2014 North Carolina Strategic Highway Safety Plan

Released March 2015

2014 North Carolina Strategic Highway Safety Plan

North Carolina Executive Committee for Highway Safety
Federal Highway Administration

The 2014 North Carolina Strategic Highway Safety Plan (SHSP) has been developed in an effort to reduce the number of crashes, injuries, and fatalities on our State's roadways. The SHSP identifies nine critical safety emphasis areas representing the 4 E's of safety selected through a data-driven, performance-based approach and a collaborative process among North Carolina's safety partners. The progress in achieving the goals of the SHSP and in implementing the strategies of the emphasis areas will be monitored by the Executive Committee for Highway Safety at regular intervals throughout the year.

VISION: Through our partnerships, we foster safety awareness and provide safe access throughout North Carolina for all users and modes of travel such that everyone arrives safety at their destination.

MISSION: Establish a collaborative, strategic approach to the identification and implementation of safety improvement programs and policies to achieve the statewide goals to reduce fatalities and serious injuries related to crashes on North Carolina's transportation system.

GOALS: Cut the fatalities and serious injuries in North Carolina in half based on the 2013 figures, reducing the total annual fatalities by 630 fatalities and the total serious injuries by 1,055 serious injuries before 2030.

By signing this document, the signatories agree to support the Vision, Mission, and Goals of the 2014 North Carolina SHSP.

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ACKNOWLEDGEMENTS

This update to the North Carolina Strategic Highway Safety Plan was developed through the coordinated efforts of safety stakeholders across the State. This diverse group of partners worked diligently to identify opportunities to reduce crashes and the fatalities and serious injuries that result and is committed to implementing the actions and strategies identified herein to achieve the goals of the Plan.

- 3M
- AARP
- Cherokee Department of Transportation
- City of Greensboro Department of Transportation
- Conference of District Attorneys
- Ennis-Flint
- Federal Highway Administration (FHWA) North Carolina Division
- French Broad River Metropolitan Planning Organization
- Governor's Highway Safety Program (GHSP)
- Guilford County Sheriff's Office
- Mothers Against Drunk Driving (MADD)
- North Carolina Department of Health and Human Services (NC DHHS)
  - Injury and Violence Prevention Branch
- North Carolina Department of Motor Vehicles (NCDMV), Vehicle Services Section
- North Carolina Department of Public Instruction (NCDPI), Safe and Healthy Schools Support Division
- North Carolina Department of Transportation (NCDOT)
  - Bicycle and Pedestrian Division
  - Division Field Operations
  - Public Transportation Division
  - Roadway Design
  - Traffic Management Unit
  - Traffic Safety
  - Transportation Mobility and Safety
  - Transportation Planning Branch
- North Carolina Indian Economic Development Initiative
- North Carolina State Highway Patrol (NCSHP)
- North Carolina State University (NCSU) Institute for Transportation Research and Education (ITRE)
- North Carolina Trucking Association, Inc.
- Students Against Destructive Decisions (SADD)
- University of North Carolina Highway Safety Research Center (HSRC)

This Plan includes crashes reported in North Carolina's Crash Database as of June 2014. The numbers presented herein may differ slightly from other data summaries, as the Crash Database is amended on a continual basis and will fluctuate slightly. Nonetheless, the data analyses provide a good overall understanding of the magnitude of the problem and the relative importance of each emphasis area.

ACRONYMS

4 E's	Education, Enforcement, Engineering, and Emergency Services
AASHTO	American Association of State Highway and Transportation Officials
BAC	Blood alcohol concentration
BrAC	Breath alcohol concentration
CDC	Centers for Disease Control
CMF	Crash Modification Factor
DWI	Driving while impaired
EAWG	Emphasis Area Work Group
ECHS	Executive Committee for Highway Safety
FDE	Fundamental data elements
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
GHSP	Governor's Highway Safety Program
HSIP	Highway Safety Improvement Program
HSRC	Highway Safety Research Center
ITRE	Institute for Transportation Research and Education
LRS	Linear referencing system
MADD	Mothers Against Drunk Driving
MAP-21	Moving Ahead for Progress in the 21st Century Act
MIRE	Model Inventory of Roadway Elements
MVMT	Million vehicle miles traveled
NC DHHS	North Carolina Department of Health and Human Services
NCDMV	North Carolina Department of Motor Vehicles
NCDOT	North Carolina Department of Transportation
NCDPI	North Carolina Department of Public Instruction
NCDPS	North Carolina Department of Public Safety
NCHRP	National Cooperative Highway Research Program
NCSHP	North Carolina State Highway Patrol
NCSU	North Carolina State University
NHTSA	National Highway Traffic Safety Administration
NPRM	Notice of Proposed Rulemaking
PHB	Pedestrian Hybrid Beacon
ROME	Road Operations and Management Effort
RRFB	Rectangular Rapid Flashing Beacon
SADD	Students Against Destructive Decisions
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity: A Legacy for Users
SHSP	Strategic Highway Safety Plan
TEAAS	Traffic Engineering Accident Analysis System
TRCC	Traffic Records Coordinating Committee

PLAN OVERVIEW

BACKGROUND

Introduction

This document presents an updated Strategic Highway Safety Plan (SHSP) for the State of North Carolina. This SHSP (also referenced herein as the Plan) is an important component of North Carolina's Highway Safety Improvement Program (HSIP). The need for a SHSP was established by the federal transportation funding legislation, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), and strengthened by the passage of the Moving Ahead for Progress in the 21st Century Act (MAP-21) in July 2012. MAP-21 specifies that the SHSP must be developed based on safety data on all public roads, be developed in consultation with stakeholders, employ a multidisciplinary approach, describe a program of safety strategies, and consider other highway safety plans and processes.

This updated SHSP was developed through the collaborative efforts of diverse safety stakeholders representing the users of the North Carolina highway system and encompassing the 4 E's of highway safety—education, enforcement, engineering, and emergency services. These safety stakeholders include State, regional, local, and tribal agencies, as well as other public and private partners. This Plan presents a statewide, comprehensive, and collaborative approach for reducing fatalities and serious injuries on North Carolina's roadways. Serious injuries are those obviously serious enough to prevent the injured person from performing his or her normal activities for at least one day beyond the day of the crash. These are also called Type A injuries.

Appendix A provides an overview of the process used for this 2014 Plan update.

Building on Success

The North Carolina SHSP was first developed in 2004 by the North Carolina Executive Committee for Highway Safety (ECHS) in support of the American Association of State Highway and Transportation Officials (AASHTO) Strategic Highway Safety Plan. The ECHS adopted AASHTO's goal to reduce the statewide fatality rate to 1.0 fatalities per 100 million vehicle miles traveled (MVMT).

The Plan was revised in 2006, and 14 emphasis areas were identified to achieve its goal:

- Lane Departure
- Ensuring Drivers Are Fully Licensed
- Curbing Aggressive Driving
- Increasing Safety Belt Usage
- Keeping Drivers Alert
- Speed
- Intersection Safety
- Older Drivers
- Motorcycles
- Commercial Motor Vehicles
- Public Information
- Bicycle and Pedestrian Safety
- Incident Management
- Driver Education

The 2006 Plan provided a strategic framework for the implementation of strategies across the 4 E's

in these 14 areas. Significant progress was made toward the Plan's overall goal, as evidenced by the dramatic decrease in the number of fatalities per 100 million vehicle miles traveled (MVMT) over the eight-year period from 2006 to 2013, presented in Figure 1. The 2013 fatality rate is just under 1.2 fatalities per 100 MVMT. Nationally, the fatality rate has also declined during the same period, although not as sharply as in North Carolina. Evaluations of North Carolina's engineering safety programs have demonstrated that the collaborative and focused statewide efforts of the SHSP in recent years have contributed to the reductions in fatalities and serious injuries. Many other factors may also have contributed to this decline, such as vehicle enhancements and economic influences.

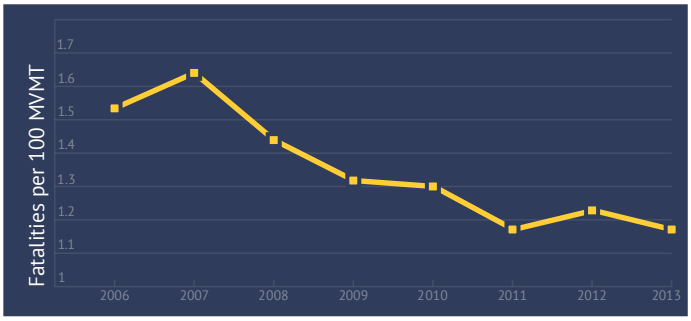


Figure 1: *Fatalities per 100 MVMT (2006 - 2013).*

The fatality rate presented in Figure 1 considers the amount of travel or exposure on North Carolina's roadways. The total number of fatalities have also decreased since 2006, as presented in Figure 2.

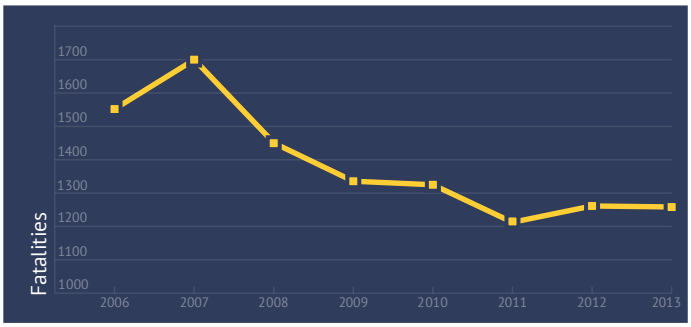


Figure 2: *Fatalities Resulting from Crashes (2006 - 2013).*

The dramatic decrease in the number of annual fatalities since 2006 is similar to the decrease in serious injuries resulting from crashes on North Carolina's roadways during the same time period, presented in Figure 3.

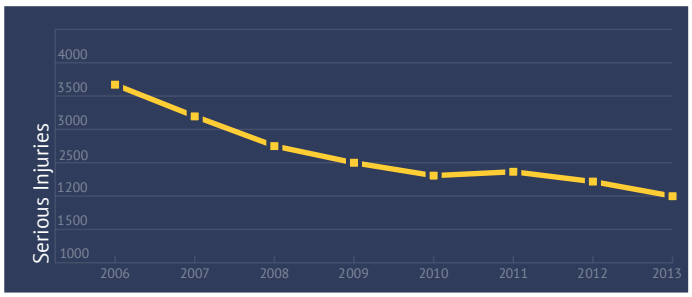


Figure 3: *Serious Injuries Resulting from Crashes (2006 - 2013).*

Although the safety stakeholders implementing the Plan have made significant progress in achieving the statewide goal since 2006, there is still work to be done. In 2013, 1,260 people died on North Carolina's roadways, and another 2,109 people were seriously injured. Additionally, the downward trend in fatalities and serious injuries has flattened over the last few years. This document—an update of the original State SHSP—presents refined goals and objectives, new safety emphasis areas, and additional strategies and actions to build on past success and to continue to reduce fatalities and serious injuries on North Carolina's roadways.

THE WAY FORWARD

North Carolina is a Vision Zero State—even one fatality is too many on our roadways. This Plan articulates the way forward to achieve Vision Zero. The Plan's vision, mission, and goals guide the development and implementation of strategies and actions to achieve Vision Zero.

Vision

Through our partnerships, we foster safety awareness and provide safe access throughout North Carolina for all users and modes of travel such that everyone arrives safely at their destination.

Mission

Establish a collaborative, strategic approach to the identification and implementation of safety improvement programs and policies to achieve the statewide goals to reduce fatalities and serious injuries related to crashes on North Carolina's transportation system.

Goals

Cut the fatalities and serious injuries in North Carolina in half based on the 2013 figures, reducing the total annual fatalities by 630 fatalities and the total serious injuries by 1,055 serious injuries before 2030.

The vision provides the long-range guiding light for the Plan. The mission articulates the motivation of the safety stakeholders who developed the Plan and undertake the responsibility of implementation. The goals provide an aggressive but achievable measure for the safety of all users on North Carolina's highways.

EMPHASIS AREAS

The goals of the Plan will be achieved through the implementation of strategies and actions in nine safety emphasis areas:

1. Demographic Considerations
2. Driving While Impaired
3. Emerging Issues and Data
4. Intersection Safety
5. Keeping Drivers Alert
6. Lane Departure
7. Occupant Protection/Motorcycles
8. Pedestrians and Bicyclists
9. Speed

These emphasis areas represent the greatest opportunity for the safety stakeholders to focus their efforts to achieve the goals of this Plan. The safety stakeholders selected these emphasis areas cooperatively through a data-driven approach, noting that many individual crashes can be attributed to more than one emphasis area. For example, a crash may involve speeding, intersection safety, and occupant protection. Therefore, these emphasis areas provide an opportunity to address crashes from multiple perspectives.

Pages 7 - 24 present an overview of each emphasis area, while Appendices B - J present Action Plans for them.

PLAN IMPLEMENTATION

The strategies and actions for each of the nine emphasis areas chart the way forward and must be implemented to meet the goals of this Plan. Leadership, performance measurement, and coordination are all critical to implementation.

Leadership

The stakeholders who developed this Plan are also largely responsible for implementing the proposed strategies and actions. Their efforts are guided by the leadership of the ECHS. This

leading body is composed of the following partner agencies, each committed to working collaboratively to accomplish the goals:

- AARP
- City of Greensboro Department of Transportation
- Conference of District Attorneys
- Eastern Carolina Injury Prevention Program
- Federal Highway Administration North Carolina Division
- French Broad River Metropolitan Planning Organization
- Governor's Highway Safety Program
- Mothers Against Drunk Driving
- North Carolina Child Fatality Task Force
- North Carolina Department of Health and Human Services
- North Carolina Department of Insurance
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- North Carolina Division of Motor Vehicles
- North Carolina Indian Economic Development Initiative
- North Carolina State Highway Patrol
- Students Against Destructive Decisions
- University of North Carolina Highway Safety Research Center

Measuring Performance

The ECHS monitors the State's progress toward meeting the goals of the SHSP, and the numbers of fatalities and serious injuries on North Carolina's roadways are the ultimate measures of progress. The following table presents target milestone reductions (expressed as lives saved for fatalities and serious injuries prevented) to achieve the goals of this Plan. The annual reductions in fatalities and serious injuries are in comparison to the number of fatalities and serious injuries in 2013 resulting from crashes.

GOAL YEAR	Annual Lives Saved*	Serious Injuries Prevented*
2015	75	125
2020	260	435
2025	445	745
2030	630	1,055

** Relative to 2013*

Some strategies and actions will take several years to implement and to determine whether a meaningful reduction in fatalities and serious injuries has been realized. This "lag" in effect should not be a deterrent to monitoring the progress toward the goals. Instead, there are actions associated with the strategies that can be tracked to measure the progress of implementing the Plan. Some potential indicators of progress have been identified for each emphasis area. Additionally, the reduction in fatalities and serious injuries will be monitored for each emphasis area individually.

The emphasis areas in this Plan address three crash types that will be monitored by FHWA as part of the MAP-21 Special Rules: crashes involving older drivers, crashes involving older pedestrians, and crashes on rural roads. Regarding crashes on rural roads, the fatality rate

on rural roads will be monitored to determine if a specified amount of HSIP funds should be allocated for High Risk Rural Roads (HRRRs). In North Carolina, a HRRR is *a rural collector (major or minor) or a rural local road that has a significant safety risk as identified through a field review, safety assessment, road safety audit, or local knowledge and experience*.

As implementation moves forward, and as the strategies and actions presented achieve their goals, the emphasis areas most critical to the State will likely change or the focus needed on an individual emphasis area may increase. This Plan is a "living document" in that it can be updated as needed through the inclusion of new initiatives and updates on existing initiatives, as well as the modification and even deletion of initiatives as North Carolina's safety needs change. The ECHS will provide the leadership for this regular updating of the Plan. Measuring the performance of the Plan—both as a whole and individually—for each emphasis area is important so that the Plan can evolve as needed.

Coordination

Many of the strategies in this Plan are also included in related statewide plans. As such, the SHSP supports the initiatives of other related plans, including the following:

- 2014 Federal Motor Carrier Safety Administration (FMCSA) Commercial Vehicle Safety Plan
- 2014 State Enforcement Plan
- 2012-2016 Federal Motor Carrier Safety Administration (FMCSA) Strategic Plan
- North Carolina Department of Transportation Current State Transportation Improvement Program (STIP), 2014
- North Carolina Governor's Highway Safety Program FY2014 Highway Safety Plan
- North Carolina State Highway Patrol Strategic Plan 2011-2013
- North Carolina Strategic Highway Safety Plan 2006
- North Carolina Traffic Records Assessment 2012
- North Carolina Traffic Safety Information Systems Strategic Plan 2013
- WalkBike NC Plan 2013

The strategies and actions in the SHSP are intended to be implemented in concert with the strategies and actions of the related plans so that highway safety in North Carolina can be advanced in a comprehensive, multi-faceted, strategic manner.

EMPHASIS AREA SUMMARIES

Pages 7-24 present a summary of the strategies and actions for each of the nine emphasis areas. To achieve the Plan's goals to reduce fatalities and serious injuries by half and to move North Carolina closer to Vision Zero, significant reductions are needed in each emphasis area. In general, the goal for each emphasis area is to reduce fatalities and injuries by half. Some emphasis areas present a greater opportunity to reduce fatalities and serious injuries than others. Factors such as trends in exposure rates and the availability of effective strategies are different for each emphasis area and affect the opportunity to reduce fatalities and serious injuries. For example, several lane departure strategies are known to be effective at reducing crashes on North Carolina's roads; their increased implementation presents an opportunity to greatly reduce fatalities and serious injuries. Conversely, because motorcycle ridership is increasing in North Carolina, crash reductions from effective strategies must outpace the growth in crashes that is attributed to the increased ridership (e.g., exposure). Overall, the strategies in the emphasis areas work collectively toward the Plan goal, with some emphasis areas expected to contribute more reductions in fatalities and serious injuries than others.

Emphasis Areas

Demographic Considerations 7

Driving While Impaired 9

Emerging Issues and Data 11

Intersection Safety 13

Keeping Drivers Alert 15

Lane Departure 17

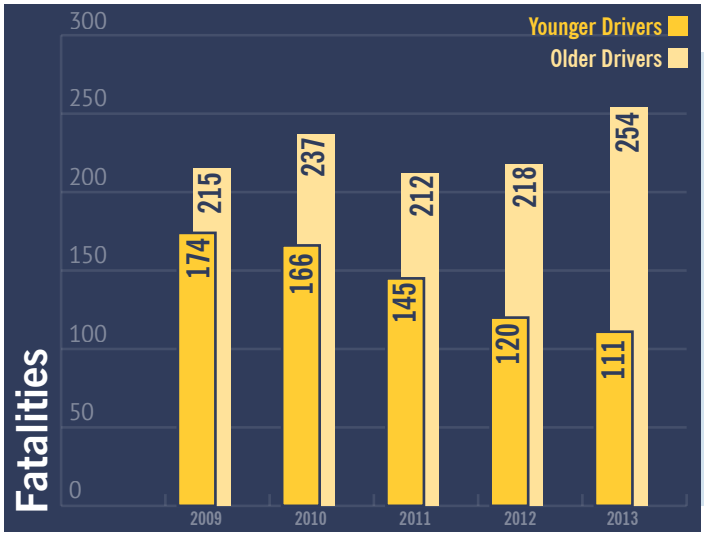
Occupant Protection/Motorcycles 19

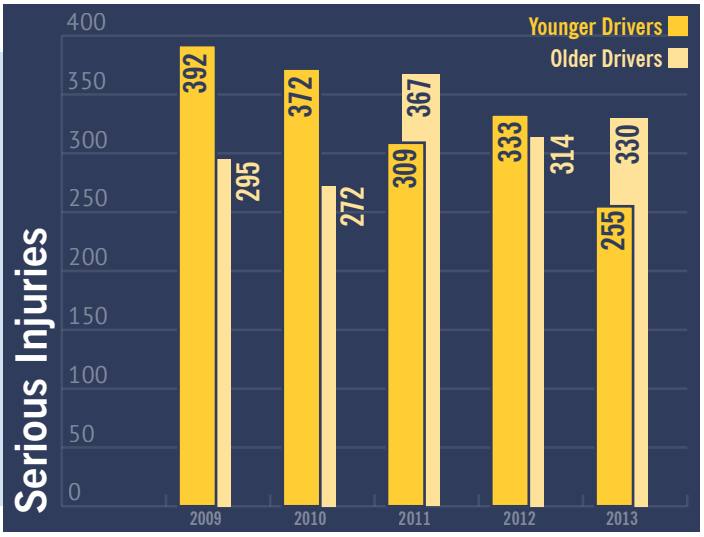
Pedestrians and Bicyclists 21

Speed 23

DEMOGRAPHIC CONSIDERATIONS

North Carolina is a great place to call home, and our growth reflects this reality. From April 2010 – July 2013, the State's population increased 3.3 percent to more than 9.8 million people—significantly faster growth than the 2.4 percent realized nationally. The driving public in North Carolina is very diverse, yet a few populations are overrepresented in fatal and serious-injury crashes, including younger and older drivers, Native Americans, and Hispanics. To improve safety for all, the characteristics and needs of demographic groups deserve thoughtful consideration in highway safety efforts.





