



Program Progress Performance Report for University Transportation Centers

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

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DUNS # 09-739-4084 EIN # 58-0603146

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

Submission Date: May 30, 2017

Reporting Period Start Date: July 1, 2016

Reporting Period End Date: December 31, 2016

Report Frequency: Semi-Annual, PPPR #10

Signature of Submitting Official:

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05/30/17

Date



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 competitiveness, 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 competitiveness and safety

NCTSPM supports multi-disciplinary research. Some projects simultaneously address infrastructure and safety; others deal with state-of-good-repair and economic competitiveness; while still others address all three 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.

UAB Continued work on three UTC projects, all of which are collaborations with center universities. Topics include drive-by damage detection of bridges, evaluation of FRP retrofits to bridge structures, and the use of ITS technologies for EMS.

Georgia Tech completed final reports for three projects and continued working on four projects.

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.

In 2016, NCTSPM produced over 111 research reports and journal publications, and presented over 66 conference proceedings, invited presentations/lectures on research findings, workshops, seminars, and webinars on a variety of research projects and produced one patent. Research papers were cited over 85 times in 2016.

UAB researchers published 11 papers related to NCTSPM projects and made eight conference presentations during this period. Details of these papers and presentations are provided in this document.

UCF researchers gave several presentations related to the O/D project held for District 5, FDOT.

FIU made two presentations at the 10th University Transportation Center Spotlight Conference: Pedestrian and Bicycle Safety, Washington, DC, December 1-2, 2016.

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

NCTSPM actively promotes education and professional development.

UCF engaged three graduate students in research during the reporting period.

For the fourth year in a row, the UCF Transportation Systems Engineering program hosted Camp Connect. The week long camp in July brought 13th through 17th graders to campus, where they were presented with an overview of the engineering discipline, describing each field using real world examples. The students also learned about transportation through an interactive board game called Reservation Road Planner where they had to complete a project through the five stages of development, project inventory inclusion, funding, preconstruction, and construction.

FIU held four seminars and GT held five seminars with guest speakers from government agencies and consulting companies.

FIU ITE Student Chapter received Best Student Chapter Award from the International Institute of Transportation Engineers (ITE) at the August 2016 ITE Annual Meeting

More than 60 researchers and students actively participated in this year's Georgia DOT Research Expo, on September 13, 2016, which was jointly hosted by the Georgia Department of Transportation and the Georgia Transportation Institute. The event featured over 85 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 remained the main point of contact and promotion of best practices. In the reporting period, the website received more than 4,720 page views, 2,566 unique visits, and 2,147 first time visits, which are illustrated in Figure 1 and Table 1 below.

