



THE UNIVERSITY OF NORTH CAROLINA  
**HIGHWAY SAFETY  
RESEARCH CENTER**

**SPECIAL TWO-YEAR ANNUAL REPORT 2015-2016**





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# MESSAGE FROM THE DIRECTOR

In 2015 and 2016, we commemorated the UNC Highway Safety Research Center (HSRC) 50th anniversary – and five decades of research and innovation – in a variety of different ways. It was an extremely busy two years, thus the decision to publish a two-year annual report to capture everything in one place.

Notably, the Center hosted a transportation symposium drawing internationally recognized scholars and more than 200 colleagues from across the state and nation to discuss how to connect people and technologies in the next 50 years of highway safety. At that event, I asked my peers to consider what our transportation system will look like when HSRC is celebrating its 100th birthday:

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**“ True success, though, will only be achieved in the years and decades ahead if we pair technology with a collaborative, multidisciplinary, systems approach to transportation safety issues. ”**

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- Will all fatalities and crashes on our roadways be eliminated?
- Will technology have solved all of our current problems?
- What will be the new challenges?
- How will highway safety research change to meet these challenges?

There is no doubt that many of these questions will be answered, at least in part, well before 2065. And HSRC will continue to be an integral part of this ever-important goal of improving the safety of our roadways.

The pace of innovation has increased dramatically in recent years, as has consumer demand for technology. Vehicle manufacturers have subsequently accelerated their efforts to integrate more technology into their products. While safety features have long been a selling point for the vehicle industry, it is perhaps more prevalent than ever, particularly as it relates to collision avoidance.

In the past decade we have also seen global technology companies enter the field of surface transportation, with an eye on solving many of the safety and efficiency challenges that we face as a society and as a profession. Their entry into the field is, in part, responsible for the increased pace of innovation.

True success, though, will only be achieved in the years and decades ahead if we pair technology with a collaborative, multidisciplinary, systems approach to transportation safety issues. It's not just an engineering, planning or behavior issue. Public health, robotics and data science are just a few of the areas that have to be a part of the way forward. And new partnerships and collaborations must be built with governments, industry, researchers, public health workers and advocates working together toward improving transportation safety. Practitioners need tools and research-based guidance on how best to make improvements and impact change in their communities.

HSRC and our staff members are deeply committed to this noble goal, and we are pleased to be able to work every day with that target in mind.

Looking ahead, we are honored to have been selected to operate a National University Transportation Center, one of the five such centers funded by the U.S. Department of Transportation. We look forward to impacting real change in our nation



HSRC director David Harkey speaks at "The Next 50 Years in Highway Safety," a 2015 transportation symposium hosted by the Center.

over the next five years through this grant. It is an opportunity to explore new solutions to old problems, as well as address the unknown challenges that technology may bring.

Thanks to all our colleagues, staff, partners and sponsors for a great two years. Here's to a successful – and busy – 2017!

**DAVID HARKEY, DIRECTOR**





# OUR MISSION

The mission of HSRC is to improve the safety, sustainability and efficiency of all surface transportation modes through a balanced, interdisciplinary program of research, evaluation and information dissemination. We conduct our everyday work with that ideal at the forefront.

For more than 50 years, HSRC has helped shape the field of transportation safety as a leading research institution. We continued to grow experience and build expertise in 2015 and 2016.

## HSRC CONTRIBUTIONS AT A GLANCE

- On average, **50 staff members** worked on **70 HSRC projects and programs** every day.
- Released around **80 publications and presentations**, sharing insight on a variety of topics from distracted driver behavior research, to the costs for pedestrian and bicyclist infrastructure improvements.
- Generated more than **\$15 in revenue for every \$1** of support provided by the state of North Carolina.
- Delivered **47 training and workforce development courses**.
- Welcomed **more than 200 attendees** to the 50th anniversary symposium.
- Answered approximately **145 requests** for North Carolina crash information and other materials from transportation professionals and members of the media.







# CENTER HIGHLIGHTS

HSRC work focuses on issues that impact all road users – from motorists and motorcyclists to bicyclists and pedestrians. Our ongoing research ensures the most current information is available to decision makers in North Carolina and across the nation. The following items highlight a selection of HSRC project accomplishments during fiscal years FY2015 (July 1, 2014, to June 30, 2015) and FY2016 (July 1, 2015, to June 30, 2016).

This section of the annual report highlights some of those accomplishments in the following areas of research:

- **PEDESTRIAN AND BICYCLIST SAFETY**
- **CHANGING BEHAVIORS**
- **SHAPING THE FUTURE OF TRANSPORTATION SAFETY**
- **THE BUILT ENVIRONMENT**

# PEDESTRIAN AND BICYCLIST SAFETY

In 2015, 17 percent of the traffic fatalities in the U.S. were pedestrians or bicyclists. In 1999, HSRC established the federally funded Pedestrian and Bicycle Information Center (PBIC), a national clearinghouse on walking and bicycling. The PBIC works to create more pedestrian- and bicyclist-friendly communities by distributing information about health and safety, engineering, advocacy, education, enforcement, access and mobility.

It has been a busy two years for PBIC. Along with releasing a new "Design Resource Index" for selecting pedestrian and bicyclist facilities and a guide for improving pedestrian and bicyclist safety on university campuses, PBIC continued to offer free webinars ([youtube.com/pedbikeinfo](https://www.youtube.com/pedbikeinfo)).

PBIC continues to equip key stakeholders, from city planners to parents, with the tools and knowledge to improve walking and bicycling conditions in their individual communities. Resources, such as PEDSAFE and BIKESAFE ([pedbikesafe.org](https://pedbikesafe.org)), offer online,



The PBIC issued several white papers including one on high-visibility crosswalk marking styles like this one. ([pedbikeimages.org/Dan Burden](https://pedbikeimages.org/Dan_Burden))

interactive guidance using real-world examples to diagnose pedestrian- and bicyclist-related issues. PBIC also issued several white papers covering the following diverse

topics: high-visibility crosswalk marking styles; crowdsourcing pedestrian and bicyclist activity data; forecasting tools; pursuing equity in pedestrian and bicyclist planning; and improving connectivity during bridge rehabilitation.

In addition, PBIC collaborated with Toole Design Group to develop the "Bike Network Mapping Idea Book," a Federal Highway

Administration (FHWA) resource that shows a variety of bike network mapping strategies, techniques and approaches. The book was designed to serve as a resource for communities to identify, plan and improve their bicycle networks.

PBIC works to maintain the Walk Friendly Communities (WFC) program. WFC is a national recognition program developed to encourage towns and cities across the U.S. to establish or recommit to a high priority for supporting safer walking environments. The program continues to expand each year, and between 2015 and 2016, 13 new towns and cities were given the WFC designation. Each of these communities showed success in improving a wide range of conditions related to walking including safety, mobility, access and comfort. WFC is sponsored by FedEx and FHWA. For more information, visit [walkfriendly.org](http://walkfriendly.org).

Similar designation programs happened at the state level, as well. For example, Watch for Me NC, the N.C. Department of Transportation (NCDOT) statewide pedestrian and bicyclist safety campaign,

## NEW AND RE-DESIGNATED WALK FRIENDLY COMMUNITIES

Now in year five, the WFC program continues to see communities commit to creating safe and comfortable environments for walking. Expect to see more communities renew and earn WFC designations in the years ahead.

Congratulations to the following cities that were awarded or re-designated with Walk Friendly status between July 1, 2014, and June 30, 2016:

**Platinum Level:** Seattle, Wash.

**Gold Level:** Evanston, Ill.; Somerville, Mass.; Ann Arbor, Mich.; Arlington, Va.

**Silver Level:** Bellevue, Wash.; Sandpoint, Idaho; Lee's Summit, Mo.; Decatur, Ga.



**Bronze Level:** Portsmouth, Va.; Sisters, Ore.; Arcata, Calif.; Saratoga Springs, N.Y.; Springfield, Mo.; Columbia, S.C.; Sebastopol, Calif.; Charlotte, N.C.; Flagstaff, Ariz.; Wilsonville, Ore.





announced 12 new partners since 2014. These partner communities received printed materials and advertisements to help improve public awareness of pedestrian and bicyclist safety and also participated in specialized police officer enforcement training. HSRC continues to provide technical support for the program with campaign implementation. Watch for Me NC is a partner project between HSRC, the National Highway Traffic Safety Administration (NHTSA),

In 2016, the Galax Safe Routes to School Program (in Galax, Va.) was awarded the James L. Oberstar Safe Routes to School Award.

NCDOT and local police and transportation agencies. The project includes comprehensive education and enforcement campaigns aimed to reduce the number of pedestrians hit and injured in crashes with vehicles. For more information, visit [watchformenc.org](http://watchformenc.org).

In 2015, the National Center for Safe Routes to School, the clearinghouse for the federal Safe Routes to School (SRTS) program that is housed at HSRC, celebrated 10 years of the federal SRTS program. The National Center released the report "Creating Healthier Generations: A Look at 10 Years of the Federal Safe Routes to School Program" highlighting the accomplishments of the program over the past decade.

