



USDOT Tier 1 University Transportation Center

FAST ACT Program Progress Performance Report #2

Federal Agency: Office of the Assistant Secretary for Research and Technology

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Project Title: Maritime Transportation Research and Education Center (MarTREC)

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Signature: 

Maritime Transportation Research & Education Center (MarTREC)

MarTREC is a USDOT Tier 1 University Transportation Center funded through the Office of the Assistant Secretary for Research and Technology. Under the FAST Act, MarTREC is working to preserve the Nation's transportation system through efficient, resilient, and sustainable maritime and multimodal logistics and infrastructure. Our vision is to be recognized as the Nation's premier source for expertise on maritime and multimodal transportation research and education.

Made up of renowned maritime transportation researchers dedicated to transferrable research and inclusive education and workforce development, the MarTREC consortium are University of Arkansas (UARK), Fayetteville, AR; Jackson State University (JSU), Jackson, MS; Louisiana State University (LSU), Baton Rouge, LA; University of New Orleans (UNO), New Orleans, LA; Texas A&M University/Texas Transportation Institute (TAMU/TTI), College Station, TX; and Vanderbilt University (VU), Nashville, TN.

1. Accomplishments

1.1 Consortium-Level Accomplishments

1.1.1 Research

Goal: MarTREC will conduct research that contributes to preserve the Nation's transportation system through efficient, resilient, and sustainable maritime and multimodal logistics and infrastructure.

Objectives:

- Conduct research projects related to MarTREC's research goal
- Engage a diverse set of faculty and students in MarTREC research activities
- Disseminate research findings

Accomplishments:

Research Effectiveness Metrics	PPPR Progress
# of peer-reviewed journal articles (published, accepted, submitted)	15
# of conference presentations given	29
# of students participating in transportation research projects funded by UTC	10

1.1.2 Leadership

Goal: MarTREC will become the premier source for expertise on maritime transportation research, education, and workforce development.

Objectives:

- Demonstrate academic leadership towards MarTREC's leadership goal
- Demonstrate industry leadership towards MarTREC's leadership goal

Accomplishments:

Leadership Effectiveness Metrics	PPPR Progress
# of national and regional leadership positions held	16
# of invited talks given	7

# of leadership and research awards received	8
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1.1.3 Education and Workforce Development

Goal: MarTREC will develop educational resources to elucidate scientific and engineering practices involved in maritime and multimodal transportation systems and practices.

Objectives:

- Conduct education and workforce development (EWD) projects related to the goal
- Educate college students within MarTREC theme
- Conduct workforce development related to MarTREC theme
- Conduct outreach activities related to MarTREC theme

Accomplishments:

Education and Workforce Development Effectiveness Metrics	PPPR Progress
# of transportation-related courses offered	29
# of technician certification programs offered	7
# K-12 outreach programs offered	6

1.1.4 Technology Transfer

Goal: MarTREC consortium institutions will participate in national, regional, and local education and workforce development outreach to provide state-of-the-art knowledge to private and public transportation organizations and provide a forum where government employees, academic researchers, and private sector can exchange ideas on current issues.

Objectives:

- Transfer MarTREC outcomes into practice
- Develop products in support of MarTREC technology transfer goal

Accomplishments:

Technology Transfer Effectiveness Metrics	PPPR Progress
# of project deliverables submitted	2
# of technical briefs	1
# of editorial journal positions held	8

1.1.5 Collaboration

Goal: MarTREC will continue our existing partnerships with maritime and multimodal transportation stakeholders and develop new partnerships at the consortium, institution, and project levels to facilitate our planned research, leadership, education, workforce development, and technology transfer activities.

Objectives:

- Develop external partnerships related to MarTREC’s collaboration goal
- Develop collaborative products related to MarTREC’s collaboration goal
- Engage faculty and students in achieving MarTREC’s collaboration goal

Accomplishments:

Collaboration Effectiveness Metrics	PPPR Progress
# of existing collaborative partnerships	16
# of new collaborative partnerships formed	6

1.1.6 Plans for Next Reporting Cycle

MarTREC had 13 active research projects during this reporting period. The faculty researchers will continue to engage with industry experts to ensure that these projects are making transformational contributions. The consortium will continue to expand our collaborative partnerships to support this. We will continue to emphasize educational and technology transfer activities. We will also be developing our MarTREC Technology Transfer Plan.

