TENNESSEE

Strategic Highway SAFETY PLAN

2020-2024

TN TDOT Department of Transportation

U.S. Department of Transportation
Federal Highway Administration

TN Department of Safety & Homeland Security

FMCSA

NHTSA

TENNESSEE

2020 - 2024

STRATEGIC HIGHWAY SAFETY PLAN

The Tennessee Strategic Highway Safety Plan has been developed under the oversight of the Tennessee Strategic Highway Safety Steering Committee to reduce the number of lives lost, human suffering, and the economic costs associated with motor vehicle crashes in Tennessee. By signing this document, the signatories agree to support the vision, mission, and goals of the 2020 – 2024 Tennessee Strategic Highway Safety Plan.

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Executive Summary

The intent of Tennessee's update to the Strategic Highway Safety Plan (SHSP) is to develop a comprehensive safety road map for the state, identifying concerns related to crashes resulting in fatalities and serious injuries (severe crashes) and providing strategies to mitigate or eliminate these concerns. This SHSP update builds off the foundation set forth by the State's original SHSP in 2004 and subsequent updates, and uses a data-driven approach with collaboration from various agencies and organizations statewide to:

- Determine predominant factors and trends associated with severe crashes
- Develop a comprehensive list of safety strategies to combat identified safety concerns
- Identify current programs, initiatives, and projects (actions) in line with safety strategies
- Identify potential actions and associated challenges with their implementation

This SHSP update follows guidance provided by the Federal Highway Administration (FHWA) and meets all current federal requirements needed for obligation of funds under the Highway Safety Improvement Program (HSIP).

Tennessee has maintained its commitment to the Toward Zero Deaths (TZD) vision. TZD is the result of a national collaboration of safety professionals from various agencies and organizations using a data-driven approach to develop standard strategies focused on providing safer roadways that are regularly refined, implemented, and evaluated. The vision set forth by TZD is a surface transportation network free of fatalities through a sustained and even accelerated decline in transportation-related deaths and injuries.

Tennessee's SHSP is a data-driven, comprehensive safety plan developed through the efforts of various highway safety stakeholders serving as the Steering Committee. Historic statewide vehicular fatality and serious injury data was used to identify key contributing factors that then were grouped into Emphasis Areas provided below. Through contributions from our safety stakeholders, a multifaceted set of strategies and actions were developed that relate to the Four (4) E's of Transportation Safety (Four E's): Engineering, Enforcement, Education, and Emergency Response. Multi-faceted solutions are essential to the reduction of severe crashes, as their cause can be the result of one or more factors (human, infrastructure, environmental, etc.) that may not be solved through the use of only one (1) of the Four E's.

2020-2024 SHSP Emphasis Areas

- Data Collection and Analysis
- Driver Behavior
- Infrastructure Improvements
- Vulnerable Road Users
- Operational Improvements
- Motor Carrier Safety

Steering Committee and Safety Partners

The Strategic Highway Safety Steering Committee oversaw the development of the SHSP update along with the Action Plans that serve as a safety road map for the State of Tennessee. This committee comprises professionals from federal, state, and local agencies and advocacy groups responsible for transportation and safety, all with various backgrounds related to the Four E's. In addition, the update effort is bolstered through contribution from other safety partners on topics specific to their areas of interest and expertise. This level of inclusion allows for maximum collaboration among various entities within Tennessee and the Four E's.

Steering Committee	Additional Safety Partners
Tennessee Department of Transportation (TDOT)	Mothers Against Drunk Driving (MADD)
Federal Highway Administration (FHWA)	Tennessee Sheriffs' Association (TSA)
Tennessee Department of Safety and Homeland Security (TDOSHS)	Tennessee Association of Chiefs of Police (TACP)
Tennessee Highway Safety Office (THSO)	Motorcycle Awareness Foundation of Tennessee (MAFT)
Tennessee Highway Patrol (THP)	National Highway Traffic Safety Administration (NHTSA)
Federal Motor Carrier Safety Administration (FMCSA)	Tennessee Education Association (TEA)
Metropolitan Planning Organizations (MPOs) and Rural Planning Organizations (RPOs)	Tennessee District Attorney General's Office
Tennessee Regional Safety Council (TRSC)	Operation Lifesaver
Tennessee Transportation Assistance Program (TTAP)	Walk Bike Nashville
Tennessee Department of Health (TDOH)	Bike Walk Tennessee
Tennessee Trucking Association (TTA)	
AARP	

SHSP Partner Committees	
Traffic Records Coordinating Committee (TRCC)	Commissioners Council on Injury Prevention
TDOT Traffic Operations Committee	Tennessee Impaired Driver Advisory Council
TDOT Work Zone Committee	Pedestrian Safety Committee
Commercial Motor Vehicle (CMV) Safety Crash Reduction Committee	Transportation Systems Management and Operations (TSM&O) Coordinating Committee
TDOT Data Governance Committee	

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SHSP Vision, Mission, and Goals

Vision

Federal, state, and local agencies, civic groups, and private industries unified as safety partners and all working together toward zero (0) fatalities and serious injuries on Tennessee roadways.

Mission

Using education, enforcement, engineering, and emergency response initiatives, to work toward zero (0) deaths and serious injuries by reducing the number and severity of crashes on Tennessee's roadways.

Goal

The five (5) SHSP goals were set using the historic trend and were adjusted based on HSIP safety performance measure targets previously submitted by the State of Tennessee. This methodology resulted in the following five (5) goals:

- **Serious Injuries** - Reduce the five (5) year rolling average of serious injuries to 6,205 in 2022. (14.1% reduction over 2017 value)
- **Serious Injury Rate** - Reduce the five (5) year rolling average of serious injury rate to 6.16 in 2022. (35.9% reduction over 2017 value)
- **Fatalities** - Reduce the trend of increasing fatalities by not exceeding the 2022 five (5) year projected rolling average of 1,165.
- **Fatality Rate** - Reduce the five (5) year rolling average of fatality rate to 1.14 in 2022. (13.6% reduction over 2017 value)
- **Non-Motorized Fatalities and Serious Injuries** - Reduce the trend of increasing non-motorized fatalities and serious injuries by not exceeding the 2022 five (5) year projected rolling average of 716.

The period for evaluation of the Plan's overall performance will be five (5) years, which is the planned interval for updating the Plan. Recognizing that statistics will vary due to atypical seasonal weather, economy, and isolated catastrophic events, this evaluation will be based on a five (5) year average of available data.

Introduction and Background

From 2013 to 2017, an average of 192,340 reported traffic crashes occurred in Tennessee annually, an approximately 17% increase from the previous five (5) year average of 163,910.[1] As shown in Table 1, crashes statewide resulted in almost 5,000 fatalities and over 36,000 serious injuries over the same period.

Using the data in Table 1 along with the previous SHSP data, the trends for fatalities, serious injuries, and their rates were reviewed to determine predominant factors and identify realistic, attainable goals based on the data. For determination of the trend, the five (5) year rolling average was used. The five (5) year rolling average is the average of the sum of the subject year and the values of the four (4) previous years. The rolling average provides a more consistent look at the data by removing random anomalies that occur due to a unique condition or event that is not characteristic of the normal traveling conditions on Tennessee's roadways, the resulting data points provide a consistent picture that is representative of the overall trend and is readily represented by traditional trend lines.

Fatalities and Serious Injuries

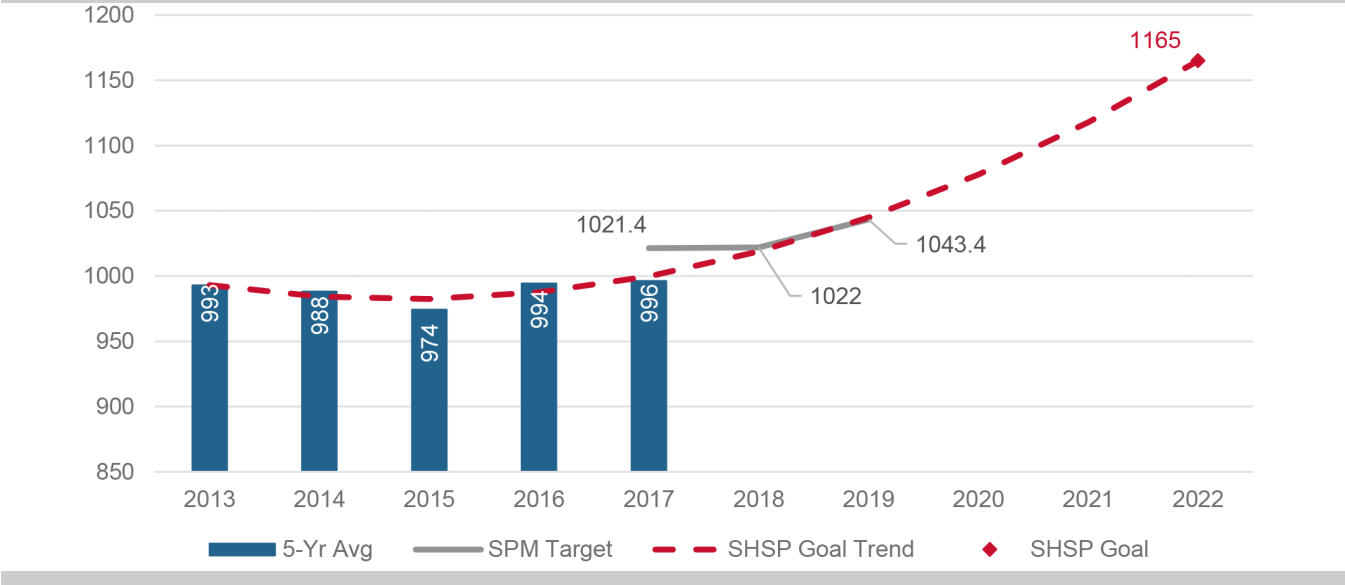
Figure 1 provides the five (5) year rolling averages of fatalities during from 2009-2013 to 2013-2017. In addition to the historic actual averages, the projected serious injury trend, targets from the first three (3) performance cycles of the Safety Performance Measures (SPM) reported in the state's annual HSIP Report, and the SHSP goal are shown. As seen in Figure 1, the projected trend using only historic values was consistently higher than the SPM targets. In lieu of using the historic trend to project a fatality number goal, the trend was revised by considering the SPM fatality targets.

The historic data points and SPM targets are noted to have a "good fit" with the fatality trend as all values fall along or close to the revised projected trendline. Additionally, the overall trend is still increasing, which is consistent with recent historic fatality numbers.

Table 1 - Yearly Fatality and Serious Injury Statistics (2013-2017)

	2013	2014	2015	2016	2017	Total
# Fatalities	995	963	962	1,037	1,024	4,981
#Serious Injuries	6,937	6,868	7,609	7,595	7,126	36,135

Figure 1 - Fatalities: Trend and Goal



Therefore, the adjusted trend line was used to establish an upper limit to the increase of the fatality five (5) year rolling average. This corresponds to a goal of 1,165 or less for the five (5) year rolling average for fatalities in 2022.

Figure 2 provides the five (5) year rolling average for statewide serious injuries from 2009-2013 to 2013-2017. In addition to the historic actual averages, the first three (3) of Tennessee's SPM targets are shown.

Unlike fatalities, the 2017 and 2018 SPM targets are higher than the trend line shown. However, the 2019 SPM target is significantly lower than the projected trend. With prior SPM targets falling above and below the projected trend line, the proposed 2022 goal was set using the trend line based on a historic five (5) year rolling average. This results in a projected five (5) year rolling average of 6,205 serious injuries in 2022, a 14.1% reduction over the 2017 value of 7,227.

Population in the state grew 7.5% from 2008-2017, but annual vehicle miles traveled (VMT) increased by 15.3%. While the state's population has certainly increased, the VMT has increased more than twice as much in the same period due to increased economic activity, both inside and outside of Tennessee. To account for the increases in the amount of travel on Tennessee's roadways, fatalities and serious injuries are considered in relation to the annual VMT. This is accomplished through the calculation of fatality and serious injury rates.

Fatality and Serious Injury Rates

To fully assess the overall picture of roadway safety, examination of both the fatal and serious injury rates is critical. The yearly rates for each category provide an "apples to apples" comparison over direct comparison of the number of occurrences by themselves. As discussed previously, rates normalize the fatal and serious injury numbers through consideration of the number of vehicle miles traveled (VMT) on Tennessee's roadways for the same year. The formula for the rate calculations is provided in Figure 3. A yearly summary of the fatal and serious injury rates for Tennessee over the SHSP assessment period is provided in Table 2.

Figure 3 - Fatality and Serious Injury Rate Calculation

$$\text{Fatality Rate} = \frac{\#\ \text{of Fatalities}}{\#\ \text{of Vehicles Miles Traveled}}$$

$$\text{Serious Injury Rate} = \frac{\#\text{of Serious Injuries}}{\#\ \text{of Vehicles Miles Traveled}}$$

Figure 2 - Serious Injuries: Trend and Goal

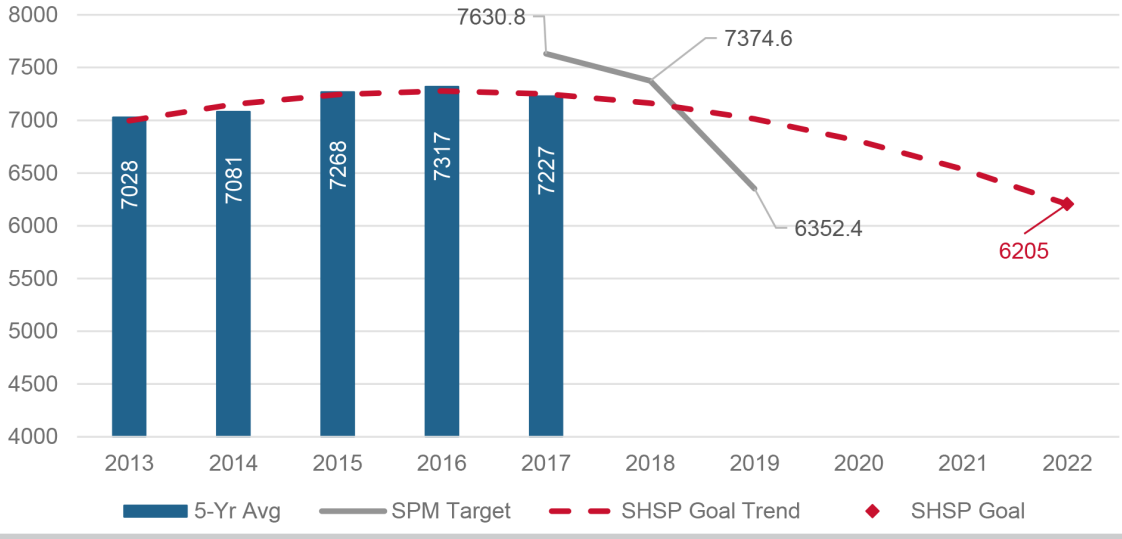


Table 2 - Yearly Fatal and Serious Injury Rates - 2013-2017

	2013	2014	2015	2016	2017
# Fatalities	995	963	962	1,037	1,024
#Serious Injuries	6,937	6,868	7,609	7,595	7,126
Vehicle Miles Traveled (100MVM)	710.14	727.90	747.61	777.64	801.10
Fatality Rate	1.40	1.39	1.35	1.35	1.32
Serious Injury Rate	9.94	9.94	10.08	9.96	9.61

As shown in Table 2, the yearly totals for the actual number of fatalities and serious injuries indicate an increasing trend with values higher in 2017 than they were in 2013. Conversely, a decreasing trend is observed for the fatality and serious injury rate over the same time period. This inverse relationship is explained by the increased VMT over the same period. The increased fatalities and serious injuries are associated with motorists' additional exposure due to higher VMT.

The trends for both the rates and VMT were examined to determine anticipated future performance. For the trend analysis, VMT data from 2003 to 2017 was used. The resulting graph and trend line is shown in Figure 4. As shown in the figure, increasing VMT is expected to continue through the current SHSP evaluation period.

Figure 4 - Vehicle Miles Traveled (per 100 million vehicle miles) - 2003-2017

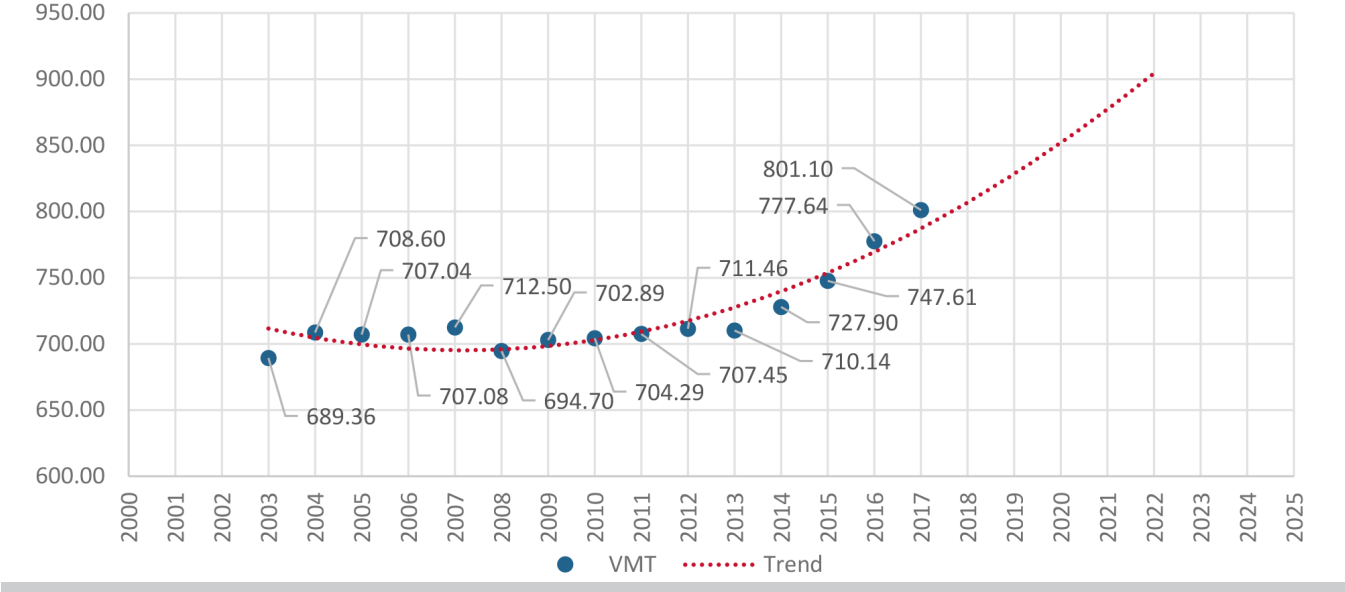


Figure 5 summarizes the five (5) year rolling average for fatality rates during 2013-2017. Like fatalities, the SPM targets along with the historic data were used to develop the projected trend shown in the figure. This trend provides the best fit for both historic data and SPM targets.

As with the other metrics, the first three (3) relevant SPM targets were used to gauge the historic trend's consistency with SPM targets set by the state. When compared to the historic trends, fatality rate targets for 2018 and 2019 were consistent with the historic trend. Therefore, the SHSP target was based on just the historic trend.

As exhibited by the revised fatality trend, the modified fatality rate trend line has an acceptable fit within the historic data points and SPM targets. As with fatalities, consideration of the SPM targets in developing the trend did not impact the overall positive or negative trend exhibited by the historic data.

Figure 6 provides the five (5) year rolling average for statewide serious injury rates. In addition to the historic actual averages, the historic trend along with the first three (3) of Tennessee's SPM targets for serious injury rates are shown.

Figure 5 - Fatality Rates (2013-2017)

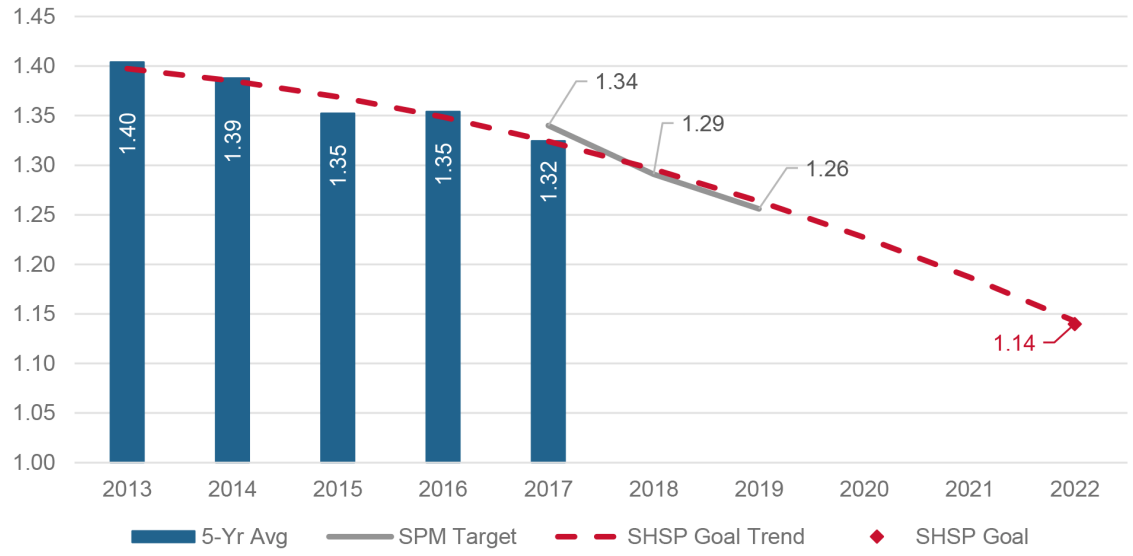
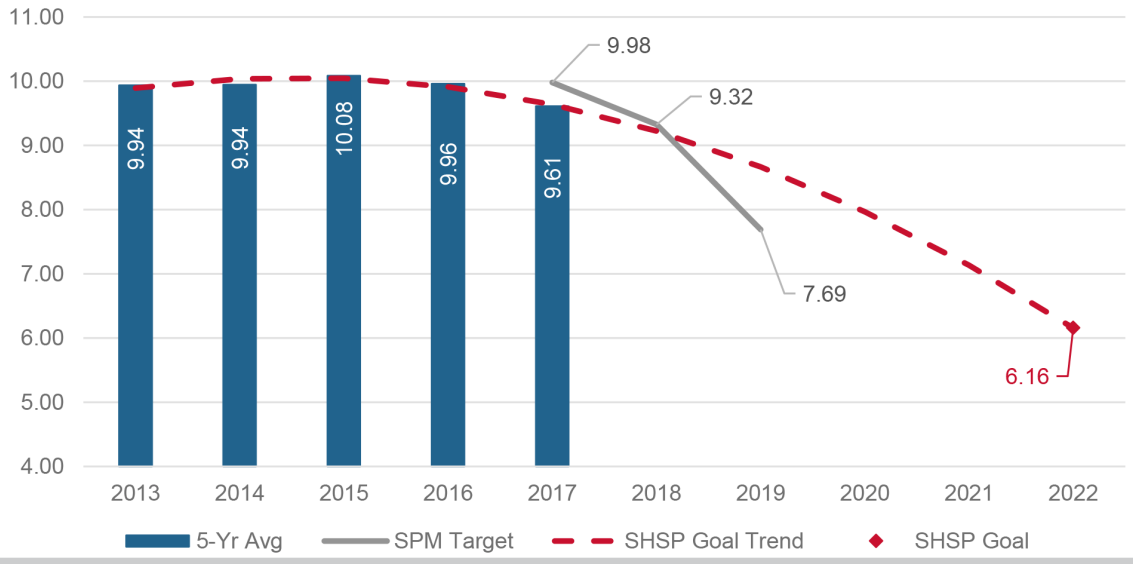


Figure 6 - Serious Injury Rates (2013-2017)



It should be noted that the serious injury rate exhibits the same relationship between the SPM targets and projected trend line shown for serious injuries. Therefore, the historic trend was again used to project the goal.

Non-Motorized Road User Fatalities and Serious Injuries

A new goal pertaining to the fifth SPM — non-motorized road user (bicyclists and pedestrians) fatalities and serious injuries — was added to the SHSP. Figure 7 provides the five (5) year rolling average fatalities and serious injuries for this group from 2009-2013 to 2013-2017. In addition to the historic actual averages, the projected serious injury trend, related SPM targets, and the SHSP goal are shown.

As shown in the figure, the number of non-motorized severe injuries is anticipated to increase over the evaluation period. This trend is based on historic data only as the projected trend exhibited an acceptable fit with both the historic averages and SPM targets. (2022 projected – 716; SHSP goal – 716)

Past Performance

The previous SHSP provided the first opportunity to set goals not only for fatality reduction but also for reducing serious injuries. The 2014 SHSP set four (4) primary goals relating to both the number and rate of fatalities and serious injuries. A summary of previous SHSP goals and assessment of achievement of each goal is provided in Table 3.

Figure 7 - Non-Motorized Fatalities and Serious Injuries

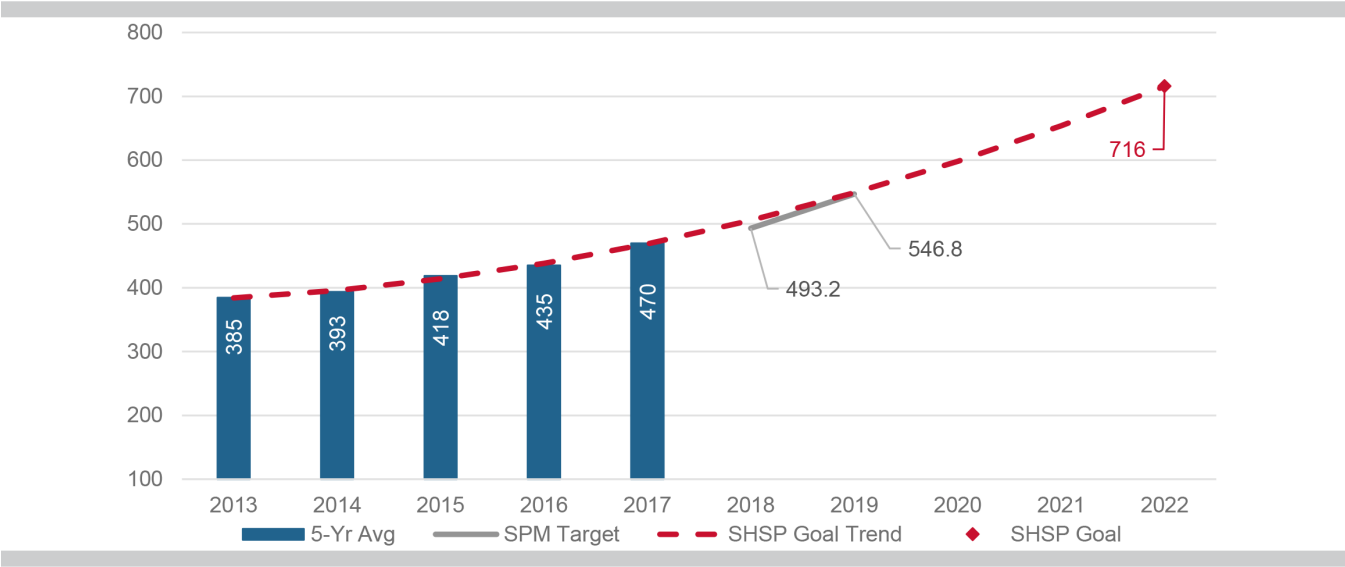


Table 3 - Assessment of 2014 SHSP Goals

Goal	2008-2012 Average	Goal Target/ Threshold	2013-2017 Average	Δ (2012 vs. 2017)	Goal Met?
Reduce the number of fatalities by 10%	1,004	903	996	-0.78%	✗
Reduce the rate of fatalities by 10%	1.42	1.28	1.32	-6.86%	✗
Reduce the trend of increasing serious injuries by not exceeding the 2012 total value of 7,574 (as an average)	6,887	7,574	7,227	4.94%	✓
Reduce the trend of increasing serious injury rate by not exceeding the 2012 total value of 10.65 serious injuries per hundred million vehicle miles traveled (as an average)	10.65	10.65	9.91	-9.77%	✓

As seen in Table 3, Tennessee achieved half of the goals set forth by the previous SHSP, both related to serious injuries. As discussed previously, increases in occurrences of fatalities and serious injuries can be attributed in part to the increased exposure on Tennessee's roadways over the assessment period. Conversely, the increased exposure (VMT) provided benefit when assessing the rates. While only the serious injury rate met the goal, it should be noted that there was significant progress toward reduction of the five (5) year average for the fatality rate. Since the previous SHSP update, the five (5) year average fatality rate dropped 6.9% from 1.42 (2008-2012) to 1.32 (2013-2017).