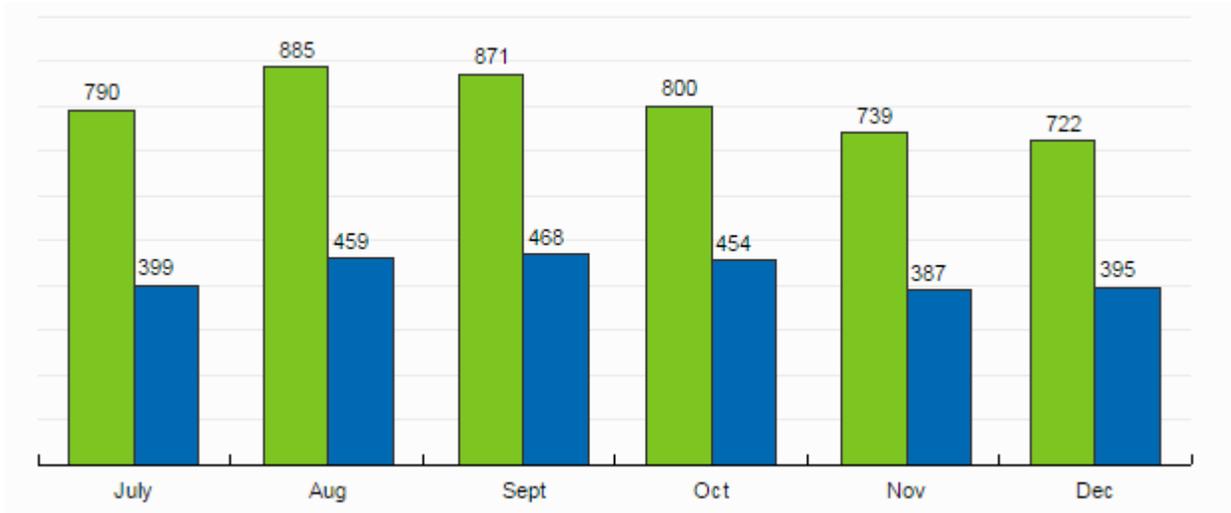


Figure 1. Web traffic during reporting period

Table 1: Web traffic during reporting period

	Page Views	Unique Visits	First Time Visits	Returning Visits
Dec 2016	722	395	328	67
Nov 2016	739	387	315	72
Oct 2016	800	454	406	48
Sept 2016	871	468	384	84
Aug 2016	885	459	379	80
July 2016	790	399	335	64

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:

- GT funded four female students of which two were minority students, and two minority male students for participation in UTC activities.
- UAB conducted the fourth annual Summer Enrichment program during June 2016. Six minority students participated in the program this year.

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

UAB has hosted conferences on NCTSPM topics as well as sustainable transportation and development.

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

- Dr. Patricia Mokhtarian, "Well-being and Travel: Retrospect and Prospect"
- Dr. Zhanmin Zhang, "Enhancing Infrastructure Management Through Cross-asset Resource Allocation"
- Dr. Roger Wayson, "Continuing to Understand and Improve Regulatory Models for Transportation Air Quality"
- Dr. Khaled Abdelghany, "A Real-Time Decision Support System for Robust Traffic Network Management"
- Dr. Laurie A. Garrow, "Estimation of Airline Itinerary Choice Models Using Disaggregate Ticket Data"

FIU hosted four seminars with guest speakers from government agencies and consulting companies.

- December 01, 2016, "Current and Future Initiatives in TSM&O Program in District Four", by Ms. Melissa Ackert, District Transportation Systems Management and Operations Engineer, Florida DOT, District 4.
- October 21, 2016, "The Use of Vehicular Countdown Traffic Signals- A Feasibility Analysis", by Dr. Joan Shen, P.E., Transportation Adviser to the City Manager, City of Doral.
- October 14, 2016, "Pedestrian and Bicycle Transportation Planning and Design Considerations", by Mr. Antonio Rosell, P.E., AICP, Director, Community Design Group (CDG).
- September 16, 2016. "Comparative Analysis of Dynamic Pricing Strategies for Managed Lanes", by Mr. Rodney Carrero-Vila, Freeway and Arterial Management System Specialist, Florida DOT.

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.

Dr. Uddin of UAB 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 27 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 six undergraduate and graduate students who traveled to England and Egypt during May 2016 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 and the broader U.S.

UAB faculty presented to the Birmingham Regional Planning Commission Technical Committee on the topic of incident management and the impacts of incidents and EMS response times on traffic congestion in the Birmingham Region. The purpose was to educate local officials of the importance of incident response and non-recurring congestion on the region. UAB faculty also presented on this topic at the FHWA sponsored Regional Training Planning Workshop in Birmingham in September 2016.

Three UCF graduate students were involved in system design, construction supervision, and data collection.

How have the results been disseminated?

The NCTSPM website remains the main point of contact and promotion of best practices. Related documents, such as presentations, pictures, reports, and posters, have been uploaded when available. Most of the presentations hosted by the center have been recorded and posted to YouTube and other social media accounts.

Researchers have produced a number of technical papers and presentations to disseminate their work. During 2016, NCTSPM produced over 111 research reports and journal publications, and presented over 66 conference proceedings, invited presentations/lectures on research findings, workshops, seminars, and webinars on a variety of research projects and produced one patent. Research papers were cited over 85 times in 2016. Examples include:

UAB researchers have submitted 11 journal papers during this reporting period:

1. Doustmohammadi, E., Sisiopiku, V.P., and Sullivan, A. (2016). "Modeling Freight Truck Trips in Birmingham Using Tour-based Approach", *Journal of Transportation Technologies*, 6, 436-448.
2. Elhatab A. and Uddin, N. (2017) "Drive-by Bridge Damage Detection Using Non-Specialized instrumented vehicle", *Journal of Bridge Structures*, accepted for publication.

