

Semiannual Program Progress Performance Report for
Southeastern Transportation Center (STC)
US DOT Regional University Transportation Center



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Contents

1.	Accomplishments	3
1A.	What are the major goals of the program?	3
1B.	What was accomplished under these goals? What opportunities for training and professional development has the program provided?	3
1C.	Have the results been disseminated? If so, in what ways?	9
1D.	What do you plan to do during the next reporting period to accomplish the goals and objectives?	9
2.	Products: What has the program produced?	10
2A.	Publications, conference papers, and presentations	10
2B.	Journal publications	11
2C.	Books or other non-periodical, one-time publications	12
2D.	Other publications, conference papers and presentations:	12
2E.	Website(s) or other Internet site(s)	12
2F.	Technologies or techniques	12
2G.	Inventions, patent applications and/or licenses	12
2H.	Other products	12
3.	Participants and Other Collaborating Organizations	13
3A.	Table of Collaborators	13
3B.	Additional collaborators	14
4.	Impact	14
4A.	What is the impact on the development of the principal discipline(s) of the program?	14
4B.	What is the impact on other disciplines?	14
4C.	What is the impact on the development of transportation workforce development?	15
4D.	What is the impact on physical, institutional and information resources at the university or other partner institutions?	15
4E.	What is the impact on technology transfer?	15
4F.	What is the impact on society beyond science and technology?	16
5.	Changes/Problems	16
5A.	Changes in approach and reasons for change	16
5B.	Actual or anticipated problems or delays and actions or plans to resolve them	16
5C.	Changes that have a significant impact on expenditures	16
5D.	Significant changes in use or care of human subjects, vertebrate animals and/or biohazards	16
5E.	Change of primary performance site location from that originally proposed	16
	Additional information regarding Products and Impacts	17
	Special Reporting Requirements	17

STC Semiannual Program Progress Performance Report #1

1. Accomplishments

1A. What are the major goals of the program?

Under the theme of Comprehensive Transportation Safety, the Southeastern Transportation Center (STC) will develop and expand a number of research, education, work force development, and technology transfer activities to address existing and emerging transportation challenges in the Southeast.

To advance comprehensive transportation safety in our region, STC strives to understand its sociology and safety cultures; gather and curate relevant data; integrate human factors with infrastructure use; implement and enrich the Highway Safety Manual and similar tools; and apply these to a variety of operations related to moving people and goods.

We will help the transportation sector improve its existing workforce while we develop the next generations of educators, professionals, technical specialists, and practitioners who will create and sustain our nation's safe transportation systems.

We will develop a comprehensive technology transfer program that is designed to implement the outcomes of our research program, and disseminate research results as well as their implications and significance to a broad range of constituents (practitioners, decision makers, students, educators, and other transportation researcher).

1B. What was accomplished under these goals? What opportunities for training and professional development has the program provided?

Research Accomplished Under Program Goals

As proposed, the STC Research Program consists of two major components: (1) Major Research Initiatives (MRIs); and (2) Opportunity and Exploratory (O&E) Grants. During this first reporting period of the STC Grant, both of these activities were initiated and are currently underway. Details of the research components, as well as specific research activities by STC consortium member, are presented in the following research performance summary.

Major Research Initiatives

To generate the MRI component of our program, we conducted a targeted safety research needs assessment in our region, completed with the assistance of TDOT and the SASHTO research subcommittee. Seven DOTs of the 12 SASHTO states responded and reported their priority safety research needs. We supplemented these data with input from our university partners in the states from which no survey responses were received. Based on this input, we selected and designed projects to address common and high-priority needs within Region 4 and nationally. We also made every effort to coordinate our MR Initiatives with specific research topics identified by the USDOT modal administrators. This process generated four MR Initiatives, which will be comprehensive research efforts with multiple sources of matching funds, and collaborations with other UTCs and/or research entities as appropriate. The four MRIs proposed for this funding period are:

MRI 1. Big Data for Safety Monitoring, Assessment, and Improvement

Emerging sensor and communication technologies have made traffic, mobility, safety, and other information available ubiquitously and in real-time with appreciable temporal resolution and spatial accuracy. Some of the real time and dynamic data come from infrastructural investments by government agencies

for traditional traffic monitoring (e.g., in-road loops and RTMS sensors), some come from private enterprises for logistical operations (e.g., RFID), and still other data come from crowd-sourced personal electronics (e.g., smartphone and Bluetooth equipped units). UT has hosted a significant and steady flow of infrastructure-based high-resolution real-time traffic data since 2008. Since 2011, UT has added to that real-time commercial tracking data along I-40/75 using text mining and license plate matching technologies they developed. UT is beginning to use Bluetooth and smartphone based individual mobile data in real-time in collaboration with TDOT and UT's Office of Emergency Management. All these and other increasingly available data could be collected, fused, and mined to help monitor, assess, and improve transportation safety in real-time as well as after the fact. Along with the potential benefits of big data come issues related to large data volumes, high data velocities, varied data types and formats, and the veracity of the data's accuracy and reliability, thus making big data and the proactive applications that rely upon it vulnerable to interruption, overload, and misuse.

MRI 2. Crash Modification Factors and the Highway Safety Manual

With the publication of the Highway Safety Manual (HSM), there is now a formal document that can be used to link roadway design with safety consequences. Part C of the HSM provides prediction models that can be used for project level analysis to assess the safety impacts of alternative designs. Crash modification factors (CMFs), which provide an estimate of the safety effectiveness of specific treatments, are available for selected treatments from Part D of the HSM. However, there are many treatments for which reliable CMFs are not available. The proposed initiative will develop CMFs for high priority engineering treatments.

MRI 3. Integrated Simulation and Safety

Simulation has evolved into a productive tool for predicting and evaluating safety on roadways and street networks. Simulation aptly defines human actions, addresses the effectiveness of roadway design and traffic operations on transportation safety, and helps to develop surrogate safety measures. Judicious and creative implementation of simulation tools holds great promise for enhancing the HSM methodologies and approaches.

MRI 4. Exploring Socio-Demographic Characteristics and Culture Factors in Differential Safety Performance across Geography

The southeastern US has among the highest roadway incident and injury rates in the country. While this disparity in roadway safety has been explored numerous times, these studies most often investigate the physical design characteristics of the transportation infrastructure. Some studies focus on the weather, government policies (e.g., speed limits, seat belt law), and the role of human factors in designing the infrastructure or vehicles. When socio-demographic characteristics are considered in other studies, they are typically limited to gender, age, and race or ethnicity. The results from these studies have not provided a comprehensive picture or convincing explanation for regional safety performance differences. The effort we propose will expand this limited set of characteristics to include socio-demographic characteristics, risk-taking and health characteristics, land use patterns, and other measures that consider the culture and values of the population as potential explanatory factors.

Opportunity & Exploratory Grants

STC Opportunity and Exploratory (O&E) Grants provide individuals or small groups of faculty and students the opportunity to engage in relevant safety-related research within their areas of interest and expertise. O&E Grants are designed to provide seed-funding to explore new and emerging concepts, tech-

nologies, and methods with promising safety enhancement applications. All O&E Grants are competitively awarded, and typically each grant will be performed at one university with single-source or in-kind matching funds. The O&E Grants awarded during this reporting period are listed in the following table.

2014 Opportunity & Exploratory Grant Awards		
Project Title	University	PI
Automated Traffic Surveillance from an Aerial Camera Array	Clemson	Wayne Sarasua
Intervention Strategies for Unsafe Cell Phone Usage Among Teen Drivers	NCA&T	Maranda McBride
Tension-Based Guardrail End Terminal Concept Development	UAB	Dean Sicking
Evaluating the Wrong-Way Driving Incidents Problem on the Florida's Turnpike Enterprise Roadway System	UCF	Haitham Al-Deek
Development and Evaluation of Coordinated Traffic Signal Emergency Preemption System	UK	Adam Kirk
Promoting Safe Transportation Among Older Drivers: Risk Assessment via Driving Simulator Technology	USF	Jerri D. Edwards
New technologies and bicycle safety	UTK	Chris Cherry
Utilizing Assistive Technology to Remove Communication Barriers in the Public Transportation System for Passengers with Disabilities	UTK	Rupy Sawhney

Research Highlights Under Program Goals, by Consortium Member

University of Tennessee

- Dr. Chris Cherry was awarded a 2014 Opportunity & Exploratory Grant (O&E) for his *New technologies and bicycle safety* research project.
- STC's four Major Research Initiatives (MRIs) were established: *Big Data for Safety Monitoring, Assessment, and Improvement*; *Crash Modification Factors and the Highway Safety Manual*; *Integrated Simulation and Safety*; and, *Exploring Socio-Demographic Characteristics and Culture Factors in Differential Safety Performance across Geography*
- Inter-university teams were established to conduct and coordinate each MRI.

