NC STATE
Engineering

CCEE NEWS

DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING
NC STATE UNIVERSITY | SPRING 2015

BIOFUEL RESEARCH MAY LEAD TO CLEANER LOCOMOTIVES

IN THIS ISSUE

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CCEE News is published by the Department of Civil, Construction, and Environmental Engineering to share information among faculty, staff, students, alumni and friends of the Department.

IN THE SPOTLIGHT

DEVELOPING STORM SURGE VISUALIZATION

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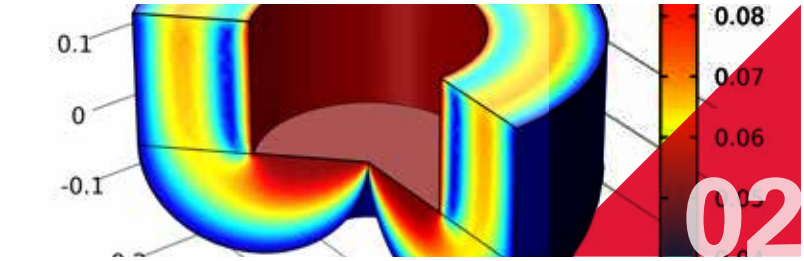
Researchers are improving the dissemination of flooding predictions to end-users by producing predictions in popular file formats.



ABOUT THE COVER

Dr. H. Christopher Frey's study of biodiesel in diesel engine locomotives included more than 270 hours of measurements during passenger rail service between Charlotte and Raleigh.

FDH Engineering Sponsors CCEE News

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We ask you to invest in our future and make a commitment to CCEE. Your gift will help us take CCEE to a new level of excellence. As a result, we anticipate having better educated and prepared students entering the work force, which will raise the visibility and build the stature and prestige of the CCEE Department. There are many ways to give to the Department. Whether an annual gift, an endowed gift, or a one-time gift, it will have a significant impact on current as well as future students and faculty at NC State University.

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LETTER FROM THE DEPARTMENT HEAD MORTON A. BARLAZ

Welcome to the Spring 2015 newsletter. It is a pleasure to update our friends on happenings in the department. I am writing this letter just after our December graduation. It is always satisfying to watch as the next generation of engineers graduates (see article on page 21). Graduation is an uplifting reminder of our mission.

This newsletter features five research briefs from our faculty, highlighting the Department's contributions to civil infrastructure. Dr. **Casey Dietrich** is working with emergency managers to improve the communication of flood predictions associated with hurricanes. Drs. **Mo Gabr**, **Shamim Rahman** and **Joe DeCarolis** are developing energy storage systems for offshore power generation. Dr. **Tasnim Hassan** is leading a team to characterize alloys that can be used in next generation nuclear plants. Dr. **Sami Rizkalla** is investigating techniques to strengthen steel structures and bridges with carbon fiber reinforced polymer strands. Dr. **H. Christopher Frey** is evaluating the use of biodiesel to reduce emissions in locomotives. These articles are great examples of how civil, construction, and environmental engineers are working to improve public welfare and environmental sustainability.

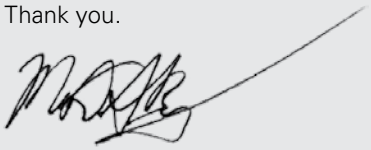
Dr. **Michael Leming**, a professor in our Construction group, and most recently the department's Coordinator of Advising, retired in December. Mike served the department for nearly 30 years, first as a lecturer from 1985 to 1994 and then in a faculty position. Dr. **Robert Borden** also retired this past semester after 28 years on the faculty. In 2013, Bob was recognized with an Alumni Association Outstanding Extension and Outreach Award for his work on groundwater remediation.

I am pleased to announce that Dr. **Lisa Castellano** has joined the department as manager of the environmental engineering laboratory. Lisa received her Ph.D. in analytical chemistry from George Washington University and has 14 years of experience as a manager of a commercial laboratory. Lisa replaces Mr. **David Black**, who retired in October after 18 years of what can only be described as truly extraordinary service.

Our student groups continue to bring a variety of extracurricular experiences to our programs including conference attendance, site visits and service projects. I would like to personally acknowledge and thank the leaders of our student groups for their drive and motivation to embrace all aspects of our profession through their leadership. I also thank three members of our Advisory Board, **Bill Pope**, **David Simpson** and **Stacey Smith**, who are serving as advisers to the student groups.

As you look through this newsletter, I hope that you get a sense of the wonderful accomplishments in our teaching, research, and extension programs. I have explained the budget reductions that we have experienced in past letters and continue to ask our friends and alumni for help. Many of you have responded and your contributions are sincerely appreciated. We are dependent on gifts and endowments to maintain excellence. Please make a contribution to the department a regular event. Your gifts provide help with the special things that make us strong, whether it is field trips for undergraduates, allowing graduate students to make a presentation at a national conference, or helping to recruit and retain the best students and faculty members in the world. We need your support as we strive for excellence in times of decreasing public funding for our mission.

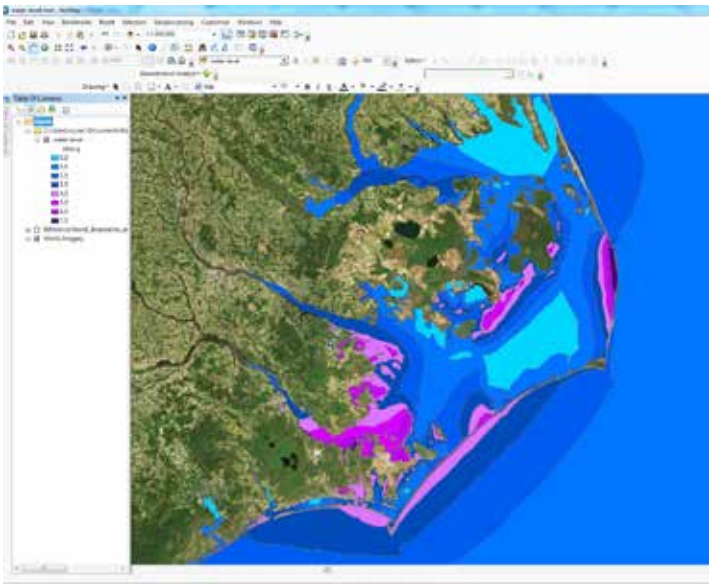
Thank you.



