NCTSPM

NATIONAL CENTER FOR TRANSPORTATION SYSTEMS PRODUCTIVITY AND MANAGEMENT

Program Progress Performance Report for University Transportation Centers

U.S. Department of Transportation
Research and Innovative Technology Administration
Federal Grant Number: DTRT12GUTC12

Program Director: Michael Hunter, Ph.D.
Associate Professor of Civil and Environmental Engineering
Georgia Institute of Technology
760 Spring Street, Atlanta, Georgia 30303
Email: michael.hunter@ce.gatech.edu
Phone: 404-385-1243

Program: National Center for Transportation Systems Productivity and Management
Georgia Tech Research Corporation
Phone: 404-385-5135
DUNS # 09-739-4084 EIN # 58-0603146

Submitted to: U.S. Department of Transportation,
Research and Innovative Technology Administration

Submission Date: November 20, 2015

Reporting Period Start Date: January 1, 2015

Reporting Period End Date: June 30, 2015

Report Frequency: Semi-Annual, PPPR #7

Signature of Submitting Official:

Michael Hunter, Ph.D. **11/19/15**
Date

FIU Florida International University | Georgia Tech | Georgia Transportation Institute

UAB The University of Alabama at Birmingham | University of Central Florida

Accomplishments

What are the major goals of the program?

The National Center for Transportation Systems Productivity and Management (NCTSPM), a Tier I University Transportation Center, was founded to facilitate, coordinate, and conduct research and educational programs toward the following goals:

- Conduct multi-disciplinary research on topics relevant to the relationship among transportation infrastructure (state-of-good-repair), economic competiveness, and safety
- Disseminate research results and other products of the Center to the transportation community
- Promote transportation education and professional development on topics relating to Center research
- Establish a central point of contact and promotion of best practices (e.g., through a web site or list serve) for materials relating to transportation systems performance and management
- Promote diversity in the workforce through active recruitment of women and minority students into degree programs
- Act as a national resource for the debates and discussions that focus on the evolving national transportation program and future directions
- Explore international cooperative activities with research entities in selected countries where similar research interests exist

What was accomplished under these goals?

Accomplishments for the reporting period are discussed below and organized by major center goal.

Conduct multi-disciplinary research on topics relevant to the relationship among transportation infrastructure (state-of-good-repair), economic competiveness and safety

NCTSPM supports multi-disciplinary research. Some projects simultaneously address infrastructure and safety; others deal with safety and infrastructure; while still others address all 3 of our themes. Our researchers represent a variety of disciplines: civil engineering, urban planning, economics, public health, and public policy.

A full listing of NCTSPM-funded research projects can be found at the end of this report.

Disseminate research results and other products of the Center to the transportation community

NCTSPM posts research updates to its website on a regular basis. A Project Information Form for each project is posted on the website, as well as related documents, such as pictures, posters, reports, and

presentations. Information on NCTSPM's research is also posted to the Georgia Tech Transportation Alumni group on LinkedIn and on the Georgia Tech Civil Engineering website.

During this reporting period, NCTSPM produced a number of research reports and journal publications, and presented conference proceedings, invited presentations/lectures on research findings, workshops, seminars, and webinars on a variety of research projects. Several journal and professional publications were submitted/accepted, to a variety of publications. Our researchers and students delivered nearly 100 presentations in the form of conference proceedings, invited presentations/lectures, workshops, seminars, and webinars held on research projects.

At UCF, researchers are coordinating with the Florida DOT Structures Research Center to publish their experimental research finding from the hybrid deck system. They hope to perform a trial installation of either the hybrid system or an ultra-high performance concrete/high-strength steel (UHPC/HSS) option developed as part of a matching funds project, dependent on continuing support.

Researchers are also in contact with practitioners, conveying the results of their work and working together to make progress on implementation. A Georgia Tech researcher presented the flow disaggregation modeling of the truck traffic on Georgia's I-85 corridor to the Atlanta Regional Commission in February. This presentation helped the *Atlanta Model Users Group* to better understand the ongoing research efforts to address increasing truck traffic on the corridor.

Recently, a GT researcher's work on ramp metering was highlighted in a Fox 5 Atlanta TV news story. The researcher demonstrated the travel time benefits in relation to ramp meters, showing when traffic begins to build and how modifying ramp wait times can be used as a tool to control highway congestion levels.

Promote transportation education and professional development on topics relating to Center research

NCTSPM actively promotes education and professional development.

During this reporting period, UCF provided training of participating graduate students and postdoctoral associate for data collection/processing, GIS techniques, and statistical analysis.

FIU conducted a two-week summer transportation camp for 18 high school students in July 2015. The summer camp featured field trips, lectures, lab demonstration, group projects and competitions. Topics included driving simulation, traffic safety, ITS, public transportation, and bridge engineering.

