



**USDOT Tier 1 University Transportation Center**

**FAST ACT Program Progress Performance Report #1**

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

Federal Grant ID #: 69A3551747130

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

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Recipient Organization: University of Arkansas

Project/Grant Period: Start Date November 30, 2016  
End Date: September 30, 2022

Reporting Period Start Date: December 1, 2016  
Reporting Period End Date: May 31, 2017

Report Term or Frequency: six months

Signature: 

**Maritime Transportation Research & Education Center (MarTREC)** consortium consists of the 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); and Vanderbilt University (VU).

**1. Accomplishments**

**1.1 What are the major goals of the program**

**Research**

Research Effectiveness Metric	Annual Goal	6 month progress
# of peer-reviewed journal articles (published, accepted, submitted)	20/yr	15
# of conference presentations given	20/yr	23
# of students participating in transportation research projects funded by UTC	20/yr	0

**Leadership**

Leadership Effectiveness Metric	Annual Goal	6 month progress
# of national and regional leadership positions held	10/yr	32
# of invited talks given	10/yr	4
# of leadership and research awards received	3/yr	1

**Education and Workforce Development**

Education and Workforce Development Effectiveness Metric	Annual Goal	6 month progress
# of transportation-related courses offered	50/yr	29
# of technician certification programs offered	8/yr	13
# K-12 outreach programs offered	5/yr	1

**Technology Transfer**

Technology Transfer Effectiveness Metric	Annual Goal	6 month progress
# of project deliverables submitted	5/yr	0
# of technical briefs	5/yr	0
# of editorial journal positions held	5/yr	12

**Collaboration**

Collaboration Effectiveness Metric	Annual Goal	6 month progress
# of existing collaborative partnerships	20/yr	2
# of new collaborative partnerships formed	5/yr	2

## **1.2 What was accomplished under these goals**

In this start-up phase we have conducted three consortium conference calls. Accomplishments have been in the areas of communicating policies and procedures, understanding data management plans, and sharing past, current, and potential project information among the team and possible collaboration with Army Corps of Engineers. The Center has set up its prime award and five subawards and each consortium member has access to funds and is ready to begin work. We also created and submitted our center's approved Data Management Plan. The Center Director and Center Coordinator attended the CUTC meeting in Buffalo, New York. The next cycle will reflect research accomplishments under our goals.

## **1.3 How have the results been disseminated**

No results at this time

## **1.4 Plans for next reporting period**

As a FAST ACT grant recipient we look forward to being up and running with projects during the next 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. Our next annual Advisory Board meeting is November 10, 2017.

## **2. Products**

### **2.1 Publications**

#### **Journal Articles**

1. Tomas, M. (student), L. Bu (student), H. Das, and F. Wang, "Analyses of Storm Surge Induced Flood Risk in Coastal Areas of Mississippi," TRB 2017. (under review)
2. Bao, R., Li, J., Li, L., Cutright, T.J., Chen, L, Zhu, J. and Tao, J., "Effect of Microbial Induced Calcite Precipitation on Surface Erosion of Granular Soils," Journal of Transportation Research Board 2017. (accepted)
3. Stich, Bethany and Jeffrey Cavanaugh, "The U.S. Gulf in a Liquefied Natural Gas Rich World," Transportation Review Board, Compendium of Papers, January 2017. (accepted)
4. Stich, Bethany and Peter Webb, "Electronic Navigation: The Future of Waterborne Shipping," Transportation Review Board, Compendium of Papers, January 2017. (accepted)
5. Chakrabarti, S. "How can public transit get people out of their cars: An analysis of transit mode choice for commute trips in Los Angeles," Transport Policy, 54, 80-89, 2017. (published)
6. Chakrabarti, S. and E. J. Shin, "Automobile Dependence and Physical Inactivity: Insights from the California Household Travel Survey," Journal of Transport & Health, 2017. (accepted)
7. Bagloee, S.A., M. Sarvi, B. Wolshon, and V. Dixit, "Identifying Critical Disruption Scenarios and a Global Robustness Index Tailored to Real Life Road Networks," Transportation Research, Part E: Logistics and Transportation Review, Vol. 98, pp. 60-81 February 2017. (published)
8. Abkowitz, M., and J. Camp, "Structuring an Enterprise Risk Assessment Protocol: Traditional Practice and New Methods," Risk Management and Insurance Review, 30 (1), p. 79-97, 2017. (under review)
9. Nelson, Katherine, S., Janey V. Camp, Craig E. Philip, and Mark D. Abkowitz, "Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures," Transportation Research Record: Journal of the Transportation Research Board, No. 2611 doi 10.3141/2611-02, 2017. (online publication)