Morton A. Barlaz
CCEE Department Head

CCEE AT NC STATE SUSTAINABLE INFRASTRUCTURE FOR SOCIETY

$17.9 million in research expenditures
149 ongoing research projects
11 winners of CAREER and other NSF young faculty awards
49 faculty members
339 graduate students
768 undergraduate students



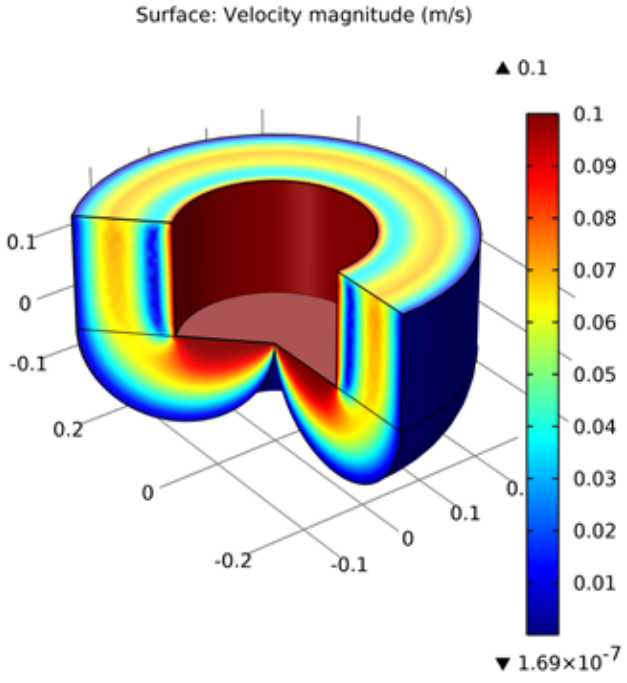
Screen-shot of the visualization of maximum water levels (in feet) along the NC coast predicted for National Hurricane Center advisory 12 for Hurricane Arthur.

Developing storm surge visualization

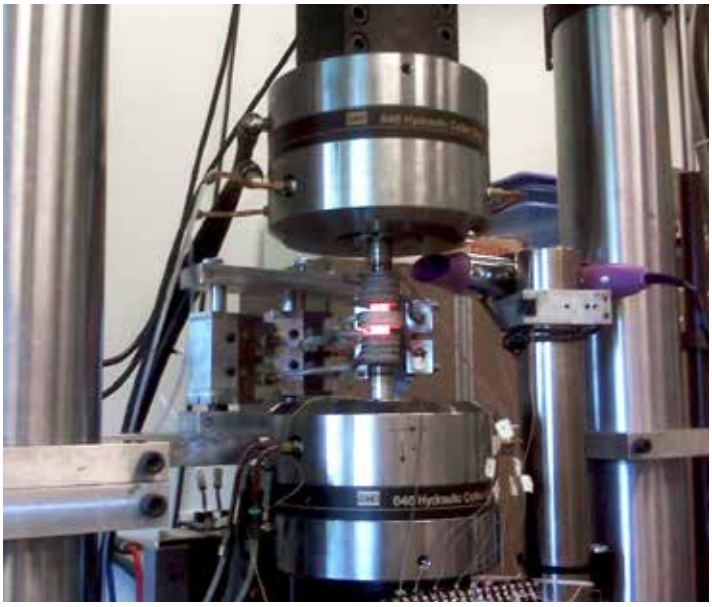
When tropical storms approach, local, state and federal emergency managers seek predictions of storm surge and coastal flooding. In a project supported by NC Sea Grant, Dr. **Casey Dietrich** and Ph.D. student **Rosemary Cyriac** are improving the dissemination of flooding predictions to end-users by producing predictions in popular file formats. The Coastal Emergency Risk Assessment (CERA, http://nc-cera.renci.org/) provides a Web-based interface for visualizing surge predictions from computer models. Dr. Dietrich's team is working with emergency managers in North Carolina's coastal counties and with other decision makers. Results from daily model simulations are sent to these individuals, and they are widely used to predict inundation and flooding levels. Such predictions are also needed for engineering design and evacuation decisions. Model outputs are converted into formats compatible with commonly used visualization software, such as ArcGIS and Google Earth. By providing predictions to local emergency managers in a useful format, the information can be more easily integrated with other data, thereby making the information more accessible to those who most need it. •

Energy from oceans: anchoring of energy storage system

Nearly 50 percent of the U.S. population lives within 50 miles of the coast. Therefore, commercial harvesting of renewable power from ocean currents represents an attractive option as the U.S works to reduce emissions from fossil fuels. The North Carolina shoreline is close to the Gulf Stream, from which energy could be recovered. However, technologies are needed to temporarily store energy recovered from ocean currents and to anchor devices to the ocean floor. A multidisciplinary team led by Dr. **Mo Gabr** with investigators Drs. **Shamim Rahman** and **Joe DeCarolis** from CCEE, Drs. **Paul Ro** and **Andre Mazzoleni** from Mechanical Engineering, and Drs. **Iqbal Husain** and **Emmanuel Agamloh** from Electrical Engineering, are analyzing and developing an energy storage system and potential anchoring mechanisms for offshore power generation devices. Graduate students **Jinfu Xiao**, **Zahra Aghazadeh**, **Binghui Li** and **Priscilla Osei** (MCE, 2013) worked on the project. Issues investigated include the storage of offshore compressed air that is subsequently used for energy generation, development of mooring approaches for energy converters and innovative foundation systems. This project is in collaboration with Dr. **Billy Edge**, the director of the Ocean Energy Program at the UNC Coastal Studies Institute. •



Numerical modeling of suction flow around a caisson.



High temperature material test set up with collaborators at Penn State University used in the experimental study

Material modeling for designing next generation nuclear power plants

High temperature gas-cooled reactors have been selected by the US Department of Energy (DOE) for constructing next generation nuclear plants for electricity and hydrogen production. To maximize thermal efficiency, these plants will be operated at temperatures as high as 950°C, which is higher than the 550°C temperature of operating reactors. The American Society of Mechanical Engineers (ASME) Design Code includes design provisions up to only 760°C. However, many high temperature alloys are not included in the Code. Hence, the DOE, through the Nuclear Engineering University Program (NEUP), has been conducting research to support design and construction of next generation plants. Dr. **Tasnim Hassan** in CCEE led an NEUP project including a team of investigators from **Penn State University** and **Idaho National Laboratory**. The team developed a broad material database for a promising high temperature alloy, Inconel 617. NC State graduate students **Patrick G. Pritchard** (MS, 2014), **Shahriar Quayyum** (Ph.D., 2014), and **Nazrul Islam** have scrutinized material data to characterize high temperature failure modes of the alloy and develop an advanced material model. The model will allow engineers to design efficient next generation nuclear reactors. •

Strengthening of steel structures and bridges

The Constructed Facilities Laboratory (CFL) at NC State is investigating techniques for strengthening steel structures and bridges with small-diameter Carbon Fiber Reinforced Polymer (CFRP) strands. Graduate students **Salar Tabrizi** (MS, 2013), **Hamid Kazem**, and **Lucas Guaderrama** (MS, 2014) are working on the project under the direction of Dr. **Sami Rizkalla**. The research is in collaboration with Nippon Steel & Sumikin Materials Co., Ltd. in Japan and is funded by the U.S. National Science Foundation through the Center on Integration of Composites into Infrastructures (CICI) at NC State. Laboratory experiments demonstrated the use of the new CFRP material in strengthening steel beams and plates of different sizes and thicknesses. Novel findings from this work have been presented at international conferences on FRP composites. Additional experiments under various loading conditions are in progress to demonstrate the effectiveness of CFRP in enhancing damage resistance of steel structures including bridges and buildings. •

Compression testing of steel plates strengthened with CFRP strands

Clockwise from top, emissions of locomotive NC 1810 were measured en route from Raleigh to Charlotte; graduate students install sensors on a locomotive diesel engine; and a sample port was installed on the airbox of a 3,000 hp locomotive diesel engine.

