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Summer 2013

## Mack Nuggets, Summer 2013

Mack-Blackwell National Rural Transportation Study Center (U.S.)

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### Citation

Mack-Blackwell National Rural Transportation Study Center (U.S.). (2013). Mack Nuggets, Summer 2013. *Mack Nuggets*, 1 (6) Retrieved from <https://scholarworks.uark.edu/mack-nuggets/10>

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## Supporting Secure Inland Waterways

In January 2013, Dr. Heather Nachtmann of the Mack-Blackwell Rural Transportation Center (MBTC) at the University of Arkansas and Dr. Henry Mayer and Mr. Matthew Campo of the Center for Transportation Safety, Security & Risk (CTSSR) at Rutgers University presented "Supporting Secure and Resilient Inland Waterways" to Vice Adm. Robert Parker along with Coast Guardsmen onsite at U.S. Coast Guard (USCG) Atlantic Area headquarters and virtually to the Districts 8 & 9, USCG R & D Center, and the USCG Academy. In addition to Dr. Nachtmann, Dr. Mayer, and Mr. Campo, the Supporting Secure and Resilient Inland Waterways (SSRIW) project team consists of Dr. Justin Chimka, Dr. Edward Pohl, and Ms. Jingjing Tong at the University of Arkansas and Ms. Jennifer Rovito at Rutgers University.

The SSRIW project, funded by the Department of Homeland Security through the National Transportation Security Center of Excellence, is developing a prototype response and planning tool that provides timely knowledge and awareness of what barge cargoes should be prioritized for offloading in the event of a catastrophic disruption to an inland navigable waterway and the availability and capacity of nearby ports and land-based freight infrastructure to receive and transport these cargoes. The tool can be used to identify infrastructure that exhibits



Vice Adm. Robert Parker along with Coast Guardsmen, and faculty members from the University of Arkansas and Rutgers University participate in a video tele-conference during a presentation on "Supporting Secure and Resilient Inland Waterways." US Coast Guard photo by Petty Officer 2<sup>nd</sup> Class Walter Shinn

low resiliency in terms of modal capacity to potential attacks or natural disasters against inland waterway transportation systems. This proof-of-concept study is based on data from the Upper Mississippi River region including commodity type, volume and frequency of barge cargoes and capacity and characteristics of ports and land-based rail systems. Considering the large volume and low cost of freight transportation via barge, the long term loss of an inland waterway would have immediate and adverse societal and economic impacts on the region and/or nation.

In addition to providing guidance on cargo prioritization, the SSRIW prototype tool can be used to identify infrastructure that exhibits low resiliency in terms of modal capacity to potential attacks or natural disasters against inland waterway transportation

systems. Inland waterways transport over 600 million tons of cargo each year, including critical commodities such as coal, petroleum and grain. A catastrophic event on the rivers could disrupt commerce for an extended period of time. It is important to pre-plan for this type of event, enable coordination between industry and governmental groups, and provide knowledge of where the system lacks resilience to recover from a disruption. Inland waterways are a national asset for many reasons, including the \$70 billion dollars of cargo that are transported annually, the impact of reducing congestion on already over-crowded highways and railways, and the tens of thousands of jobs associated with this transportation mode.

The team is currently utilizing Microsoft Silverlight to integrate a shortest path routing model and cargo prioritization and terminal

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## Message from the Director



Heather Nachtmann,  
MBTC Director

This year it feels like the theme of our Center should be *Time Flies When You Are Having Fun (and Working Hard)*. I am continually amazed at how quickly days turn into weeks, weeks turn into semesters, and semesters turn into years. One could never say that life within a research center is boring!

This issue's research spotlight focuses on the maritime transportation mode. I have enjoyed working on inland waterway transportation for many years and am pleased to have the opportunity to highlight one of our ongoing maritime

projects with you. As our most cost effective and sustainable mode, I see a great future for maritime transportation.

We enjoyed an outstanding Distinguished Lecture series this year including our annual Evening with the Pros featuring our new Director of the Arkansas State Highway and Transportation Department and a lecture by one of our international collaborators from the University of Nottingham.

In November, we held a successful and productive Annual Advisory Board meeting including a planning session focused on future

research directions. We are grateful for the continued support of our advisory board members. Our Center for Training Transportation Professionals has moved online courses from a future initiative to a reality, further serving our transportation community.

