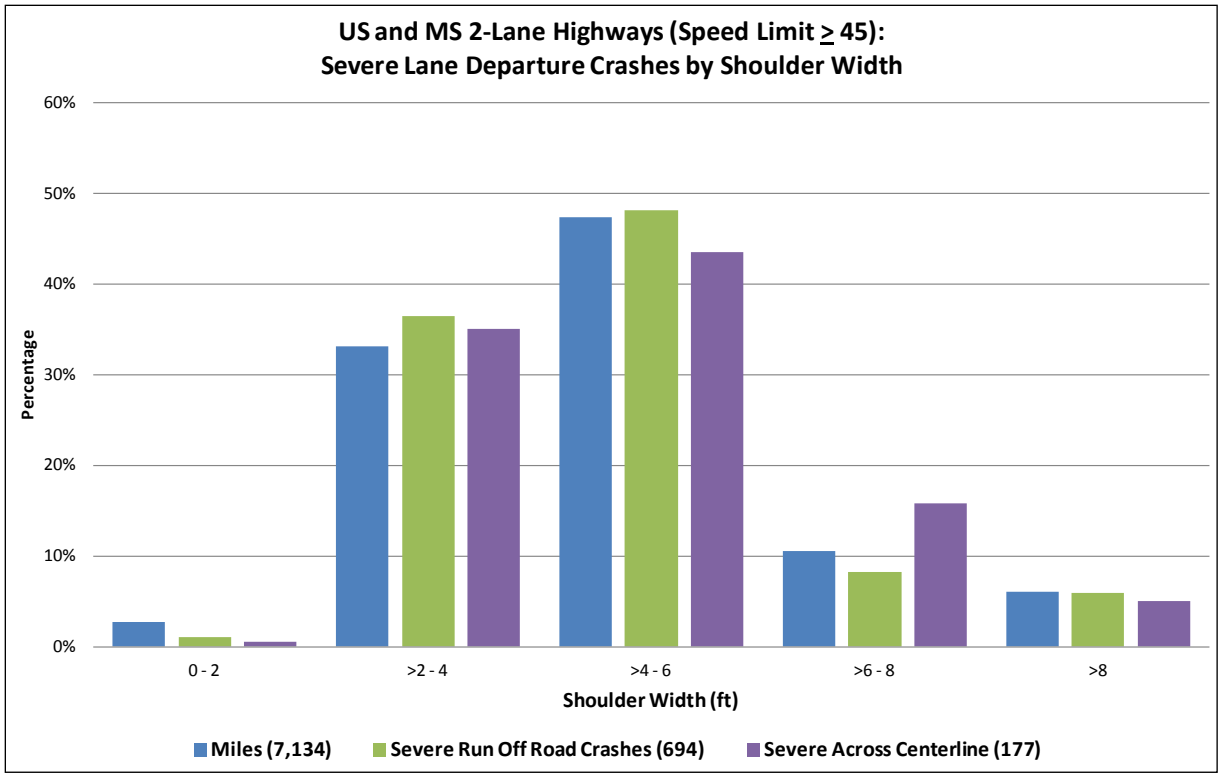


FIGURE 4-3
Severe Lane-Departure Crashes by Shoulder Width

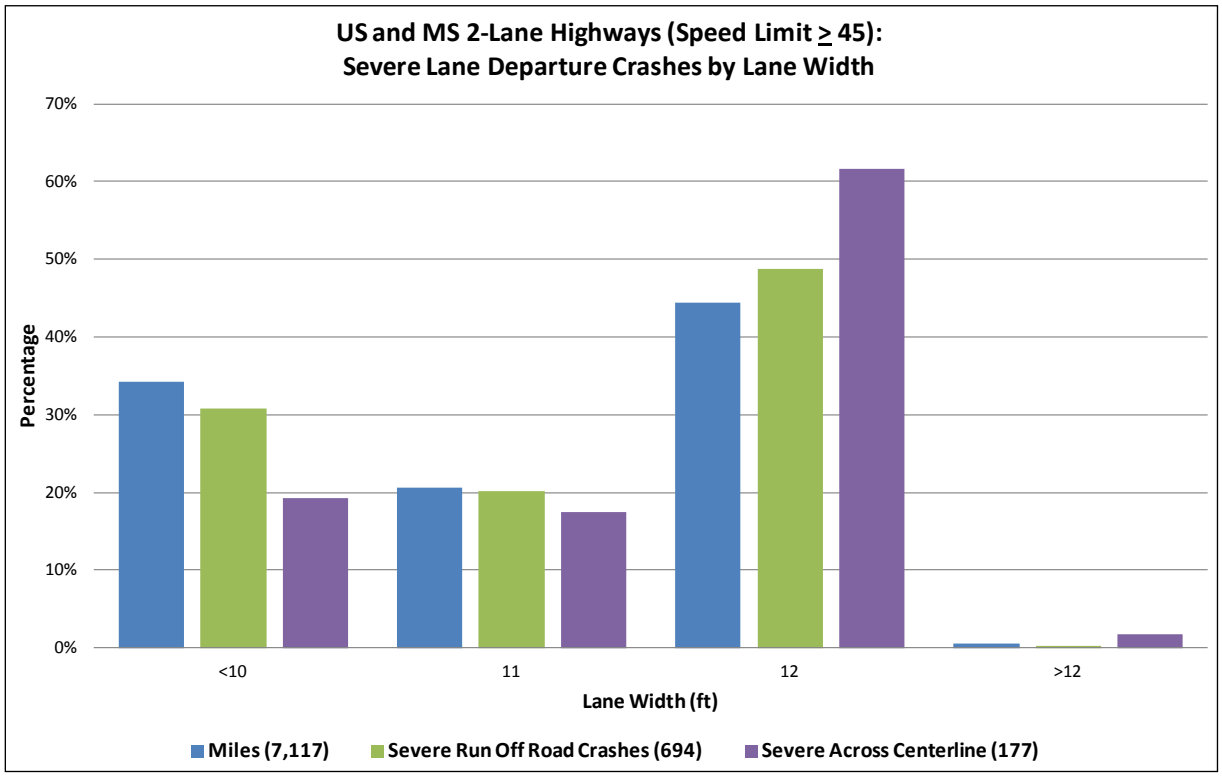


FIGURE 4-4
Severe Lane-Departure Crashes by Lane Width

### 4.3.1 Statewide Review Using GIS Data

There were 276 lane-departure crashes identified (235 run-off-the-road and 41 across-centerline) on rural, two-lane highways. The total road network size remained at 7,134 miles since tangent segments could not be removed from the analysis. The following results were found for rural, two-lane highways:

- At volumes less than 750 vpd, curve-related lane-departure crashes are underrepresented in comparison to all rural, two-lane miles. No specific volume range was identified where run-off-the-road collisions had a noticeably greater proportion in comparison to the road miles, but over 60 percent of run-off-the-road collisions occurred on roads with less than 2,250 vpd. Across-centerline crashes are over represented in the 750-to-1,500-volume range and above 4,500 vpd compared to the distribution of road miles (Figure 4-5).