NOTABLE FACTS

- North Carolina has the third-highest migration rate in the US, and the average age of persons moving to the State is 50 years old.
- Considering all drivers, 19 percent of fatal crashes in North Carolina involve an alcohol-impaired driver; however, the average for alcohol-impaired fatal crashes among Native American and Hispanic drivers is 26 percent and 31 percent, respectively.

EMPHASIS AREA GOAL

The goal for this emphasis area is to address demographic considerations in highway safety efforts. The focus is the reduction of fatalities and serious injuries for two demographic groups in particular—older drivers and younger drivers. In 2013, there were 254 fatalities and 330 serious injuries from crashes involving older drivers (age 65 and older) in North Carolina. In 2013, there were 111 fatalities and 255 serious injuries from crashes involving younger drivers (ages 16 – 19) in North Carolina.

STRATEGIES

- Encourage the use of roadway design practices and traffic control devices that are better suited to accommodate the needs of older drivers and older pedestrians.
- Adopt or develop a set of programs to help older drivers to decide whether to continue driving and identify adequate alternatives to driving.
- Improve driver education courses included in high school curricula by improving the content and the delivery.
- Investigate the effectiveness of programs, policies, and strategies that have been employed across the US to address teen driver training that could also be used in North Carolina to reduce teen crashes.
- Continue engaging and informing North Carolina's diverse population on issues of traffic safety.
- Improve electronic crash data collection and dissemination.
- Support lifelong driver education.

INDICATORS OF PROGRESS

- Number of safety efforts that consider the diverse needs of various demographic groups in the program structure and message.
- Number of tribal groups that integrate crash reports into the NCDMV system.
- Number of traffic control device improvements implemented in the interest of older drivers and older pedestrians.

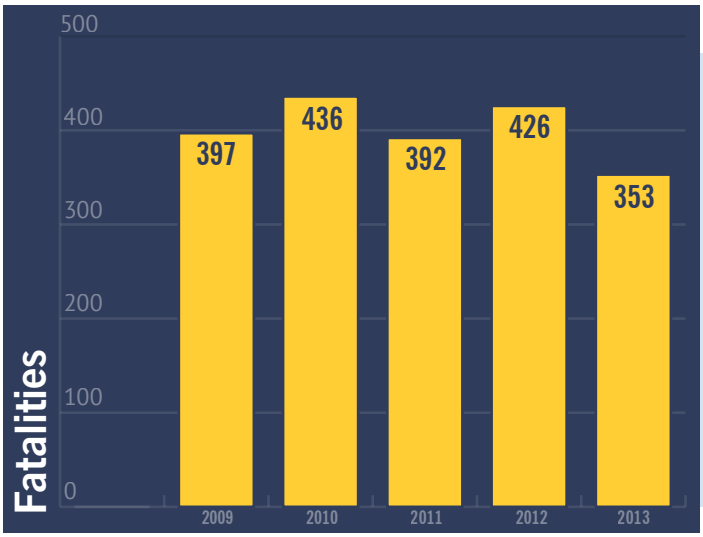
POTENTIAL IMPLEMENTING AGENCIES

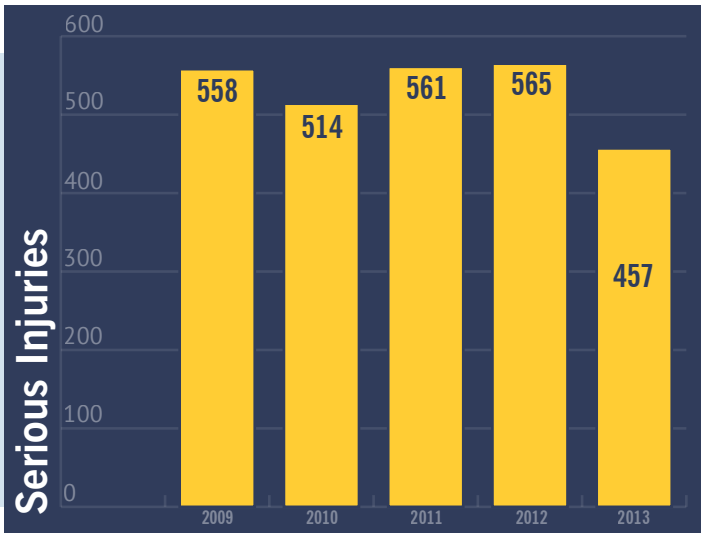
- Advocacy groups
- Governor's Highway Safety Program
- Law enforcement
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- North Carolina Division of Motor Vehicles
- University partners

See Appendix B for the Demographic Considerations Action Plan.

DRIVING WHILE IMPAIRED

The Driving While Impaired (DWI) emphasis area targets collisions on North Carolina's roadways that involve one or more drivers of whom alcohol impairment is suspected or detected. Although drivers can be impaired in many ways—due to drug or alcohol use, fatigue, aging, emotional state, etc.—alcohol-impaired driving is considered to be the linchpin of the issue. As such, it should be the primary focus of our efforts to reduce fatalities and serious injuries resulting from impaired driving.





NOTABLE FACTS

- From 2009 – 2013, alcohol-related crashes in North Carolina took the lives of over 400 people on average each year and resulted in over 500 serious injuries a year on average.
- 2 of 3 drivers arrested nationally for DWI have not been previously charged with DWI.
- 4 of 5 drivers in an alcohol-related crash nationally have not been previously charged with DWI.

EMPHASIS AREA GOAL

In 2013, there were 353 fatalities and 457 serious injuries due to alcohol-involved crashes in North Carolina. The goal for this this emphasis area is to reduce fatalities and serious injuries associated with DWI.

STRATEGIES

- Increase the visibility of DWI enforcement efforts.
- Collaboratively redefine the roles and responsibilities of various State government offices in processing license revocations for DWI.
- Expand the use of ignition interlock devices.
- Improve the efficiency and consistency with which DWI cases are adjudicated and sanctions are levied against offenders.
- Expand how "success" or "progress" in addressing DWI is measured.

INDICATORS OF PROGRESS

- Number of ignition interlock devices installed.
- Level of funding that directly supports the ignition interlock device program.
- Publicity efforts (e.g., total column inches in print media, total minutes in broadcast media, and total number of paid media spots) devoted to promoting awareness of DWI checkpoints and enforcement efforts.

POTENTIAL IMPLEMENTING AGENCIES

- Administrative Office of Courts
- Advocacy groups
- District Attorneys
- Governor's Highway Safety Program
- Law enforcement
- North Carolina Department of Public Safety
- North Carolina Division of Motor Vehicles
- Non-profit groups such as MADD

See Appendix C for the Driving While Impaired Action Plan.

EMERGING ISSUES AND DATA

Flexibility and forward thinking are critical components of strategic visioning. Because the North Carolina landscape of technology, research, and social behavior can change quickly, it is essential that a multiyear plan such as this can address new issues and opportunities that will arise in the future. The role and importance of traffic safety data have increased in recent years as data-driven decision-making has become the norm. Quality data related to crashes, roadway characteristics, driver characteristics, vehicles, citations, and injuries provide the backbone for all safety management efforts—including the implementation of this SHSP. Accurate, complete, and timely data are needed not only to guide safety decisions and endeavors but also to assess the effectiveness of past and ongoing efforts.

NOTABLE FACTS

- Only 70 percent of crashes in North Carolina are reported electronically, even though electronic reporting requires less manpower and results in more timely availability of crash data.

EMPHASIS AREA GOAL

This emphasis area has two goals. The first goal is to improve the State's data and data systems in support of the SHSP goal to reduce fatalities and serious injuries on North Carolina's roadways. The second goal is to use the improved data to identify and address safety concerns and additional emphasis areas that emerge as the SHSP is implemented and the State moves toward the 2030 goal.

STRATEGIES

- Improve the quality and usefulness of crash data.
- Improve the completeness and accuracy of roadway inventory data.
- Improve driver record data.
- Increase the State's ability to use existing traffic safety data.
- Accommodate new issues that emerge in the field of highway safety.

INDICATORS OF PROGRESS

- Percent of crashes reported electronically.
- Percent of roadway miles in linear referencing system (LRS).

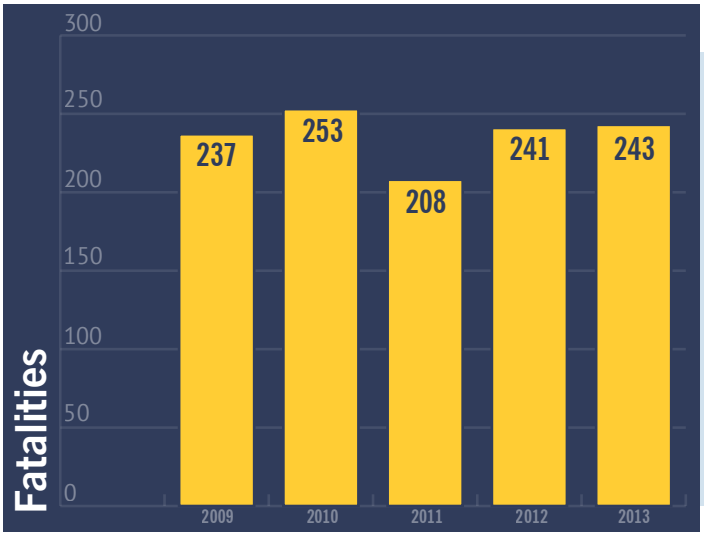
POTENTIAL IMPLEMENTING AGENCIES

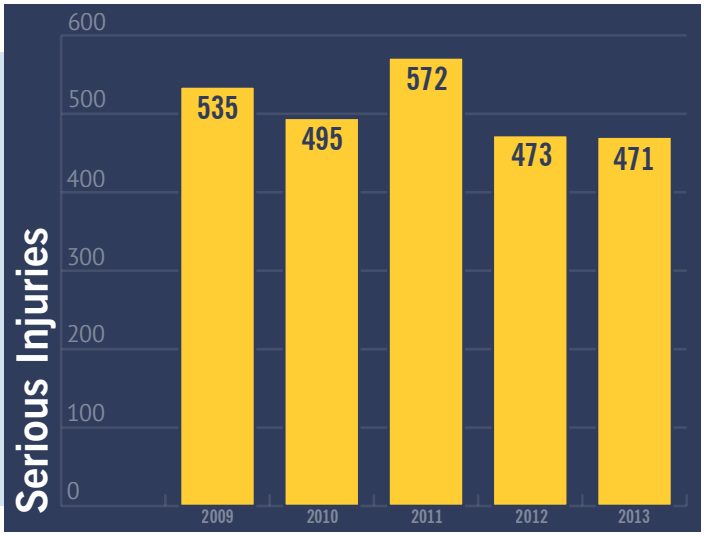
- Advocacy groups
- Law enforcement
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- North Carolina Division of Motor Vehicles
- Traffic Records Coordinating Committee

See Appendix D for the Emerging Issues and Data Action Plan.

INTERSECTION SAFETY

Because an intersection is the point at which multiple paths converge, it inherently presents increased opportunities for conflicts between those who traverse it. While the last decade has seen a steady decline in intersection crashes in North Carolina, this decrease mirrored the decrease observed across all crashes with no significant reduction in the proportion of intersection crashes. North Carolina has taken—and should continue to take—a multifaceted approach to tackling this issue, one that considers the intersection design, users from all modes, and both spot-safety and systemic improvements.





NOTABLE FACTS

- From 2004 – 2013, collisions at North Carolina's intersections resulted in an annual average of 265 fatalities and 670 serious injuries.
- Through its safety programs, NCDOT implemented safety improvements at nearly 400 intersections statewide from 2008 – 2012.

EMPHASIS AREA GOAL

In 2013, there were 243 fatalities and 471 serious injuries at intersections. The goal for this emphasis area is to reduce intersection fatalities and serious injuries.

STRATEGIES

- Improve visibility of intersections by providing enhanced signs and pavement markings.
- Reduce the frequency and severity of intersection crashes through traffic control enhancements.
- Enhance safety at signalized intersections through the use of proven safety countermeasures.
- Support and enhance driver education and awareness programs.

INDICATORS OF PROGRESS

- Number of intersections at which low-cost improvements are systemically implemented.
- Number of intersections at which the intersection traffic control is improved or reinforced through enhancements.
- Number of signal improvements installed, including pedestrian improvements and visibility improvements.
- Inclusion of intersection-focused content in the driver education curriculum.

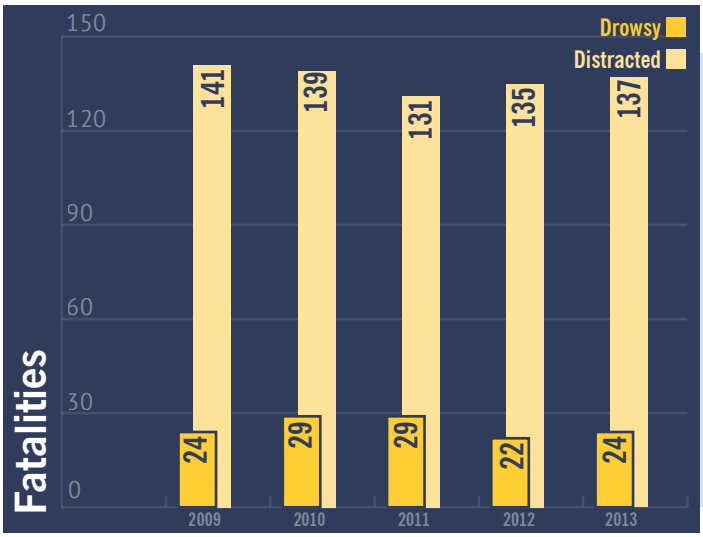
POTENTIAL IMPLEMENTING AGENCIES

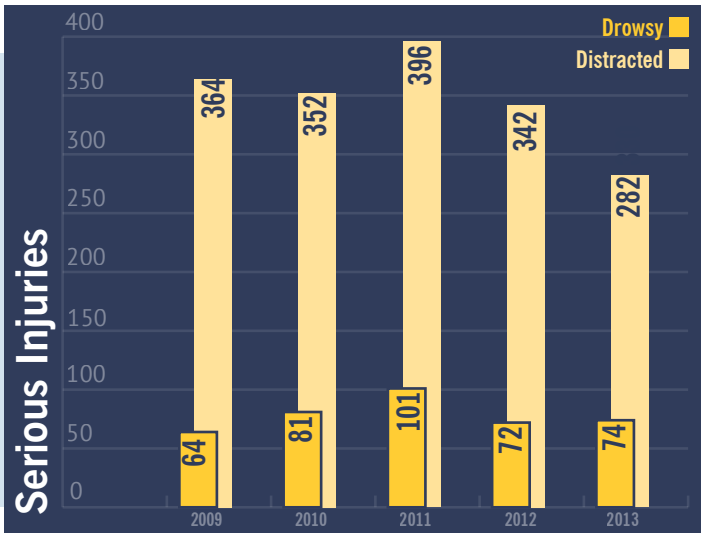
- Law enforcement
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- University partners

See Appendix E for the Intersection Safety Action Plan.

KEEPING DRIVERS ALERT

Insufficient attention to the task of driving puts drivers and others at greater risk on North Carolina's roadways. The explosion of wireless handheld devices coupled with a multitasking, frenetic society have amplified this longstanding cause of vehicular crashes in recent years. Because law enforcement officers must rely on witness accounts or admission from the drivers themselves, an accurate assessment of the magnitude of this issue is difficult to establish.





NOTABLE FACTS

- From 2009 – 2013, an average of 135 fatalities occurred each year due to distracted drivers and over 25 annual fatalities resulting from drowsy drivers.
- Between 2008 and 2012, only two percent of fatalities and one percent of serious injuries attributed to distracted driving were classified as involving an electronic device—figures believed to be grossly understated.

EMPHASIS AREA GOAL

In 2013, there were 161 fatalities and 356 serious injuries due to distraction and drowsiness. The goal for this emphasis area is to reduce fatalities and serious injuries related to distraction and drowsiness.

STRATEGIES

- Explore the specifics of instituting a handheld cell phone ban while operating a motor vehicle that is in motion.
- Promote the existing ban on texting while driving by increasing the visibility of law enforcement and the frequency of high-visibility enforcement campaigns.
- Investigate new and emerging technologies to prevent distracted driving.
- Continue implementing rumble strips on roadway shoulders and investigate additional engineering countermeasures and programs that can alert drowsy or distracted drivers.
- Improve the quality of data on driver distraction to demonstrate the extent of the problem and need for a solution.

INDICATORS OF PROGRESS

- Number of miles of new rumble strips.
- Number of enforcement activities focused on distracted driving.
- Number of education or visibility activities focused on distracted driving.

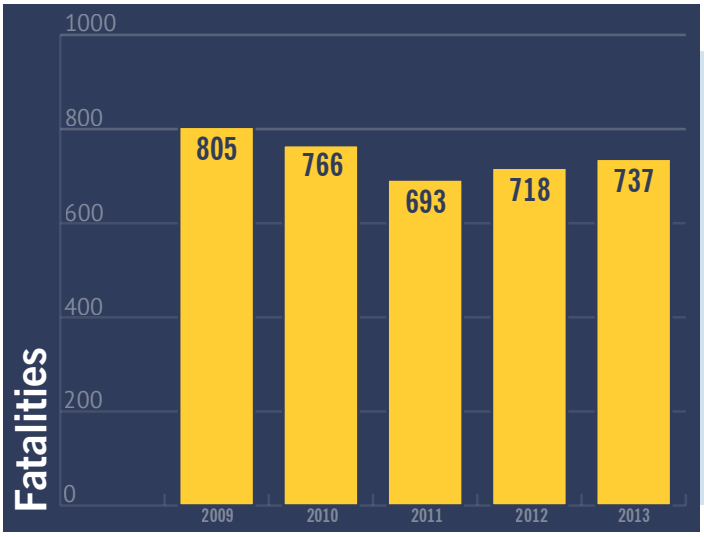
POTENTIAL IMPLEMENTING AGENCIES

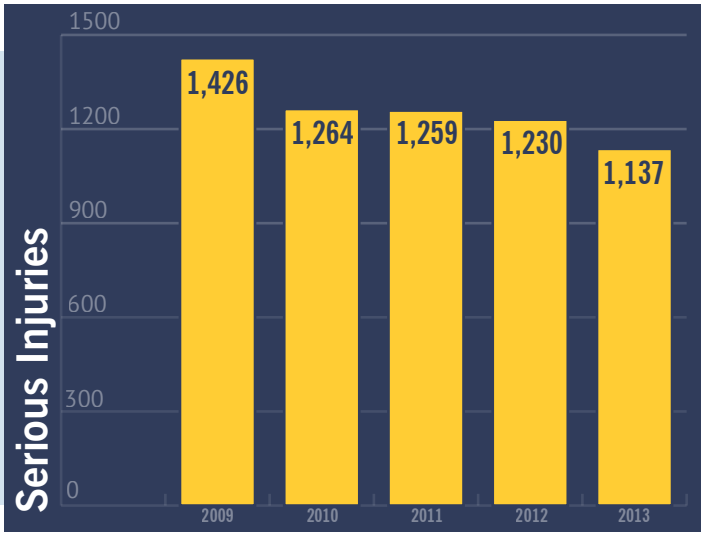
- Law enforcement
- North Carolina Department of Transportation
- North Carolina Division of Motor Vehicles
- University partners

See Appendix F for the Keeping Drivers Alert Action Plan.

LANE DEPARTURE

The consequences of a vehicle leaving its travel lane can be severe, sometimes resulting in serious injury or death, as errant vehicles can strike roadside objects, collide with other vehicles, or overturn. More than half of all traffic fatalities in North Carolina are attributed to lane departure crashes. Because North Carolina has the second-largest State-maintained road system in the US—approximately 80,000 miles—finding a balance between spot-safety improvements and systemic applications is critical to address this issue across such an expansive network.