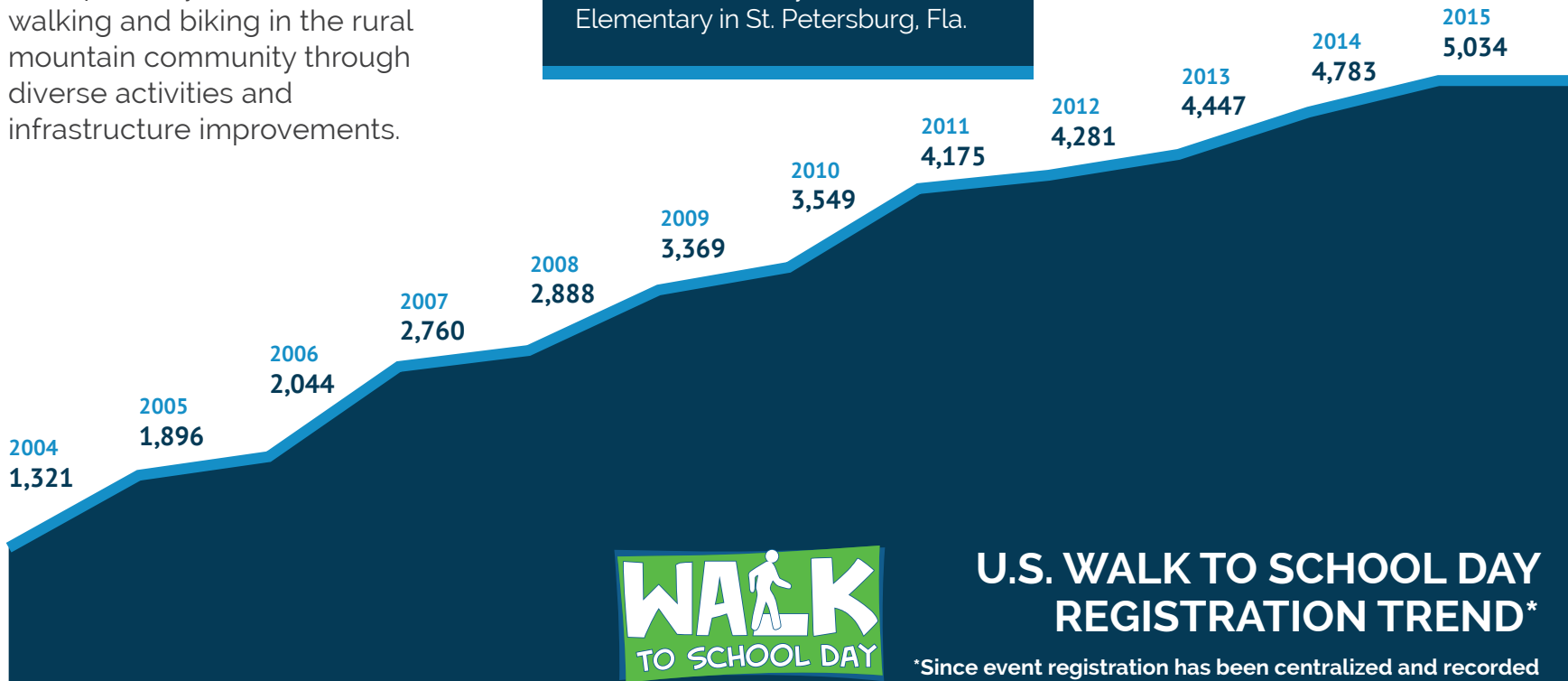
Since SRTS was established by Congress in 2005, over 19,000 schools teaching kindergarten through eighth grade in all 50 states and the District of Columbia have been a part of SRTS. The program has reached more than 6.8 million students nationwide, with underserved schools well represented, and has demonstrated safe transportation and health benefits of active travel for these students.

In both 2015 and 2016, the National Center not only celebrated a 10-year anniversary, but also set new participation records for the Center's annual Walk to School and Bike to School days through [walkbiketoschool.org](http://walkbiketoschool.org).

Also in 2016, the National Center awarded the Galax Safe Routes to School Program (in Galax, Va.) the James L. Oberstar Safe Routes to School Award. This award recognizes a program's outstanding achievement in implementing a Safe Routes to School program and was given in recognition of the 10-year anniversary of the federal Safe Routes to School Program. Galax's program has helped create safer pathways for students walking and biking in the rural mountain community through diverse activities and infrastructure improvements.



Walk to School Day 2015 at Maximo Elementary in St. Petersburg, Fla.



## U.S. WALK TO SCHOOL DAY REGISTRATION TREND\*

\*Since event registration has been centralized and recorded

# CHANGING BEHAVIORS

The safest choice for drivers is to remain alert and engaged while driving, but a host of other distractions and behaviors compete both inside and outside the vehicle to tempt drivers' focus away from the road ahead and the driving task.

Researchers at HSRC's Center for the Study of Young Drivers are working hard to identify and better understand the factors that contribute to risk and to develop strategies to help teens and parents better prepare for driving.

Most parents will tell you that waking up early is not easy for the typical 16- or 17-year-old. School administrators recognize that fact, too. Since research has suggested that lack of sleep impairs functioning, some school districts have pushed start times from 7:15 a.m. (or earlier) to a time more aligned with teen's biologically controlled sleep cycle. This has led to improved academic performance and behavior. But, given that drowsy driving is a problem for drivers of all ages including teens, HSRC



HSRC researchers are developing strategies to help teens and parents better prepare for driving.

researchers wondered: could this change in school start times also lead to fewer teen driver crashes?

HSRC researchers teamed up with the UNC Department of Statistics and Operations Research to examine crash data before and after high school start times were changed in Forsyth County, N.C. The research team conducted sophisticated time series analyses, examining monthly crash rate data among 16- and 17-year-old licensed drivers in

several large North Carolina counties. Research showed that there was a 14 percent decrease in overall crash rates among the 16- and 17-year-olds studied following the change in school start time, and peak crash times shifted by about an hour, as the time when teens were driving to and from school was delayed.

Another area of HSRC research covers motorcycle riding, which is an increasingly popular form of transportation in North Carolina and throughout the U.S. Between 2000 and 2013, motorcycle registrations per capita increased by more than 70 percent in the U.S. Not surprisingly, the number of motorcyclist crashes and fatalities during this period increased, as well. In response to these trends, HSRC has focused on understanding the causes of motorcycle crashes and ways to prevent them.

HSRC researchers recently conducted an extensive survey of 4,000 registered motorcycle and scooter owners in North Carolina. The purpose was to gauge how



important safety issues in the motorcycle riding community have changed since a 2004 HSRC motorcyclist survey. Periodically surveying a representative sample of the riding population is an important way to stay abreast of changes in the rider population, as well as riding conditions and rider behaviors that may influence injury risks.

Training is always a popular approach to improving transportation safety, but traditional rider training programs for motorcyclists have shown little

HSRC researchers conducted an extensive survey of 4,000 registered motorcycle and scooter owners in North Carolina.

benefit. This may be because training tends to focus only on very basic riding skills. HSRC researchers have been at the forefront on this issue, conducting evaluations of newer, more realistic and forward-looking rider training efforts. A multi-year evaluation of the Motorcycle Safety Foundation's revolutionary new multi-session rider training

program was conducted a few years ago. More recently, researchers began a multi-year effort to address a first-of-its-kind rider training program in North Carolina called "BikeSafe." The ongoing program is unique in that training takes place on the streets, rather than in parking lots. Riders are paired with motorcycle officers who observe them during lengthy rides, providing feedback and offering guidance on how riders can improve their riding techniques to enhance safety.

HSRC researchers are also preparing a comprehensive, state-of-the-art review of the research literature on motorcycle safety. In addition to summarizing existing knowledge about issues, such as rider education and training, impaired riding, effectiveness of wearing protective equipment and rider conspicuity, the review will document trends in licensing, motorcycle registrations and the changing rider population. The review will serve as a key resource for researchers, highway safety and public health professionals, rider instructors, policymakers and others working to develop motorcycle safety programs and policies.

# SHAPING THE FUTURE OF TRANSPORTATION SAFETY

Throughout HSRC's 50 years of existence, it has made a special effort to share expertise and research with communities, students, researchers and practitioners. By assisting with hundreds of requests for safety information and data per year, presenting at conferences, and publishing research findings in journals and other publications, HSRC staff continue to promote multi-disciplinary interest in highway safety.

HSRC's training and education arm, the Road Safety Academy (RSA), makes transportation safety education more accessible than ever before by offering both in-person and web-based trainings that cover a broad range of safety topics. In addition, HSRC's work includes coordinating dozens of free webinars each year for researchers and practitioners, and developing teaching modules for university courses being taught in engineering, planning and public health curriculums.



In spring 2016, RSA delivered the second installment of Road Safety 101, a free, in-depth study of the fundamentals of road safety. The objective of Road Safety 101 is to equip professionals who are relatively new to the road safety discipline with the knowledge to understand the elements of

2015 Megan Cornog Memorial Highway Safety Scholarship recipient Hallie Clark speaks to HSRC staff about her work.

successful road safety programs, as well as road safety data collection, analysis and evaluation. Learn more at [rsa.unc.edu](http://rsa.unc.edu).



The spring 2016 course consisted of weekly two-hour interactive online sessions, along with roughly one hour per week of independent work and assignments completed outside of class. HSRC researchers operated as the primary course instructors. They were joined by experts from outside organizations and guest speakers representing a variety of road safety perspectives, such as law enforcement, planning, advocacy and public health. In addition to lectures and guest speakers, the course was designed to be convenient and flexible and encourage participation via interactive discussions and student-to-student presentations.

HSRC continually works to support tomorrow's transportation safety professionals by awarding scholarships and research assistantships to deserving students and by integrating students into research work.