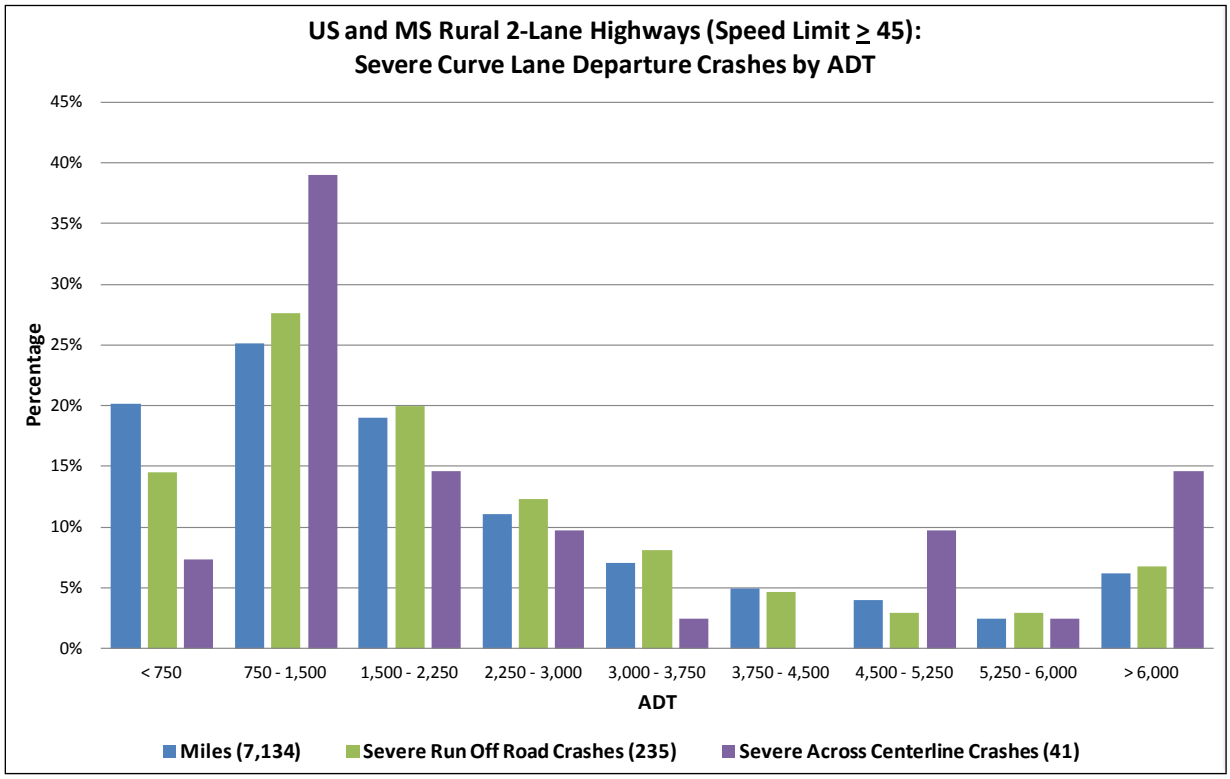


FIGURE 4-5
Severe Curve Lane-Departure Crashes by Average Daily Trip (ADT)

- Severe lane-departure crashes in curves are concentrated on roads with shoulder widths between 2 and 6 feet. However, the crashes were observed to be overrepresented in roads with shoulder widths between 2 and 4 feet (Figure 4-6).
  - If crashes were separated by light condition, the percentage of severe crashes on roads with shoulders between 4 and 6 feet remained fairly constant for run-off-the-road crashes(all light conditions = 41 percent; daylight = 40 percent; dark = 42 percent; dawn/dusk = 43 percent). However, across-centerline collisions exhibit more variation (all light conditions = 46 percent; daylight = 78 percent; dark = 50 percent). [Note: The fewer severe across-centerline crashes in curves, 41 compared to 235 run-off-the-road crashes, may reduce the reliability of the findings when the crashes are separated by light condition.]