The center participated in the University Transportation Centers (UTC) Conference for the Southeastern Region on March 26-27, 2015, in Birmingham, AL. This event sought to bring together faculty, students, practitioners, and public agencies in the southeast to disseminate information about on-going activities at all partner universities and to further enhance collaboration among the academic community and the private and public sector agencies in the region. The researchers associated with the center displayed their research with 27 posters and presentations at the conference.

Over a 100 researchers and students from the universities associated with the center presented at the Transportation Research Board Annual Meeting in Washington, District of Columbia, in January 2015.

NCTSPM and Georgia Tech opened the new year with a reception at the Transportation Research Board's 94th Annual Meeting to promote networking and collaboration opportunities for students and faculty.

The center again supported this year's annual *Transportation Camp South* event. The event was an "unconference", with participant-designed sessions and discussion, which brought together professionals and laypersons with an interest in transportation. The camp provided a day of connection and creativity, facilitated by its novel approach, filled with discussions, demonstrations, and education related to transportation in the South.

Many of our researchers and students actively participated in this year's Georgia DOT Research Expo, on September 22nd, 2015, which was jointly hosted by the Georgia Department of Transportation and the Georgia Transportation Institute. The event featured over 70 posters, highlighting research and results of GDOT-sponsored research projects.

Establish a central point of contact and promotion of best practices (e.g., through a web site or list serve) for materials relating to transportation systems performance and management

The NCTSPM website remains the main point of contact and promotion of best practices. In the reporting period, the website received more than 8,000 web views, 4,500 unique visits, and nearly 4,000 first time visits. Monthly page views, unique visits, and returning visits is shown in Figure 1 below.

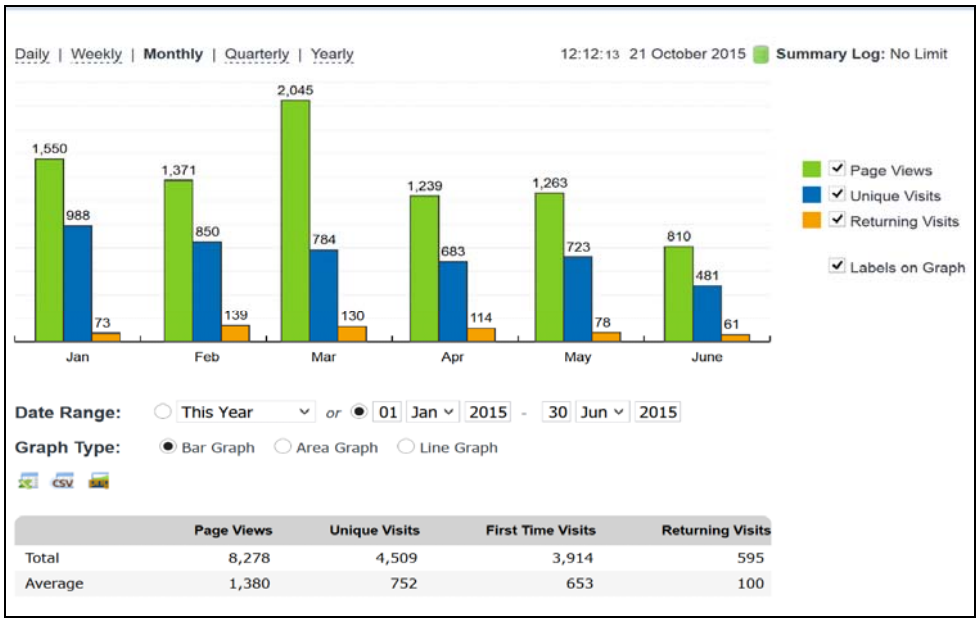


Figure 1. Web traffic during reporting period

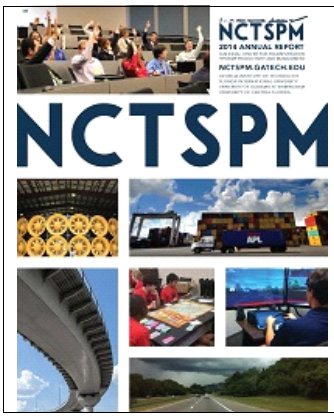
Figure 2. Distribution of recent NCTSPM website visitors

In addition to the website, NCTSPM communicates its research efforts through publications, such as the annual report and an email newsletter.

The newsletter is sent out on a semi-annual basis, and three newsletters have been created for 2015 thus far. The newsletter for spring of 2015 included two research features, one on “Development of a Web-based Decision Making Tool for the Highway Safety Manual Implementation” and one on “HOV to HOT Conversion Impacts on Carpooling”. The newsletter also features a principal investigator profile on Dr. Virginia P. Sisiopiku of the University of Alabama at Birmingham, and a student profile on Ossama Ramadan, also of the University of Alabama at Birmingham. Additionally, the newsletter included several upcoming NCTSPM-related events and news items, such as the 2015 University Transportation Center Conference for the Southeastern Region and the 2014 Road Safety and Simulation International Conference, and a spotlight on three Georgia Tech graduate students who were awarded fellowships in Spring. This newsletter reached 687 recipients, with readers from areas as far away as Greece, Portugal, and China.