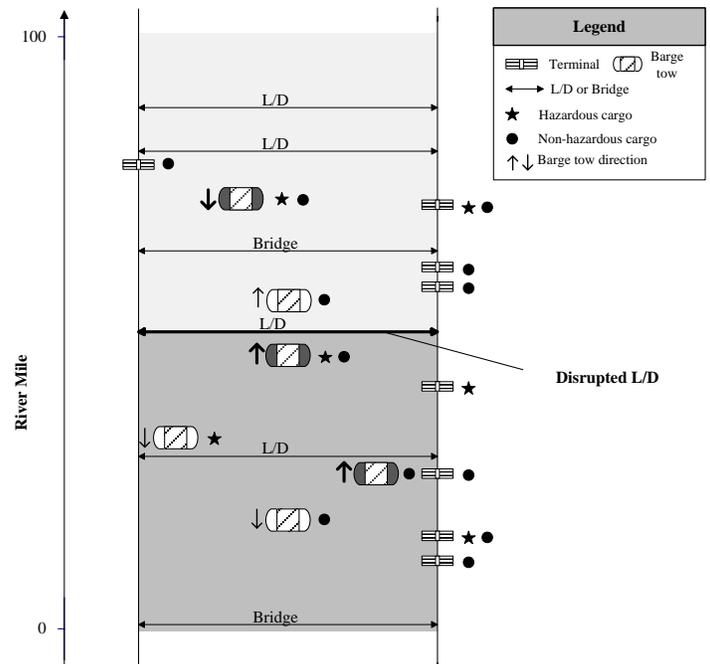
I hope you enjoy reading about our recent accomplishments. Please visit [www.mackblackwell.org](http://www.mackblackwell.org) for more information. We are proud of our faculty, staff, students, and partners. On behalf of MBTC, I wish you a relaxing and productive summer.

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allocation model to develop the web-based SSRIW prototype tool. Users will be able to generate and save multiple what-if scenarios and customize the network infrastructure depending on preferences. Upon completion of prototype development, the research team expects to make it available for testing by potential user communities. Next steps include the development of a more robust tool for application by the USCG and other federal agency partners responsible for waterways management and marine transportation system recovery. Collaborative meetings with the U.S. Army Corps of Engineers indicate potential collaboration with the river information services development and other waterways management initiatives. The project is scheduled for completion in June 2014.



Challenge Coin presented to Dr. Heather Nachtmann by USCG Vice. Adm Robert Parker



## Evening with the Pros

The Evening with the Pros was held September 20, 2012 in the John A. White Engineering Hall on campus. **Bob Walters** welcomed everyone and introduced the speakers.

**Scott Bennett**, Director of the Arkansas State Highway and Transportation Dept., spoke on "*Graduate School: To Go or Not to Go – and When: Now or Later.*" He stated that civil engineers come with a higher level of responsibility than some other careers and graduate degrees will be increasingly more important in the future. Individuals need the higher level of education to handle the higher level of responsibility. Mr. Bennett encouraged students to work while in school as interns during their academic career.

**Nate Bachelor**, CEI Engineering, spoke on "*The Professional Engineer and Social Media.*" He stated that companies use social media

to keep track of potential hires and achievements as well as keep track of existing employees. He also advised using social media to research potential employers as a way to become involved in what the company is doing. A few of the tips he gave are: be mindful of what you post, it is not all about you, make yourself look hireable and remember that there is a back door to your content.

The third speaker of the evening was **Ross O'Kelley**, AECC, who spoke on "*The Top x Things Your Professors Don't Tell You About Working as an Engineer.*" Mr. O'Kelley encouraged students to volunteer to do the software portion of the team group assignments. He noticed that those who excel maximized their software skills. He also suggested pursuing real life problems in senior electives. He recommended holding the teachers accountable to teach what they are supposed to teach. He noted that employers see you as

civil engineers – not water, environmental, highway, etc. He stressed the importance of being involved in activities like concrete canoe, steel bridge, honors program and internships. You can make contacts anywhere and everywhere.

**Stuart Nolan**, Crisp Engineering, spoke on "*It's Never Too Early to Lead.*" He stated leaders inspire others to achieve their goals. He suggested that when choosing an organization look for opportunities to show leadership and be committed. Develop passion and vision which are both important to be a good leader. He noted some observations of a good leader: be a good communicator as well as listener, be a good member, recognize when don't have enough information to make a decision and learn to recognize strengths of others.