For example, HSRC's Megan Cornog Memorial Highway Safety Scholarship was created to foster the education and professional development of

## MEGAN CORNOG MEMORIAL HIGHWAY SAFETY SCHOLARSHIP RECIPIENTS

The 2015 scholarship winner was Hallie Clark. Clark is pursuing a master's degree in human factors and applied cognition at North Carolina State University. Her research interests include autonomous driving, attention and spatial cognition, human-computer interaction and interface design.

The 2016 scholarship winner was North Carolina State University student Yulin Deng. Yulin is pursuing a doctoral degree in Industrial and Systems Engineering. Her research interests include applying ergonomic knowledge to roadway and in-vehicle design for transportation safety improvement.

graduate students with an interest in transportation safety-related areas including engineering, driver behavior, planning, public health and environment.

The Patricia F. Waller Lecture is held annually in memory of Patricia F. Waller, a professor who worked for

nearly two decades as a researcher at HSRC, where she helped develop the concepts for graduated licensing that were later adopted nationwide. Dr. Waller was a pioneer in injury prevention research.

In 2015, the Waller Lecture, sponsored by HSRC, the UNC Injury Prevention Research Center and the UNC-Chapel Hill Department of Psychology, welcomed Eric Caine, M.D., a leading researcher in the field of risk factor for suicide and ways to prevent suicide.

Dr. Caine spoke about the necessity of considering how best to develop collective, community-based programs that deal with both individual and contextual factors that contribute to suicide. These programs are built upon an understanding of the social geography of communities, identifying where we can engage distinct populations and the social ecology of groups bearing specific risks.

# THE BUILT ENVIRONMENT

Transportation engineers and administrators are continually faced with making decisions about the design and operation of roadways. Informed decision-making requires an understanding of how the safety of the driver is affected by such things as the geometric design of the roadway, the features of the roadside and the use of traffic control devices. HSRC strives to assist in this process through sound analysis of these elements and by developing tools to help practitioners make the most of their safety improvement budgets.

In 2015, HSRC researchers developed a guide to help researchers and practitioners select the most appropriate infrastructure countermeasures to improve roadway safety. The "Synthesis of Countermeasure Service Life and Crash Severity Costs User Guide," sponsored by FHWA, helps transportation professionals identify a countermeasure's service life, the amount of time the countermeasure is expected to last before needing replacement, crash severity costs



HSRC helps practitioners incorporate safety into roadway design, operation and maintenance.

"Roundabout construction in Blaine" by Washington State Dept of Transportation (CC BY-NC-ND 2.0), [flic.kr/p/826zgC](https://www.flic.kr/p/826zgC)

and the economic impact of a crash based on its severity. This information assists in the economic decision-making process by allowing the roadway designer to

conduct a cost/benefit analysis for implementing a particular improvement over a given period.

Most states compile their own, separate information on service lives of countermeasures and crash severity costs that they use for economic appraisals. Some of this documentation is made publicly available on state DOT safety websites or published in the Highway Safety Improvement

## DEVELOPING AND MAINTAINING ROBUST DATA FOR RESEARCHERS

HSRC manages and operates the Highway Safety Information System (HSIS), a multi-state research database, for FHWA. It is the only national database that allows crash data to be linked to roadway inventory and traffic operations data, thus providing the capability to conduct robust risk analyses. Over the past two years, several new research questions and analyses have been conducted as a part of this project.

Program manuals, but never before has all available information for states been compiled in one place for all to access. As part of this synthesis project, HSRC researchers searched various sources for available resources, identified the relevant information and synthesized it in two databases: one for countermeasure service life and the other for crash severity costs. The data and a user's guide are available on the CMF Clearinghouse website, [cmfclearinghouse.org](http://cmfclearinghouse.org).

In addition to analysis efforts, HSRC researchers are constantly looking for ways to improve the data that are available for evaluation studies. In 2015, HSRC was tasked with determining how to use the roadway characteristics data that were collected as part of the Strategic Highway Research Program (SHRP2) to fill gaps that exist in many roadway data inventory databases – the location and characteristics of vertical curves in the roadway system.

The SHRP2 Roadway Inventory Database contains grade data (percentage incline or decline of the roadway) measured at approximately every 25 feet along a road. This information, along with numerous other data elements, were collected using an instrumented vehicle that drove the roadways. From this grade data, HSRC researchers employed a "sliding window" analysis to identify inflection points and extract the vertical curve information. The results were validated using a new linear correlation method that produces more accurate results for vertical alignment than the simple difference in average grades.

## CMF CLEARINGHOUSE

Crash modification factors (CMFs) help highway safety and traffic engineers, highway designers and transportation planners identify the most effective countermeasures, or changes to a roadway, that can be made to improve safety. The CMF Clearinghouse, a large data resource maintained by HSRC for FHWA, represents a unique type of data and an opportunity for transportation professionals to learn about potential safety impacts of decisions based on another state's or community's experience. It allows users to search a database for a CMF for a particular roadway treatment that best matches a location and scenario to determine the potential benefit of implementing that change. Find it at [cmfclearinghouse.org](http://cmfclearinghouse.org).

The screenshot shows the CMF Clearinghouse website. At the top, there is a navigation bar with the CMF logo and links for 'About the CMF Clearinghouse', 'Using CMFs', 'Developing CMFs', and 'Additional Resources'. Below the navigation bar is a search section with a 'Search for:' input field and a 'Search' button. To the right of the search section is a banner for 'Get training on applying CMFs' with a description of training opportunities. Below the search and training sections is a 'Recently Added CMFs' section with a table of entries.

Install by state	Install by state	Install by state
CMF: 0.77	CMF: 0.85	CMF: 0.76
CMF: 0.77	CMF: 0.85	CMF: 0.76
Crash type: vehicle/bicycle	Crash type: Other	Crash type: All
Crash severity: All	Crash severity: All	Crash severity: FATAL, SERIOUS, NON-FATAL INJURY

Researchers can now use this tool to identify vertical curve segments of a road where drivers may be more susceptible to risk.

The development of this vertical curve identification tool supported a larger goal. The second phase of the study combined these identified vertical curves with horizontal curve data and investigated driver behavior – particularly speed and lane deviation – on various combinations of alignment. Results showed that drivers navigating horizontal curves (i.e., curves on the road from left to right) have the worst performance in terms of lane deviation. In addition, the results showed that the sharper the curve, the higher the likelihood of lane deviation.

## AUBURN UNIVERSITY PH.D. STUDENT WINS FIRST HIGHWAY SAFETY DATA RESEARCH PAPER COMPETITION

Mahdi Pour-Rouholamin, Ph.D., won first place in the inaugural Highway Safety Information System (HSIS) Research Paper Competition for his paper "Analyzing the Severity of Motorcycle Crashes in North Carolina using HSIS Data."

The HSIS Research Paper Competition encourages university students to use HSIS data with the intent of introducing potential future highway safety professionals to quality safety data, the application of appropriate research methods to derive recommendations and the practice of using data to make decisions. The competition is jointly administered by FHWA and the Institute of Transportation Engineers (ITE).

For the winning paper, Pour-Rouholamin analyzed HSIS motorcycle crash data from 2009 to 2013 to identify opportunities to help reduce the severity of injuries associated with single-vehicle, single-rider motorcycle crashes in North Carolina. These opportunities included safety awareness



campaigns, educational efforts and efforts by law enforcement. Pour-Rouholamin accepted his award at the ITE 2016 Annual Meeting and Exhibit in Anaheim, Calif.

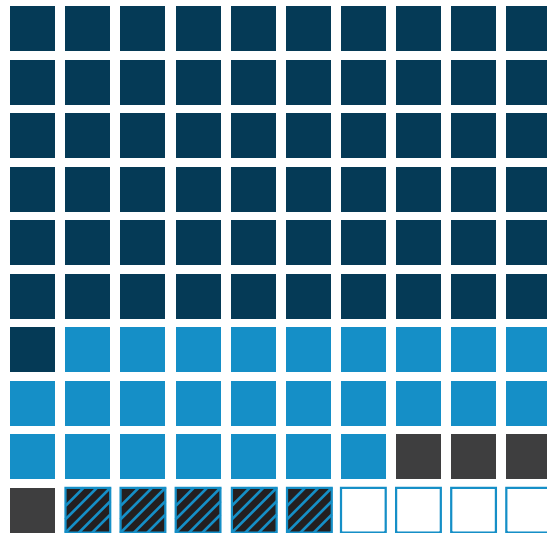
For more information on HSIS, visit [hsisinfo.org](http://hsisinfo.org).

# FINANCIAL REPORT

HSRC is a part of the UNC system, located on the UNC-Chapel Hill campus. Work is funded through state and national level project monies.

For each dollar appropriated to HSRC by the state of North Carolina in FY2016, HSRC staff generated \$15 in research and program funding. External revenues to support the mission of HSRC were received from contracts, grants, cooperative agreements and donations.