The Winter 2015 newsletter was also issued with success, as its readership was spread across the globe, with top readership in the United States, France, Canada, Portugal, and Greece. The newsletter reached 674 subscribers, and included a section detailing the production of the 2014 Annual Report, as well as three project spotlights. These featured projects were "Field Validation of a Drive-By Bridge Inspection System with Wireless BWIM and NDE Devices", "Evaluation of Signage Alternatives for Express Lane Facilities", and "A Comprehensive Investigation of Visibility Problems on Highways: Developing Real Time Monitoring and Prediction System for Reduced Visibility and Understanding Traffic and Human Factors Implications". Dr. Mohammed Hadi, P.E., of Florida International University, was the profiled

Principal Investigator for the Winter newsletter, and Florida International University Ph.D. student Somayeh Fakharian Qom was the profiled student.



The 2015 NCTSPM Annual Report will be released in the winter of 2015/16. The report will provide an overview of our 2015 activities, including research, education, and technology transfer. It will be distributed to our university partners, the UTCs, state DOTs, the NCTSPM Board of Advisors, and at the Transportation Research Board Annual Meeting and 2016 Southeast UTC Conference.

Promote diversity in the workforce through active recruitment of women and minority students into degree programs

During the reporting period, each university took action to recruit women and minority students into their transportation programs and provide them with opportunities for professional development. Activities included:

- At UCF a female PhD student worked as a research assistant on the NCTSPM research project.
- FIU recruited three minority undergraduate students for NCTSPM internships at local transportation agencies.
- FIU provided training to 16 minority high-school students in a 2-week summer transportation camp.
- UAB conducted the third annual Summer Enrichment program during June 2015. Six minority students participated in the program this year.
- GT funded 18 female students of which 3 were minority students, and 2 minority male students.
- The center provided a stipend of $1,000/month to a minority student during his internship with MARTA from January through April.
- A female Information Technology major from Florida International University (FIU), interned with District Four of the Florida Department of Transportation (FDOT). She worked with intelligent transportation systems, aiding District traffic operators in monitoring roadway conditions.
- A minority Civil Engineering student at FIU interned this summer as an Undergraduate Assistant with FDOT working with FDOT's District VI Intelligent Transportation Systems department.
- A female freshman undergraduate at the Georgia Institute of Technology (GT), interned with the Transportation Safety and Operations Lab (TSOL) as a part of her required Magnet Senior internship. A GT graduate student, supervised her work in completing human factors research certification course, collecting data from her high school, and drafting a full-length paper. This was the pilot internship for the TSOL, who expect to continue the program in the future, and

published an ASEE conference paper on “Designing an Engineering Research Experience for High School Students”.

Act as a national resource for the debates and discussions that focus on the evolving national transportation program and future directions

UCF researchers found that the Airport weather data was useful for predicting low-visibility related traffic risks. They hope that utilizing airport weather data will save considerable expenses incurred from installing weather sensors on the highway.

UAB also hosted the 2015 Sustainable Smart Cities Symposium in Birmingham, which included presentations on sustainable transportation and development and a panel discussion with the leading experts from industry and academia.

Recently, a researcher at GT contributed to the ongoing discussion of public transit agencies' use of social media in communicating with their users. Her article, "How Public Transit Agencies Deal with All Your Angry, Mean, and Terrible Tweets", discussed riders' potential expectations in regards to these agencies' online presence, and how they used social media, particularly Twitter, to communicate with transit companies.

Georgia Tech hosted six seminars during the reporting period, bringing a variety of speakers to discuss their research and professional pursuits. Speakers and their topics included:

- Dr. Susan Handy, “Driving Less: Reducing Vehicle-Miles Traveled in the Land of Freeways”
- Dr. Samer Madanat, “Incorporating Environmental Sustainability Objectives in the Planning, Operations, and Maintenance of Transportation Systems”
- Dr. Ken Laberteaux, “Tracking Transportation Trends: Gen Y, Suburbs, and Automated Driving”
- Dr. Geoffrey Whitfield, “Active Transportation: Understanding Surveillance and Measuring Health Impacts”
- Dr. Daniel Piatkowski, “Carrots vs. Sticks: Strategies for Increasing Walking and Cycling in the US”
- Dr. Omar Smadi, “Asset Management: A New Approach to Decision Making”

FIU hosted the following seven guest speaker seminars during the reporting period:

- Dr. Ram M. Pendyala, “Applications of the Multiple Discrete-Continuous Choice Framework in Activity-Based Travel Models”
- Mr. Muhammad Asif Khan, “An Introduction to Miami-Dade County’s Transportation Plan in CDMP”
- Mr. K.K. Saxena, “How Miami-Dade County’s Advanced Transportation Management System is Improving Traffic Flow”

- Mr. Rossi M. Gaudio, “Ramp Metering Considerations on I-95 – The Miami Experience”
- Mr. Charles J. Robbins, “95 Express Dynamic Pricing”
- Mr. Zach Clark and Mr. Edward Myers, “Roundabout Triage – Improving Safety and Operations”
- Dr. Srinivas Geedipally, “4Es in Traffic Safety: What are their contributions?"

Explore international cooperative activities with research entities in selected countries where similar research interests exist

Many of our researchers are collaborating and presenting their work internationally.

UCF is currently communicating about the low-visibility issues with Korea Expressway Corporation, which manages the all the expressways in Korea. Recently 100-vehlcie pile-up occurred due to severe fog on the expressway in South Korea, which prompted the need for collaboration.

A UAB researcher continues to use UTC funds to leverage an ongoing NSF collaboration on B-WIM with universities in Ireland and the UK.

What opportunities for training and professional development has the program provided?

In the reporting period, more than _200_ students participated in NCTSPM research projects, which provided them with valuable training. Some gained field experience via data collection for research projects, while many others gained experience conducting analyses and writing.

UAB sponsored a group of eight undergraduate and graduate students who traveled to the Netherlands and Egypt during May 2015 to study sustainable transportation and development. Through a combination of tours, lab visits, seminars, and meetings with industry leaders in those countries, the students explored principles of sustainable urban engineering and developed reports for potential implementation of these practices in Birmingham, AL and the broader U.S.

UCF has provided the following training and professional development for graduate students and a postdoctoral associate:

1) Weather and traffic data collection and processing

2) GIS techniques to process the collected data and to identify hotspots

3) Statistical analysis techniques to analyze the data

4) Involvement of three Ph.D. students in solar-powered image capture systems.

5) A graduate student researcher funded by the FIU/UCF Joint project has been receiving training on industry practices and construction techniques for both ultra-high performance concrete and fiber-reinforced polymers. In addition, they have received training and curricular expertise regarding numerical methods in structural analysis.

How have the results been disseminated?

The NCTSPM website remains the main point of contact and promotion of best practices. During the reporting period, an updated Project Information Form was posted for each research project. Related documents, such as presentations, pictures, reports, and posters, have been also been uploaded when available. Most of the presentations hosted by the center have been recorded and posted to YouTube and other social media accounts. Additionally, the semi-annual email newsletter has served to inform readers about at least two featured NCTSPM-funded projects each reporting period.

Researchers have produced a number of technical papers and presentations to disseminate their work. Our researchers delivered nearly 100 presentations in the forms of conference proceedings, invited presentations/lectures, workshops, seminars, and webinars held on research projects. Many of these presentations were conducted at conferences. Our researchers are also prolific publishers. During the reporting period, more than 50 refereed journal and professional publications were submitted/accepted, to a variety of journals such as Transportation Research Record, Accident Analysis & Prevention, Journal of Transportation Safety and Security, ASCE Journal of Composites for Construction, Journal of Civil Engineering and Architecture, Traffic Injury Prevention, etc.

What do you plan to do during the next reporting period to accomplish the goals?

Research will continue on the active NCTSPM projects; project information forms posted on the website provide detailed work plans. Final reports are expected for a number of projects.

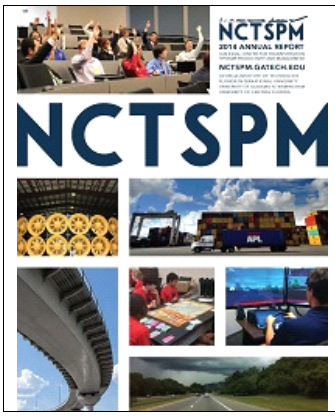
UCF will organize the *Road Safety and Simulation 2015* conference in Orlando, Florida in October 2015.

Georgia Tech will host eight seminars during the fall semester. These events are open to Georgia Tech students, faculty, and staff, as well as alumni and general members of the public. Recording of these seminars are available on the center's YouTube channel.

Products

The center's website, http://nctspm.gatech.edu continues to be updated regularly with updates on research projects, educational initiatives, and news related to NCTSPM researchers.

The center produces newsletters that provide updates on research projects, educational activities, and the people behind center. The spring newsletter highlighted two research projects, a researcher profile and a student profile, recent events and upcoming events.