10. Camp, J., L. Dundon, M. Abkowitz, A. Jones, "Assessing the Impacts of Extreme Weather and Climate Change on Critical Transportation Assets: An Expert Elicitation Approach," Risk Analysis, 2017. (under review)
11. Camp, J., A. Shaw, D. Whyte, "Use of Hazus and Regional Climate Models to Identify Vulnerable Transportation Infrastructure due to Future Extreme Precipitation Events," Society for Risk Analysis Annual Meeting, December 2016. (under review)
12. Thabrew, L., D. Perrone, A. Ewing, M. Abkowitz and G. Hornberger, "Using Triple Bottom Line Metrics and Multi-Criteria Methodology in Corporate Settings," Journal of Environmental Planning and Management, <https://doi.org/10.1080/09640568.2017.1289900>, 2017. (online publication)
13. Abkowitz, M. and E. Bickford, "Development of Rail Accident Rates for Spent Nuclear Fuel Rail Shipments," Proceedings of Waste Management, 2017. (under review)
14. Gillespie-Marthaler, Leslie Nelson and Katherine S. Nelson (students), "Resilience, Sustainability, and Vulnerability: Multi-Scale, Dynamic Interactions within Complex Systems and an Integrative Assessment Method," Society for Risk Analysis Annual Meeting, San Diego, California, December, 2016. (under review)
15. Oztanriseven, Furkan and Heather Nachtmann, "Economic Impact Analysis of Inland Waterway Disruption Response," The Engineering Economist, January-March 2017 (published)

#### **Conference Papers**

1. Tomas, M. (student), L. Bu (student), H. Das, and F. Wang, "Analyses of Storm Surge Induced Flood Risk in Coastal Areas of Mississippi," 96th TRB Annual Meeting, Washington, DC, January 2017. (accepted)
2. Lu, W. (student), L. Bu (student), F. Wang, and L. Liu, "Game-theoretic Analysis of Networks Vulnerability under Hurricane Evacuation," 96th TRB Annual Meeting, Washington, DC, January 2017. (accepted)
3. Lu, W. (student), F. Wang, L. Liu, and G. Hu, "Bottleneck Identification for Network under Hurricane Evacuation," 96th TRB Annual Meeting, Washington, DC, January 2017. (accepted)
4. Yin, C., L. Bu (student), and F. Wang, "Optimization of Transshipping Freight of Less than Container Load at Port Rail-Sea Container Intermodal Terminal," World Transport Convention annual meeting, Beijing, China, February 2017. (submitted)
5. Hu, G., F. Wang, W. Lu, and L. Liu, "The Spatial Partitioning of Traffic Networks for Boundary Flow Control," World Transport Convention annual meeting, Beijing, China, February 2017. (under review)
6. Whalin, W., Qing Pang, La Shon N. Lowe, and Josie Latham, "Assessment of a Summer Bridge Program: Seven Years and Counting," American Society for Engineering Education, 2017 Annual Conference, Columbus, OH, March 2017. (accepted)
7. Stich, Bethany, "Energy, Environment, Transportation and Trade," American Society of Public Administration Annual Conference, Atlanta, GA, March 2017. (under review)
8. Freitas, J. (student) and H. Baroud, "Impact of Climate Change and Infrastructure Risk Management on Arctic Shipping," 12th International Conference on Structural Safety & Reliability (ICOSSAR), 2017. (under review)

#### **Conference Presentations**

1. Lozano, Christine, "Pre-stressed CFRP fatigue retrofits for improved waterway lock reliability," presented to the Civil Engineering Graduate Seminar, March 2017.
2. Tomas, M. (student), L. Bu (student), H. Das, and F. Wang, "Analyses of Storm Surge Induced Flood Risk in Coastal Areas of Mississippi," 2017 TRB Annual Meeting.