## FY2016 FUNDING SOURCES



HSRC is pleased to have the opportunity to work with a diverse group of government, non-government, corporate and foundation sponsors during the past several years, including:

## U.S. AND INTERNATIONAL GOVERNMENT SPONSORS

- American Association of State Highway and Transportation Officials
- British Columbia Ministry of Transportation
- California Department of Transportation
- Florida Department of Transportation
- Kansas Bureau of Traffic Safety
- Kansas Turnpike Authority
- Land Transport New Zealand/  
The Beca Group
- National Institutes of Health
  - National Institute of Child Health and Human Development
  - National Institute on Alcohol Abuse and Alcoholism
- New York City Department of Transportation
- North Carolina Department of Health and Human Services
- North Carolina Department of Transportation
- North Carolina Governor's Highway Safety Program
- Traffic Injury Research Foundation of Canada
- Transportation Research Board of The National Academies
  - National Cooperative Highway Research Program
- University of North Carolina at Chapel Hill
- U.S. Centers for Disease Control and Prevention
- U.S. Department of Transportation
  - Federal Highway Administration
  - National Highway Traffic Safety Administration
  - Research and Innovative Technology Administration
- U.S. Environmental Protection Agency
- Volpe National Transportation Systems Center
- Wisconsin Department of Transportation

## CORPORATE AND FOUNDATION SPONSORS

- AAA Foundation for Traffic Safety
- AAA Kansas
- FedEx Corporation
- FIA Foundation
- General Motors
- Insurance Institute for Highway Safety
- John Rex Endowment
- Motorcycle Safety Foundation
- National Safety Council
- Robert Wood Johnson Foundation
- Safe Kids Worldwide
- Schwinn
- Society for the Advancement of Violence and Injury Research
- State Farm Insurance Company



1965

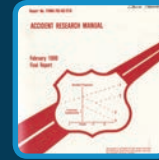
1970

1975

1980

1985

19



### 1965

At the recommendation of Gov. Dan K. Moore, the North Carolina General Assembly establishes a highway safety research center.

### 1966

HSRC begins operations at UNC-CH. Under the direction of Dr. B.J. Campbell, HSRC focuses on providing useful highway safety information based on sound research.

### 1968

HSRC conducts the first-ever scientifically based brand comparison of automobiles showing the variation in injury to unbelted drivers in crashes.

### 1973

Center researchers formulate the conception of graduated driver licensing, a three-stage system designed to improve novice driver learning through practical experience.

### 1974

An HSRC study shows increased crash rates among younger school bus drivers. As a result of HSRC research, N.C. school districts increase the minimum legal bus driver age to 16-and-a-half.

### 1980

HSRC develops the Accident Research Manual, a compilation of sound research techniques to help engineers and analysts conduct crash-based evaluations.

### 1981

The Center's research demonstrates the benefits of child restraints and safety belts in crashes. N.C. lawmakers rely heavily on HSRC data while formulating the child passenger safety law (passed in 1981) and the seat belt law (passed in 1985).

### 1987

HSRC develops the concept for FHWA's Highway Safety Information System, which provides crash, roadway and traffic data to researchers.



**1993**

HSRC helps spearhead "Click It or Ticket," the high visibility enforcement program for increasing seatbelt use in North Carolina.

**1997**

North Carolina General Assembly enacts the Graduated Driver Licensing system developed by HSRC to address the extraordinarily high crash rate of young novice drivers.

**1999**

The Center conducts the first survey to directly measure college student drinking using portable breath-testers.

**2001**

HSRC evaluates the initial effects of Graduated Driver Licensing, finding a substantial decline in 16-year-old driver crashes.

**2003**

"Click It or Ticket" is adopted nationally as the model for increasing seat belt use.

**2003**

Center researchers conduct some of the first studies to use in-vehicle technology to collect naturalistic data, observing supervised driving and distraction among drivers.

**2005**

The Center for the Study of Young Drivers is established within HSRC with a focus on better understanding the factors that contribute to the high crash rate among young drivers.

**2005**

Federal legislation creates the National Safe Routes to School program, which is housed at HSRC, to encourage families to walk or bike to school and to improve safety.

**2006**

HSRC launches an annual scholarship program to foster the education and development of future transportation safety professionals.

**2009**

HSRC works with FHWA to launch the CMF Clearinghouse, which helps transportation safety professionals identify the most appropriate countermeasure to address a safety issue.

**2011**

HSRC partners with FedEx to launch Walk Friendly Communities, a national recognition program to encourage towns and cities across the U.S. to establish or recommit to supporting safer walking environments.

**2012**

The first-ever national Bike to School Day is created and launched by HSRC to encourage children to safely bicycle (or walk) to school.

**2015**

HSRC researchers deliver Road Safety 101, a training course designed to equip professionals who are relatively new to the field with the knowledge to understand the elements of successful road safety programs.

# A solid foundation in safety, research and innovation

**F**or more than 50 years, HSRC has helped shape the field of transportation safety by conducting research, developing interventions and programs, training road safety professionals and serving as a resource of safety information to practitioners, policymakers and the general public.

The idea of HSRC began to take root in 1964 thanks to the ceaseless efforts and pioneering foresight of the governor of North Carolina. Gov. Dan K. Moore was keenly aware of an alarming trend: deaths on N.C. roads had increased by 25 percent and injuries had increased by 42 percent in just four years.

Gov. Moore presented four primary goals to improve highway safety including making greater use of modern knowledge and existing research to address the complex problems of highway safety. In 1965, the N.C. General Assembly responded to the request of the governor and established HSRC through a legislative act.

More than five decades later, the interdisciplinary researchers and staff of HSRC continue to work on strategies and interventions to save lives and reduce injuries on our roadways in N.C., throughout the U.S. and across the globe. The Center is known for applying rigorous methodologies to the evaluation of road safety programs, implementing innovative data collection strategies to support research studies and fostering valuable partnerships with public and private agencies.

Most recently, HSRC has studied the topics of pedestrian safety, motorcycle and bicyclist safety, younger driver issues and the benefits of walking and bicycling. With regard to the design of roadways, HSRC has studied geometric features; traffic operations and control; and roadside design to assess safety impacts and develop improved policies and guidance. HSRC's work has also centered on using and enhancing national, state and local crash and roadway inventory data systems, which is key to much of the analysis conducted at the Center.

On average, HSRC is actively engaged in approximately 70 projects, with funding from a variety of sources including the U.S. DOT, state departments of transportation and many private organizations and institutions.





Current HSRC Director David Harkey presents the Order of the Long Leaf Pine to the family of Founding HSRC Director Dr. B.J. Campbell (who was not able to attend) at the 50th anniversary safety symposium. This award is given for exemplary service to the state of North Carolina and the community that is above and beyond the call of duty.

## LOOKING FORWARD TO THE NEXT 50 YEARS

As we look to the future and consider what role HSRC may have in making a difference in roadway safety, we are ready for the opportunities and challenges of the years ahead.

The transportation industry continues the trend of evolving quickly with the rapid pace of innovation and consumer demand for new technologies. Vehicle manufactures have accelerated their efforts to integrate more

technology into their products, and this progress over the next decade will impact our transportation system unlike anything we have ever seen.

As a research center whose primary mission is safety, HSRC stands at the ready to evaluate the impact of the latest technologies – like automated and connected vehicles – on human behavior. Always incorporating sound research practices, HSRC operates with alacrity to make

assessments about the potential for saving lives and reducing injuries; to determine what changes in policy will be necessary to support these rapid changes; and to communicate findings and recommendations to decision makers, the general public and the media.

HSRC will continue to play a vital role in the evolving world of transportation technology and continue to work to create safer, more efficient transportation systems.

## THE NEXT 50 YEARS IN HIGHWAY SAFETY: CONNECTING PEOPLE AND TECHNOLOGIES

HSRC marked its 50th year with a highway safety symposium that drew more than 200 of HSRC's colleagues, partners and peers to Chapel Hill on November 10, 2015. The symposium, titled "The Next 50 Years in Highway Safety: Connecting People and Technologies," sparked rich conversations about connected

and autonomous technologies, vehicle infrastructure, policy and regulatory challenges and human behavior during each of the symposium's morning, keynote and afternoon sessions.

The Center also took time to celebrate its past. The luncheon program honored two people who were an important part of HSRC from the very beginning: former Gov. Dan K. Moore, who helped establish HSRC, and founding director Dr. BJ Campbell.

The U.S. Congressional Record recognizes the 50th anniversary of HSRC.





The HSRC family – including current and retired staff – gathers in July 2016 at The Pit in Durham to celebrate 50 years of HSRC.







# RESEARCHERS AND STAFF

# RESEARCHERS AND STAFF

Our researchers and staff are the foundation of HSRC. It is through their creativity, passion, energy and expertise that the Center has been able to achieve its successes these past two years. This listing includes current, former and retired staff who were employed by HSRC during fiscal years FY2015 (July 1, 2014, to June 30, 2015) and FY2016 (July 1, 2015, to June 30, 2016).

## BUSINESS SERVICES

Matthew Glassman  
**Technical Support Analyst**

Daniel Harper  
**Contract Specialist**  
20 years of NC service (2016)

Dianne Harrington  
**Business Manager**

Harvey Hou  
**Information Technology Systems Manager**

Ann Hume  
**Accounting Technician**

Latisha Johnson, M.S.  
**HR Consultant**

Jean Justice  
**Administrative Support**

Paulette McKoy  
**Senior Contracts Specialist**

## IN REMEMBRANCE

In 2015, the HSRC family lost a dear colleague, Harvey Hou. Harvey has been a friend of many HSRC staff and a long-time HSRC team member. In late 2012, Harvey was diagnosed with an advanced stage of cancer, which he valiantly battled for more than two years. Harvey served as manager of Information Technology Systems at HSRC for more than 15 years. Away from the Center, Harvey was a loving husband, father, son, brother, uncle and friend.