3. Elhatab A., Uddin, N, and Obrien, E. (2017) "Drive-by bridge damage monitoring using Bridge Displacement Profile Difference", *Journal of Civil Structural Health Monitoring*, DOI 10.1007/s13349-016-0203-6
4. Kalyankar, R., and Uddin, N. (2017) "Axle Detection on Prestressed Concrete Bridge Using Bridge Weigh-In-Motion System", *Journal of Civil Structural Health Monitoring*, accepted for publication.
5. Zhao, Z. and Uddin, N. (2016) "Bridge Weigh-in-Motion Algorithms Based on the Field Calibrated Simulation Model" *ASCE Journal of Infrastructure System*, February 2016, DOI: 10.1061/(ASCE)IS.1943-555X.0000308
6. Du, W. & Uddin, N. (2016) "Innovative Composite Structural Insulated Panels (CSIPs) Folded Shell Structures for Large-Span Roofs", *Journal of Materials and Structures*, February 2017, 50: 51. doi:10.1617/s11527-016-0924-3
7. Kalyankar, R. R., and Uddin, N. (2017), "Simulation of Advanced 3D Finite Element Dynamic Vehicle Bridge Interaction Using Single and Multi-Vehicle Scenario for Obtaining Dynamic Amplification Factor," *Int. Journal of Bridge Engineering*, Volume 5, Issue 2 (May. - Aug. 2017).
8. Kalyankar, R. R., and Uddin, N. (2016), "Simulating the Effects of Surface Roughness on Reinforced Concrete T Beam Bridge under Single and Multiple Vehicles," *Advances in Acoustics and Vibration*, vol. 2016, Article ID 3594148, 12 pages, 2016. doi:10.1155/2016/3594148.
9. Mostafa, M. and Uddin, N. (2016) "Experimental analysis of Compressed Earth Block (CEB) with banana fibers resisting flexural and compression forces", *Journal of Case Studies in Construction Materials*, Volume 5, December 2016, Pages 53–63.
10. Pandey, S., Haider, M. and Uddin, N. (2016) "Design and Implementation of a Low-Cost Wireless Platform for Remote Bridge Health Monitoring", *International Journal of Emerging Technology and Advanced Engineering*, Volume 6, Issue 6, June 2016
11. Lydon, M., Robinson, D., Taylor, S. E., OBrien, E., Uddin, N. (2016) "Next generation bridge weigh-in-motion system: optimized using explicit finite element analysis" *ASCE Journal of Bridge Engineering*, Accepted for publication.

UAB researchers were also accepted for eight conference presentations:

1. Elhatab A. Uddin, N, and Obrien, E. "Drive-by Bridge Damage Detection Using Road Reaction Force", IALCCE, Netherlands, (2016)
2. Elhatab A., Uddin, N, and Obrien, E. "Drive-by Bridge Inspection Using Inverse Dynamics Optimization Algorithm", IALCCE, Netherland (2016)
3. Elhatab A. and Uddin, N, Drive-by Bridge Inspection Using Inverse Dynamics Optimization Algorithm, 26th Research Symposium 2017, ASNT Conference, 2017, Tampa, Florida
4. Elhatab A. and Uddin, N, Identifying Localized Bridge Damage Using Frequency Domain Decomposition, 26th Research Symposium 2017, ASNT Conference, 2017, Tampa, Florida
5. Elhatab A. and Uddin, N, Field Verification for Drive-by Bridge Monitoring using Non-specialized Inspection Vehicle, 26th Research Symposium 2017, ASNT Conference, 2017, Tampa, Florida
6. Winardi, E. and Uddin, N, Bridge Curvature for Detecting Bridge Damage Location, 26th Research Symposium 2017, ASNT Conference, 2017, Tampa, Florida
7. Tan, C. and Uddin, N, Damage Assessment and Localization for Bridge Structures, 26th Research Symposium 2017, ASNT Conference, 2017, Tampa, Florida
8. Mohammed, Yahya M. and Uddin, N, Bridge Damage Detection using The Inverse Dynamics Optimization Algorithm, 26th Research Symposium 2017, ASNT Conference, 2017, Tampa, Florida

UCF Papers:

- Al-Ramahee, M.A., Chan, T., Mackie, K.R., Ghasemi, S., and Mirmiran, A. (2017). "Lightweight UHPC-FRP composite deck system." *Journal of Bridge Engineering (ASCE)*, accepted January 2017.