	In 2015, NCTSPM will produce an Annual Report, which provides an overview of 2015 center activities, including research, education, and technology transfer. It will be distributed to our university partners, the UTCs, state DOTs, the NCTSPM Board of Advisors, and to attendees at Georgia Tech's TRB reception and the 2016 Southeast UTC Conference.

Our researchers will continue to produce technical papers and deliver presentations to disseminate their work throughout the nation and internationally (see table in page 8).

Participants and Other Collaborating Organizations

NCTSPM Participants at Georgia Institute of Technology

The following individuals from Georgia Tech have worked on the NCTSPM at the programmatic level.

Name	*Michael Hunter, Ph.D.*
Program/Project Role	*NCTSPM Director*
Number of hours worked during the reporting period	*Approximately 500 hours*
Contribution to Program/Project	*Responsible for oversight and governance of NCTSPM*
Funding Support	*UTC, GDOT*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

Name	*Catherine Ross, Ph.D.*
Program/Project Role	*NCTSPM Deputy Director for Policy, Education and Workforce Development*
Number of hours worked during the reporting period	*Approximately 60 hrs.*
Contribution to Program/Project	*Responsible for administrative oversight and faculty coordination; liaison to NCTSPM researchers.*
Funding Support	*UTC, GDOT*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*

If traveled to foreign country(ies), duration of stay	*N/A*
Name	*Michael O. Rodgers, Ph.D.*
Program/Project Role	*NCTSPM Deputy Director for Research and Technology Transfer*
Number of hours worked during the reporting period	*Approximately 350 hours*
Contribution to Program/Project	*Oversees subcontract reporting requirements and research products and is responsible for coordinating technology transfer activities of the center*
Funding Support	*UTC, GDOT, U.S. DOE,*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

Name	*Ms. Audrey F. Leous*
Program/Project Role	*Research Program Coordinator*
Number of hours worked during the reporting period	*Approximately 800 hours*
Contribution to Program/Project	*Provided administrative management and assistance to Center.*
Funding Support	*UTC, GDOT*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

Name	*Ms. Marjorie Jorgenson*
Program/Project Role	*Transportation Faculty Assistant*
Number of hours worked during the reporting period	*Approximately 250 hrs.*
Contribution to Program/Project	*Provide assistance to Director and Research Coordinator for UTC management*
Funding Support	*GT*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

NCTSPM University Partner Representatives

These individuals have served as liaisons between NCTSPM and their institutions to organize joint efforts related to research, education, technology transfer, and workforce development. These met with the NCTSPM Director and Deputy Director, via teleconference, in an initial kick-off meeting in order to establish governing parameters for the management and coordination of the center's research and activities. They also coordinated submissions of proposals and cost sharing from their respective institutions and were members of the proposal selection committee. Subsequently, these individuals served to facilitate the subcontracting process within their institutions.

University of Alabama, Birmingham

Fouad H. Fouad, Professor and Chair, Department of Civil Construction and Environmental Engineering
Email: ffouad@uab.edu

Name	*Fouad H. Fouad, Ph.D.*
Program/Project Role	*NCTSPM Partner Representative/University of Alabama, Birmingham*
Number of hours worked during the reporting period	*Approximately 15 hours*
Contribution to Program/Project	*Liaison between UTC and the University of Alabama, Birmingham*
Funding Support	*UTC, ADOT, UAB*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

Florida International University

Dr. Albert Gan, Email: gana@fiu.edu

Name	*Albert Gan, Ph.D.*
Program/Project Role	*NCTSPM Partner Representative / Florida International University*
Number of hours worked during the reporting period	*200 hours on (1) development, coordination, administration, and teaching of a two-week Summer Transportation Camp; (2) recruitment and administration of student internship program.*
Contribution to Program/Project	*Liaison between UTC and Florida International University*
Funding Support	*UTC, FDOT, FIU*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

University of Central Florida

Dr. Essam Radwan, Executive Director, Center for Advanced Transportation Systems Simulation
Email: Ahmed.Radwan@ucf.edu

Name	*Essam Radwan, Ph.D.*
Program/Project Role	*NCTSPM Partner Representative/University of Central Florida*
Number of hours worked during the reporting period	*Completed approximately 40 hours in activities related to research, education, and administration activities.*
Contribution to Program/Project	*Liaison between UTC and the University of Central Florida*
Funding Support	*UTC, FDOT, UCF*
Collaborated with individual in foreign country	*N/A*
Country(ies) of foreign collaborator	*N/A*
Travelled to foreign country	*N/A*
If traveled to foreign country(ies), duration of stay	*N/A*