Real-world effect of biofuels on railroad locomotive emissions

There are more than 25,000 diesel locomotives in the United States. Biodiesel fuel can be substituted for petroleum diesel in varying proportions, and has the potential to reduce locomotive exhaust emissions of some pollutants. With funding from the **Federal Railroad Administration** and access to locomotives provided by the **North Carolina Department of Transportation**, Dr. **H. Christopher Frey** led a study to evaluate biodiesel for railroad applications. Graduate students **Brandon Graver** and **Jiangchuan Hu** measured three locomotives operated on ultra low sulfur diesel (ULSD) and blends of ULSD with 10, 20, and 40 percent biodiesel.

More than 270 hours of measurements were made during Amtrak passenger service between Raleigh and Charlotte. The biofuels were found to be effective in reducing emissions of hydrocarbon, carbon monoxide, and particulate matter air pollution, although there was some increase in emissions of nitrogen oxides. These fuels also reduce net carbon dioxide emissions. No adverse effects on locomotive operation were observed, and there was little difference in fuel cost. This new information will be helpful to rail operators in making decisions regarding possible adoption of biofuels. •

NEW RESEARCH

In the past few months, CCEE faculty members have received research awards to study a diverse range of vital systems. These latest projects highlight how faculty members are both building on past successes and breaking ground with innovative new ideas.

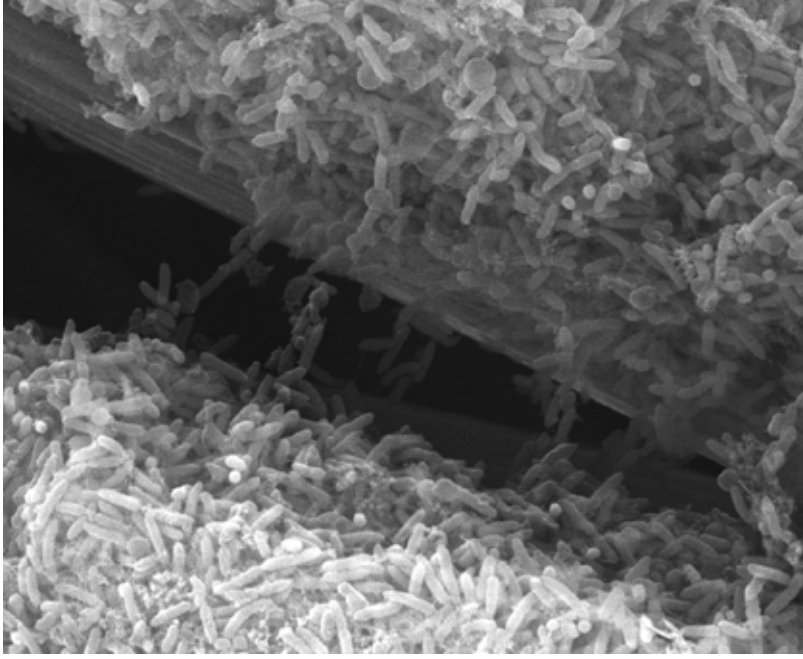
DRS. DOUGLAS CALL and **FRANCIS DE LOS REYES** received a grant from the Water Resources Research Institute (WRRI) to improve energy recovery from wastewater treatment. They will experimentally investigate the ability of nano- to micro-scale electrically conductive particles to improve microbe-to-microbe "communication" within anaerobic digesters, with the goal of increasing methane gas production rates.

DR. DOUGLAS CALL received seed funding from NC State to collaborate with **DR. MIKE HYMAN** from the NC State Department of Plant and Microbial Biology. They will investigate the biological conversion of methane gas into electrical current. The team will conduct experiments using methane-consuming bacteria and a microbial fuel cell. The team envisions this project as the first step toward a process that uses natural-gas derived electrical current to generate liquid transportation fuels in a single bioelectrochemical system.

DRS. MORTON BARLAZ, **JOSEPH DECAROLIS**, **JAMES LEVIS**, and **RANJI RANJITHAN** received a grant from Wake County to model the county's current solid waste system and evaluate future alternatives that consider cost, energy use, and environmental emissions. The team will apply the solid waste optimization life-cycle framework (SWOLF), which they developed.

DR. DANIEL OBENOUR received funding from the National Oceanic and Atmospheric Administration (NOAA) via the Sea Grant Program to study the impacts of human activity on estuarine habitat quality. A hierarchical model will be developed to analyze trawl survey results collected across 40 estuaries along the Gulf of Mexico coast over multiple decades to better distinguish human-caused impacts from natural variability.

DRS. MIN LIU, **EDWARD JASELSKIS** and **WILLIAM RASDORF** received funding from the North Carolina Department of Transportation (NCDOT) to design a model to accurately quantify construction costs of mega projects on a monthly basis. The model will enable NCDOT to simulate changes in scheduling and make better cash flow management decisions.



Microbial biofilm formation on an electrically conductive carbon surface used to harvest energy from wastewater

DR. MOHAMMAD POUR-GHAZ, along with FDH Engineering, Inc., received funding from the Federal Highway Administration (FHWA) to develop new inspection techniques for prestressed concrete members as well as a data fusion approach for combining results from multiple inspection techniques. The resulting corrosion detection will be used to create risk-based criteria for specifying inspection intervals.

DR. Y. RICHARD KIM received continued funding from Applied Research Associates to demonstrate Performance-Related Specifications (PRS) for asphalt concrete developed under previous FHWA-funded projects. The project aims to promote adoption of PRS for asphalt concrete and jointed plain concrete pavements by highway agencies throughout the U.S.

DR. EDWARD JASELSKIS, along with co-investigator **DR. ALI MOSTAFAVI** from Florida International University, received a grant from the Construction Industry Institute to improve project progress and performance assessment. The research will focus on project progress measurement, performance assessment, performance improvement and forecasting.

DRS. KUMAR MAHINTHAKUMAR, **RANJI RANJITHAN** and **DOWNEY BRILL** have been funded by Sensus, USA, Inc. to work with the Town of Cary to design and execute experiments based on the Cary water distribution network. Data from the experiments will be used to evaluate optimization algorithms developed to model Cary's water distribution network. Additional phases may be carried out to develop software modules for efficient management of urban water distribution systems.