Over the past five (5) years, Tennessee has had many accomplishments related to transportation safety. They include the following:

- TDOT completed the Intersection Safety and Roadway Departure Action Plans, integrating systemic improvements into safety projects.
- The Tennessee Department of Transportation won two (2) National Roadway Safety Awards in 2013 for The J-Turn Experiment and 2017 for the Safety Project Evaluation.
- Tennessee was removed from FHWA's list of Intersection Focus States, indicating that the anticipated fatality rate as calculated by FHWA is greater than the actual fatality rate of statewide intersection-related fatalities.
- TDOT developed implementation plans for Data Driven Safety Analysis (DDSA) and Safe Transportation for Every Pedestrian (STEP).
- From 2015-2020, the Tennessee Highway Safety Office (THSO) awarded 2,398 grants totaling almost $125 million in federal grant funds for enforcement and education of highway traffic safety behavioral issues.
- In 2020, Tennessee achieved an impaired driving fatality rate of 0.30 and is now considered a low range state by the National Highway Traffic Safety Administration (NHTSA).
- In 2019, Tennessee achieved a seat belt usage rate of 91.75 percent, the highest on record. This study is conducted annually by the University of Tennessee Knoxville, Center for Transportation Research.
- In 2018, the THSO moved its paid media purchasing and creative services to another state entity — Tennessee Tech University (TTU), which has a vast amount of experience in traffic safety. This partnership allowed the THSO to avoid heavy markups from for-profit agencies, providing a significant cost savings, and to retain oversight of the contracting process.
- In August 2017, the THSO hosted its 30th annual Lifesavers Conference in Murfreesboro with over 750 registrants. The conference also celebrated the 50th anniversary of the THSO.
- The THSO executed an innovative enforcement campaign in 2017 to target distracted driving. It was called the Statewide Distracted Driving Enforcement Bus Tour. The sixth installment will occur in April 2020 under a new name, Operation Hands Free. Tennessee will partner with Georgia, a neighboring state, in this effort for the first time.
- In 2016, the THSO successfully transitioned from the Tennessee Department of Transportation to the Tennessee Department of Safety and Homeland Security. This move, by executive order of Governor Bill Haslam, strengthened the reach and impact of the THSO.
- Over the past five years, the THSO maintained almost 100% participation of law enforcement in its campaigns.
- Tennessee met its SHSP objective of integrating all written crash records into its statewide database, the Tennessee Integrated Traffic Analysis Network (TITAN), and established the capability to receive all crash reports in Tennessee electronically.
- From 2015-2020, TDOT continued to host the Tennessee Operations and Safety Conference. The annual conference brings together various safety partners from all Four E's to inform participants on issues, innovations, and trends relevant to transportation safety and operations. This conference has been ongoing since 2005.

Through a combination of these accomplishments and the individual efforts of our safety partners, Tennessee realized significant (five (5) percent or greater) reductions in severe injuries in comparison to the previous SHSP statistics (2008-2012), including the following decreases:

- Fatalities
  - Unrestrained Occupants (17%)
  - Teen Drivers (25%)
  - Impaired Drivers (18%)
  - Aggressive Drivers/Speeding (25%)
  - Roadway Departures (5%)

- Serious Injuries
  - Unrestrained Occupants (18%)
  - Teen Drivers (8%)
  - Impaired Drivers (10%)
  - Aggressive Drivers/Speeding (10%)
  - Train-Vehicle Crashes (50%)

Despite the notable reductions, the state still experienced an increase in the number of severe injuries when compared to the previous SHSP statistics. Continued efforts on the part of safety stakeholders are still needed to create new solutions to move closer to the adopted vision set forth by Toward Zero Deaths (TZD).

Toward Zero Deaths

With over 37,000 fatalities on the nation's streets and highways in 2017, roadway safety remains one of the most challenging issues facing the United States. The TZD initiative was created on the premise that even one death is unacceptable, and therefore, we must aspire to move toward zero deaths on our roadways.

The Toward Zero Deaths strategy is a data-driven effort focusing on identifying and creating opportunities for changing the culture and building a foundation of safety on public roadways. It involves multiple disciplines in its approach to improving safety but realizes that significant reductions in roadway fatalities cannot take place without a change in our values and behavior as a culture. Tennessee is proud to be one of over 45 states to adopt this strategy for the basis of their SHSP.

Update Process

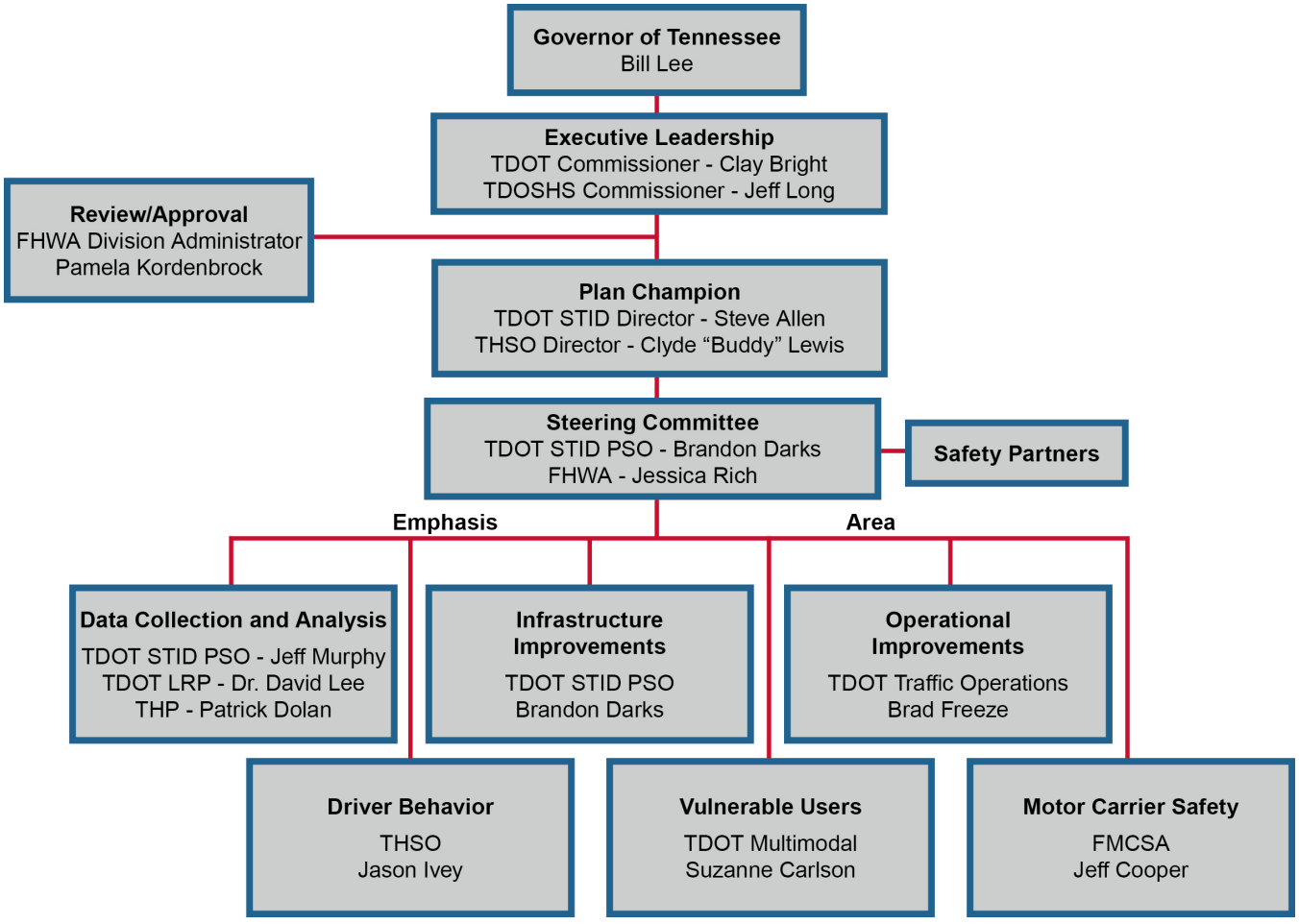
Created in November 2004, the Tennessee SHSP defines a system, organization, and process for managing the attributes of the road, the users, and the modes to achieve the highest level of highway safety by integrating the work of disciplines and agencies involved. These disciplines include planning, design, construction, operation, and maintenance of the roadway infrastructure (engineering); injury prevention and control (law enforcement, emergency response, and health education); those involved in modifying road user behaviors (education and enforcement); and the design and maintenance of vehicles.

Federal legislation passed in 2015 (The FAST Act) requires states to regularly update their plans in order to utilize HSIP funds. Current guidance is provided by A Champion's Guidebook to Saving Lives, Second Edition, which is published by the Federal Highway Administration (FHWA-SA-12-034). This update to the Tennessee SHSP was based on the principles established in 2004 and the guidelines of current legislation.

Organizational Structure

The current organizational structure in place for the SHSP update is shown in Figure 8. Following development of this update, the organizational structure is anticipated to change with the addition of an Executive Committee. The addition of the Executive Committee allows for more active and regular involvement of senior leadership from various safety stakeholders.

Figure 8 - SHSP Organization Structure



Steering Committee Collaboration

Coordination meetings were held to review the Plan update and discuss six (6) emphasis areas, including:

- Data Collection and Analysis
- Driver Behavior
- Infrastructure Improvement
- Vulnerable Road Users
- Operational Improvement
- Motor Carrier Safety

All meetings were open to all safety stakeholders. During each meeting, the following items were addressed:

- Review of the previous SHSP's content
- Review of 2013-2017 data relevant to contributing factors associated with the emphasis area
- Discussion of actions (projects, initiatives, etc.) currently ongoing or planned
- Discussion of known constraints and challenges

Data Analysis

Determination of the aforementioned emphasis areas and contributing factors adopted for the SHSP is based on a data-driven approach. The analysis uses crash data from 2013-2017. The 2013-2017 period represents the most recent five (5) year period of crash data whose fatality statistics have been finalized by NHTSA through the Fatality Analysis Reporting System (FARS) at the time of the update process.

Utilizing the 2013-2017 crash data, the number of fatalities and serious injuries associated with all contributing factors was developed. Their combined total was used to determine the candidates to be considered for inclusion in the SHSP. A fatality or serious injury could count toward more than one contributing factor, as it is common for more than one of the factors to be cited with a fatality or serious injury.

The primary data sources used in the assessment are provided in Table 4.

Methodology

The datasets were consolidated into a Microsoft Access database to allow for efficiency and flexibility with potential queries. Queries were developed to analyze crashes through an array of variables including contributing factor, age, gender, facility type, date, and time of day. Verification of consistency with the queries performed for the analysis was completed through coordination with the Tennessee Department of Safety and Homeland Security (TDOSHS). This validation is important to verify that no conflicting data is published with what is currently released by TDOSHS. The final data query definitions are included as part of the Supplemental Data.

The query results were compared to determine predominant commonalities with the fatal and serious injury crashes. The identified commonalities (contributing factors) were considered as candidates for inclusion in the SHSP. Additional queries for each contributing factor were developed to help establish relationships with the factor's occurrence with other conditions (road/weather conditions, time, age cohorts, etc.). Significant findings resulting from inspection of this data are mentioned in each emphasis area discussion. Full details of the results from the queries conducted can be found in the Crash Data Sheets in the Supplemental Data.

Table 4 - Fatal and Serious Injury Statistics Data Sources

Source	Provider	Usage
TN Dept. of Safety and Homeland Security (TDOSHS) Crash Database	TDOSHS	Primary source of crash data including contributing factors, person attributes, date, time, conditions, etc.
Fatality Analysis Reporting System (FARS)	NHTSA	Source for fatality related statistics
ETRIMS Crash Database	TDOT	Determination of functional classification
2014 TN Strategic Highway Safety Plan	TDOT	Previous plan statistics used for performance comparison
TDOT Highway Performance Monitoring System	TDOT	VMT data for fatality and serious injury rate statistics

Emphasis Areas and Contributing Factors

Determination of the emphasis areas and contributing factors to include in the SHSP is based on crash data analysis. Utilizing the 2013-2017 crash data, the number of fatalities and serious injuries associated with all contributing factors were determined. Their combined total established the candidates considered for inclusion in the SHSP. It should be noted that a fatality or serious injury could count toward more than one contributing factor as it is common for more than one (1) of the factors to be cited with a fatality or serious injury. The top contributing factors queried are shown in Table 5. All factors shown in the table were allocated to the emphasis area most closely related to the factor.

As shown in Table 5, a mixture of infrastructure- and driver behavior-related factors comprise the top five (5) factors with the most fatalities and serious injuries associated with lane and roadway departures. Additional analysis on each contributing factor shown is provided in the Crash Data Sheets located in the Supplemental Data.

In addition to contributing factors, the overall fatality and serious injury data was evaluated with respect to age and location to gain a better understanding of any predominant age groups or locations overrepresented in the severe injury statistics. Figure 9 shows a summary of fatalities and serious injuries per age group over the period assessed (2013-2017). As shown in the figure, younger drivers ages twenty-one (21) to thirty (30) accounted for the largest share of severe injuries.

Table 5 - Fatalities and Serious Injuries Percent of Total by Contributing Factors (2013-2017)

Contributing Factors Involved	Total # Fatalities (2013-2017)	Total # Serious Injuries (2013-2017)	Total	% of All Fatalities & Serious Injuries
All Severe Crashes	4,981	36,135	41,116	100.0%
Lane and Roadway Departure	3,024	17,011	20,035	48.7%
Intersections	1,063	11,646	12,709	30.9%
Unrestrained Occupants	1,731	5,621	7,352	17.9%
Senior Drivers (65+)	1,120	6,131	7,251	17.6%
Teen Drivers (13-19)	463	5,665	6,128	14.9%
Impaired Drivers	1,191	4,347	5,538	13.5%
Inattentive, Distracted, and Drowsy Drivers	339	4,802	5,141	12.5%
Aggressive Drivers/ Speeding	783	3,459	4,242	10.3%
Motorcycles	662	3,437	4,099	10.0%
Large Trucks	609	2,296	2,905	7.1%
Pedestrians	508	1,406	1,914	4.7%
Work Zones	75	587	662	1.6%
Secondary Crashes	59	343	402	1.0%
Bicycles	40	332	372	0.9%
Train-Vehicle Crashes	17	22	39	0.1%

Figure 9 - Severe Crashes by Age Group (2013-2017)

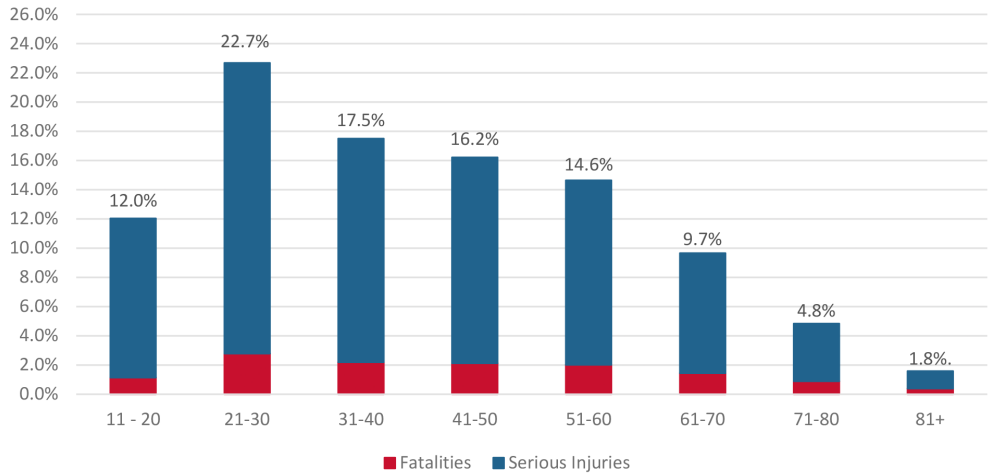


Figure 10 shows the distribution of fatal crashes by roadway classification from 2013 to 2017. The top three (3) facility types — urban arterials, rural collectors, and rural arterials — are consistent with the findings of the previous SHSP. The total percentage of crashes on rural arterials and collectors has been reduced by a combined seven (7) percent, while the percentage on urban arterials has increased by five (5) percent over the previous SHSP data.

Further investigation into fatalities by facility using the fatal crash rate paints a slightly different picture than what is shown in Figure 10. As shown in Figure 11, normalizing the number of fatal crashes with respect to VMT results in rural collectors and rural local roads having the two (2) highest rates (fatal crashes per 100 million vehicle miles traveled), exceeding any of the other facilities considered under this analysis. Overall, the order shown in Figure 11 has not changed since the previous plan, indicating again that focus on rural roads – particularly collectors, local roads and arterials – is still warranted and will still provide significant improvement in user safety.

Figure 10 - Severe Crashes by Roadway Classification

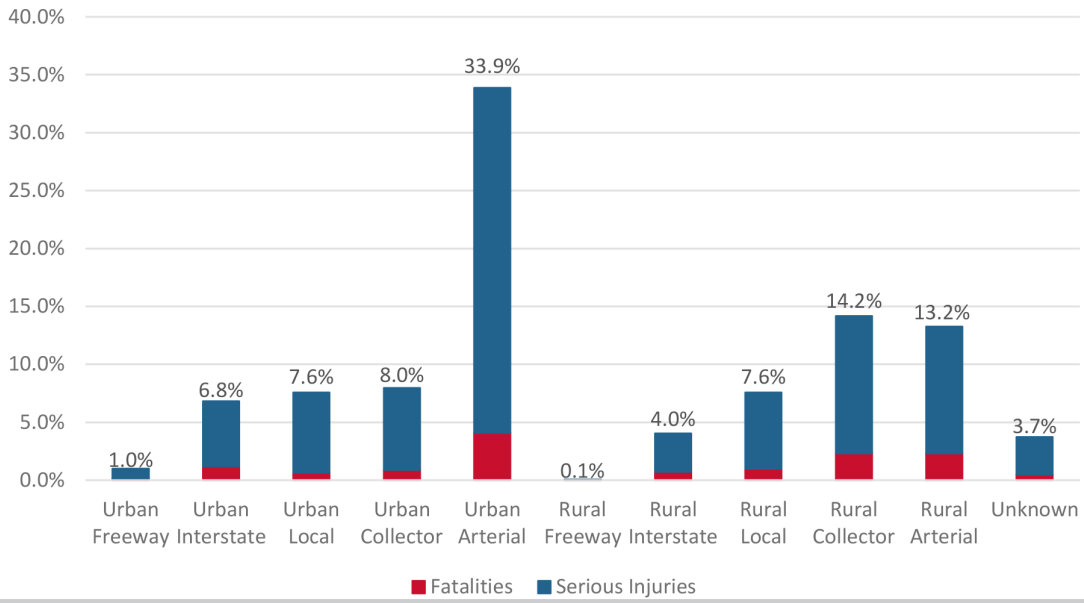
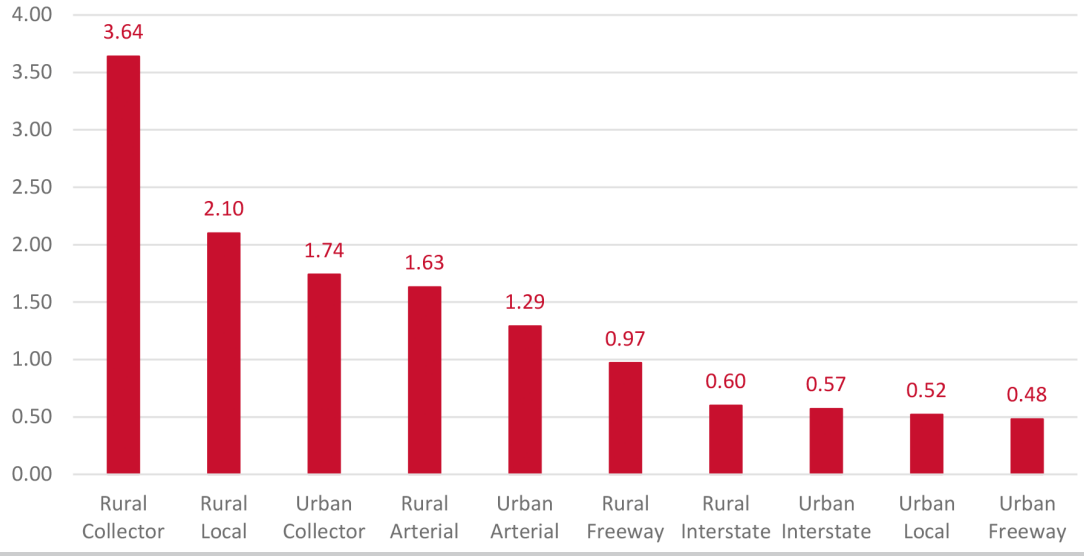


Figure 11 - Fatal Crashes with respect to VMT (2013-2017)



Other Criteria

Based on requirements of current legislation, the Steering Committee considered the following additional factors during development of the emphasis area strategies and countermeasures.

- Findings from previous road safety audits
- Locations of fatalities and serious injuries and locations that present risk for potential crashes
- Crashes with fatalities and serious injuries to bicyclists and pedestrians
- Cost effectiveness of improvements
- Improvements to railroad crossings
- Safety on local roads

Plan Update

Based on review of the safety data and criteria above, the Steering Committee confirmed inclusion of the emphasis areas previously identified during the update process. Goals, objectives, and key strategies were identified for each of the emphasis areas.

Because crashes can involve multiple contributing factors (human, infrastructure, environment, etc.), key strategies related to more than one of the Four E's were utilized to provide a comprehensive solution that mitigates identified safety concerns. This basic strategy is a basis of the SHSP's mission statement.

The Plan was further refined by distributing it to other organizations and agencies with specific interest in highway safety in Tennessee. This group includes the SHSP safety partners as illustrated in the organization chart in Figure 8. Safety partners received a copy of the plan with a request for comments and their assistance in implementing the plan. Comments received were incorporated into the SHSP update.

Special Rules

Per legislative requirements, two (2) special requirements must be addressed by the SHSP update. Discussion of each of the requirements and related analysis is provided in the sections below.

High Risk Rural Roads

Inclusion of the definition of "High Risk Rural Roads" in the SHSP update became a requirement under MAP-21 and is continued by the FAST Act. Tennessee defines a High Risk Rural Road (HRRR) as "any roadway functionally classified as a rural major or minor collector or a rural local road with significant safety risks."

Specific to the SHSP update, no statistical data or calculation is required to accompany the definition. However, it should be noted that an annual assessment of fatalities and serious injuries on these roadway is currently conducted to determine if the HRRR Special Rule established under the FAST Act is triggered. If it is found that the HRRR Special Rule applies to a State, legislation requires the State obligate an amount equal to 200 percent of its Fiscal Year (FY) 2009 high risk rural roads set-aside for high risk rural roads, as defined in their State SHSP.

Older Driver and Pedestrian Safety

This statute, originally enacted by MAP-21 and continued by the FAST Act, focuses on the fatalities and serious injuries per capita incurred by drivers and pedestrians over the age of sixty-five (65). The related required assessment is conducted on the most recent two (2)-year period of available data (2010-2014 and 2012-2016). If an increase is found to have occurred during the assessment period, the State shall be required to include, in the subsequent SHSP of the State, strategies to address the increases in those rates, taking into account the recommendations included in the publication of the FHWA's *Handbook for Designing Roadways for the Aging Population*.

The analysis conducted to satisfy this requirement for Tennessee utilized data from 2010-2016. A summary of the analysis is provided in Table 6.

Table 6 - Per Capita Senior Road Users (Age 65+) Calculation Summary

Year	Senior Driver Fatalities	Senior Pedestrian Fatalities	Population (1,000s)	Senior Fatality Rate (per 1,000 seniors)	5 Year Average
2010	157	9	860	0.19	
2011	145	9	879	0.18	2010-2014
2012	163	9	921	0.19	0.189
2013	177	15	950	0.20	
2014	167	20	987	0.19	2012-2016
2015	167	14	1016	0.18	0.192
2016	187	23	1045	0.20	

As shown in the table, the 2012-2016 five (5) year average for senior fatality rates is greater than that for 2010-2014. Therefore, the mandate set forth by this rule will apply to the SHSP update.

Data Collection and Analysis Emphasis Area

Background and Overview

Accurate and comprehensive data provides the basis of a successful traffic safety program. During the SHSP update process, datasets pertaining to crash records, roadway inventories, and demographics are essential to determine safety concerns, underlying factors related to crashes, and relationships of demographics and locations to overrepresented numbers of fatalities and serious injuries. Following development of the SHSP, the same data becomes a valuable project tool allowing engineering professionals to identify safety concerns, law enforcement to focus attention on high risk areas, and all safety partners to focus on the goal of reducing severe crashes on Tennessee's roadways. Analysis of the data, both through historic and predictive analysis, offers safety partners the ability to determine benefit (both potential and actual) of a given countermeasure and to be proactive with decision making pertaining to projects and programs related to safety.

Current Data Collections

Crash Records

The Tennessee Integrated Traffic Analysis Network (TITAN) is a suite of tools developed for the electronic collection, submission and management of all traffic safety-related data in Tennessee. It consists of a centralized data and document repository for public safety information managed by the Department of Safety & Homeland Security.

TITAN was designed to accept reports submitted by law enforcement agencies, validate the data contained within the report for completeness and accuracy, and then store the information for analysis. The TITAN repository also creates document images of submitted reports and retains them for future access and records retention requirements. This information is used to make data-driven decisions and help make Tennessee a safe and secure place in which to live, work, and travel.[2]

Meeting a goal of the previous SHSP update, the state mandates and requires all law enforcement in the state to electronically submit crash reports to the TITAN database. This, along with efforts to manually log paper crash reports previously recorded, allows the TITAN database to become a comprehensive, real-time repository for crash records statewide. Through use and inspection of the resulting datasets, both TDOSHS and TDOT recognize the need for the following improvements to TITAN and analysis of its data:

- Improve the quality of the data provided by the crash reports
- Improve the consistency of the crash reporting with all agencies statewide
- Establish a method to perform quality assurance and quality control on the data received

Roadway Network Data

Correlating roadway network data (geometry, volumes, etc.) with crash records is an essential element for safety issue identification. TDOT has developed and maintains the Enhanced Tennessee Roadway Information Management System (ETRIMS) that serves as a repository for roadway characteristics including but not limited to traffic volumes, horizontal geometry, functional classification, and roadway section information. Recently, ETRIMS became a web-based application for increased user functionality. Future updates are planned for ETRIMS to improve its functionality and capabilities. These include enhanced mapping capabilities and an increased ability to pull data from TITAN in a less cumbersome and more frequent manner. A request for proposal (RFP) for development of a software with such functionality is currently planned for 2020 with planned implementation of the software at a date to be determined once a vendor is selected.

ETRIMS is a valuable tool for practitioners conducting crash analysis. The data contained within the repository is routinely used by TDOT to consider locations as candidate projects under the HSIP. TDOT's Strategic Transportation Investments Division (STID) Project Safety Office uses ETRIMS data along with crash information imported from TITAN to determine crash rates of candidate locations. During project development, the database provides information such as current signing installed, guardrail locations, log mile references, speed limits, and the cross section of the roadway at the project location.

Work Zone Data

The Work Zone Safety and Mobility Rule (23 CFR 630 Subpart J) (Rule), effective since October 12, 2007, requires the development and implementation of an overarching policy for state and local agencies using federal funding aimed at the reduction of crashes and congestion in work zones. This translates into an agency making use of field observations coupled with relevant data (crash records, speed data, traffic volumes, etc.) to assess and analyze any potential safety or operational concern. At a project level, this process allows for mitigation of a specific concern in a timely fashion. Collectively, the data, concerns identified, and mitigations used can help shape an agency's policies and create a best practice that mitigate known issues and fosters safe and efficient mobility through the work zone.

These efforts are resulting in an increase in roadway projects and, therefore, work zones. The presence of a work zone changes the nature of a roadway and behavior of the motorists traveling on it through many factors, including but not limited to reduction in the number of travel lanes, posted speed, and shoulder width/ availability.

Efforts to combat safety concerns spawning from work zones will be addressed in the Operational Improvements Emphasis Area. To support these efforts, accurate identification of severe crashes occurring in active work zones during crash reporting is essential. The responsibility of proper identification rests with the law enforcement officer conducting the crash investigation. Additionally, maintaining the location, start, end, and duration of a work zone in TDOT's Program Project Resource Management (PPRM) System would give analysts the ability to pull crashes in the active work zone to assess issues.

Data Analysis

As is evidenced in the previous discussion, the State requires an effective data gathering and processing procedure that coordinates independent data sets to achieve statistical consistency. Historically, relevant data sources were used and linked using the crash case number as common data forming a crash database. This database provides safety practitioners the statistical data needed for identification of crash-related trends and issues. The genesis of the specific statistics provided as part of this update can be found in the Supplemental Data.

Beyond the SHSP update, the need for analysis of crash data remains, whether it be for countermeasure evaluation or assessment at the project level. Aside from statistical development, crash analysis focuses on two (2) primary calculations: crash rate analysis using historic crash data, and predictive calculation of crash frequency using methodology set forth by the Highway Safety Manual (HSM).

Crash Analysis Using Historic Data

Development of crash rates based on historic data is a commonly used method to determine if a location qualifies for HSIP funding and to determine the safety impact of a project through comparison of pre- and post-improvement implementation. The analysis conducted under this method produces crash rates expressed in crashes per one hundred million vehicle miles for segments and crashes per one million vehicles entering for intersections. While this method does not allow for prediction of how a location will perform based on a proposed improvement, it does allow for an accurate account of how the location currently performs as it uses actual crash experience as a factor. It is anticipated that this method will continue to be utilized by safety professionals (engineers, law enforcement, etc.) for these functions.

Predictive Analysis

In 2010, the HSM was published, providing a means to quantitatively predict the impact on the number of crashes based on the improvements or modifications proposed to a roadway segment or intersection. The impact realized by the improvements is determined through comparison of the calculated crash frequency of the current conditions versus that of the roadway with the improvements implemented. For the calculation, the HSM methodology utilizes Crash Modification Factors (CMFs) to adjust crash prediction to reflect the current or proposed field conditions. Additionally, a calibration factor is typically applied in the equation to adjust for regional conditions. The resulting crash frequencies calculated for existing and proposed conditions are compared to provide a quantitative measure of anticipated safety benefit. It should be noted that the calculated benefit is an estimate and is considered a useful tool during the planning process for the purpose of alternatives comparison or justification of a design exception.

Currently, Tennessee is developing CMFs and calibration factors to allow for realistic calculations that align with safety benefit results experienced by previous projects statewide. Development of these factors will allow for greater accuracy of the predicted impact, thus allowing safety professionals a more realistic understanding of benefits early in the project development process. This allows for adjustments during planning for the sake of increasing the safety benefit of a project. Additionally, calculation of project safety benefits helps with determination of expected impact to fatality and serious injuries for the purpose of setting annual safety performance measure targets.