NOTABLE FACTS

- From 2009 – 2013, an average of 740 lives were lost each year in a lane departure crash.
- In 2012, nearly 1 in every 4 crashes and 3 in 5 traffic fatalities in North Carolina involved a vehicle leaving its lane of travel.

EMPHASIS AREA GOAL

In 2013, there were 737 fatalities and 1,137 serious injuries resulting from lane departure crashes. The goal for this emphasis area is to reduce lane departure-related fatalities and serious injuries.

STRATEGIES

- Keep vehicles on the roadway.
- Reduce the potential for crashes when vehicles leave the roadway.
- Reduce the severity of crashes that do occur when vehicles leave the roadway.
- Support and enhance driver education and awareness programs.

INDICATORS OF PROGRESS

- Number of miles of new paved shoulders.
- Number of miles of Safety Edge treatment.
- Number of miles of new guardrail.

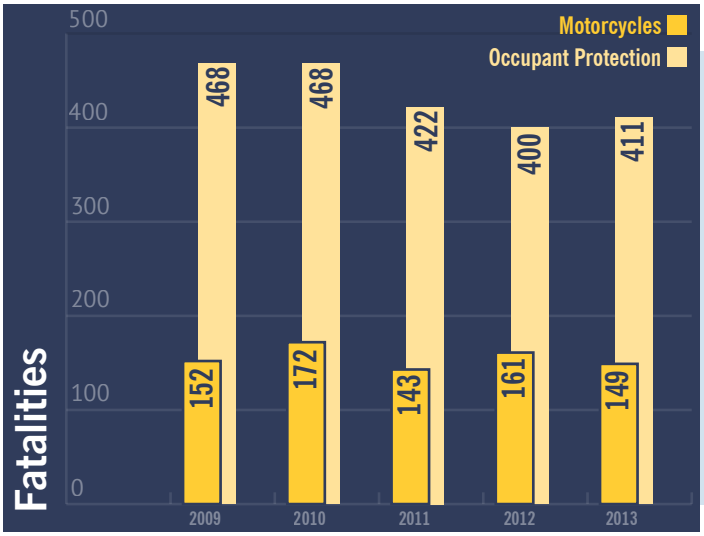
POTENTIAL IMPLEMENTING AGENCIES

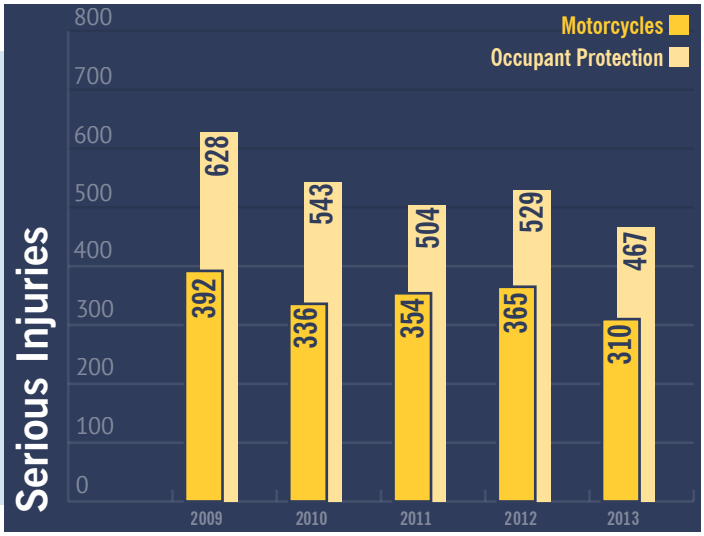
- Governor's Highway Safety Program
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation

See Appendix G for the Lane Departure Action Plan.

OCCUPANT PROTECTION/MOTORCYCLES

Approximately 40 percent of all passenger vehicle fatalities in North Carolina involve an unrestrained occupant. Although we recently celebrated the 20th anniversary of the "Click It or Ticket" seatbelt enforcement campaign, the lack of universal seatbelt use continues to be a problem among certain demographics in our State and across the US. Motorcycle crashes also appear to be on the rise in North Carolina, occurring most frequently in our western mountains, most populated counties, and counties with military bases. Simply put, increased compliance with seatbelt and helmet laws will save lives.





NOTABLE FACTS

- From 2009 – 2013, motorcycle crashes in North Carolina resulted in an annual average of 155 fatalities and 350 serious injuries. During that same time, an average of 433 unrestrained occupants died each year in crashes on North Carolina's roadways.
- Among the groups most likely to be involved in a fatal crash in which the occupant was not wearing a seatbelt are males, persons ages 20-24, and drivers of pickup trucks.
- Half of North Carolina's motorcycle crashes involve persons age 41 and older.

EMPHASIS AREA GOAL

In 2013, there were 411 fatalities and 467 serious injuries from crashes of unrestrained occupants in passenger vehicles and 149 motorcycle fatalities and 310 serious injuries in North Carolina. The goals of this action plan are to reduce fatalities and serious injuries in North Carolina related to occupant protection and motorcycles.

STRATEGIES

- Improve enforcement strategies to increase seatbelt use.
- Identify high-risk counties and demographic groups to inform specific safety countermeasures and messaging specific to restraint use.
- Continue current and develop new messaging and education programs promoting seatbelt use focusing on high-risk locations or groups.
- Continue to support and promote North Carolina's strong motorcycle helmet law.
- Continue to promote motorcycle safety in North Carolina.
- Identify high-risk counties and demographic groups to inform specific motorcycle safety countermeasures.

INDICATORS OF PROGRESS

- Seatbelt and helmet use estimated through crash data and observational/survey efforts.
- Level of seatbelt enforcement efforts conducted statewide.
- Level of seatbelt education and awareness efforts conducted statewide.
- Number of motorcycle safety strategies deployed.

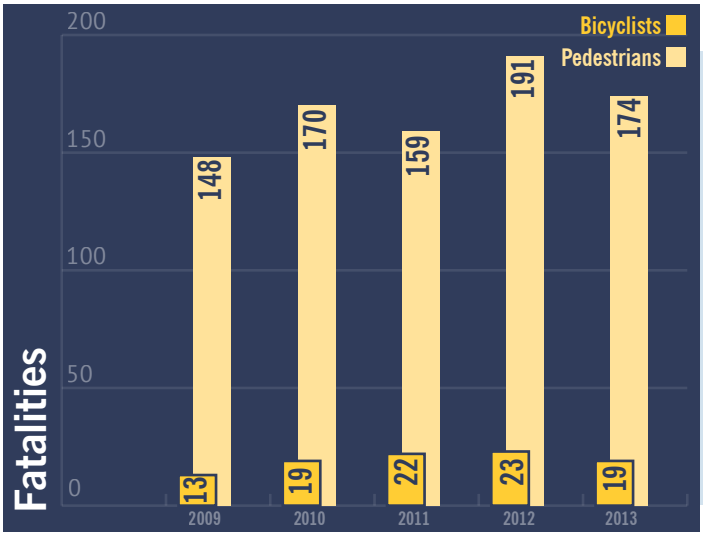
POTENTIAL IMPLEMENTING AGENCIES

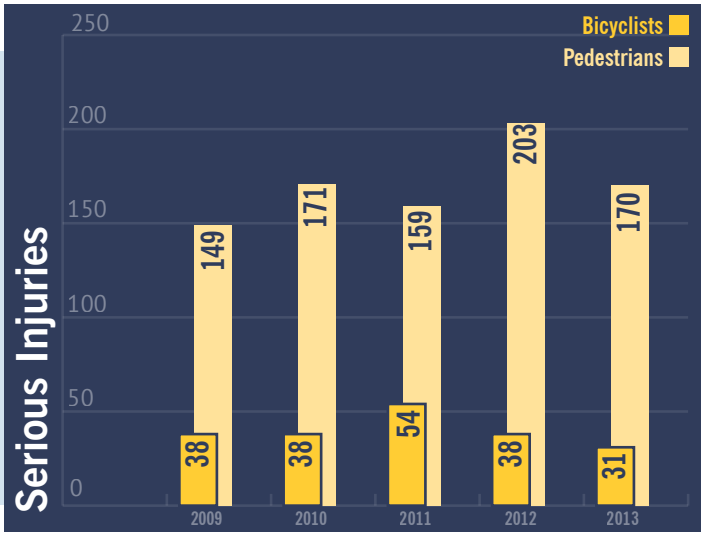
- Advocacy groups
- District Attorneys
- Governor's Highway Safety Program
- Law enforcement
- Motorcycle clubs
- North Carolina Department of Health and Human Services
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- North Carolina Division of Motor Vehicles

See Appendix H for the Occupant Protection/Motorcycle Action Plan.

PEDESTRIANS AND BICYCLISTS

Walking and bicycling can be a great alternative to the motor vehicle because they reduce congestion on our roadways, promote an active lifestyle, and are environmentally-friendly. However, the smaller size, slower speed, and limited protection of pedestrians and bicyclists make them vulnerable to serious injuries and fatalities when involved in collisions with motor vehicles. The responsibility to exercise prudence and maintain awareness of one another is shared equally among all road users—pedestrians, bicyclists, and drivers alike.





NOTABLE FACTS

- From 2009 – 2013, an average of 168 pedestrians and 19 bicyclists were killed annually in collisions with motor vehicles in North Carolina.
- 7 of 10 pedestrian crashes occur within municipal limits.
- While 70 percent of all North Carolina bicycle crashes take place in urban areas, more than half the bicycle fatalities occur in rural-designated areas.

EMPHASIS AREA GOAL

In 2013, there were 174 pedestrian fatalities and 170 serious injuries, and 19 bicyclist fatalities and 31 serious injuries resulting from crashes in North Carolina. The goals of this action plan are to reduce pedestrian and bicyclist fatalities and serious injuries in North Carolina.

STRATEGIES

- Continue to develop training and education programs for pedestrian and bicycle safety.
- Implement and develop plans, policies, and resources.
- Continue to develop communication and leadership support for pedestrian and bicycle safety.
- Build on strong data and evaluation programs.

INDICATORS OF PROGRESS

- Number of pedestrian and bicyclist volume counting efforts.
- Number of pedestrian- and bicycle-related targeted enforcement activities conducted.
- Number of pedestrian or bicycle-focused Road Safety Audits conducted.
- Number of agency staff trained on safe pedestrian and bicycle planning and design.
- Number of pedestrian or bicycle-focused improvements installed.
- Miles of pedestrian and bicycle network added or improvement.

POTENTIAL IMPLEMENTING AGENCIES

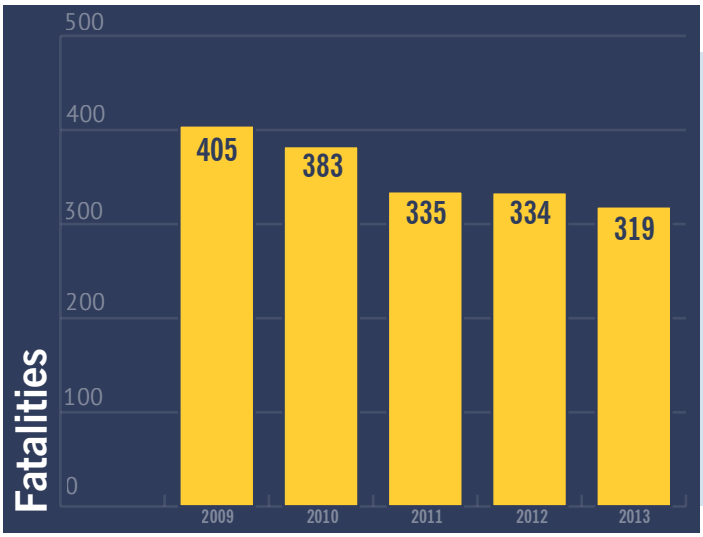
- Engineering consultants and organizations
- Governor's Highway Safety Program
- Law enforcement
- Municipalities
- North Carolina Department of Health and Human Services
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- University partners

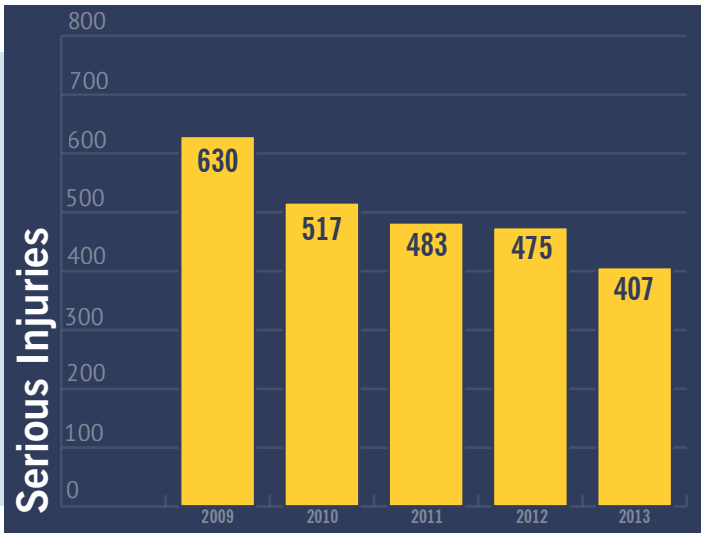
See Appendix I for the Pedestrians and Bicyclists Action Plan.

SPEED

As is the case in much of the country, speeding persists as a highway safety problem in North Carolina. The North Carolina General Statutes (§20 – 141) refer to speeding as driving at a "speed greater than is reasonable and prudent under the conditions then existing," while the State crash report form (Form DMV-349) defines speeding as either exceeding "authorized speed limit" or exceeding "safe speed for conditions." Not only do higher speeds leave less time for drivers to perceive and react to roadway conditions or situations, they also lead to more severe impacts when collisions do occur. Because excessive speed can exacerbate all other roadway safety issues in North Carolina, progress in addressing speeding has the potential to positively affect other areas, as well.

It takes the involvement of many parties to create a culture that encourages and expects safe speeds. Such parties include law enforcement, roadway designers, driver educators, and drivers themselves.





NOTABLE FACTS

- 2 of 5 fatal crashes in North Carolina are related to speeding.
- Speeding is a contributing factor in more fatal crashes in North Carolina than alcohol or seatbelt use.

EMPHASIS AREA GOAL

In 2013, there were 319 fatalities and 407 serious injuries from speed-related crashes. The goal for this emphasis area is to reduce speed-related fatalities and serious injuries.

STRATEGIES

- Set speed limits that are appropriate to the roadway type, area type, and current conditions.
- Explore new avenues of enforcement and penalties.
- Investigate and address problem locations.
- Engage stakeholders to create a culture of safe speed.

INDICATORS OF PROGRESS

- Number of training events for setting speed limits.
- Number of communities engaged in anti-speeding programs.
- Number of corridors reviewed for speed-related improvements.
- Number of speed-related improvements implemented.

POTENTIAL IMPLEMENTING AGENCIES

- Advocacy groups
- Law enforcement
- Legislative liaisons
- North Carolina Department of Public Instruction
- North Carolina Department of Transportation
- North Carolina Division of Motor Vehicles

See Appendix J for the Speed Action Plan.

APPENDICES

Emphasis Area Action Plans

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APPENDIX A - SHSP Update Process

Introduction

The 2014 update to the North Carolina Strategic Highway Safety Plan was accomplished through an ongoing, iterative process. It involved consultation with North Carolina's diverse safety stakeholders and a thorough review of existing plans and data. The following sections provide a summary of that process.

Data Review and Analysis

The first phase of the Plan update required a cooperative and data-driven process to identify key areas for consideration, using the 14 emphasis areas of the published 2006 version of the Plan as a starting point. Ten years of statewide data were analyzed to identify the crash scenarios and factors contributing to fatalities and serious injuries on all of North Carolina's public roads. Additionally, maps summarizing the data assisted in identifying regions or locations where specific crash types occurred more commonly.

Several key reports and partner plans were reviewed and evaluated for the purpose of the SHSP update. Namely, these plans were assessed to identify related goals and objectives, potential emphasis areas for consideration, and actions or strategies underway or proposed that relate to the SHSP. Other State transportation and safety plans reviewed included:

- 2014 Federal Motor Carrier Safety Administration (FMCSA) Commercial Vehicle Safety Plan
- 2014 State Enforcement Plan
- 2012-2016 Federal Motor Carrier Safety Administration (FMCSA) Strategic Plan
- North Carolina Department of Transportation Current State Transportation Improvement Program, October 2014
- North Carolina Governor's Highway Safety Program FY2014 Highway Safety Plan
- North Carolina State Highway Patrol Strategic Plan 2011-2013
- North Carolina Strategic Highway Safety Plan 2006
- North Carolina Traffic Records Assessment 2012
- North Carolina Traffic Safety Information Systems Strategic Plan 2013
- WalkBike NC Plan 2013

Based on the detailed data analysis and partner plan review, 16 potential new or updated emphasis areas were identified for further consideration.

Stakeholder Engagement

North Carolina's diverse safety stakeholders—representing State, regional, local, and tribal agencies, as well as other public and private organizations—were convened at several key milestones during the update process. The first occurred on March 20, 2014, when 33 stakeholders representing the 4Es of highway safety and a variety of agencies and organizations gathered for an interactive workshop. Its purpose was to refine the mission, vision, and goals of the updated Plan and to select its key safety emphasis areas.

The all-day meeting included a complete review of the previously-collected data and in-depth discussions on partner perspectives and information sharing about needs and related programs. The first key outcome of the workshop was an updated vision, mission, and goal. Workshop participants were introduced to the

2006 SHSP—and a complete review of the vision, mission, and goal—as well as an overview of changing trends and outcomes associated with the 2006 Plan. After a facilitated group discussion, the vision, mission, and goal were updated for the 2014 Plan (see page 3 of this report).

The next key outcome of the March workshop was the identification of emphasis areas for the updated Plan. The 2006 Plan included 14 emphasis areas, 8 of which were carried forward for consideration, 3 were recast, and 3 were omitted based on relevance. An additional 4 new emphasis areas were proposed for consideration so that 16 emphasis areas in total were presented to the stakeholders. Workshop participants also had the opportunity to suggest potential revisions or additional emphasis areas. Detailed descriptions, supporting data, and related activities across the State for each emphasis area were presented, and partners participated in the facilitated discussion sharing relevant professional expertise and feedback. The relative impact of each proposed emphasis area on fatalities and serious injuries was presented. After the discussion, workshop attendees voted on the emphasis areas, with nine being selected for inclusion in the 2014 Plan. Those nine emphasis areas represent over 95 percent of the fatalities that occurred on North Carolina's roadways in 2013.

The final key outcome of the day was the formation of multi-disciplinary working groups for each of the nine emphasis areas, composed of workshop participants and their delegates. The process for these Emphasis Area Working Groups is discussed in more detail in the next section.

Emphasis Area Working Groups

As noted previously, the formation of Emphasis Area Working Groups (EAWGs) was essential to the update of the 2014 Plan. Because these groups were initially established at the first workshop, they were primarily composed of workshop participants or their designees. However, several of the groups were expanded to individuals representing additional interests and subject-matter expertise. In total, 60 individuals from 21 different agencies were involved in the development of the Plan. A complete list of partners can be found on page ii of this report, and individual EAWG members are identified in Appendices B-J.

Membership in the EAWGs varied widely across the nine groups. Five individuals acted as facilitators for the nine groups, and the total number of members varied by group. The subject matter composition also varied by group, in part due to the nature of the strategies and the expertise and knowledge required by the participants. Some emphasis areas required more technical engineering expertise, while others were more rooted in policy and legislative action.

Background material (such as the findings of the partner plan reviews) and data summaries for each emphasis area were provided to the EAWG participants. In-person meetings were held in April, May, and June 2014. The members developed goals, objectives, strategies and associated actions, and performance measures for the emphasis area. The goals and objectives outlined for the selected emphasis areas were

developed to address the changing landscape of highway safety in North Carolina and are directly tied to measurable data points to track the immediate and long-term successes of the Plan.

The work that took place at these meetings resulted in the development of draft Emphasis Area Action Plans, which underwent an iterative process with opportunities to review and provide feedback. While each group followed the same general process, individual EAWGs were allowed flexibility based on the emphasis area and the membership composition.

Draft Plan Update

The Emphasis Area Action Plans established by the EAWGs became the foundation for the development of the 2014 Plan update. A Plan was drafted that incorporated the findings of the data analysis and partner plan reviews, the feedback from the workshop participants, and the strategies and actions in the Emphasis Area Action Plans. Once the draft Plan was developed, several review cycles took place throughout the summer of 2014. EAWGs and stakeholders were provided the opportunity to provide comments on the technical information, and NCDOT provided essential ongoing direction, including thorough reviews and insightful comments. In some cases, the EAWGs reconvened to discuss and incorporate the comments of other stakeholders.