Jeana Nickerson  
**Business Officer**  
Retired August 2014

Linette Tyson  
**Human Resources Manager and  
Executive Administrative Assistant**

## RESEARCH PROGRAMS

Kristen Brookshire, M.C.R.P.  
**Research Associate**

Daniel Carter, M.S.C.E., P.E.  
**Senior Engineering Research Associate**



Forrest Council, Ph.D.  
**Senior Research Scientist**

Rob Foss, Ph.D.  
**Senior Research Scientist and Director,  
 Center for the Study of Young Drivers**

James Gallagher, M.A.  
**Communications Manager,  
 Pedestrian and Bicycling Programs**

Dan Gelinne  
**Project Coordinator**  
 5 years of NC service\* (2016)

Christine Gomola Mullin, M.S.  
**Embedded Research Librarian**

Arthur Goodwin, M.A.  
**Senior Research Associate**

Bill Hall, M.A.  
**Manager, Occupant Protection Program**

David Harkey, Ph.D., P.E.  
**Director**

Stephanie Harrell, M.A.  
**Project Coordinator**  
 5 years of NC service\* (2015)

Congressman David Price meets with staff in 2016 while visiting HSRC to present a copy of the Congressional Record recognizing the Center's 50th anniversary.

Patty Harrison, M.A.  
**Communications Coordinator**

Bevan Kirley, M.S.  
**Research Associate**  
 5 years of NC service\* (2016)

\* All years of service at HSRC

Seth LaJeunesse, M.C.R.P.  
**Research Associate and Assistant Director,  
National Center for Safe Routes to School**  
5 years of NC service\* (2016)

Bo Lan, Ph.D.  
**Research Associate**

Daniel Levitt  
**Research Associate**  
5 years of NC service\* (2016)

Richard Lytle  
**Web Applications Programmer**

Lauren Marchetti  
**Director, National Center for  
Safe Routes to School**  
Retired January 2016

Carol Martell  
**Senior Applications Specialist**  
Retired October 2014

Caroline Mozingo  
**Senior Manager of Communications,  
Education and Outreach**  
5 years of NC service\* (2016)

Krista Nordback, Ph.D., P.E.  
**Senior Research Associate**

Natalie O'Brien, M.S.  
**Research Associate**

Colleen Oliver  
**Communications Manager,  
Safe Routes to School Programs**

## ADVISORY BOARD

The HSRC Advisory Board serves to assist in the identification of strategies and program direction for the Center. It is comprised of distinguished professionals from both within and outside the field of transportation research.

**Herb Garrison, M.D., M.P.H.**  
Advisory Board Chairperson  
Director, Eastern Carolina  
Injury Prevention Program, Greenville

**Alice Ammerman, DrPH, RD**  
Director, Center for Health Promotion &  
Disease Prevention, UNC-Chapel Hill

**Jo Anne Earp, ScD†**  
Professor, Health Behavior/  
Health Education, UNC-Chapel Hill

**Dr. Kelly Evenson‡**  
Research Professor, Department of  
Epidemiology, UNC-Chapel Hill

**Colonel William J. Grey††**  
North Carolina Highway Patrol

**Edd Hauser, Ph.D., M.R.P., P.E.**  
Director, Transportation Policy Studies,  
UNC-Charlotte

**Stephen W. Marshall, Ph.D.**  
Director, Injury Prevention Research  
Center, UNC-Chapel Hill

**Richard F. Pain, Ph.D.**  
Transportation Research Board (ret.)

**Nagui Roupail, Ph.D.††**  
Director, Institute for Transportation  
Research & Education,  
N.C. State University

**John F. Sullivan III, P.E.**  
Division Administrator,  
Federal Highway Administration

† FY2015 final year of service †† FY2016 final year of service ‡ As of March 2016

Nancy Pullen-Seufert, M.P.H.  
**Senior Research Associate and Director,  
National Center for Safe Routes to School**

Kristel Robison, M.S.W.  
**Research Associate**

Eric Rodgman, M.P.H.  
**Senior Database Analyst**

Graham Russell  
**Graphic Designer**



Laura Sandt, Ph.D., M.R.P.  
**Senior Research Associate and Director,  
Pedestrian and Bicycle Information Center**

Sarah Smith  
**Engineering Research Associate**  
**5 years of NC service\* (2016)**

Raghavan Srinivasan, Ph.D.  
**Senior Transportation Research Engineer**

Carl Sundstrom, M.S.C.E., P.E.  
**Senior Research Associate**

Donna Suttles  
**Research Assistant**

Libby Thomas, M.S.  
**Senior Research Associate**  
**15 years of NC service\* (2015)**

Jonathon Weisenfeld  
**Design Services Manager**

Carolyn Williams, M.B.A  
**Senior Applications Specialist**

Charles Zegeer, M.S.C.E., P.E.  
**Associate Director for Engineering and  
Planning and Director, Pedestrian and  
Bicycle Information Center**  
**Retired June 2016**

**\* All years of service at HSRC**

## STAFF MILESTONES

**Forrest Council,** HSRC senior research scientist and former director, was presented with the 2014 Roy W. Crum Distinguished Service Award. The award rewards "outstanding achievement in the performance of



distinguished service; the production of fundamental or developmental research; or the administration, promotion, or fostering of outstanding research." Dr. Council was recognized for his long-term efforts to enhance highway safety research methodologies including his role in the development and implementation of FHWA's Accident Research Manual and Highway Safety Information System.

**Laura Sandt,** HSRC senior research associate and Pedestrian and Bicycle Safety Information Center director, earned her Ph.D. in 2015. Sandt's dissertation had two parts: In the first aim, Sandt examined North Carolina police-reported pedestrian crash records to emergency room visits and death certificate records for the same time period and drew comparisons about the three datasets and their utility in better understanding pedestrian crash trends. In the second aim, she



conducted an evaluation of the effectiveness of the Watch for Me NC pedestrian and bicyclist education and enforcement program in improving driver compliance with yielding laws, using a before-after study design with a comparison group. The overall goal was to better understand what data sources can be used for pedestrian injury surveillance and the potential impact of population-level interventions, such as Watch for Me NC. Sandt's work led to two published papers, another one in review, and an award from the American Public Health Association (the Injury Control and Emergency Health Services Student Oral Presentation Award).

# PUBLICATIONS AND PRESENTATIONS

This listing includes publications and presentations covering a wide variety of highway safety topics, many of which overlap. The works were produced by HSRC staff during fiscal years FY2015 (July 1, 2014 to June 30, 2015) and FY2016 (July 1, 2015 to June 30, 2016).

## CHANGING BEHAVIORS

### FY2016

Decina, L. E., Will, K. E., Maple, E. L., Perkins, A. M., Kirley, B., & Mastromatto, T. (2016, February). *Effectiveness of child passenger safety information for the safe transportation of children*. (Report No. DOT HS 812 245). Washington, DC: National Highway Traffic Safety Administration.

Foss, R.D., Smith, R.L., Shi, F., & O'Brien, N.P. (2015). *School start times and teenage driver motor vehicle crashes*. (Report No: DOT HS 812 221). Washington, DC: National Highway Traffic Safety Administration.

Foss, R.D., & Williams, A.F. (2015). Adolescent drivers: Fine-tuning our understanding. *Journal of Adolescent Health, 57*(1), S1-S5.

Goodwin, A.H., L. Thomas, L., B. Kirley, W. Hall, N.P. O'Brien, & K. Hill (2015, November). *Countermeasures that work: A highway safety countermeasure guide for state highway safety offices*, Eighth edition. (Report No. DOT HS 812 202). Washington, DC: National Highway Traffic Safety Administration.

McDonald, C.C., Goodwin, A.H., Pradhan, A.K., Romoser, M.R.E., & Williams, A.F. (2015). A review of hazard anticipation training programs for young drivers. *Journal of Adolescent Health, 57*, S15-S23.

Sandt, L., Marshall, S.W., Rodriguez, D., Evenson, K., Ennett, S.T., & Robinson, W. (2016, August). Effect of a community-based pedestrian injury prevention program on driver yielding behavior at marked crosswalks. *Accident Analysis and Prevention*, pp. 169-178. doi: 10.1016/j.aap.2016.05.004.

Bingham, C.R., & Foss, R.D. (2016, January). *Measurement Issues in Self-Report Data: Perils and Practicalities*. Workshop on Measurement in Teen Driver Research, 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Foss, R.D. (2016, January). *How do novices learn to drive safely?* Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Foss, R.D. (2016, May). *Reducing Motor Vehicle Crashes, Deaths & Injuries Involving Young Drivers*. Webinar sponsored by Ohio Conference of AAA Clubs.

Foss, R.D. (2016, May). *Impaired Driving, Distraction, Alcohol and Drugs*. Invited presentation to 12th Annual North Carolina Substance Abuse Prevention Conference, Raleigh, NC.

Foss, R.D. (2016, April). *What and How Novice Drivers Learn: Some implications*

*for Driver Education Now and in the Future*. Invited Plenary Talk, North Carolina Driver and Traffic Safety Education Association (NCDTSEA) Annual Meeting, Clemmons, NC.

Foss, R.D. (2016, January). *Measurement Issues in using Archival Data: The Agony & the Ecstasy*. Workshop on Measurement in Teen Driver Research, 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Foss, R.D. (2016, January). *How do novices learn to drive safely?* Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Foss, R.D., & Goodwin, A.H. (2015, September). *What Every Parent Needs to Know About Supervising a New Teen Driver*. UNC Injury Prevention Research Seminar, Chapel Hill, NC.