Advisory Board and Other Collaborators

The following are members of the NCTSPM Advisory Board:
Tread Davis – Lawyer and Board Member, Atlanta Regional Commission (Chair)
James Balloun – Financial Investor and Former CEO (Past Chair)
Harry L. Anderson - Senior Vice President, Global Business and Technology Services, The Coca-Cola Company
Harold Barley – Executive Director, MetroPlan Orlando
Mark Bartlett – FHWA Division Administrator, Alabama
Jeffrey W. Brown – Alabama DOT Bureau Chief, Research and Development
Russell McMurry – GDOT Commissioner
Bill Johnson – Director, Port of Miami
Michelle Livingstone – Vice President for Supply Chain Distribution, The Home Depot
George Overstreet – Executive Board Member of the Alabama Trucking Association, Vice President of Operations
G. P. "Bud" Peterson – President, Georgia Tech, Ex Officio
Daniel L. Rodgers – President, Dunn Investment Company
Randy Stashick – Global Vice President of Engineering, UPS
Yvette Taylor – Regional Administrator, FTA
Dave Williams – Vice President of Infrastructure and Government Affairs, Metro Atlanta Chamber of Commerce

Other Partnering Organizations:
Georgia Department of Transportation (GDOT)
Florida Department of Transportation (FDOT)
Alabama Department of Transportation (ADOT)

Other Collaborators:
Morehead State University
Saint Louis University
Georgia State University
Georgia Southern University
Kennesaw State University

Impact

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

Our research is producing results that contribute to the body of knowledge on transportation safety, economic competitiveness, and state-of-good-repair. Research results are disseminated through publications and presentations, with the potential to impact transportation practitioners well beyond the Southeast region.

Our researchers also collaborate with state DOTs, regional planning commissions, and other transportation agencies, informing work that is being done at these agencies. For instance, researchers investigating "Bringing Freight Components into Statewide and Regional Travel Demand Forecasting" are working with their regional planning commissions, which may improve their in-house modeling. Likewise, many of our researchers are collaborating with their state DOTs, which may enhance DOT work; for instance, researchers at FIU are working closely with FDOT to develop a tool to enable DOT district offices to easily utilize the Highway Safety Manual. Researchers are also conducting research to help their DOT's evaluate and maintain the health of vital infrastructure, such as bridges, signage and pavement. These studies may help eliminate the types of structural failures that DOTs have experienced in the past. NCTSPM partner NCTSPM institutions are becoming recognized as leaders in the use of advanced materials for repair and retrofit of nation's infrastructure.

At FIU Ph.D. students are breaking new ground. One Ph.D. student is developing materials that will allow for increased load-bearing on existing bridges and extended service lives. Other is examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-making.

At Georgia Tech a Ph.D. student is researching the "inevitable" impact of autonomous vehicles, in order to develop modeling and performance measurement tools, and to demonstrate how these tools can be applied to high-volume freight corridors in Georgia. Another Ph.D. is focusing on the measurement of transportation system users' performance.

Meanwhile, at UAB, three outstanding graduate researchers and a postdoctoral researcher are impacting the civil engineering field in unique ways.

- A Ph.D. student and his advisor are evaluating anchor bolt clearance discrepancies and their research findings will be included in the future AASHTO Standard Specifications for Structural Supports manual.
- A master's student is contributing to a collaborative effort between UAB, FIU, and UCF, attempting to determine if a new type of decking system for bridges can help to speed up repair times for failing bridges.

- A Ph.D. student is working to determine optimal designs for highway signs to minimize fatigue caused by wind gusts.
- A postdoctoral research assistant is investigating the impacts of increasing vehicle loading on existing infrastructure to create bridge retrofit, management, and network maintenance tools for use by the bridge engineering community as a whole.

At the UCF, a master's student analyzed and assessed the behavior and performance of taxicab drivers in large cities. A Ph.D. student is focusing on understand the impact that environmental and traffic conditions have in causing car crashes. A master's student is working on the factors that affect driver behavior and safety at toll plazas.

Researchers at UAB worked closely with the Regional Planning Commission of Greater Birmingham (RPCGB) to evaluate the new tour based model. The RPCGB is interested in continuing development of this model and improving freight forecasting for the region. UAB is currently negotiating additional projects with the RPCGB related to the freight model.

The results of the Digital Billboards project are likely to influence the future Alabama DOT guidelines for their placement and characteristics.

The researchers of the Anchor Bolts study have developed analysis procedures and design methods for computing the stress distribution for anchor bolts with excessive and uneven standoff distances, something that was not available earlier. They also developed a procedure to identify structures that are susceptible to damage resulting from this condition, which will help the Alabama DOT eliminate the types of structural failures that has experienced in the past.

What is the impact on other disciplines?

The interdisciplinary nature of NCTSPM's work impacts disciplines beyond transportation engineering. Our work spans public policy, public health, and economics.