Stakeholder Reengagement

After the initial review period and subsequent updates to the draft Plan, the EAWGs and additional stakeholders were reconvened on August 14, 2014 for a second interactive workshop. This event included a thorough review of the Plan update process to-date and the presentation and discussion of the nine Emphasis Area Action Plans. A representative from each EAWG was asked to present a summary of their action plan.

Beyond the update, the primary focus of the workshop was to move toward implementation. The Emphasis Area Action Plans developed by the EAWGs were once again essential to laying the groundwork for these focused discussions. Workshop participants worked together to outline the importance of SHSP leadership and determined the roles of agencies and individuals in future and ongoing implementation of the Plan. Several existing groups were identified to continue the efforts of the working groups.

After the workshop, all SHSP stakeholders were once again afforded the opportunity to review the draft Plan and provide final comments. Feedback collected at this time was considered and integrated into the draft update, resulting in a revised draft Plan.

ECHS Engagement

The final step of the 2014 Plan update was to engage the ECHS collectively. (Several members of the ECHS were active participants in the workshops and EAWGs.) The revised draft Plan with a summary of the update process was provided to the ECHS for its review and comment. On October 10, 2014, the ECHS convened to review the Plan. Several comments and suggestions were offered at the meeting and in the weeks that followed, and these were integrated into the final update of the Plan.

In addition to this general oversight, the ECHS is responsible for identifying liaisons with

implementers who can report on the implementation progress. An ongoing and annual evaluation schedule will assist the State in identifying areas requiring greater emphasis or areas for adjustments as new technologies or strategies become more available, milestones are achieved, or new risks emerge. The overall Plan will then be reviewed and updated as determined by the ECHS.

APPENDIX B - Demographic Considerations Action Plan

Introduction

Demographic Considerations is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. Currently, this emphasis area focuses on crashes involving younger drivers, older drivers, Native Americans, and Hispanics. However, the intention of this emphasis area is to be responsive to demographic considerations, which may change as the State's population changes. This emphasis area can also help to inform the strategies and actions in the other emphasis areas.

State of the Problem

Older Drivers

The population of the US is aging as the baby boomer generation reaches retirement age. In North Carolina, the growth of the over-65 population is compounded by the attractiveness of the State as a retirement destination. North Carolina has the third-highest rate of in-migration in the country, and the average age of people moving to the State is 50 years old. Because of these trends, addressing the needs of older drivers will be important for North Carolina's future.

For reasons of health or comfort, some older drivers experience a loss in the ability or desire to drive as they age. The key issue, however, is not age but ability. Not all older drivers will see any degradation in driving ability or comfort level with driving; nor will a loss of ability or comfort level be felt at the same rate or to the same degree for all older drivers. Although many older drivers will continue to drive and not experience any problems or difficulties, older drivers are overrepresented in angle crashes that frequently occur at intersections involving drivers attempting a turning movement.

Younger Drivers

Younger drivers are another important group in North Carolina that has unique characteristics. Crash rates for new drivers are highest during the first month after a teen obtains a license that permits unsupervised driving. Crash risk then declines sharply for the next six months. Even after several years of driving, teen crash risk remains higher than for adult drivers.[1] New drivers typically master the physical control of a vehicle quickly, but experience and knowledge of how to react in specific situations—the cognitive aspects of driving—take a much longer time to develop.

Table B-1 shows the numbers of crashes, injury crashes, serious injuries, and fatalities for crashes involving older (over 65) and younger (ages 16 – 19) drivers from the five-year period from 2009 – 2013. Younger drivers are overrepresented in fixed object crashes, crashes along curve segments, and crashes involving speeding. These types of crashes reflect the inexperience of this demographic and the less developed decision-making skills for handling common driving situations.

Native Americans and Hispanics

Accurate crash data are essential to gain insight on trends and patterns and to establish effective countermeasures. Yet, the availability of accurate crash data presents one of the biggest challenges to reducing crashes involving Native Americans.

Table B-1: *North Carolina Crash Trends for Older Drivers (65+) and Younger Drivers (16-19) (2009 – 2013).*

		2009	2010	2011	2012	2013
Crashes	Older Drivers (65+)	26,597	28,855	28,715	31,008	32,540
	Younger Drivers (16-19)	37,215	34,807	33,055	32,875	33,264
Injury Crashes	Older Drivers (65+)	9,504	10,061	10,115	10,717	11,004
	Younger Drivers (16-19)	13,214	12,045	11,463	11,668	11,215
Serious Injuries	Older Drivers (65+)	295	272	367	314	330
	Younger Drivers (16-19)	392	372	309	333	255
Fatalities	Older Drivers (65+)	215	237	212	218	254
	Younger Drivers (16-19)	174	166	145	120	111

Many tribes do not report crash data through the North Carolina Division of Motor Vehicles (NCDMV) crash database, making it impossible to quantify the frequency of the crashes and develop possible solutions. Sovereignty concerns may create an obstacle for some tribes to participate in the NCDMV crash reporting system. Consequently, the incidence of fatalities and serious injuries of Native Americans in North Carolina is likely underreported.

The available crash data show that Native Americans and Hispanics are overrepresented in crashes involving alcohol. Furthermore, Native Americans are overrepresented in crashes where no restraint was used. To a degree, alcohol and restraint use are challenges generally associated with rural areas.

Figure B-2 displays fatal crashes involving alcohol for older drivers, younger drivers, Native Americans, and Hispanics.

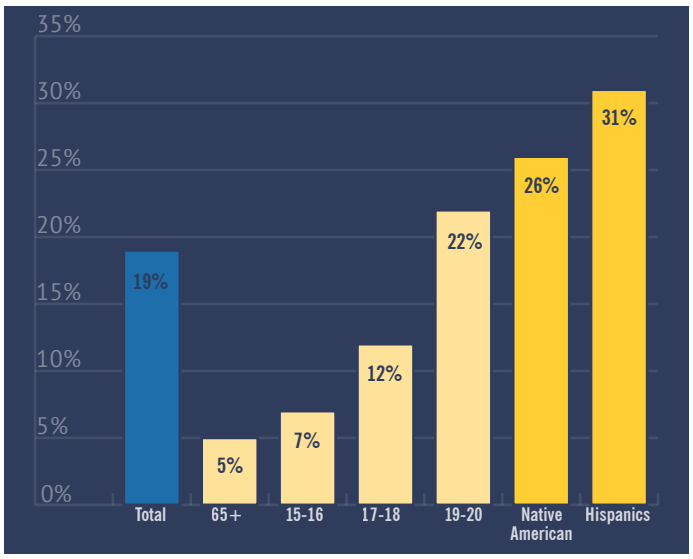

Figure B-2: *Fatal Crashes with an Alcohol-Involved Driver for Select Demographic Groups Compared to All North Carolina Drivers.*

Emphasis Area Goal

The goal for this emphasis area is to address demographic considerations in highway safety efforts. The focus of this emphasis area is the reduction of fatalities and serious injuries for two

demographic groups in particular—older drivers and younger drivers.

In 2013, there were 254 fatalities and 330 serious injuries from crashes involving older drivers (age 65 and older) in North Carolina. In 2013, there were 111 fatalities and 255 serious injuries from crashes involving younger drivers (ages 16 – 19) in North Carolina.

Strategies and Supporting Actions

The following strategies are needed to achieve the goals of the Demographic Considerations emphasis area. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Encourage the use of roadway design practices and traffic control devices that are better suited to accommodate the needs of older drivers and older pedestrians.

This may include larger and brighter signs, improved sign placement, higher retroreflective pavement markings, more wayfinding signs, shorter crossing distances, signalized crossings, pedestrian-friendly signal timing, etc.

Supporting Actions

1. Partner with AARP and FHWA for assistance identifying and promoting the use of design practices and traffic control devices that are better suited to the needs of older drivers and pedestrians.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Identify concentrations of older driver populations and locations of crashes involving older drivers for potential application of targeted strategies.
Potential Implementing Agencies: NCDOT
Status: Needed

3. Prioritize and implement design practices and traffic control devices to accommodate older drivers and older pedestrians.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 2

Adopt or develop a set of programs to help older drivers to decide whether to continue driving, and identify adequate alternatives to driving.

Supporting Actions

1. Expand doctor education efforts on how to have the conversation with older drivers on whether to stop driving. "We Need to Talk" program is an example.
Potential Implementing Agencies: NC DHHS, AARP
Status: Ongoing

2. Provide resources and guidance to older drivers at time of license recertification.
Potential Implementing Agencies: NCDMV
Status: Needed

3. Reach out to faith-based organizations on how to have the conversation with elderly members regarding driving and what resources are available as alternatives.
Potential Implementing Agencies: AARP
Status: Ongoing

Strategy 3

Improve driver education courses included in high school curricula by improving the content and the delivery.

Younger drivers are by definition inexperienced drivers, so ensuring their proper training is critical for their safety and the safety of all road users. North Carolina's Driver Education Program administered by the Department of Public Instruction is the primary mechanism for young drivers in the State to receive formal training. A 2014 report to the Joint Legislative Program Evaluation Oversight Committee found that statewide performance measures for driver education and a data-driven outcome monitoring system for student drivers completing driver education would be beneficial for assessing possible program changes that may be needed. An established monitoring system can develop a system of feedback to improve the curriculum and provide consistent delivery for training the State's youngest drivers. NHTSA will be conducting an assessment of the program in 2015 as part of their Driver Education Program Technical Assessment Process. The assessment will note where improvements can be made to strengthen the program.

The funding mechanism for the Driver Education Program, which has received State funding historically, has experienced some adjustments over the past four years. A small parent fee of $45.00 was added in 2011 and has increased to a maximum of $65.00 in 2014. Senate Bill 744 directs that the funding for driver education will no longer come from the Highway Fund, but instead from funds available to local education agencies starting on July 1, 2015. The State will have to determine in the 2015 budget if it plans to continue to fund the program and identify alternative funding sources if the Highway Fund is not used. A likely consequence is that families in most jurisdictions will be required to pay a substantially larger fee for driver education. The impact of this on the participation rate of young drivers or their decision to seek a driver license before 18 years of age is not known but should be monitored as it relates to young driver crashes. For example, crashes may decrease for drivers ages 16 and 17 as licensure rates decline for these ages, but crashes may increase for drivers 18 years and older because of a potential rise in the number of individuals who postpone their licensure.

Supporting Actions

1. Conduct discussion of annual review of the standardized curriculum.
Potential Implementing Agencies: NCDPI, Driver Education Advisory Committee, State Board of Education
Status: Needed

2. Advance programs that improve teacher training to ensure that educators are well versed in the material and effective teaching strategies.
Potential Implementing Agencies: NCDPI
Status: Ongoing

3. Implement program improvements based on the upcoming NHTSA Assessment.
Potential Implementing Agencies: NCDPI
Status: Needed

4. Establish a system to evaluate and monitor the performance of drivers completing the driver education program to provide a feedback loop to improve the curriculum and consistent delivery of the training.
Potential Implementing Agencies: TRCC
Status: Needed

5. Determine if the pending change in funding of driver education has an impact on young driver licensure and crashes.
Potential Implementing Agencies: NCDPI
Status: Needed

Strategy 4

Investigate the effectiveness of programs, policies, and strategies that have been employed across the US to address teen driver training that could also be used in North Carolina to reduce teen crashes.

Supporting Actions

1. Identify and implement programs that are proven effective at reducing young driver crashes.
Potential Implementing Agencies: NCDPI
Status: Needed

2. Provide better access to simulator training programs and driving simulators that are demonstrated effective at improving hazard recognition skills among young drivers.
Potential Implementing Agencies: NCDPI
Status: Needed

3. Include smart phone apps and other technologies designed to assist supervisors, as well as technologies that help parents monitor teens once they begin driving unsupervised.
Potential Implementing Agencies: NCDPI, NCDOT
Status: Needed

4. Research programs and countermeasures that have shown promise around the country and partner with local school districts to launch pilot programs in North Carolina to test the effectiveness of these programs.
Potential Implementing Agencies: HSRC, ITRE
Status: Needed

Strategy 5

Continue engaging and informing North Carolina's diverse population on issues of traffic safety.

Supporting Actions

1. Support the Nuestra Seguridad initiative, the Hispanic Highway Safety Education Campaign.
Potential Implementing Agencies: NCDOT
Status: Ongoing

2. Reach out to organizations (e.g., tribal groups, non-profits) representing demographic groups to provide education on relevant traffic-related issues and concerns.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 6

Improve electronic crash data collection and dissemination.

Supporting Actions

1. Continue expanding e-data to all police departments within the State.
Potential Implementing Agencies: NCDMV
Status: Ongoing

2. Work with tribal groups to integrate crash reporting into the NCDMV system to better understand resources needed by tribal governments. Ensure that crash reporting will not threaten tribal sovereignty.
Potential Implementing Agencies: NCDMV
Status: Needed

3. Provide training to law enforcement on demographic issues to ensure proper recording at the scene of the crash.
Potential Implementing Agencies:
NCSHP, Law enforcement
Status: Needed

4. Improve geocoding of crashes to allow governmental organizations to better understand the spatial relationships of crashes within their jurisdiction.
Potential Implementing Agencies:
NCSHP, Law enforcement
Status: Needed

Strategy 7

Support lifelong driver education.

Supporting Actions

1. Educate the public, regardless of age, on changes to the driving environment (e.g., regulations, emerging issues).
Potential Implementing Agencies: NCDMV, NCDPI
Status: Needed

2. Educate the driving public on new traffic control devices (such as flashing yellow arrow signals) or new technologies before the devices or technologies are implemented on North Carolina roadways.
Potential Implementing Agencies: NCDMV, NCDPI
Status: Needed

Working Group Members

The working group for this emphasis area includes the following representatives from nine agencies committed to achieving the goals of this Action Plan:

- Kelsie Ballance, North Carolina Indian Economic Development Initiative
- Paul Black, French Broad River Metropolitan Planning Organization
- Lauren Blackburn, North Carolina Department of Transportation
- Julian Council, North Carolina Division of Motor Vehicles
- Reginald Flythe, North Carolina Department of Public Instruction
- Arthur Goodwin, UNC Highway Safety Research Center
- Bradley Hibbs, Federal Highway Administration North Carolina Division
- Suzanne LaFollette-Black, AARP
- Chris Oliver, North Carolina Department of Transportation
- Renee Roach, North Carolina Department of Transportation
- Connie Sessoms, Jr., Driver Education Advisory Committee

Supporting Material

- AARP Livability Fact Sheet, Modern Roundabouts. http://bit.ly/1u1ZC6w
- AARP Livability Communities, Dangerously Incomplete Streets. http://bit.ly/1wUz5Ul

- NHTSA Uniform Guidelines for State Highway Safety Programs – Driver Education. http://bit.ly/1wUyYrO
- North Carolina Driver Education Strategic Plan, June 2012. http://bit.ly/17DOJh6
- Performance Measurement and Monitoring Would Strengthen Accountability of North Carolina's Driver Education Program, March 19, 2014. Final Report to the Joint Legislative Program Evaluation Oversight Committee. Report Number 2014-02.

References

1: Foss, Martell, Goodwin & O'Brien (2011). "Measuring Changes in Teenage Driver Crashes During the Early Months of Driving." Washington, DC: AAA Foundation for Traffic Safety. Available at: http://bit.ly/1DDquN4

APPENDIX C - Driving While Impaired Action Plan

Introduction

Driving While Impaired (DWI) is one of nine critical safety emphasis areas identified for the update of the North Carolina Strategic Highway Safety Plan. This emphasis area focuses on collisions on North Carolina's roadways that involve one or more drivers of whom alcohol or drug impairment is suspected or detected. In this case, drugs mean both illicit and prescription/medicinal substances.

Alcohol has long been a chief concern in terms of highway safety because of its well-documented ability to impair drivers. In recent years, prescription drug use appears to be on the rise and is getting more attention than it has in the past. So-called "medicinal" drugs (e.g., antihistamines, benzodiazepines, marijuana) have been shown to increase crash risk among drivers.

While all forms of impaired driving pose a significant threat to safety along North Carolina's roadways, alcohol-impaired driving is considered to be the linchpin of the issue for several reasons.

- The presence of alcohol in a person's system is both detectable (through proven technology such as alcohol screening devices) and quantifiable (through measures of breath or blood alcohol concentration [BAC]), whereas the accurate determination of drug impairment among drivers is arduous, at best.
- Drug use is known to often coincide with alcohol use, so targeting alcohol-impaired driving brings the opportunity to also reduce drug-impaired driving without focusing directly on drug use.
- Years of focus and research on alcohol-impaired driving have cast light on successful and unsuccessful approaches to address the issue, and there are past achievements on which future efforts can be based. Conversely, the drug issue itself is ever-changing, as new combinations and production methods continue to manifest themselves, and is, therefore, considered more difficult to combat directly.

For these reasons, the greatest opportunity to reduce instances of DWI in North Carolina is in reducing alcohol-impaired driving; hence, alcohol is the primary focus of this Action Plan.

State of the Problem

Table C-1 offers a basic summary of alcohol-involved crashes and the resultant fatalities and injuries on North Carolina's highways from 2009 – 2013. For the purposes of this effort, serious injuries refer to those coded as A Type Injuries.

Nationally, 67 percent of drivers arrested for DWI have never previously been charged with DWI, and 80 percent of drivers in an alcohol-related crash have never been previously charged with DWI. An impaired driver's first time being caught by law enforcement rarely coincides with the first time driving in an impaired state. Therefore, if the focus is only on efforts addressing persons arrested for DWI, then most of the impaired driving problem will be missed and, with it, the opportunity to have a large effect on the issue.

In North Carolina, drivers are considered to be impaired when their mental or physical faculties are noticeably affected by any impairing

Table C-1: *Alcohol-Involved Crashes in North Carolina (2009 – 2013).*

	2009	2010	2011	2012	2013	Annual Avg.
Crashes	11,414	10,704	10,708	11,273	10,802	10,973
Fatalities	397	436	392	426	353	401
Serious Injuries (A)	558	514	561	565	457	531
All Injuries (A, B, C)	8,844	7,983	8,172	8,496	7,719	8,243

Fatal Injury *– Any injury that results in death within 12 months after the crash occurred.*

A Type Injury (disabling) *– An injury obviously serious enough to prevent the injured person from performing his or her normal activities for at least one day beyond the day of the crash. Massive loss of blood, broken bone, unconsciousness of more than momentary duration are examples.*

B Type Injury (evident) *– An obvious injury, other than a fatality or A Type injury, which is evident at the scene. Bruises, swelling, limping, soreness, are examples. This injury would not necessarily prevent the person from carrying on his or her normal activities.*

C Type Injury (possible) *– No visible injury, but person complains of pain, or has been momentarily unconscious.*

substance. Like other States, North Carolina has adopted a per se DWI offense of driving with a BAC of 0.08 or higher. The per se offense treats a driver as being legally impaired without the necessity of proving actual impairment. Based on national data, a driver with a BAC of 0.08 is 2.7 times as likely to get in a crash as a driver with a zero BAC. The median BAC of those arrested for impaired driving or killed in an alcohol-related crash is 0.16, which has been consistent for a number of years.[1] Drivers with a BAC of 0.16 are approximately 29 times as likely to be involved in a crash as those with a zero BAC.[2,3]

The process by which a DWI occurs and is then dealt with is shown in figure C-2. Traditionally, the focus of efforts to reduce impaired driving tends to be toward the bottom of this list—on adjudication and sanctions. However, the greatest opportunity for a large effect on impaired driving is by intervening earlier in the process to keep impaired individuals from driving in the first place. This direct control of undesired behavior holds more promise than threats of punishment after the fact for improving safety. Although punishment of detected offenders is essential, it is the certainty of punishment—not its severity—that ultimately provides the motivation for compliance with desired driver behaviors.

Figure C-2: *DWI General Process.*

North Carolina has long been a leader in innovative approaches to address DWI. The

notion of high-visibility enforcement for DWI on a statewide level was first implemented here beginning in 1994 with the launch of the initial Booze It & Lose It program that is still active today. Ignition interlock devices are considered to be among the more cutting edge approaches to tackling alcohol-impaired driving. While these devices have been employed in North Carolina, their utilization here lags behind that in the leading States nationwide. A general estimate of 300,000 such devices are in use across the US, with approximately 10,000 or so of those in North Carolina. Varying levels of success have been observed in implementing ignition interlock programs across the US, and the experiences of other States can serve as a valuable resource for North Carolina if it looks to expand the program here. A possible indicator of progress is the recently-passed legislation (SB 744) that provides more than $600,000 of recurring funds and more than $45,000 of non-recurring funds to the North Carolina Division of Motor Vehicles (NCDMV) to establish an ignition interlock unit.