1.2 Project-Level Accomplishments

1.2.1 Maritime and Multimodal Logistics Management Projects

Development and Application of a Methodology for Maritime-Truck Shipments Generation Analysis

Mario Monsreal, PhD

Jim Kruse, MS, MBA

Texas A&M Transportation Institute

December 2017-February 2019

Project Plans: Truck activity is logically connected to, and generated by, vessel activity at a port. In turn, vessel activity is generated by truck shipments. Although one might expect a 1 to 1, relation between the two types of shipments that is unlikely the case. For instance, many maritime containers carry consolidated cargos that have multiple (and different) final destinations. Furthermore, different truck capacities and regulations play a critical role in determining the actual relation between these two shipment modes. A clearer and quantitative understanding of the relationship between vessel and truck shipments enables agencies and organizations is needed to develop a system for managing trucks that maximizes efficiency for industry, while minimizing industry's negative impacts on a region.

Changing Trade and Transportation Patterns: NAFTA, Cuba, and the US Gulf Coast

Bethany Stich, PhD

University of New Orleans

March 2018-February 2019

Project Plans: Since the passage of the National Environmental Protection Act in 1969, transportation planning became a complex, interdisciplinary challenge. The need for meeting environmental legislation coupled with public participation demands have revealed innumerable problems associated with the use of outdated techniques. In order to satisfy the current regulations and public policies, the transportation planning process can no longer solely rely on the basics of engineering; it is now forced to find the way in a sea of data, values and actors towards a comprehensive and integrated solution. Therefore, not only the variety of data, but

also the quality and vast amount of data to be processed has become one of the big issues for transportation practitioners.

Shipping Container Chassis in the US: The Legacy of Ocean Carriers

Bethany Stich, PhD

University of New Orleans

March 2018-February 2019

Project Plans: Containerized shipping, which accounts for approximately 60 percent of all world seaborne trade while generating approximately 12 trillion United States (US) dollars in 2017, links trading partners between the water, rail, and air modes (as well as on-time distribution points and retail outlets). Therefore, the international chassis is, in turn, "...the linchpin of today's international commerce" (Lane, 2015). The University of New Orleans Transportation Institute (UNOTI) will examine the issues surrounding the current state of international chassis utilization in the United States (US). The international chassis system in the US is unique compared to global chassis utilization where the motor carriers, the freight customers, or off-site terminals provide chassis. However, in the US, the divestment of international chassis by ocean carriers, which began in 2009, resulted in three major international chassis leasing companies linked to the foreign carriers being the American shippers' only options for international chassis leasing in many cases. This situation is compounded by the fact that DCLI is in the process of acquiring the domestic fleet of one of the other two major international chassis lessors, TRAC Intermodal, which is slated to be completed in January of 2018. The extra cost associated with the lack of international chassis lessor competition profits the foreign ocean carrier lines while raising costs for domestic consumers.

1.2.2 Maritime and Multimodal Infrastructure Preservation Projects

Economic Impact of the Gulf Intracoastal Waterway on the States It Serves

Brianne Glover, JD

Jim Kruse, MS, MBA

Texas A&M Transportation Institute

September 2017-August 2018

Project Plans: We are researching the economic impact of the Gulf Intracoastal Waterway (GIWW) on the five states it serves (TX, LA, MS, AL, and FL). In many respects, it will be similar to a recent study sponsored by the National Waterways Foundation for the entire inland waterway system. This analysis focuses on the economic importance of the GIWW to the various states and assume only sufficient investment to maintain current system performance. The underlying methodology will evaluate what an abandonment (or closure) of the canal would mean in terms of economic impact. It will compare the transportation and related supply-chain costs faced by current waterway users to the costs they would face if the GIWW were to become permanently unavailable and they had to use the next best transportation alternative.

Engaging the Business and Tourism Industry in Visualizing Sea Level Rise Impacts to Transportation Infrastructure in Waikiki, Hawaii

Brian Wolshon, PhD, PE, PTOE

Louisiana State University

March 2018-February 2019

Project Plans: This study builds upon another related UTC project that focuses on visualizing sea level rise impacts to transportation infrastructure in South Florida. This study will build upon and

extend the research to Waikiki, located in Honolulu, Hawaii and focus on the business and tourism industry community. Waikiki is facing major impacts from sea level rise and transportation and community planners will engage with stakeholders through meetings to seek input and engagement on planning, including impacts of sea level rise on streets, buildings and neighborhoods. The team will seek to visualize the differences between King Tide, storm surges, tsunami and sea level rise. The team will utilize three-dimensional (3D) imaging utilizing virtual and augmented reality to serve as a policy deliberation tool to better discuss coastal planning, engineering and design solutions.