SHSP Evaluation Data

Pushing toward real-time, accurate, and comprehensive data also provides the ability to create statistics that will aid in the evaluation of a specific countermeasure. All actions (projects, campaigns, initiatives, etc.) associated with a given strategy need a measurement of effectiveness (MOE) to determine success or failure of the action. As the data becomes more accurate and robust, conducting a quantitative assessment using meaningful MOEs for a given action will become easier. For this, the need to establish logical MOEs for countermeasures based on data availability and development of a consistent procedure for the extraction and analysis of the identified MOE is paramount to effective evaluation of countermeasures.

Strategies

Topics of concern along with the associated mitigation strategies are provided below. Strategies relevant to this emphasis area will differ from ones identified in other emphasis areas as they do not focus on directly driving down the number of fatalities and serious injuries. The strategies cited below are geared toward improving the data that support other emphasis areas, aiding in problem identification, and providing for evaluation of countermeasures.

1. Improve traffic data collection systems, hardware, and technology to provide data in a more timely and efficient manner.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.1	Improve the quality and accuracy of crash reports by improvement of uniform reporting standards, improving the ease of use for officers, and switching reporting to a web based platform.	TRSP	TDOSHS	• Establishments of new standards • Deployment of web based reporting platform	Enforcement
1.2	Expand TITAN to improve timeliness and accuracy of data collection, analysis processes, and consistency with FARS data and other traffic safety data systems including the linkage of crash, roadway, driver, medical-injury surveillance system and ambulance and trauma system, enforcement, conviction, criminal, and homeland security data.	TRSP	TDOSHS	• Number of completed linkages of TITAN to other State datasets	Enforcement
1.3	Conduct periodic training for officers to improve the operational readiness of the THP and all local law enforcement agencies investigating crashes that occur on Tennessee roadways. Include training on data collection, submission, analysis, definitions, importance, and appropriate uses for traffic safety data.	HSP	TDOSHS	• Number of training provided	Education Enforcement
1.4	Establish a process for quality assurance/quality control (business checks) of data uploaded to TITAN	HSIP	TDOSHS	• Establishment of uniform statewide requirements	Enforcement
1.5	Integrate ETRIMS Database for efficient and consistent analysis of current data by TDOT for safety analysis conducted by TDOT and TDOSHS.	HSIP	TDOT	• Uniform reporting with TITAN database	Engineering

1. Improve traffic data collection systems, hardware, and technology to provide data in a more timely and efficient manner.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
1.6	Continue work to update the TDOT Linear Reference System (LRS) for locating crashes, improving crash data recorded locations, and identifying potential safety projects	HSIP	TDOT	• Integration of map based location capture for crash reporting • Percent of incorrectly located crashes • Availability of ETRIMS data for integration to TITAN to integrate LM reference in crash reports	Engineering
1.7	Distribute data-driven statistics (utilizing predictive analytics) indicating the days and times most alcohol related crashes are occurring to each district captain on a weekly basis.	HSP	TDOSHS	• Provision of regular reporting	Enforcement
1.8	Continue to expand local partner agencies' participation in the collection and use of crash information with focus on rural county law enforcement and highway officials through promotion and education of ETRIMS, TITAN, and MAP-IT by TDOSHS and TDOT.	HSP	TDOT TDOSHS	• Number of agencies educated	Engineering Enforcement Education
1.9	Complete collection of mandatory fundamental data elements (FDE) for Model Inventory of Roadway Elements (MIRE).	HSIP	TDOT	• Completed collection of FDE	Engineering

2. Improve data collection in the field and data distribution to expedite and improve delivery of relevant data for safety analysis, infrastructure improvements, and law enforcement.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
2.1	Develop an online crash instructional manual with data definitions defined by Model Minimum Uniform Crash Criteria (MMUCC), ANSI D-20 and D-16, FARS and SafetyNet criteria.	HSP	TDOSHS	• Completed manual available via the internet	Enforcement, Education
2.2	Complete integration and upgrade of crash related databases with other relevant state databases.	HSIP	TDOT	• Completion of integration and upgrade of databases	Engineering
2.3	Conduct an annual supervision and leadership class for all new supervisors and selected troopers on developing and using enforcement plans utilizing traffic records data.	HSIP	TDOSHS	• Conduction of yearly class	Enforcement, Education
2.4	Expand data collection of work zone related crashes in TDOT PPRM (Program, Project and Resource Management), integrate work zone crashes in ETRIMS and TITAN.	HSIP	TDOT	• Successful integration of PPRM and work zone crash data in ETRIMS	Engineering

3. Enhance the ability of and encourage the use of predictive safety analysis for Tennessee roadway projects.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
3.1	Continue to support research projects for the purpose of developing Crash Modification Factors (CMF) specific to Tennessee.	HSIP	TDOT	• Number of CMFs developed	Engineering
3.2	Conduct outreach and training opportunities for safety practitioners for proper use and development of quantitative safety analysis using the Highway Safety Manual (HSM) methodology and its role in project development.	HSIP	TDOT TTAP	• Number of training and outreach opportunities conducted	Engineering, Education
3.3	Research, selection, and deployment of a software package that utilizes Highway Safety Manual methodologies to allow for quantitative safety assessment of roadways by safety practitioners.	HSIP	TDOT	• Deployment of Software	Engineering

Driver Behavior Emphasis Area

Background and Overview

Often, safety on our roadways is ultimately reliant on drivers' capabilities, limitations, and behavior. This emphasis area focuses on six (6) contributing factors identified through analysis that fall into one of two categories:

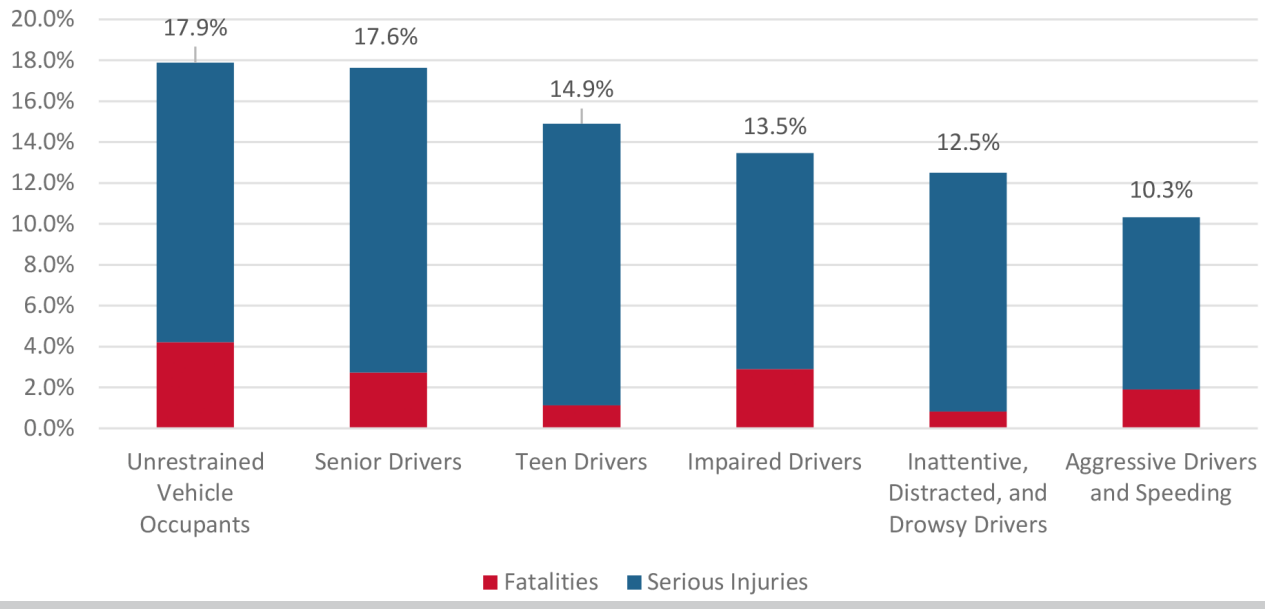
- Pertain to a specific behavioral characteristic (Unrestrained Vehicle Occupants, Impaired Drivers, Aggressive Driving and Speeding, and Inattentive, Distracted and Drowsy Drivers)
- A person group that exhibits consistent behavioral characteristics (Senior and Teen Drivers)

The percentage of fatalities and serious injuries where a given factor was cited for the data assessed is provided in Figure 12. Combined, these factors were associated with 35,652 of a total of 41,116 fatalities and serious injuries from 2013 to 2017.

Under the commitments made in the previous SHSP, Tennessee endeavored to address negative behavior and foster good driving habits through the following:

- **Targeted Enforcement Campaigns -** Concentrated enforcement of laws specific to a negative driving behavior. The location and time of year to conduct these campaigns is determined through predictive analysis based on historic data to determine "hot spots."
- **Road Safety Audits -** RSA projects address various safety concerns along routes with a crash experience that meets or exceeds that state's criteria for inclusion under HSIP funding. Coordination and collaboration with local law enforcement is conducted during the RSA development for discussion of enforcement and education actions that address behavioral related traffic safety concerns.
- **Increase Public Awareness -** Actions geared toward raising public awareness of negative driver behaviors during relevant events or times of year through radio, television, internet, and print media.
- **Education of Teen Drivers -** Engage teen drivers to provide activities, guidance, and information to encourage positive driving habits and smart driving decisions through programs such as Reduce TN Crashes and Checkpoints.
- **Passage of The Hands Free Tennessee Law -** On July 1, 2019, the State of Tennessee enacted a law that prohibits drivers from using any part of their body to support a cellphone or other wireless communication device, watching a video or movie, text messaging activities (writing, sending, or reading), and recording/broadcasting video on an electronic device.

Figure 12 - Fatalities and Serious Injuries by Driver Behavior (2013-2017)



Unrestrained Occupants

Figure 13 shows the fatalities and serious injuries attributed to unrestrained vehicle occupants from 2013 to 2017, with no significant change during the study period. During this period, 1,731 fatalities (35%) and 5,621 serious injuries (16%) involved unrestrained occupants statewide. Since the previous period (2008-2012), unrestrained occupant fatalities have decreased by 17%. Nationally, the percentage of crash-related fatalities linked to unrestrained vehicle occupants was 47% in 2017.[4]

A statewide observational survey was conducted to determine "All Vehicle" restraint usage rate. The surveys findings revealed an occupant restraint user rate of 88.5% in 2017, slightly lower than the national average of 89.7%.[4] Figure 14 shows the seatbelt usage rate from 2013 to 2017.[5] Since the previous period (2008-2012), the seatbelt usage rate increased by 3.87%. This modest increase in seatbelt usage correlates with the recent decline in unrestrained occupant fatalities.

Figure 13 - Unrestrained Vehicle Occupants-Related Fatalities and Serious Injuries (2013-2017)

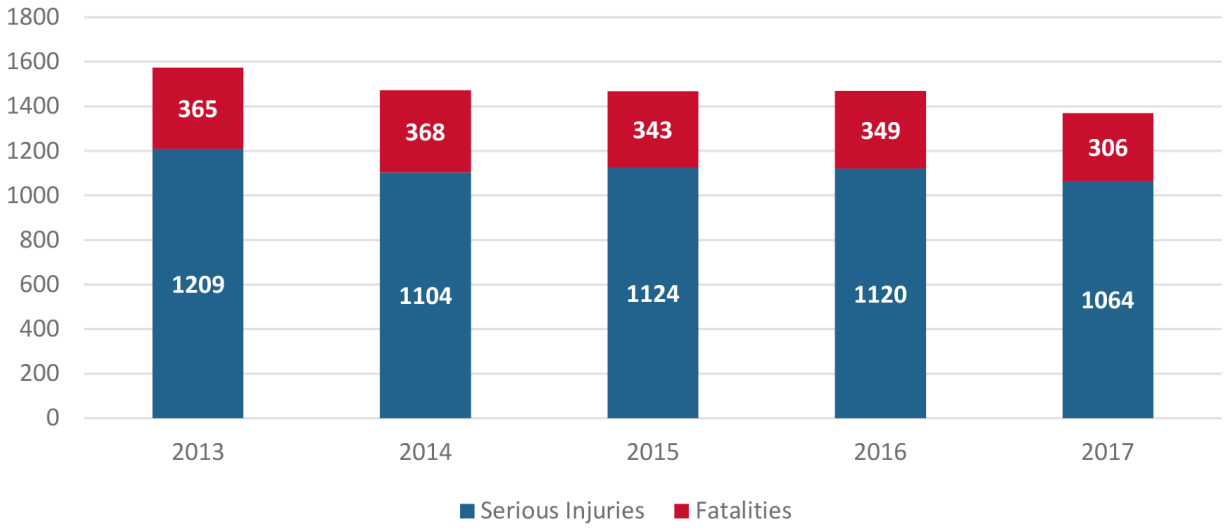
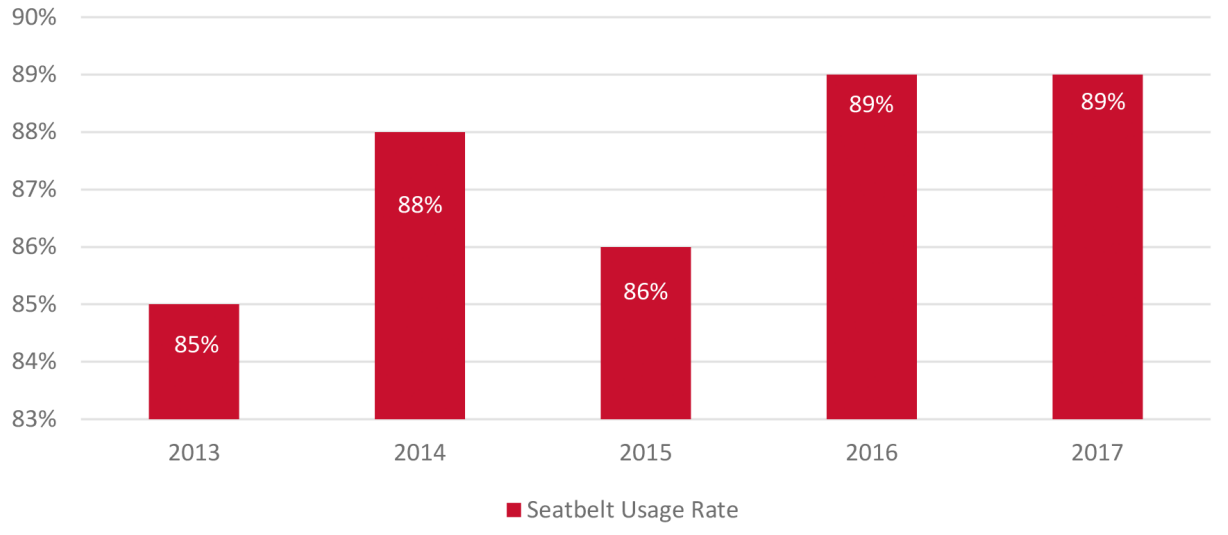


Figure 14 - Seatbelt Usage Rate (2013-2017)



Additional investigation was performed to determine any significant trends. Notable observations include the following with regard to unrestrained occupant related severe crashes:

- Approximately 24% of the people involved in severe crashes citing unrestrained occupants were between the ages of twenty-one (21) and thirty (30)
- Severe crashes are split evenly between rural and urban roadways
- Approximately 48% of the severe crashes were cited as single vehicle crashes (lane and roadway departures)
- Approximately 54% of fatalities and serious injuries occur in the afternoon into the early evening (noon to 9 p.m.) with the highest frequency occurring from 3 p.m. to 6 p.m.

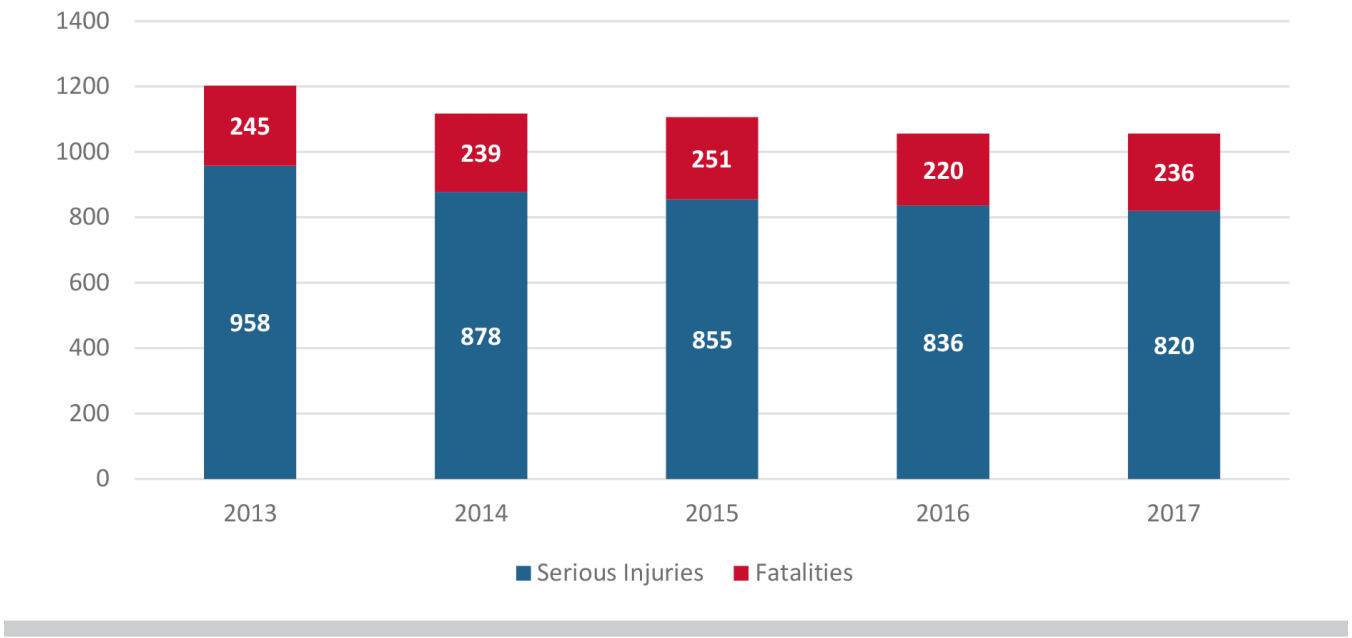
Current crash record data does not show the seated positions of occupants who suffered fatality or serious injury. This is significant as drivers, front seat passengers, and children under the age of eighteen (18) are required by law to use a seatbelt. The law does not currently apply to rear-seated adults, leaving the potential of legally unrestrained vehicle occupants exposed to crashes.

Impaired Driving

Impaired driving has the highest proportion of fatalities to total severe crash incidents, where 25% of severe crashes involving an impaired driver result in a fatality. It is important to consider that impaired driving is not just limited to driving under the influence of alcohol. Impairment includes substances that, while legal, still diminish a driver's ability and make driving ill advised. Prescription drugs and the potential legalization of marijuana would fall into this category.

Figure 15 shows the fatalities and serious injuries where impaired driving was a contributing factor from 2013 to 2017. As seen in the figure, the numbers remained relatively consistent during the study period: 1,191 (24%) of the total fatalities and 4,347 (12%) of the total serious injuries involved impaired driving. Since the previous study period (2008-2012), impaired driving fatalities have decreased by 18%. In 2017, the national percentage of fatalities due to driving under the influence was 29%, well above the statewide average.[6]

Figure 15 - Impaired Driving Fatalities and Serious Injuries (2013-2017)



Both the averages of fatalities and serious injuries related to impaired driving showed significant reduction in comparison to the previous plan, with only a slight decrease experienced by both. Additional observations from review of the impaired driving-related crash data include the following:

- Approximately 49% of drivers involved in severe crashes were between the ages of twenty-one (21) and forty (40)
- Severe crashes are split evenly between rural and urban roadways 51% rural, 49% urban)
- Approximately 50% of severe crashes occur during nighttime (6 p.m. to 3 a.m.)
- Lane and roadway departures are associated with 63% of the severe crashes

Senior Drivers

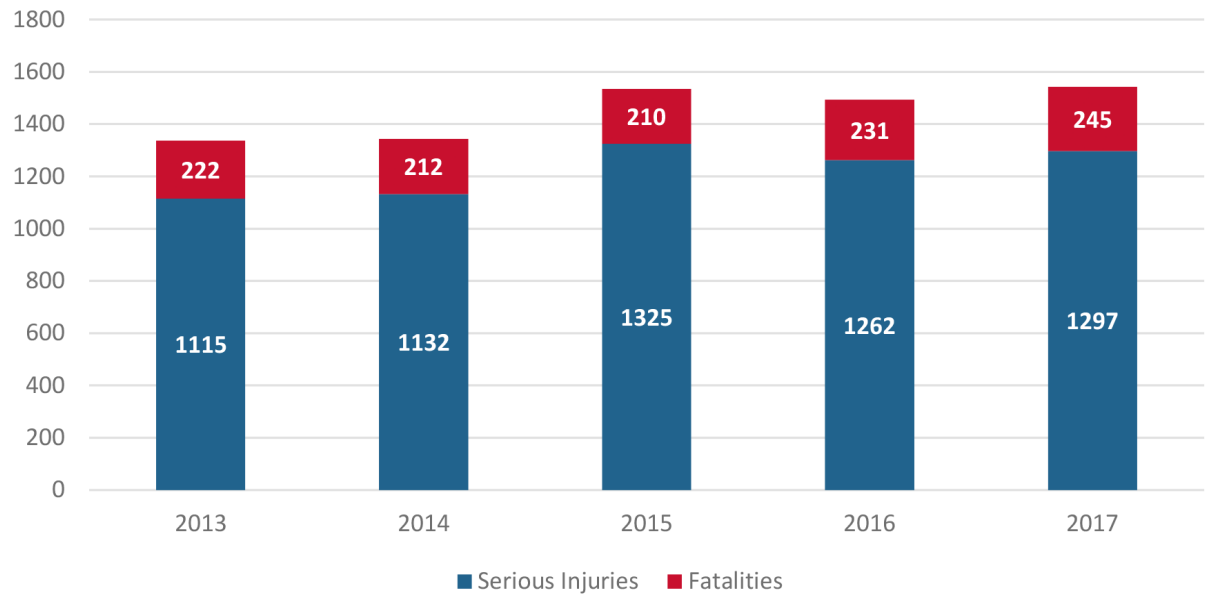
Senior drivers are significantly overrepresented in vehicle crashes in Tennessee. The risk for continued over-representation in incidents involving senior drivers is anticipated to increase as the state is expected to experience large growth in the senior population in the near future, with up to a 40% increase in rural communities. The potential for a senior driver or vehicle occupant to be severely injured in a crash due to their frailty. Fortunately, many senior drivers self-regulate, avoiding high-traffic driving times and limiting nighttime driving. However, with an aging population, further precautions may be required.

Figure 16 shows the fatalities and serious injuries involving senior drivers from 2013 to 2017, with a slight increase during the study period. During this period, 1,120 fatalities (23%) and 6,131 serious injuries (17%) involved senior drivers statewide. Since the previous period (2008-2012), senior driver-related fatalities increased 21%.

Further assessment of the crash data provided the following insights:

- Fifty-nine (59) percent of the senior related crashes occurred on urban roadways
- Forty-three (43) percent of the severe crashes involving senior drivers occurred at an intersection
- Approximately 38% of all severe crashes were angle crashes
- Roadway and lane departure crashes were associated with 25% of the severe crashes
- Approximately 72% of severe crashes occur between 9 a.m. and 6 p.m. The frequency of severe crashes is evenly spread through this period

Figure 16 - Senior Driver-Related Fatalities and Serious Injuries (2013-2017)



A senior driver faces many challenges when driving. From a physical standpoint, the reflexes, vision, and cognitive abilities of an individual typically decline, which increases the safety risk associated with seniors driving in congested conditions or on unilluminated roadways. Although new technologies like ridesharing, dashboard touch screens and smartphones have the potential to aid senior drivers, they may also serve as a distraction. Excessive reliance on technology or difficulty embracing new technologies needs to be addressed so that senior drivers are safer on the road in this digital age.

Speeding and Aggressive Driving

Aggressive Driving

The American Automobile Association (AAA) defines aggressive driving as "any unsafe driving behavior, performed deliberately and with ill intention or disregard for safety." Aside of speeding, examples of aggressive driving behaviors include:

- Tailgating
- Cutting in front of another driver and then slowing down
- Running red lights
- Weaving in and out of traffic
- Changing lanes without signaling
- Blocking cars attempting to pass or change lanes
- Using headlights or brakes to "punish" other drivers[7]

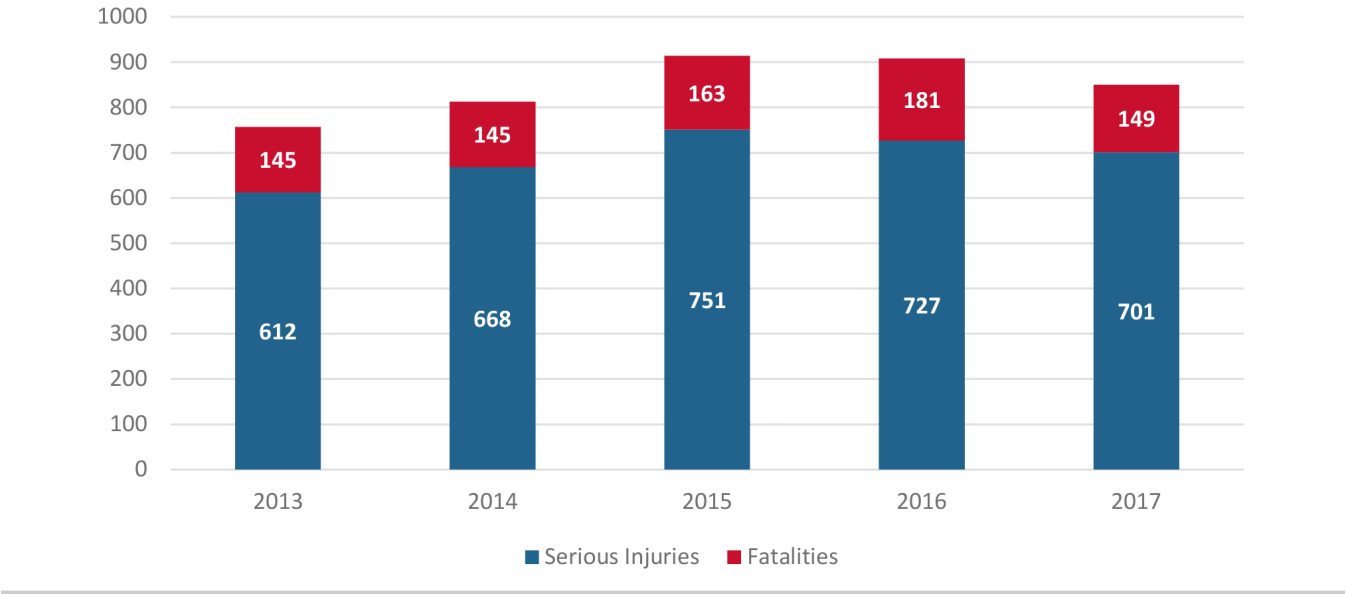
Combined, speeding and aggressive driving-related fatalities have decreased by 25% when compared to the previous SHSP statistics. However, current analysis shows that speeding and aggressive driving are still linked to approximately 10% of all fatalities and serious injuries. Figure 17 shows the fatalities and serious injuries attributed to aggressive driving and speeding from 2013 to 2017. During this period, 783 of the total fatalities (16%) and 3,459 of the total serious injuries (10%) involved aggressive driving and speeding statewide. Nationally, speeding was related to 26% of all traffic fatalities.[4]

Similar to the previous update, speeding remains the biggest contributing factor when analyzing severe crashes due to aggressive driving. Per TDOSHS statistics, speeding accounts for 85% of aggressive driving-related fatal crashes.