For instance, several projects focus on freight movement; these studies not only inform the discipline of transportation engineering, but also the disciplines of supply chain management and regional economics. "Optimizing EMS Through The Use of Intelligent Transportation Systems (ITS) Technologies" impacts the discipline of health; "Reducing Service Interruptions in Linear Infrastructure Systems (Transportation and Water/Sewer) by Synchronizing Schedules for Selected Maintenance Activities" deals with environmental engineering. These researchers are publishing in non-transportation-centered publications and presenting at non-transportation-focused conferences. The UTC funding is a critical part of producing this multidisciplinary work.

The results of the Visibility Project supplemented with quick and accurate weather prediction will be essential for providing timely and adequate preemptive countermeasures to avoid traffic crashes.

What is the impact on transportation workforce development?

NCTSPM places a heavy emphasis on workforce development. Each partner university engages in a variety of activities to support this work.

During the reporting period, over 200 students were involved in our research projects, providing them with valuable experience in transportation research and over 20 of those students received degrees.

The transportation graduate program at UCF has produced graduates receiving both MS and Ph.D. degrees and engineering consulting firms, academia, and public agencies employed their recipients. Specifically, the Florida Department of Transportation, the Florida Turnpike Enterprises, and the City of Orlando are the three public agencies that hired the majority of our MS graduate. Other Ph.D. graduates were hired in academic institutions in Australia, China, and the US.

At UAB, the Summer Enrichment Program has provided transportation engineering training to 16 freshman and sophomore minority students. Also, the middle school Youth Champions Program has provided education and learning activities related to transportation for approximately 52 middle school students.

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

Nothing new to report.

What is the impact on technology transfer?

Technology transfer is an important component of our program. Many of our research projects have a focus on being applied, so that transportation agencies can readily apply them to their own work.

The main vehicle for technology transfer is presentations and publications delivered by our researchers. During the reporting period, our researchers delivered over 100 presentations in the forms of conference proceedings, invited presentations/lectures, workshops, seminars, and webinars held on research projects.

In the reporting period, UAB planned and produced the 2015 Regional UTC Conference for the Southeast Region, which was hosted in Birmingham in March 2015. The conference was a collaboration between UAB and Mississippi State University. NCTSPM faculty and graduate students presented their NCTSPM research and findings.

Collaborative project between 2 states (FL and AL) engages the State DOTs directly and addresses broader concerns that may lead to immediate deployment of some of the solutions. There are plans to engage the AL DOT in the next reporting period to gage interest and ascertain feasibility of deploying a test hybrid bridge deck.

What is the impact on society beyond science and technology?

We expect several projects will have impacts beyond science/engineering professions.

"Bringing Freight Components into Statewide and Regional Travel Demand Forecasting" has already demonstrated improvements over traditional freight models and we will continue to pursue implementation of the tour based model in Birmingham. This could lead to better freight facilities for private carriers. Goods movement will also be impacted by the results of "Automated Data Collection for Origin/Destination Studies of Freight Movement," as it has the potential to reduce the cost of transporting goods.

"Impact and Feasibility Study of Solutions for Doubling Heavy Vehicles" will, in the end, impact the trucking and commercial freight industries.

"Digital Advertising Billboards and Driver Distraction" may ultimately have impacts to both State DOT's as well as the advertising industry.

The results of the Visibility Project, when will save many precious lives from traffic crashes due to reduced visibility.

The outcomes of the Commercial Vehicles O-D Project are expected to reduction of emissions, travel time, cost of goods transport and increase the capacity of the national highway system to move freight.

The joint FIU/UCF project addresses major national need: deteriorating infrastructure and increasing demands on the existing infrastructure. Therefore, potential for extending service life of bridges through deck replacement (most common cause of deficient or functionally obsolete bridges) has major economic and social impacts.

Changes/Problems

Changes in approach and reasons for change: Nothing to Report
Changes that have a significant impact on expenditures: Unexpected increase in costs for installation of system for the Commercial Vehicles O-D Project
Significant changes in use or care of human subjects, vertebrate animals and/or biohazards: Nothing to Report
Change of primary performance site location from that originally proposed: Nothing to Report

Special Reporting Requirements

Specific Requirements

Website: Created and operational in 2013; continues to be updated regularly as new information becomes available
Directory of Key Personnel: Information available on the program website and updated as needed
Financial and Annual Share Reports: The SF425 requirements will be met by separate report.
FFATA Subaward and Executive Compensation Report: Will be met by separate submission
Research Project Descriptions: Available on program website. The projects selected and funded by the center are provided below.