Green Technology Approach for Capturing Pollution Washed from Transportation Infrastructures

Danuta Leszczynska, PhD

Jackson State University

March 2018-February 2019

Project Plans: The aim of this study is to produce and investigate a carbon-based substance, namely biochar, as a new material for the in-situ adsorption of pollutants carried by the storm water runoff from the roads. A series of lab-scale experiments will be designed to optimize biochar's microscopic structures and to determine its adsorption capacities. The particular source material, and applied techniques for obtaining biochar may influence its final properties; therefore, the initial set of experiments will be focused on testing properties of biochar manufactured by different techniques, temperature set-ups and oxygen-free environments. The long-term spin-offs from proposed research are aimed toward (a) development of the new substance based on biochar that could be used for the emergency recovery of spills, and (b) exploring possibilities of using biochar as an additive to pervious concrete or asphalt.

A Multimodal Network Approach to the Inland and Coastal Waterway System

Bruce Wang, PhD

Texas A&M University

July 2017-November 2018

Project Plans: The national marine highway initiative intends to position waterways in the context of multimodal transportation system. Maintenance and capacity of each element of the waterway system has its implication to the multimodal network. This project will develop a multimodal freight network model that includes both waterway landside components in order to analyze the impact of waterway operations. The goal is to enhance the entire network efficiency. Algorithms will be proposed. The model will accommodate delay/congestion and other network restraints. This research builds on earlier work of the PI that studied the Ohio River network system. The difference is that this proposed work will focus on the network efficiency.

Large Scale Evaluation of Erosion Resistance of Biocementation against Bridge Scour and Roadway Shoulder Erosion

Lin Li, PhD

Jackson State University

March 2018-February 2019

Project Plans: Water erosion causes a variety of infrastructure problems such as bridge scour and roadway shoulder erosion. Nearly two-third of bridge failure cases is related to bridge scour. To address the need of MarTREC for the sustainable and resilient transportation infrastructure preservation and building upon its experience and expertise in the area, this

project is examining the feasibility of using biocementation through MICP as an erosion countermeasure. MICP is a natural phenomenon where calcite precipitation occurs because of microbial metabolic activity. The precipitated calcite modifies the soil fabrics and provides additional bonding force between soil particles. The biocemented geomaterials may provide great and previously unexplored opportunities as cost-effective and sustainable preserving materials for erosion mitigation in transportation infrastructure.

Liquefied Natural Gas: Export Competition in a Well Supplied, Flow-Shifting Global Economy

Bethany Stich, PhD

University of New Orleans

March 2018-February 2019

Project Plans: With trillions of cubic feet of shale reserves, the United States' (US) abundance of natural gas has prompted an increase in production of Liquefied Natural Gas (LNG) as an export commodity. While the Trump administration is taking strides to loosen policy set by the Federal Energy Regulatory Commission (FERC) in order to streamline US LNG export facility permitting, UNOTI has reasoned that policy focused too heavily on LNG as an export is misguided. A more robust energy policy acknowledges the higher value of natural gas to the petrochemical manufacturing industries as well as the development and commercialization of new LNG technologies in the maritime industry, particularly as a marine fuel. Furthermore, US energy independence fueled by shale mining could potentially alter how the US acts in the global market place, thereby destabilizing the system in place since the Bretton Woods Agreement in 1944. However, competing natural gas rich nations like Australia, Qatar, and Russia have similar goals to expand production indicating US LNG export growth will not be without competition.

1.2.3 Disaster Response and Transportation Planning for Coastal and River Valley Communities Projects

Development and Implementation of Sustainable Transportation Resilience Indicators

Mark Abkowitz, PhD

Vanderbilt University

June 2017-August 2018

Project Plans: Much has been discussed about resilient transportation infrastructure as well as sustainable practices, but only recently have their interdependencies been brought to light in terms of a community's ability to develop sustainable (economic, social and environmental) resource capacity necessary to be resilient in the face of natural hazard events that could lead to catastrophic consequences. In order to evaluate whether a community has achieved an acceptable level of sustainable transportation resilience, it requires performance indicators that are both relevant and measurable. The intent of this project is to establish a protocol and method for evaluating a community's level of sustainable transportation resilience, such that if deficiencies exist, attention can be focused on mitigating those concerns. The protocol and method will be subsequently applied to a river valley community to demonstrate proof-of-concept.