Clemson University

- Drafted the MRI 1 (Crash Modification Factors and the Highway Safety Manual) Statement of Work in conjunction with UNC-Chapel Hill Highway Safety Research Center.

UNC-Chapel Hill Highway Safety Research Center

- A draft scope of work was developed for Major Research Area (MRI) 1: Crash Modification Factors and the Highway Safety Manual. This document outlines two tracks: (1) CMF development and (2) HSM implementation. The goal of the first track is to develop crash modification factors/functions for engineering treatments. The second track will involve the estimation of safety performance functions for the Southeast Region. Five universities will participate in this research area: Highway Safety Research Center at the University of North Carolina, Clemson University, University of Kentucky, University of Alabama, and the University of Tennessee.

North Carolina A&T State University

- We submitted seven proposals for STC's O&E research grants; one was accepted for implementation.

University of Alabama Birmingham

- UAB has recruited an Alabama based company to fund development of tension based safety features. The first project in this study will involve development of a tension based crash cushion. These funds will be used as a match for the work that UAB will devote for education enhancement.

- The Barber Laboratory for Advanced Education and Research (BLASER) at UAB will undertake the analysis of the safety performance of compression based terminals to identify the field performance of these terminals. The accident data has been collected and the data will be analyzed and a final report written during the next reporting period.

University of Central Florida

- MRI 2: *Integrated Simulation and Safety Project*. The scope of work was jointly completed between UCF and two other institutions (UTK and UK). The target start date is mid May.
- MRI 4: *Big Data*. The scope of work was jointly completed between UCF and two other institutions (UTK and UK). The target date to get started on this project is mid May.
- O&E Grant titled, *Evaluating the Wrong-Way Driving Incidents Problem on the Florida's Turnpike Enterprise Roadway System*, was awarded to Haitham Al-Deek, PI.

University of Kentucky

Research Management—Major Research Initiatives

- Objective: Direct the development of research program for major research initiatives (MRIs) in collaboration with the STC Director
- Activities: Finalized scope and budget; helped select research coordinators for each MRI
- Accomplishments: Established the Major Research Initiative Program (four program areas) and the Implementation Plan (included several meetings with participants); MRI Coordinators tasked with developing work program guidance and soliciting research task descriptions.

MRI-1 Crash Modification Factors

- Objective: Develop Kentucky specific data for Crash Modification Factors and verify previously developed Safety Performance Functions (SPFs)
- Activities: Developed draft scope for research tasks, awaiting approval.

MRI-2 Simulation

- Objective: Develop Vehicular Crash Models for Intersections and Interchanges
- Activities: Finalized scope and budget, awaiting approval

MRI-4 Big Data

- Objective: Inventory and assess the expanding array of safety-related data/sources and investigate scenarios for how different types of data can contribute to improving transportation safety
- Activities: Conducted Webinar with researchers at partner schools; developed draft scope, awaiting approval

O&E-Coordinated Emergency Vehicle Pre-emption

- Objective: Quantify the operational benefits of preempting an entire corridor for emergency vehicle operations
- Activities: Finalized scope and budget and identified peer reviewers

University of South Florida

- This time period covered the formative stages of engagement in STC safety research and education initiatives. Activities included refining the research work program and initiating recruiting of graduate research assistants.

Education Accomplished Under Program Goals

The STC Education Program is appropriately distributed and coordinated among all the consortium members. During the initial performance reporting period of the STC Grant, Education Sub-grants were put in place with each of our member universities, and a number of education-related activities began, as summarized below, by consortium member.

University of Tennessee

- Two Transportation Safety Courses are being revised for delivery in Fall 2014.
- STC sponsored students to attend the Transportation Research Board annual meeting in Washington, D.C. and the 2nd UTC Conference for the Southeastern Region at Georgia Institute of Technology.
- The STC Director and faculty participated in the annual *Breakfast of Champions* for 50 high school seniors and their parents. Students visited the STC-sponsored Driving Simulator Lab where they had a chance to take a turn in the driving simulator.
- STC supported Hyeonsup Lim, a PhD student in transportation, who won the 2014 Intelligent Transportation Society of Tennessee \$2,000 Scholarship Award. Lim will present his paper at ITS Tennessee's 2014 Annual Meeting in Chattanooga.