Foss, R.D. (2015, August). *Distracted Driving is Complicated!* Invited plenary panel presentation at North Carolina Annual Highway Safety Symposium, Concord, NC.

Kirley, B., & Robison, K. (2016, May). *Online Resources for Child Passenger Safety*. Presented at BuckleUpNC Conference.

LaJeunesse, S. (2016, January). *TRB committee input - Pedestrians (ANF 10) to the Emphasizing human factors in highway*

safety: *Recognizing road user needs to reduce crashes session*. Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Sandt, L. (2015, November). *Evaluation of a community-based intervention to prevent pedestrian injury*. Presented to the American Public Health Association Conference, Chicago, IL. Winner of the APHA Injury Control and Emergency Health Services Student Oral Presentation Award.

Sandt, L., & Gallagher, J. (2015, October). *Watch for Me NC: Lessons from a statewide pedestrian and bicycle safety program*. Presented to the National Walking Summit, Washington, DC.

Sandt, L., & Marshall, S. (2016, January). *Effect of a community-based pedestrian injury prevention program on driver yielding behavior at marked crosswalks*. Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Srinivasan, R., Carter, D., & Lan, B. (2016, March). *Use of data from the SHRP2 naturalistic driving study to investigate driver performance in different horizontal and vertical curve combinations*. Presented to the 2016 UTC Conference for the Southeastern Region, Knoxville, TN.

## FY2015

Foss, R.D. (2014, November). *Driving after drinking: Problem, prevalence & prevention*. Invited presentation to the UNC School of Government DWI Training for Magistrates, Chapel Hill, NC.

Foss, R.D. (2014, October). *Teen driver crashes: Can you help?* Keynote address to Students Against Violence Everywhere Statewide Conference: Teen Safe Driving: Reckless or Wreckless?, Raleigh, NC.

Foss, R.D. (2014, October). *Using national licensing data to measure teen driver exposure: Proceed with caution!* Presented to the 40th International Forum on Traffic Records & Highway Information Systems, St. Louis, MO.

Foss, R.D. (2014, September). *What and how novice drivers learn: Implications for GDL now and driver education in the future*. Invited presentation to the Governors Highway Safety Association Annual Meeting, Grand Rapids, MI.

Foss, R.D. (2015, February). *Where have all the teen drivers gone: Problems with driver license data in North Carolina and beyond*. Presented to the North Carolina Traffic Records Coordinating Committee, Raleigh, NC.

Foss, R.D. (2015, January). *Is graduated driver licensing needed for older novice drivers in the United States? Existing evidence and burning research questions!* Presented to the 94th Annual Meeting of the Transportation Research Board, Human Factors Workshop, Washington, DC.

Foss, R.D. (2015, January). *Learning to drive after a year of supervised driving*. Presented to the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

Foss, R.D. (2015, March). *Are teen drivers really that bad?* Presented to the 2015 North Carolina BuckleUpNC Conference, Raleigh, NC.

Foss, R.D. (2015, March). *Planning for success: What makes an effective teen*

*driver program?* Presented to the 2015 North Carolina BuckleUpNC Conference, Raleigh, NC.

Foss, R.D. (2015, March). *The next big leap in teen driver safety: Helping novices know how to do what we do without knowing*. Distinguished Faculty Seminar, University of Michigan, Ann Arbor, MI.

Goodwin, A.H., Foss, R. D., Margolis, L. H., & Harrell, S. (2014). Parent comments and instruction during the first four months of supervised driving: An opportunity missed? *Accident Analysis & Prevention*, 69, 15-22. doi:10.1016/j.aap.2014.02.015.

Goodwin, A.H. (2015, January). *Review of hazard recognition training programs for young drivers*. Presented to the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

Goodwin, A.H. (2015, March). *Three things parents should do when supervising a teen driver*. Presented to the North Carolina Teen Driver Safety Symposium, Raleigh, NC.

Goodwin, A.H. (2015, May). *Risks for newly licensed teen drivers*. Presented to the North Carolina Professional Driving Schools Association, Greensboro, NC.

O'Brien, N.P., & Kirley, B. (2015, May). *Overview of teen driver safety in North Carolina and suggestions for effective programs*. Presented to the North Carolina Safe Kids Conference, Concord, NC.

Sandt, L. (2015, January). *Pedestrian and driver behavior influences on pedestrian safety*. Presided over session at the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

# PEDESTRIAN AND BICYCLIST SAFETY

## FY2016

Brookshire, K., L. Sandt, C. Sundstrom, L. Thomas, & R. Blomberg. (2016). *Advancing pedestrian and bicyclist safety: A primer for highway safety professionals*. (Report No. DOT HS 812 258). Washington, DC: National Highway Traffic Safety Administration.

Gelinne, D., Penn, J., & Thomas, L. (2015). *Case studies in delivering safe, comfortable, and connected pedestrian and bicycle networks*. Washington, DC: Federal Highway Administration.

LaJeunesse, S., Pullen-Seufert, N., & Marchetti, L. (2015). *Active Routes to School project evaluation baseline results*. Raleigh, NC: Community and Clinical Connections for Prevention and Health, NC Division of Public Health.

Rosenblatt, B., Flynn, M., and Sundstrom, C. (2015). Separated bike lanes go mainstream: With a planning and design guide published by USDOT, transportation engineers can move full steam ahead on new street designs. *ITE Journal*, 85(10), 39-45.

Rothenberg, H., Goodman, D., & Sundstrom, C. (2016, January). *Separated bike lane crash analysis*. Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Sandt, L., Marshall, S., & Ennett, S. (2015). Developmental framework and process evaluation of a community-based pedestrian and bicycle safety program. *Transportation Research Record* 2519, 51-60.

Sandt, L., Combs, T., & Cohn, J. (2016, April). *Pursuing Equity in Pedestrian and Bicycle Planning*. Federal Highway Administration, Washington, DC.

Sandt, L., Marshall, S.W., Rodriguez, D., Evenson, K., Ennett, S.T., & Robinson, W. (2016, August). Effect of a community-based pedestrian injury prevention program on driver yielding behavior at marked crosswalks. *Accident Analysis and Prevention*. pp. 169-178. doi: 10.1016/j.aap.2016.05.004.

Semler, C., A. Vest, K. Kingsley, S. Mah, W. Kittelson, C. Sundstrom, & K. Brookshire. (2016). *Guidebook for developing pedestrian and bicycle performance measures*. (Report No. FWA-HEP-16-037). Washington, DC: Federal Highway Administration.

Thomas, L., Ryus, P., Semler, C., Thirsk, N.J., Krizek, K., & Zegeer, C. (2015, May). *Delivering safe, comfortable, and connected pedestrian and bicycle networks: A review of international practices*. (Report No. FHWA-15-051). Washington, DC: Federal Highway Administration.

Thomas, L., Thirsk, N.J. & Zegeer, C.V. (2015). *Application of pedestrian crossing treatments for streets and highways*. National Cooperative Highway Research Program, Washington, DC. Transportation Research Board.

## FY2015

Carter, D., & Barlow, J. (2014). *Guidelines for accessible pedestrian signals*. National Cooperative Highway Research Program Project 3-62, Phase III, Final Report.

LaJeunesse, S., Pullen-Seufert, N., & Marchetti, L. (2015). *Active Routes to School project evaluation baseline results*. Raleigh, NC: Community and Clinical Connections for Prevention and Health, NC Division of Public Health.

LaJeunesse, S., Srinivasan, R., Marchetti, L., & Pullen-Seufert, N. (2015). *Trends in walking and bicycling to school from 2007 to 2013*. Washington, DC: Federal Highway Administration.

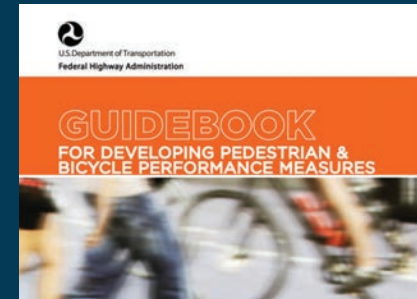
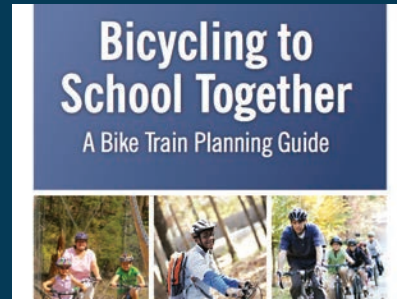
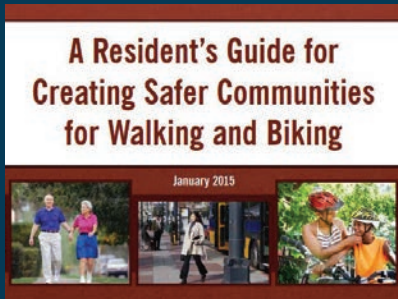
Lambert, D., Marchetti, L., & Oliver, C. (2015). *Bicycling to school together, a bike train planning guide*. Developed as part of the National Center for Safe Route to School and Schwinn's Helmets on Heads partnership.

McDonald, N., McGrane, A., Rodgman, E., Steiner, R., Palmer, W., & Lytle, B. (2015). Assessing multimodal school travel safety in North Carolina. *Accident Analysis & Prevention*, 74, 126-132.