Additional statistics related to severe crashes where speeding and aggressive driving were factors include the following:

- Approximately 55% of fatalities and serious injuries occurred on urban roadways. For rural routes, 12% of fatalities and serious injuries occurred on locally classified roadways
- Approximately 29% of severe crashes involved drivers ages twenty-one (21) to thirty (30)
- Male drivers are over three times more likely to be involved in an aggressive driving- or speeding-related severe crash

Figure 17 - Speeding and Aggressive Driving-Related Fatalities and Serious Injuries (2013-2017)



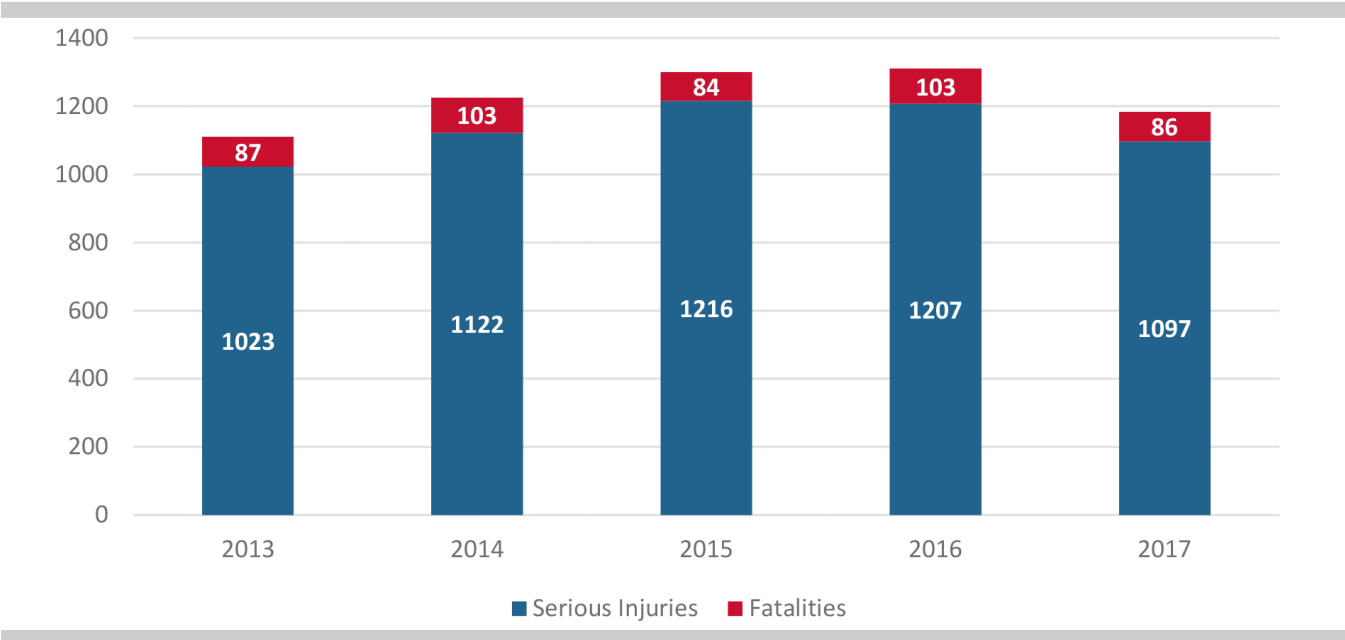
- About 49% of the severe crashes occurred along a horizontal curve
- Approximately 62% of the severe crashes occurred between noon and midnight with a slight increase in frequency during the 3 p.m. to 9 p.m. time frame
- Approximately 63% of the severe crashes were cited as roadway and lane departures
- Approximately 24% of the severe crashes occurred during nighttime hours in areas that were not lit by street lighting

Teen Drivers

As discussed previously, the number of fatalities and serious injuries involving drivers ages thirteen (13) to nineteen (19) decreased approximately 10% since the previous SHSP update. The improvement in younger driver safety could be attributed to advancements in automobile safety technology, increased seat belt usage, education and outreach efforts, or eliminating their need to drive through use of ridesharing apps like Uber and Lyft. While texting and driving is a safety concern for all drivers, it has only been linked to 6.3% of severe crashes involving young drivers statewide.[8]

Despite the decrease in severe injuries, young drivers are still overrepresented in fatality and serious injury statistics, with teen drivers accounting for 5.3% of Tennessee's driver population but are associated with 14.9% of severe crashes over the period assessed for the SHSP update. Figure 18 below shows the fatalities and serious injuries attributed to young drivers from 2013 to 2017, with a slight increasing trend but a decrease in 2017. During this period, 463 fatalities (9%) and 5,665 serious injuries (16%) involved young drivers statewide.

Figure 18 - Teen Driver-Related Fatalities and Serious Injuries (2013-2017)



An initial evaluation of the crashes involving young drivers was conducted to identify trends. The statistics created for the evaluation are provided in the Supplemental Data. Through this investigation, the following observations were made:

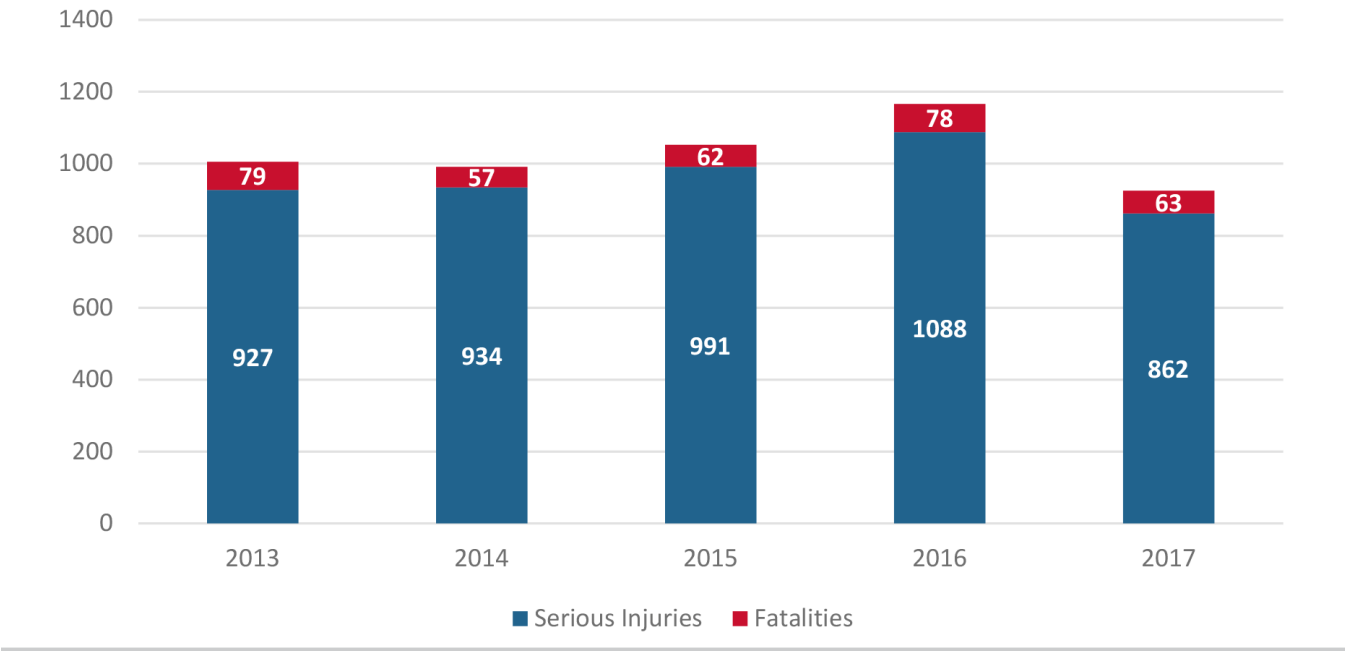
- Less than 10% of teens involved in severe crashes were impaired
- Approximately 56% of fatalities and serious injuries occurred on urban roadways. For rural routes, 10% of fatalities and serious injuries occurred on routes classified as local roadways
- Over half of the fatalities and serious injuries occur in the afternoon into the early evening (noon to 9 p.m.) with the highest frequency occurring from 3 p.m. to 6 p.m. This aligns with the typical school dismissal time and afternoon peak traffic conditions
- Approximately 35% of the severe crashes occur at an intersection
- Angle crashes account for 28% of the severe crashes involving teens
- Approximately 39% of the severe crashes were cited as a lane or roadway departure
- Young male and female drivers have roughly equal occurrences of serious injuries, but young male drivers have almost 2.5 times more fatalities than young female drivers

Inattentive, Distracted and Drowsy Drivers

While inattentive, distracted and drowsy drivers (IDAs) only account for 9% of fatalities from 2013 to 2017, these issues are worth addressing due to the prevalence of digital communication devices. According to a Carnegie Mellon University study, driving while using a cellphone reduces the amount of brain activity associated with driving by 37%. With the recent legislation that bans use of hand-held devices while operating a vehicle enacted July 1, 2019, new data will determine the seriousness of the issue. Due to complexity associated with the identification of a driver's inattention, distraction, or drowsiness, potential for underreporting of this factor remains high. Continued enforcement and diligent reporting is necessary for this legislation to be a success.

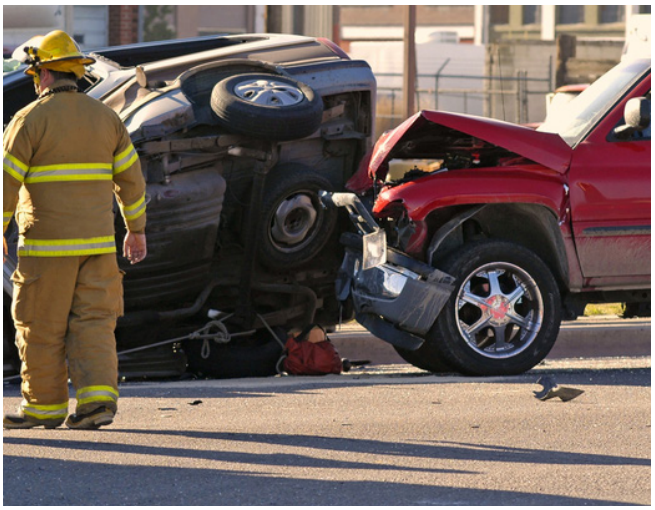
Figure 19 below shows the fatalities and serious injuries attributed to inattentive, distracted and drowsy drivers from 2013 to 2017, with no discernible trend. During this study period 339 fatalities (7%) and 4,802 serious injuries (13%) involved inattentive, distracted and drowsy drivers statewide. As there were no statistics on this driver characteristic in the previous period, there is no recorded change in severe crashes.

Figure 19 - Distracted, Inattentive, and Drowsy Driver-Related Fatalities and Serious Injuries (2013-2017)



Further review of the statistical information provided the following observations:

- Sixty-eight (68) percent of the severe crashes occurred on urban roadways
- One-third of the severe crashes occurred at an intersection
- Approximately 24% of the severe crashes involved drivers ages 21 to 30
- Lane or roadway departure was cited for 31% of the reported crashes
- Approximately 36% of severe crashes were rear ends collisions



Goal and Objectives

Emphasis Area Goal:	To provide a safer environment for all modes of transportation in Tennessee through education of Tennessee's driver population and improvement of law enforcement efforts.
Emphasis Area Objective(s):	Reduce the number of fatalities and serious injuries linked to driver behavioral factors. Promote safer driving practices through a combination of education and enforcement activities.

Strategies

The following strategies target driver behavior and improve roadway safety. While these strategies will be applied statewide, additional data analysis and agency coordination will be performed to identify ways to target these focus areas under this plan.

1. Reduce the number of impaired drivers on Tennessee's roadways

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.1	Coordinate conference and training programs for enforcement agencies pertaining to detection, arrest, and conviction of impaired drivers	HSP	TDOSHS	• Number of trainings held	Enforcement, Education
1.2	Coordinate DUI enforcement projects that provide highly visible patrols, selective enforcement methods utilizing current field sobriety techniques and target areas with high impaired driving arrests and crashes through data-driven analysis.	HSP	TDOSHS	• Number of enforcement campaigns • Number of citations given	Enforcement
1.3	Partner with stakeholders and other interested groups to support and make recommendations for impaired driving state laws and establishment of specialized prosecution of driving under the influence.	HSP	TDOSHS	• Establishment of special prosecution	Enforcement
1.4	Establish statewide tracking system for Blood Alcohol Content (BAC) levels of offenders	HSP	TDOSHS	• Establishment of tracking system	Enforcement

1. Reduce the number of impaired drivers on Tennessee's roadways

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.5	Reduce minors' access to alcohol and other drugs through vendor education and enforcement of underage sales laws.	HSP	TDOSHS	• Number of vendors engaged • Citations for possession by minor	Enforcement, Education
1.6	Provide high-risk driver education programs targeting drivers aged 15-21 with a focus on impaired driving. Continue to address college campus impaired driving and other high risk transportation related behavior issues.	HSP	TDOSHS TDH	• Number of drivers in target age cohort educated • Citations for impaired driving by target cohort in areas where education program conducted	Enforcement, Education
1.7	Collaborate with organizations to address youth alcohol and drug problems i.e., select Committee on Children and Youth and Tennessee Council of Juvenile and Family Court Judges.	HSP	TDOSHS	• Number of organizations actively collaborating • Number of initiatives developed	Enforcement

2. Reduce aggressive driving practices among motorized road users.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
2.1	Develop and implement enforcement programs aimed at aggressive driving in high frequency areas.	HSP	TDOSHS	• Number of related citations • Number of related severe crashes	Enforcement
2.2	Evaluate the adoption of a statutory traffic law through the legislative process to clearly define aggressive driving for enhanced enforcement efforts.	HSP	TDOSHS	• Number of outreach to safety stakeholders • Number of outreach to legislature	Enforcement
2.3	Evaluate the adoption of a uniform citation for enforcement that will serve as a tracking mechanism for courts and traffic records analysis.	HSP	TDOSHS	• Evaluation completed	Enforcement
2.4	Use engineering measures to effectively manage speeds through design and safety improvements	HSIP	TDOT	• Number of projects implemented • Number of citations pre- and post-improvements • Number of related severe crashes	Engineering

3. Increase the usage of proper vehicle occupant restraint.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
3.1	Coordinate and promote child passenger safety initiatives	HSP	TDOSHS	• Number of outreach campaigns conducted • Number of related citations	Education

3. Increase the usage of proper vehicle occupant restraint.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
3.2	Provide checklist forms to be utilized to provide the Tennessee Occupant Protection Center better information detecting reasons for child safety seat misuse	HSP	TDOSHS	• Development of checklist	Education
3.3	Increase monitoring and target enforcement campaigns of seat belt usage & provide advice on usage to public and Commercial Motor Vehicle drivers	HSP	TDOSHS	• Percent of people given citations at check points	Education, Enforcement
3.4	Provide high-risk driver-education programs and defensive driving programs targeting drivers aged 15-21 focusing on seatbelt usage.	HSP	TDOSHS TDH	• Target age cohort participation rate	Education
3.5	Continue to support youth seatbelt programs.	HSP	TDOSHS TDH	• Number of programs actively supported	Education
3.6	Coordinate conference and training programs for law enforcements officers, prosecutors, and judges to be aware and implement the Child Passenger Restraint Law	HSP	TDOSHS	• Number of trainings provided • Percent of people given restraint related citations at check points	Education
3.7	Pursue legislation changes that further proper use of restraints for all vehicle occupants	HSP	TDOSHS	• Engagement of legislature	Enforcement

4. Increase Education & Enforcement Targeted at Reducing Distracted Driving					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
4.1	Continue to educate drivers on the danger of distracted driving	HSP	TDOSHS TDH	• Number of education opportunities provided	Education
4.2	Continue special enforcement to combat distracted driving through funding and support of the Statewide Distracted Driving Enforcement Bus Tour.	HSP	TDOSHS	• Number of citations given • Number of related severe crashes in special enforcement location	Enforcement
4.3	Continue outreach and communications through various campaigns such as its Thumbs Down to Texting and Driving and support of the Distracted Driving Awareness Month.	HSP	TDOSHS	• Number of campaigns conducted	Education
4.4	Establish consistency and frequency of enforcement of the current Hands Free Law	HSP	TDOSHS	• Number of citations given • Number of related severe crashes	Enforcement

5. Reduce Crashes Involving Teen Drivers					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
5.1	Reduce minors' access to alcohol and other drugs through vendor education and enforcement of underage sales laws.	HSP	TDOSHS	• Number of vendors engaged • Citations for possession by minor	Enforcement, Education
5.2	Provide high-risk driver education programs targeting drivers aged 15-21 with a focus on impaired driving. Continue to address college campus impaired driving and other high risk transportation related behavior issues.	HSP	TDOSHS TDH	• Number of citations given • Number of schools participating	Enforcement, Education
5.3	Encourage local adoption of Comprehensive Alcohol Risk reDuction (CARD) enforcement projects. These are a combination of the Cops in Shops and the Party Patrol programs that allows for a greater number of patrols in a community and will increase the perception of risk.	HSP	TDOSHS	• Number of schools participating	Education

6. Pursue programs in accordance with NHTSA Highway Safety Program Guideline No. 13 to reduce the frequency and severity of crashes involving senior and medically at-risk drivers and pedestrians.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
6.1	Provide senior driver and medically at-risk driver training from local TDOSHS license examiners.	HSP	TDOSHS	• Number of drivers educated	Education
6.2	Pursue legislation to require in-person driver license renewal and vision testing for older drivers every five years starting at age 75.	HSP	TDOSHS	• Number of activities to pursue legislation	Enforcement
6.3	Pursue educational and public relations programs to educate, inform and encourage mature and senior drivers (ages 55 or older) to participate in Tennessee's Yellow DOT program (See page 56)	HSIP	TDOT	• Number of Senior Driver Participants	Education
6.4	Encourage efforts to link seniors to transit systems with infrastructure for adequate accessibility and increased awareness of public, nonprofit, and private transportation alternatives to driving.	HSIP	TDOT	• Senior use of public transportation/ride-sharing	Engineering
6.5	Encourage seniors to participate in the AAA Driver Improvement Program, AARP Senior Driving Online Program & CarFit	HSP	TDOSHS	• Senior Population Participation Rate	Education
6.6	Investigate a communications and educational plan for assisting local entities in the deployment of the guidelines and recommendations to accommodate older drivers and pedestrians.	HSP	TDOSHS	• Development of Communication Plan	Education

Infrastructure Improvements Emphasis Area

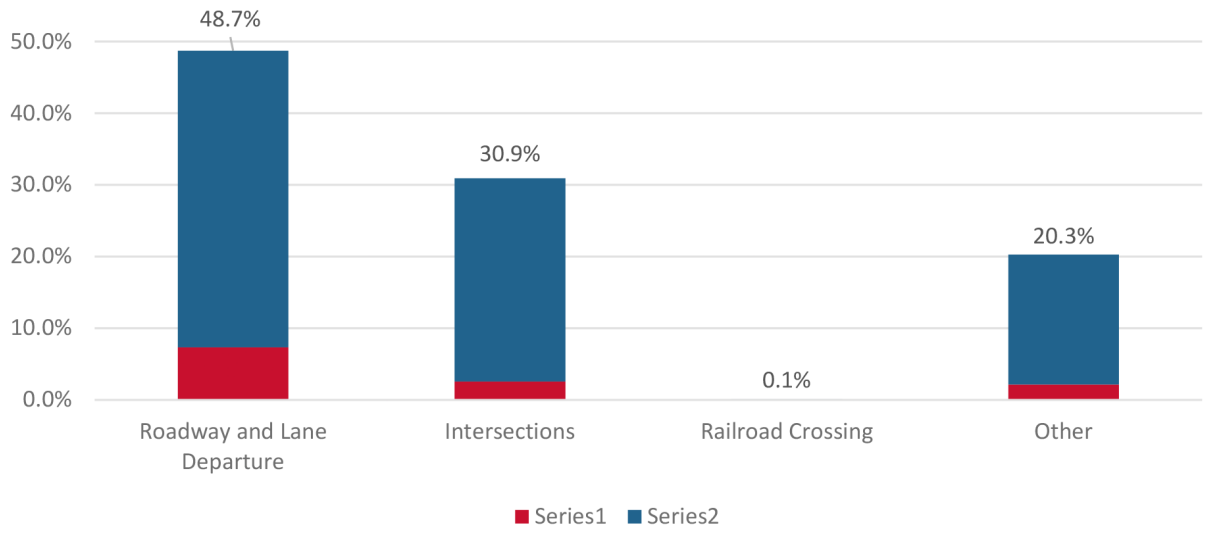
Background and Overview

There are over 97,167 miles of roadway statewide. Of the total mileage, 67% is classified as rural. Approximately 70% of the total roadway miles are local roadways that are owned and maintained by local jurisdictions. As these roadways age and new ones are constructed, establishment and maintenance of safe facilities is a key component in combating severe crashes, particularly in areas with a significant crash history.

The Infrastructure Improvements Emphasis Area focuses on improving safety performance of specific locations or features along the state's roadways that are associated with higher occurrences of fatal and serious injury crashes. The emphasis area focuses primarily on roadway departures, lane departures, intersections, and railroad crossings. Roadway departures, lane departures, and intersections were selected based on reported crash data. Combined, they were identified in 71% of fatalities (3,537 of 4,981) and 71% of serious injuries (25,653 of 35,897) reported from 2013 to 2017 in Tennessee. Railroad crossings, while statistically insignificant compared to other locations or features, are required to be addressed per FAST Act requirements. Figure 20 summarizes the statewide percentage of fatalities and serious injuries from 2013 to 2017 attributed to each.

Collectively, "other" makes up 20% of roadway locations or features reported in fatal and serious injury crashes. It includes locations such as freeway ramp terminals experiencing excessive queue lengths and atypical roadway configurations that introduce conflict or encourage wrong-way movements. High crash rates at these locations indicate a safety risk in the roadway infrastructure that can be mitigated through safety improvements to the location. Selection and design of the proposed improvements should take into account the needs and challenges of senior drivers. Where appropriate, education and enforcement strategies should be considered to supplement any engineering improvements. These measures will help to address any driver behavior issue(s) observed to be a safety concern that cannot be solved through infrastructure improvement alone.

Figure 20 - Fatalities and Serious Injuries by Infrastructure Type (2013-2017)



Due to the commitments made in the previous SHSP, Tennessee made significant efforts to improve the safety performance of its roadway network through installation of infrastructure improvements. These improvements were implemented through a variety of projects, programs, and initiatives, which include:

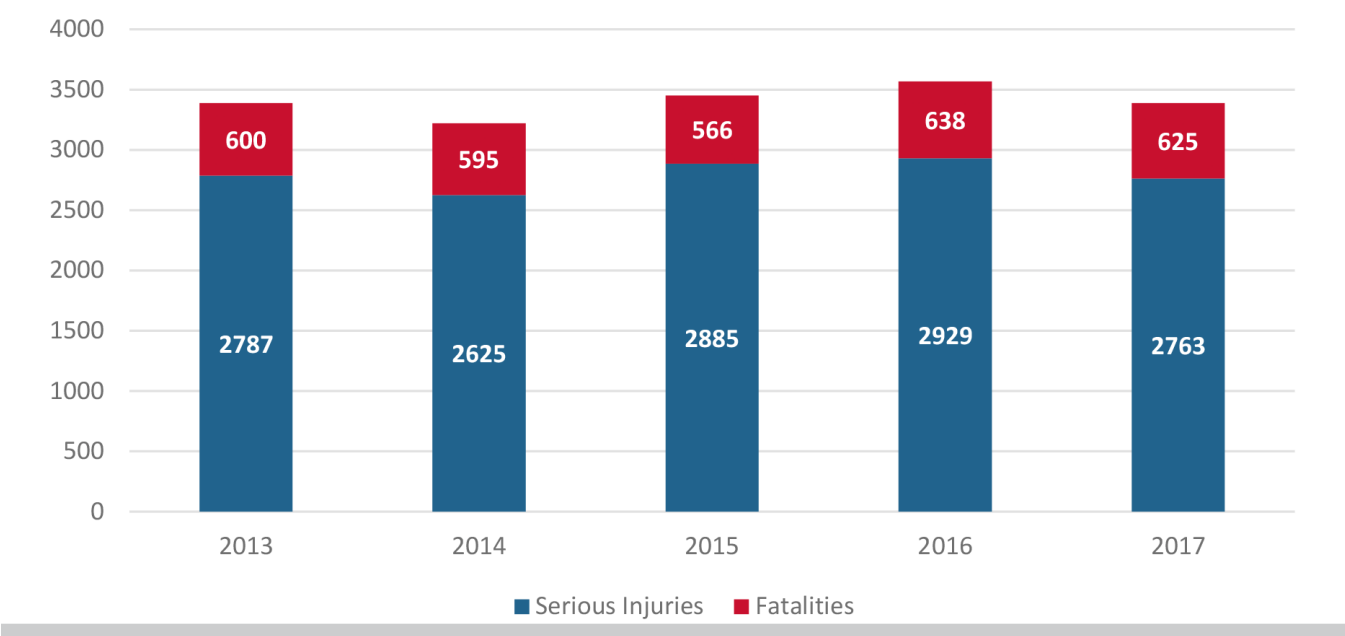
- **Road Safety Audits (RSA)** - RSA projects address various safety concerns along routes with a crash history that meets or exceeds the state's criteria for inclusion under HSIP funding. Safety concerns are mitigated through a combination of low-cost safety improvements and more design improvements.
- **Ramp Queue Programs** - Projects under the Ramp Queue Program address potential safety risks of observed excessive ramp queues that spill back onto the main travel lanes of the freeway. These projects generally involve addition of ramp lane storage and various operational improvements at the ramp terminal intersection.
- **Local Roads Safety Initiatives (LRSI)** - LRSI projects address safety concerns on a group of local roadways within a county through the implementation of low-cost safety improvements on routes located outside of Metropolitan Planning Organization (MPO) and Transportation Planning Organization (TPO) planning areas.

Roadway and Lane Departures

FHWA defines roadway departure crashes as "a non-intersection crash which occurs after a vehicle crosses an edge line or a center line, or otherwise leaves the traveled way." Often, these types of crashes occur when a driver loses control of his/her vehicle and departs the travel lane, resulting in the vehicle colliding with either a fixed object or another vehicle. In Tennessee, this type of crash is defined as either a lane departure or a roadway departure, depending on how the crash occurred. A lane departure crash occurs when a driver fails to remain in the proper lane or conducts an improper lane change, and a roadway departure crash occurs when a vehicle crosses an edge line or a center line, or otherwise leaves the traveled way.

Figure 21 illustrates the fatalities and serious injuries attributed to roadway and lane departures from 2013 to 2017, with no significant change during the study period. During this period, 3,024 of the total fatalities (61%) and 13,989 of the total serious injuries (40%) involved roadway and lane departures statewide. Since the previous period (2008-2012), roadway- and lane departure-related fatalities decreased by 5%.

Figure 21 - Roadway- and Lane Departure-Related Fatalities and Serious Injuries (2013-2017)



Additional investigation of these crashes was conducted to determine any notable trends or over-representations. Notable statistics in the severe crash data include:

- Sixty (60) percent of the crashes occurred on rural roads
- Combined, 22% of the crashes occurred on urban and rural local roadways
- Approximately 44% of the crashes occurred in a horizontal curve
- Dark conditions without lighting were noted in approximately 29% of the crashes
- Fifty-four (54) percent of the crashes involved collision with a fixed object
- Drivers ages twenty-one (21) to thirty (30) were involved in 35% of the crashes

Intersections

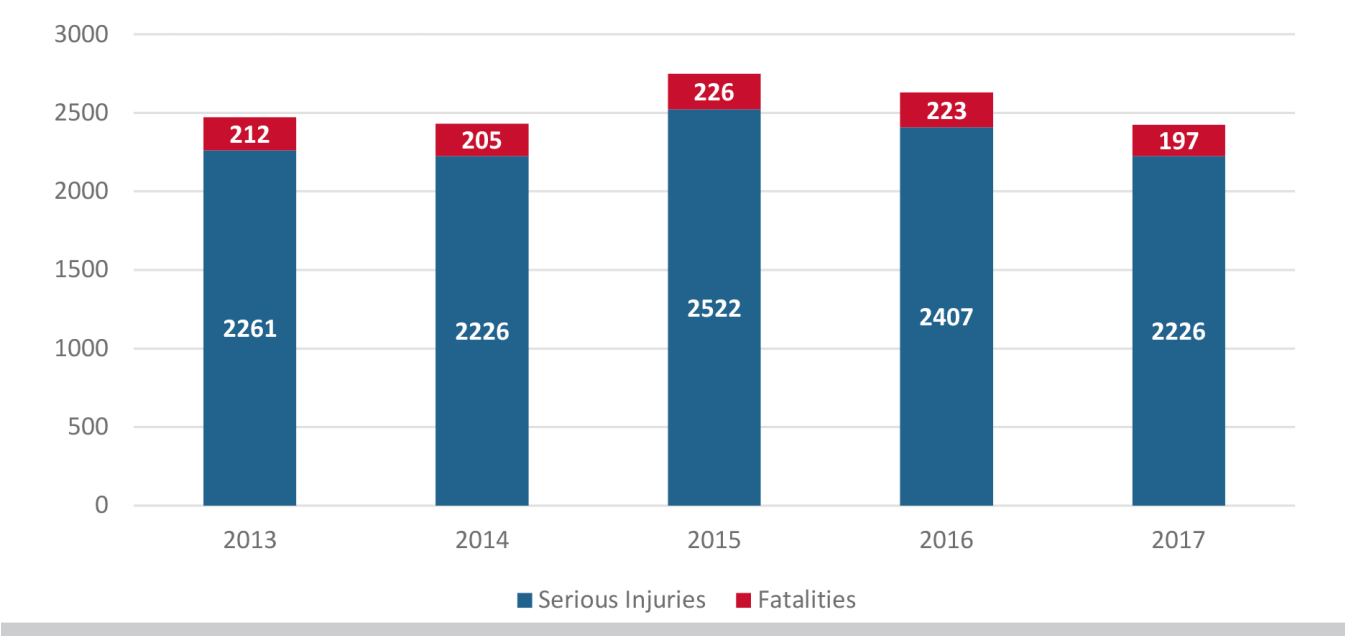
Intersection related crashes include stop-controlled, signal-controlled, and alternative intersections such as roundabouts, traffic circles, diverging diamond interchanges, and J-turns. In the United States, over the last several years, an average of one-quarter of traffic fatalities and roughly half of all traffic injuries are attributed to intersectional crashes.[10]

Figure 22 shows the fatalities and serious injuries at intersections from 2013 to 2017, with no significant change during the study period. During this period, 1,063 of the total fatalities (21%) and 11,642 of the total serious injuries (32%) statewide occurred either at an intersection or were related to an intersection. Since the previous period (2008-2012), intersection-related fatalities have increased by 20%.

Further assessment of the severe crash data provided the following insights:

- Seventy-two (72) percent of crashes occurred on urban roadways
- Approximately 24% of crashes occurred between 3 p.m. and 6 p.m.
- Motorcycles were involved in 12% of the crashes
- Angle crashes accounted for 53% of the crashes
- Drivers under thirty (30) were involved in approximately 33% of the crashes

Figure 22 - Intersection Related Fatalities and Serious Injuries (2013-2017)



Railroad Crossings

Railroad crossing-related crashes have a higher potential for fatalities compared to other crash types due to their involvement with trains. Fortunately, severe crashes occurring at railroad-highway grade crossings only account for 0.1% of roadway fatalities in Tennessee. Nationally, 0.5% (194) of total crash-related fatalities occurred at highway-railroad grade crossings in 2017.