Looking to the future, collaboration is a central theme to successfully addressing the problem of impaired driving. Collaboration among various governmental agencies is essential to establishing the universal deterrence that is critical to controlling impaired driving (and other driver misbehavior). As Federal, State, and local tax dollars continue to be stretched further and further, collaboration is also key to allow agencies to share resources and data and streamline their collective efforts—actions that will help them maximize their reach and effectiveness. Attention should be given to the many, and not just the few, habitual offenders. The attempt to curb DWI has traditionally centered upon arrests, but crash-based metrics (e.g., decreased fatalities, serious injuries, and crashes) should be established as an additional means to track progress.

Between October 1, 2013 and October 1, 2014, there were 30,000 DWI convictions and 6,500 limited privilege licenses issued. Additionally, of the 5,400 refusals to submit to an alcohol screening test, 118 limited privilege licenses were issued. And of the 38,500 30-day civil revocations, 4,000 limited privilege licenses were issued. Based on the analysis of this data, it is recommended that eight positions be added. Furthermore, it was determined that limited privilege licenses would be processed in an average time of 30 minutes.

The DWI strategies presented below provide strong deterrents for individuals who chose to drive after drinking by limiting or removing driving privileges. These strategies also provide an opportunity to support North Carolina's broadest initiatives related to public health and safety by making the connection between an impaired driving arrest and actual substance abuse. A DWI arrest may be an indication of an alcohol problem and presents the opportunity to intervene during the period immediately following that arrest—when individuals may be most open to recognizing and addressing the consequences of their drinking behavior. A DWI arrest is a chance for intervention to better connect a person with effective alcohol screening and treatment. The Screening, Brief Intervention,

Referral and Treatment (SBIRT) is one such approach that has been identified as effective and available in North Carolina.

Emphasis Area Goal

In 2013, there were 353 fatalities and 457 serious injuries due to alcohol-involved crashes in North Carolina. The goal for this Emphasis Area Action Plan is to reduce alcohol-involved fatalities and serious injuries.

Strategies and Supporting Actions

The following section outlines strategies needed to achieve the desired goals of improved safety with regard to DWI. They are not proposed as isolated, standalone measures. Rather, to effectively address DWI on North Carolina's road network, coordinated and concerted efforts statewide across agencies and partners are required. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Increase the visibility of DWI enforcement efforts.

Research indicates that individuals who drive after drinking believe they have a low risk of being apprehended. Numerous studies have documented that the key to changing this belief is to extensively publicize that enforcement is (1) ever-present, (2) unpredictable in when and where it takes place, and, as a result, (3) inescapable.

Accordingly, the following messages in various media and other venues are critical:

- Law enforcement officials are continuously looking for drivers who have been drinking.
- DWI enforcement efforts are unpredictable, so they cannot be avoided.
- The only way to avoid being caught is to avoid driving after drinking.

Supporting Actions

1. Increase the visibility of DWI checkpoints by deploying them often, at most times of day, on all days of the week, during all months of the year, in a wide variety of locations, and in a manner that the driving public will notice them even if they do not drive through them.
Potential Implementing Agencies: NCSHP, county sheriff's offices, local police departments
Status: Ongoing

2. Use a wide range of media—including both earned media coverage and paid media—to alert the driving public to the ubiquitous, ever-present nature of DWI enforcement efforts.
Potential Implementing Agencies: GHSP, NCSHP, local police, County Sheriff's Offices, MADD, Media, HSRC
Status: Ongoing

3. Identify funding sources to ensure adequate publicity of enforcement.
Potential Implementing Agencies: GHSP, MADD
Status: Ongoing

Strategy 2

Collaboratively redefine the roles and responsibilities of various State government offices in processing license revocations for DWI.

Administrative procedures have proven to be the most effective way to reduce alcohol-impaired driving, and their use is essential if further progress is to be made.[4]

The vast majority of official licenses in North Carolina are administered by a licensure board or committee. While the NCDMV is responsible for issuing driver licenses in North Carolina, NCDMV cannot revoke the license of an impaired driver without a final conviction from a court. As such, in the case of a crash involving DWI, the offending driver will continue to have their license until the case is addressed in the court system. Even after a conviction, courts determine when, where, and under what restrictions the convicted impaired driver may operate a vehicle by the issuance of limited driving privileges. NCDMV has no authority to reject a limited driving privilege, even if NCDMV determines the court lacked the authority to issue the limited driving privilege. Revising State legislation such that the licenses of DWI offenders are revoked and limited driving privileges are issued through an administrative mechanism instead of by judicial action has the potential to offer the following benefits:

- Expedited imposition of sanctions against offenders
- Reduced burden on the court system
- Establishment of a consistent, statewide response to impaired driving events

Additionally, as discussed in detail in the next strategy, ignition interlock devices have great potential to reduce impaired driving, and requiring the use of an interlock could also be incorporated into the administrative response to an impaired driving event.

Supporting Actions

1. Investigate the feasibility and potential benefits of placing the administration of driver licensure—including both issuance and revocation of licenses and issuance of limited driving privileges—under the purview of the NCDMV.
Potential Implementing Agencies: NCDMV
Status: Legislation needed

2. Investigate the feasibility and potential benefits of placing the administration of the ignition interlock program under the purview of the NCDMV.
Potential Implementing Agencies: NCDMV
Status: Legislation needed

Strategy 3

Expand the use of ignition interlock devices.

According to NHTSA's Model Guideline for State Ignition Interlock Programs (November 2013), "the purpose of an alcohol ignition interlock device is to prevent drivers who have consumed alcohol from operating a motor vehicle if their breath alcohol concentration (BrAC) exceeds a set point. Drivers must provide a breath sample by blowing into the ignition interlock device and, if the driver's BrAC is over the set point, the vehicle will not start." (Note that BrAC is essentially

synonymous with the commonly used terms BAC and alcohol concentration.)

In a February 2010 press release entitled, Ignition Interlocks Reduce Alcohol-Impaired Driving, the Center for Disease Control (CDC) reported that "after these devices were installed, re-arrest rates for alcohol-impaired driving decreased by a median of 67 percent relative to drivers with suspended licenses." The CDC recommended "(1) more widespread use of interlocks and (2) ignition interlocks for everyone convicted of DWI, even for first convictions."

The following identifies actions in support of this initiative. Note that the Potential Implementing Agencies listed below were identified assuming the second strategy (oversight of licensure revocation is reassigned to NCDMV) is achieved.

Supporting Actions

1. Identify successful ignition interlock programs in other jurisdictions.
Potential Implementing Agencies: MADD, NCDMV, HSRC, GHSP
Status: Underway

2. Work to revise legislation to require interlocks for all drivers determined to have been involved in an impaired driving event, giving serious consideration to the following components.

- Allow removal of ignition interlock device only on the basis of clear evidence it is no longer needed (e.g., information in the interlock record indicating excellent compliance, combined with information from treatment professional that any existing alcohol problem has been resolved).
- Consider using the ignition interlock device as part of a reward system in which a driver whose license has been revoked could be relicensed sooner if a device is installed on his vehicle.

Potential Implementing Agencies:
Various advocacy groups
Status: Legislation needed

3. Assign management and administration of this program to the NCDMV instead of the judicial arm of the government.
Potential Implementing Agencies: NCDMV (assuming it is assigned responsibility for administering driver license revocation and issuing limited driving privileges)
Status: Legislation needed

Strategy 4

Improve the efficiency and consistency with which DWI cases are adjudicated and sanctions are levied against offenders.

In North Carolina, if drivers charged with DWI following a breath test exercise their right to a court trial, then it takes approximately 12 – 14 months for the case to be adjudicated by the judicial system, in large part due to the sheer volume of cases that must be processed by the courts. Additionally, the penalties imposed by the courts can be inconsistent from one county to another. One potential strategy to address both issues is to assign complete control of driver licensing in North Carolina—issuance, revocation, and imposition of license restrictions—to a single entity.

The following list identifies actions in support of this strategy, which is closely related to the second and third initiatives.

Supporting Actions

1. Explore the potential reassignment of licensing determination from the courtroom to NCDMV, including issuing of limited driving privileges and imposition of driving restrictions (e.g., ignition interlock devices).
Potential Implementing Agencies: NCDMV
Status: Legislation needed

2. Allow administrative licensing sanctions to be imposed based upon results of a BAC test and not just test refusal. (There is a 30-day revocation based upon BAC and a one-year revocation based upon refusal. Allowing NCDMV to impose a one-year revocation based upon a BAC will allow swift, sure sanctions.)

Determine the impacts of NCGS 20-16 on these actions.

Confirm how NCGS 20-16.2 (refusal) will be addressed with limited driving privileges associated with a BAC test.
Potential Implementing Agencies: NCDMV
Status: Legislation needed

3. Identify the actions necessary to make all of the DWI information obtained by the arresting officer available to the courts. Investigate (1) what revisions to the alcohol screening device regulations would be necessary to make the numeric results of the device available, (2) the feasibility of revising those regulations, and (3) their potential impacts on current law enforcement procedures.
Potential Implementing Agencies: District Attorneys, Law enforcement
Status: Legislation needed

4. If a license is revoked, access to the vehicle should be prohibited by revoking the vehicle's registration (i.e., seizing the registration plate), booting the vehicle, or seizing the vehicle.
Potential Implementing Agencies: NCDMV
Status: Legislation needed

5. Expand the use of technology for continuous alcohol monitoring. (North Carolina law currently restricts around-the-clock monitoring to transdermal devices. There is other technology available—including ignition interlock devices—that can report breath tests even when not starting a car. This system should be allowed for use by the court and/or probation officers.)
Potential Implementing Agencies:
NCDPS, Law enforcement
Status: Legislation needed

Strategy 5

Expand how "success" or "progress" in addressing DWI is measured.

Federal grants from NHTSA have been and continue to be a major source of funding for efforts to address DWI in North Carolina. NHTSA requires that the enforcement activities it sponsors be tracked and measured, and arrests are at the heart of the monitoring process. However, the focus statewide should be expanded to include alcohol-related crashes, fatalities, and serious injuries to measure progress. Expanding the focus statewide to include these crash

measures could provide a more holistic approach to measuring progress in reducing impaired driving in North Carolina.

The following identifies actions in support of this initiative.

Supporting Actions

1. Develop education programs for law enforcement officers and political leaders across the State related to the expanded metrics.
Potential Implementing Agencies:
Law enforcement, GHSP, MADD
Status: Needed

2. Work with sponsoring agencies to define new metrics, as grants and funding applications will need to reflect any changes.
Potential Implementing Agencies: MADD, GHSP, law enforcement, HSRC
Status: Underway

Working Group Members

The working group for this emphasis area includes the following representatives from seven agencies committed to achieving the goals of this Action Plan:

- Ike Avery, North Carolina Conference of District Attorneys
- Lt. Aaron Back, North Carolina State Highway Patrol
- Robert Foss, UNC Highway Safety Research Center
- Terry Hopkins, North Carolina Department of Transportation
- Don Nail, Governor's Highway Safety Program
- Chris Oliver, North Carolina Department of Transportation
- LaRonda Scott, Mothers Against Drunk Driving
- Harriett Southerland, Students Against Destructive Decisions

Supporting Material

The following are considered valuable resources to the implementation of Driving While Impaired Emphasis Area Action Plan:

- North Carolina Governor's Highway Safety Program FY2014 Highway Safety Plan. http://1.usa.gov/1Ir9GZF
- Governor's Statewide Impaired Driving Task Force Impaired Driving Plan, submitted to NHTSA August 29, 2014
- NHTSA's Countermeasures that Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices. http://bit.ly/1AbynCV
- NCHRP Report 500, Vol. 16: A Guide for Reducing Alcohol-Related Collisions. http://bit.ly/1AM2l3n
- MADD information on ignition interlock devices. http://bit.ly/1Ir9REq
- British Columbia Ignition Interlock Program Fact Sheet. http://bit.ly/1y7N3Ib

References

1: National Highway Traffic Safety Administration. Traffic Safety Facts 2012 Data: Alcohol-Impaired Driving. DOT HS 811 870. Washington, DC: U.S. Department of Transportation (December), 2013.

2: Blomberg, R., R. Peck, H. Moskowitz, M. Burns, and D. Fiorentino. Crash risk of alcohol impaired driving: A case-control study. Stamford CT: Dunlap and Associates, Inc., September 2005.

3: Peck, R. C., M.A. Gebers, R.B. Voas, and E. Romano. The relationship between blood alcohol concentration (BAC), age, and crash risk. Journal of Safety Research, 39(3), 311-319, 2008.

4: Goodwin, A.H., R.D. Foss, J. Hedlund, and J. Sohn. A guide for reducing alcohol-related collisions. Guidance for implementation of the AASHTO Strategic Highway Safety Plan. Vol. 16. NCHRP Report 500. Washington, DC: Transportation Research Board, 2005.

APPENDIX D - Emerging Issues and Data Action Plan

Introduction

Emerging Issues and Data is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. This emphasis area includes strategies related to improving the quality of traffic safety data, including crash data, roadway data, driver data, vehicle data, citation data, and injury data. It also encompasses a broader topic of emerging issues to highlight the flexibility needed in a strategic plan to address issues and opportunities that arise as a result of advances in technologies, scientific knowledge, and research findings. Throughout the implementation of the Plan, data will be used to identify and address these emerging issues.

Background

Good quality data are critical to all areas of the Strategic Highway Safety Plan (SHSP). Crash data are used as the primary source for defining the magnitude and location of highway safety problems. However, many other types of data—related to roadways, drivers, vehicles, citations, and injuries—must be used to supplement and interpret the crash data picture and provide direction for safety-focused actions.

The most recent federal transportation bill, Moving Ahead for Progress in the 21st Century Act (MAP-21), placed an increased focus on data for improving the decisions of agencies. The Federal Highway Administration recently released proposed rulemaking for implementing the requirements of MAP-21. The proposed rulemaking on performance measures advises that States track their safety performance according to the number and rate of fatalities and serious injuries (National Performance Management Measures, 2014). It also recommends that States be prepared to link their crash and medical data to determine the occurrence of serious injuries in crashes. The proposed rulemaking for the Highway Safety Improvement Program (HSIP) regulations would require States to collect a certain set of characteristics on all public road miles, including local roads (HSIP, 2014). These federal documents emphasize the need for North Carolina to focus on improving its road safety data. The inclusion of a new data-specific emphasis area in this SHSP (not included in previous SHSPs) demonstrates North Carolina's commitment to quality data.

Another aspect of this emphasis area is the need to anticipate new and emerging issues that may arise. For example, as research progresses, new knowledge is developed on the effectiveness of existing crash countermeasures, leading to improved decision-making on whether and where to implement the countermeasures. In addition, new countermeasures that are being developed and evaluated will add to the number of "tools in the toolbox." Other aspects of the highway safety field are projected to change as technology advances, allowing for previous impossibilities, such as driver assistance within the vehicle and connecting vehicles with each other and with the roadway infrastructure network. It will be important for North Carolina to be flexible to structure its safety strategies and actions to accommodate new knowledge as it becomes available.

Emphasis Area Goals

This emphasis area has two goals. The first goal is to improve the State's data and data systems in support of the SHSP goal to reduce fatalities and serious injuries on North Carolina's roadways. The second goal is to use the improved data to identify and address safety concerns and additional emphasis areas that emerge as the SHSP is implemented and the State moves toward the 2030 goal.

Strategies and Supporting Actions

The following strategies have been established as priorities for North Carolina for the Emerging Issues and Data emphasis area. These include actions in support of the eight other Emphasis Area Action Plans. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Improve the quality and usefulness of crash data.

Currently, crash data in North Carolina are reported in a combination of paper forms and electronic submittals. Approximately 70 percent of all crashes are reported electronically. By increasing the percentage of crashes reported electronically, the quality and usefulness of crash data will increase. Electronically submitted crash data do not require a staff member to code the information from a paper form, thus eliminating the data entry step and a potential source of errors. Additionally, the electronic submissions can be processed faster, leading to shorter lag times between the occurrence of a crash and the availability of the associated crash data. An electronic crash report form can be updated more easily in the future when data fields are added or modified. In order to see an increase in electronic crash submissions, North Carolina needs to focus on improving the ease of use for the on-scene officer by streamlining the electronic submittal process, increasing the ability for automatic completion of data fields, and increasing training for officers.

Crash location is a crucial piece of information. Currently, most crashes are located using information recorded by the reporting officer, such as street names and distances from intersections. This leads to a potential for misreporting (e.g., an officer reports an incorrect street name, distance, or direction) or miscoding when the information is entered into the crash database. There is a need for a tool that would record accurate latitude and longitude coordinates and would integrate well with the electronic reporting systems used by the law enforcement agencies, improving the ease and accuracy of recording crash location. Such a tool would need to provide the ability for the responding officer to record accurate crash coordinates even if not physically present at the exact location of the crash.

Supporting Actions

1. Increase the percentage of crashes reported electronically.

Potential Implementing Agencies:
NCDMV, Law enforcement
Status: Underway

2. Improve the ease and accuracy of recording crash location.
Potential Implementing Agencies:
Law enforcement, NCDOT
Status: Planned

Strategy 2

Improve the completeness and accuracy of roadway inventory data.

The proposed implementation language for MAP-21 requires a collection of fundamental data elements (FDE) on all public roads. The required elements will differ according to the functionality of the road, with lower-volume roads having a reduced set of required FDE. North Carolina will prepare for the implementation of this rule by continuing to increase information on the functionality of State and non-State roadways. This may involve improving the completeness of traffic volume information or determining the general function of the road in the local network (e.g., collector vs. subdivision road).

Related to the collection of the FDE, an effort is underway to develop a linear referencing system (LRS) for all public roads. The proposed implementing language in MAP-21 recognizes the benefit of having a LRS on all public roads—both State and non-State miles. While this is not a requirement, it states that "an all-public-roads LRS is a prerequisite to realizing the full benefits from collecting and using the Model Inventory of Roadway Elements (MIRE) FDE" (HSIP NPRM, 2014). Since 2013, North Carolina has been working toward a linear referencing system implemented on all public roads through the Road Operations and Management Effort (ROME). This effort will continue to improve the completeness of the coverage on all public roads.

Exposure data, generally in the form of traffic volumes, is another important component of a complete and accurate roadway inventory. Knowing the types and number of users of the roadway system is important in many aspects of safety management. North Carolina will seek to improve data on roadway user exposure by improving the completeness of its data on the traffic volume of vehicles, pedestrians, bicyclists, commercial vehicles (large trucks), and motorcycles.

Supporting Actions

1. Prepare for a collection of fundamental data elements.
Potential Implementing Agencies: NCDOT
Status: Underway

2. Continue development of a linear referencing system (LRS) for all public roads.
Potential Implementing Agencies: NCDOT
Status: Underway

3. Improve data on roadway user exposure.
Potential Implementing Agencies: NCDOT
Status: Planned

Strategy 3

Improve driver record data.

Driver education is required in North Carolina for anyone under 18 years of age and seeking a driver license. Approximately 92 percent of teens receive driver education (North Carolina Driver

Education Strategic Plan, 2012). Currently, the NCDMV driver record data does not contain information on whether the person received driver education or where they received it. The effectiveness of the driver education program could be tracked if this information were maintained in the driver record data. Additionally, tracking the particular location where the person received the training would allow the Driver Education Program to determine if particular programs or methods are more effective than others, which could in turn be used to support a call for increased funding for the proven methods.

Supporting Actions

1. Collect and maintain data on driver education programs.

Potential Implementing Agencies:
NCDPI/Driver Education, NCDMV
Status: Needed

Strategy 4

Increase the State's ability to use existing traffic safety data.

Many North Carolina agencies collect data relevant to their programs, such as data related to crashes, citations, driver records, and medical records. In order to make full use of these collected data, North Carolina will seek to improve the analytical ability of department staff and acquire, adopt, or develop new tools for analyzing these data. This may involve updating current data systems such as the Traffic Engineering and Accident Analysis System (TEAAS).

The ability to use existing data can be assisted by concerted sharing of data among agencies. This strategy recognizes the work of the North Carolina Traffic Records Coordinating Committee (TRCC) and would support the goals stated in the North Carolina Traffic Safety Information Systems Strategic Plan 2013 to improve data sharing among the various agencies and transportation safety partners.