Bob Walters ended the evening with a quote from Tom Brokaw, "It's easy to make a buck. It's tougher to make a difference."



Bob Walters speaking with a student



Speakers interact with students and faculty.

## Dan Flowers Distinguished Lecture Series

Dr. John Andrews, the Royal Academy of Engineering and Network Rail Professor of Asset Management, from the University of Nottingham Transport Engineering Centre, was this Spring's Dan Flowers Mack-Blackwell Distinguished lecturer. Dr. Andrews presented a talk on Thursday January 14, 2013 entitled: *Controlling the Effects of Engineering Failure.*

In his presentation, Dr. Andrews described some of the modeling work taking place at the University of Nottingham Transportation Engineering Centre which predicts the effects of failures on system performance. His talk examined system performance in the context of

both risk assessment and asset management. Dr. Andrews described his risk assessment work as focused on the use of the Binary Decision Diagram technique and how its characteristics can be exploited to enable its novel use in autonomous vehicle (such as UAVs) mission planning as well as its more conventional use in system certification.

Dr. Andrew's asset management discussion also focused on the development of maintenance strategies for a modern railway system. The diverse range of asset types which are encountered on a railway include: the track, signalling systems, points, and the electrification systems, in

addition to the civil structures such as bridges, tunnels and stations. These assets provide a significant challenge to model their degradation and maintenance processes to minimize whole life costs when viewed from a system perspective. Dr. Andrew's included several videos in his talk that illustrated the issues associated with asset mana



Dr. Heather Nachtmann, MBTC Director, Dr. John Andrews, and Dr. Kevin Hall, MBTC Executive Director



## Center for Training Transportation Professionals



Frances Griffith, Diane Allen, Charles Steelman, Stacy Williams, Anna McGraw, Mary Fleck, Roselie Conley

The Center for Training Transportation Professionals (CTTP) completed a busy year in 2012, and 2013 promises to be just as action-packed. As a result of the Interstate Rehabilitation Program in Arkansas, new construction contracts have significantly increased the demand for contractor training and certification within the state. In order to meet this demand and the needs of the Arkansas Highway and Transportation Department (AHTD), the training course calendar has been extremely full. Thus far in calendar year 2013, CTTP has already hosted 15 of the 26 required annual contract courses. Overall, course enrollment continues to increase, with most scheduled courses operating at or near capacity and waiting lists for virtually every course topic. It is anticipated that several additional courses will be scheduled this year in order to meet the increasing demand for recertification.

In addition to the primary contract courses, additional courses are also being offered this year, including the National Pollutant Discharge Elimination System (NPDES) certification

and Roadway Construction Control. NPDES certification continues to gain priority as stormwater regulations evolve, and this class has experienced greater contractor participation.

The Basic Aggregates Refresher Certification (online course) was required of all CTTP-certified technicians during calendar year 2012, and is still available to technicians that have not yet renewed their certification. New technicians may also access these course modules in “view only” mode prior to attending an in-house CTTP Basic Aggregates course in order to better prepare for the live course. Online modules for Transportation Math and Concrete Math are also available on the CTTP website, and additional course topics are currently under development.

An increase in participation in the CTTP laboratory certification program has also stemmed from new construction contracts within the state, with approximately 100 laboratories currently participating in the program. The seventh inspection tour is in progress, which represents new efforts to

increase the quality of laboratory testing in the state, as well as methods to streamline the documentation required for the program. A new digital documentation system for laboratory inspection is in the implementation phase, and this system is being used to assist CTTP in tracking laboratory data and historical inspection records. The new system will also aid laboratory personnel in maintaining equipment calibration and maintenance records by providing interactive forms on the CTTP website.

CTTP is also assisting in AHTD's Technology Transfer efforts through the Local Technical Assistance Program (LTAP). In 2012, courses in Asphalt Pavement Maintenance and Stormwater Management were developed. In 2013, a ROAD Scholar Program will be implemented, and several additional courses will be developed that relate specifically to the Federal Highway Administration's (FHWA) Every Day Counts Initiatives.

For more information on opportunities at CTTP, visit us at [www.cttp.org](http://www.cttp.org), or email [cttp@uark.edu](mailto:cttp@uark.edu).