Clemson University

- Updated CE 4110/6110 Roadway Design Course to focus more on safety in design
- Taught CE4120 Transportation Planning
- Sought information on existing safety text book materials for CE 8150 Transportation Safety Course to be revised and taught online across consortium universities
- Planning meeting of university partners who teach safety courses to share experiences, best-practices, and resources
- Developed materials and activities to host a Peer and Wise STEM day event introducing local high school students to GPS technologies through geocaching

North Carolina A&T State University

- We are soliciting applications from our students for the 2014-15 STC Education Award. These recipients will be given research mentorship, internship opportunities, and experiential learning activities such as the Transportation Research Board Meeting.
- We have distributed our applications for the Summer High School Transportation Institute. This program introduces transportation careers and academic opportunities to high school juniors and seniors.

University of Alabama

- The University of Alabama set July 14-16, 2014 as the dates for its Advanced Transportation Institute, a day-camp for rising high school juniors and seniors in underrepresented groups to introduce them to careers in transportation.

University of Alabama Birmingham

- UAB has create a summer program targeted to the recruitment of lower level high school students from rural areas and under represented groups. This program will attempt to stimulate the intellectual curiosity of young students regarding transportation related problems and challenges. The program will include 25 students and will last approximately 10 days. In addition procedures for awarding competitive fellowships an scholarships in order to maximize the benefit in the transportation education and research program at UAB.

University of Kentucky

- Objective: Select, engage and support graduate students in safety research and support undergraduate and high school teacher/student outreach
- Activities: Finalized scope and budget, awaiting approval

Technology Transfer Accomplished Under Program Goals

The STC Technology Transfer (T2) component is intended to be the focal point for dissemination of researcher results derived from STC-funded projects. It is intended that the STC T2 program will complement existing technology transfer activities already in place at our member institutions as well as those

already practiced by individual researchers within the consortium. Successful implementation of the STC T2 program in a way that ensures the research products developed under the current STC funding cycle are presented as consortium wide body of safety re. As set out in the proposal, the three primary outcomes for the STC T2 Program are:

1. Implement peer-reviewed research (journal articles and conference proceedings/presentations)
2. Deliver symposia, specialty conferences, professional forums and other interactive presentations
3. Support development of procedures, programs and policies that leverage research results for the improvement of transportation, especially in the context of delivering comprehensive safety solutions.

The following subsections summarize our technology transfer activities, by university, during the first reporting period of the grant.

University of Tennessee

- STC 2014 speaker series & webinars, Shashi Nambisan, coordinator. The six webinar presentations are archived at stc.utk.edu/STCtechtransfer/webinars.html. Topics are: *Tennessee's Highway Traffic Safety Culture--What We Think We Know* (Jerry Everett, UTK); *Why Plan for Mobility?* (Jeff Welch & Mike Conger, Knoxville Regional Transportation Planning Organization); *Forging a New Road to the Future: Five Maxims for Creating Value* (Mary Holcomb, UTK); *Designing Power Electronics to Meet the Demands of Future Electric Vehicles* (Daniel Costinett, UTK); *The Big Move: Challenges of Transporting a Super-Heavy and Oversized Load* (Chris Kirby, CDM Smith); and *The Future of Transportation Finance* (Marty Wachs, UC Berkeley, UCLA, RAND Corporation).
- Faculty, staff, and student made many presentations at various conferences and workshops. The body of papers provided significant results related to safety and titles of the papers are suggestive of the diverse topics addressed by STC affiliated University of Tennessee faculty. See further details below.
- Faculty, staff, and students served on various Transportation Research Board committees. Of special note, Dr. Nambisan presided at the Council of University Transportation Centers awards banquet. Dr. Khattak co-chaired the Advanced Traveler Information Systems sub-committee meeting and is member of the User Information Systems committee. Dr. Cherry is member of ANF20, bicycle transportation. He also chairs the joint (bike, ped, motorcycle, law enforcement committees) subcommittee on emerging technologies for low speed vehicles.

Clemson University

- Planning a statewide Traffic Incident Management workshop for summer 2014
- Planning a statewide workshop on Accessible and Safe Design for Pedestrians and Transit Users for fall 2014

University of Alabama Birmingham

- UAB has contacted principles from the major roadside hardware manufacturers and requested that they provide construction and repair training in Alabama. The STC will video tape these presentations and edit the resulting video tape to add-in crash test video photos of crash scenes to clearly illustrate the issues raised by the presenters.