FIU Papers Prepared, Published and/or Presented:

1. Alluri, P. *Development of Decision Making Tool for Highway Safety Manual Implementation*, 2016 Florida Section ASCE Conference, Jacksonville, FL, July 14-16, 2016.
2. Shams, K., Asgari, H., & Jin, X. (2016) Valuation of Travel Time Reliability in Freight Transportation: A Review and Meta-Analysis of Stated Preference Studies. *Transportation Research Part A: Policy and Practice* (in press). <http://dx.doi.org/10.1016/j.tra.2016.08.001>.
3. Shams, K., X. Jin, R. Fitzgerald (2016). Stated Preference Survey Design to Understand How Freight Users Value Travel Time Reliability. *Transportation Research Procedia, Proceedings of the 14th World Conference on Transport Research*, Shanghai, China, July 10-15, 2016.
4. Alluri, P., Gan, A., Saha, D., and Fernandez, L. (2017). "Evaluation of Signage Alternatives for Express Lane Facilities: A Focus Group Study," *Proceedings of the 96th Annual Meeting of the Transportation Research Board*, Washington, DC (Revised version was accepted for publication in *Transportation Research Record: Journal of the Transportation Research Board*).
5. Gan, A., Alluri, P., Raihan, A., Liu, K., Saha, D., and Jung, R. (2017). "An Automated System for Prioritizing Highway Improvement Locations and Analyzing Project Alternatives," *Proceedings of the 96th Annual Meeting of the Transportation Research Board*, Washington, DC (Revised version was accepted for publication in *Transportation Research Record: Journal of the Transportation Research Board*).
6. Saha, D., Alluri, P., Wu, W., and Gan, A. (2017). "Analysis of Bicycle Crashes with Spatial Autocorrelation: A Comparison of Conditional Autoregressive Models," *Proceedings of the 96th Annual Meeting of the Transportation Research Board*, Washington, DC.

Two FIU students attended the 10th University Transportation Center Spotlight Conference: Pedestrian and Bicycle Safety, Washington, DC, December 1-2, 2016.

1. Raihan, A. *Impact of Roadway Characteristics on Bicycle Safety*, 10th University Transportation Center Spotlight Conference: Pedestrian and Bicycle Safety, Washington, DC, December 1-2, 2016.
2. Huq, A. *Comprehensive Study to Improve Bicycle Safety*, 10th University Transportation Center Spotlight Conference: Pedestrian and Bicycle Safety, Washington, DC, December 1-2, 2016.

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.

NCTSPM researchers will present work at the Transportation Research Board 96th Annual Meeting in January 2017.

Georgia Tech will host seminars during the spring 2017 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.

UAB will host the 2017 Sustainable Smart Cities Symposium in October in Birmingham with NCTSPM sponsorship.

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 summer newsletter highlighted two research projects, a researcher profile and a student profile, recent events and upcoming events.

Our researchers will continue to produce technical papers and deliver presentations to disseminate their work throughout the nation and internationally.

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

Name	<i>Catherine Ross, Ph.D.</i>
Program/Project Role	<i>NCTSPM Deputy Director for Policy, Education and Workforce Development</i>
Number of hours worked during the reporting period	<i>Approximately 60 hrs.</i>
Contribution to Program/Project	<i>Responsible for administrative oversight and faculty coordination; liaison to NCTSPM researchers.</i>
Funding Support	<i>UTC, GDOT</i>
Collaborated with individual in foreign country	<i>N/A</i>
Country(ies) of foreign collaborator	<i>N/A</i>
Travelled to foreign country	<i>N/A</i>
If traveled to foreign country(ies), duration of stay	<i>N/A</i>
Name	<i>Michael O. Rodgers, Ph.D.</i>
Program/Project Role	<i>NCTSPM Deputy Director for Research and Technology Transfer</i>
Number of hours worked during the reporting period	<i>Approximately 350 hours</i>
Contribution to Program/Project	<i>Oversees subcontract reporting requirements and research products and is responsible for coordinating technology transfer activities of the center</i>
Funding Support	<i>UTC, GDOT, U.S. DOE,</i>
Collaborated with individual in foreign country	<i>N/A</i>
Country(ies) of foreign collaborator	<i>N/A</i>
Travelled to foreign country	<i>N/A</i>
If traveled to foreign country(ies), duration of stay	<i>N/A</i>