Interdependency of Port Clusters during Regional Disasters

Brian Wolshon, PhD, PE, PTOE

Louisiana State University

January 2018-December 2018

Project Plans: External disruptions to a port may result for storms, such as Hurricane Mathew and Super Storm Sandy as well as terrorism and oil/hazardous material spill. The overall impact of a disruption on a port is a function of vulnerability of the port and the severity of the disruption. The resiliency of ports and inland waterways is critical for maintaining the flow of essential goods throughout the United States and is critical to national security and defense readiness (Sturgis et al., 2014). The research seeks to build upon the prior knowledge and expand the scientific understanding of regional disruptions to port clusters, areas of the country with multiple ports servicing the same region. The contribution of this research is to empirically show how port clusters rely upon each other during disruptive events to increase the overall resiliency of water bourn commerce during disruptive events.

Utilizing Graceful Failure as an Opportunity for Flood Mitigation Downstream to Protect Communities and Infrastructure

Janey Camp, PhD, PE, GISP, CFM

Vanderbilt University

May 2018-April 2019

Project Plans: In 2011, we observed how “graceful failure” through planned damages to the Birds Point Levee by the US Army Corps of Engineers was enacted to alleviate extreme flooding on the Mississippi River. This action, while flooding croplands as planned in the past, actually reduced flooding and damage to waterway infrastructure and communities downstream. Recent trends and future climatic projections indicate that we will have more of these “extreme” flooding situations in our future. Therefore, this project focuses on identifying locations beyond Birds Point on the inland waterway system and associated tributaries where “graceful failure” or planned breach of levee infrastructure can be used as a means of flood protection for downstream communities and infrastructure. Advanced spatial analysis techniques will be used along with a set of criteria to be developed to identify probable locations for such mititagive approaches. Each location that is identified as a viable candidate will then be analyzed in terms of capacity for flood water detention, potential impacts to local infrastructure, and population potentially affected by the new floodway. This project will provide alternatives for flood mitigation not typically employed to reduce the need for disaster response and assist in transportation planning during extreme flood conditions.

Visualizing Sea Level Rise Impacts in Transportation Planning

Brian Wolshon, PhD, PE, PTOE

Louisiana State University

January 2018-December 2018

Project Plans: Transportation planners regularly engage communities through public meetings to seek input and engagement on planning, including impacts of sea level rise on streets and neighborhoods. Meetings typically include small-group discussions where planners present ideas verbally and with the use of maps and other two-dimensional (2D) media, such as photo renderings. New media options allow for three-dimensional (3D) imaging utilizing virtual and augmented reality. Such 3D visualizations are increasingly affordable and accessible to display on glasses that connect to smartphones, such as Samsung Gear VR. This project will test and compare new technologies on individuals in community-meeting settings in South Florida to test if 3D technology helps residents better understand the impacts of sea level rise on transportation infrastructure and communities. The Team will host multiple meetings of neighborhoods facing impacts over the next 5-20 years from sea level rise. Some of the meetings will use traditional methods, such as verbal presentations and 2D mapping and

visualizations whereas other meetings will include 3D technologies to visualize the impacts of sea level rise on their streets. Attendees will be surveyed immediately after the meeting and 3 – 4 months after the meeting to determine if the 3D visualization technologies have had a significant impact on the meeting attendees to have a deeper understanding of the issues and become more engaged in community planning activities.

2. Products

2.1 Publications

Journal Articles

1. Gillespie-Marthaler, L., K. Nelson, H. Baroud, D. Kosson and M. Abkowitz. "Vulnerability, Resilience and Sustainability: Multi-Scale, Dynamic Interactions within Complex Systems and the Need for Integrative Assessment Methods, Risk Analysis" (in review).
2. Nelson, K., L. Gillespie-Marthaler, H. Baroud, D. Kosson and M. Abkowitz. "Vulnerability, Resilience and Sustainability: An Integrated and Dynamic Assessment Framework for Complex Adaptive Systems, Risk Analysis" (in review).
3. Gillespie-Marthaler, L., K. Nelson, H. Baroud, and M. Abkowitz, "Community Resilience Indicators – A Foundational Set of Indicators and Metrics for Implementation of Community Resilience Assessments, Risk Analysis" (in review).
4. Baroud, H. and K. Barker, "A Bayesian Kernel Approach to Modeling Resilience-Based Network Component Importance", Reliability Engineering and System Safety (170: 10-19).
5. Johnson, Paul, and Janey Camp. "Spatiotemporal trends in US Midwest corn yields - biotechnology counters climate change", Climatic Change, (In Review).
6. Dundon, L. (Graduate Student), M. Abkowitz, J. Camp, C. Philip, "Assessing Impacts to Transportation Infrastructure from Oil and Gas Extraction in Rural Communities: A Case Study in the Mississippi Tuscaloosa Marine Shale Oil Play", Journal of Rural and Community Development, (Accepted for early 2018 publication).
7. Dundon, L. (Graduate Student), M. Abkowitz, J. Camp, and C. Philip. 2017. "Assessing Impacts to Transportation Infrastructure from Oil and Gas Extraction in Rural Communities: A Case Study in the Mississippi Tuscaloosa Marine Shale Oil Play", Journal of Rural and Community Development, (Accepted for publication in Fall/Winter 2017 edition).
8. Abkowitz, M and J. Camp, "Structuring an Enterprise Risk Assessment Protocol: Traditional Practice and New Methods", Risk Management and Insurance Review, (20(1): 79-97).
9. Miao, Q. (student), Y. Li, X. Wang, "A generalized decomposition algorithm for real-time truck routing problems", Pesquisa Operacional, Brazilian Operations Research Society. (Accepted)
10. Li, Y., Q. Miao (student) and X. Wang, "Restaurant reservation management with table combinability", Pesquisa Operacional, Brazilian Operations Research Society, 2018, (38(1): 73-86).
11. Wang, X., X. Cao (student) and C. Wang, "Dynamic optimal real-time algorithm for signals (DORAS): Case of isolated roadway intersections", Transportation Research Part B: Methodological, 2018, (106 433-446).
12. Wang, X., X. Cao (student), K. Yin and T.D. Adams, "Modeling vehicle miles traveled on local roads using roadway spatial structure", Networks and Spatial Economics. (17: 713-735)