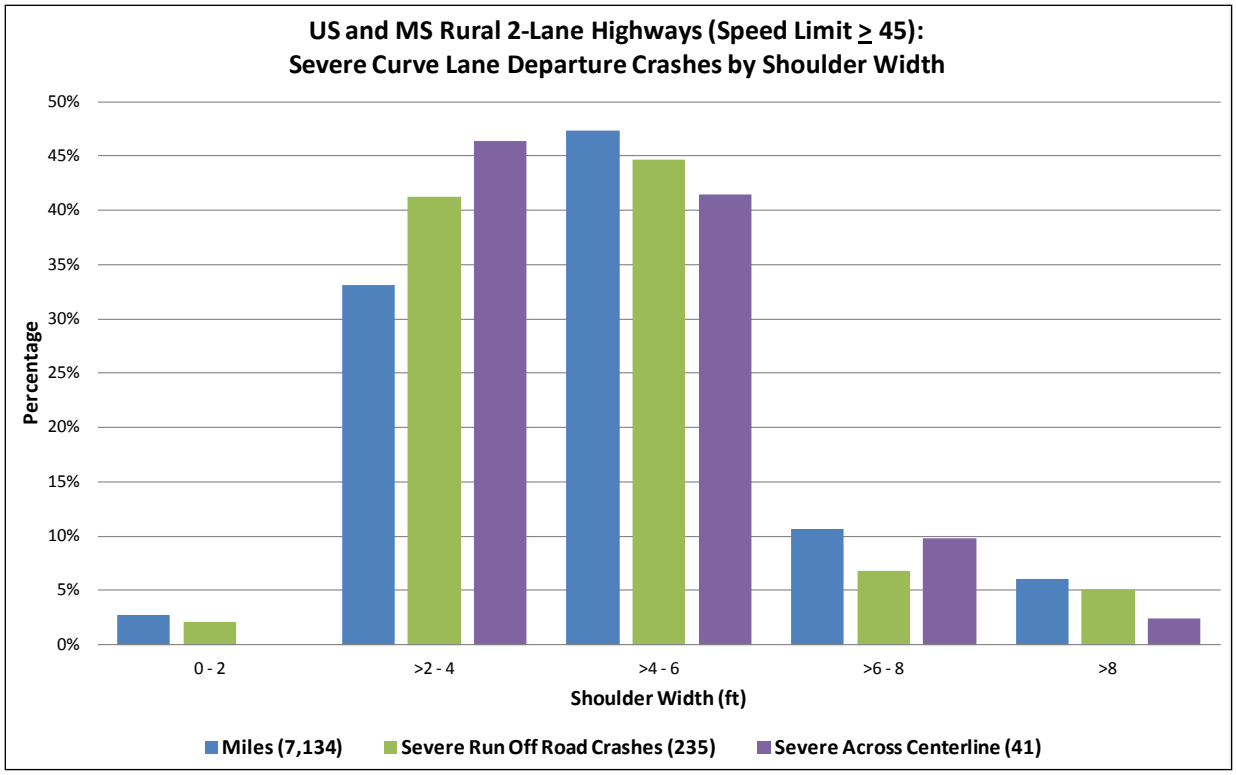


FIGURE 4-6
Severe Curve Lane-Departure Crashes by Shoulder Width

- Approximately 55 percent of the total rural, two-lane miles have lane widths that are less than 12 feet. Severe lane-departure crashes in curves were slightly higher in comparison: run-off-the-road crashes were at 63 percent and across-centerline crashes were at 68 percent (Figure 4-7).
  - When wet surface pavement was reported by the officer, severe run-off-the-road crashes in curves increased to 77 percent on roads with lane widths less than 12 feet.

## 4.3.2 Sampled Curves

Additional review of a sample of rural curves included curve radius (estimated from aerial photography), the presence of driveways or intersections, visual traps, and if Chevrons are already present. The findings revealed that only four of the curves currently have Chevrons installed and no curves were found to have a visual trap (that is, a feature, such a minor road, utility line, or tree line that extends straight giving the driver a false impression the road continues straight). However, intersections and driveways were commonly located within the curves, including 18 curves with an intersection and 37 curves with a driveway.

The curve radius review did not reveal any specific range where crashes were noticeably overrepresented in comparison to the number of curves (Figure 4-8). However, the review did identify that 80 percent of the severe crashes occurred on a curve with a radius between 500 and 2,000 feet. This radius range could be indicating a priority for improvements and countermeasure implementation.