Name	<i>Charlene Mingus, MCRP & MSCE</i>
Program/Project Role	<i>Research Program Coordinator</i>
Number of hours worked during the reporting period	Approximately 800 hours
Contribution to Program/Project	<i>Provided administrative management and assistance to Center.</i>
Funding Support	<i>UTC, GDOT</i>
Collaborated with individual in foreign country	<i>N/A</i>
Country(ies) of foreign collaborator	<i>N/A</i>
Travelled to foreign country	<i>N/A</i>
If traveled to foreign country(ies), duration of stay	<i>N/A</i>

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

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

Florida International UniversityDr. Albert Gan, Email: gana@fiu.edu

Name	<i>Albert Gan, Ph.D.</i>
Program/Project Role	<i>NCTSPM Partner Representative / Florida International University</i>
Number of hours worked during the reporting period	<i>Approximately 200 hours</i>
Contribution to Program/Project	<i>Liaison between UTC and Florida International University</i>
Funding Support	<i>UTC, FDOT, FIU</i>
Collaborated with individual in foreign country	<i>N/A</i>
Country(ies) of foreign collaborator	<i>N/A</i>
Travelled to foreign country	<i>N/A</i>
If traveled to foreign country(ies), duration of stay	<i>N/A</i>

University of Central FloridaDr. Essam Radwan, Email: Ahmed.Radwan@ucf.edu

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

Advisory Board and Other Collaborators

The following are members of the NCTSPM Advisory Board:

F.T. "Tread" Davis, Jr. – Senior Counsel, McKenna Long & Aldridge, LLP (Board Chair) and Board Member, Atlanta Regional Commission

Harry L. Anderson - Senior Vice President, Global Business and Technology Services, The Coca-Cola Company

James Balloun – Financial Investor and Former CEO (Past Chair)

Harold Barley – Executive Director, MetroPlan Orlando

Mark Bartlett – FHWA Division Administrator, Alabama

Jeffrey W. Brown – Alabama DOT Bureau Chief, Research and Development

Mike Dover – GDOT Deputy Commissioner

Bill Johnson – Director, Port of Miami

Michelle Livingstone – Vice President for Transportation Distribution, The Home Depot

Todd Long – Chief Operating Officer, Fulton County

Russell McMurry – GDOT Commissioner

George Overstreet – Executive Board Member and Vice President of Operations, Alabama Trucking Association

G. P. "Bud" Peterson – President, Georgia Tech, Ex Officio

Jay Roberts – GDOT Division of Planning

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.

The UCF research for “Automated Data Collection for Origin/Destination Studies of Freight Movement” will produce an inexpensive and powerful approach for collecting data about travel destinations of commercial vehicles. UCF and partner NCTSPM institutions are becoming recognized as leaders in the use of advanced materials for repair and retrofit of nation’s infrastructure.

At UAB for the Anchor Bolts study, the project has continued to developed analysis procedures and design methods for computing the stress distribution for anchor bolts with excessive and uneven standoff distances. Bridge rail design procedures will be implemented by ALDOT and potentially other government entities. The Field Validation of a Drive-By- Bridge Inspection System with Wireless BWIM + NDE Devices project has laid the groundwork for future demonstration projects.

A project at FIU, “Development of Web-based Decision Making Tool for the Highway Safety Manual Implementation”, focuses on developing a web-based tool to assist agencies in deciding how to tailor the Highway Safety Manual (HSM) procedures to their needs by helping agencies select the most suitable safety analysis methods among those discussed in the HSM.