13. Cao, X. (student), J. Jiao, Y. Zhang, and X. Wang, "Left turn spillback probability estimation in a connected vehicle environment", *Advanced Transportation*. (In Review)
14. Wang, X., Y. Li and K. Yin (student), "Distribution Product Packaging for Net Revenue Maximization", *Journal of Computers & Industrial Engineering*. (submitted)
15. Wang, X., K. Yin (student), and H. Liu., "Vehicle Actuated Signal Performance under General Traffic at an Isolated Intersection", *Transportation Research Part C: Emerging Technologies*. (In review).

Conference Papers

1. Nelson, K. (Graduate Student), J. Camp, C. Philip, M. Abkowitz, "Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures." *Transportation Research Record: Journal of the Transportation Research Board*, 2017, No. 2611 (2017). Doi 10.141/2611-02
2. Camp, J., L. Nolen, and C. Sofman, "Leveraging the ASCE Infrastructure Report Card and Economic Studies in the STEM Classroom", *ASCE Conference Compendium of Papers*, Columbus, Ohio, June 2017. Refereed.

Conference Presentations

1. Renne, J., B. Wolshon, P. Murray-Tuite, and A. Pande, "Emergence of Resilience as a Framework for Transportation Agencies" *Transportation Research Board Meeting*, Washington D.C., January 2018.
2. Philip, C., "Resilience of the Inland Waterways in the 21st Century: It's All about Governance", *TRB Annual Meeting*, Washington DC, January 2018.
3. Dundon, L., M. Abkowitz, J. Camp, C. Philip, C., "Impacts to Transport Infrastructure from Oil and Gas Extraction: A Case Study", *Transportation Research Compendium*, October 2017.
4. Philip, C., "Ethic vs Ethics: Observations from a CEO's Perspective", *Cumberland University's Program in Business Ethics and Society*. Lebanon, TN, November 2017.
5. Philip, C and M. Burton, "The Impacts of Unscheduled Lock Outages", *Waterways Council Annual Meeting*, Mobile, Alabama, December 2017.
6. Philip, C., "Building Institutional and Social Resilience as a Response to Maritime Infrastructure Fragility", *PIANC World Congress*, Cairns Australia, June 2017.
7. Abkowitz, M, Burke E. and Philip, C., "The Use of Freight Advisory Committees in Responding to Supply Chain Disruption", *West Tennessee FAC Meeting*, Memphis TN, August 2017.
8. Burton, M. and C. Philip, "Unscheduled Lock Outages – Estimating the Impacts", *TRB Annual Meeting*, Washington, DC, January 2018.
9. Abkowitz, Mark, "Managing Transportation System Risk & Resilience", *Rutgers University*, October 2017, (invited talk).
10. Abkowitz, Mark, "Managing Infrastructure & Community Climate Risk and Resilience", *Georgetown University*, December 2017, (invited talk).
11. Gillespie-Marthaler, Leslie, "Community Resilience: Establishment of Foundational Indicators and Variables for Use in an Integrated Dynamic Assessment Framework", *Society for Risk Analysis Annual Meeting*, Arlington, VA, December 2017.