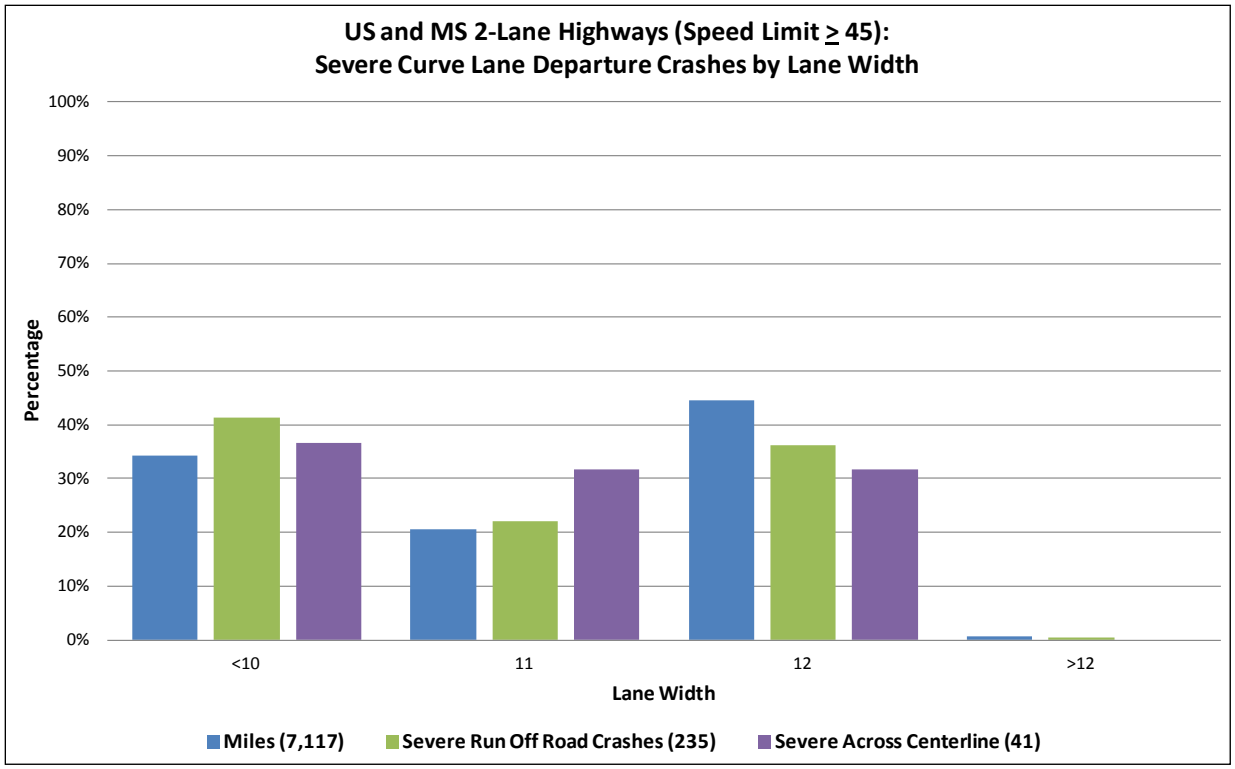


FIGURE 4-7
Severe Curve Lane Departure Crashes by Lane Width

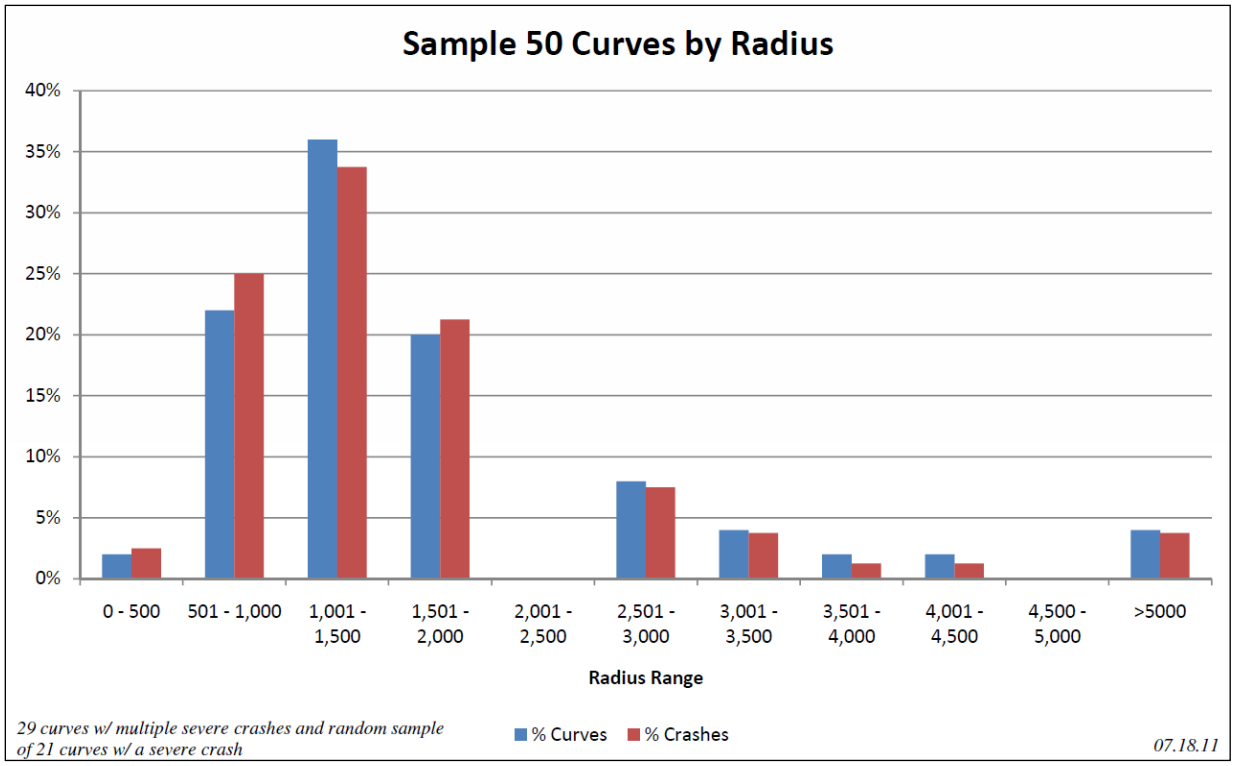


FIGURE 4-8
Sample of 50 Curves by Radius

## 4.4 Intersection Crashes

MDOT does not maintain a database of intersection locations and attributes. Therefore, the intersection characteristics for severe intersection crashes were collected using online aerial and street-level imagery. Using a manual data collection process, the information was gathered from a sample of intersections where severe crashes had occurred. This included 51 intersections that MDOT identified with three or more severe crashes within the 5-year study period (2005 to 2009). The characteristics reviewed include intersection skew, nearby railroad crossing, street lighting, horizontal curve, commercial development, presence of advance warning signs, daily traffic volumes, and roadway type.

Intersections located within city limits were classified as urban and those outside city limits as rural. Of the 51 locations, there were 27 rural intersections (19 unsignalized, 8 signalized) and 24 urban intersections (9 unsignalized, 15 signalized). When considering area type and traffic control type, the sample size is relatively small. Therefore, caution needs to be exercised when using the results to prioritize future safety investments.

### 4.4.1 Major and Minor Street Daily Traffic Volumes

Major and minor street daily traffic volumes were collected for the 51 intersections with at least three severe intersection crashes. For major street volumes, the majority of rural intersections have an ADT of less than 15,000 vpd (Figures 4-9 and 4-10). The same is true for the unsignalized intersections reviewed. Urban intersections and signalized intersections both tended to be equally distributed across the ADT ranges, indicating no pattern in the volume of where severe intersections occurred.

For minor street volumes, most locations have an ADT of less than 4,500 vpd (Figures 4-11 and 4-12). This pattern was noticeably strong for rural or unsignalized intersections; but also held true for the urban or signalized locations.

### 4.4.2 Intersection Design and Sign Conditions

Table 4-1 documents several additional attributes collected for the 51 intersections. The information was gathered from online aerial and street-level images. Several patterns were identified in the location of severe intersection collisions. This information can be used to help distinguish between projects, giving preference to any locations that exhibit any of the following characteristics:

- Regardless of location or traffic control, the major street was a four-lane or six-lane divided road at a majority of the intersections. Furthermore, the minor street was predominately a two-lane facility, including all unsignalized intersections in the sample.
- Most intersections with three or more severe crashes are a four-legged intersection. Regardless of location or control type, approximately one-quarter of all intersections have at least a 15-degree skew angle.
- Over half of all 51 locations have no street lighting. For rural or unsignalized locations, more than 85 percent had no street lighting.
- Intersections located in a horizontal curve accounted for less than half of all crash locations. However, rural intersections were more commonly located in a horizontal curve.
- Commercial development in the adjacent lane was commonly observed at signalized or urban locations.

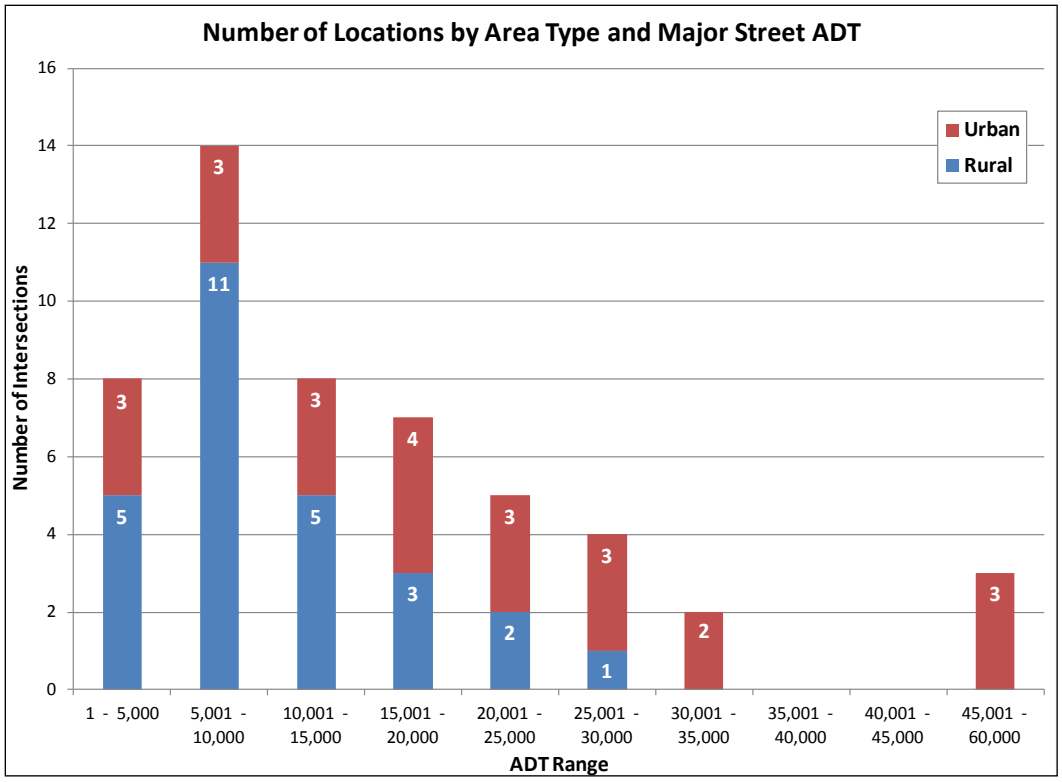


FIGURE 4-9
Major Streets – Number of Locations by Area Type and Average Daily Trip (ADT)