3. Lu, W. (student), L. Bu (student), F. Wang, and L. Liu, "Game-theoretic Analysis of Networks Vulnerability under Hurricane Evacuation," 2017 TRB Annual Meeting.
4. Lu, W. (student), F. Wang, L. Liu, and G. Hu, "Bottleneck Identification for Network under Hurricane Evacuation," 2017 TRB Annual Meeting.
5. Li, L., Li, M., Ogbonnaya, U., Wen, K. (student), Xu, Y., and Amini, F., "Study of Discrete Randomly Distributed Fiber on the Tensile Strength Improvement of Microbial-Induced Soil Stabilization," Geotechnical Frontier, Orlando, FL, March 2017.
6. Bao, R., Li, J., Li, L., Cutright, T.J., Chen, L, Zhu, J. and Tao, J., "Effect of Microbial Induced Calcite Precipitation on Surface Erosion of Granular Soils," Proof of Concept, 96th TRB, Washington DC, January 2017.
7. Whalin, W., "PhD in Engineering (Coastal, Computational) HBCU," Department of Homeland Security, Coastal Resilience Center (CRC) of Excellence Annual PI Meeting, University of North Carolina, February 2017.
8. Whalin, W., "CRC Education and Workforce Development," Department of Homeland Security, Coastal Resilience Center (CRC) of Excellence Annual PI Meeting, University of North Carolina, February 2017.
9. Wolshon, B. and Scott Parr, Session 867, "Training and Prepping for Community Disasters," 96th Annual Meeting of the Transportation Research Board, Meeting of TRB Committee ANB80, Washington, DC, January 2017.
10. Wolshon, B. and Scott Parr, Session 893, "Short-Notice Evacuation Planning, Analysis, and New Training Opportunities," 96th Annual Meeting of the Transportation Research Board, Meeting of TRB Committee ANB80, Washington, DC, January 2017.
11. Wolshon, B. and Scott Parr, Session 501, "Emergency Evacuation Research," 96th Annual Meeting of the Transportation Research Board, Meeting of TRB Committee ANB80, Washington, DC, January 2017.
12. Stich, Bethany and Peter Webb, "Electronic Navigation: The Future of Waterborne Shipping," Transportation Review Board, Washington, DC. January 2017.
13. Stich, Bethany and Jeffrey Cavanaugh, "The U.S. Gulf in a Liquefied Natural Gas Rich World," Transportation Review Board AT045 Committee, Washington, DC. January 2017.
14. Severson, Ian (student), "Containerized Urban Agriculture," LAAPA conference, March 2017.
15. Pardue, James, "Louisiana Supply Chain / Transportation Council on Critical Infrastructure Resilience and Fuel System Resilience," Louisiana Capital Annex, March 2017. (Invited Talk)
16. Philip, C., "Resilience of the Inland Waterways in the 21st Century," TRB Annual Meeting, January 2017, (Invited Talk)
17. Philip, C., "Vanderbilt University Competency Domains Critical to CV/AV Deployment," TDOT CV/AV Summit, May 2017.
18. Nelson, Katherine, S., Janey V. Camp, Craig E. Philip, and Mark D. Abkowitz, "Agent-Based Model of Navigable Inland Waterway Tow Operation Procedures," 96th Annual Meeting of the Transportation Research Board (TRB), Washington, D.C., January 2017.
19. Camp, J., "Integrating Geospatial Technologies into K12 STEM Education – A SWOT Analysis," Tennessee STEM Education Research Conference, Murfreesboro, TN, February 2017. (Invited Talk)
20. Camp, J., "The Importance of Licensure and Membership in Professional Societies," Vanderbilt Engineering Students, Spring 2017.
21. Abkowitz, M., "Assessing the Impacts to Transportation Infrastructure from Oil and Gas Extraction in Rural Communities: A Case Study in the Mississippi Tuscaloosa Marine Shale Oil Play," Annual Meeting of the Transportation Research Board, Washington, DC, January 2017.

22. Oztanriseven, Furkan and Heather Nachtmann, "Modeling Dynamic Behavior of Navigable Inland Waterways," Institute of Industrial Systems Engineering Annual Conference, Pittsburgh, PA, May 2017.
23. Helgado-Hidalgo, Liliana (student), Heather Nachtmann, and Chase Rainwater, "Prioritization and Allocation of Disrupted Barges," Institute of Industrial and Systems Engineering Annual Conference, Pittsburgh, PA, May 2017.