Figure 23 summarizes the fatalities and serious injuries at railroad crossings from 2013 to 2017, with no consistent trend during the study period. During this period, seventeen (17) of the total fatalities and twenty-two (22) of the total serious injuries involved railroad crossings statewide.

Further assessment of the severe crash data provided the following insights:

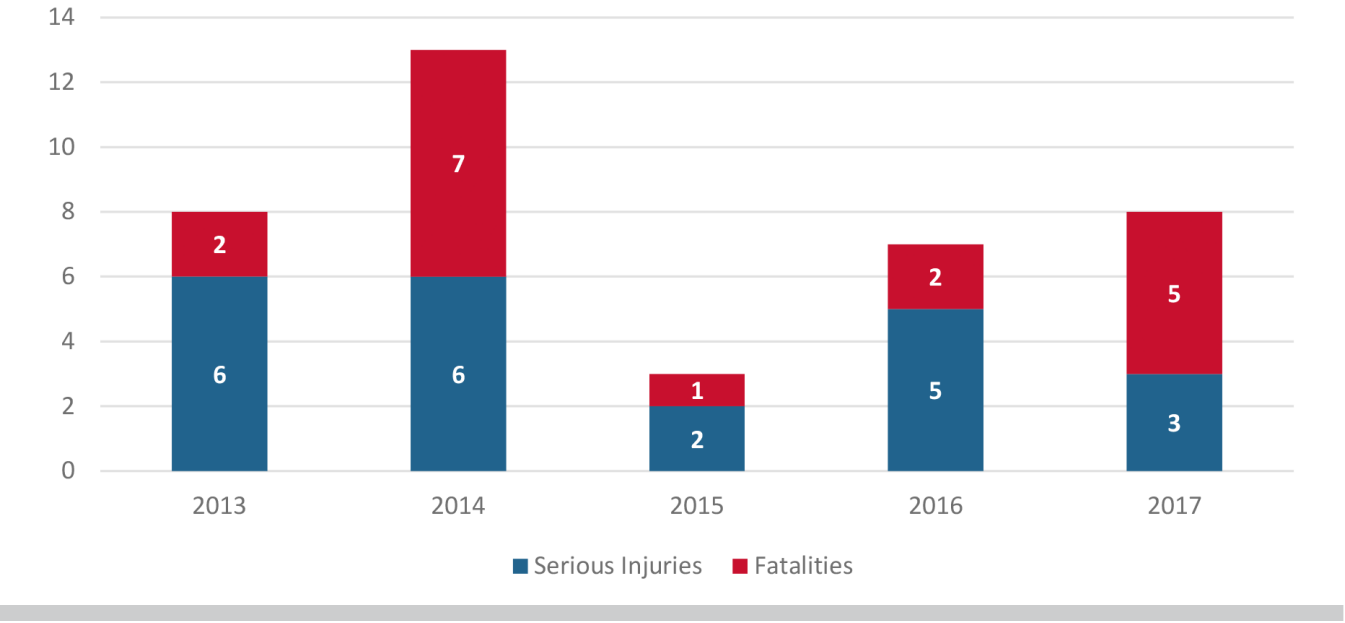
- Approximately 61% of the crashes occurred on urban roadways
- Drivers ages twenty-one (21) to thirty (30) were involved in 29% of the crashes
- Drivers ages fifty-one (51) to sixty (60) were involved in 21% of the crashes
- Large trucks were involved in 13% of crashes
- Approximately 45% of the crashes occurred between 9 a.m. and 3 p.m.

Other Infrastructure Considerations

Freeway Ramp Terminals

Tennessee's interstate and freeway systems have experienced increases in volume and congestion in recent years. In 2017, interstate highways and freeways accounted for approximately 1.4% of the State's total road mileage. However, approximately 34% of the total vehicle miles traveled occurred on interstates.[11] The increased demand on interstates and freeways, especially in urban areas, leads to extensive queue lengths at highway interchange areas, ultimately encroaching into the adjacent interstate through lanes. Excessive queue lengths can increase the likelihood of crashes during peak hours of traffic.

Figure 23 - Railroad Crossing-Related Fatalities and Serious Injuries (2013-2017)



Senior Drivers

Unfamiliarity with alternative roadway geometry can prove challenging for senior drivers along with deteriorating mobility and slower perception and reaction times. The statewide population is aging, with approximately 15.3% of the state's population sixty-five (65) years or older per 2017 census data. This is slightly below the national average of 15.4%.[12] However, the proportion of seniors in Tennessee has increased by 13% since 2012, and seniors are projected to be twenty (20) percent of the U.S. population by 2030.[12] As noted in the Driver Behavior Emphasis Area, senior driver fatalities have increased by 24.8% since the previous SHSP study period (2008-2012) and account for 23% of all roadway fatalities. To combat this statistic, infrastructure modifications are critical.

Rural Roadways

Nearly 40% of all crashes in Tennessee occur on rural roads, even though they account for 33% of vehicle miles traveled (VMTs).[11] Data from TDOSHS shows that 51% of fatal and serious injury crashes involving impaired drivers occurred on rural roads, and in 2017, 18.2% of the rural population was 65 years and older, about three (3) percent more than the state average.[13] With historic data indicating that severe crashes are more likely to occur on rural roads, mitigating safety concerns at high-risk areas in rural communities is a priority. To date, this effort has been addressed through TDOT's Local Roads Safety Initiative (LRSI) and Road Safety Audit (RSA) programs, which identify segments of local and rural roads with a recurring history of fatal and serious injury crashes and address them with infrastructure improvements.

Goal and Objectives

Emphasis Area Goal:	To provide a safer roadway network for Tennessee's driver population through the implementation of both low-cost safety improvements and design improvements.
Emphasis Area Objective(s):	Reduce the number of fatalities and serious injuries linked to roadway infrastructure that pose a safety concern.

Strategies

The following strategies target the implementation of roadway improvements to foster a safer driving environment in Tennessee. While these strategies will be applied statewide, additional data analysis and agency coordination will be performed to identify ways to target these focus areas under this plan.

1. Reduce the likelihood and severity of crashes involving roadway and lane departures

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.1	**Road Safety Audits (RSA) -** Identify and review roadway segments with disproportionate occurrences of roadway departure related crashes. Fund and prioritize improvements to these segments through federal-aid and state-aid roadway departure safety programs based on the number and severity of fatal and injury crashes on interstate, state and local routes.	HSIP	TDOT	• Number of Severe Crashes • Number of RSA completed • Number of RSA constructed	Engineering Enforcement
1.2	**Local Roads Safety Initiative (LRSI) -** Identify and review roadway segments of local non-state routes in counties or sections of counties not represented by a MPO with disproportionate occurrences of fatal and serious injury crashes per mile. Fund and prioritize safety improvements to these segments through federal-aid safety programs based on the number and severity of fatal and injury crashes per mile on these routes.	HSIP	TDOT	• Number of Severe Crashes • Number of LRSI completed • Number of LRSI constructed	Engineering Enforcement

1. Reduce the likelihood and severity of crashes involving roadway and lane departures					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
1.3	Implement targeted enforcement campaigns at locations with a high occurrence of severe crashes	HSP	TDOSHS	• Number of Severe Crashes • Number of Relevant Citations	Enforcement

2. Reduce the likelihood and severity of intersection-related crashes					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
2.1	**Road Safety Audits (RSAs) -** Identify and review intersections at local and state routes with disproportionate occurrences of fatal and injury crashes. Fund and prioritize such intersections based on the number and severity of these crashes; and develop plans to reduce conflicts in traffic flow by improving geometry, traffic control, roadway lighting, pedestrian accommodations and other appropriate measures.	HSIP	TDOT	• Number of Severe Crashes • Number of RSA completed • Number of RSA constructed	Engineering Enforcement
2.2	**Spot Safety Program -** Initiate safety studies by regional TDOT Regional Traffic Engineers of state route intersections located within cities or towns with populations of less than 50,000. Develop limited-cost safety projects for eligible sites to install a traffic signal, fix a sight distance problem, add turn lanes with or without a traffic signal, install a flashing beacon or install school flashing signals.	HSIP	TDOT	• Number of Severe Crashes • Number of Spot Safety Projects completed • Number of Spot Safety Projects constructed	Engineering
2.3	Incorporate countermeasures from intersection safety programs into the *TDOT Traffic Design Manual* and TDOT Roadway Design Standard Drawings as appropriate	HSIP	TDOT	• Review and completion of incorporation of recommendations	Engineering
2.4	Incorporate Intersection Control Evaluation (ICE) policies into *TDOT's Access Management Handbook* (currently under development) to aid practitioners in the screening of potential intersection configurations	HSIP	TDOT	• Completion of handbook	Engineering
2.5	Develop a program to inventory and bring up to the MUTCD standards the shape, color, dimensions, legends, borders, and minimum retroreflectivity or illumination of roadway regulatory, warning, and guide signs on Tennessee roadways.	HSIP	TDOT	• Establish program and guidelines	Engineering

3. Reduce the likelihood of conflict between trains and vehicles at railroad crossings with improvements to geometry, traffic control, and visibility.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
3.1	**Section 130 Program -** Select railroad crossing safety improvement projects based on crash prediction. Consideration will be given to past crash experiences, number of trains, train speeds, number of cars at crossings, and other data. Projects may include flashing lights, gates, signal warning time adjustments, geometric improvements, regulatory and warning signs, pavement markings, and other safety measures.	HSIP	TDOT	• Number of Railroad Crossing Related Severe Crashes • Number of DTRs completed • Number of DTRs constructed	Engineering
3.2	**23 CFR 646 Investigations -** Review railroad crossings within the limits or near federal-aid highway projects for compliance with 23 CFR 646.214(b)(2) for minimum adequate warning devices. Provide recommendations to such projects which may include flashing lights, gates, signal warning time adjustments, regulatory and warning signs, pavement markings, and other safety measures.	HSIP	TDOT	• Number of Railroad Crossing Related Severe Crashes • Number of DTRs completed • Number of DTRs constructed	Engineering
3.3	Develop a Tennessee Highway-Rail Grade Crossing Action Plan. The proposal stems from the Fixing America's Surface Transportation (FAST) Act of 2015, which mandated FRA establish a rule requiring states to create highway-rail grade crossing action plans. The Plan will be completed in accordance to all requirements and deadlines once FRA announces the final rule (expected sometime in 2020).	HSIP	TDOT	• Completion of Plan	Engineering Education Enforcement

4. Educate roadway users and local agencies to raise awareness about contributing factors linked to severe injury crashes.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
4.1	Utilize the Tennessee Transportation Assistance Programs (TTAP) to train local agencies and practitioners on identification of safety concerns and improvement options at roadway intersections, railroad crossings, and roadway segments	HSIP	TTAP	• Number of Relevant Courses Conducted	Education
4.2	Develop and provide educational programs to motorists with focus on increasing safety awareness at intersections, roadway segments, and railroad crossings	HSP	TDOSHS	• Number of Relevant Courses Conducted	Education

5. Reduce the lengths of interchange exit ramp queues					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
5.1	**Ramp Queue Program -** Identify safety and capacity improvements to interchange exit ramps on interstate highways and freeways where ramp queue lengths are excessive during peak traffic times.	HSIP	TDOT	• Interchange Intersection Operational Performance of the Ramp	Engineering

6. Improve the safety of senior drivers by reducing roadway geometric deficiencies					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
6.1	**Road Safety Audits (RSAs) -** Address locations with geometric and visual deficiencies with improvements recommended in the *Handbook for Designing Roadways for the Aging Population*	HSIP	TDOT	• Number of Senior Related Severe Crashes • Number of RSAs completed • Number of RSAs constructed	Engineering
6.2	**Local Road Safety Initiative -** Address locations with geometric and visual deficiencies with improvements recommended in the *Handbook for Designing Roadways for the Aging Population*	HSIP	TDOT	• Number of Senior Related Severe Crashes • Number of LRSIs completed • Number of LRSIs constructed	Engineering
6.3	Review TDOT Standard Drawings and incorporate recommendations contained in the *Handbook for Designing Roadways for the Aging Population*	HSIP	TDOT	• Review and completion of incorporation of recommendations	Engineering
6.4	Incorporate replacement of roadway signage with signs conforming to recommendations set forth by the Handbook for Designing Roadways for the Aging Population for all safety projects	HSIP	TDOT	• Number of projects completed • Number of projects constructed	Engineering

Vulnerable Road Users Emphasis Area

Background and Overview

All road users are at risk of suffering either a serious injury or fatality when involved in a crash. However, the risk of such an outcome for certain groups of road users is greater due to factors such as age, type of vehicle occupied, or mode of transportation. The users with the greatest probability of suffering a severe injury due to a crash are referred to as vulnerable road users.

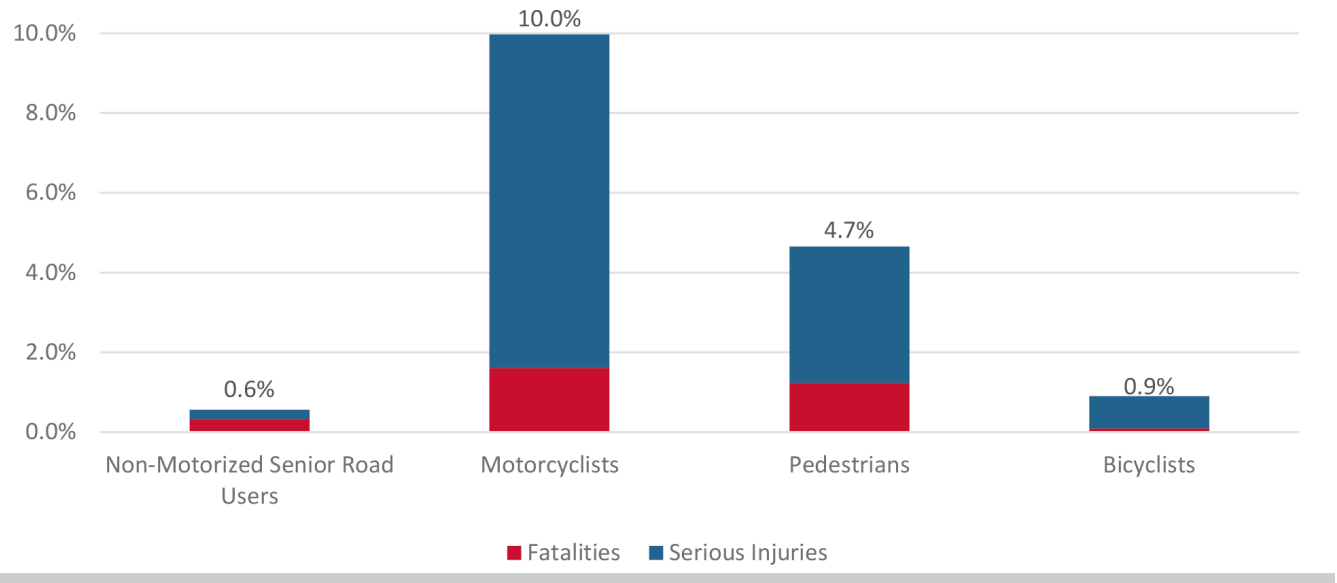
Non-motorists (bicyclists and pedestrians) and users of micromobility options are classified among those groups considered to be vulnerable road users. In Tennessee, 33% of serious injuries and fatalities from roadway crashes occurred among vulnerable road users from 2013-2017, with a total of 13,693 serious injuries and fatalities. Figure 24 details the fatalities and serious injuries attributed to each vulnerable road user during this period as a percentage of the total.

The total number of fatalities and serious injuries related to vulnerable road users increased by 16% over the 2008-2012 study period. The increase can be attributed to increases in severe injuries experienced by senior drivers, bicyclists, and pedestrians. It should be noted that a majority of severe crashes related to these groups occur in urban areas where Tennessee is currently experiencing growth. In addition, according to research conducted in Tennessee, the majority of pedestrian crashes occur on multi-lane roadways (that are three or more lanes wide) with vehicle speeds above 45 MPH. In other words, multi-lane roads are more likely to have pedestrian crashes than roads with two lanes. Given this increased risk and coupled with the trend that non-motorized crashes are increasing in Tennessee, road widening projects need to be evaluated for need, and if deemed necessary, include robust non-motorized safety and access elements that accommodate people traveling on foot and by bicycle.

To combat this increasing trend, Tennessee has implemented past SHSP strategies to improve safety for vulnerable road users through various programs and initiatives. These include:

- **Road Safety Audits (RSA)** - RSA projects address various safety concerns along routes with a crash history that meets or exceeds the state's criteria for inclusion under HSIP funding. Safety concerns are mitigated through a combination of low-cost safety improvements and more complex, longer term improvements.
- **Pedestrian Road Safety Initiative (PRSI)** - The PRSI was created to address severe crashes involving pedestrians on qualified corridors and intersections statewide. Projects under the PRSI addressed identified safety concerns with countermeasures consistent with FHWA's Pedestrian Safety Guide and Countermeasure Selection System (PEDSAFE).

Figure 24 - Vulnerable Road User Fatalities and Serious Injuries by Type of User (2013-2017)



Motorcycles

Operation of a motorcycle contributes to increased risks compared to operation of a passenger car. According to the NHTSA, motorcyclist fatalities occurred nearly 27 times more frequently than passenger car occupant fatalities in traffic crashes.[16] Nationally, motorcyclists accounted for 14% of all traffic fatalities despite only accounting for an estimated 0.6 percent of VMT.

Figure 25 shows the fatalities and serious injuries involving motorcycles from 2013 to 2017, with an increase exhibited by the annual number of serious injuries over the period assessed. During this period, 662 fatalities (13%) and 3,514 serious injuries (10%) involved motorcycles statewide. In comparison to the previous SHSP, motorcycle fatalities increased by one-half (0.5) percent and serious injuries decreased by one and one-half (1.5) percent.

Additional investigation of these crashes was conducted to determine any notable trends or over-representations. Notable statistics in the crash data include:

- Crash statistics are slightly higher for urban roadways (54% urban, 42% rural, 4% unknown)
- Only 8% of severe crashes involving motorcycles occurred on controlled access facilities
- Single vehicle crashes (lane departures and roadway departures) and angle crashes were cited as the manner of collision for approximately 79% of the related crashes
- Thirty-one (31) percent of the severe crashes occurred at intersections
- Approximately 46% of the severe crashes occurred between noon and 6 p.m.
- Eighty-two (82) percent of the motorcycle-related severe crashes occur from April to October when temperature conditions are more favorable

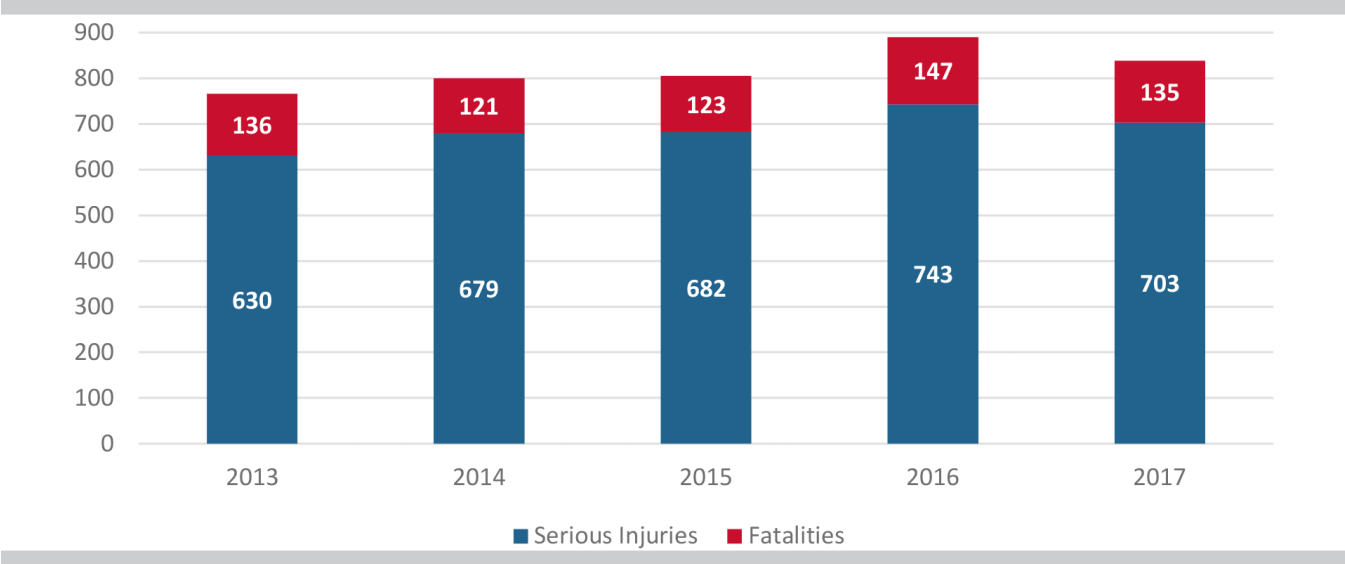
In addition to the local statistics, several national statistics below illuminate further challenges to consider when identifying motorcycle-related severe crashes.

- Twenty-nine (29) percent of motorcycle riders involved in fatal crashes in 2017 were riding without a valid motorcycle license.
- In 2017, a higher percentage (27%) of motorcycle users involved in a fatal crash were operating under the influence of alcohol compared to operators of other modes 21% for passenger cars, 20%for light trucks, and 3% for large trucks)
- Motorcycle riders killed in traffic crashes at night were three (3) times more frequently alcohol-impaired than those killed during the day in 2017[16]

While these statistics focus on motorcyclists, it is crucial that motorists are educated and maintain awareness of motorcycles sharing the road. For example, in 2017, for 42% of the 2,598 two (2)-vehicle fatal crashes involving a motorcycle and another type of vehicle, the other vehicles were turning left while the motorcycles were going straight, passing, or overtaking other vehicles.[16]

LOOK TWICE FOR MOTORCYCLES
TENNESSEE HIGHWAY SAFETY OFFICE

Figure 25 - Fatalities and Serious Injuries Involving Motorcycles (2013-2017)



Non-Motorized Road Users

Public transit, sidewalks, bikeways, and multi-use paths are important components of Tennessee's transportation system and provide access to opportunity for people of all ages, income and abilities. They also provide health, environmental, safety, and cost benefits. The public health benefits of walking and bicycling for transportation are well known. Additionally, reducing VMT reduces congestion, reduces crashes, and improves air quality. People who walk or bicycle, however, are the most vulnerable members of our transportation network and are more likely to perish if involved in a crash with a motor vehicle.

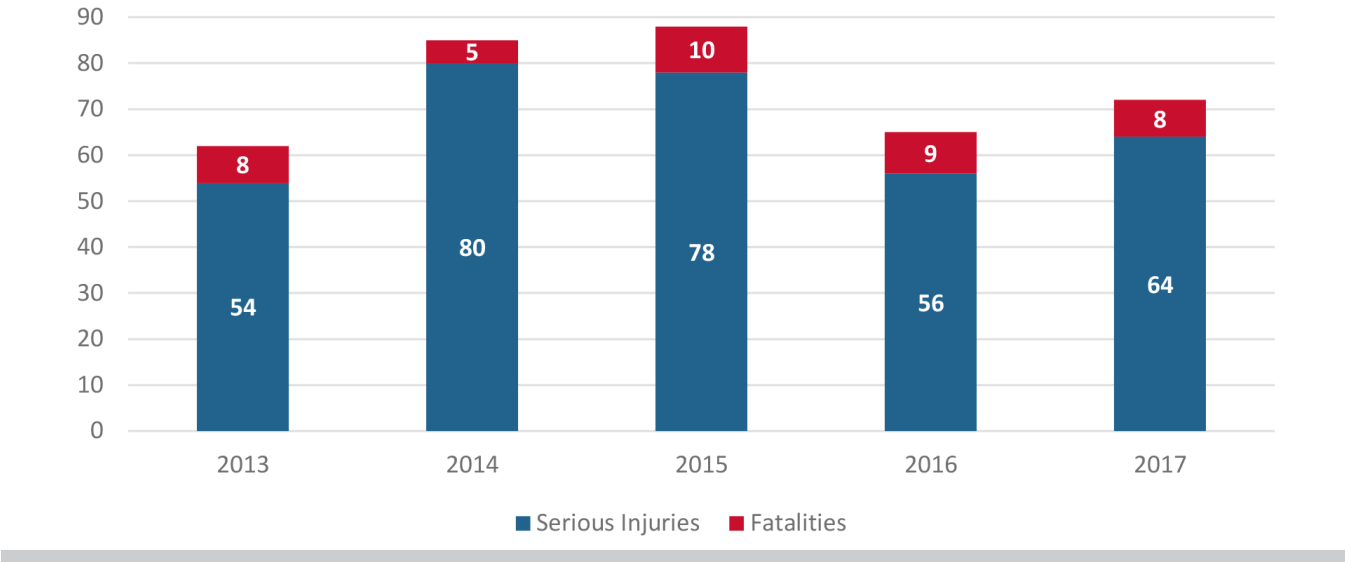
According to USDOT, Complete Streets are streets designed and operated to enable safe use and support mobility for all users. Those include people of all ages and abilities, regardless of whether they are traveling as drivers, pedestrians, bicyclists, or as public transportation riders.[17] Data has shown that streets with sidewalks on both sides have the fewest crashes, and as the proportion of pedestrians and bicyclists increases, fatalities and serious injuries decrease for all users.[18] Tennessee can improve safety for non-motorized users by enforcing protective laws on motorists, but, more importantly, the state can increase funding for safe and accessible pedestrian and bicycle infrastructure as well as public transit.

Bicyclists

In Tennessee, a bicycle has the legal status of a vehicle with full rights on the roadway and is subject to regulations governing the operation of a motor vehicle.[19] The operator of a motor vehicle, when overtaking and passing a cyclist proceeding in the same direction on the roadway, shall leave a safe distance between the motor vehicle and the bicycle of not less than three (3) feet and shall maintain the clearance until safely past the overtaken.[19] Motorists are required by law to exercise due care when in the presence of pedestrians and cyclists, whether they are on the roadway, sidewalks or bike paths.[20]

Figure 26 shows the fatalities and serious injuries involving bicyclists from 2013 to 2017. During this period, 40 fatalities (1%) and 338 serious injuries (1%) were bicyclists. This equates to a 14% increase in both fatalities and serious injuries over the previous SHSP statistics, significantly surpassing rates of increase for any other mode of road user.

Figure 26- Fatalities and Serious Injuries Involving Bicyclists (2013-2017)



Further assessment of the crash data provided the following insights:

- Eighty-four (84) percent of severe crashes occurred on urban roads
- Approximately 46% of severe crashes occurred between 3 p.m. and 9 p.m.
- A significant increase in crash frequency was noted during the months of April, May, August, and September (cumulative total accounts for 51% of all severe crashes)
- No single age range accounted for the vast majority of bicycle-related severe crashes. The severe crashes were spread fairly evenly for the ten (10)-year age ranges between twenty-one (21) and seventy (70)
- Sixty-three (63) percent of bicyclist fatalities occur outside of intersections nationwide because vehicle speeds are higher.

While the majority of pedestrian fatalities and serious injuries occur in Tennessee's most populated cities, with populations of between 30,000 and 100,000 had the greatest increase in the rate of pedestrian fatalities and serious injuries.

Currently, the large percentage increase in bicyclist fatalities equates to an actual increase of eight (8) fatalities annually. However, with Tennessee's urban centers growing and modes of transportation like bicycling more common, addressing safety concerns pertinent to bicyclists could result in a significant decrease of severe injuries in the future.

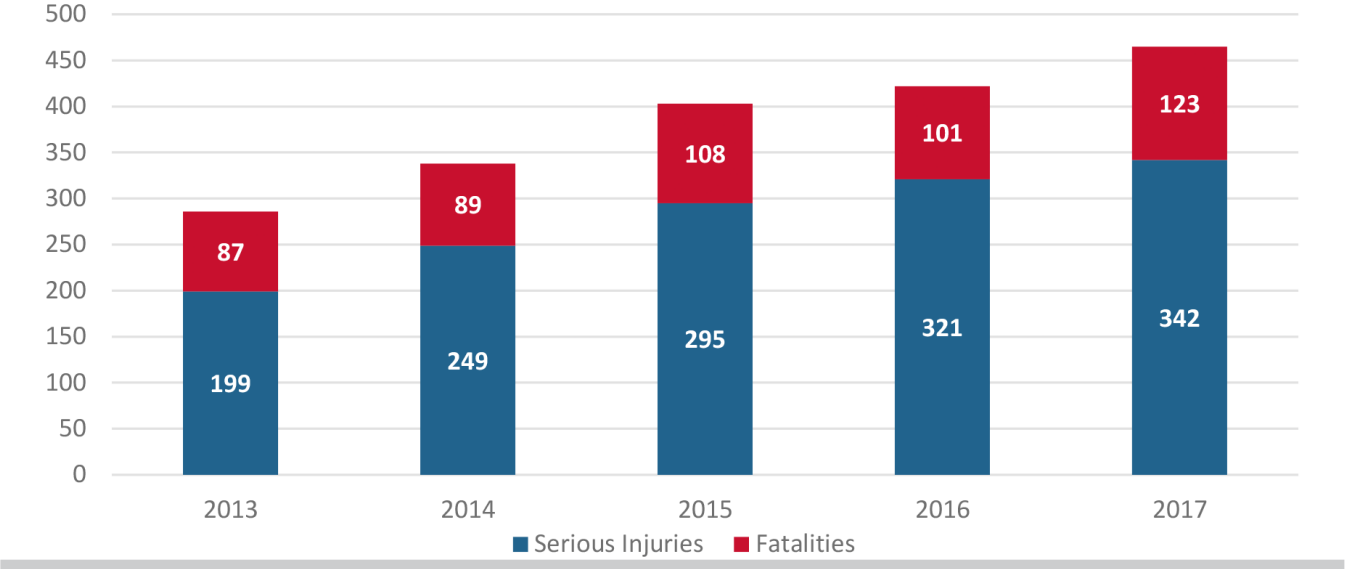
Pedestrians

Pedestrians have the right-of-way at all intersections and driveways regardless of the presence of a marked crosswalk. Other crucial regulations promoting pedestrian safety are below:

- Between adjacent intersections which have traffic control devices, crossing at any other place besides a marked crosswalk or an intersection is not allowed. TCA 55-8-135
- It is unlawful for any pedestrian to walk or use a wheelchair upon a roadway when sidewalks are present In the event of a sidewalk being obstructed or inaccessible, use the roadway or shoulder is permitted. TCA 55-8-138

Figure 27 shows the fatalities and serious injuries involving pedestrians from 2013 to 2017, with a steady increase in both fatalities and serious injuries during the study period. During this period, 508 of the total fatalities (10%) and 1,509 of the total serious injuries (4%) involved pedestrians statewide. Since the previous period (2008-2012), pedestrian fatalities increased by 39% and serious injuries increased by 27%.