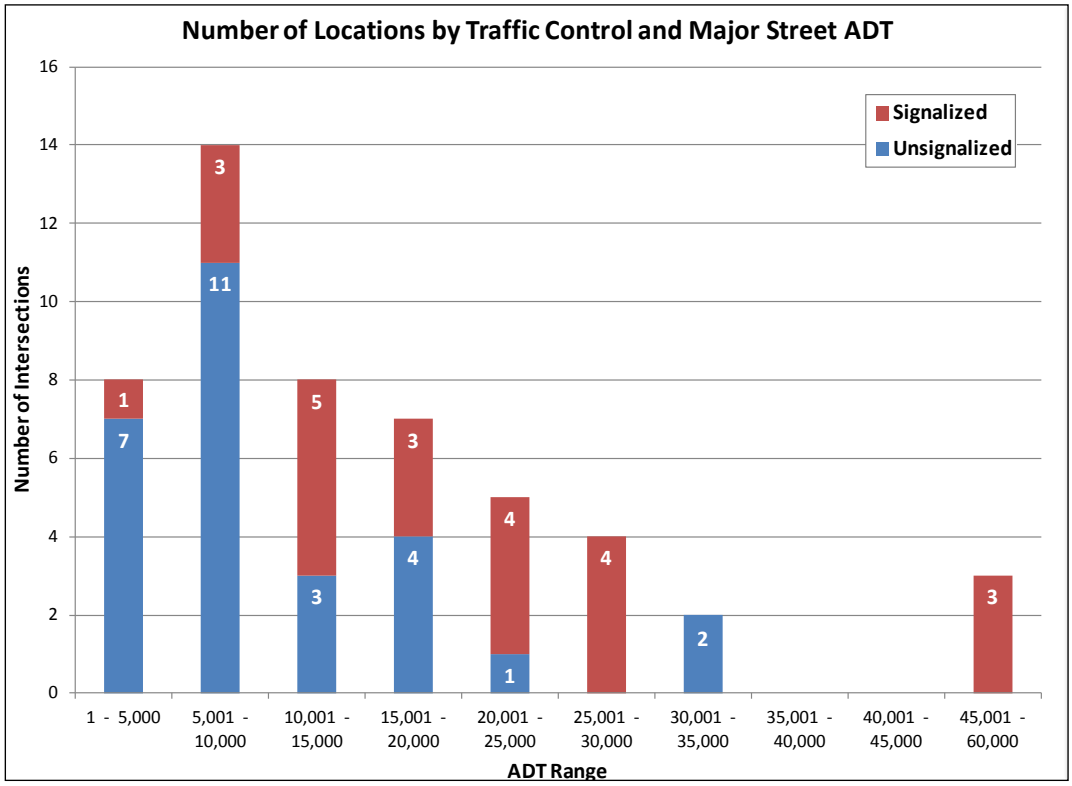


FIGURE 4-10
Major Streets – Number of Locations by Traffic Control and Average Daily Trip (ADT)

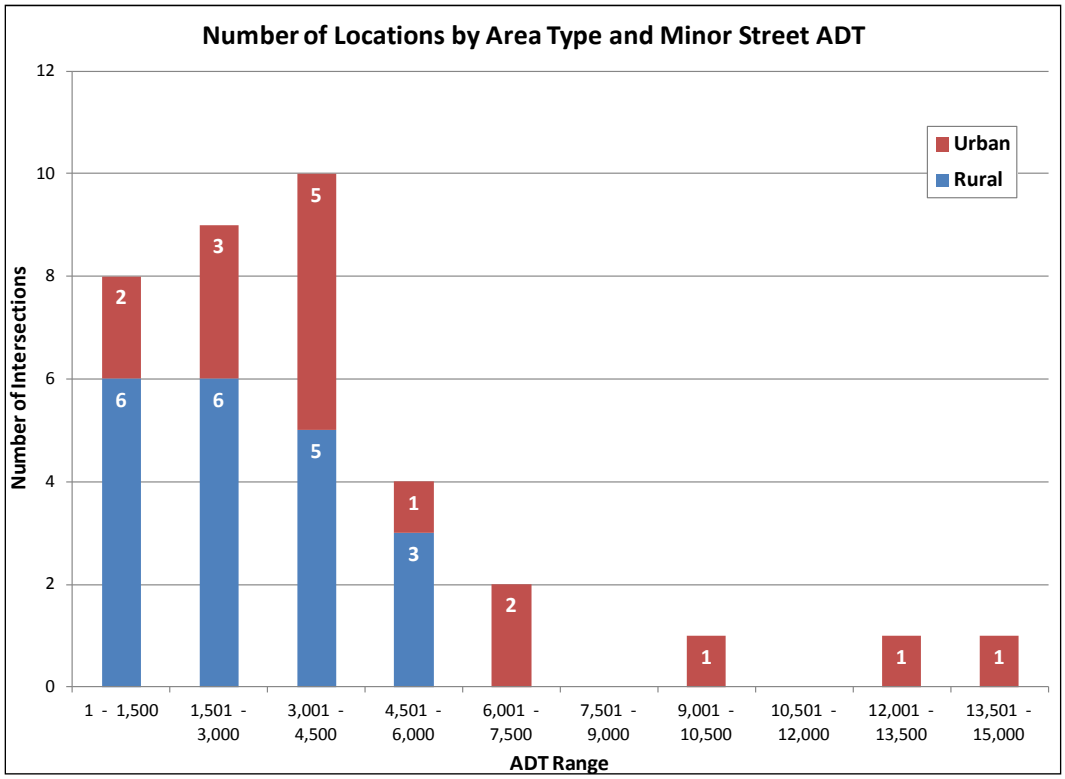


FIGURE 4-11
Minor Streets – Number of Locations by Area Type and Average Daily Trip (ADT)