**Books/Other One Time Publications**

Nothing to report

**2.2 Websites**

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

**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
Dr. Kenneth Ned Mitchell, US Army Engineer Research and Development Center Coastal and Hydraulics Laboratory	Vicksburg, MS	research collaborator
Dr. John Renne, Florida Atlantic University	Boca Raton, FL	research collaborator

New Partnership Name	Location	Collaboration
Brandon Zinser, Don Bradley, Eddie Jackson, John Gordon Central Intermodal Authority Meeting	Central Arkansas	research collaborator
Glenn Moore and Chad Johnston (DHS); Matt Kauffman (DHS HQ); James Butler (DHS HQ/Argonne National Labs); David Bertelin from Arkansas Dept. of Emergency Mgmt.	State and Federal	research collaborator

## **4. Impacts**

### **4.1 Principal Disciplines**

Nothing to report

### **4.2 Other Disciplines**

#### *Related External Grants*

1. "Data-Enabled Security in Cyber, Transportation, Critical Infrastructure, and Food," (NSF)
2. "Next Generation Ex-Post Analysis for Transportation Economics," (AASHTO EconWorks)
3. "A Virtually Connected Laboratory for Introducing Self-driving Car Technology through a New Mobile-learning Pedagogy," (NSF IUSE)
4. "Coastal Resilience Center of Excellence," subcontract from University of North Carolina, (DHS)
5. "Coastal Flood Risk Reduction," subcontract from Texas A&M University (NSF, PIRE project)
6. "RII Track 4: Collaborative Research to Advance Enhanced Landfill Mining," (NSF EPSCoR)
7. "Building Louisiana coastal resilience to shocks and stressors through collaborative citizen-expert data collection, analysis, and intervention," (Gulf Research Institute)
8. "Converting Vulnerable Landscapes to Resilient and Sustainable Community Assets," (Metro Water Services project)
9. "Leveraging Information Technology for the Nexus of Food Energy and Water Systems (NSF, INFEWS)
10. "Application-based Water Quality Network Tool for Food Safety Management and Education," (USDA Southern SARE)
11. "Development, Demonstration and Dissemination of Integrated Technology Solutions to Improve Hazardous Materials Transportation Safety and Security," (Pipeline and Hazardous Materials Safety Administration)

### **4.3 Human Resources (Transportation Workforce Development)**

#### *K-12 Programs*

- During this time period the University of Arkansas Engineering Recruiting office engaged over 1000 students

#### *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.

#### *Internships*

1. One logistics internship with J.B. Hunt
2. Two Arkansas State Highway and Transportation Department internships

#### *Short Courses and/or Workshops*

1. "Use of Geospatial technologies for improving society (here and abroad)", mini workshop held for 5 middle school girls in Dickson, TN by J. Camp and D. Martin

2. "Evacuation Traffic and Transportation Planning and Management," National Hurricane Conference, New Orleans, April 2017, 50 attendees

#### **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. WTS

##### *Leadership Positions*

1. Junior Vice President of Programs, Public Sector OR Section, INFORMS
2. President Elect, American Society for Engineering Management
3. President, American Society for Engineering Management
4. Member, Advisory Council for Transportation Research, Arkansas State Highway and Transportation Department
5. Chair, ASCE Methods of Design Committee
6. Member, Transportation Research Board Committee (ABJ90 - Freight Transportation Data)
7. Sub-committee chair, TRB, (ABG20- Transportation Training and Education)
8. Special Projects Subcommittee Chair, Geo-Institute Soil Properties and Modeling
9. Member, TRB Pavement Management Committee
10. Member, TRB Emergency Evacuation Committee
11. Vice chair, AFP-40 committee, TRB
12. Education Director, University of North Carolina, Coastal Resilience Center of Excellence
13. Professional Committee, Serving as an Executive Officer (Industry Representative) for the American Society of Engineering Education's (ASEE)
14. Subcommittee Member, Office of Marine Engineering Division(OMED)
15. Chair, Standing Committee on Emergency Evacuation, Transportation Research Board
16. Committee member, Standing Committee on Emergency Evacuation, Transportation Research Board
17. Member, TRB Intermodal Freight Transport Committee; American Society for Public Administration Section on Transportation Policy and Administration Executive Committee
18. Marine Board Member, Transportation Research Board
19. Resilience Section Committee Member, Transportation Research Board
20. ASCE /COPRI Subcommittee on Alternative Financing for Waterways Infrastructure Member
21. Chair, Committee for a Study of Propane Gas Pipeline Facilities, TRB
22. Member, Committee on Domestic Transport of Engery Products, TRB
23. Southeast Regional Vice Chair for the Professional Engineers in Higher Education (PEHE) Executive Board of the National Society of Professional Engineers (NSPE), 2016-2017.
24. President for the Tennessee Society of Professional Engineers, 2016-2017.
25. Member of the ASCE Committee on America's Infrastructure (CAI) for the development and release of the 2013 and 2017 Report Card on America's Infrastructure (2012-Present). Representing CAI on the ASCE Excellence in Journalism Award Committee (2016-2017).
26. Member of the New Professionals Council for the Environment and Water Resources Institute, ASCE (2015-Present)