Pullen-Seufert, N., & Oliver, C. (2014). *How to plan a Walk to School Day event*. Produced for the Active Routes to School project and adapted for national use.

Sandt, L., LaJeunesse, S., Cohn, J., Pullen-Seufert, N., & Gallagher, J. (2015). *Bicycle and pedestrian safety, education, and enforcement campaign: 2014 Watch for Me NC program summary*. (NCDOT Report No. 201445). Raleigh, NC: North Carolina Department of Transportation.

Sandt, L., Thomas, L., Langford, K., & Nabors, D. (2015). *A resident's guide for creating safer communities for walking and biking*.



- (FHWA-SA-14-099). Washington, DC: Federal Highway Administration.
- Sandt, L., LaJeunesse, S., Cohn, J., Pullen-Seufert, N., & Gallagher, J. (2015, February). *Bicycle and pedestrian safety, education, and enforcement campaign: 2014 Program Summary*. Watch for Me NC. (NCDOT Contract #201445). Raleigh, NC: North Carolina Department of Transportation.
- Sandt, L., Marshall, S., & Ennett, S. (2015). *Community-based pedestrian and bicycle safety program: Developmental framework and process evaluation*. Transportation Research Record, 2519 (51-60). doi: 10.3141/2519-06.
- Thomas, L., Ryus, R., Semler, C., Thirsk, N.J., Krizek, K., & Zegeer, C. (2015). *Delivering safe, comfortable, and connected pedestrian and bicycle networks: A review of international practices* (Report No. FHWA-15-051). Washington, DC: Federal Highway Administration.
- Gelinne, D., Sundstrom, C., & Langford, K. (2015, June). *Step up! Walk Friendly Communities*. Invited presentation to the Mid-America Regional Council, Kansas City, MO.
- LaJeunesse, S. (2014, September). *The power of diffusion can amp up walking and bicycling: How it's already working*. Presented to the 18th Biennial Pro Walk, Pro Bike, Pro Place Conference, Pittsburgh, PA.
- Pullen-Seufert, N. (2015, February). *The status of walking and bicycling to school in NC*. Presented to the Community Connections Group, Advocates for Health in Action, Raleigh, NC.
- Pullen-Seufert, N. (2015, January). *SRTS John Rex Endowment Grant Award*. Presented to the Wake County School District School Health Advisory Council, Raleigh, NC.
- Pullen-Seufert, N. (2015, March). *Three reasons to support Bike to School Day and four ways to do it*. Presented as part of the Healthy Eating, Active Living webinar, NC Division Public Health, Raleigh, NC.
- Pullen-Seufert, N., & LaJeunesse, S. (2015, April). *Safe Routes to School workshop*. Thomasville, NC.
- Pullen-Seufert, N., LaJeunesse, S., & Marchetti, L. (2014, November). *Safe Routes to School workshop*, Tarboro, NC.
- Sandt, L. (2015, February). *A resident's guide for creating safer communities for walking and biking*. Presented to Pedestrian and Bicycle Information Center webinar, Chapel Hill, NC.
- Sandt, L. (2015, January). *Pedestrian and driver behavior influences on pedestrian safety*. Presided over session at the 94th Annual Meeting of the Transportation Research Board, Washington, DC.
- Sandt, L. (2015, January). *Watch for Me NC pedestrian and bicycle safety program: Developmental framework and process evaluation*. Presented to the 94th Annual Meeting of the Transportation Research Board, Washington, DC.
- Sandt, L. (2015, March). *Performance measures matter: Tips and techniques for collecting and leveraging bike/pedestrian data*. Presented to the Lifesavers Conference, Chicago, IL.
- Sundstrom, C., & Langford, K. (2015, April). *Best practices in separated bike lanes*. Presented to the American Planning Association National Planning Conference, Seattle, WA.
- Sundstrom, C., & Langford, K. (2015, April). *Seattle: Building a Walk Friendly Community*. Presented to the American Planning Association National Planning Conference, Seattle, WA.

# THE BUILT ENVIRONMENT

## FY2016

Gelinne, D., Penn, J., & Thomas, L. (2015).

*Case Studies in delivering safe, comfortable, and connected pedestrian and bicycle networks.* Washington, DC: Federal Highway Administration.

Rosenblatt, B., Flynn, M., and Sundstrom, C. (2015). Separated bike lanes go mainstream: With a planning and design guide published by USDOT, transportation engineers can move full steam ahead on new street designs. *ITE Journal*, 85(10), 39-45.

Smith, S. (2015). *Synthesis of countermeasure service life and crash severity costs user guide.* Washington, DC: Federal Highway Administration.

Srinivasan, R., Colety, M., Bahar, G., Crowther, B., & Farmen, M. (2016). Estimation of calibration functions for predicting crashes on rural two lane roads in Arizona. *Transportation Research Record: Journal of the Transportation Research Board*, No. 2583, 17-24. doi: 10.3141/2583-03.

Thomas, L., Ryus, P., Semler, C., Thirsk, N.J., Krizek, K., & Zegeer, C. (2015, May). *Delivering safe, comfortable, and connected pedestrian and bicycle networks: A review of international practices.* (Report No. FHWA-15-051). Washington, DC: Federal Highway Administration.

Thomas, L., Thirsk, N.J., & Zegeer, C.V. (2015). *Application of pedestrian crossing*

*treatments for streets and highways.* National Cooperative Highway Research Program, Washington DC. Transportation Research Board.

Carter, D., & Srinivasan, R. (2016, January). *The hills are alive: Identifying vertical curves using Strategic Highway Research Program roadway data.* Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Hummer, J., Cunningham, C., Srinivasan, R., Warchol, S., Claros, B., Edara, P., & Sun, C. (2016, January). *Safety evaluation of seven of the earliest diverging diamond interchanges installed in the US.* Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Rothenberg, H., Goodman, D., & Sundstrom, C. (2016, January). *Separated bike lane crash analysis.* Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

Srinivasan, R., Carter, D., & Lan, B. (2016, March). *Use of data from the SHRP2 naturalistic driving study to investigate driver performance in different horizontal and vertical curve combinations.* Presented to the 2016 UTC Conference for the Southeastern Region, Knoxville, TN.

Srinivasan, R., Colety, M., Bahar, G., Crowther, B., & Farmen, M. (2016, January). *Estimation of calibration functions for predicting crashes on rural two lane roads in Arizona.* Presented to the 95th Annual Meeting of the Transportation Research Board, Washington, DC.

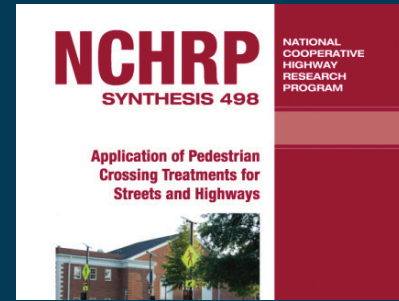
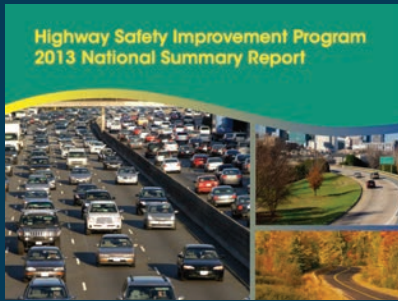
Srinivasan, R., & Lan, B. (2016, March). *Development of Crash Modification Functions using data from empirical Bayes before-after studies.* Presented to the 2016 UTC Conference for the Southeastern Region, Knoxville, TN.

Sundstrom, C. (2015, November). *Separated bike lanes and the potential to transform nonmotorized travel.* Presented to the American Public Health Association Conference, Chicago, IL.

## FY2015

Smith, S., & Carter, D. (2014). *Highway Safety Improvement Program 2013 national summary report* (Report No. FHWA-SA-14-030). Washington, DC: Federal Highway Administration.

Srinivasan, R., Lan, B., & Carter, D. (2014). *Safety evaluation of signal installation with and without left turn lanes on two lane roads in suburban and rural areas* (Report No. FHWA/NC/2013-11). Raleigh, NC: North Carolina Department of Transportation.



Thomas, L., Srinivasan, R., Worth, M., Parker, M.R., & Miller, R. (2015). *Jurisdiction speed management action plan development package*. Washington, DC: Federal Highway Administration.

Carter, D. (2014, October). *Future CMF research and challenges*. Presented to the 40th International Forum on Traffic Records and Highway Information Systems, St. Louis, MO.

Council, F.M. (2015, January). *SHRP 2 safety legacy*. Presented to the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

Green, J., Guptill, P., Ferrara, G., Shaberg, E., & Rodgman, E. (2014, October). *Low cost traffic records data improvements on a tight budget*. Presented to the 40th International Forum on Traffic Records and Highway Information Systems, St. Louis, MO.

Harkey, D.L. (2015, January). *Safety data and information technology challenges*. Presided over invited workshop at the 94th Annual

Meeting of the Transportation Research Board, Washington, DC.

Harkey, D.L. (2015, January). *Significant road safety accomplishments and challenges for the future*. Panel session, Safety on Modern Transportation Assets, at the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

Persaud, B., Lyon, C., & Srinivasan, R. (2015, June). *On the transferability of Crash Modification Factors for highway geometric design elements*. Presented to the 5th International Symposium on Highway Geometric Design, Vancouver, Canada.