## MBTC Advisory Board Member Receives Honor

Rebecca Brewster, President and COO of the American Transportation Research Institute (ATRI) was presented with the prestigious 2013 “Influential Woman in Trucking” award by the Truckload Carriers Association, the Women in Trucking (WIT) organization. Ms. Brewster was selected from among over 100 nominations. This award recognizes women in the trucking industry who are

responsible for critical decision-making, have a proven track record in management, and who provide a role model for other women. “We are excited to honor a woman who has had so much influence on commercial trucking,” said Ellen Voie, WIT president and CEO.

Steve Williams, Chairman of Maverick Transportation and chair of the ATRI Board of

Directors described the WIT award by saying, “The transportation industry and our nation at large are dependent on individuals whose vision for the safe and efficient movement of commerce is based upon factual research. Fortunately, Rebecca's passion and dedication will continue to benefit the American public. She is very deserving of this recognition.”



CTTP concrete proctors observe as students complete performance exams.



## MBTC's Recently Completed Projects

Listed below are projects completed since our Spring 2012 newsletter. Full reports for these and all other completed MBTC projects are listed on our website at [www.mackblackwell.org](http://www.mackblackwell.org).

### March 2012

MBTC DOT 3030  
Performance of Prestressed Girders Cast with LWSCC – Phase II

*Principal Investigator:*  
Micah Hale, Ph.D., P.E.  
University of Arkansas

MBTC DOT 3022  
Nanotechnology-Based Improvements for Portland Cement Concrete – Phase I  
*Principal Investigators:*  
R. Panneer Selvam, Ph.D., P.E.  
University of Arkansas

*Principal Investigators:*  
Ashlea Bennett Milburn, Ph.D. and Chase Rainwater, Ph.D.  
University of Arkansas

### July 2012

MBTC DOT 3033  
Exploring Different Forms of Base Stabilization

*Principal Investigators:*  
Andrew Braham, Ph.D.  
University of Arkansas

MBTC DOT 3034  
Biodiesel Waste Products as Soil Amendments – Field Study and Runoff Impacts  
*Principal Investigator:*  
Thomas Soerens, Ph.D., P.E.  
University of Arkansas

### April 2013

MBTC DOT 3031  
Identification of Expansive Soils Using Remote Sensing and In-Situ Field Measurements – Phase I  
*Principal Investigator:*  
Richard Coffman, Ph.D., P.E.  
University of Arkansas

MBTC DOT 3032  
Site-Specific Ground Motion Analyses for Transportation Infrastructure in the New Madrid Seismic Zone  
*Principal Investigator:* Brady Cox, Ph.D., P.E.  
University of Arkansas

### August 2012

MBTC DOT 3021  
Performance of Prestressed Girders Cast with LWSCC

*Principal Investigator:*  
Micah Hale, Ph.D., P.E.  
University of Arkansas

**February 2013**  
MBTC DOT 3028  
Models for Disaster Relief Shelter Location and Supply Routing



Aggregate Draining Setup used in MBTC DOT 3030

## MBTC Student of the Year

The 2012 Mack-Blackwell Rural Transportation Center *Outstanding Student of the Year* was awarded to Cyrus Garner. Cyrus traveled to the 22<sup>nd</sup> Annual Council of University Transportation Centers (UTC) Awards Banquet held in Washington, D.C. on January 12, 2013.

He was nominated by Dr. Rick Coffman, who said, "Simply put, numerous hurdles encountered during the project would not have been overcome without Mr. Garner's contribution to this project. Mr. Garner's raw intelligence has allowed him to conduct this pioneering research within Geotechnical Engineering enabling him to make a significant

contribution to the profession." Cyrus worked on MBTC DOT 3031, "Identification of Expansive Soils Using Remote Sensing and In-Situ Field Measurements–Phase I."

Cyrus is a doctoral candidate at the University of Arkansas. He was born in New York City and raised in Brooklyn, New York and Vinalhaven, Maine. Before continuing his education for a Master's Cyrus worked as part of the construction management team, building correctional facilities in Arizona and Colorado.

His master's research focused on the

characterization of tunneling induced subsidence, using finite element modeling and closed form solutions, and resulted in three journal publications. Building on his previous work, his current research focuses on ground deformation associated with unsaturated soils (specifically expansive clays).

Cyrus is using remote sensing methodologies, utilizing a wide range of the electromagnetic spectrum, to determine soil: color, mineralogy, volumetric moisture content, temperature, and volume change.