Ph.D. student Reza Rashetnia evaluates the effect of accelerated corrosion on the vibration response of post-tensioned beams

DR. SAMI RIZKALLA received a five-year extension from the National Science Foundation (NSF) to support the Center on Integration of Composites into Infrastructure (CICI), an Industry/University Collaborative Research Center (I/UCRC). The center includes domestic and international industrial members that annually contribute $50,000 each to supplement NSF funds. Current research projects include strengthening steel bridges with carbon fiber reinforced polymer (CFRP) material, the use of CFRP for precast Concrete Sandwich Panels, and other design improvements.

DR. JOEL DUCOSTE received funding from the Emerson Electric Company to characterize long chain fatty acids (LCFA) in wastewater and evaluate management strategies. LCFAs are important because they can lead to fat, oil, and grease (FOG) deposits that clog sewer lines and can cause sanitary sewer overflows. The study will determine the effectiveness of cleanout protocols used as part of grease interceptor operation in municipal sewer systems to reduce the formation of FOG deposits.

DR. H. CHRISTOPHER FREY received a grant from the University Global Partnership Network (UGPN) to conduct research in collaboration with Dr. **Prashant Kumar** of the University of Surrey in Guildford, UK. The joint research focuses on development and demonstration of methods for measuring air pollution related to transportation. The collaboration will culminate in a workshop to be held in June to share lessons learned from the joint research. •

Robert Borden retires: 28 years at NC State

Dr. **Robert Borden** is retiring from the CCEE faculty this year. Borden joined the department in August 1986 and has been part of the Water Resources and Environmental Engineering group since. Borden developed an outstanding and internationally recognized program of basic and applied research. His work has had broad impacts on professional practice, with major advances in our understanding and implementation of practical, cost-effective technologies for management of contaminated groundwater.

Early in his career, Borden established himself as a leader in the development and application of laboratory, field and numerical modeling approaches for evaluating the monitored natural attenuation (MNA) of groundwater contaminants, such as petroleum hydrocarbons and perchlorate. His work led to acceptance of MNA as a scientifically rigorous, yet practical, approach for management of contaminated groundwater. This approach has been implemented at thousands of contaminated sites worldwide.

Over the past decade, much of Borden's research has focused on the development of emulsified vegetable oil (EVO) for in situ bioremediation of chlorinated solvents, explosives and propellants, certain metals and radionuclides, as well as for acid mine drainage. His work included laboratory studies of EVO transport and biodegradation, development of mathematical models to understand process fundamentals and improve process efficiency, field demonstrations to evaluate performance at contaminated sites, and detailed protocols and design tools to guide implementation by design professionals. As a result of this work, in situ bioremediation with EVO has been successfully implemented at thousands of contaminated sites on six continents. Most recently, Borden extended this work to develop slow release colloidal buffers in combination with EVO to treat dense non-aqueous phase liquid contaminants.

Borden's achievements were recognized by the 2010 Brown and Caldwell Lifetime Achievement Award for contributions to the groundwater remediation industry. In 2013, Borden received the NC State Alumni Association's Outstanding Extension and Outreach Award.

Borden continues to be active in research post-retirement. He will continue to participate in both fundamental and applied research at NC State and through a local consulting firm, Solutions-IES, Inc. This includes mentoring two current Ph.D. students (**Jason Tillotson** and **Jongho Won**), and advising on several research projects funded by the US Department of Defense. •

Robert Borden

Mike Leming retires after 33 years at NC State

Dr. **Michael Leming**, professor in Construction Engineering and Management, retired from the Department of CCEE in December 2014. Leming enrolled at NC State as an ROTC student and graduated first in his class with a BSCE in 1977. He went on to serve in the military, earn a master's degree at the University of California, Berkeley as a Regent's Fellow, and work at a construction company in Colorado. He returned to NC State in 1985 as a lecturer in civil engineering to teach and conduct research. In 1994, he completed a Ph.D. at NC State under the supervision of Dr. **Paul Zia**.

Over the years, Leming has taught many construction-related courses, including CE 332 - Construction Materials, CE 261 - Construction Engineering Systems, CE 263 - Introduction to Construction Engineering, CE 465 - Construction Equipment and Methods, CE 464 - Legal Aspects of Contracting (with the help of Dr. **Edward Jaselskis**), CE 469 - the Construction Engineering Capstone, CE 390 - Engineering Economy, CE 551/ 751 - Theory of Concrete Mixtures, CE 561 - Project Management, CE 592/765 - Construction Equipment, and CE 603 - Construction Engineering Seminar.

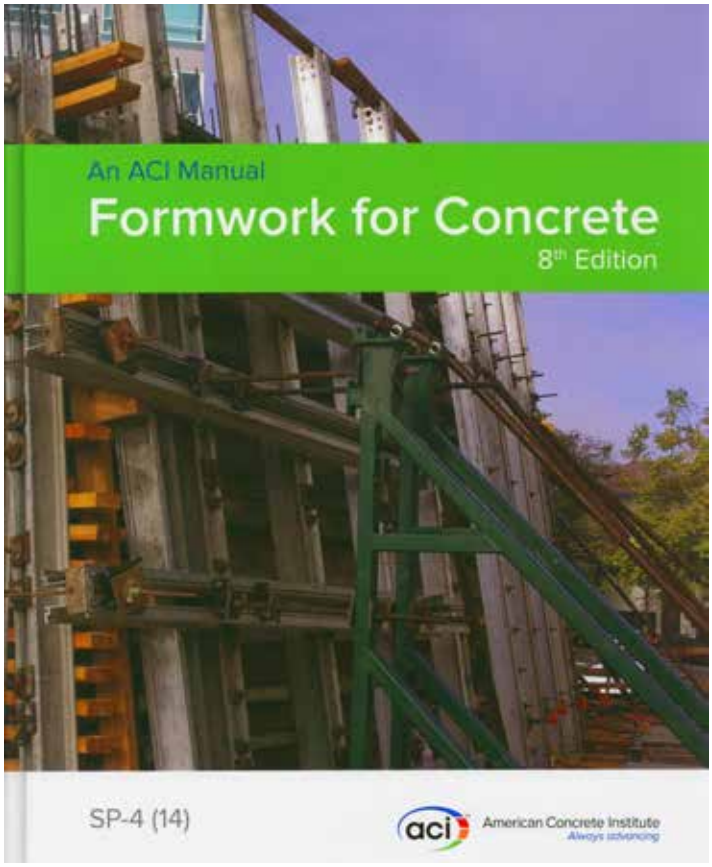
Leming's research has largely been in concrete materials and construction. His research focus has been on durability and sustainability of concrete, including alkali-silica reactivity, salt scaling, and changes in water and ion penetrability as concrete is damaged. He has also worked on construction-related issues with concrete. He has collaborated with numerous faculty members on a wide variety of interdisciplinary research projects related to concrete, construction, or both, including pervious concrete pavements, construction equipment fleet air pollution, deposits in sewer pipes, crack density of damaged concrete, use of new construction technology, and the effect of social networks on project management.