Figure 27- Fatalities and Serious Injuries Involving Pedestrians (2013-2017)



Further assessment of the crash data provided the following insights:

- Only 5% of pedestrian-related severe crashes involved distracted driving
- Eighty-two (82) percent of severe crashes occurred on urban roadways
- Seventy-three (73) percent of the severe crashes occurred away from the actual roadway intersection
- Approximately 45% of severe crashes occurred between 6 p.m. and midnight
- Forty (40) percent of severe crashes related to pedestrians involve people ages twenty-one (21) to forty (40)

The data above shows that fatalities make up a larger proportion of incidents compared to other vulnerable road users 27% of pedestrian incidents are fatal), indicating pedestrians are the least protected road user. The increase in pedestrian fatalities and serious injuries could be correlated to increased pedestrian activity in urban areas, as 82% of severe crashes (those resulting in a serious injury or fatality) involving pedestrians occurred on urban roads.

Senior Non-Motorized Road Users

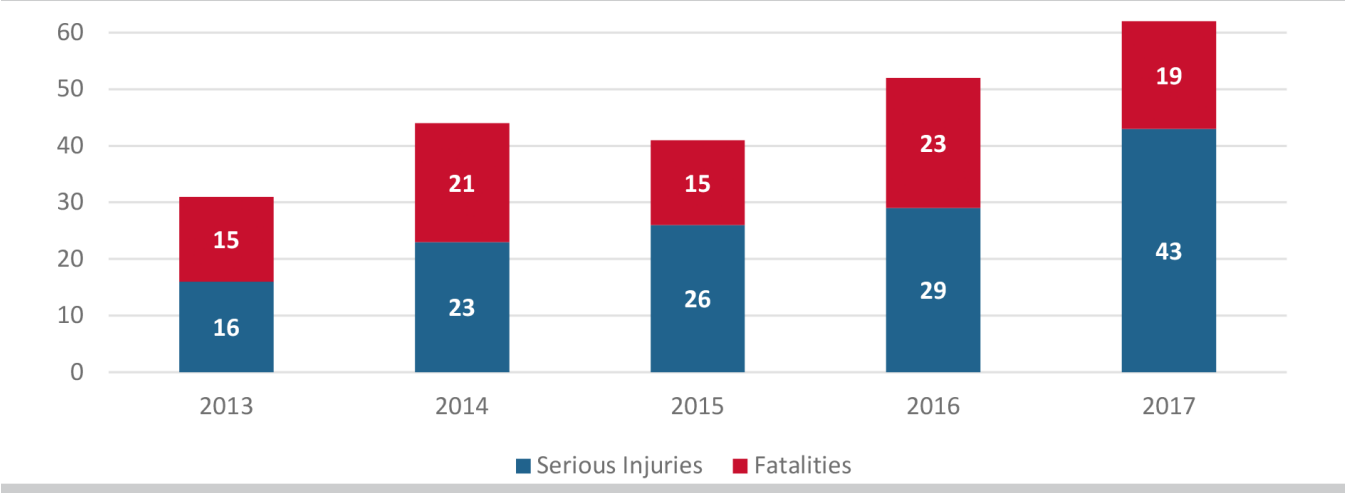
NHTSA estimates that by 2025, 40% of fatal crashes will be due to age-related difficulties, with visual and cognitive impairments as major contributing factors.[15] Coupled with the anticipated growth of Tennessee's senior population, the potential for severe injury crashes involving our senior aged pedestrians, bicyclists, and drivers will increase. This section will focus on the non-motorized senior road users as in-depth discussion of severe crashes, factors contributing to these crashes, and challenges involving senior drivers are provided in the Driver Behavior Emphasis Area.

In addition to the age-related difficulties mentioned previously, non-motorized senior road users face the same challenges by all pedestrians and bicyclists previously discussed. Figure 28 shows the fatalities and serious injuries involving non-motorized senior road users from 2013 to 2017. During this period, ninety-three (93) fatalities (0.3%) and 230 serious injuries (0.3%) involved a senior aged bicyclists or pedestrian statewide.

The notable statistics founds through further analysis of the severe injury data include:

- Approximately 48% of non-motorized senior severe injuries were above the age of 85.
- Approximately 11% of the severe injuries occurred at an intersection where the senior road user either was not using the crosswalk or a crosswalk was not available.
- Approximately 50% of non-motorized senior related severe injuries occurred along roadway segments where a mid-block crossing was not used or unavailable.
- One third of the related severe injuries occurred between the hours of 6 PM and 9 PM.
- Drug and alcohol impairment was cited for 2% of the related severe injuries.
- Twenty-two (22) percent of the senior non-motorized road user fatalities and serious injuries occurred when the senior road user attempted to cross at a location without a pedestrian signal.

Figure 28 - Fatalities and Serious Injuries Involving Non-Motorized Senior Road Users (2013-2017)



Other Vulnerable Road Users

In recent years, urban areas in Tennessee have experienced the emergence of micromobility in their downtown areas. Micromobility refers to modes of transportation that are provided by small vehicles such as scooters, Segways, and electric skateboards. Regardless of the specific small vehicle used, persons operating any of these vehicles are still considered vulnerable road users.

Integration of these types of transportation in downtown areas has presented its own set of challenges. Micromobility introduces an additional mode of transportation that follows bicycling, low speed vehicle, motorized vehicle, and other regulatory requirements, depending on type. These conveyances can cause new conflicts with pedestrians, for example, having to share the sidewalk where safe infrastructure for micromobility users is not otherwise present. The presence and impact of using personal protection equipment (PPE), while not legally required for micromobility users, has yet to be substantiated in these relatively new modes.

While detailed statistics are currently unable to determine trends or similarities in related severe crashes, Tennessee is currently working toward uniform identification of micromobility vehicles in crash reports to provide accurate data for future assessment.

Goal and Objectives

Emphasis Area Goal:	Create safer roadway environments for travel by vulnerable road users.
Emphasis Area Objective(s):	Reduce the number of fatalities and serious injuries involving vulnerable road users.

Strategies

1. Improve infrastructure for bicyclists and pedestrians.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.1	Maintain, improve, and install bicycle and pedestrian facilities through bicycle - and pedestrian - specific projects and in conjunction with other roadway and safety improvement projects.	HSIP HSP	TDOT TDOSHS	• Number of projects completed • Mileage of bicycle and pedestrian facilities maintained, improved, and installed • Comparison of the number of bicycle and pedestrian severe crashes pre- and post-improvement	Engineering
1.2	Develop risk-based analysis and STEP countermeasure guidance for high potential crash corridors and intersections based on areas with high pedestrian and bicyclist crash rates using TDOT's Multimodal Prioritization Tool.	HSIP	TDOT	• Comparison of the number of bicycle and pedestrian severe crashes pre- and post-improvement	Engineering

1. Improve infrastructure for bicyclists and pedestrians.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
1.3	Coordinate with MPOs, RPOs, cities and counties across the state to ensure that roadway policies and projects prioritize safety for all modes, especially bicyclists and pedestrians. Encourage the adoption and utilization of Complete Streets policies.	HSIP	TDOT	• Percent of agencies that consider all modes of road users in their policies and projects • Number of Complete Street Projects Constructed	Education Engineering
1.4	Design and construct bicycle and pedestrian facilities in accordance to current applicable laws and regulations, utilizing best practices, guidance, and standards published by TDOT, such as the Multimodal Design Guidelines and Multimodal Project Scoping Manual, FHWA Safe Transportation for Every Pedestrian (STEP) countermeasures, and other appropriate governmental agency guidelines.	HSIP	TDOT	• Mileage of bicycle and pedestrian facility built • Comparison of the number of bicycle and pedestrian severe crashes pre- and post-improvement	Engineering
1.5	Implement the Tennessee Safe Transportation for Every Pedestrian Implementation Plan.	TSTEP	TDOT	• Percent of STEP Plan Implemented	Engineering
1.6	Identify location and corridor with a history of high pedestrian crashes and implement improvements through the pedestrian Road Safety Initiative.	HSIP	TDOT	• Number of PRSI completed • Number of PRSI constructed • Number of bicyclist and pedestrian fatalities and serious injuries	Engineering

2. Increase awareness of vulnerable road users					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
2.1	Enhance driver awareness of bicyclists and pedestrians on the roads through communication efforts on social media as well as the THSO's website, www.TNTrafficSafety.org, which has a webpage dedicated to bicycle and pedestrian safety resources.	HSP	TDOSHS	• Number and frequency of communications	Education
2.2	Promote bicycle and pedestrian laws such as: Share the Road, Give 3 Feet When Passing, Bicycles May Use Full Lane, and Yield to Pedestrians in Crosswalks. Develop public information and education campaigns targeting all drivers as well as continuing ongoing campaigns for motorcycle safety awareness, sharing the road with non-motorized users, and other highway safety issues.	HSP	TDOSHS	• Number of campaigns conducted	Education
2.3	Continue to offer, encourage, and endorse bicycle and pedestrian safety education through written materials, web based information, social media, training courses, and pre-established initiatives.	HSIP HSP	TDOT TTAP	• Number of education opportunities provided • Number of media hits	Education

3. Improve safety of vulnerable road users on existing routes					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
3.1	Engage transit agencies during the planning phases of projects to ensure that pedestrians have safe access to transit stops at intersections and follow design principles that best protects people walking or bicycling to transit stops.	HSIP	TDOT	• Inclusion of transit operators in planning stages of project development process	Engineering
3.2	Ensure that all modes have safe alternative routes during construction, including routes for bicyclists and pedestrians.	HSIP	TDOT	• Development of design policy requiring traffic control for all modes of road user	Engineering

4. Increase the effectiveness of enforcing current laws protecting vulnerable road users					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
4.1	Conduct high visibility enforcement campaigns in areas with a high volume of vulnerable road users with focus on low speed limit compliance, high frequency of right turn on red, and low yield compliance at mid-block pedestrian/bicycle crossings.	HSP	TDOSHS	• Number of related citations	Enforcement
4.2	Provide law enforcement agencies training about the laws that apply to bicyclists and pedestrians and sharing the road with bicyclists and pedestrians. Include information on ticketing and the adjudication process.	HSP	TDOSHS	• Number of trainings conducted	Education Enforcement
4.3	Enforce school zone speed limits.	HSP	TDOSHS	• Number of speeding citations in active school zones	Enforcement

5. Assess growing needs and concerns of vulnerable road users					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
5.1	Conduct bicycle and pedestrian count programs as part of turning movement count collections and other count efforts to contribute to the knowledge base of bicycle and pedestrian usage in the state and to assist with bicycle and pedestrian crash rate calculation.	HSIP	TDOT	• Percent of relevant conducted counts including bicycles and pedestrians volumes	Engineering
5.2	Support research of bicycle and pedestrian safety issues in Tennessee.	HSIP	TDOT	• Number of active research projects supported	Education
5.3	Analyze bicycle and pedestrian crash data, especially on state routes, associated with a nearby transit stop to determine if specific improvements may be needed for safe access to transit facilities.	HSIP	TDOT	• Development of routine crash analysis	Engineering
5.4	Assess new safety concerns for emerging alternative modes of transportation (i.e. electric scooters, ATVs, etc.)	HSIP	TDOT	• Number of Alternative Modes Where Safety Data is Available, Analysis of alternative mode crash data	Engineering

6. Improve and strengthen laws pertaining to vulnerable road users.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
6.1	Strengthen the Due Care law to ensure that careless driving against non-motorized roadway users is illegal and enforceable.	HSP	TDOSHS	• Number of Due Care law related citations given • Number of vulnerable road user related severe crashes	Enforcement
6.2	Issue citations in school zones for speeding and use fines for bicycle and pedestrian safety education in school zones.	HSP	TDOSHS	• Number of speeding citations in active school zones	Enforcement
6.3	Amend legislation so that bicyclists may use either the left or right hand to signal a right turn.	HSP	TDOSHS	• Engagement of legislature	Enforcement
6.4	Strengthen the 3-Foot law (Jeff Roth and Brian Brown Bicycle Protection Act) to make it easier for law enforcement to cite and enforce the law.	HSP	TDOSHS	• Engagement of legislature	Enforcement
6.5	Pursue legislation to allow restricted licenses for medically at-risk drivers.	HSP	TDOSHS	• Engagement of legislature	Enforcement

7. Reduce Motorcycle Related Fatalities and Serious Injuries.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
7.1	Develop and implement impaired riding awareness programs and events.	TMSSP	TDOSHS	• Number of programs conducted • Number of impaired driving severe crashes involving motorcycles in program area	Education
7.2	Create and distribute Tennessee-specific impaired riding materials.	TMSSP	TDOSHS	• Number of licensed motorcyclists reached	Education
7.3	Develop programs to inform law enforcement and adjudication officers of impaired riding enforcement strategies.	TMSSP	TDOSHS	• Number of programs conducted	Enforcement
7.4	Implement additional impaired riding prevention efforts based on available data.	TMSSP	TDOSHS	• Number of related citations given	Enforcement
7.5	Establish an evaluation program to continuously measure the Motorcycle Rider Education Program's (MREP) impact on rider safety and motorcycle crashes.	TMSSP	TDOSHS	• Completion of evaluation program	Education
7.6	Ensure entry-level training curriculum is standardized statewide.	TMSSP	TDOSHS	• Percent of participation in standardized training	Education
7.7	Increase the number of trained Tennessee motorcyclists and encourage advanced training.	TMSSP	TDOSHS	• Percent of license motorcyclists trained	Education
7.8	Assess data-driven and research-based training curriculum needs and develop a process to revise the curriculum.	TMSSP	TDOSHS	• Assessment Completed	Education

7. Reduce Motorcycle Related Fatalities and Serious Injuries.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
7.9	Increase motorcycle-related law enforcement training.	TMSSP	TDOSHS	• Number of law enforcement trained	Education, Enforcement
7.10	Expand enforcement in areas of high motorcycle crashes using a data-driven approach.	TMSSP	TDOSHS	• Number of motorcycle related severe crashes	Enforcement
7.11	Develop a graduated licensing program for motorcyclists.	TMSSP	TDOSHS	• Determination of feasibility	Education
7.12	Ensure compliance and quality assurance for motorcycle examiners.	TMSSP	TDOSHS	• Percent of examiners meeting compliance	Education
7.13	Reduce the number of unlicensed motorcycle operators.	TMSSP	TDOSHS	• Number of related citations given	Enforcement
7.14	Reform licensing exercises for motorcycle testing done at driver's licensing centers.	TMSSP	TDOSHS	• Reform Completed	Education, Enforcement
7.15	Educate motorcycle riders on conspicuity strategies to increase use of high visibility clothing and gear.	TMSSP	TDOSHS	• Number of motorcyclists educated	Education
7.16	Encourage motorists to share the road with motorcycles and increase their knowledge about sharing the road with motorcyclists.	TMSSP	TDOSHS	• Number of campaigns conducted	Education
7.17	Identify opportunities to provide enhanced engineering and maintenance personnel training on motorcycle safety	TMSSP	TDOSHS	• Number of personnel trained	Education, Enforcement
7.18	Increase the number of motorcyclists properly wearing all personal protective equipment.	TMSSP	TDOSHS	• Number of citations given	Education
7.19	Encourage enforcement of the universal helmet law.	TMSSP	TDOSHS	• Number of citations given	Education
7.20	Revise and simplify all Tennessee comprehensive administrative code definitions to allow for easier enforcement of motorcycle-related infractions.	TMSSP	TDOSHS	• Revision of administrative codes	Enforcement

Operational Improvements Emphasis Area

Background and Overview

According to FHWA, about half of congestion is caused by temporary disruptions that take away part of the roadway from use – or "nonrecurring" congestion. The three main causes of nonrecurring congestion are incidents, work zones, and weather.[21] Aside from the increase in motorists' delay, congestion negatively impacts air quality, drivers' health, and introduces elevated safety concerns as the traveling speed decreases drastically and cars slow and queue on the roadway.

Tennessee has implemented past SHSP strategies to improve safety where operational challenges exist. They include the following:

Move Over Law Enforcement - Under Operation Safety on the Smartway (SOS), THP partnered with the TDOT HELP Operators to coordinate increased enforcement activities during instances of incident response along the interstate.

Installation of Emergency Response Markers (ERM) - installation of ERM along controlled access roadways to provide more frequent location reference markers to allow for more timely response by first responders.

Yellow DOT Program - The Yellow DOT Program assists first responders at the scene of an emergency on Tennessee's roadways by providing participants' vital medical information.[14] This program can greatly benefit seniors who are involved in severe crashes and potentially reduce fatalities. (See page 56 for further information)

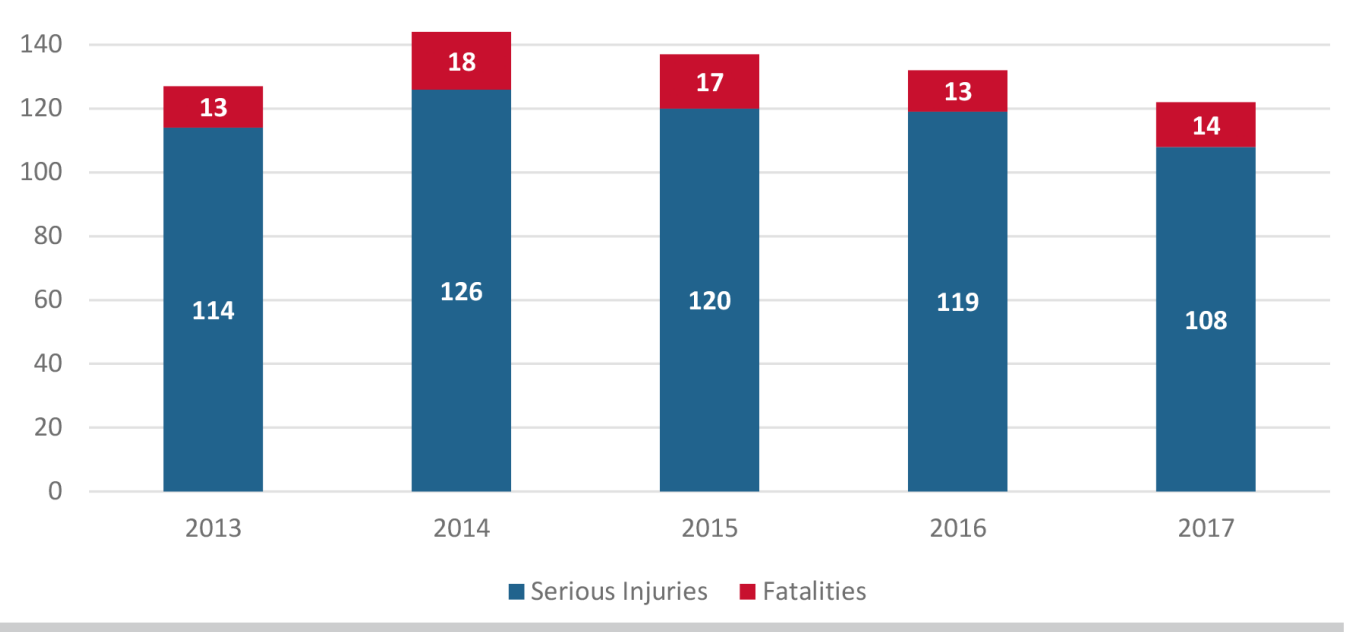
Protect the Queue - program that stresses the importance of protecting motorists caught in traffic queues through the provision of education and training to state and local agencies on effective queue management techniques

Work Zone Safety

Growing urban populations, maintenance of existing roadways, and construction of new facilities require more work zones and increase the opportunity for workers to be injured on the job. "Roadside" workers are extremely vulnerable with nearly 800 fatalities nationwide in 2017. According to FHWA, work zones account for an estimated 10% of overall congestion and 24% of unexpected freeway delays.[22] Roadway work zones must be effectively managed and protected to improve the safety of both workers and motorists as well as reduce traffic delays.

Figure 29 shows fatalities and serious injuries at work zones in Tennessee from 2013 to 2017, with little change in fatalities and a slight decreasing trend in serious injuries. Since the previous period (2008-2012), work zone fatalities increased by 25% and serious injuries increased by 48%.

Figure 29 - Work Zone Related Fatalities and Serious Injuries (2013-2017)



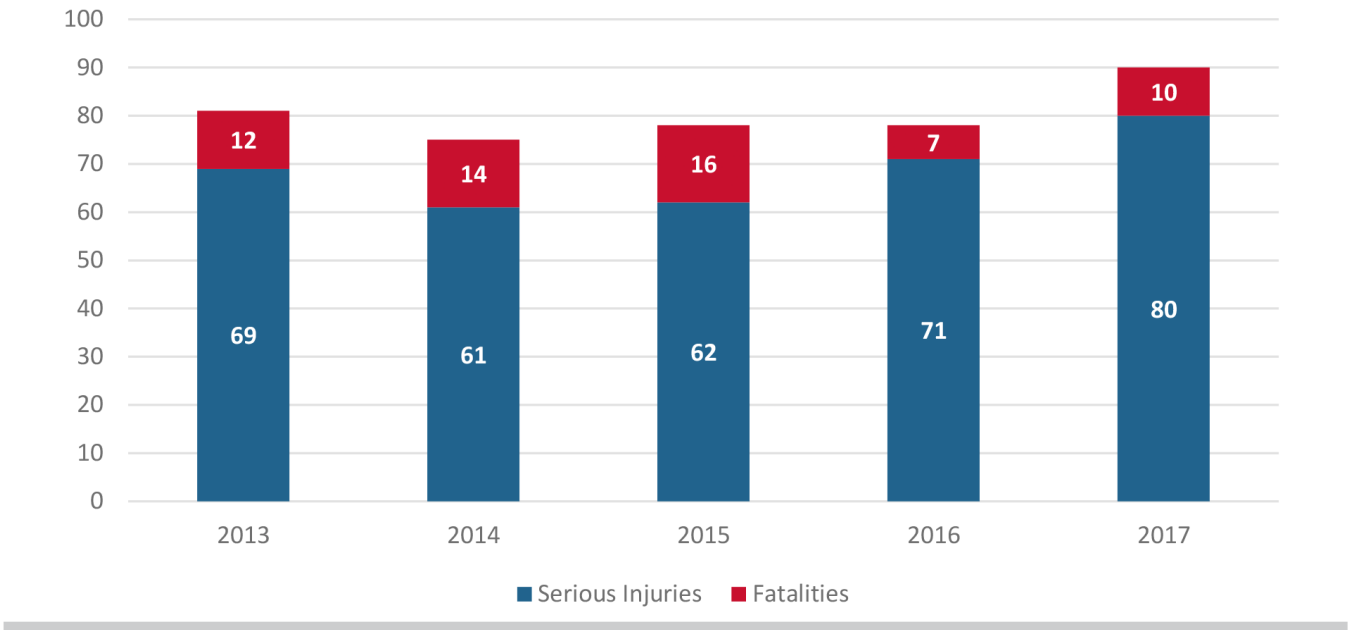
Further assessment of the crash data provided the following insights:

- Sixty-seven 67) percent of work zone severe crashes occurred on urban roadways
- Thirty-five (35) percent % of the severe crashes occurred on interstates
- Twenty-two (22) percent of the severe crashes occur between noon and 3 p.m.
- Rear end collisions were cited in 37% of the severe crashes
- Large trucks were involved in 18% of work zone severe crashes

As discussed in the Data Collection and Analysis Emphasis Area, there is a need to verify that an active work zone is properly identified on the crash record in order to capture all relevant incidents. Aside from providing an accurate representation of relevant fatalities and serious injuries, a complete and real-time capture of work zone-related crashes allows professionals the ability to identify a work zone hot spot and address any traffic control issues that may contribute to the occurrences.

TDOT placed emphasis on addressing the broader impacts of work zones through the development of policies and guidelines that target the key areas of safety, operations, congestion, public information, and outreach. The TDOT Work Zone Safety and Mobility Manual defines the processes by which major aspects of applicable work zones are established. The manual promotes coordination among all organizations involved in work zone development and provides guidance for implementation of the requirements set forth in The Final Rule on Work Zone Safety and Mobility. In addition to the Work Zone Safety and Mobility Manual, TDOT dedicated staff to focus on work zone safety and operations. This group is developing both a field manual and design manual specific to work zones. These resources are geared to provide guidance for the proper setup of work zones and establish a "toolbox" of resources to utilize when designing traffic control plans.

Figure 30 - Secondary Crash Fatalities and Serious Injuries (2013-2017)



Incident Management

Disabled vehicles, highway facility failures, and adverse weather conditions can endanger roadway travelers. Mitigating these incidents requires temporary work zones and can lead to extensive delays and long queues, increasing the probability of a crash upstream of the incident (secondary crash). Secondary crashes are formally defined as the number of crashes beginning with the time of detection of the primary incident where the collision occurs either

a. within the incident scene or

b. within the queue, including the opposite direction, resulting from the original incident.

The likelihood of a secondary crash increases by 2.8% for each minute the primary incident continues to be a hazard, increasing the risk to driver and responder lives, and making it even more difficult for responders to get to and from the scene.[23]

Figure 30 shows fatalities and serious injuries occurring as a result of secondary crashes from 2013 to 2017, with an increasing trend in serious injuries. Since the previous period (2008-2012), work zone fatalities have doubled and serious injuries increased by 138%.

Further assessment of the crash data provided the following insights:

- Urban and rural roads had similar percentages of severe crashes (53% and 44%, respectively)

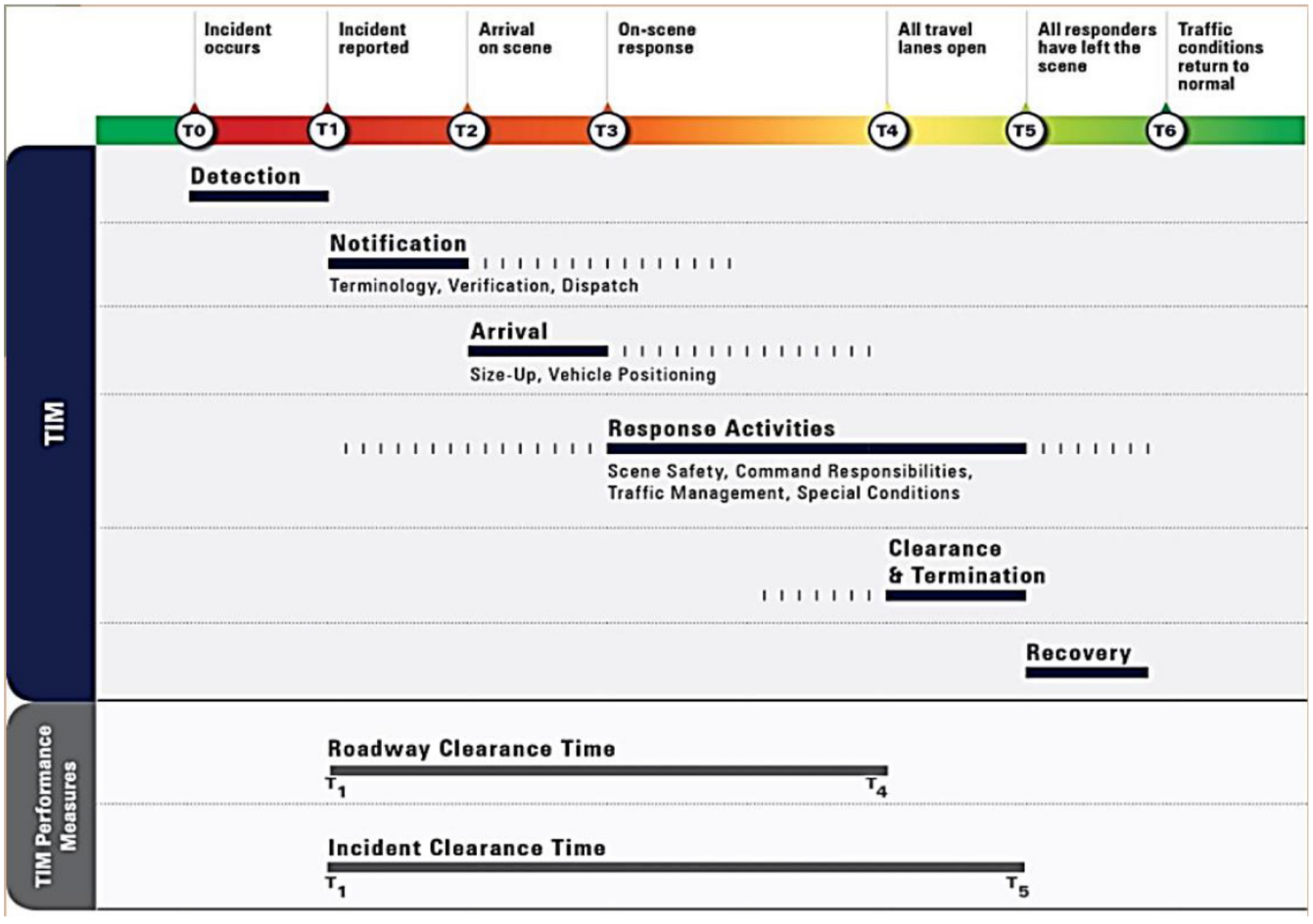
- Fifty-two (52) percent of severe secondary crashes occurred on interstates
- Wet roadway conditions were cited for 18% of severe secondary crashes
- Large trucks were involved in 25% of severe secondary crashes
- Forty-nine (49) percent of secondary severe crashes were rear end collisions
- Dark/not lighted conditions were noted for 33% of the severe secondary crashes

Improving emergency response to highway incidents has become essential in Tennessee, with emphasis on safe, quick clearance of lane closing and road closing crashes. Physical installations, specifically Enhanced Reference Markers (ERM), help pinpoint the location of an incident. ERM, also referred to as Emergency Reference Markers, are placed along controlled access highways to provide precise route, direction and mile marker location every two-tenths of a mile to motorists for travel information and for use in reporting emergencies to 911 Centers, TDOT, and other response agencies. The precise information provided by ERM is essential in timely response to crashes and other major incidents to ensure proper resources are dispatched to the correct location as quickly as possible. In addition to physical installations, quick clearance practices adopted by law enforcement, fire departments, emergency medical service (EMS), rescue squads, and transportation agencies can reduce the time emergency personnel are exposed to dangerous highway conditions during rescue activities. Swift action and coordination from all first responders are key to minimizing injury and potential fatalities.