Taking the need to improve sharing a step further, there is the potential to link crash data with medical data. Therefore, an action in support of this strategy is to evaluate the value of linking medical and crash data. The proposed language for performance measures in MAP-21 recognizes the importance of accurate crash injury data. To that end, it recommends that by 2020 "serious injuries data is collected through and reported by a hospital records injury outcome reporting system that links injury outcomes from hospital inpatient and emergency discharge databases to crash reports" (National Performance Management Measures, 2014). An effort of this size would bring a sizeable cost, but the benefit of such an effort is unknown at this point. North Carolina will investigate this issue and determine the potential value of linking medical records and crash data in such a manner to guide any future steps on this topic.

Finally, exposing crash data trends and high crash locations to the driving public may help to increase driver awareness and reduce risky driver behaviors in North Carolina. This action will seek to increase public awareness of road safety through the use of the many different types of safety data that are currently collected by the State, the foremost of which is crash data. This

action may involve increased use of informational maps on the internet or in public media campaigns. The campaigns could use data specific to a region or county to personalize the outreach effort in that area.

Supporting Actions

1. Increase analytical tools and expertise.
Potential Implementing Agencies:
NCDOT, Law enforcement
Status: Needed

2. Increase sharing of data between agencies.
Potential Implementing Agencies: TRCC
Status: Underway

3. Evaluate the value of linking medical and crash data.
Potential Implementing Agencies: NCDMV, NCDOT
Status: Needed

4. Expose crash data trends and high-crash locations to the driving public.
Potential Implementing Agencies: Various advocacy groups, NCDOT, NCDMV, Law enforcement
Status: Needed

Strategy 5

Accommodate new issues that emerge in the field of highway safety.

The future of highway safety is bright with many potential advances. North Carolina will make every effort to remain aware of emerging issues and will remain flexible to incorporate new ideas and resources into the safety programs of its various agencies. Issues may emerge in the following categories:

- New knowledge on countermeasures or safety programs
- Technological advances, such as autonomous vehicles, increased in-vehicle technologies, and vehicle-infrastructure integration
- Alternative data sources for decision-making, such as onboard computers or naturalistic driving data
- Demographic changes

Supporting Actions

1. As it emerges, embrace and support the Vision Zero, and look for ways to integrate it with the SHSP.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Remain aware of emerging issues and address issues accordingly.
Potential Implementing Agencies: NCDOT
Status: Needed

Measuring Performance

The progress toward the goals of this emphasis area is measured by the number of actions and strategies implemented.

Working Group Members

The working group for this emphasis area includes the following representatives from seven agencies committed to achieving the goals of this Action Plan:

- Ike Avery, North Carolina Conference of District Attorneys
- Mike Bruff, North Carolina Department of Transportation

- Julian Council, North Carolina Division of Motor Vehicles
- Greg Ferrara, NCSU Institute for Transportation Research and Education
- Daniel Findley, NCSU Institute for Transportation Research and Education
- Reginald Flythe, North Carolina Department of Public Instruction
- David Harkey, UNC Highway Safety Research Center
- Eric Jackson, North Carolina State Highway Patrol
- Brian Mayhew, North Carolina Department of Transportation
- Chris Oliver, North Carolina Department of Transportation
- Terry Robinson, North Carolina State Highway Patrol

Supporting Material

- Highway Safety Improvement Program (HSIP), Notice of Proposed Rulemaking (NPRM), Department of Transportation, Federal Highway Administration, 23 CFR Part 924, [Docket No. FHWA–2013–0019], RIN 2125–AF56, March 28, 2014. Accessed 6/17/14 at http://1.usa.gov/O4TTs6
- National Performance Management Measures; Highway Safety Improvement Program, Notice of Proposed Rulemaking (NPRM), Department of Transportation, Federal Highway Administration, 23 CFR Part 490, [Docket No. FHWA–2013–0020], RIN 2125–AF49, March 11, 2014. Accessed 6/17/14 at http://1.usa.gov/1kaOScZ
- North Carolina Driver Education Strategic Plan, Prepared By The Driver Education Advisory Committee, State Board of Education, and Department of Public Instruction, June 2012. Accessed 6/17/14 at http://bit.ly/1y8yTXi

APPENDIX E - Intersection Safety Action Plan

Introduction

Intersection Safety is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. This emphasis area includes all crashes occurring at the intersection of two or more roads.

State of the Problem

Intersection crashes comprised 23 percent of all crashes and 19 percent of all fatalities in 2012 on North Carolina roadways. Table E-1 offers a basic summary of intersection-related crashes by severity on North Carolina's highways from 2004 – 2013. Also included are the number of injuries and fatalities resulting from intersection crashes. Injuries are classified into four levels of severity, defined as:

- **Fatal** – Crash-related injuries result in a death within twelve months of the crash.
- **Type A Injury** – Crash-related injuries serious enough to prevent normal activity for at least one day such as a massive loss of blood, broken bones, etc.
- **Type B Injury** – Crash-related injuries that are not fatal or Type A, but are evident at the scene such as bruises, swelling, limping, etc.
- **Type C Injury** – There is no visible injury but there are complaints of pain or has been momentarily unconsciousness.

Table E-1 shows intersection crash trends in North Carolina from 2004 – 2013. The total crashes figures include crashes that did not result in injury or fatality.

There has been a steady decline in intersection crashes over the last decade, consistent with a decline in all crashes statewide. However, the percent of all crashes that are intersection crashes has remained consistent over the ten-year period. The number of fatalities and injuries has also declined, with serious injuries reduced by more than half in the last ten years.

There are many challenges to reducing intersection crashes and the fatalities and serious injuries that result. Notable challenges include:

- Determining the best use of resources in an area that has countermeasures of widely varying costs and effectiveness.
- Determining the right combination of system-wide countermeasures versus site-specific applications.
- Selecting appropriate treatments at rural intersections, where there are often less frequent but more severe collisions.

In 2011, as part of the Focused Approach to Safety, the Federal Highway Administration (FHWA) worked with the North Carolina Department of Transportation (NCDOT) to address intersection crashes through data analyses and the development of a straw man intersection safety implement plan. This plan provided insight for several efforts in North Carolina. Additionally, North Carolina has undertaken several related successful efforts in the last few years that have likely contributed to the reductions evident in Table E-1.

Notable efforts include the following successes:

- The North Carolina Highway Safety Improvement Program (HSIP) has been very successful in identifying hazardous intersections, performing field investigations, and developing safety recommendations to reduce intersection crashes.

Table E-1: *North Carolina Intersection Crash Trends (2004 – 2013).*

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Intersection Crashes	59,431	56,866	55,296	56,023	52,815	50,829	49,616	49,244	49,723	50,059
Fatal Crashes	278	261	262	289	250	224	236	201	231	225
A Injury Crashes	748	687	672	597	533	436	379	456	391	387
B Injury Crashes	6,212	5,891	5,607	5,681	5,208	4,864	4,776	4,678	4,671	4,481
C Injury Crashes	18,187	16,881	16,528	16,547	15,642	15,186	14,516	14,255	14,592	14,404
Fatalities	312	280	287	319	269	237	253	208	241	243
A Injuries	964	904	865	788	660	535	495	572	473	471
B Injuries	9,063	8,480	8,064	8,024	7,295	6,810	6,599	6,527	6,441	6,102
C Injuries	33,736	31,134	30,588	30,514	28,845	28,305	27,037	26,054	26,678	25,879

- The Complete Streets policy has been successful and ensures that all modes of transportation are considered.
- Modern intersection designs—such as roundabouts, superstreets, and median channelization—have been successfully installed throughout the State.
- North Carolina has successfully incorporated systemic treatments such as pedestrian countdown heads, signal lenses size, and flashing yellow arrows at signalized intersections.

Although these successful efforts have had a positive impact on intersection crashes, additional actions are needed to continue to improve intersection safety.

Emphasis Area Goal

In 2013, there were 243 fatalities and 471 serious injuries at intersections. The goal for this emphasis area is to reduce fatalities and serious injuries at intersections.

Strategies and Supporting Actions

The following strategies are needed to achieve the goals of the Intersection Safety emphasis area. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Improve visibility of intersections by providing enhanced signs and pavement markings.

There are many cases in which intersections are not readily visible to approaching drivers, particularly at rural, unsignalized locations. The

visibility of intersections and the ability of approaching drivers to perceive them and respond appropriately can be enhanced by signing and delineation.

Supporting Actions

1. Conduct an evaluation of intersections that are candidates for systematic, low-cost signage, and delineation improvements.

Field check sites to determine quality and appropriateness of existing signs and pavement markings; verify that minimum signing needs are met; identify unnecessary signs or sight distance obstructions to remove. Improvements may include additional signs, advance signs, post reflectors, sign replacement, and pavement markings.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Research high-visibility crosswalk markings to determine whether a higher prevalence of their use dilutes their effectiveness, and refine guidelines on suggested or required locations for their installation.
Potential Implementing Agencies: NCDOT, ITRE
Status: Needed

Strategy 2

Reduce the frequency and severity of intersection crashes through traffic control enhancements.

Traditional two-way stop-controlled and signalized intersections comprise the overwhelming majority of intersection types in North Carolina. Unconventional intersection designs (e.g., roundabout and superstreet) often experience fewer and less severe crashes due to a reduction in conflict points at the intersection. In addition, all-way stop-controlled intersections have been effectively used at some locations in the State to reduce severe crashes.

Supporting Actions

1. Consider the conversion from traditional two-way stop control to all-way stop intersections as a low-cost means of reducing crash severity.

Review volume warrants for all-way stop installation, and ensure that they are appropriate.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Consider the installation or conversion of intersections to roundabouts.
Potential Implementing Agencies: NCDOT
Status: Underway

3. Increase use of access management techniques to reduce conflict points at intersections. Intersection treatments include the use of a raised median to restrict movements, superstreet designs, and driveway consolidation.
Potential Implementing Agencies: NCDOT
Status: Underway

4. Investigate the use of actuated No Turn on Red signs, Pedestrian Hybrid Beacons (PHBs), or Rectangular Rapid Flashing Beacons (RRFBs) at intersections or other pedestrian crossings to improve driver yielding rates.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 3

Enhance safety at signalized intersection through the use of proven safety countermeasures.

North Carolina has successfully upgraded and enhanced equipment at signalized intersections over the years. Continued applications of measures designed to improve signal head visibility and conspicuity, compliance with the signal, and yielding compliance (including to pedestrians) are encouraged.

Supporting Actions

1. Investigate opportunities to install signal technology improvements, such as leading pedestrian intervals. Flashing yellow arrows, pedestrian countdown heads, and 12" signal lenses are being installed regularly. Increased use of back plates and dynamic red extension technology are measures that can be expanded within the State.
Potential Implementing Agencies: NCDOT
Status: Underway

Strategy 4

Support and enhance driver education and awareness programs.

Targeted public information and education campaigns increase awareness of the safety issues at intersections.

Supporting Actions

1. Update driver education curriculum to include information on flashing yellow arrows and other newer traffic control devices or intersection treatments (e.g., RRFBs, PHBs, roundabouts). Incorporate additional bicycle and pedestrian information into the driver education curriculum, with particular emphasis on yielding to pedestrians at crosswalks.
Potential Implementing Agencies: NCDOT, NCDPI
Status: Planned

2. Consider implementation of a graduated transportation education curriculum that focuses on pedestrian and bicycle safety for children ("Let's Go NC!") and then transitions to vehicular safety for teenagers.
Potential Implementing Agencies: NCDOT, NCDPI
Status: Needed

Working Group Members

The working group for this emphasis area includes the following representatives from nine agencies committed to achieving the goals of this Action Plan:

- Greg Brew, North Carolina Department of Transportation
- Julian Council, North Carolina Department of Transportation
- Andie Cozzarelli, North Carolina Department of Transportation
- Haywood Daughtry, North Carolina Department of Transportation
- Reginald Flythe, North Carolina Department of Public Instruction
- Bucky Galloway, North Carolina Department of Transportation
- Frank Hackney, Governor's Highway Safety Program
- David Harkey, UNC Highway Safety Research Center

- Denny Hoadley, AARP
- Terry Hopkins, North Carolina Department of Transportation
- Tim Inglis, 3M
- Ron King, North Carolina Department of Transportation
- Dan Lang, Ennis-Flint
- Brian Mayhew, North Carolina Department of Transportation
- Brian Murphy, North Carolina Department of Transportation
- Barak Myers, Eastern Band of Cherokee Indians
- Sarah O'Brien, NCSU Institute for Transportation Research and Education
- Chris Oliver, North Carolina Department of Transportation
- Shawn Troy, North Carolina Department of Transportation
- Robert Willcox, Eastern Band of Cherokee Indians

Supporting Material

The following are considered valuable resources to the implementation of the Intersection Safety Emphasis Area Action Plan:

- FHWA, Intersection Safety Implementation Plan Process. http://1.usa.gov/14ScssN
- FHWA, Proven Safety Countermeasures. http://1.usa.gov/1HvhEBv
- FHWA, Intersection Safety Needs Identification Report. http://1.usa.gov/1BXZ42g
- FHWA, National Agenda For Intersection Safety. http://1.usa.gov/1Acj25h
- FHWA, Intersection Safety. http://1.usa.gov/1BXZ5TS
- FHWA, North Carolina Intersection Safety Implementation Plan: Data Analysis and Straw Man Outline, March, 2011.
- North Carolina Department of Transportation Crash Data Tool and Reports. http://bit.ly/1u2vHeu
- North Carolina Department of Transportation Complete Streets Policy. http://bit.ly/1n5k3tx
- NHTSA's Countermeasures that Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices. http://bit.ly/1AbynCV
- Pedestrian and Bicycle Countermeasure Selection System. http://bit.ly/1AMQ2Ur
- Crash Modification Factors Clearinghouse. http://bit.ly/1wVVK2x
- Watch for Me NC. http://bit.ly/1tywPok
- Let's–Go NC! - Pedestrian and Bicycle Safety Curriculum. http://bit.ly/1y8EZXE
- National Association of City Transportation Officials Urban Street Design Guide (http://bit.ly/1AMR4Qj) and Urban Bikeway Design Guide (http://bit.ly/1gPhKHi).
- American Association of State Highway and Transportation Officials (AASHTO) bicycle and pedestrian design guides
- Institute of Transportation Engineers Designing Urban Walkable Thoroughfares

APPENDIX F - Keeping Drivers Alert Action Plan

Introduction

Keeping Drivers Alert is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. This emphasis area focuses on crashes in which a driver is drowsy, distracted, or otherwise inattentive to the task of driving.

State of the Problem

Distracted driving has long been a cause of motor vehicle crashes but has recently gained attention as electronic devices have become increasingly important in peoples' lives, data become more portable, and car manufacturers integrate electronic interfaces into their vehicles. Cell phone use—and in particular smart phone use—has grown at impressive rates over the last decade. Drivers now have more devices available to them that can take attention and eyesight away from the road itself, potentially putting more people at risk of motor vehicle crashes, injuries, and fatalities.

One of the biggest challenges to addressing distracted driving is that accurate data are difficult to obtain. Law enforcement officers responding to the scene often require a witness to establish the presence of a distraction, since drivers may not voluntarily report having been distracted. Privacy laws exist that limit the officer's ability to pull usage information from the phone to determine if the driver was using their phone at the time of a crash. Moreover, electronic devices are a relatively recent phenomena, so accurate collection methods are still being developed, and fewer years of good data exist for historical comparison.

Even as electronic device use has grown, laws and technical fixes have moved quickly to try to limit electronic device use while operating a vehicle. Most States have bans on at least some aspect of phone use for at least some portion of the population. All but 13 States ban cell phone use for younger drivers, and all but 2 States have some form of texting ban. Thirteen States ban handheld cell phone use for all drivers, and 4 States have partial, situational bans on handheld cell phone use (e.g., not allowed in a school zone). North Carolina bans texting for all drivers and cell phone use for drivers under 18.

Drowsiness is another form of driver inattention contributing to motor vehicle crashes. Not operating a vehicle while drowsy is the most obvious solution; however, most drivers will likely drive while drowsy at some point in their driving careers. Engineering countermeasures like rumble strips on highways have proven effective in alerting distracted drivers that they are drifting off the roadway.

Table F-1 shows total crashes, serious injuries, and fatalities where drowsiness or distraction was cited as a factor in the crash for the five-year period from 2009 – 2013. Of note is that 93 percent of fatalities and 92 percent of serious injuries for distracted driving are classified as "inattention" in the crash report. Only two percent of fatalities and one percent of serious injuries for distracted driving are classified as involving an electronic device.

Table F-1: *North Carolina Crashes due to Drowsy and Distracted Drivers (2009 – 2013).*

		2009	2010	2011	2012	2013
DROWSY CRASHES	Crashes	2,828	2,864	3,106	3,203	3,120
	Fatalities	24	29	29	22	24
	Serious Injuries	64	81	101	72	74
DISTRACTED CRASHES	Crashes	48,105	48,420	49,461	49,597	49,405
	Fatalities	141	139	131	135	137
	Serious Injuries	364	352	396	342	282

Emphasis Area Goal

In 2013, there were 161 fatalities and 356 serious injuries due to distraction and drowsiness. The goal for this emphasis area is to reduce fatalities and serious injuries related to distraction and drowsiness.

Strategies and Supporting Actions

The following strategies are needed to achieve the goals of the Keeping Drivers Alert emphasis area. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Explore the specifics of instituting a handheld cell phone ban while operating a motor vehicle that is in motion.

Supporting Actions

1. Investigate legislative solutions in other States to determine the specifics of a ban.
Potential Implementing Agencies: Advocacy groups
Status: Needed

2. Identify a champion in the legislature who could push for this legislative change.
Potential Implementing Agencies: Advocacy groups
Status: Needed

3. Support the move for a nationwide ban on cell phone use.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 2

Promote the existing ban on texting while driving by increasing the visibility of law enforcement and the frequency of high-visibility enforcement campaigns.

Supporting Actions

1. Establish a high-visibility enforcement campaign in North Carolina to deter drivers from texting while driving.
Potential Implementing Agencies: NCSHP
Status: Needed

2. Examine best enforcement practices from other States (e.g., Minnesota and New York) to devise an effective enforcement plan.
Potential Implementing Agencies: NCSHP
Status: Needed

3. Encourage NHTSA and national laws allowing law enforcement to access phone usage data to determine if the phone was being used around the time of a crash.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 3

Investigate new and emerging technologies to prevent distracted driving.

Supporting Actions

1. Explore applications that could be used to disable the phone while the vehicle is moving.
Potential Implementing Agencies:
HSRC, ITRE, NCDOT
Status: Needed

2. Explore options for how to effectively require drivers to use an app or other technological solution that disables the phone while driving.
Potential Implementing Agencies:
HSRC, ITRE, NCDOT
Status: Ongoing

3. Partner with telecommunications companies, cell phone manufacturers, app developers, insurers, and vehicle manufacturers to investigate possibilities for a technological means to disable handheld phone use while driving.
Potential Implementing Agencies:
HSRC, ITRE, NCDOT
Status: Needed

Strategy 4

Continue implementing rumble strips on highway shoulders and investigate additional engineering counter measures and programs that can alert drowsy or distracted drivers.

Supporting Actions

1. Continue implementing rumble strips and guardrails on highways that may be missing these countermeasures.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Investigate the effectiveness of alternative measures (e.g., flashing lights) that can alert drivers.
Potential Implementing Agencies: NCDOT
Status: Needed

3. Investigate cost and feasibility of free coffee at rest stops.
Potential Implementing Agencies: NCDOT
Status: Needed

4. Investigate possibility of partnering with hotel chains with locations along interstates to offer rooms at reduced rates after a certain hour to encourage drivers to pull over and sleep.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 5

Improve the quality of data on driver distraction to demonstrate the extent of the problem and need for a solution.