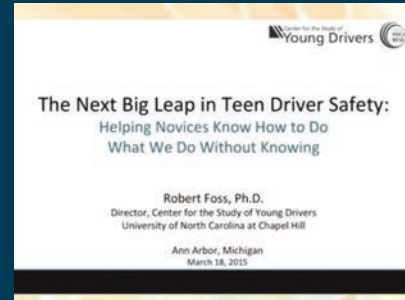
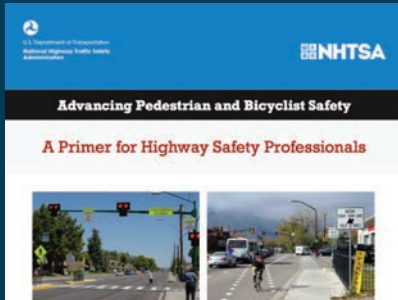
Srinivasan, R. (2015, January). *Engineering and expert methods of setting speed limits*. Presented to the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

Srinivasan, R., & Carter, D. (2014, October). *Crash modification factor development: Data needs and protocols*. Presented to the 40th

International Forum on Traffic Records & Highway Information Systems, St. Louis, MI.

Sundstrom, C., & Langford, K. (2015, April). *Best practices in separated bike lanes*. Presented to the American Planning Association National Planning Conference, Seattle, WA.

Thomas, L. (2015, January). *The present and future of speed limits in a Toward Zero Deaths (TZD) framework*. Presided over workshop at the 94th Annual Meeting of the Transportation Research Board, Washington, DC.



# SHAPING THE FUTURE OF TRANSPORTATION SAFETY

## FY2016

Brookshire, K., L. Sandt, C. Sundstrom, L. Thomas, & R. Blomberg. (2016). *Advancing pedestrian and bicyclist safety: A primer for highway safety professionals*. (Report No. DOT HS 812 258). Washington, DC: National Highway Traffic Safety Administration.

Foss, R.D. (2016, April). *What and How Novice Drivers Learn: Some implications for Driver Education Now and in the Future*. Invited Plenary Talk, North Carolina Driver and Traffic Safety Education Association (NCDTSEA) Annual Meeting, Clemmons, NC.

Rosenblatt, B., Flynn, M., and Sundstrom, C. (2015). Separated bike lanes go mainstream: With a planning and design guide published by USDOT, transportation engineers can move full steam ahead on new street designs. *ITE Journal*, 85(10), 39-45.

Sundstrom, C. (2015, November). *Separated bike lanes and the potential to transform nonmotorized travel*. Presented to the American Public Health Association Conference, Chicago, IL.

## FY2015

Foss, R.D. (2014, September). *What and how novice drivers learn: Implications for GDL now and driver education in the future*. Invited presentation to the Governors Highway Safety Association Annual Meeting, Grand Rapids, MI.

Foss, R.D. (2015, January). *Is graduated driver licensing needed for older novice drivers in the United States? Existing evidence and burning research questions!* Presented to the 94th Annual Meeting of the Transportation Research Board, Human Factors Workshop, Washington, DC.

Foss, R.D. (2015, March). *Planning for success: What makes an effective teen driver program?* Presented to the 2015 North Carolina BuckleUpNC Conference, Raleigh, NC.

Foss, R.D. (2015, March). *The next big leap in teen driver safety: Helping novices know how to do what we do without knowing*. Distinguished Faculty Seminar, University of Michigan, Ann Arbor, MI.

Harkey, D.L. (2015, January). *Significant road safety accomplishments and challenges for the future*. Panel session, Safety on Modern Transportation Assets, at the 94th Annual Meeting of the Transportation Research Board, Washington, DC.

O'Brien, N.P., & Kirley, B. (2015, May). *Overview of teen driver safety in North Carolina and suggestions for effective programs*. Presented to the North Carolina Safe Kids Conference, Concord, NC.

Thomas, L., Srinivasan, R., Worth, M., Parker, M.R., & Miller, R. (2015). *Jurisdiction speed management action plan development package*. Washington, DC: Federal Highway Administration.

Thomas, L. (2015, January). *The present and future of speed limits in a Toward Zero Deaths (TZD) framework*. Presided over workshop at the 94th Annual Meeting of the Transportation Research Board, Washington, DC.



# WEBSITES

HSRC maintains dozens of websites for various highway safety-related projects. In this section of the annual report, we highlight newly created websites or websites that have undergone major design changes in FY2015 and FY2016, as well as a selection of other sites that continue to be maintained by HSRC.

## Accessible Pedestrian Signals: A Guide to Best Practices

[apsguide.org](http://apsguide.org)

A comprehensive source of information on Accessible Pedestrian Signals (APS), including recommended or required features, and how to design intersection corners to accommodate APS appropriately.

## Bicycle Safer Journey

[pedbikeinfo.org/bicyclesaferjourney](http://pedbikeinfo.org/bicyclesaferjourney)

An online educational resource that introduces kids and teens to bicycle safety skills.

## BuckleUpNC.org

[buckleupnc.org](http://buckleupnc.org)

A comprehensive website that provides information about North Carolina's seat belt and child passenger safety laws; tips for choosing and using car seats; and a listing of locations where families can go for education and assistance with car seat installation.

## Crash Modification Factors Clearinghouse

[cmfclearinghouse.org](http://cmfclearinghouse.org)

A searchable database of crash modification factors, helpful tools in evaluating road safety engineering countermeasures.

## Highway Safety Information System

[hsisinfo.org](http://hsisinfo.org)

A multi-state database that contains crash, roadway inventory and traffic volume data for a select group of states and urban centers.

## National Center for Safe Routes to School

[saferoutesinfo.org](http://saferoutesinfo.org)

A clearinghouse of information that includes steps on starting a Safe Routes to School program, frequently asked questions, helpful links and a list of sample programs currently in place across the country.

## North Carolina Crash Data Query

[nccrashdata.hsrc.unc.edu](http://nccrashdata.hsrc.unc.edu)

A data analysis tool to create tables reflecting North Carolina crash, vehicle and driver/occupant information for crashes.

## Pedestrian and Bicycle Information Center

[pedbikeinfo.org](http://pedbikeinfo.org)

A clearinghouse for pedestrian and bicycle resources, with information about health and safety, engineering, advocacy, education, enforcement and access and mobility.

# NEW AND UPDATED SITES



## Active Routes to School Conference

[activeroutestoschoolconference.org](http://activeroutestoschoolconference.org)

A website with information about the 2015 Active Routes to School Conference.



## BIKESAFE Guide & Countermeasure Selection System

[pedbikesafe.org/bikesafe](http://pedbikesafe.org/bikesafe)

An online guide that provides practitioners with up-to-date information, such as engineering or enforcement treatments, for improving the safety and mobility of bicyclists.



## Center for the Study of Young Drivers

[csyd.unc.edu](http://csyd.unc.edu)

A website that provides insight into why motor-vehicle crashes are the leading cause of death among teenagers, and information on the research being conducted to investigate this issue.

## Pedestrian Safer Journey

[pedbikeinfo.org/pedsaferjourney](http://pedbikeinfo.org/pedsaferjourney)

Curriculum for teaching pedestrian safety to children and teens, available in both English and Spanish.

## PEDSAFE Guide and Countermeasure Selection System

[pedbikesafe.org/pedsafe](http://pedbikesafe.org/pedsafe)

An online guide intended to provide practitioners with the latest information including engineering, education or enforcement treatments, for improving the safety and mobility of pedestrians.

## Safe Kids Orange County

[safekidsorangenc.org](http://safekidsorangenc.org)

A website that provides the Orange County, North Carolina, community with information and resources to decrease injury, disability and death, and the costs to the community that are associated with injuries.



## Highway Safety Research Center

[hsrc.unc.edu](http://hsrc.unc.edu)

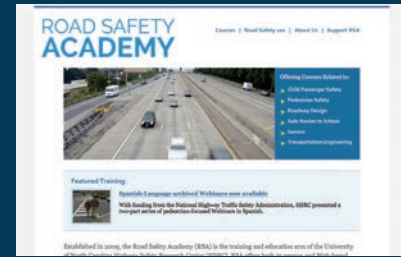
HSRC's own website was redesigned this year as part of our 50th anniversary celebration. Here, visitors can access information about the Center including updates about our work, publication lists, news updates, staff bios and contact information.



## NC Strategic Highway Safety Plan

[ncshsp.org](http://ncshsp.org)

This website provides public access to the North Carolina Strategic Highway Safety Plan along with a dashboard giving a quick view of progress toward the plan's goals.



## Road Safety Academy

[rsa.unc.edu](http://rsa.unc.edu)

The Road Safety Academy is the training and education arm of HSRC. Through this site, the RSA offers both in-person and web-based trainings that cover a broad range of road safety topics.



## Safe Routes Wake County

[saferouteswakecounty.org](http://saferouteswakecounty.org)

A website created to support Safe Routes Wake County, an effort to improve safety and to encourage more children to walk or bike to school.

## Walk and Bike to School

[walkbiketoschool.org](http://walkbiketoschool.org)

A website with information about National Walk and Bike to School events in the U.S., how to get involved and resources to help plan an event in your community.

## Walk Friendly Communities

[walkfriendly.org](http://walkfriendly.org)

A website that recognizes communities that are working to improve a wide range of conditions related to walking including safety, mobility, access and comfort.

## Watch for Me NC

[watchformenc.org](http://watchformenc.org)

A website about the Watch for Me NC education and enforcement campaign aimed to encourage safety among pedestrians, bicyclists and drivers.

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