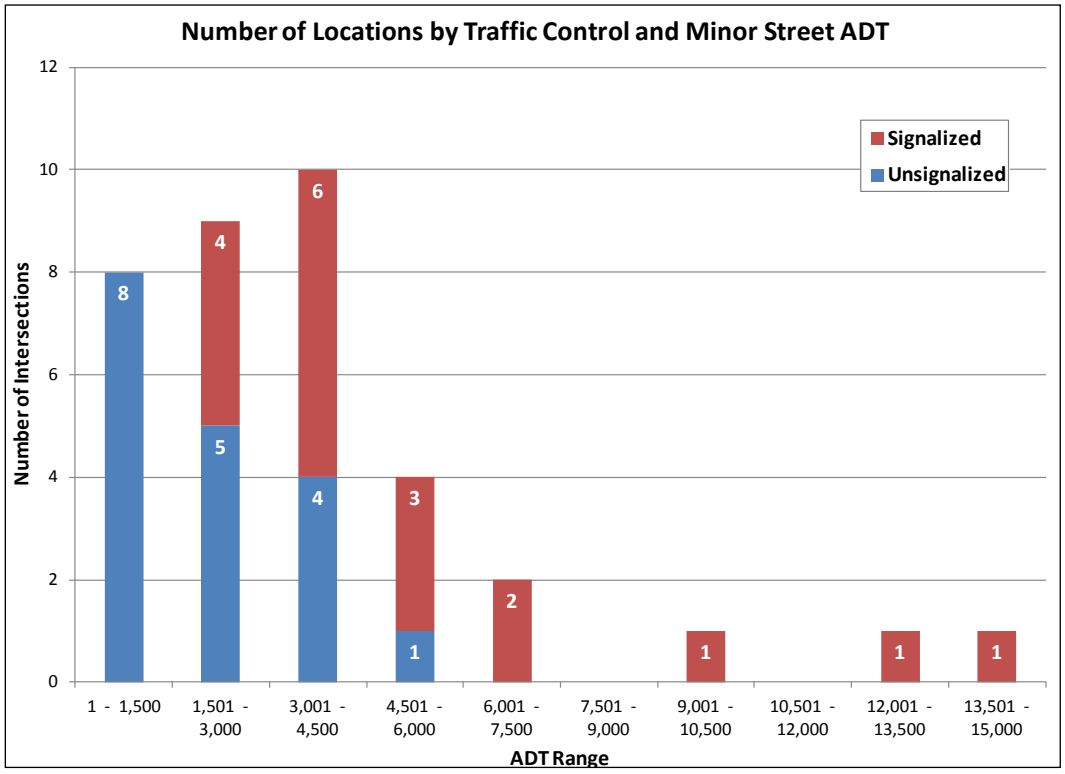


FIGURE 4-12
Minor Streets – Number of Locations by Area Type and Average Daily Trip (ADT)

TABLE 4-1
**Detailed Crash Location Summary**

| | Urban | Rural | Signalized | Unsignalized | Urban – Signalized | Urban – Unsignalized | Rural – Signalized | Rural – Unsignalized | Total |
|---|---|---|---|---|---|---|---|---|---|
| Number of Locations | 24 | 27 | 23 | 28 | 15 | 9 | 8 | 19 | 51 |
| Severe Crash Frequency | 80 | 103 | 86 | 97 | 52 | 28 | 34 | 69 | 183 |
| Four-Lane or Six-Lane Divided Major Street | 15 (63%) | 22 (81%) | 17 (74%) | 20 (71%) | 11 (73%) | 4 (44%) | 6 (75%) | 16 (84%) | 37 (73%) |
| Two-Lane Minor Street | 21 (88%) | 24 (89%) | 17 (74%) | 28 (100%) | 12 (80%) | 9 (100%) | 5 (63%) | 19 (100%) | 45 (88%) |
| Four-Leg | 19 (79%) | 21 (78%) | 20 (87%) | 20 (71%) | 14 (93%) | 5 (56%) | 6 (75%) | 15 (79%) | 40 (78%) |
| Skewed | 6 (25%) | 7 (26%) | 5 (22%) | 8 (29%) | 4 (27%) | 2 (22%) | 1 (13%) | 6 (32%) | 13 (25%) |
| No Major Street Left-Turn Lane | 4 (17%) | 3 (11%) | 1 (4%) | 6 (21%) | 0 (0%) | 4 (44%) | 1 (13%) | 2 (11%) | 7 (14%) |
| No Street Lighting | 11 (46%) | 24 (89%) | 11 (48%) | 24 (86%) | 6 (40%) | 5 (56%) | 5 (63%) | 19 (100%) | 35 (69%) |
| On Curve | 5 (21%) | 12 (44%) | 10 (43%) | 7 (25%) | 5 (33%) | 0 (0%) | 5 (63%) | 7 (37%) | 17 (33%) |
| Development Nearby | 17 (71%) | 6 (22%) | 16 (70%) | 7 (25%) | 11 (73%) | 6 (67%) | 5 (63%) | 1 (5%) | 23 (45%) |
| Major Intersection Warning In Place | 5 (21%) | 13 (48%) | 9 (39%) | 9 (32%) | 8 (42%) | 5 (63%) | 1 (11%) | 4 (27%) | 18 (35%) |
| Minor Intersection Warning In Place | 9 (38%) | 21 (78%) | 11 (48%) | 19 (68%) | 15 (79%) | 6 (75%) | 4 (44%) | 5 (33%) | 30 (59%) |
| Near Railroad Crossing | 0 (%) | 0 (%) | 0 (%) | 0 (%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) | 0 (0%) |

# 4.5 Review of Driver Behavior Elements

## 4.5.1 Unbelted Drivers

Crash data used for the Mississippi SHSP update did not contain information about vehicle occupant seat belt use. However, the *Mississippi Highway Safety Performance Plan* identifies that 62.4 percent of driver and passenger fatalities were not using seat belts. By age, the percent of fatalities that were unbelted for all age ranges below age 64 exceeded the 62.4 percent average. Unbelted fatalities peaked for 10 to 24 year olds, where unbelted fatalities accounted for 77 percent to 83 percent of vehicle occupant fatalities.