Projects Selected for Funding by NCTSPM

Project Title	Lead Uniy	Principal Investigator
Integrating Safety in Developing a Variable Speed Limit System	UCF	Mohamed Abdel-Aty
Reducing Service Interruptions in Linear Infrastructure Systems (Transportation and Water/Sewer) by Synchronizing Schedules for Selected Maintenance Activities	FIU	Berrin Tansel
Performance Measurements of Transportation Systems based on Fine-Grained Data Collected by AVI and AVL Systems	FIU	Mohammed Hadi
Full-Scale Wall of Wind Testing of Variable Message Signs (VMS) Structures to Develop Drag Coefficients for AASHTO Supports Specifications	FIU	Arindam Chowdhury
Information Services in Social Networked Transportation	GT	Hans Klein
Traffic Management Centers: Challenges, Best Practices, and Future Plans	FIU	Xia Jin
Digital Advertising Billboards and Driver Distraction	UAB	Virginia Sisiopiku
Impact and Feasibility Study of Solutions for Doubling Heavy Vehicles	UAB	Nasim Uddin
Optimizing EMS Through The Use of Intelligent Transportation Systems (ITS) Technologies	UAB	Andrew Sullivan
Efficient Utilization of the Existing Its System and the Viability of a Proactive Traffic Management System for the Orlando-Orange County Expressway Authority System	UCF	Mohamed Abdel-Aty
Development of a Prototype Evidence-Based Database and Planning Tool: Applying Performance Management Principles in Asset Management Program Development	GT	Adjo Amekudzi
Bringing Freight Components into Statewide and Regional Travel Demand Forecasting	GT	David Lee
Development of Risk Management Strategies for State DOTs to Effectively Deal with Volatile Prices of Transportation Construction Materials	GT	Baabak Ashuri
Freight Movement and Economic Competitiveness from the Megaregion Perspective	GT	Catherine Ross
Economic Development and Workforce Impacts of State DOT Expenditures	GT	Danny Boston
Factors Influencing Visual Search in Complex Driving Environments	GT	Mike Hunter
Next-Generation Wireless Bridge Weigh-in-Motion (WIM) System Incorporated with Nondestructive Evaluation (NDE) Capability for Transportation Infrastructure Safety	GT	Yang Wang
Micro-Dynamics of Business Location and Growth and its Effects on the Transportation Network and Congestion in Georgia and the Southeast Region	GT	Frank Southworth
Automated Data Collection for Origin/Destination Studies of Freight Movement	UCF	Amr A. Oloufa
Enhanced Role of Activity Center Transportation Organizations in Regional Mobility	GT	Angshuman Guin
Georgia SPLOST Database and Clearinghouse for Transportation Finance	GT	Catherine Ross
GRTA/GDOT Real-Time Tracking and Choice Data	GT	Randall Guensler
Evaluation of Signage Alternatives for Express Lane Facilities	FIU	Albert Gan
Innovative Modular High Performance Lightweight Decks for Accelerated Bridge Construction	FIU	Amir Mirmiran
Field Validation of a Drive-By Bridge Inspection System with Wireless BWIM + NDE Devices	GT	Yang Wang
Development of a Web-based Decision Making Tool for the Highway Safety Manual Implementation	FIU	Priyanka Alluri
A Data Driven Approach to State Transportation Investment Decisions: a Transportation Project Investment and Evaluation Resource (T-Pier)	GT	Timothy F. Welch
Freight impacts on Small Urban and Rural Areas	GT	Catherine Ross
HOV to HOT Conversion Impacts on Carpooling	GT	Yanzhi "Ann" Xu
Consumer Response to Road Pricing: Macro and Micro Modeling Tools for Socioeconomic Evaluation and Pricing of Managed Lanes	GT	Randall Guensler
Evaluation of the Cost Effectiveness of Illumination as a Safety Treatment at Rural Intersections	GT	Angshuman Guin
Assessment of High Early Strength Limestone Blended Cement for Next Generation Transportation Structures	GT	Kimberly Kurtis
Managing Transportation System Health: Setting Performance Targets and Policies in Non-Uniform Regions and Jurisdictions to Achieve Uniform Statewide and National Objectives	GT	Adjo Amekudzi

Extending HYRISK to Predict Scour Risk as a Function of Soil Erodibility Characteristics	GT	Laurie Garrow
Cooperative Vehicle-Highway Automation (CVHA) Technology: Simulation of Benefits and Operational Issues	GT	Michael Rodgers
Next Generation Crack Sealing Planning Tool for Pavement Preservation	GT	James Tsai
Estimating the Monetary Benefits of Reducing Delays on Heavily Trafficked Truck Freight Corridors in Georgia	GT	Frank Southworth
A Comprehensive Investigation of Visibility Problems on Highways: Developing Real Time Monitoring and Prediction System for Reduced Visibility and Understanding Traffic and Human Factors Implications	UCF	Mohamed Abdel-Aty
Evaluating the Impact of Real-time Transit Passenger Information on Ridership and Mode Share	GT	Kari Watkins
Bridge Rail Design Procedures	UAB	Dean Sicking
Evaluation of Anchor Bolt Clearance Discrepancies	UAB	Ian Hosch
Examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-Making	FIU	Xia Jin