Leming served as coordinator of undergraduate advising from 2010 to 2014. He received the George H. Blessis Outstanding Undergraduate Advisor Award in 2012 and the Kimley-Horn Faculty Award in 1990. He was elected a Fellow of the American Concrete Institute in 1996.

His plans for retirement include taking some well-deserved time off as well as some consulting. •

Michael Leming

Johnston authors concrete formwork manual



ACI SP-4 Formwork for Concrete manual authored by David Johnston.

David Johnston

The eighth edition of the American Concrete Institute (ACI) SP-4 Formwork for Concrete was released in November 2014. Dr. **David W. Johnston**, Edward I. Weisiger Distinguished Professor Emeritus, the author, was tasked by ACI to extensively revise and update the heavily used formwork design manual. The new 512-page edition is the first in color and involved replacing almost 500 photographs and drawings.

Since the manual made its first appearance in 1963, more than 130,000 copies have been printed. While most of the SP-4 manuals are used in design and construction firms, initially half are used by students in civil engineering, construction engineering, architectural engineering, engineering technology, and construction management university curricula. Later, those copies follow the graduates into industry use.

Recent recommendations of ACI committees as well as OSHA safety requirements are incorporated into the new edition. These include a growing number of standards related to design of the construction process and design of temporary structures, as well as a number of formwork industry products and practices adopted since the last edition was published.

More than 25,000 Twitter users participated in a Nov. 18 Twitter chat, hosted by the American Concrete Institute, to ask questions about the revised manual. Johnston noted that "about half the cost of a concrete structure is the formwork; thus, design of the formwork for safety, quality and economy deserves engineering effort similar to the design of the structure." •

AWARDS &

CCEE faculty members and students have received university, national and international awards and honors and other forms of recognition in recent months.

Mohammed Gabr

DR. MOHAMMED GABR has been appointed as Editor-in-Chief (EIC) for the ASCE Journal of Geotechnical and Geoenvironmental Engineering, effective March 2015. The journal has the highest circulation of any journal worldwide in the field of geotechnical engineering. As EIC, Gabr will work with four editors and 40 associate editors to process typically 700-800 manuscripts annually. Gabr previously served as Editorial Board Member and one of the four Editors for the journal.

AYSE KARANCI, a Ph.D. candidate with **DR. MARGERY OVERTON**, won a Student Educational Award from the American Shore & Beach Preservation Association (ASBPA). She received this award at the organization's annual conference on October 16, 2014. This award is given annually to an undergraduate or graduate student who, through his or her research, is furthering the state of science of coastal or riverine systems. The award included $500 and an invitation to present at the ASBPA conference. Karanci's presentation titled "Modeling Overwash on a Barrier Island: Land Cover Implementation" focused on numerical modeling of storm induced breaching and overwash along the North Carolina Outer Banks.

Francis de los Reyes

DR. FRANCIS DE LOS REYES was featured online in a TED talk titled "Sanitation is a basic human right." In its first month online, it received over 420,000 views. His video was followed up by multiple interviews, including the Water Resources Research Institute (WRRI), Iowa State University, and *Truthloader*. You can view the video at go.ncsu.edu/ted_sanitation.

Graduate student **DYLAN HORNE** and undergraduate student **NICK MACHAK** won poster awards at the American Railway Engineering and Maintenance-of-Way Association (AREMA) Annual Conference in Chicago, held September 27-29, 2014. Horne received 2nd place honorable mention for his poster titled "Radar Vehicle Detection within Four Quadrant Gate Crossings." Machak won 2nd place for his poster titled "Reduction in Railroad Right-of-Way Trespassing Incidents." The NC State AREMA chapter formed in 2014 and is under the direction of **DR. GEORGE LIST**.

Margery Overton

DR. MARGERY OVERTON was featured in a September 27, 2014, editorial in the *Greensboro News and Record* for her research on shoreline erosion and her role as Chair of the Science Panel for the Coastal Resources Commission (CRC). The Science Panel provides the CRC with data and

& HONORS

recommendations, and has been in the spotlight for its work on assessment of sea level rise. The editorial argues that the Science Panel will do its work with integrity and emphasizes the need for the best possible information to support policy decisions.

CARMELINA PAPPALARDO, a senior in Civil Engineering, is one of two students selected by the College of Engineering to represent NC State University in a National Science Foundation-sponsored project to bring about transformative changes to engineering curricula, pedagogy, and academic culture. Pappalardo will participate in a workshop in Washington, DC, scheduled for April 10-11, 2015, to discuss student perspectives on the strengths and weaknesses of the current chronological curricula structure and teaching methodologies.

Two CCEE graduate students, **LING WANG** and **CATHERINE MCMILLAN**, won awards for their posters at the North Carolina American Water Works Association and Water Environment Association (NC AWWA/WEA) Annual Conference in Winston-Salem, Nov. 17-19. Wang won first place ($250) for her poster titled "How to Tame your Digester: Step and Pulse Feeding of Grease Interceptor Waste Increased Community Resilience and Methane Yield by up to 450%" and McMillan won third place ($150) for her poster titled "Green Fuel from Green Algae: Production of Biofuels from Dunaliella viridis."

DR. LUIS MONTEJO (Ph.D., 2008), who is an assistant professor at the University of Puerto Rico, and **DRS. MERVYN KOWALSKY** and **TASNIM HASSAN** won a best paper award in November 2014 from the ASCE Journal of Cold Regions in Engineering. Their paper, titled "Seismic behavior of flexural dominated reinforced concrete bridge columns at low temperatures," is based on research conducted at NC State while Montejo was a student.

Roberto Nunez

DR. ROBERTO NUNEZ, CCEE lecturer and senior construction extension specialist, was appointed by North Carolina Governor **Pat McCrory** to serve on the Governor's Advisory Council on Hispanic/Latin Affairs. This council advises the Governor on issues relating to the Hispanic/Latino community in North Carolina.

Several Best Paper Awards were received at the 2015 Transportation Research Board (TRB) Annual Meeting in Washington, DC, January 11-14. **DRS. KATY SALAMATI**, **NAGUI ROUPHAIL**, and **BASTIAN SCHROEDER** of the Institute for Transportation Research and Education (ITRE), and **DR. H. CHRISTOPHER FREY** and **BIN LIU** (Ph.D. student) of CCEE won a Best Paper Award from the TRB Roundabout Committee. The TRB Committee on Highway Capacity And Quality of Service 2014 best paper award went to **CHUN HO YEOM** (CCEE Ph.D. student), ITRE's **DR. BASTIAN SCHROEDER**, **MR. CHRIS CUNNINGHAM**, **MR. CHRIS VAUGHN**, and **DR. NAGUI ROUPHAIL**, and **DR. JOE HUMMER** (Wayne State University). **SHANNON WARCHOL**, an MSCE student, received a Best Graduate Student Poster Award from the TRB Geometric Design Committee.