Supporting Actions

1. Work with NHTSA to identify and review cutting edge research and target opportunities for new research.
Potential Implementing Agencies: HSRC, ITRE
Status: Needed

2. Cultivate discussion among multiple groups to identify ways of improving the collection of distracted and drowsy driving data in North Carolina.
Potential Implementing Agencies:
NCDMV, NCSHP, TRCC
Status: Needed

3. Analyze crash reports and citation data to better understand distraction-related crashes, particularly in relation to electronic devices.
Potential Implementing Agencies:
NCDMV, NCDOT, NCSHP
Status: Needed

Working Group Members

The working group for this emphasis area includes the following representatives from eight agencies committed to achieving the goals of this Action Plan:

- Kelsie Ballance, North Carolina Indian Economic Development Initiative
- Julian Council, North Carolina Division of Motor Vehicles
- Henrietta Coursey, AARP
- Chris Cunningham, NCSU Institute for Transportation Research and Education
- Adam Fischer, City of Greensboro
- Roger Garrett, North Carolina Department of Transportation
- Arthur Goodwin, UNC Highway Safety Research Center
- Terry Hopkins, North Carolina Department of Transportation
- Hubie Mercado, Governor's Highway Safety Program
- Chris Oliver, North Carolina Department of Transportation

Supporting Material

Data on State-by-State laws on cell phone use:
http://bit.ly/1wbmw5L

APPENDIX G - Lane Departure Action Plan

Introduction

Lane Departure is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. This emphasis area targets the following crashes:

- Ran Off Road – Left
- Ran Off Road – Right
- Ran Off Road – Straight
- Overturn/Rollover
- Fixed Object
- Head On
- Sideswipe – Opposite Direction

State of the Problem

Lane departure crashes comprised 24 percent of all crashes and 57 percent of all fatalities in 2012 on North Carolina roadways. Table G-1 offers a basic summary of lane departure-related crashes by severity on North Carolina's highways from 2004 – 2013. Also included are the number of injuries and fatalities resulting from lane departure crashes. Injuries are classified into four levels of severity as defined below:

- **Fatal** – Crash-related injuries result in a death within twelve months of the crash.
- **Type A Injury** – Crash-related injuries serious enough to prevent normal activity for at least one day such as a massive loss of blood, broken bones, etc.
- **Type B Injury** – Crash-related injuries that are not fatal or Type A but are evident at the scene such as bruises, swelling, limping, etc.
- **Type C Injury** – There is no visible injury but there are complaints of pain or has been momentarily unconsciousness.

Table G-1 shows trends for lane departure crashes in North Carolina from 2004 – 2013. The figures for total crashes also include crashes that did not result in injury or fatality.

The number of lane departure crashes has fluctuated over the years, with a general decline from approximately 60,000 crashes ten years ago to just above 50,000 crashes in recent years, consistent with a decline in all crashes statewide. However, the percent of all crashes that are lane departure crashes has remained consistent over the ten-year period. The number of fatalities peaked within this time period at 1,040 fatalities in 2007, but fatalities have steadily declined since that time to 737 in 2013.

There are many challenges to reducing lane departure crashes and the fatalities and serious injuries that result, including the following:

- Determining the best use of resources in areas with countermeasures of widely varied costs and effectiveness.
- Determining the right combination of system-wide countermeasures versus site-specific applications.
- Determining root cause or causes of lane departure events.

In 2009, as part of the Focused Approach to Safety, the Federal Highway Administration (FHWA) worked with the North Carolina Department of Transportation (NCDOT) to address lane departure crashes through data analyses and the development of a straw man roadway departure safety implement plan. This plan provided insight for several efforts in North Carolina. Additionally, North Carolina has

Table G-1: *North Carolina Lane Departure Crash Trends (2004 – 2013).*

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Total Lane Departure Crashes	61,239	57,520	56,243	56,435	54,999	56,475	55,498	50,022	51,853	53,615
Fatal Crashes	823	796	846	927	803	737	708	629	671	666
A Injury Crashes	1,744	1,663	1,554	1,386	1,237	1,126	981	1,011	983	893
B Injury Crashes	9,880	9,596	9,236	9,481	9,082	8,444	8,186	7,880	8,107	7,681
C Injury Crashes	13,831	12,787	12,741	12,807	12,285	12,598	12,204	11,464	11,922	11,787
Fatalities	917	871	939	1,040	871	805	766	693	718	737
A Injuries	2,304	2,161	2,025	1,780	1,556	1,426	1,264	1,259	1,230	1,137
B Injuries	13,145	12,444	12,003	12,252	11,651	10,950	10,439	10,091	10,294	9,706
C Injuries	20,640	19,034	18,677	18,893	18,031	18,446	17,968	16,990	17,673	17,189

undertaken several related successful activities in recent years that have likely contributed to the reductions evident in Table G-1.

Notable efforts include the following successes:

- The North Carolina Highway Safety Improvement Program (HSIP) has been very successful in identifying potentially hazardous locations, performing field investigations, and developing safety recommendations to reduce lane departure crashes.
- North Carolina has been a leader in installing cable median barriers, which help reduce the severity of cross-median (head-on) crashes on freeways.
- NCDOT has undertaken an effort to upgrade rural two-lane roads to modern roadway design standards, which includes adding shoulders.
- Statewide, enforcement personnel have undertaken several high-visibility enforcement efforts focusing on driver behaviors that contribute to lane departure crashes, including impaired driving, speeding, and distracted driving. Additionally, their efforts to increase occupant protection have reduced the severity of crashes that result.

Although these successful efforts have had a positive impact on lane departure crashes, additional actions are needed to reduce these crashes.

Emphasis Area Goal

In 2013, there were 737 fatalities and 1,137 serious injuries from lane departure crashes. The goal for this emphasis area is to reduce lane departure-related fatalities and serious injuries.

Strategies and Supporting Actions

The following strategies are needed to achieve the goals of the Lane Departure emphasis area. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Keep vehicles on the roadway.

The first objective to designing safe roads is to keep drivers on roadways and, more specifically, in their appropriate directional lane. The use of improved delineation techniques and other positive guidance measures minimize vehicle lane departures.

Supporting Actions

1. Conduct a pilot program to evaluate the safety and operational performance of white edgelines with various widths and levels of reflectivity.
Potential Implementing Agencies: NCDOT
Status: Underway

2. Increase the use of longitudinal rumble strips (shoulder, edgeline, and centerline).
Potential Implementing Agencies: NCDOT
Status: Underway

3. Increase the use of paved shoulders and wider outside lanes.
Potential Implementing Agencies: NCDOT
Status: Underway

4. Conduct field safety evaluation of targeted curve locations that have experienced crashes. Identify proper treatment measures such as enhanced signs, pavement markings, or other low-cost systemic treatments at each location.
Potential Implementing Agencies: NCDOT
Status: Planned

5. Continue to use evidence-based countermeasures to reduce collisions, including strategies identified in the FHWA Crash Modification Factors (CMF) Clearinghouse maintained by HSRC and from NCDOT evaluations of countermeasure effectiveness.
Potential Implementing Agencies: NCDOT
Status: Underway

6. Coordinate with other emphasis areas where the root cause of lane departure is related to driver behavior instead of or in addition to an engineering issue.
Potential Implementing Agencies:
NCDOT and Other Emphasis Area Leads
Status: Needed

Strategy 2

Reduce potential for crashes when vehicles leave the roadway.

Once a vehicle leaves the roadway, it is important to provide the driver with an opportunity to recover safely and re-enter the roadway once the vehicle is under control. Pavement edge drop-offs contribute to drivers overcorrecting, which may lead to severe head-on or rollover crashes.

Supporting Actions

1. Apply Safety Edge technology to paving projects. Conduct before-and-after evaluations to

test effectiveness of the treatment.
Potential Implementing Agencies: NCDOT
Status: Underway

2. Lessen impacts of leaving the lane with low-cost clear zone treatments, including the removal of fixed objects and tripping mechanisms.
Potential Implementing Agencies: NCDOT
Status: Underway

Strategy 3

Reduce severity of crashes that do occur when vehicles leave the roadway.

The first and second strategies are intended to prevent crashes. This strategy includes actions to lessen the severity of a lane departure crash once it occurs.

Supporting Actions

1. Increase use of median barriers statewide. Cable barriers in particular provide a cost-effective means of shielding the median and reducing severity of impacts.
Potential Implementing Agencies: NCDOT
Status: Underway

2. Shield motorists from trees, poles, or other fixed objects using guardrail or other barrier types.
Potential Implementing Agencies: NCDOT
Status: Underway

Strategy 4

Support and enhance driver education and awareness programs.

This strategy provides motorists with training and tools to avoid lane departure crashes. Both classroom and behind-the-wheel training are important so that drivers understand the dangers of lane departure crashes, as well as learn how to avoid them.

Supporting Actions

1. Continue support for education and awareness programs and ensure that the curriculum and behind-the-wheel training addresses emergency lane departure situations.
Potential Implementing Agencies:
NCDOT, GHSP, NCDPI
Status: Underway

2. Continue support for information and outreach efforts that target highway safety messaging related to lane departure situations not solely caused by engineering issues.
Potential Implementing Agencies:
NCDOT, GHSP, NCDPI
Status: Underway

Working Group Members

The working group for this emphasis area includes the following representatives from nine agencies committed to achieving the goals of this Action Plan:

- Mike Bruff, North Carolina Department of Transportation
- Catherine Bryant, North Carolina Department of Transportation
- Greg Burns, North Carolina Department of Transportation
- Julian Council, , North Carolina Division of Motor Vehicles

- Haywood Daughtry, North Carolina Department of Transportation
- Daniel Findley, NCSU Institute for Transportation Research and Education
- Reginald Flythe, North Carolina Department of Public Instruction
- Bucky Galloway, North Carolina Department of Transportation
- David Harkey, UNC Highway Safety Research Center
- Terry Hopkins, North Carolina Department of Transportation
- Chris Howard, North Carolina Department of Transportation
- Tim Inglis, 3M
- Kevin Lacy, North Carolina Department of Transportation
- Dan Lang, Ennis-Flint
- Brian Mayhew, North Carolina Department of Transportation
- David Morton, North Carolina Department of Transportation
- Brian Murphy, North Carolina Department of Transportation
- Barak Myers, Eastern Band of Cherokee Indians
- Chris Oliver, North Carolina Department of Transportation
- Mark Scaringelli, Governor's Highway Safety Program
- Eric Schaberg, North Carolina State Highway Patrol
- Matthew Springer, North Carolina Department of Transportation
- Shawn Troy, North Carolina Department of Transportation
- Robert Willcox. Eastern Band of Cherokee Indians
- Tony Wyatt, North Carolina Department of Transportation

Supporting Material

The following are considered valuable resources to the implementation of the Lane Departure Emphasis Area Action Plan:

- FHWA, North Carolina Roadway Departure Safety Implementation Plan: Data Analysis and Straw Man Outline, July 9, 2009
- NCHRP, Best Practices In Lane-Departure Avoidance and Traffic Calming. http://bit.ly/1AXU2nE
- North Carolina Department of Transportation Crash Data Tool and Reports. http://bit.ly/1u2vHeu
- North Carolina Department of Transportation Complete Streets Policy http://www.completestreetsnc.org/
- NHTSA's Countermeasures that Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices. http://bit.ly/1AbynCV
- NCHRP, Centerline Rumble Strips http://bit.ly/1wbo5k2
- Crash Modification Factors Clearinghouse http://bit.ly/1wVVK2x
- Institute of Transportation Engineers Designing Urban Walkable Thoroughfares http://bit.ly/1z7ShUi
- Safety Impacts of Pavement Edge Drop-offs http://bit.ly/1AXUmTh
- FHWA, Proven Safety Countermeasures http://1.usa.gov/1HvhEBv

APPENDIX H - Occupant Protection/Motorcycles Action Plan

Introduction

Occupant Protection is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. This emphasis area focuses on serious injuries and fatalities for unrestrained occupants in passenger vehicles. Motorcycle-involved crashes are also included in this emphasis area.

State of the Problem

Approximately 40 percent of all traffic fatalities in North Carolina involve an unrestrained occupant. Table H-1 presents the fatalities and serious injuries from unrestrained occupants in passenger vehicles. The total fatalities and serious injuries in passenger vehicles are also presented. From 2009 – 2013, there have been an average of 433 unrestrained fatalities per year in collisions involving passenger vehicles in North Carolina. The unrestrained fatalities persistently remain around 35 to 40 percent of all traffic fatalities in passenger vehicles. The lack of seatbelt use by all occupants remains a problem; among the most likely groups to be involved in a fatal crash where the occupant was not wearing a seatbelt are those ages 20-24, males, and pickup truck drivers. The percent of fatal crashes with an unrestrained passenger is highest at night and often occurs in the most populated counties and in counties in the southeastern part of the State. North Carolina recently celebrated the 20th anniversary of the "Click It or Ticket" seat belt enforcement campaign. This program is instrumental in creating awareness of the risks of unrestrained driving and the North Carolina seatbelt law; however, it will likely need to target specific demographic groups and geographic areas to improve the use of seatbelts statewide.

Motorcycle crashes appear to be increasing in North Carolina from just ten years ago. In 2003, there were 101 motorcycle fatalities. In 2013, there were 149 motorcycle fatalities, as presented in Table H-2, with an average of 350 serious injuries and 155 fatalities occurring each year from 2009 – 2013. Nearly half of all motorcycle crashes in North Carolina involve those age 41 and older. Helmet use is high even in fatal crashes, where approximately 90 percent of motorcyclists were wearing a helmet. However, it is not known if the helmet was DOT-approved. Geographically, motorcycle crashes occur most frequently in the far western part of the State—North Carolina's mountain corridors offer scenic beauty but also increased risks due to abrupt changes in horizontal and vertical alignments—the most populated counties, and in counties with military bases.

Emphasis Area Goals

In 2013, there were 411 fatalities and 467 serious injuries from crashes of unrestrained occupants in passenger vehicles and 149 motorcycle fatalities and 310 serious injuries in North Carolina. The goals of this action plan are to reduce fatalities and serious injuries in North Carolina that are related to occupant protection and motorcycles.

Strategies and Supporting Actions

The following section outlines strategies needed to achieve the desired goals of improved safety with regard to occupant protection. They are not

Table H-1: *North Carolina Unrestrained Crash Trends (2009 – 2013) for Passenger Vehicles.*

	2009	2010	2011	2012	2013
Unrestrained Fatalities	468	468	422	400	411
Total Fatalities	1,235	1,201	1,096	1,124	1,135
Unrestrained Serious Injuries	628	543	504	529	467
Total Serious Injuries	2,186	2,034	2,124	2,018	1,901

Table H-2: *North Carolina Motorcycle Crash Trends (2009 – 2013).*

	2009	2010	2011	2012	2013
Motorcycle Crashes	3,635	3,786	4,118	4,157	3,790
Motorcycle Serious Injuries	392	336	354	365	310
Motorcycle Fatalities	152	172	143	161	149

proposed as isolated, standalone measures. Rather, to effectively address occupant protection on North Carolina's road network, coordinated and concerted efforts statewide across agencies and partners are required.

Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Improve enforcement strategies to increase seatbelt use.

Supporting Actions

1. Continue to use data to promote the importance of occupant protection enforcement to law enforcement (e.g., demonstrate previous successes in enforcement efforts and how these efforts can result in other benefits such as crime suppression).
Potential Implementing Agencies:
GHSP, NCDOT, HSRC
Status: In progress

2. Use data to direct enforcement efforts to target specific locations, times, or high-risk groups.
Potential Implementing Agencies:
GHSP, Law enforcement
Status: In progress

3. Increase knowledge about occupant protection laws and possible enforcement actions among law enforcement officers through "roll call" videos, educational materials, and other reference materials.
Potential Implementing Agencies:
GHSP, Law enforcement
Status: In progress

4. Work with the North Carolina court systems to address issues that may undermine enforcement efforts, such as the reduction and dismissal of charges.
Potential Implementing Agencies:
GHSP, District Attorneys, Law enforcement
Status: In progress

Strategy 2

Identify high-risk counties and demographic groups to inform specific countermeasures and messaging.

Supporting Actions

1. Expand the use of geocoding to more efficiently identify high-risk locations.
Potential Implementing Agencies:
NCDOT, GHSP, NCSHP
Status: Needed

2. Continue to support and expand the use of observational and survey data on the local level to measure seatbelt use and program effectiveness.
Potential Implementing Agencies: GHSP
Status: In progress

Strategy 3

Continue current messaging and develop new messaging and education programs promoting seatbelt use focusing on high-risk locations or groups.

Supporting Actions

1. Continue the "Click It or Ticket" program, and consider creating new media marketing campaigns to refresh the messaging and target specific groups or locations (e.g., males ages 18-34, counties with a high number of unrestrained fatalities, or at the State borders).
Potential Implementing Agencies:
GHSP, Law enforcement
Status: In progress

2. Develop materials and countermeasures targeting high-risk locations and groups (e.g., messaging in multiple languages or that target pickup truck drivers).
Potential Implementing Agencies:
GHSP, Law enforcement
Status: In progress

3. Work with the NC Department of Public Instruction to include seatbelt use in health education, especially for pre-teens and teenagers.
Potential Implementing Agencies: GHSP, NCDPI
Status: Needed

4. Develop occupant protection materials and resources in a variety of languages to ensure that multiple populations have access to the information.
Potential Implementing Agencies: GHSP, HSRC
Status: In progress

5. Include seatbelt use in health education for commercial truck drivers.
Potential Implementing Agencies: NC DHHS
Status: Needed

6. Continue to support and promote the importance of occupant protection and safety from birth, focusing on child passenger safety through proper use of car seats and booster seats.
Potential Implementing Agencies:
GHSP, NCDOI/OSFM, HSRC
Status: In progress

MOTORCYCLES

Strategy 4

Continue to support and promote North Carolina's strong motorcycle helmet law.

Supporting Actions

1. Continue to monitor legislative actions that have potential to weaken the helmet law in North Carolina.
Potential Implementing Agencies:
GHSP, Advocacy groups
Status: In progress

2. Provide messaging to promote the importance of DOT-compliant helmet use.
Potential Implementing Agencies: GHSP
Status: Needed

3. Continue to support the motorcycle helmet law as a statewide priority by emphasizing safety data.
Potential Implementing Agencies:
GHSP, Law enforcement, HSRC
Status: In progress

4. Continue to support the motorcycle helmet law as a statewide priority by estimating the associated economic costs and communicating them to key decision-makers.
Potential Implementing Agencies: DHHS
Status: In progress

5. Explore the possibility of creating a field on the NCDMV 349 crash reporting form to include information stating whether a DOT-compliant helmet was used.
Potential Implementing Agencies: GHSP, NCDMV
Status: Needed

Strategy 5

Continue to promote motorcycle safety in North Carolina.

Supporting Actions

1. Encourage lifelong training and other behavioral countermeasures (e.g., the use of reflective clothing) through developing partnerships with dealers, manufacturers, convenience stores, event organizers, and clubs.
Potential Implementing Agencies: GHSP, Law enforcement, Advocacy groups, Dealer networks, Event organizers, Motorcycle clubs
Status: In progress

2. Evaluate existing programs to identify if they are effective at reducing serious injury and fatal crashes.
Potential Implementing Agencies: NCDOT
Status: Needed

3. Develop strategies for increasing safety for motorcyclists visiting North Carolina, including roadway-based countermeasures such as optical speed bars in advance of hazardous locations, safety messaging, and mobile enforcement teams.
Potential Implementing Agencies: NCDOT
Status: In progress

4. Increase awareness of the dangers of impaired motorcycle riding to both riders and law enforcement.
Potential Implementing Agencies:
GHSP, Law enforcement, HSRC
Status: Needed

5. Provide law enforcement with materials on how to identify impaired riding and other behaviors that contribute to crashes.

Potential Implementing Agencies:
GHSP, Law enforcement, HSRC
Status: Needed

Strategy 6

Identify high-risk counties and demographic groups to inform specific countermeasures.

Supporting Actions

1. Expand crash mapping to geocode all motorcycle crashes in North Carolina.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Improve the crash data reporting system to be more specific on the differences among motorcycles, mopeds, and scooters, and the use of approved helmets with each.
Potential Implementing Agencies: GHSP, NCDMV
Status: Needed

Working Group Members

The working group for this emphasis area includes the following representatives from four agencies committed to achieving the goals of this Action Plan:

- Debra Collins, North Carolina Department of Transportation
- Josh DeFisher, Governor's Highway Safety Program
- Bill Hall, UNC Highway Safety Research Center
- Sheila Higgins, Department of Health and Human Services
- Bevan Kirley, UNC Highway Safety Research Center
- Craig Moss, Governor's Highway Safety Program
- Don Nail, Governor's Highway Safety Program
- Chris Oliver, North Carolina Department of Transportation

Supporting Material

The following are considered valuable resources to the implementation of the Occupant Protection/ Motorcycles Emphasis Area Action Plan:

- North Carolina Governor's Highway Safety Program Initiatives.
http://bit.ly/1CfEatD
- NHTSA's Countermeasures that Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices.
http://bit.ly/1AbynCV
- North Carolina's FY2015 – FY2016 Occupant Protection Program Plan
- "Investigating a Unique Motorcycle Crash Cluster: Problem Identification for Graham County Motorcycle Crash Concentration." University of North Carolina Highway Safety Research Center. September 2013.
- North Carolina BuckleUpNC Resource Center
www.buckleupnc.org
- Crash Modification Factors Clearinghouse
http://www.cmfclearinghouse.org/

APPENDIX I - Pedestrians and Bicyclists Action Plan

Introduction

Pedestrians and Bicyclists is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan. This emphasis area focuses on serious injuries and fatalities among pedestrians and bicyclists on North Carolina's roadways.