University of Central Florida

- Road Safety and Simulation Conference, RSS2015: UCF and UTK won the bid to host the RSS2015 in Orlando, Florida. The organizing committee is setting up a website for the conference and developing a marketing brochure that will outline critical dates and potential sponsors.
- First International Conference on Road Safety in Abu Dhabi, March 11, 2014: The conference brought together transportation engineers and medical physicians in joint sessions. The goal was to raise the

profile of the preventability of road traffic injuries and promote good practices to achieve safe roads, safe speeds, safe vehicles, and safe people. Drs. Mohmaed Abdel-Aty and Essam Radwan were keynote speakers in this event. Dr. Atef Garib, the first Ph.D. graduate in the transportation program at UCF, and who is currently a consultant to the Abu Dhabi Police Department, was the lead organizer of this conference.

- IRF Presentation on Forgiving Highways: February 26, 2014, Transportation Engineering, CATSS and the UCF Chapter of ITE hosted Michael Dreznes, Executive Vice President of the International Road Federation. Mr. Dreznes presented a seminar on the concept of *Forgiving Highways* to students and faculty.

1C. Have the results been disseminated? If so, in what ways?

University of Tennessee

- STC-affiliated faculty have communicated results through several sources: websites, news releases, scholarly presentations, and publications.

1D. What do you plan to do during the next reporting period to accomplish the goals and objectives?

Research Plans for Next Reporting Period

University of Tennessee

- We will begin work on the four MRIs (Highway Safety Manual, safety simulations, big data applications in safety, and the role of socio-demographics in safety) and on the O&E grant for bicycle safety.

UNC-Chapel Hill Highway Safety Research Center

- The first task is to finalize the work plan for MRI 1, Crash Modification Factors and the Highway Safety Manual. We will also start on the individual research projects that form part of this research area.

North Carolina A&T State University

- Research will commence for the selected O&E grant.

University of Alabama

- University of Alabama personnel will participate in two of the four MRIs and conduct its Advanced Transportation Institute for underrepresented groups.

University of Alabama Birmingham

- Proof of concept will be completed for a tension based impact attenuator and the refinement of a concept for a tension based guardrail terminal will begin.

University of Central Florida

- Commence the two MRIs and the O/E grant
- Secure the needed match for these research initiatives

University of Kentucky

Research Management—Major Research Initiatives

- Work with MRI Coordinators to review and initiate specific research tasks for all MRIs

MRI-1 Crash Modification Factors

- Develop residual plots to provide confidence in model performance
- Collaborate with partner researchers to develop regional SPFs

MRI-2 Simulation

- Near completion of the literature search
- Begin analysis of crash patterns at intersections and interchanges

MRI-4 Big Data

- Inventory and assess “big data” sources relevant to highway safety
- Identify safety-enhancing data needs for various users

O&E-Coordinated Emergency Vehicle Pre-emption

- Identify and review published and ongoing research work
- Collect corridor data sufficient for micro simulation
- Develop micro simulation model to emulate real world conditions

University of South Florida

- Initiate activities on research work program and initiate support of graduate research assistants.

Education Plans for Next Reporting Period

University of Tennessee

- Faculty will work with STC to continue the transportation seminar series, with presentations available online. Safety courses will be offered in 2014.

North Carolina A&T State University

- Applicants will be selected for the STC Education Award. Participants for the STI will be selected and the program started and completed during the next reporting period.

University of Central Florida

- Take active role in Camp Connect III planned for this summer. It is a summer engineering exploration program for students from underrepresented communities that is facilitated by the College of Engineering and Computer Science’s Office of Diversity at UCF.
- Attempt to establish two more internships with other transportation agencies such as Florida Turnpike Enterprise, and the Orlando Orange County Expressway Authority.

University of Kentucky

- Select graduate students for support with partial funding to work on safety research projects
- Identify existing efforts to encourage students into technical fields that focus on transportation issues
- Provide supplementary materials/liaison that could encourage teacher/student interest in challenges of improving transportation safety

Technology Transfer Plans for Next Reporting Period

University of Tennessee

- We will strengthen international links with Beijing Jiatong and Southeast Jiaotong universities, Kunming University of Science and Technology, Tsinghua University, and Changsha University; and explore new ones with various universities in Asia and Europe.
- The UTK faculty will strengthen the *Journal of Transportation Safety & Security*. Our aim is to have the journal listed in the Science Citation Index within the next couple of years.