STUDENT NEWS

AGC/NAHB travels to Buckner Steel in Graham, NC to participate in AISC Steel Day.

Association of General Contractors (AGC) and National Association of Home Builders (NAHB)

The NC State Chapter of Associated General Contractors and National Association of Home Builders (AGC/NAHB) worked with the NC State chapters of the American Society of Civil Engineers (ASCE) and Engineers without Borders to compete in the annual Habitat for Humanity Shack-a-thon. The AGC/NAHB chapter competed in the Associated Schools of Construction Student Competition in Greensboro, NC. AGC/NAHB also participated in the annual American Institute of Steel Construction (AISC) Steel Day at Buckner Steel in Graham, NC. In a unique service project, six AGC/NAHB students visited Burt's Bees headquarters in Durham, NC to assist with a construction-related bee-hive problem. The chapter held monthly meetings with presentations given by construction industry leaders from companies including **Brasfield & Gorrie General Contractors** and **Clancy & Theys Construction Company**.

Air & Waste Management Association

With seven new board members, led by President **Disha Gadre**, the A&WMA Student Chapter is preparing for the A&WMA's Annual Conference, which will come to Raleigh June 22-25, 2015. In fall 2014, chapter members toured the CCEE Department's Air Pollution Laboratory followed by an afternoon cookout at Pullen Park. Seminars by **Katie Hanks** of RTI International and faculty advisor Dr. **H. Christopher Frey** exposed students to recent developments in air pollution policy and research. The chapter organized environmental awareness activities for young children at the first annual Healthy Body Healthy Earth program, held at the Bond Park Community Center in Cary this past October.

American Concrete Institute (ACI)

Eight students from the ACI student chapter attended the Fall Convention in Washington, D.C. in October 2014. Members participated in the student competition, attended technical committee meetings, participated in career development opportunities, and visited national museums and monuments. The objective of the student competition was to design and construct an egg protection device. One of the two student-led teams sponsored by NC State finished 13th overall. A select group of students also participated in the ACI Concrete Construction Competition. The students were given a current problem in concrete construction and proposed a solution. The team placed 8th in the international competition. The chapter plans to attend the spring 2015 convention in Kansas City, MO.

Chi Epsilon

Chi Epsilon is the civil engineering honor society. We are pleased to announce the selection of **Thomas DeWolfe**, **Gregory Sallade, Jr.**, **Jonathan Holtvedt**, **Matthew LeShure**, **Jacob Monroe**, **Rebecca Dupuis**, and **Jonathan Flehan** for membership.

Students from NC State with their advisor, Roberto Nunez, at the Fall 2014 ACI Convention in Washington, D.C. Pictured, from left: Roberto Nunez, Vivian Chung, Kris Malpica, Elizabeth Phelps, Mehrdad Nasiri, Diana Artero, Frank Holcombe, Lia Ribeiro, and Steven Thornton.

Engineers Without Borders

Engineers Without Borders-USA NCSU (EWB-NCSU) continues to support the Dele School in Lower Allen Town, Sierra Leone. In July 2014, a team traveled to Sierra Leone to provide science, technology, engineering, and mathematics (STEM)-based educational materials; connect with the community; and gather data for local water well and solar energy projects. However, as a result of health concerns in West Africa, travel to Sierra Leone is on hold until further notice. The chapter is preparing for an assessment and monitoring trip to Bolivia for a water sanitation project, scheduled for Summer 2015. The team will present a rainwater harvesting field guide to a school; repair a diversion ditch around a water holding tank, which was built in May 2013; collect data and measurements needed to design additional water catchment and storage systems; and ask the community about its needs. The chapter attended the EWB-USA National Conference and hosted an annual benefit dinner that raised $900.

Young professionals and students met for an afternoon of kickball and food.

Earthquake Engineering Research Institute (EERI)

The Earthquake Engineering Research Institute (EERI) student chapter at NC State hosted a kick-off meeting and seminar during the fall 2014 semester. The seminar was presented by **Diego Aguirre**, a Ph.D. student in structural engineering at NC State. EERI will host a lecture and seminars during the spring 2015 semester. Invited speakers include Dr. **Chad Goodnight** (Ph.D., 2013), and Mr. **Emrah Tasdemir**, a current Ph.D. student at NC State. The chapter officers for the 2014-2015 academic year are: President **Diego Aguirre**, Vice President **Emrah Tasdemir**, Treasurer **David Overby**, Secretary **Gabriela Haro**, **Cuiyan Kong**, and **Nihar Gogoi**. Dr. **Mervyn Kowalsky** is the faculty advisor, and the practitioner advisor is Dr. **Satrajit Das**, of WSP Sells.

Geo-Institute Graduate Student Organization (GI GSO)

GI-GSO members kicked off the Fall 2014 semester with visits to ongoing NCDOT projects, including the new Cape Fear River bridge near Wilmington, NC. GI-GSO hosted Dr. **Katerina Ziotopoulou**, assistant professor in the Department of Civil & Environmental Engineering at Virginia Tech. She gave a lecture entitled "A Sand Plasticity Model for Earthquake Engineering Applications." GI-GSO members are preparing to host the first Geotechnical Engineering Symposium at NC State, which will be held on March 6, 2015.

NC SafeWater

During the fall 2014 semester, speakers from ARCADIS, Cavanaugh, and URS presented at NC Safewater monthly lunch meetings. NC Safewater, the Professional Engineers of North Carolina (PENC), and the Civil Engineering Grad Student Association (CEGSA) hosted a joint speaker from the Career Development Center to help students prepare for the engineering career fair. Several members participated in "NC Clean Sweep" by picking up trash along a local stream in October. NC Safewater hosted a picnic and kickball game with the Young Professional chapter of NC SafeWater. Members served as judges at the annual Water Tower Competition for local 4th and 5th graders. NC SafeWater finished the semester with a trip to the North Carolina American Water Works Association and Water Environment Association (NC AWWA/WEA) State Conference, which is typically attended by professionals involved in drinking water and wastewater treatment. Thirteen students attended the conference, and five students presented posters. Graduate students **Ling Wang** and **Catherine McMillan** placed first and third, respectively, in the poster competition.