Additional information from the 2010 and 2012 *Mississippi Seat Belt and Motorcycle Helmet Survey* identified several characteristics regarding seat belt use. Overall, following the 2010 seatbelt enforcement campaign, Mississippi seat belt use was observed to be 81 percent. The seat belt usage rate in 2012 increased to 83.2 percent. Several observations regarding facility type, vehicle type and demographics were noted:

- At 86.8 percent, seat belt use was highest on interstates. Collector roads was the one facility type where the seat belt use rate (79.3 percent) is below the state average.
- Out of four observed vehicle types (passenger car, pickup, van, and sports utility vehicle [SUV]), pickup occupants had an observed seat belt use rate of 71.3 percent. Pickup was the only vehicle type where the average seat belt use rate was below the state average.
- Seat belt use rate for males was 8 to 12 percentage points below that for females. However, the observed average by ethnicity for males was always below the statewide average [black males = 71.6 percent; Hispanic males = 76.0 percent; and white males = 78.5 percent].
- Black vehicle occupants had the lowest belt use (males = 71.6 percent; females = 79.9 percent). Hispanic and white vehicle occupants had similar seat belt use rates, but Hispanic occupants were 1 to 3 percentage points below white occupants.

MDPS also provided information about seat belt use for vehicle driver and passengers killed in traffic crashes in 2010. Based on this information, only 38 percent of drivers killed were using a seat belt or helmet. In contrast, 58 percent of passengers were belted or wearing a helmet. The reason for this difference is not evident, but the data demonstrates that drivers killed in a traffic crash are more likely to be unbelted than passengers and, therefore, would be a target audience for education campaigns.

## 4.5.2 Impaired Drivers

Mississippi crash data records (2005 to 2009) were used to identify representative characteristics for location, time, and driver. Based on location, the Top 5 counties accounted for 23.5 percent of severe impaired-driving (alcohol- and/or drug–related) crashes and were spread across the state (Table 4-2). By jurisdiction, state highways accounted for over half of all severe alcohol- and/or drug-related crashes (61 percent). The jurisdiction with the second highest number of severe crashes was county roads with 27 percent. For all related crashes, approximately 66 percent were located in rural areas.

TABLE 4-2
Top 5 Counties for Severe Impaired-Driving Crashes

| County | Severe Crashes | Percentage of Mississippi's Severe Impaired-Driving Crashes |
|---|---|---|
| Jackson (Gulf Coast) | 132 | 5.5% |
| Harrison (Gulfport/Biloxi) | 119 | 5% |
| Forrest (Hattiesburg/Petal) | 110 | 5% |
| De Soto (Metro Memphis) | 92 | 4% |
| Hinds (Metro Jackson) | 90 | 4% |

For severe alcohol- and/or drug-related crashes, 2,526 motor vehicle drivers involved were identified as impaired. Of these drivers, 78 percent were male. Additionally, impaired drivers were often driving without a valid license (27 percent) or were not wearing a seat belt or helmet at the time of the crash (56 percent).

The age of impaired drivers involved in a severe crash indicates several opportunities for targeted education programs (Table 4-3). For example, 10 percent of impaired drivers were under the age of 21, which is below the legal drinking age. Furthermore, drivers between the ages of 21 and 45 accounted for 62 percent of the severe driver-impaired crashes.

TABLE 4-3
Age Distribution of Impaired Drivers in Severe Crashes

| Age Group | Male | Female | Total |
|---|---|---|---|
| <20 | 10% | 11% | 10% |
| 21 – 25 | 17% | 15% | 16% |
| 26 – 35 | 24% | 24% | 24% |
| 36 – 45 | 21% | 26% | 22% |
| 46 – 55 | 15% | 15% | 15% |
| 56 – 65 | 8% | 5% | 7% |
| 66+ | 5% | 5% | 5% |

For driver-impaired crashes, 52 percent of the severe crashes occurred between 6:00 pm and 3:00 am. Additionally, 56 percent of the crashes were from Friday through Sunday, indicating that there is an increased risk for driver-impaired crashes on the weekends.

### 4.5.3 Unlicensed Drivers

Mississippi crash data records (2005 to 2009) were used to identify representative characteristics for location, time, and driver of severe crashes involving an unlicensed or suspended-licensed driver. Based on location, the Top 5 counties accounted for 25 percent of the severe unlicensed-driver crashes and were spread across the state (Table 4-4). By jurisdiction, state highways accounted for 55 percent of the unlicensed-driver crashes. The jurisdiction with the second highest number of severe crashes was

county roads with 29 percent. For all related crashes, approximately 67 percent were located in rural areas.

TABLE 4-4
**Top 5 Counties for Severe Unlicensed or Suspended-License Driver Crashes**

| County | Severe Crashes | Percentage of Mississippi's Severe Unlicensed Driver Crashes |
|---|---|---|
| Hinds (Metro Jackson) | 96 | 7% |
| Jackson (Gulf Coast) | 82 | 6% |
| Harrison (Gulfport/Biloxi) | 76 | 5% |
| Forrest (Hattiesburg/Petal) | 53 | 4% |
| De Soto (Metro Memphis) | 46 | 3% |

For severe unlicensed-driver crashes, 1,622 unlicensed or suspended licensed drivers were involved. Of these drivers, 80 percent were male. Additionally, unlicensed or suspended licensed drivers were often driving impaired (42 percent) or were not wearing a seat belt or helmet at the time of the crash (64 percent).

The age of unlicensed or suspended licensed drivers involved in a severe crash indicates several opportunities for targeted enforcement programs (Table 4-5). For example, nearly one-third of all drivers were between the ages of 26 and 35, which may represent an audience to target when designing public education campaigns that accompany enforcement blitzes.

TABLE 4-5
**Age Distribution of Unlicensed or Suspended-License Drivers in Severe Crashes**

| Age Group | Male | Female | Total |
|---|---|---|---|
| <20 | 13% | 18% | 14% |
| 21 – 25 | 18% | 15% | 17% |
| 26 – 35 | 31% | 34% | 32% |
| 36 – 45 | 21% | 17% | 20% |
| 46 – 55 | 11% | 13% | 11% |
| 56 – 65 | 4% | 2% | 4% |
| 66+ | 2% | 0% | 1% |

For unlicensed-driver crashes, 19 percent of severe crashes occurred between 3:00 pm and 6:00 pm. Severe crashes continued to be overrepresented during the evening and early morning in comparison to typical volume distributions. Additionally, 57 percent of the crashes were from Friday through Sunday, indicating that there is an increased risk for an unlicensed or suspended-licensed driver to be involved in a severe crash on the weekend.

## 4.6 At-Risk Elements Conclusions

This analysis suggests two key points. First, it was assumed that there are few high-crash locations in Mississippi—that is, locations where clusters of severe crashes occur are rare. All the data indicate that this assumption is correct. The review of Mississippi's crash records could not find a specific location that averaged one severe crash per year (over a 5-year period). This leads to the second assumption, that severe crashes tend to be widely scattered across Mississippi's system of roadways, especially in rural areas. The data also indicates that this is correct. As a result, it appears that increasing the safety program focus on proactively deploying low-cost strategies (based on a systematic risk analysis) would be a more effective use of the state's safety funds.