Cyrus Garner receiving his award from RITA Administrator Greg Winfree at the CUTC Awards Banquet

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The Research and Innovative Technology Administration (RITA) coordinates the U.S. Department of Transportation's (DOT) research programs and is charged with advancing the deployment of cross-cutting technologies to improve our Nation's transportation system and Mack-Blackwell is proud to be a participating university.



The Department of Homeland Security's National Transportation Security Center of Excellence (NTSCOE) is developing new technologies, tools and advanced methods to defend, protect and increase the resilience of the nation's multi-modal transportation infrastructure and education and training base lines for transportation security geared towards transit employees and professionals.

**Kevin Hall, Ph.D., P.E.**  
Executive Director

**Heather Nachtmann, Ph.D.**  
Director

**Sandra Hancock CAP, M.S.**  
Fiscal Support Analyst

We're on the Web!

See us at:  
[www.mackblackwell.org](http://www.mackblackwell.org)

## MBTC Students and Researchers Receive Recognition and Promotions

August 2013 brings promotions for three MBTC faculty researchers – **Dr. Micah Hale**, Civil Engineering; **Dr. Heather Nachtmann**, Industrial Engineering and Director of MBTC; and **Dr. Edward Pohl**, Industrial Engineering, are promoted to Professor.

**Dr. Manuel Rossetti**, Industrial Engineering, received the U of A Charles and Nadine Baum Faculty Teaching Award at the Alumni Awards Celebration held November 2012.

**Dr. Stacy Williams**, MBTC Researcher and Director of the Center for Transportation Professionals, was featured in a University of Arkansas video highlighting her research in Warm-Mix Asphalt. <http://bit.ly/UAAAsphalt>.

**Eric Fernstrom**, recently

won 1<sup>st</sup> place (and a \$1000 award) in the Ph.D. level at the 1<sup>st</sup> Annual Heartland Transportation Consortium Student Competition which was sponsored by the Oklahoma Transportation Center. This competition was held April 2 -4, 2013 in Oklahoma City, OK. His paper was entitled "Evaluation of Economical Dynamic Excitation Devices for Vibration Testing of Bridges."

**Mr. Fernstrom** was also recognized with a 2<sup>nd</sup> place finish in the Civil Engineering category at the 2013 From Abstract to Contract Graduate Student Research and Creative Expression Competition at the University of Arkansas which was held February 25, 2013 at the University of Arkansas Janelle Y. Hembree Alumni House.

**Ridvan Gedik**, Ph.D. candidate, received the E.J. Sierleja Memorial Fellowship and **Jingjing Tong**, Ph.D. candidate, received the Gilbreth Memorial Fellowship at the Institute of Industrial Engineers Annual Conference and Expo held in San Juan, Puerto Rico in May 2013.

**Ms. Tong** also received the 2013 Supply Chain and Logistics Track First Place Award from U of A Graduate Student Research and Creative Expression Competition. The award was presented by Dr. Sharon Gaber, provost and vice chancellor for academic affairs.

MBTC congratulates our students and faculty researchers for all their achievements.

## AHTD Support Recognized by MBTC

From its beginnings twenty-one years ago through the present, the Mack-Blackwell Rural Transportation Center (MBTC) has enjoyed a true partnership with the Arkansas State Highway and Transportation Department (AHTD).

Building on the legacy of transportation research success from AHTD and the Department of Civil Engineering, MBTC allowed AHTD to expand its scope and productivity to bring research solutions to routine practice in an expedited manner. The creation of the Center for Training Transportation Professionals (CTTP) in 2001 extended this partnership into the areas of workforce development and

construction quality control / quality assurance. To date, AHTD has invested more than \$7.5 million in MBTC/CTTP for research, undergraduate scholarships, graduate fellowships, workforce training and certification, and professional development through the Dan Flowers Distinguished Lecture Series.

The AHTD Director of Highways is a charter member of MBTC's Professional Advisory Board, and consistently promotes MBTC at the highest levels of state and federal government. It is not an exaggeration to state that MBTC would not exist without the generous support of AHTD; its future success

is forged in the research, education, and service ties that bind the two organizations.

On August 8, 2013, the University of Arkansas and AHTD will host a joint media event to celebrate this successful partnership.



Scott Bennett, Director of Arkansas State Highway and Transportation Department with Former Director Dan Flowers