Improved emergency response is accomplished through partnerships and coordination among agencies from transportation, law enforcement, fire and rescue, EMS, and the towing and recovery industry using the established Traffic Incident Management (TIM) process. As shown in Figure 31, the TIM timeline encompasses all aspects of incident response from the occurrence of the incident to the return of normal conditions to the incident affected area. Milestones are set within the timeline to isolate certain activities and analyze the efficiency and effectiveness of methods used. Incident response partners are continually developing methods to improve emergency response to reduce fatalities and provide safe working conditions for responders and a safe environment for motorists.

TDOT places emphasis on developing partnerships with local, state, and federal agencies to improve communication, cooperation, and coordination during major highway incidents. These collaborations have led to the adoption of FHWA's training and program enhancements derived from the Strategic Highway Research Program – Part 2 (SHRP2) initiatives. This has led to the creation of programs, such as TDOT's Protect the Queue Program, that look to increase the amount of trained and qualified personnel responding to an incident, establish better protocols to communicate between partners, and promote additional measures that will increase safety of motorists and responders within the affected area or improve the efficiency of clearing the incident.

Figure 31 - Traffic Incident Management (TIM) Timeline[24]



(Source: National TIM Training Manual)

Since 1999, the TDOT HELP program, which operates in Chattanooga, Knoxville, Memphis, and Nashville, has been a core component of the TDOT SmartWay Program. The purpose of SmartWay is to reduce traffic congestion, alleviate problems caused by congestion, and improve operational efficiency, effectiveness, and safety on Tennessee's transportation system. In additional to servicing the major metropolitan areas during routine congestion, HELP trucks are dispatched to provide operational assistance for special events statewide. HELP supervisors and operators work closely with local towing and recovery companies to provide assistance to the public, which is their first priority, and to implement quick clearance of the roadways. The HELP program will continue to be an important countermeasure for addressing traffic congestion and providing quick response for closed travel lanes, traffic control during major incidents, and queue protection operations.

To assist first responders in their job of saving lives in the event of an emergency on Tennessee's roadways, the Tennessee General Assembly passed a bill in 2012 creating a Tennessee Yellow DOT program (HB 2296). Tennessee is currently one (1) of ten (10) states whose Department of Transportation is affiliated with a Yellow DOT program. This program is geared toward mature and senior drivers (ages 55 or older); however, anyone can participate in this program. The Tennessee Yellow DOT program is designed to alert first responders at the scene of a vehicle incident or other medical emergency on Tennessee's roadways that vital medical information is available in the vehicle's glove compartment, as indicated by a Yellow DOT decal on the driver's side rear window. On motorcycles, the decal should be placed on the "triple tree" of the motorcycle frame and the packet is placed in the saddlebag/compartment. The information in the yellow packet can mean the difference between life and death in the "Golden Hour" immediately following a serious incident or emergency. Because the program is focused on senior drivers, it will be an important countermeasure to address the increased number of fatalities and serious injuries in this age group as required by the FAST Act for this plan.

Technology

The ability to collect data by an agency for the purpose of incident mitigation and to disseminate useful information to drivers can be a powerful tool when combating congestion. TDOT and many municipalities within the state have made great efforts to develop and expand their Intelligent Transportation Systems (ITS) assets to allow for better management of their roadway networks and active work zones. Utilization of ITS assets provides agencies capabilities that include:

- Monitor roadway speeds
- Active transportation and demand management through strategies such as dynamic speed control, managed lanes, and ramp metering
- Remote incident identification
- Establish alert system(s) for road workers
- Provide travel time and incident-related messaging to motorists
- Modification of signal timing plans to better fit an instance of non-reoccurring congestion

Specifically in major urban centers, technology will be a needed tool to help combat potential safety concerns by aiding in the easing of congestion on roadways where major infrastructure projects are not feasible.

Goal and Objectives

Emphasis Area Goal:	Increase safety of Tennessee's road users in areas of reoccurring and non-reoccurring congestion through effective facility management, technology improvements, and timely emergency response. Improve the safety of roadway work zones and traffic incident sites for drivers and workers.
Emphasis Area Objective(s):	Reduce the number of fatalities and serious injuries linked to work zones and congested roadway conditions.

Strategies

1. Reduce the number and severity of secondary roadway crashes by effective emergency response.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.1	**TIM Responder Training Program -** Equip incident responders such as TDOT's HELP operators and supervisors with a common set of core competencies as part of the FHWA SHRP2 program. Assist them in the areas of responder safety; safe, quick clearances; and prompt, reliable, and interoperable communications.	TIM	TDOT	• Number of trainings conducted	Education, EMS, Enforcement
1.2	**TIM Action Plan -** Maintain the incident response plan as part of the Transportation Systems Management and Operations (TSM&O) strategic plan to promote safe and efficient management and operation on highways to serve the mobility needs of people and freight.	TIM	TDOT	• Plan Updated	EMS, Enforcement
1.3	**TDOT Protect the Queue Program -** Place emphasis on this program to provide advance motorist information when traffic is slowed or stopped upstream from a highway incident or work zone.	TIM	TDOT	• Impacts on queue length and congested conditions	EMS, Enforcement
1.4	Explore technology based solutions to improve safety for motorists and road workers in active temporary work zones.	TIM	TDOT	• Impacts on queue length and congested conditions • Number of severe crashes in temporary work zone while devices deployed	Engineering

2. Develop inter-agency memorandums of understanding to support safe and expedited clearance of incidents.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
2.1	Partner with all state and local jurisdictions to improve emergency response, to provide quick clearance of incidents, and to enhance inter-agency communication.	TIM	TDOT	• Number of active partner agencies	EMS, Enforcement

2. Develop inter-agency memorandums of understanding to support safe and expedited clearance of incidents.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
2.2	Develop inter-disciplinary training and joint exercises through participation in the FHWA SHRP2 training curriculum.	HSIP	TDOT	• Number of trainings conducted	Education, EMS, Enforcement

3. Improve incident response and reduce the clearance time for crashes.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
3.1	Improve communications procedures between 911 centers and first responders.	HSIP	TDOSHS	• Decrease in response time to incident	EMS, Enforcement
3.2	Establish TIM Committees in each county or region of the state.	HSIP	TDOT	• Number of TIM committees established	Engineering
3.3	Maintain and utilize the incident management test track for the training of first responders to handle a variety of crash scenarios.	HSIP	TDOT	• Number of trainings conducted • Maintenance of test track	Education
3.4	Expand installation of Enhanced Reference Markers (ERM) and expand coverage of TDOT's HELP program on controlled access highways.	HSIP	TDOT	• Percent of access controlled highway with ERMs	Engineering

4. Reduce the severity and number of crashes occurring in work zones.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
4.1	Refine procedures to comply with the Final Rule on Work Zones (23 CFR 630 Subpart J) and the Final Rule on Temporary Traffic Control (23 CFR 630 Subpart K).	HSIP	TDOT	• Number of work zone related severe crashes	Engineering
4.2	Install truck and trailer mounted attenuators within work zones to increase work zone safety.	HSIP	TDOT	• Number and severity of crashes in work zone	Engineering
4.3	Refine standardized procedures for the use of law enforcement in work zones.	HSIP	TDOT TDOSHS	• Procedures updated	Enforcement
4.4	Develop in-house training program for TDOT staff and related partners with focus on Tennessee procedures.	HSIP	TDOT	• Number of employees trained	Education
4.5	Continue to refine standardized inspections for work zones.	HSIP	TDOT	• Maintenance of regular standard inspections of all work zones	Engineering

4. Reduce the severity and number of crashes occurring in work zones.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
4.6	Refine speed limit policies for work zones and improve standard procedures for reducing speed in work zones.	HSIP	TDOT	• Formal policy and procedure created	Enforcement, Engineering
4.7	Enhance visual measures for assisting senior drivers through work zones as recommended in the Handbook for Designing Roadways for the Aging Population.	HSIP	TDOT	• Number of senior driver related crashes in work zones	Engineering
4.8	Develop a manual providing guidance related to traffic control design for use by design professionals	HSIP	TDOT	• Number of work zone related crashes	Engineering
4.9	Explore technology based solutions to improve safety for motorists and road workers in active construction zones	HSIP	TDOT	• Comparison of the number of crashes pre- and post-installation of device	Engineering
4.10	Coordinate with local jurisdiction to establish traffic control policies and procedures		TDOT	• Number of local agencies coordinated	Engineering

5. Mitigate regular and non-reoccurring congestion to decrease the likelihood of severe crashes.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
5.1	Continue to identify, refine, and utilize procedures and tools (i.e. night-work procedures, lane closure decision tool, etc.) to help reduce congestion.	HSIP	TDOT	• Travel time reliability • Number of nighttime severe crashes in active work zones	Engineering
5.2	Continue improvement of communication of important work zone information and current/ upcoming construction work to the public through the use of the 511 system, TDOT web site, and other public information strategies.	HSIP	TDOT	• Travel time through work zone	EMS, Enforcement
5.3	Explore various ITS strategies to make travel through and around work zones and congested areas safer and more efficient.	HSIP	TDOT	• Travel delay • Number of secondary crashes	Engineering
5.4	Continue efforts such as expanded coverage of TDOT's HELP program to reduce the amount and time duration of lane closures when possible.	HSIP	TDOT	• HELP response time • Travel delay	Engineering

6. Reduce the severity of crashes involving senior drivers.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
6.1	Train first responders and law enforcement on implementation of the Yellow DOT Program.	HSIP	TDOT	• Number of officers trained	Education
6.2	Educate drivers on the benefits and use of the Yellow DOT Program.	HSIP	TDOT	• Number of outreach campaigns conducted	Education

Motor Carrier Safety Emphasis Area

Background and Overview

More through trucks utilize roadways in Tennessee than any other state, and the state also has the sixth-most ton miles of truck shipments in the country.[25] While Tennessee's "bridge state" position fosters economically favorable conditions and is an important component of the state's freight network, the added exposure due to truck traffic introduces a greater potential for severe crashes involving commercial motor vehicles (CMVs).

Severe crashes involving large trucks accounted for 6% of all fatalities and serious injuries in Tennessee from 2013 to 2017. Figure 32 shows large truck-related fatalities and serious injuries from 2013 to 2017, with little change in fatalities and a slight increasing trend in serious injuries.

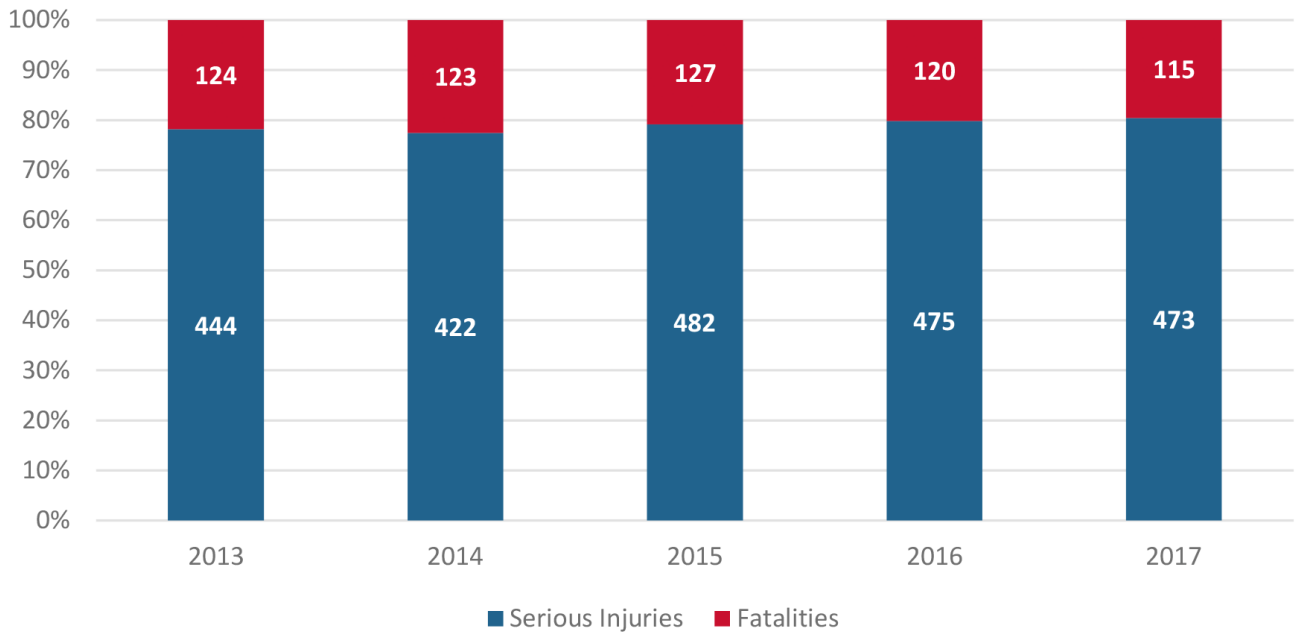
Further assessment of the crash data provided the following insights:

- Approximately 56% of the severe crashes occurred on urban roadways
- Lane and roadway departures were cited in 30% of large truck-related severe crashes
- Twenty-five (25) percent of severe crashes occurred at an intersection
- Rear ends (30%), angle (27%), and single vehicle (21%) were the top three (3) manner of collisions cited

The mission of TDOSHS through education, regulation, and enforcement is to ensure the overall safety and welfare of Tennessee citizens and the state's motoring public. The Commercial Vehicle Enforcement (CVE) Administration Unit of the Tennessee Highway Patrol (THP) is responsible for pursuing the Department's mission with respect to CMVs. The THP carries out this mission through its regular law enforcement and educational activities and via the implementation of special initiatives targeting CMV safety issues. These activities include:

- Enforcement of motor vehicle and criminal laws focusing on commercial motor vehicles
- Regulation of commercial motor vehicles and motor carriers per Title 49 CFR
- Public education and awareness
- Driver/vehicle inspections
- Carrier investigations and New Entrant Safety Audits
- Data collection
- Crash investigations

Figure 32 - Large Truck Related Fatalities and Serious Injuries (2013-2017)



The THP has troopers certified to conduct all levels of the North American Standard (NAS) inspections, including inspections of passenger carriers, cargo tanks, and hazardous materials. "Unilaterally, and in partnership with the federal and other state governments, THP conducts CMV-targeted enforcement and uses public relations and educational programs geared toward both the industry and the general public to increase awareness of CMV safety issues."[26] The THP supervisors will approve overtime to conduct targeted enforcement based on data provided by the Tennessee Department of Safety and Homeland Security Research, Planning, and Development division on the CVE Dashboard. The CVE Dashboard provides monthly snapshots of large truck crash data for each district based on: day of week, time of day, functional route, lane use (urban/rural), driver factors, large truck-related fatalities and serious injuries, and the number of NAS inspections performed.

Despite current efforts, the state faces many challenges when combating safety issues related to large trucks. These include but are not limited to the following:

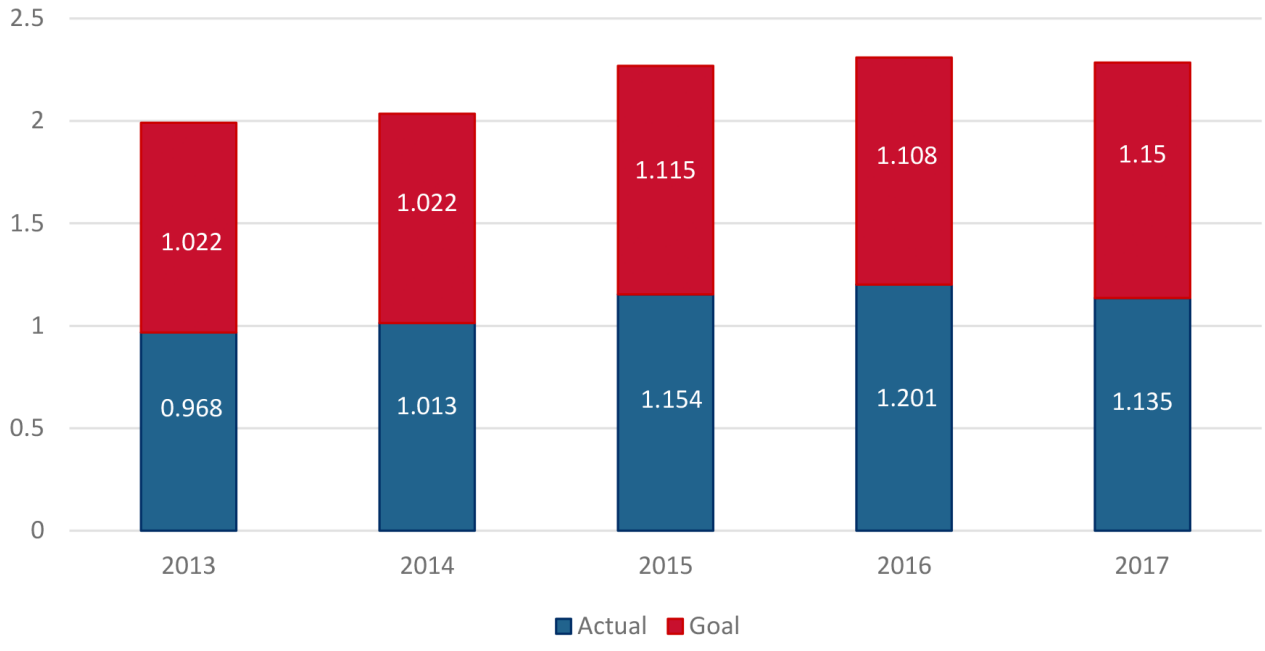
- Aggressive or improper driver behavior of passenger car operators around large trucks
- Significant industry growth within the state has increased demand for truck drivers. This resulted in the pool of drivers becoming younger and less experienced
- Inefficient and ineffective enforcement at weigh stations due to limited availability of law enforcement officers
- Penalties associated with convictions of motor carrier violations

Goal and Objective

Tennessee has historically developed goals and activities designed to not only reduce fatalities within the state related to CMV crashes, but also to reduce the rate of CMV crashes themselves. While the state rate for CMV fatalities has declined, the rate of Tennessee large truck crashes has steadily increased.[25] Figure 33 shows the crash reduction goals and results for CMV crashes.

In 2013, the THP changed their 2011 goal of 1.153 crashes per 1 million TN VMT for large truck crashes to 1.022. Since then, Tennessee has been just short of that goal each calendar year (excluding CY 2014). It is believed that this increase can be attributed to lower fuel prices since the year 2012, as indicated by the increase in the number of miles traveled each year since 2011.[25]

Figure 33 - Large Truck Crashes per Million CVMT (2013-2017)



Strategies

1. Reduce occurrence of CMV crashes.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
1.1	Conduct enforcement by troopers emphasizing targeted locations and times based on large truck crash locations, times, and driver factors identified in the most recent CVE Dashboard.	HSIP	TDOSHS	• Number of citations given • Number of large truck related severe crashes	Enforcement
1.2	Make contacts with commercial vehicles and passenger vehicles driving dangerously in the vicinity of commercial vehicles. Emphasize public campaigns such as the "Teens and Trucks" program alerting of the dangers of aggressive driving in the vicinity of commercial vehicles.	HSIP	TDOSHS	• Number of drivers of passenger vehicles engaged • Number of truck related severe crashes involving aggressive driving	Education Enforcement
1.3	Installation of No Parking signs along entrance ramps to deter heavy vehicle parking.	HSIP	TDOT	• Number of ramps signed	Engineering

2. Improve CMV safety inspections.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
2.1	Install Smart Roadside Inspection Systems (SIRIS) at more inspection stations. SIRIS devices use infrared measurements of tires, wheels, and brake and axle assemblies to assist troopers in identifying vehicles that may need a North American Standard Level I inspection.	CVSP	TDOSHS	• Number of devices installed • Inspection throughput time	Enforcement
2.2	Improve and update scales located at interstate weigh stations.	CVSP	TDOSHS	• Number of weigh stations updated	Enforcement

3. Increase inspections and training for CMV hazardous material safety.

Action/ Project ID	Action/Project	Plan	Agency/ Champion	Performance Measure	E's Involved
3.1	Conduct yearly intrastate/interstate hazardous material bulk/non-bulk inspection strike forces on commercial motor vehicles (trucks) by the THP at each of the following locations: Nashville, Memphis, Knoxville, Chattanooga, and Department of Energy/Oak Ridge. Place emphasis on such inspections around holiday periods such as Independence Day, Labor Day, Memorial Day, and other holidays or special events to check for fireworks or other undeclared explosives.	HSIP	TDOSHS	• Number of citations given	Enforcement

3. Increase inspections and training for CMV hazardous material safety.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
3.2	Provide on-the-job training to certified inspectors, by conducting hazardous material inspections on bulk and non-bulk transporters during hazardous material strike forces. Provide a refresher course for all certified hazardous material troopers during calendar year. Provide a refresher course for the North American Standard Inspection Level VI certified troopers during calendar year.	HSIP	TDOSHS	• Number of inspectors trained	Education, Enforcement
3.3	Conduct North American Standard Level I hazardous materials inspections statewide on rental trucks and intermodal containers for undeclared fireworks.	HSIP	TDOSHS	• Number of rental trucks and intermodal containers inspected	Enforcement

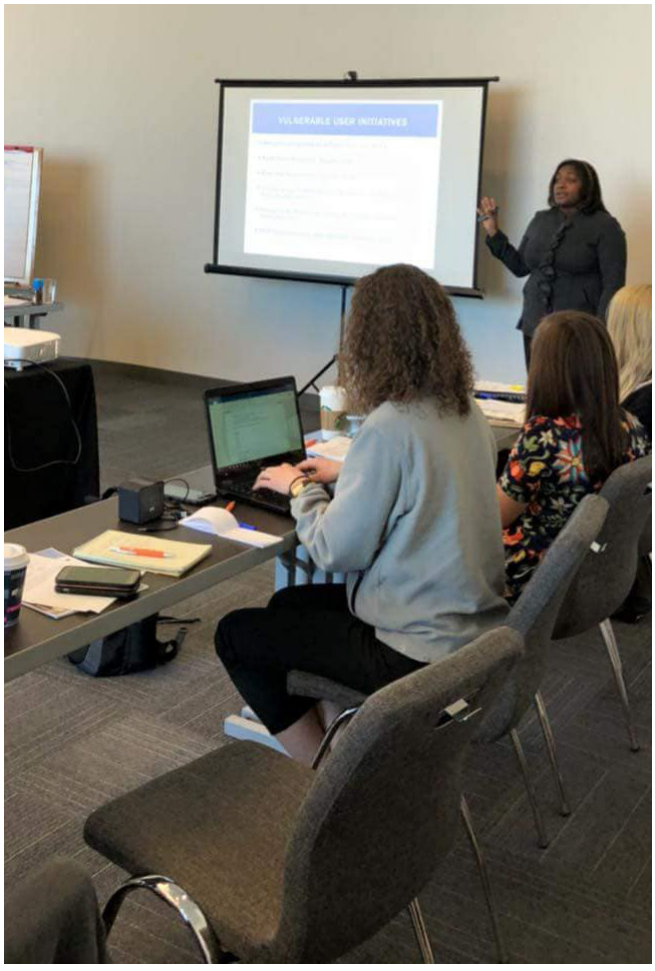
4. Ensure that the activities that the state will execute to meet the requirements of 49 CFR 350.213(b) - All troopers receive training to detect drivers under the influence.					
Action/ Project ID	**Action/Project**	**Plan**	**Agency/ Champion**	**Performance Measure**	**E's Involved**
4.1	Activities aimed at removing impaired CMV drivers from the highways through adequate enforcement of restrictions on the use of alcohol and controlled substances and by ensuring ready roadside access to alcohol detection and measuring equipment.	CVSP	TDOSHS	• Number of citations given • Number of large truck severe crashes involving an impaired CMV driver	Enforcement
4.2	Provide basic training for roadside officers and inspectors to detect drivers impaired by alcohol or controlled substance.	CVSP	TDOSHS	• Number of officers trained • Number of citations given	Education, Enforcement
4.3	Breath testers are readily accessible to roadside officers and inspectors either at roadside or a fixed facility location.	CVSP	TDOSHS	• Percent of officers with access to breath tester	Enforcement
4.4	Criminal interdiction activities, in conjunction with an appropriate CMV inspection, including human trafficking and activities affecting the transportation of controlled substances by any occupant of a CMV, and training on appropriate strategies for carrying out those interdiction activities.	CVSP	TDOSHS	• Number of persons trained	Enforcement
4.5	Provide training for roadside officers and inspectors to detect indicators of controlled substance trafficking.	CVSP	TDOSHS	• Number of officers trained • Number of citations given	Education, Enforcement
4.6	Ensure drug interdiction officers are available as a resource if an officer/inspector suspects controlled substance trafficking.	CVSP	TDOSHS	• Determine and fill the numerical need of officers	Enforcement
4.7	Engage in drug interdiction activities in conjunction with inspections including interdiction activities that affect the transportation of controlled substances.	CVSP	TDOSHS	• Incorporation in inspection activities	Enforcement

SHSP Implementation and Evaluation

Effective implementation of the SHSP strategy is anticipated to accomplish the following steps:

1. Establishment of sustained, regular coordination and collaboration among safety stakeholders
2. Development of Emphasis Area Action Plans
3. Development and execution of a marketing strategy
4. Monitor and evaluate the SHSP and related actions

The time frame for the associated programs, projects, and initiatives (actions) related to each strategy is expected to be an on-going process with all actions will be completed by the end prior to the next SHSP update period. All actions will be subject to a yearly evaluation to determine effectiveness and viability based on their cited performance measures.



Coordination and Collaboration

Effective implementation of the SHSP will require continual participation and collaboration of all safety stakeholders across Tennessee. At a minimum, regular coordination will occur quarterly through the SHSP Steering Committee meetings.

Emphasis Area Action Plans

For each Emphasis Area as described in the SHSP, a comprehensive list of countermeasures (projects, programs, initiatives, etc.) that support the cited Emphasis Area strategies and are currently either planned or ongoing by state and local safety partners was compiled. For each countermeasure listed, the following was identified:

- Description of countermeasure
- Association with appropriate SHSP strategy
- Indication of inclusion of countermeasure in a current state or local safety plan
- Agency and/or individual responsible for countermeasure
- Identification of which "E" the countermeasure corresponds to
- Estimated cost to deploy countermeasure
- Available funding source for countermeasure
- The goal of the countermeasure
- The performance metric selected for evaluation of the countermeasure
- Potential obstacles for deployment of countermeasure (if required)
- Reasons for countermeasure exclusion (if required)

The resulting list was developed to be the Action Plan for the related Emphasis Area. The purpose of the Action Plan is to provide a complete listing of relevant countermeasures and allow the entity or individual in responsible charge of that countermeasure the method and means to conduct a regular evaluation on the countermeasure to determine successful impact.

It should be noted that the Action Plans provide safety stakeholders the opportunities to align other relevant safety programs and plans. Through regular assessments of these programs and plans, linkages between strategies and actions of a specific plan can be correlated to the SHSP.

Marketing and Communication

Marketing benefits implementation of the SHSP in many ways. It increases awareness of the vision, mission, and goals of the Plan, which is directed at reducing fatalities and serious injuries on state roadways. It is a useful tool to educate community leaders on their role in saving lives. Marketing can change the attitudes and behaviors of roadway users by recruiting them into the effort of saving lives as a team.

The SHSP includes the basic framework for a marketing strategy for creating, communicating, delivering, and exchanging information about transportation to the public, stakeholders, and elected officials. Upon approval of the SHSP, the following action items will be implemented to provide awareness of the existence of the updated SHSP and effectively communicate the principles of the Plan.

- Press releases shall be issued to provide information regarding the updated SHSP and its availability
- A copy of the updated SHSP will be conveyed to the Tennessee Metropolitan Planning Organizations (MPOs), Transportation Planning Organizations (TPOs), and Regional Planning Organizations (RPOs) for their use and distribution to local municipalities and agencies
- A web link to a digital version of the updated SHSP will be provided on TDOT's website

Monitor and Evaluate

To obligate funds under the HSIP, Tennessee must evaluate the SHSP on a regular and recurring basis to ensure the accuracy of data and priority of chosen strategies. To meet this requirement, the SHSP includes a two-tiered approach.