2. Products: What has the program produced?

2A. Publications, conference papers, and presentations

University of Tennessee

- User Behaviors on Regular and Electric-Assist Bicycles with Regard to Safety in an On-Campus Electric Bicycle Sharing System, Langford
- Driver Behavior at Railway-Highway Grade Crossings with Passive Traffic Controls: A Driving Simulator Study, Bartnik, Liu, Richards, Khattak
- How are Driver Characteristics related to Safety at Railroad-Crossings? The case of Passive Railroad

- Grade Crossings, Liu, Bartnik, Richards, Khattak
- Pilot Initiative in Iowa for Intern Development and Management Program, Nambisan, et al.
 - Evacuee Compliance Behavior Analysis Using High-Resolution Demographic Information, Lu, Han, et al.
 - Short-Term Freeway Speed Profiling Based on Longitudinal Spatial-Temporal Dynamics, Yang, Han, Freeze
 - Estimation of Pavement Damage Costs Caused by Heavy Vehicles Using Finite Element Analysis and MEPDG Distress Model, Dong, Huang, et al.
 - Pedestrian Level of Service at Signalized Intersections in China Using Contingent Field Survey and Pedestrian Crossing Video Simulation, Ling, Ni Cherry, Li
 - What is the Level of Volatility in Instantaneous Driving Decisions? Wang, Khattak et al.
 - Patterning Demographic and Socioeconomic Characteristics Affecting Pedestrian and Bicycle Crash Frequency. Chimba, Emaasit, Cherry, Pannell
 - How are Driver Characteristics Related to Safety at Railroad-Crossings? The Case of Passive Railroad Grade Crossings, Liu, Bartnik, Richards, Khattak
 - Do we need more data to get better short-term traffic prediction accuracy? Yang, Han, Freeze
 - Evaluating user safety on electric and regular bikes using observed behaviors. Langford, Cherry, Yoon, Chen

Clemson University

- Ogle, J. (2014) “Sharing CMFs: An Overview of US Initiatives”, Transportation Research Arena, Paris, France; April 17, 2014 – This session was initiated by Jari Kaupilla from OECD and included speakers from Paris, Italy, Greece and US.

2B. Journal publications

University of Tennessee

- Ng, M., A. Khattak, & W. Talley, A semi-Markov stochastic process for primary and secondary incidents modeling, Transportation Research, Part B, Volume 58, pp. 44–57, 2013 (federal support acknowledged).
- Zhang, H., M. Cetin, and A. Khattak, Queuing delays associated with secondary incidents, Forthcoming, Journal of Intelligent Transportation Systems, 2014 (federal support acknowledged).
- Yang, Q., L.D. Han, and C. Cherry, Some Measure for Sustaining Red-Light Camera Programs and Their Negative Impacts, Transport Policy, 2013, 29:192-198.
- Fang, Z., Q. Li, Q. Li, L.D. Han, and S. Shaw, A Space Time Efficiency Model for Optimizing Intra-Intersection Vehicle-Pedestrian Evacuation Movements, Transportation Research Part C, Emerging Technologies, 2013, 30:112-130.
- Lu, W., L.D. Han, and C.R. Cherry, Evaluation of Vehicular Communication Networks in a Car Sharing System, International Journal of Intelligent Transportation Systems Research, 2013.
- Yang, Q., L.D. Han, and X. Yan, Driver Behaviors on Rural Highways with and without Curbs—a Driving Simulator Based Study, International Journal of Injury Control and Safety Promotion, 2013.
- Yang, Q., R. Overton, L.D. Han, X. Yan, and S.H. Richards, The Influence of Curbs on Driver Behaviors in Four-Lane Rural Highways: a Driving Simulator Based Study, Accident Analysis & Prevention, 2013, 50:1289-97.
- Wolff, D., E. Fitzhugh, D. Bassett, C. Cherry (2013) Greenway siting and design: relationships with physical activity behaviors and user characteristics. Journal of Physical Activity and Health (in press).

- Langford, B.C., C. Cherry, T. Yoon, S. Worley, D. Smith (2013) North America's first electric bicycle share: A year of experience. Transportation Research Record: Journal of the Transportation Research Board (in press).

2C. Books or other non-periodical, one-time publications

University of Tennessee

- Pannell, Zane, A framework to predict high-risk roadways for pedestrians in Tennessee, MS Thesis (supervisor: Chris Cherry).

2D. Other publications, conference papers and presentations:

Nothing to report.