12. Gillespie-Marthaler, Leslie, "An Indicator-Based Assessment of Community Resilience to Failure of Flood Protection Infrastructure", Society for Risk Analysis Annual Meeting, Arlington, VA, December 2017.
13. Camp, J. "Exploring Science with Students Outdoors through the GLOBE Program." 12th Annual Tennessee STEM Education Research Conference, Middle Tennessee State University, Murfreesboro, TN, February 2018.
14. Camp, J. "Impacts of Climate Change on Infrastructure Systems and the Communities They Serve." The Poynter Institute: Covering the Issues Ahead in Trump's Second Year, A McCormick Specialized Reporting institute, Nashville, TN, October 2017, (invited talk).
15. Ford, M., J. Camp, and A. Hawkins, et al. "Hereditary Colorectal Cancer Referral Patterns to a Tertiary Care Center: A Novel Approach using GIS Mapping." Collaborative Group of the Americas 2017 Inherited Colorectal Cancer Annual Meeting, Orlando, Florida, October 2017.
16. Wang, X., X. Cao and C. Wang, "Optimal Signal Control at Isolated Intersections", Proceedings of 96th TRB Annual Meeting (CD Rom), Washington DC. January 2018.
17. Thornton, Dennis (PhD student), I-NUF Conference, "Changing Trade Patterns: NAFTA, Cuba & the U.S. Gulf Coast, October 2017.
18. Stich, Bethany, I-NUF Conference, "Liquefied Natural Gas (LNG): Export Competition in a Well-Supplied, Flow Shifting Global Economy", October 2017.
19. Stich, Bethany, "Transportation Policy", ASPA, March 2018, (invited talk).
20. Stich, Bethany, "The MS River: Energy, Trade and Transportation " SanteFe, Argentina, March 2018, (invited talk).
21. Web, Peter, (Ph.D. student) "New Orleans: A Living Laboratory - Dueling Narratives - Tourism v. Freight" November 2017.
22. Mark Abkowitz, "Indicators for Assessing and Achieving Resilient and Sustainable Communities", SRA-E Annual Conference, Lisbon, June 2017.
23. Leah Dundon, "Quantifying Social Resilience and Evaluating Climate Change Adaptation Strategies", European Climate Change Adaptation Conference, Glasgow, June 2017.
24. Hiba Baroud, "Quantifying the Resilience of Critical Infrastructure Systems", Purdue University, School of Industrial Engineering, West Lafayette, IN, September 2017.
25. Camp, J. "Introduction to Geographic Information Systems (GIS)." Tennessee Department of Education's Career and Technical Education (CTE) Institute, Nashville, TN, July 2017.
26. Camp, J., L. Nolen, C. Sofman. "Leveraging the ASCE Infrastructure Report Card in K12 Education." Tennessee Department of Education's Career and Technical Education (CTE) Institute, Nashville, TN, July 2017.
27. Camp, J., L. Nolen, C. Sofman. "Leveraging the ASCE Infrastructure Report Card in K12 Education." American Society for Engineering Education 124th Annual Conference, Columbus, OH, June 2017.
28. Bethany Stich, Programação - 2o. Workshop sobre Inteligencia Geográfica Aplicada ao Planejamento de Transportes, "The Complexification of Intermodal Transportation Policies", July 2017, (invited talk).
29. Bethany Stich, Peter Webb (PhD student), Smart Rivers Conference, "E-NAV: The Future of Waterborne Shipping", September 2017, (invited talk).

Books/Other One-Time Publications

Technical Brief

- P. Murray-Tuite, M. Lindell, B. Wolshon, and E.J. Baker. “Large-Scale Evacuation: The Analysis, Modeling, and Management of Emergency Relocation from Hazardous Areas (working title), in contracted and in development for publication by CRC Press, Taylor and Francis Publishing Group, LLC, (accepted for September 2018 publish date).

2.2 Websites

Website Title	Web Address
MarTREC	http://martrec.uark.edu/
Institute for Multimodal Transportation	http://www.jsums.edu/imtrans/
Gulf Coast Center for Evacuation and Transportation Resiliency	http://www.evaccenter.lsu.edu/
Merritt C. Becker Jr. UNO Transportation Institute	http://transportation.uno.edu/
Texas A&M Transportation Institute	https://tti.tamu.edu/
Vanderbilt Center for Transportation and Operational Resiliency (VECTOR)	http://www.vanderbilt.edu/vector/