Professional Engineers of North Carolina (PENC)

PENC had a successful fall semester filled with networking and professional development events. Events included a seminar focused on resume and career fair preparation, several socials with PENC Central Carolina professionals, a trip to the Wake County landfill with engineers from Smith Gardner Inc., and monthly meetings with local engineering firms. •

Using wetsuits & hardhats, CCEE brings research into the field

While one might think of instrument-filled laboratories or computer screens filled with computer code when thinking of university research, faculty and graduate students in the Department of Civil, Construction, and Environmental Engineering are often getting their hands dirty in the field. There's no replacing hands-on field work when research requires measurements of a property or phenomena of interest or to test engineered solutions under real-world conditions. Here we highlight a few recent field-based projects to give an idea of the breadth of work ongoing in the department and the range of settings, questions and partners involved when we're working 'in the field.'

JUMPING IN TO UNDERSTAND COASTAL PROCESSES

Dr. **Margery Overton** conducts research to understand the response of the coast to waves, tides and currents, and the influence human activities have on these ever-evolving systems. The research team uses numerical models in combination with field data to reproduce the hydrodynamics, sediment transport and morphological change of a tidal inlet. Due to the highly dynamic nature of the coastal features and the risks related to shallow water navigation and instrument mooring, field work requires strategic planning of data collection taking into account water and air temperature, tidal levels, wave conditions, bathymetric change, precipitation, presence of harmful aquatic fauna, maritime traffic and touristic activities. For example, graduate student **Liliana Velasquez Montoya** participated in a field campaign as part of the Hands-On Field Methods Internship at Woods Hole Oceanographic Institution during the summer of 2014.

DOING THE DIRTY WORK TO IMPROVE HEALTH AND THE ENVIRONMENT

The aptly named "Excrevator" for emptying pit-latrines in developing countries is now in its third year of funding from the Bill and Melinda Gates Foundation. During testing in Durban, South Africa in August 2014, several areas for improvement were identified, including the need to handle the large amounts of trash present in the pits. Masters student **Tracey Sisco** tested several designs for handling trash including shredding mechanisms, shaftless augers, and vacuum assist techniques. Research Associate **Tate Rogers** (MS ENE 2012) accompanied Excrevator Version 3, incorporating trash handling techniques, to Malawi for field testing in collaboration with Mzuzu University in December 2014. The Malawi tests yielded promising results. Mzuzu University will continue to test and develop Version 3 with the goal of starting a small pit emptying business focused around the Excrevator. NC State will continue to develop and implement new designs for field testing in 2015. Rogers and Dr. **Francis de los Reyes** attended the January 2015 Fecal Sludge Management Conference in Hanoi, Vietnam to present their latest results.

Research associate Tate Rogers (MS ENE 2012), and Mzuzu University master's students testing the latest version of the Excrevator on a pit latrine in Mzuzu, Malawi.

DEFUSING AN EXPLOSIVE SITUATION

Firing ranges for grenades and mortars used by the US Department of Defense (DoD) for personnel training have been contaminated with explosive residues such as TNT that can leach into ground water. These residues include possible

human carcinogens. A major challenge in managing explosive residues is the presence of unexploded ordinance (UXO). UXO greatly increases costs and worker exposure associated with site remediation. Under the supervision of Dr. **Robert Borden**, graduate students **Jongho Won**, **Stewart Farling** (MSENE 2013), and **Della Shaw** (MENE 2014) are evaluating a new approach developed in CCEE and being tested at Ft. Bragg, NC, with funding from the US Department of Defense (DoD). The approach involves spraying a mixture of water, lignin and glycerol on firing ranges requiring treatment. Once applied, the lignin and glycerol are intended to enhance biodegradation of TNT in a process similar to that commonly used in wastewater treatment plants. The glycerol and lignin solution can be spray applied from over 100 feet, greatly reducing costs and potential worker exposure to UXO.

In March 2013, the students worked with field crews from Solutions-IES, Inc. to install monitoring and sampling equipment below-ground in trenches within two hand grenade throwing bays. Jongho and Della collected soil samples from the bay for the initial site characterization while the instrumentation was installed. In July 2013, the water, lignin and glycerol mixture was sprayed on the surface of one bay while a second was used as a control. The students are monitoring soil pore water for explosives concentrations and indicators of degradation of the explosives. Initial results indicate that treatment is effective; however, monitoring is ongoing. Once final results are in, DoD will consider whether this treatment should be applied at other military bases globally.

Ph.D. student Jongho Won (on right), Della Shaw (MENE, 2014) (middle), and field crews from Solutions-IES, Inc. assemble monitoring and water sampling equipment at Fort Bragg, NC (March 2013).

Ph.D. student Jongho Won (center) and Della Shaw (MENE, 2014) (left) collect soil samples on a hand grenade range at Fort Bragg, NC (March 2013).

HITTING THE ROAD: PROVIDING ECONOMICAL HIGHWAY DESIGNS

Drs. **Roy Borden** and **Mo Gabr** are leading research to improve the design of temporary slopes and excavations in soils in North Carolina's Piedmont region. Natural steep slopes are often found to be stable even if they are not predicted to be safe using conventional analysis techniques. Suction from capillary action in partly saturated soil, referred to as "matric suction," may be an overlooked factor that may help stabilize some naturally steep slopes. Graduate students **Cheng Wang** (Ph.D. 2014), **Jungmok Lee**, **Chien-Ting Tang** and **Justin Pescosolido** have been monitoring matric suction within soil at a NC Department of Transportation construction site in Greensboro, NC. Field monitoring, combined with laboratory experiments, will lead to improved understanding of unsaturated soil behavior in the Piedmont. Improved understanding of soil behavior will enable improved designs of temporary slopes and excavation support systems, leading to steeper, and more economical, temporary slopes.

Jungmok Lee painting white markers on the sheet pile to monitor deformations

The use of pavement surface treatments (PSTs) is growing as a technique for maintaining acceptable road performance under

Clockwise from top, Cheng Wang (Ph.D., 2014) measures the matric suction of the soil in the field using a tensiometer; CCEE graduate students Mohammad Illias, Javon Adams and Mary Rawls conduct tack lifter field trials at a rural North Carolina field site; and CCEE graduate students Mary Rawls and Javon Adams conduct tack lifter field trials at a rural North Carolina field site.

tight budgetary constraints. A PST consists of a thin protective layer of asphalt to seal an existing pavement surface. Ongoing research conducted under the direction of Drs. **Y. Richard Kim** and **Cassie Castorena** include both National Cooperative Highway Research Program (NCHRP) and North Carolina Department of Transportation (NCDOT) funded projects that seek to improve the overall quality and maximize the performance benefits of PSTs. Research efforts include the development of performance-related specifications for chip seal mixtures (funded by NCDOT) and binders (funded by NCHRP). As part of these projects, field sections were constructed and monitored for performance by graduate students **Javon Adams** and **Mohammad Illias**. NCDOT-funded research conducted by Dr. Kim and graduate students Javon Adams and **Mehdi Mashayekhi** has included development of field tests to improve quality control. In addition, a test has been developed by Dr. Castorena and graduate student **Mary Rawls** for in-situ measurement of emulsion application rates. The rate of emulsion application is critical in determining pavement performance.