2E. Website(s) or other Internet site(s)

University of Tennessee

- stc.utk.edu
The Official Website of the STC
- tesp.engr.utk.edu
Transportation Engineering & Science Program, UT Civil & Environmental Engineering - disseminates the results of research and/or program activities.
- www.cycleushare.com
The website provides information about key research, education, and outreach activities for Dr. Cherry's STC-funded bikeshare program.

University of Central Florida

- www.catss.ucf.edu
The Center for Advanced transportation Systems Simulation website

University of Kentucky

- www.ktc.uky.edu
Site lists all transportation research reports issued by the UK-Kentucky Transportation Center, highlights high-value research activities and provides link to the Center's technology transfer website.

2F. Technologies or techniques

Nothing to report.

2G. Inventions, patent applications and/or licenses

Nothing to report.

2H. Other products

Nothing to report.

3. Participants and Other Collaborating Organizations

3A. Table of Collaborators

Organization Name	Location of the Organization	Partner's Contribution to the Project	Name (First and Last)	University
Clemson University	Clemson SC	In-kind support of funding for 2 Student Teaching Assistants to assist with CE 4120 Transportation Planning and CE 4110 Roadway Design	Logan Reed - CE 4110 Parth Bhavsar - CE 4120	Clemson University
Missouri DOT	Jefferson City MO	Funded study of compression based terminals	Joe Jones	University of Alabama Birmingham
Ohio DOT	Columbus OH	Provided data for study of compression based terminals	Maria Ruppe	University of Alabama Birmingham
Safety Research Institute	Boston MA	Funded study of compression based terminals	Melanie Macdonald	University of Alabama Birmingham
KY Transportation Cabinet-DOH	Frankfort KY	In-Kind support, Collaborative support	Jason Siwula	University of Kentucky
AAA Foundation for Traffic Safety	Washington DC	Collaborative support	Peter Kissinger	University of Kentucky
UNC-Highway Safety Research Center	Chapel Hill NC	Collaborative support	David Harkey	University of North Carolina
Center for Transportation Research	Knoxville TN	Collaborative support	Airton Kohls	University of Tennessee
UK College of Engineering—Office of the Dean	Lexington KY	Collaborative support	Kamyar Mahboub	University of Kentucky
Tennessee DOT	Nashville TN	Matching	N/A	University of Tennessee
ORNL	Oak Ridge TN	Collaborative support		University of Tennessee
INRIX		Match		University of Tennessee
US Dept. of Energy	Washington DC			University of Tennessee
Knoxville Regional Trans Planning Org	Knoxville, TN	Collaborative support	Jeff Welch	University of Tennessee
Social Bicycles (SoBi)	New York	Collaborative support & data match		University of Tennessee
Georgia Tech	Atlanta	Collaborative support	Audrey Leous	University of Tennessee
Various Jiaotong Universities in China	Beijing, Nanjing, Guangzhou, Shenzhen, Changsha, China	Collaborative support & personnel exchanges	Xuedong Yang	University of Tennessee
Knoxville Area Transit	Knoxville TN	Facilities and equipment	Belinda Brill	University of Tennessee
TN Dept of Safety	Nashville TN	Equipment - No Zone Truck	Tony Barham	University of Tennessee

3B. Additional collaborators

University of Tennessee

- Collaborations with others outside the United States or with an international organizations include Beijing Jiaotong University, Southeast Jiaotong University, Tongji University, Southwest Jiaotong University, Kunming University of Science and Technology, Tsinghua University, and Changsha University; and COTA-Chinese Overseas Transportation Association.

University of Central Florida

- CATSS at UCF is in the process of establishing an internship with MetroPlan Orlando to support a student (either graduate or undergraduate) to work full time in summer 2014 and part time in fall 2014 on a pedestrian safety project at the agency site in downtown Orlando. The cost of the partnership will be split 50-50.

4. Impact

4A. What is the impact on the development of the principal discipline(s) of the program?

University of Tennessee

- The work undertaken at UTK will enhance safety through research on Highway Safety Manual, safety simulations, big data applications in safety, and the role of socio-demographics in safety. The multi-disciplinary research activity underway with diverse consortium partners will help create the knowledge-base needed for innovations in safety countermeasures and make methodological advances in safety modeling, simulation, and visualization. The impact will be felt in multiple modes of transportation and multiple stakeholders.