Human factors engineering, which attempts to account for the capabilities and limitations of drivers, promises to provide ways to improve safety by designing more forgiving systems and environments. By understanding a driver’s perception of the environment, engineers can make informed design changes to operational environments and reduce the potential for driver confusion, thus improving safety for both workers and drivers. The Georgia Tech project “Factors Influencing Visual Search in Complex Driving Environments” focused on identifying changes in the visual search patterns of drivers as environments became more complex. The overarching focus of the project was safety enhancement.

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", a project at UAB, impacts the discipline of health.

The FIU project "Examining the Value of Travel Time Reliability for Freight Transportation to Support Freight Planning and Decision-Making" advances the understanding of how the freight industry values transportation system performance in travel time reliability. Understanding the pattern and sensitivity of the demand is critical to freight investment and policy decisions.

The Georgia Tech project "Estimating the Monetary Benefits of Reducing Delays on Heavily Trafficked Truck Freight Corridors in Georgia" focuses on improving the information provided to state planners by assessing the state-of-the art in value of travel time saving for different classes of truck and automobile travel, and developing a practical method that can be applied at the statewide, corridor level for the purposes of deriving the monetary benefits of limiting within-corridor travel delays.

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 27 students were involved in our research projects, providing them with valuable experience in transportation research and over 11 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 graduates. Other Ph.D. graduates were hired in academic institutions in Australia, China, and the US.

At FIU, about six undergraduate and graduate students have been funded to conduct research for NCTSPM and match projects.

At UAB during the reporting period, students completed numerous master's theses and developed dissertations. For example:

MS Thesis: Yahya M. Abdelrazek: "Cyber physical system for monitoring and controlling loads"
(Graduated Summer 2016).

MS Thesis: Amin Pahlevannejad (MS Thesis leading to PhD): "Impact Simulation of Reinforced Concrete

in LS-DYNA”, (Graduated Summer 2016).

MS Project: Chris Arias: “The Use of Three Dimensional Finite Element Analysis to Simulate a Vehicle Moving Across a Bridge (Graduated Fall 2016).

PhD Dissertation Proposal (approved) by Ahmed Hattab: Drive-by Bridge Monitoring and Damage Identification

PhD Dissertation Proposal (approved) by Erik Winardi: Simulation of Dynamic Interaction of Bridge with Wind and vehicle

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 2016, NCTSPM produced over 111 research reports and journal publications, and presented over 66 conference proceedings, invited presentations/lectures on research findings, workshops, seminars, and webinars on a variety of research projects and produced one patent. Research papers were cited over 85 times in 2016.

The Georgia Tech project “Evaluation of the Cost Effectiveness of Illumination as a Safety Treatment at Rural Intersections” developed a tool that gives state DOTs better information for making decision about when illumination, as well as, what level of illumination is justified in a rural setting from a safety and operations perspective. Illumination is a proven safety countermeasure to the significantly higher fatality rates associated with late-night/early-morning driving.

UAB projects have been presented at conferences and in technical journals (see previous sections). UAB is continuing work to transfer the Birmingham freight model to the Birmingham Regional Planning Commission to improve regional modeling efforts.

FIU made two presentations at the 10th University Transportation Center Spotlight Conference: Pedestrian and Bicycle Safety, Washington, DC, December 1-2, 2016.

The UCF research resulting in the application of the off-the-shelf technology for data collection.

What is the impact on society beyond science and technology?

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

The collection of reliable origin/destination data for freight has profound consequences for a large range of application in both planning and operations. The outcomes of the UCF project “Automated Data Collection for Origin/Destination Studies of Freight Movement” 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 Georgia Tech analyses of the project “HOV to HOT Conversion Impacts on Carpooling” assessed potentially important demographic and land use factors associate with noted changes in carpooling activities within each sample strata. The findings should have significant policy implications for future HOV/HOT conversion projects with regard to the retention and promotion of carpools. The carpooling survey method can also apply to the implementation of similar surveys in other regions.

The UAB project “Optimizing Emergency Medical Services (EMS) Through the Use of Intelligent Transportation Systems (ITS) Technologies” focuses on the integration of ITS technologies into the transportation system’s infrastructure, which can greatly benefit EMS operations. The expected benefits from this synergy are tremendous for the healthcare sector, the transportation sector, and the public.

Changes/Problems

Changes in approach and reasons for change: Nothing to Report

Changes that have a significant impact on expenditures: Nothing to Report

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
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