- **Evaluate and Update the SHSP –** Periodically, the Steering Committee will meet to review current safety data and to evaluate emphasis areas for past performance and future goals. The evaluation process will follow the current edition of the Strategic Highway Safety Plan – Evaluation Process Model. The Plan will be updated at each review period, which will be no greater than five (5) years following adoption of the most current plan. If changes in legislation, plan performance, or crash data warrant, the Plan's Executive Leadership will direct an update to the SHSP, regardless of the planned update schedule.
- **Monitor Action Plans Annually –** During interim years between scheduled plan updates, the Steering Committee will monitor the performance of each action plan. Current crash statistics will be developed and distributed to each of the emphasis area leaders with a request for an updated plan and summary of the performance of the previous action plan. A summary of action plan reports provided by emphasis area leaders will be distributed to Executive Leadership and the Steering Committee for comment. Any necessary revisions to action plans will be requested at that time. This structured annual monitoring plan will also satisfy the terms of the current stewardship agreement between TDOT and FHWA, which requires a two (2) year plan interval.

The Plan's success will be measured at the time of evaluation and updated by a statistical comparison of actual data to the Plan's Goal Statement and the goals and objectives of each emphasis area. Performance metrics will be tied directly to specific strategies and countermeasures as appropriate. This will illustrate how targeting safety improvements with specific strategies can yield positive results and will be the basis for future strategies to maximize results. In some instances, it may reveal strategies or countermeasures that are not effective and should be eliminated from future plans. In order to perpetuate lessons learned, results of the evaluation will be reported in the subsequent plan update.

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26. See 1.

Glossary of Acronyms and Terms

100 MVM: One hundred million vehicle miles.

A

A & I: U.S. Department of Transportation-Federal Motor Carrier Safety Administration-Analysis and Information website.

AASHTO: American Association of State Highway and Transportation Officials.

Action Plan: A plan for each Emphasis Area that provides specifics for projects, programs, and initiatives supporting key strategies that include performance measures, funding source, project level details, and evaluation criteria for assessing outcomes.

Aggressive Driving: Operating a motor vehicle in a selfish, pushy, or impatient manner, often unsafely that directly affects other drivers.

Alcohol Involvement: Alcohol-involved fatal crashes and fatalities reflect those where a driver or a non-occupant with a positive alcohol result was involved or where the investigating officer reported alcohol involvement.

ANSI: American National Standards Institute is a private, nonprofit organization that oversees the voluntary consensus standards for products, services, processes, systems, and personnel in the United States, and the organization coordinates U.S. standards with international standards so that American products can be used worldwide.

B

BAC: Blood Alcohol Concentration is measured as a percentage by weight of alcohol in the blood (grams/milliliter). A positive BAC level (0.01 g/ml and higher) indicates that alcohol was consumed by the person tested. In Tennessee, a BAC level of 0.08 g/ml or more indicates that the person was intoxicated.

Bicyclist: A person riding a vehicle consisting of a tubular metal frame mounted on two (or more) large, spoked wheels, one behind the others, and equipped with handlebars, a saddle-like seat, and foot or arm pedals.

C

CDL: Commercial Driver License.

Citation: A written order issued, in lieu of a physical arrest or issuance of a warrant, for a violation of law, ordinance, or regulation, which requires the accused person's signature. The order also requires the person to appear in a designated court or government office at a specified date and time. (See also Uniform Citation)

CMV: A Commercial Motor Vehicle is any motor vehicle operated in intrastate, interstate, or foreign commerce.

CMVC: Commercial Motor Vehicle Crash.

CODES: The Crash Outcome Data Evaluation System is a collaborative approach to generating medical and financial outcome information relating to motor vehicle crashes and using this outcome-based data as the basis for decisions related to highway traffic safety.

Collision: A road vehicle crash other than an overturning crash in which the first harmful event is a collision of a road vehicle in transport with another road vehicle, other property (including the highway), animal, or pedestrian.

Complete Streets: Transportation policy and design approach that encourages streets to be planned, designed, operated, and maintained to enable safe, convenient, and comfortable travel and access for users of all ages and abilities regardless of their mode of transportation, which could include walking, bicycling, driving automobiles, riding public transportation, or delivering goods.

Construction, Maintenance, or Event Zone: An area, usually marked by signs, barricades, or other devices, indicating that construction, maintenance, or event activities are occurring either on or near the highway.

CRD: A Child Restraint Device is an object or system used by children in a vehicle to prevent or minimize injury and to prevent ejection during a crash. Common objects include child safety seats, booster seats, and seatbelts.

CSD: Context Sensitive Design is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.

Crash: An event that produces property damage, injury, or fatality, involves a motor vehicle in transport, and occurs on a traffic way or while the vehicle is still in motion after running off the traffic way.

Crash Modification Factor (CMF): a multiplicative factor used in quantitative safety analysis to compute the expected number of crashes after implementing a given countermeasure at a specific site.

Crash Rate: The number of crashes per million vehicle miles traveled. A crash rate may be calculated for non-motorized modes using alternate methodologies.

Cushion of Safety: The area around your vehicle you want to keep free of other vehicles, pedestrians, and fixed objects.

CVE: Commercial Vehicle Enforcement

CVE Dashboard: A report on large truck crashes generated by the Tennessee Department of Safety and Homeland Security (TDOSHS) Records and Statistical Management team, which shows crashes by day of the week, time, location, causation factor, and inspection data for each Tennessee Highway Patrol (THP) district.

CVSP: Commercial Vehicle Safety Plan developed and maintained by the Tennessee Department of Safety and Homeland Security in coordination with the Federal Motor Carrier Safety Administration to target CMV safety issues.

D

D-16: A reference to the Manual on Classification of Motor Vehicle Traffic Accidents, which promotes uniformity and comparability of motor vehicle traffic accident statistics that are being developed in federal, state, and local jurisdictions.

D-20: A reference for the Data Element Dictionary for Traffic Records Systems, which provide a common set of coding instructions for data elements related to highway safety, driver licensing, and vehicle registration.

Defensive Driving: Driving to save lives, time, and money in spite of the conditions around us and the actions of others.

DDSA: Data Driven Safety Analysis

Driver's License Suspension/Revocation/Cancellation: The temporary loss of driving privileges, which may be regained after the requirements for reinstating the privileges are met.

DUI: Driving Under the Influence of alcohol or drugs is a crime that can result in fines, suspension or revocation of driver's license, or jail time.

DWI: Driving While Intoxicated refers to driving while impaired by alcohol or drugs (may be used interchangeably with DUI).

DWS, DWR, or DWU: These acronyms refer to "driving while suspended," "driving while revoked," and "driving while unlicensed." The term is used to denote the DWS, DWR, or DWU citation (a moving violation) and/or the license status of the driver at the time of a crash or other event.

E

Economic Loss: The total monetary cost of a motor vehicle crash, including continuing or future expenses to be incurred because of the crash. Included in these losses are lost productivity, medical costs, legal and court costs, emergency service costs, insurance administration costs, travel delay, property damage, and workplace losses.

Ejection: Refers to occupants being totally or partially thrown from the vehicle as a result of an impact or rollover.

ERM: Enhanced Reference Markers (also referred to as Emergency Reference Markers) are signs placed along access controlled facilities every 0.2 of the mile displaying the direction of travel and mile marker location.

Excessive Speeding: Fifteen (15) mph or more in excess of the speed limit in a commercial vehicle per Rules of Tennessee Department of Safety and Homeland Security Driver Control Division, Chapter 1340-1-4, Tennessee Driver Improvement Program (not defined for non-commercial vehicles, but traffic moving violation points for speeding is based on the amount in excess of the speed limit).

F

FARS: The Fatality Analysis Reporting System contains data on a census of fatal traffic crashes within the 50 states, the District of Columbia, and Puerto Rico. To be included in FARS, a crash must involve a motor vehicle traveling on a traffic way customarily open to the public and result in the death of a person (occupant of a vehicle or a non-occupant) within thirty (30) days of the crash.

Fatal Crash: A police-reported crash involving a motor vehicle in transport on a traffic way in which at least one person dies within 30 days of the crash.

Fatal Injury: Any injury that results in death within 30 days of the crash.

Fatality: Any death resulting from a fatal injury.

Fatality Rate: The number of persons killed per 100 million vehicle miles traveled.

Five (5) year Moving Average: Statistical tool to evaluate trends and changes in traffic records by computing the average for a given year (abscissa) and the previous four (4) years for a five (5) year average value (ordinate). This methodology reduces the effects of isolated catastrophic events, weather, and other random influences.

FMCSA: Federal Motor Carrier Safety Administration is an agency within the U.S. Department of Transportation that regulates the trucking industry within the United States, and its mission is to prevent commercial vehicle-related crashes, fatalities, and injuries.

FHWA: Federal Highway Administration is an agency within the U.S. Department of Transportation that supports state and local governments in the design, construction, and maintenance of the nation's highway system (Federal Aid Highway Program) and various federally and tribal owned lands (Federal Lands Highway Program).

Four (4) E's of Transportation Safety (Four E's): Categories that define the broad stakeholders and partners that care about safety and are responsible for making the roads safe for all users. These stakeholders are typically from engineering, enforcement, emergency response, and education.

FY: Fiscal Year

G

GDL: Graduated Driver License.

GIS: A Geographic Information System is a collection of computer software, hardware, data, and personnel used to store, manipulate, analyze, and present geographically referenced information.

Golden Hour: the first hour following a traumatic injury.

GPS: A Global Positioning System is a Government-owned system of twenty-four (24) Earth-orbiting satellites that transmit data to ground-based receivers and are used to determine the precise position of vehicles on the ground. GPS provides extremely accurate latitude/longitude ground position.

GVWR: The Gross Vehicle Weight Rating is the maximum rated capacity of a vehicle, including the weight of the base vehicle, all added equipment, driver and passengers, and all cargo loaded into or on the vehicle. Actual weight may be less than or greater than GVWR.

H

HB: House Bill of the Tennessee General Assembly.

High-Risk Driver: A driver persistently engaging in a range of behaviors such as impaired driving, non-use of seatbelts, speeding, and running red lights that increase his/her probability of being involved in collisions resulting in fatalities and/or serious injuries.

High Risk Rural Road (HRRR): Any roadway functionally classified as a rural major or minor collector or a rural local road with significant safety risks.

Highway: A public way for purpose of vehicular travel, including the entire area within the right-of-way (urban areas: highway or street; rural areas: highway or road).

Highway Safety Improvement Program (HSIP): A core federal aid program with the purpose to achieve a significant reduction in traffic fatalities and serious injuries on all public roads. The program is legislated under Section 148 of Title 23, United States Code (23 U.S.C. 148) and regulated under Part 924 of Title 23, Code of Federal Regulations (23 C.F.R. Part 924).

Highway Safety Manual (HSM): a manual that provides analytical tools and techniques for quantifying the potential effects on crashes as a result of decisions made in planning, design, operations, and maintenance of a roadway.

Highway Safety Plan (HSP): A State document, coordinated with the State strategic highway safety plan as defined in 23 U.S.C. 148(a), that the State submits each FY as its application for highway safety grants. The HSP describes the strategies and projects that State plans to implement and the resources from all sources it plans to use to achieve its highway safety performance targets.

HRGX: Highway Rail Grade Crossing

I

IDA: Inattentive, distracted, and drowsy drivers

Ignition Interlock: A device that renders a vehicle inoperative unless one or more preconditions are met. In DUI driver-control programs, the typical ignition interlock device requires the driver to give a breath sample, which is then analyzed for the presence of alcohol. If there is alcohol present (above some minimum threshold value), the vehicle will not start. Other variations are used to ensure that an individual either does not operate the vehicle or is the only operator of a vehicle.

Incident: An event occurring by chance or arising from unknown causes, for example, unawareness. An unexpected happening causing loss or injury that is not due to any fault or misconduct on the part of the person injured, but from the consequences.

Injury: Bodily harm to a person.

Injury Crash: A police-reported crash that involves a motor vehicle in transport on a travel way in which no one died but at least one person was reported to have: (1) an incapacitating injury; (2) a visible but not incapacitating injury; (3) a possible, not visible injury; or (4) an injury of unknown severity.

Intersection: An area that contains a crossing or connection of two or more roadways not classified as driveway access and within the prolongation of the lateral curb lines. If no curb exists, it is the area within the extension of the lateral boundary lines of the roadway of two joined traffic ways.

Intersection Control Evaluation (ICE): a data-driven, performance-based framework and approach used to objectively screen alternatives and identify an optimal geometric and control solution for an intersection.

Interstates: Limited access divided facilities of at least four lanes designated by the Federal Highway Administration as part of the Interstate System.

L

Lane Departure Crash: A crash caused by a driver failing to keep in his/her proper lane or conducting an improper lane change.

Large Trucks: Trucks (single unit trucks and truck tractors) over 10,000 pounds gross vehicle weight rating.

Linear Reference System (LRS): A method of spatial referencing in which the locations of features are described in terms of measurements along a linear element from a defined starting point.

Local Roads Safety Initiative (LRSI): an initiative whose projects identify and address safety concerns on local, non-state route segments located outside of an urban boundary and not represented by Tennessee Metropolitan Planning Organizations (MPOs). Routes considered under this program are classified as rural major collectors, rural minor collectors, or rural local routes. All candidate locations for this program are selected using a data driven process with set qualification criteria.

LRP: Long Range Planning

M

MADD: Mothers Against Drunk Driving.

Managed Lanes: A highway facility or set of lanes where operational strategies are proactively implemented and managed in response to changing conditions.

MCMIS: Motor Carrier Management Information System. Operated and maintained by FMCSA, MCMIS contains information on the safety fitness of commercial motor carriers and hazardous material (HM) shippers subject to the Federal Motor Carrier Safety Regulations (FMCSRs) and the Hazardous Materials Regulations (HMRs). MCMIS is a collection of safety information including state-reported crashes, compliance review and roadside inspections results, enforcement data, and motor carrier census data. The Crash Profiles module uses the MCMIS Crash and Census data to compile and publish the State Profiles and several national reports.

Medically at-risk Driver: A driver who has recognizable cognitive (mental) or functional (physical) impairments that can limit one's ability to safely operate a motor vehicle without compensating for or controlling such impairments through medication or adaptive devices.

Minimum drinking age and zero tolerance laws: These laws make it illegal for anyone under the age of 21 to drink alcohol. If someone under age 21 is suspected of drunk driving, a BAC of only 0.01 or 0.02 may be enough to revoke the person's license in many states. All states have zero tolerance laws.

MMUCC: Model Minimum Uniform Crash Criteria are a voluntary set of guidelines that help states collect consistent, reliable crash data that are more effective for identifying traffic safety problems, establishing goals and performance measures, and monitoring the progress of programs.

Motorcycles: All motorcycle type vehicles including two- and three-wheel motorcycles, mopeds, motor scooters, motorbikes, and three- and four-wheel all-terrain vehicles (ATVs).

MPO: Metropolitan Planning Organizations are created for each "urbanized area" with a population of more than 50,000 people to carry out the transportation planning process required by federal laws and regulations (Title 23 USC 134). MPOs, which include representatives of local governments, have been established in 11 urbanized areas in Tennessee — Bristol, Chattanooga, Clarksville, Cleveland, Jackson, Johnson City, Kingsport, Lakeway, Morristown, Knoxville, Memphis, and Nashville.

Motor Carrier: An individual, association, corporation, or other legal entity that controls, operates, or directs the operation of one or more commercial motor vehicles that transport persons or cargo over a road or highway in this state.

MUTCD: *The Manual of Uniform Traffic Control Devices* (MUTCD) defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets and highways.

N

NCUTLO: The National Committee on Uniform Traffic Laws and Ordinances is a private, nonprofit membership organization dedicated to providing uniformity of traffic laws and regulations through the timely dissemination of information and model legislation on traffic safety issues.

NHTSA: The National Highway Traffic Safety Administration, an organization within the U.S. Department of Transportation that is responsible for reducing deaths, injuries, and economic losses resulting from motor vehicle crashes. This is accomplished by setting and enforcing safety performance standards for motor vehicles and motor vehicle equipment, and through grants to state and local governments to enable them to conduct effective local highway safety programs.

Night: From 6 p.m. to 5:59 a.m.

North American Standard Inspection Level I: An inspection by qualified commercial vehicle enforcement officers that includes examinations of a commercial driver's license; medical examiner's certificate and Skill Performance Evaluation (SPE) Certificate (if applicable); alcohol and drugs; driver's record of duty status as required; hours of service; seatbelts; vehicle inspection reports(s) (if applicable); brake systems; coupling devices; exhaust systems; frames; fuel systems; lighting devices (headlamps, tail lamps, stop lamps, turn signals, and lamps/flags on projecting loads); securement of cargo; steering mechanisms; suspensions; tires; van and open-top trailer bodies; wheels, rims, and hubs; windshield wipers; emergency exits and/or electrical cables and systems in engine and battery compartments (buses); and Hazardous Materials/Dangerous Goods (HM/DG) requirements as applicable. HM/DG-required inspection items will be inspected by certified HM/DG inspectors.

North American Standard Inspection Level III (Driver/ Credential Inspection): An examination by commercial vehicle enforcement officers that includes as minimum requirements, where applicable, examinations of the driver's license; medical examiner's certificate and Skill Performance Evaluation (SPE) Certificate; record of duty status; hours of service; seatbelts; vehicle inspection report; and requirements for Hazardous Materials/ Dangerous Goods (HM/DG). Those items not indicated in this inspection procedure shall not be included on this level of inspection.

North American Standard Inspection Level VI (Transuranic Waste and Highway Route Controlled Quantities (HRCQ) of Radioactive Material): An inspection of select radiological shipments by commercial vehicle enforcement officers certified in this level of inspection, which includes procedures, enhancements to the North American Standard Level I inspection, radiological requirements, and the North American Standard Out-of-Service Criteria for Transuranic Waste and Highway Route Controlled Quantities (HRCQ) of Radioactive Material. As of January 1, 2005, all vehicles and carriers transporting HRCQ are regulated by the U.S. Department of Transportation and are required to pass this inspection (previously the U.S. Department of Energy (DOE) voluntarily complied with this inspection requirement). Select radiological shipments include HRCQ of radioactive material as defined by Title 49 CFR Section 173.403 and DOE transuranic waste.

NSSP: National Student Safety Program is the youth program of the American Driver and Traffic Safety Education Association (ADTSEA) that encourages and assists students through the initiation and implementation of safety activities within their respective schools and communities.

O

Open container laws: Prohibit drivers and passengers from having a container containing an alcoholic beverage open in a vehicle. The federal government has encouraged all states to enact open container laws by linking highway funding to the implementation of such laws. So far, about 30 states have adopted open container laws.

Older Drivers: Drivers, licensed or unlicensed, that are of age 65 and older (synonymous with Senior Drivers).

P

Pedestrian: A person traveling on foot; a walker. Also includes those using assistance for mobility, such as manual or motorized wheelchairs, walkers and other mobility aids.

Preventable Collision: A vehicle collision (crash) in which the driver fails to do everything reasonable to avoid it.

Property Damage-Only Crash: A police-reported crash involving a motor vehicle in transport on a trafficway in which no one involved in the crash suffered any injuries nor were there any fatalities.

PRSI: Pedestrian Road Safety Initiative

PSO: Project Safety Office

Q

Queue: A line (backup) of vehicles awaiting their turn to proceed.

R

Railroad Crossing - Active: An at-grade railroad crossing with traffic control devices activated by the approach or presence of a train, such as flashing light signals, automatic gates and similar devices, as well as manually operated devices and crossing watchmen, all of which display to motorists positive warning of the approach or presence of a train.

Railroad Crossing - At-grade: A location where one or more railroad tracks intersect with a public highway, road, or street, including associated sidewalks. Also includes railroad track intersections with authorized pathways dedicated for the use of non-vehicular traffic, including pedestrians, bicyclists, and others. At-grade railroad crossings may be active or passive.

Railroad Crossing - Grade-separated: A location where one or more railroad tracks are separated by a bridge from other traffic.

Railroad Crossing - Passive: An at-grade railroad crossing with traffic control devices, including signs, markings and other devices, located at or in advance of grade crossings to indicate the presence of a crossing but which do not change aspect upon the approach or presence of a train.

Ramp Metering: An operational strategy used to control the frequency of traffic flow of an on-ramp onto the travel lanes of a controlled access facility through use of a signal installed on the ramp.

Reckless Driving: Operating a motor vehicle with a willful and wanton disregard for the safety of persons or property.

RITA: Research and Innovative Technology Administration is an agency within the U.S. Department of Transportation that coordinates its research programs and is charged with advancing the deployment of cross-cutting technologies to improve our nation's transportation system.

Road Safety Audit (RSA): a formal safety performance examination of an existing or future road or intersection by an independent, multidisciplinary team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. The FHWA works with State and local jurisdictions and Tribal Governments to integrate RSAs into the project development process for new roads and intersections, and also encourages RSAs on existing roads and intersections.

Road Safety Audit Ramp Queue: a RSA that focuses on eliminating queues on exit ramps from access controlled facilities, when the queues impact the mainline travel lanes. The recommended improvements focus on correction of the conditions through a combination of geometric and intersection control improvements that will improve operations on the ramp and alleviate the excessive queue.

Roadway Departure Crash: A vehicle crash resulting from any departure of a vehicle from a travel lane (left or right) and the roadway.

Rollover: Any vehicle rotation of 90 degrees or more about any true longitudinal or lateral axis. Includes rollovers occurring as a first harmful event or subsequent event.

ROW: Right-of-Way.

RPM: Raised Pavement Marker.

RPO: Rural Planning Organizations are created under the Tennessee Department of Transportation's Long Range Transportation Plan to assist in identifying and evaluating regional transportation priorities in Tennessee's rural areas. Twelve RPOs, which involve local officials in the areas they represent, are established throughout the rural areas of Tennessee. These RPOs are identified as Center Hill, Dale Hollow, East Tennessee North, East Tennessee South, First Tennessee, Middle Tennessee, West Tennessee, Northwest Tennessee, South Central East, South Central West, Southeast Tennessee, and Southwest Tennessee.

RTE: Regional Traffic Engineer

Rumble Strips: Raised or grooved patterns typically located along the highway edgeline or centerline and sometimes in advance of a highway element that drivers may not expect (e.g. a rural traffic control device). The rumble strips provide both an audible warning and a physical vibration to alert drivers that they are leaving their lane or approaching something that will need their attention.

Rural Area: All territory outside the boundaries of incorporated cities/towns regardless of population density.

Rur. Art.: Rural Arterial.

Rur. Col.: Rural Collector.

Rur. Int.: Rural Interstate.

Rur. Loc.: Rural Local.

S

SADD: Students Against Drunk Driving.

Safety Edge: A modified edge strike-off attached to an asphalt paver, which produces a 30-degree slope from edge of pavement. It results in a pavement edge that is far less likely to contribute to a crash should a vehicle cross over the edge. It also produces better compaction at the edge of pavement.

Safe Transportation for Every Pedestrian (STEP): a FHWA program that provides guidance through resources (FHWA Publication Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations) on safety countermeasures and case studies.

SafetyNet: A Federal Motor Carrier Safety Administration (FMCSA) database management system that allows entry, access, analysis, and reporting of data from driver/vehicle inspections, crashes, compliance reviews, assignments, and complaints.

Safety Performance Measures (SPM): Five safety-related measurements of effectiveness used to assess fatalities and serious injuries on all public roads. The measures include: the number of fatalities, fatality rate, number of serious injuries, serious injury rate, and number of non-motorized fatalities and serious injuries. Yearly estimated projections of each SPM are required to be included as part of a state's HSIP report.

Saturation Blitzes: Heavy enforcement with checkpoints and roving saturation patrols and extensive publicity. Example "Click It or Ticket" enforcement blitzes, in July and November, respectively.

Secondary Crash: A highway crash that occurs as a result of traffic conditions, events, or activities related to an earlier crash, incident, or other event. The crash could occur in the original crash or incident area, within the queue, or even in the opposite direction or travel.

Senior Drivers: Drivers, licensed or unlicensed, who are of age 65 and older (synonymous with Older Drivers).

Serious Injury: Any incapacitating injury to a person that occurs as a result of a crash.

Serious Injury Rate: The number of persons seriously injured per 100 million vehicle miles traveled.

Severe Crash: A vehicular crash that results in a fatality or serious injury.

Severe Injury: Any fatality or serious injury that occurs as a result of a crash.

Second Strategic Highway Research Program (SHRP2): A program created by Congress to address the challenges of moving people and goods efficiently and safely on the nation's highways. This research program addresses four strategic focus areas: Safety, Renewal, Reliability, and Capacity.

Section 130 Program: A program that provides funds for the elimination of hazards at railway-highway crossings. The candidate locations must meet eligibility and program requirements set forth by 23 USC 130.

Sobriety Checkpoints: Temporary operations in which law enforcement officers stop or restrict the movement of some or all traffic to examine and ensure compliance with driving under the influence laws in order to advance legitimate state interests in promoting highway safety.

Spot Safety Program: a program whose projects address safety concerns at a location that failed to qualify for HSIP funding under the other programs currently active with STID. The formal request to STID for a location's consideration under this program is provided by the TDOT Regional Traffic Engineers (RTE). The origination of the request comes from a TDOT Region.

SPM: Snowplowable pavement marker.

Strategic Highway Safety Plan (SHSP): A statewide-coordinated safety plan that provides a comprehensive framework for reducing highway fatalities and serious injuries on all public roads.

STID: Strategic Transportation Investments Division.

T

Trafficway: Any road, street, or highway open to the public as a matter of right or custom for moving persons or property from one place to another.

TDH: Tennessee Department of Health

TDOSHS: Tennessee Department of Safety and Homeland Security.

TDOT: Tennessee Department of Transportation.

TEA: Tennessee Education Association.

Teen Driver: Drivers, licensed or unlicensed, that are of age 13 through 19.

THP: Tennessee Highway Patrol.

THSO: Tennessee Highway Safety Office.

TIP: Transportation Improvement Program.

TITAN: The Tennessee Integrated Traffic Analysis Network is a suite of tools developed for the electronic

collection, submission, and management of all crash data in Tennessee. It consists of a centralized data and document repository for public safety information managed by the Tennessee Department of Safety.

Title 23 CFR 630: Federal legislation governing preconstruction procedures for federally funded projects including work zone safety (Subpart J) and temporary traffic control devices (Subpart K).

Title 23 CFR 646: Federal legislation governing requirements for federally funded projects involving railroads.

Title 49 CFR 350: Federal legislation establishing the Commercial Motor Carrier Safety Assistance Program.

Tennessee Motorcycle Safety Strategic Plan (TMSSP): a safety plan developed by the TSHO addressing safety concerns, challenges, and proposed strategies specific to motorcycle safety.

Traffic Records Coordinating Committee (TRCC): A multimodal group with members from FHWA, FMCSA, NHTSA, and RITA that works to improve the collection, management, and analysis of traffic safety data at the state and federal level.

Tennessee Regional Safety Council (TRSC): A tax-exempt nonprofit organization that offers a wide range of vehicle-specific safety courses and human resource and workplace safety courses in Tennessee.

Tennessee Transportation Assistance Program (TTAP): The State's Local Technical Assistance Program (LTAP) center.

Traffic Incident Management (TIM): The planned and coordinated program process to detect, respond to, and remove traffic incidents and restore traffic capacity as safely and quickly as possible. This coordinated process involves a number of public and private sector partners including: Law Enforcement, Fire and Rescue, Emergency Medical Services, Transportation, Public Safety Communications, Emergency Management, Towing and Recovery, Hazardous Materials Contractors, and Traffic Information Media.

Traffic Records Strategic Plan (TRSP): The Tennessee Traffic Records Strategic Plan describes the goals, strategies, and desired outcomes for improving Tennessee's traffic records core data systems. This plan includes projects that will implement these improvements as selected by the Tennessee Traffic Records Coordinating Committee.

Transportation Planning Organization (TPO): An organization that has the same functions as a Metropolitan Planning Organization (MPO). The Knoxville Urban Area MPO, for example, is now known as the Knoxville Regional TPO.

U

Uniform Citation: A form promulgated by the Tennessee Department of Safety as authorized by Tennessee Code Annotated (T.C.A.) §55-10-208, which may be issued by all law enforcement officers in Tennessee.

Urban Area: The Census Bureau defines urban areas as densely developed territories encompassing residential, commercial, and other non-residential urban land uses. The Census Bureau identifies two types of urban areas: Urbanized Areas of 50,000 or more people and Urban Clusters of at least 2,500 and less than 50,000 people. All other areas are deemed rural.

Urb. Art.: Urban Arterial.

Urb. Col.: Urban Collector.

Urb. Int.: Urban Interstate.

Urb. Loc.: Urban Local.

V

Vehicle Safety Restraints: A system or device for restraining an occupant in a vehicle to prevent or minimize contact with the vehicle interior components and/or prevent ejection during a crash. Common systems and/or devices include seatbelts, child safety seats, and airbags.

VMT: Vehicle Miles Traveled represents the total number of vehicle miles traveled by motor vehicles on all public roadways within Tennessee.

W

Work Zone: The area between the first advance warning sign and the point beyond the utility or construction zone where traffic is no longer affected. See construction/ maintenance zone.

Y

Young Driver: Drivers, licensed or unlicensed, that are of age 15 through 24.

Z

Zero Tolerance: In cases of DUI, the right to convict minors with virtually any amount of alcohol in the bloodstream. In many cases, this amounts to a BAC of .01%, much less than the legal limit for adults.


TN