University of Alabama Birmingham

- Findings from the field performance study of compression based guardrail terminals will provide significant input to the developers and the users of guardrail terminals. Preliminary findings from the study have pointed to impact conditions that are commonly associated with a guardrail penetrating into the occupant compartment. Further, the study will provide the most objective evaluation to date on the relative safety performance of existing tangent terminal systems.

University of Central Florida

- We believe that this cooperative activity between CATSS and MetroPlan Orlando will gain the selected student an excellent hands on experience with how metropolitan planning organizations conduct technical assessment and this will build a bridge with this organization for potential future activities.

4B. What is the impact on other disciplines?

University of Tennessee

- UTK and STC's comprehensive view of safety affects our region's safety culture and sociology, transportation operations, and transportation planning.

4C. What is the impact on the development of transportation workforce development?

University of Tennessee

- UTK offers several transportation safety courses. For Fall 2104, the Transportation Safety course will be offered online and TDOT employees (practitioners and students pursuing their MS degree) will be able to take it though distance learning.

North Carolina A&T State University

- The STC Education Award provides an opportunity for students to be mentored by faculty on various research projects in transportation and supply chain as well as civil engineering. We encourage students to participate in an internship experience and other scholarship opportunities. Travel to transportation conferences is provided. The STI allows high school students to be exposed to transportation careers and post- secondary academic opportunities in the field of engineering and transportation.

University of Alabama Birmingham

- The development of online and video based training programs will allow any conscientious highway construction worker or their supervisor to train themselves and their construction crew on the procedures for installing any safety device. The DVD based training video can be brought to the field and referred to as needed.

University of Central Florida

- The selected intern might be a good candidate for full time employment with MetroPlan Orlando.

4D. What is the impact on physical, institutional and information resources at the university or other partner institutions?

University of Tennessee

- The Civil & Environmental Engineering Department has moved to a newly constructed facility with ample space for transportation labs such as the UT driving simulator.
- In January 2014, CEE hired Shashi Nambisan, a renowned expert in transportation safety.

University of Alabama Birmingham

- Efforts to recruit and retain more diverse students to study transportation will eventually provide better trained and more creative transportation professionals.

University of Central Florida

- The exchange of information through the intern would be beneficial for the transportation program at UCF. MRI 2, Integrated Simulation and Safety, has a pedestrian safety aspect and we think this partnership could benefit this project.

4E. What is the impact on technology transfer?

University of Tennessee

- As STC research projects progress, we will communicate the results to various stakeholders in trans-

portation safety. This includes transportation practitioners, researchers, policy makers, and the private sector. Also, STC's journal reaches an international audience of authors, reviewers, researchers, and practitioners.

University of Central Florida

- Any reports developed from this initiative can be shared with UCF and a seminar be delivered.

4F. What is the impact on society beyond science and technology?

North Carolina A&T State University

- The STI program will likely impact the transportation workforce as students in the program become aware of the career opportunities in the field and transition to college and, ultimately into the transportation industry.

University of Tennessee

- STC and UTK faculty directly affect safety in many ways. Socio-demographic and attitudinal research on safety will improve public knowledge and provide a deeper understanding of how to improve safety from broad social, economic, geographic and behavioral perspective. Highway Safety Manual improvements (one of the major research initiatives) can lead to reductions in hazards and implementation of countermeasures that save lives. The Big Data applications in safety provides and means to innovate and consider new ways of approaching safety by combining information from diverse databases and in a dynamic context. Safety simulations can lead to a better understanding of vehicles' interactions and why collisions occur. Modeling, simulation and visualization can ultimately help formulate regulatory policies that lead to safety improvements.

5. Changes/Problems

5A. Changes in approach and reasons for change

Nothing to report.

5B. Actual or anticipated problems or delays and actions or plans to resolve them

Nothing to report.

5C. Changes that have a significant impact on expenditures

Nothing to report.

5D. Significant changes in use or care of human subjects, vertebrate animals and/or biohazards

Nothing to report.

5E. Change of primary performance site location from that originally proposed

Nothing to report.

Additional information regarding Products and Impacts

University of Alabama Birmingham

Outputs:

- The center has undertaken two research projects involving field performance evaluation of guardrail terminals in Missouri and Ohio.

Outcomes:

- We anticipate that the two research studies will provide a foundation for the development of the next generation of guardrail terminals an objective evaluation of the safety performance of existing designs.

Impacts:

- The two research studies will provide significant improvements in roadside safety by eliminating poor performing guardrail terminals from the qualified products lists in many states.

Special Reporting Requirements

Nothing to report.