However, the systematic risk analysis requires the availability of data to document the roadway, traffic control, and traffic volume characteristics of the locations with the target types of severe crashes in order to support the identification of crash surrogates. This initial review of a small portion of Mississippi's system suggests that the current data systems may not be sufficiently robust to support this kind of analysis. A larger scale effort would be required to more reliably determine if this is in fact the case.

This limited analysis provides some interesting hints that could help in identifying candidates for safety investment. For example:

- Run-off-the-road crashes are overrepresented on two-lane highways at volumes under 2,250 vpd and cross-centerline crashes are overrepresented at volumes over 2,250 vpd
- Lane-departure crashes are overrepresented in curves with radii less than 2,000 feet
- Intersection-related crashes are overrepresented at locations with four approaches
- Rural, unsignalized intersection crashes are overrepresented at locations without street lights
- Males exhibit greater risky behavior, whether it is driving impaired, driving unlicensed or with a suspended license, and/or not using seat belts.

# 5 Wrap Up

Mississippi's 2007 Strategic Highway Safety Plan set a goal of reducing traffic-related fatalities to 700 traffic fatalities by 2011. At the time, this was considered a stretch goal because during the prior study period (2000 to 2007), Mississippi averaged almost 900 traffic fatalities per year and the trend line was flat. However, through the combined efforts of the Department of Transportation, the Department of Public Safety, and other safety partners across the state, the goal was achieved in 2009. The key action by the departments that contributed to these results was focusing their safety investments in deploying mitigation strategies targeted at the critical emphasis areas identified in the 2007 SHSP: Reducing Impaired Driving, Increasing Belt Usage, Reducing Lane-Departure Crashes, Reducing Over-Involvement of Young Drivers, and Curbing Aggressive Driving.

Going forward, the 2013 Strategic Highway Safety Plan builds on the prior success and establishes a new goal – to reduce the number of traffic fatalities by 25 percent, to 525 traffic fatalities by 2017. The efforts to achieve this goal will require focusing future safety investments on the following:

- Implementing the 4Es – in recognition of the fact that driver behavior, education, and the delivery of emergency services also contribute to the severity of crashes and that solutions that include multiple approaches tend to be more effective.
- Implementing improvements to all roads – in recognition of the fact that approximately 40 percent of severe (fatal and life-changing-injury) crashes occur on local systems and that meeting the crash reduction goal would be far more difficult to achieve if safety investment is exclusively dedicated to state facilities.
- Implementing identified high-priority strategies associated with the adopted critical emphasis areas (Unbelted Drivers, Impaired Driving, Unlicensed Drivers, Road Departure Crashes, and Intersection Crashes) and targeted crash types because it has been determined that these categories of crashes represent the greatest opportunity to reduce the number of fatalities and life-changing (Type A) injuries.
- Deploying the adopted high-priority strategies that have been proven effective at reducing the target crash types and that have relatively low implementation costs. The use of proven-effective strategies will provide safety program managers a high level of confidence that their investments will in fact produce crash reductions (because these same strategies have demonstrated a crash reduction in other applications) and the use of low-cost strategies allows for a wider deployment across Mississippi's system of roadways.
- Developing a comprehensive approach to address safety that finds the right balance for Mississippi between the traditional reactive approach of limiting implementation to a few high-crash locations and a proactive approach that widely deploys low-cost strategies across the system. This approach should more effectively deal with the target crash types (lane-departure and angle crashes at intersections) that tend to be widely scattered across rural areas in the state.

Specific actions that will be key components of Mississippi's Strategic Highway Safety program going forward include the following:

- Crash Data
  - Implementing the recommended measures to improve overall quality of the crash data reporting system as documented in *Crash Data Improvement Program – Final Report* (February 4, 2011) prepared by the Federal Highway Administration's Crash Data Improvement

Program Technical Assistance Team. This report addresses the nine key elements of the crash data reporting system: Data Processing, Crash Location, Quality, Timeliness, Accuracy, Completeness, Consistency, Integration, and Accessibility. Examples of improvement strategies include adopting and institutionalizing performance measures for quality; providing law enforcement with additional training and feedback about their performance; improving location information by using "smart map" technology; better integrating crash and roadway data in SAMS; and producing a data user's guide to inform potential users of availability and how to request data.

- Driver Behavior
  - Conducting additional DUI and seat belt enforcement campaigns and saturation patrols in order to support the continued decline in these types of crashes.
  - Investigating new strategies and the use of new technologies to address the number of speed-related and red-light-running crashes.
  - Addressing distracted driving by improving data quality with respect to law enforcement identifying and reporting distracted driving and adding an emphasis on distracted driving to the ongoing enforcement campaigns.
- Highway Related
  - Increasing the level of investment in the systemic/proactive deployment of low-cost strategies to address severe road departure crashes – in particular, more investment on road edges, including; more edge rumble strips, enhanced edge lines, Safety Edge,[2] and enhanced curve delineation.
  - Increasing the level of investment in the systemic/proactive deployment of low cost strategies to address severe intersection crashes – in particular, more investment on upgrading signs and markings, installing street lights and conflict reduction techniques (roundabouts, J-turns, etc.)
  - Moving away from significant investments in installing and upgrading traffic signals, except for a few high-priority strategies such as offset left-turn lanes, flashing yellow arrow, and red-light confirmation lights (where partnerships with local law enforcement agencies can be executed) can reduce the occurrence of right angle crashes.
  - Providing more educational opportunities for local agencies to learn about the statewide safety planning efforts; opening the safety planning process to create more opportunities for local agencies to participate; and dedicating a fraction of the safety program for projects on the local system.

In an effort to address safety issues on locally maintained roads, MDOT, in partnership with the Local Technical Assistance Program (LTAP) Center, Office of State Aid Road Construction (OSARC), and the Federal Highway Administration (FHWA) will implement a Circuit Rider Program with the goal of decreasing the number of fatalities and serious injuries that occur on Mississippi's roads. This effort will primarily focus on the locally maintained roads within the municipalities and counties. The Circuit Rider program will provide technical assistance and support to the local agencies to help identify and address

[2] The Safety Edge is a beveled pavement edge to help lessen the severity of roadway departures. Instead of a vertical drop-off, the Safety Edge shapes the edge of the pavement to 30 degrees. When a driver drifts off the paved surface, the Safety Edge provides greater ease re-entering the roadway, and reduces the risk of over steering and loss of control of the vehicle. Even at higher speeds, vehicles can return to the paved road smoothly and easily.

highway safety concerns. The ultimate goal is to create a sustained safety effort at the local level to reduce fatalities.

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