27. Creative Catalyst at The Curb Center for Art, Enterprise, and Public Policy, Vanderbilt University (2015-Present)
28. Member, Environment and Urban Planning Academy Advisory Board, Glencliff High School (2010-Present)
29. Education Outreach Chair, Nashville Section, American Society of Civil Engineers (2010-Present)
30. Reviewer for publications: (1) ASCE Journal of Infrastructure Systems; (2) Risk Analysis; (3) International Journal of Sustainable Transportation (IJST)
31. Freight Modeling Subcommittee Chair of TRB AT015: Freight Planning and Logistics Committee
32. TRB Committee Chair: Ports and Harbors

#### *Leadership Awards*

- JSU, *High-value research in safety and maintenance*, AASHTO 96th TRB Annual Meeting, Washington DC, January 2017, "Evaluation of MSDOT's Distress Thresholds for Maintained Pavement Projects"

#### **4.5 Technology Transfer**

##### *Transfer of Results*

1. Invited presentation to Louisiana Supply Chain / Transportation Council Louisiana Capital Annex, *Critical Infrastructure Resilience and Fuel System Resilience*, March 30, 2017.
2. Interdisciplinary Data Science, Predictive Analytics, and Big Data Retreat, - Several MarTREC PI's presented on their MarTREC projects, May 15, 2017
3. Central Intermodal Authority Meeting, April 17, 2017 – MarTREC PI's discussed current and potential projects with central Arkansas Intermodal leaders.
4. Department of Homeland Security Meeting, May 16, 2017 – MarTREC Director met and discussed the MarTREC match project McClellan-Kerr Arkansas River Navigation System (MKARNS).
5. Dr. Ned Mitchell, United States Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC) held a webinar, with all MarTREC Site Directors on May 18, 2017 to discuss current and potential project collaborations.

##### *Editorial Journal Positions*

1. Associate Editor, Operations Research Letters
2. Associate Editor, Economic Quality Control
3. Editor, International Journal of Six Sigma and Competitive Advantage
4. Editorial Board, International Journal of Quality Engineering and Technology
5. Associate Editor, Engineering Management Journal
6. Area Editor, The Engineering Economist
7. Editor Board Member, Journal of Geotechnical and Geological Engineering
8. Editorial Board Member, Journal of Frontiers of Structural and Civil Engineering (FSCE)
9. Area Editor, Journal of Transportation Safety System Security
10. Guest Co-Editor, Journal of Advanced Transportation
11. Guest Co-Editor, International Journal of Disaster Risk Reduction
12. Board Member, Transportation Research Part E: Logistics Review

#### **4.6 Society beyond Science and Technology**

##### *Conference Planning Positions*

1. Cluster Co-chair, Public Sector OR Cluster, INFORMS 2017
2. Co-chair, Road Safety and Emergency Management Section Technical Committee, 2017 World Transport Convention (WTC), Beijing, China
3. Co-chair, Marine Transport Safety and Management, 2017 World Transport Conference, Beijing, China
4. Organizing Committee Member, Smart Rivers 2017, PIANC Biennial Waterway Research Conference

##### *Diversity*

1. Presentation at the Women in Transportation Seminar(WTS), Louisiana Chapter
2. Six officially recognized diverse student societies and organizations

#### **5. Changes/Problems**

Nothing to report

#### **6. Special Reporting Requirements**

Nothing to report