2.3 Technologies or Techniques

Nothing to report

2.4 Inventions

Nothing to report

2.5 Other Products

Nothing to report

3. Participants & Collaborating Organizations

3.1 Collaborative Partnerships

Existing Partnership Name	Location	Collaboration
US Army Corps of Engineers	Vicksburg, MS	research collaborator
Dr. John Renne, Florida Atlantic University	Boca Raton, FL	research collaborator
Port of New Orleans International Freight Forwarders & Customs Brokers Assn. of New Orleans World Trade Center Transportation Committee Ports Assn. of Louisiana GNO Port Safety Council Propeller Club of New Orleans New Orleans Regional Planning Commission MS Valley Trade & Transport	New Orleans, LA	Industry networks

Port of South LA Port of Plaquemines Coastal Cargo Triple G. Express Jefferson Transit Regional Innovation Alliance.		
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New Partnership Name	Location	Collaboration
TN Department of Transportation	TN	research collaborator
TN Department of Economic and Community Development	TN	research collaborator
American Bureau of Shipping	TN	research collaborator
ISL, Germany	Germany	software
National Marine Transportation Center	Wuhan, China	research collaborator
Scott Parr, Embry-Riddle Aeronautical University	Florida	research collaborator

4. Impacts

4.1 Principal Disciplines

Nothing to report

4.2 Other Disciplines

Related External Grants

- Khan, M.S. and Amini, F. "Performance Evaluation of Highway Slopes on Yazoo Clay". Submitted to MS DOT on June 2017. Total Budget \$196K, Notice to Proceed received on Feb 27, 2018

4.3 Human Resources (Transportation Workforce Development)

K-12 Programs

1. Facilitated visit of 20 high school girls to Vanderbilt campus from Glenciff High School to learn about STEM and engineering on March 14, 2018. Attended by 75% minority girls.
2. Organized "Dream Big" movie screening for ASCE Nashville Branch members and the public at the Adventure Science Center in Nashville, TN on January 27, 2018
3. Organized a "Dream Big Girls' Night Out" movie screening sponsored by ASCE, SWE and KSWARE for 30+ girls at the Adventure Science Center in Nashville, TN on February 21, 2018
4. Organized the 10th annual ASCE Music City Bridge Competition for High School Students at Vanderbilt's LASIR facility with over 35 bridges tested to failure on March 3, 2018
5. "Who Works the Rivers", Outreach event for 150 high school students
6. MarTREC hosted thirty-five fifth and sixth grade girls at our new "GirlTREC" summer camp, on the University of Arkansas Campus. The camp focused on hands-on activities related to transportation engineering from roads to rail to waterways and was designed to build courage

and interest towards studying STEM fields and considering a career in the transportation industry. July 10-14, 2017.

Pre-College and Recruitment

- The University of Arkansas Engineering Career Awareness program (ECAP) is designed to recruit students who are underrepresented in the field of engineering, and to give these students the support they need to feel comfortable, confident and ready to succeed. The ECAP program provides financial assistance to qualifying students, but ECAP is much more than a scholarship. Starting with the three-week summer bridge program and continuing through graduation and beyond, ECAP students become part of a family.

Short Courses and/or Workshops

1. Brianne Glover, TRENDS (Transportation Revenue Estimator and Needs Determination System) Workshop for the Association of Texas Metropolitan Planning Organizations, 3/1/18, Austin, TX, 50
2. Brianne Glover, TxDOT District Workshops on Accelerated Construction, Economic Screening Tool, 11/7/17, Abilene, TX, 120; 11/8/17, Lubbock, TX, 100; 11/28/17 Tyler, TX, 100

4.4 Physical, Institutional, and Informational Resources

Student and Professional Societies and Organizations

1. American Indian Science and Engineering Society
2. National Society of Black Engineers
3. Society of Hispanic Professional Engineers
4. Society of Women Engineers
5. Women Impacting Supply Chain Excellence
6. Advancing Women in Transportation (WTS)

Informational Resource Organizations (Collaborative Activities)

1. World Trade Center Transportation Committee, 10/2/17, 12/4/17, 2/5/18
2. Propeller Club of New Orleans, 9/14/17
3. LA International Trade Jubilee, 11/3/17
4. TRB and CUTC, 1/6/18 - 1/11/18
5. MS Valley Trade and Transport Council, 2/7/18 -2/9/18
6. LA Transportation Conference, 2/26/18

Leadership Positions

1. Chair, Standing Committee on Emergency Evacuation, Transportation Research Board
2. Chair, TRB Special Task Force on Climate Change
3. Vice-chair, Engineering Infrastructure Specialty Group, Society for Risk Analysis
4. Member, Risk and Resilience Measurement Committee, ASCE Infrastructure Resilience Division
5. US representative, World Association for Waterborne Transport Infrastructure (PIANC)
6. Chair, ASCE Nashville Branch Education Outreach
7. Member, ASCE National Committee for America's Infrastructure
8. Member, Nashville ACE Board
9. Marine Group Chair, Transportation Research Board
10. Member, Marine Transportation System National Advisory Committee