State of the Problem

From 2009 – 2013, an average of 168 pedestrians and 19 bicyclists were killed annually in collisions with motor vehicles in North Carolina. This represents 14 percent of total fatal crashes in North Carolina. In addition, the five-year average of serious-injury crashes involving pedestrians and bicyclists and motor vehicles is 170 and 40, respectively (see Table I-1).

More than two-thirds (71 percent) of pedestrian crashes in North Carolina from 2004 – 2013 occurred within municipal limits, likely due to many more people walking in urbanized areas. Specific risk factors for pedestrians include age (10 percent of crashes involving pedestrians 61 and older are fatal), seasonality (September through December typically see the highest number of crashes), light conditions (44 percent of crashes occur during non-daylight hours), and street lighting (crashes on unlighted roadways are three times more likely to result in a fatality compared with lighted roadways). Speed also contributes to the severity of the crash; 72 percent of all pedestrian fatalities occur on roadways with speed limits of 40 mph and higher, even though these roadways only account for 28 percent of pedestrian crashes in the State (NCDOT Pedestrian Crash Facts Summary Report, 2014).

Bicycle crashes in North Carolina are occurring predominantly in urban areas (70 percent); however, 57 percent of fatal bicycle crashes occur in rural-designated areas. Of bicyclists involved in crashes, 85 percent on average are male, and 38 percent are black. In contrast to the pedestrian crash averages, bicycle crashes occur most often during the warmer months (from May to September). Crashes also tend to occur during

Table I-1: *Pedestrian and Bicycle Crashes in North Carolina (2008 – 2012).*

	2009	2010	2011	2012	2013	Annual Avg.
Pedestrian Crashes	1,708	1,867	1,906	2,251	2,095	1,965
Pedestrian Serious (A) Injuries	149	171	159	203	170	170
Pedestrian Fatalities	148	170	159	191	174	168
Bicycle Crashes	603	687	716	709	606	664
Bicycle Serious (A) Injuries	38	38	54	38	31	40
Bicycle Fatalities	13	19	22	23	19	19

peak afternoon travel times, with 51 percent occurring between the hours of 3 and 9 PM. Seventy-three (73) percent of bicycle crashes occur during daylight hours, with half of the nighttime crashes occurring on lighted roadways and half occurring on unlighted roadways. As with the pedestrian crashes, speed affects the crash severity, with less than one percent of crashes on roadways with speed limits of 35 mph and under resulting in a fatality. The vast majority of bicyclist fatalities in North Carolina (79 percent) occur on roadways with speed limits of 40 mph and higher (NCDOT Bicycle Crash Facts Summary Report, 2012).

There have been many efforts to understand and address the pedestrian and bicycle crashes that are occurring in North Carolina. These efforts include developing a high-quality database of crash locations and types, mapping pedestrian and bicycle facilities across the State, and collecting information on when and where people are walking and bicycling. This information has been instrumental in developing awareness campaigns and efforts with local law enforcement, such as the Watch for Me NC program. In addition, policy changes—such as the Complete Streets policy—have led to the development of training opportunities and resources on how to plan and design the roadways in North Carolina to be safe for all street users.

There are several national efforts underway to better understand strategies that are effective at reducing pedestrian and bicycle crashes. These efforts are being conducted under the leadership of FHWA and the National Cooperative Highway Research Program (NCHRP) and will provide critical information on effective strategies and associated estimates of the potential to reduce pedestrian and bicycle crashes. Once complete, the results of these efforts should be reviewed and the emphasis area plan should be modified as necessary to incorporate effective strategies for implementation in North Carolina.

Emphasis Area Goal

In 2013, there were 174 pedestrian fatalities and 170 serious injuries, and 19 bicyclist fatalities and 31 serious injuries from crashes in North Carolina. The goals of this action plan are to reduce pedestrian and bicyclist fatalities and serious injuries in North Carolina.

Strategies and Supporting Actions

The following section outlines strategies needed to achieve the desired goals of improved safety with regard to pedestrians and bicyclists. They are not proposed as isolated, standalone measures. Rather, to effectively address pedestrian and bicycle safety on North Carolina's road network, coordinated and concerted efforts statewide across agencies and partners are required. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Continue to develop training and education programs for pedestrian and bicycle safety.

Supporting Actions

1. Continue to develop staff knowledge on safe pedestrian and bicycle planning and design at all staff levels and agencies through training workshops, desktop and web-based resources, toolkits, and other in-person and online trainings.
Potential Implementing Agencies:
NCDOT, Local agencies, Consulting firms
Status: In progress

2. Continue to expand targeted education and enforcement activities under the Watch for Me NC program.
Potential Implementing Agencies:
NCDOT, Law enforcement
Status: In progress

3. Continue to develop bicycle safety messaging to encompass skills and awareness information including bright apparel, distractions, proper lighting, helmet use, and the rules of the road.
Potential Implementing Agencies:
NCDOT, Local agencies, Law enforcement
Status: In progress

4. Promote and enforce laws pertaining to pedestrian and bicycle safety through law enforcement training and targeted outreach campaigns.
Potential Implementing Agencies:
NCDOT, Local agencies, Law enforcement
Status: In progress

5. Expand education in schools through the implementation of Let's Go NC! and other programs that encourage safe walking and riding behaviors.
Potential Implementing Agencies: NCDOT, NCDPI
Status: In progress

6. Encourage law enforcement participation in the Watch for Me NC program, and provide additional training opportunities at the Justice Academy, roll call, and through reference materials.
Potential Implementing Agencies:
NCDOT, Law enforcement
Status: In progress

7. Encourage additional professional education at the university level through collaboration on teaching materials and lectures.
Potential Implementing Agencies: NCDOT, University partners, Professional organizations
Status: In progress

Strategy 2

Implement and develop plans, policies, and resources.

Supporting Actions

1. Update design guidance, as appropriate, to provide the latest in safe facility design.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Continue to implement programs and countermeasures to address high speeds in urban, suburban, and rural areas.
Potential Implementing Agencies: NCDOT, Local agencies, Law enforcement
Status: Needed

3. Implement the existing statewide and regional plans, and continue to foster the development

and updates of plans with a focus on safety and performance measures.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: Planned

4. Identify and implement system-wide improvements and policies to improve pedestrian and bicycle safety.
Potential Implementing Agencies: NCDOT
Status: Needed

5. Continue to construct safe pedestrian and bicycle networks.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: In progress

6. Define target for NCDOT or local-led Road Safety Audits and Reviews with a focus on bicycle and pedestrian safety.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: Needed

7. Identify ways local agencies can conduct more Road Safety Audits and Reviews in compliance with NCDOT standards.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: Needed

8. Connect Road Safety Audits and Reviews with the new prioritization process for bicycle and pedestrian improvements.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 3

Continue to develop communication and leadership support for pedestrian and bicycle safety.

Supporting Actions

1. Demonstrate support for pedestrian and bicycle safety through continued investment in Complete Streets and Safe Routes to School.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Continue to develop interdepartmental and interagency coordination to improve safety and efficiency on pedestrian and bicycle efforts.
Potential Implementing Agencies: NCDOT, GHSP, NHTSA, Commerce, NC DHHS, NCDPI, FHWA, ECHS, Local agencies
Status: In progress

3. Support communication between departments and agencies through the use of Road Safety Audits.
Potential Implementing Agencies: NCDOT, Local agencies, Law enforcement, FHWA
Status: In progress

4. Increase investments in pedestrian and bicycle safety projects and grant programs.
Potential Implementing Agencies: NCDOT
Status: Needed

5. Collaborate with municipalities on land use and transportation decisions to identify the best designs for safe bicycle and pedestrian infrastructure, access, and site design.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: Needed

Strategy 4

Build on strong data and evaluation programs.

Supporting Actions

1. Continue to support research on safer pedestrian and bicycle infrastructure (e.g., pilot installations and evaluations) and programs.
Potential Implementing Agencies: NCDOT
Status: In progress

2. Incorporate evaluation and benchmarking in programs and investments.
Potential Implementing Agencies: NCDOT
Status: Needed

3. Link Road Safety Audits and Reviews to enforcement efforts and evaluate effectiveness when jointly implemented.
Potential Implementing Agencies: NCDOT
Status: Needed

4. Apply proactive tools to identify strategic improvements for bicycle and pedestrian safety based on roadway and land use characteristics.
Potential Implementing Agencies: NCDOT
Status: Needed

5. Target high-frequency crash locations for analysis, evaluation, improvements, and/or spot enforcement.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: In progress

6. Continue to code and geocode pedestrian and bicycle crashes, and continue to update and maintain a statewide geodatabase of existing and planned facilities.
Potential Implementing Agencies:
NCDOT, Law enforcement
Status: In progress

7. Continue to establish and build out a non-motorized traffic monitoring program.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: In progress

8. Use counting techniques and surveys to understand the movement and demand of pedestrians and bicyclists around the State.
Potential Implementing Agencies:
NCDOT, Local agencies
Status: In progress

9. Develop performance measures and benchmarks for departments, projects, and programs to evaluate their effect and progress toward pedestrian and bicycle safety.
Potential Implementing Agencies: NCDOT
Status: Needed

Working Group Members

The working group for this emphasis area includes the following representatives from five agencies committed to achieving the goals of this Action Plan:

- Paul Black, French Broad River MPO
- Lauren Blackburn, North Carolina Department of Transportation
- Catherine Bryant, North Carolina Department of Transportation
- Brad Hibbs, Federal Highway Administration North Carolina Division
- Kristy Jackson, NCSU Institute for

Transportation Research and Education

- Jeff Jaeger, North Carolina Department of Transportation
- Ed Johnson, North Carolina Department of Transportation
- Brian Mayhew, North Carolina Department of Transportation
- Sarah O'Brien, NCSU Institute for Transportation Research and Education
- Chris Oliver, North Carolina Department of Transportation
- Shawn Troy, North Carolina Department of Transportation
- Charlie Zegeer, UNC Highway Safety Research Center

Supporting Material

The following are considered valuable resources to the implementation of the Pedestrians and Bicyclists Emphasis Area Action Plan:

- North Carolina Department of Transportation Statewide Pedestrian and Bicycle Plan. http://bit.ly/1IIgTVn
- North Carolina Department of Transportation Crash Data Tool and Reports. http://bit.ly/1u2vHeu
- North Carolina Department of Transportation Complete Streets Policy http://www.completestreetsnc.org/
- NHTSA's Countermeasures that Work: A Highway Safety Countermeasure Guide for State Highway Safety Offices http://bit.ly/1AbynCV
- Pedestrian and Bicycle Countermeasure Selection System http://www.pedbikesafe.org/
- Crash Modification Factors Clearinghouse http://www.cmfclearinghouse.org/
- Watch for Me NC http://www.watchformenc.org/
- Let's Go NC! - Pedestrian and Bicycle Safety Curriculum. http://bit.ly/1y8EZXE
- National Association of City Transportation Officials Urban Street Design Guide and Urban Bikeway Design Guide. http://nacto.org/usdg/ (Street Design Guide) http://bit.ly/1gPhKHi (Bikeway Design Guide)
- American Association of State Highway and Transportation Officials (AASHTO) bicycle and pedestrian design guides
- Institute of Transportation Engineers Designing Urban Walkable Thoroughfares. http://www.ite.org/css/RP-036A-E.pdf

APPENDIX J - Speed Action Plan

Introduction

Speed is one of nine emphasis areas of the North Carolina Strategic Highway Safety Plan (SHSP). This emphasis area includes serious injuries and fatalities related to excessive or unsafe speeds.

State of the Problem

Speeding continues to persist as a highway safety problem in North Carolina. In 2013, approximately 319 fatalities and 407 serious injuries in North Carolina were speed-related. Higher speeds lead to less time for a driver to react to a situation on the road and a higher severity impact if a crash occurs. The North Carolina General Statutes (§20 – 141) refer to speeding as driving at a "speed greater than is reasonable and prudent under the conditions then existing," while the State crash report form (Form DMV-349) defines speeding as either exceeding "authorized speed limit" or exceeding "safe speed for conditions." Table J-1 shows speed-related crash trends in North Carolina from 2009 – 2013. It is important to note that Table J-1 and the speed-related data in the SHSP reflect the definitions of speeding that are found on the State crash report form.

Speeding has been reported as a contributing factor in North Carolina fatal crashes more often than alcohol intoxication or lack of seatbelt (Thomas et al., 2013). Several recent resources provide actions and strategies to combat the speeding problem on our State's roads. The Governor's Highway Safety Program (GHSP) included a speed-related goal in its FY2014 Highway Safety Plan in which the target is to reduce speed-related fatalities by 25 percent through increased police traffic services. The North Carolina Department of Transportation (NCDOT) developed a document entitled, "North Carolina Speed Management: Recommendations for Action" in 2013 that presented key strategies, including engineering, enforcement, education, and other strategies (Thomas et al., 2013).

Emphasis Area Goal

In 2013, there were 319 fatalities and 407 serious injuries from speed-related crashes. The goal for this emphasis area is to reduce speed-related fatalities and serious injuries.

Table J-1: *North Carolina Speed-Related Crash Trends (2009 – 2013).*

	2009	2010	2011	2012	2013	Annual Avg.
Crashes	23,894	23,225	16,711	15,561	18,166	19,511
Fatalities	405	383	335	334	319	355
Serious (A) Injuries	630	517	483	475	407	502
All Injuries (A, B, C)	13,199	12,540	9,825	9,355	9,817	10,947

Strategies and Supporting Actions

The following strategies have been established as priorities for North Carolina to combat speeding-related crashes. Listed below each strategy are several recommended actions to support it, as well as one or more North Carolina agencies identified as having a potentially significant role in its implementation and the current status of the action.

Strategy 1

Set speed limits that are appropriate for the roadway type, area type, and current conditions.

Supporting Actions

1. Standardize methods for setting speed limits and train engineers. This would involve developing a standard method for setting speed limits that could be implemented in a consistent manner statewide and training engineering staff in this method. This idea was also recommended in the North Carolina Speed Management Recommendations for Action (Thomas et al., 2013) with a focus on using an injury minimization approach to establish appropriate limits. A key part of this action would be the training of engineers to use the standard method for setting speed limits. Currently, NCDOT engineers do not get any formal classroom or field training in setting speed limits. It is left up to experienced engineers in their unit to provide "in-the-field training." This leads to many different speed limit setting philosophies and practices in the NCDOT Divisions and Regions of the State. There is an evident need to standardize the speed limit procedure and training to achieve statewide consistency.
Potential Implementing Agencies: NCDOT
Status: Needed

2. Evaluate the method for determining advisory speed limits on curves. There is a potential need for an updated method for setting curve advisory speeds that can be used consistently throughout the State. The current method will be evaluated to determine the need for revision.
Potential Implementing Agencies: NCDOT
Status: Needed

3. Explore the potential benefits of a variable speed limit system. With current technology, it is possible to have a system where the speed limit is changed dynamically in response to the current conditions on the roadway. Such conditions may be weather-related (e.g., fog in mountainous areas) or traffic conditions (e.g., congestion related to peak hour traffic or a crash on the roadway). This action could begin with a pilot study to test the implementation and evaluate its feasibility and effect on speed. This idea was also recommended in the North Carolina Speed Management Recommendations for Action (Thomas et al., 2013).
Potential Implementing Agencies: NCDOT
Status: Needed

4. Evaluate roads in rural areas to determine if the statutory speed limit should be lowered. The statutory speed limit of 55 mph may not be appropriate for many rural roads, especially those not meeting modern design standards. This action would set the statutory rural speed limit to 45 mph and allow a speed limit of 55 mph only as intentionally determined by NCDOT. This idea

was also recommended in the North Carolina Speed Management Recommendations for Action (Thomas et al., 2013). The evaluation of rural roads will consider the presence of design features, such as paved shoulders, lane widths, and the presence of Safety Edge.
Potential Implementing Agencies: NCDOT
Status: Needed

Strategy 2

Explore new avenues of enforcement and penalties.

Supporting Actions

1. Implement a uniform system for speeding offenses that includes civil penalties. This proposed system would be structured as a uniform system of penalties that would assign civil penalties for certain lower levels of speeding offenses. The ECHS proposed a system with five different classes of speeding (0-10 mph over, 11-15 mph over, 16-20 mph over, etc.) with the lower penalties starting at civil, followed by criminal charges for the higher levels (Executive Committee, 2005). The benefits of this system are an increased expectation by drivers for receiving penalties when caught speeding and a lower caseload for the court system. This idea was also recommended in the North Carolina Speed Management Recommendations for Action (Thomas et al., 2013).
Potential Implementing Agencies:
Various advocacy groups
Status: Needed

2. Increase the use of automated speed enforcement. The use of automated enforcement would supplement traditional enforcement and provide wider coverage that would lead to an increased expectation of being caught and penalized for speeding, and should result in an increase in population-wide deterrence. This idea was also recommended in the North Carolina Speed Management Recommendations for Action (Thomas et al., 2013).
Potential Implementing Agencies: NCDOT, Law enforcement, Legislative liaisons
Status: Needed

Strategy 3

Investigate and address problem locations.

Supporting Actions

1. Implement network screening to identify corridors in need of further review. This data-based approach would use roadway, ordinance, and crash data to proactively identify locations on the roadway network that are most in need of attention. This approach would identify a set of locations (e.g., intersections, curves, etc.) per region and inform the managing agency that the locations fall into a category that indicates a need for review. Such review may lead to an adjustment of the speed limit, enhancement of enforcement, modification of the road design, or other safety countermeasures.
Potential Implementing Agencies: NCDOT
Status: Planned

Strategy 4

Engage stakeholders to create a culture of safe speed.

Supporting Actions

1. Develop toolkit for communities to build anti-speeding program. It takes the involvement of

many parties to create a culture that encourages and expects safe speeds. Such parties include law enforcement, roadway designers, driver educators, and drivers themselves. The SHSP will encourage the creation of anti-speeding campaigns and programs in North Carolina communities by developing a toolkit of resources and examples for conducting such programs. The toolkit would include measures that are likely to be successful (with expected safety benefits of different treatments) and tips on important implementation considerations to maximize chances of success. One example was conducted in Johnston County, with a program that targeted teen driving safety. Each Johnston County high school has a Teen Drivers chapter that speaks to each group of students and parents that attend the informational sessions required before students are allowed to take Driver Education. Speed is just one of the items the JoCo Teen Drivers speak on at the informational sessions.
Potential Implementing Agencies: NCDOT, NCDMV, NCDPI, NCSHP, Community groups
Status: Needed

2. Support the "Vision Zero" initiative of the Governor's Highway Safety Plan. The central premise of Vision Zero is to communicate to the public that the stakeholders of highway safety—including the actions recommended in the SHSP—are each focused on reducing and, to the extent possible, eliminating highway fatalities. This initiative has the potential to serve as the public image for all highway safety outreach and marketing efforts, while promoting efforts within the individual areas (like the SHSP does for the engineering side). The Vision Zero initiative will complement existing highway safety marketing programs, and the SHSP will support Vision Zero through a detailed description of actions that are needed, planned, and underway to reduce highway fatalities. This action is also related to an action in the emphasis area for Emerging Issues and Data that seeks to increase public awareness of road safety through the use of the many different types of safety data.
Potential Implementing Agencies: NCDOT, NCDMV
Status: Underway

Working Group Members

The working group for this emphasis area includes the following representatives from five agencies committed to achieving the goals of this Action Plan:

- Julian Council, North Carolina Division of Motor Vehicles
- Haywood Daughtry, North Carolina Department of Transportation
- Greg Ferrara, NCSU Institute for Transportation Research and Education
- Daniel Findley, NCSU Institute for Transportation Research and Education
- Reginald Flythe, North Carolina Department of Public Instruction
- Bucky Galloway, North Carolina Department of Transportation
- Terry Hopkins, North Carolina Department of Transportation
- Brian Mayhew, North Carolina Department of Transportation

- Chris Oliver, North Carolina Department of Transportation
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