11. Member, Lt. Gov.'s Port Advisory Board
12. Chair, TRB Freight Modeling Subcommittee
13. Member, TRB Intermodal Freight Committee
14. Member, TRB Logistics of Disaster Committee
15. Member, Federal Demonstration Partnership/NAS.
16. Member, LA Supply Chain Transportation Council

Leadership Awards

1. Brian Wolshon, awarded 2017 James M. Todd Technical Accomplishment Medal, Louisiana Engineering Society - Baton Rouge Chapter.
2. Ph.D. Candidate Leslie Gillespie-Marthaler awarded The University Transportation Center Program Award for Outstanding Student of the year, January 2018
3. Janey Camp, 2018 Distinguished Young Alumna, College of Engineering, Tennessee Technological University
4. Janey Camp, Vanderbilt University Provost Studio Award for Professional Development (2017-2018)
5. Janey Camp, Recipient of a Provost Research Studios Award, October 2017
6. Heather Nachtmann, awarded the Earl J. and Lillian P. Dyess Endowed Chair in Engineering
7. Peter Webb, UNO, Dwight David Eisenhower Transportation Fellowship, January 2018.
8. Charles Doktycz, Vanderbilt, Dwight David Eisenhower Transportation Fellowship, January 2018.

4.5 Technology Transfer

Transfer of Results

1. Mack-Blackwell/MarTREC Advisory Board Meeting held on November 10, 2017
2. News Channel 5 segment on Vanderbilt Engineers' Without Borders Student Chapter's trip to Guatemala
3. Quoted by ABC News and Good Morning America on the Florida International University's bridge collapse, March 15, 2018. <https://www.yahoo.com/gma/explaining-accelerated-bridge-construction-technique-used-collapsed-miami-233504444--abc-news-topstories.html>
4. J. Camp, "Nashville needs to prepare for the flood of the future." Op Ed in the Tennessean, January 5, 2018

Project Deliverables

1. GIS transportation and related geo-spatial databases developed and provided to the TN Dept. of Transportation in support of agency long-term planning
2. Technical Brief - P. Murray-Tuite, M. Lindell, B. Wolshon, and E.J. Baker. "Large-Scale Evacuation: The Analysis, Modeling, and Management of Emergency Relocation from Hazardous Areas (working title), in contracted and in development for publication by CRC Press, Taylor and Francis Publishing Group, LLC, (accepted for September 2018 publish date).

Editorial Journal Positions

1. Associate Editor, Stochastics and Quality Control
2. Editor, International Journal of Six Sigma and Competitive Advantage
3. Editor-in-Chief, Engineering Management Journal
4. Area Editor, The Engineering Economist

5. Area Editor, Journal of Transportation Safety System Security
6. Guest Co-Editor, Special Issues, Journal of Advanced Transportation and the International Journal of Disaster Risk Reduction
7. Member, Editorial Board, Transportation Research Part D: Transport and Environment
8. Advisory Board Member, Transportation Research Part E: Logistics Review

4.6 Society beyond Science and Technology

Conference Planning Positions

1. Member and Workshop Organizer, Transportation Research Board Committee (ABJ90 - Freight Transportation Data)
2. Sub-committee Chair, ABG20- Transportation Training and Education
3. Planning Member, Institute of Transportation Engineers (ITE) MOVITE Section Local
4. Planning Member, 2018 Marine Transportation System Research and Technology Conference
5. Session Co-Chair, Pipeline and Transportation Structures in Unsaturated Soils of PAN-AM UNSAT
6. Technical Committee Chair, Marine Engineering and Safety, World Transport Convention

Distinguished Lectures

1. Frank Parker Endowed Lecture, Dr. Salemmul Huq, Director, International Centre for Climate Change & Development (ICCCAD), October 2017, Vanderbilt University, 75 participants
2. CEE Seminar Series, Erik Cole, Chief Resilience Officer, Nashville-Davidson County, March 2018, Vanderbilt University, 15 participants
3. Dr. Mark Abkowitz, Professor of Civil & Environmental Engineering, Vanderbilt University, October 2017, Rutgers University, 50 participants
4. Dan Flowers Distinguished Lecture, Speaker: Regina Hopper, Senior Vice President Global Public Policy, GRIDSMART Technologies, Inc., *Intelligent Next Generation Transportation: Integrated Mobility Through Connected and Automated Technologies* November 9, 2017, 150 attendance

5. Changes/Problems

Nothing to report

6. Special Reporting Requirements

Nothing to report