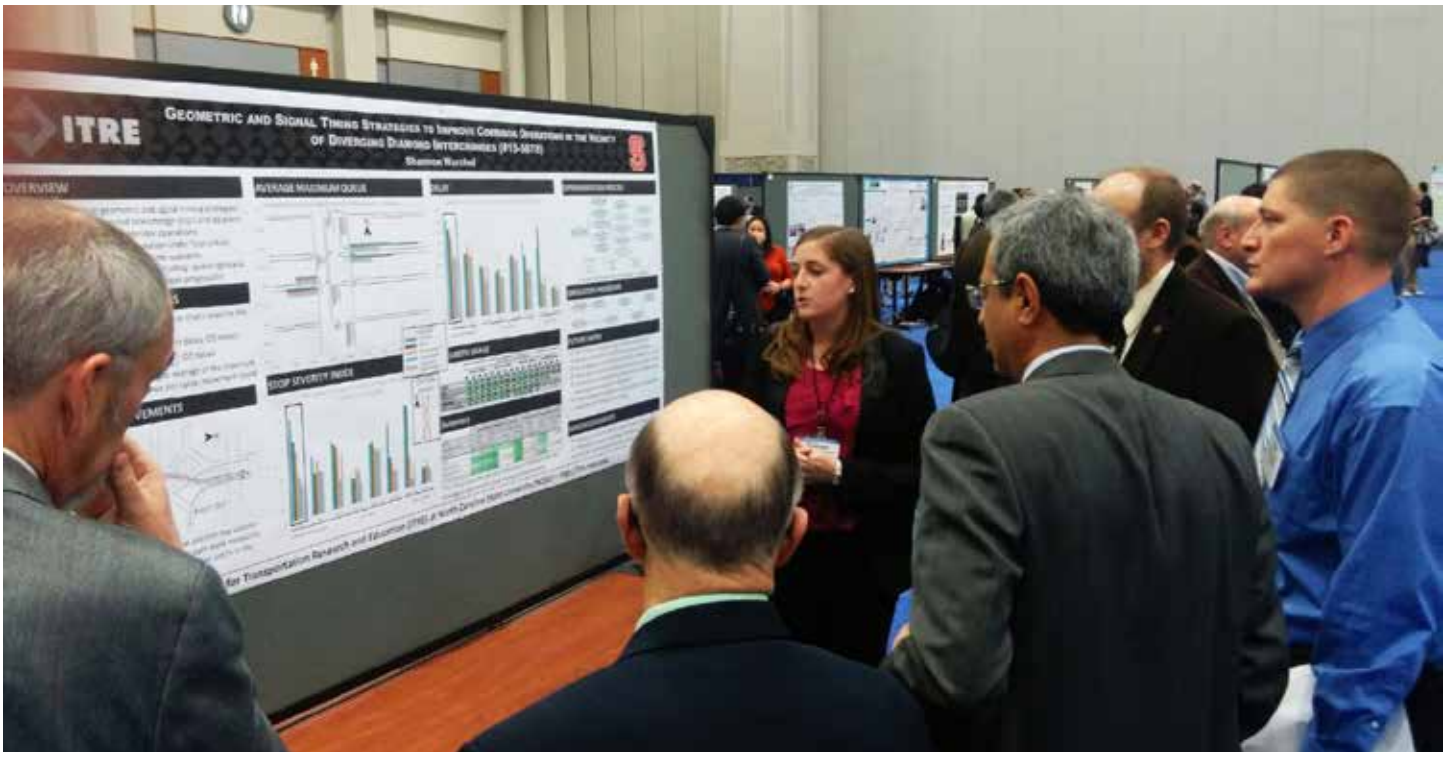
Clockwise from top left, a Portable Emission Measurement System (PEMS) for measuring tailpipe exhaust emissions and a laptop computer for recording engine data installed inside a passenger car; an instrumented vehicle is shown during an instrument check stop in Research Triangle Park, NC; the exhaust sample line for tailpipe exhaust, weather sensors (on window), and GPS receiver (on roof) are visible; graduate student Gurdas Sandhu (kneeling) trains fellow students regarding installation of exhaust sample probe into a vehicle tailpipe; a student installs exhaust sampling line in the exhaust pipe of a car; the device measures vehicle exhaust.

THE ROAD TO CLEANER AIR

For 15 years, Dr. **H. Christopher Frey**, collaborators including Drs. **Nagui Rouphail** and **William Rasdorf**, and students (both graduate and undergraduate) have conducted field measurements of the real-world activity, energy use, and exhaust emissions of more than 200 vehicles, including cars, trucks, construction equipment, snow vehicles and railroad locomotives. Unlike laboratory measurements, in-use measurements more accurately represent when and where emissions occur and how they can be reduced.

Methods for study design, data collection, quality assurance and data analysis developed at NC State have influenced researchers and practitioners globally. In addition to extensive local data collection, NC State vehicle emissions research teams have been dispatched to Georgia, Florida, New Jersey, New York, Wyoming and internationally to Canada and England. •

CCEE at the TRB Annual Meeting: continuing a longstanding tradition in a new venue



Shannon Warchol, an MSCE student, presenting a poster.

The Transportation Research Board (TRB), a division of the National Research Council (NRC), has the mission "to provide leadership in transportation innovation and progress." This year's TRB annual meeting was held at the Walter E. Washington Convention Center in Washington, DC. Running from January 11-15, the meeting drew approximately 12,500 participants globally and included more than 5,000 presentations in roughly 750 sessions and workshops.

For many years, the TRB annual meeting has been the cornerstone activity of the department's student chapter of the Institute of Transportation Engineers (ITE). This year, 32 students made the trip. Student travel cost was kept low through the generous support of the Southeastern Transportation Research, Innovation, Development and Education Center (STRIDE), gifts to the CCEE department and the chapter's student-led fundraising activities. Chapter President **Shannon Warchol** provided coordination and leadership throughout the months-long process of organizing and directing the trip with able assistance from the chapter Vice President **Corey Steiss** and Secretary **Kambiz Tabrizi**.

More than 30 papers were presented by researchers affiliated with the department, and student researchers were co-authors on many of these papers. Each year, the excellence and relevance of CCEE student research is affirmed by their selection for participation in TRB technical sessions. Several papers from NC State received best paper awards. In addition to supervising research presented at TRB, CCEE faculty members are national leaders though their service as members of numerous standing technical committees.

CCEE and the Institute for Transportation Research and Education (ITRE) hosted a reception for alumni, friends, and supporters. The reception provided an opportunity for ITRE researchers, faculty and students to say "thank you" to alumni, friends and supporters of our integrated education and research mission. The reception would not have been possible without the generous help of Gold Sponsors, including **AECOM**, **Kimley-Horn**, **McKim & Creed**, **Norfolk Southern** and **Ramey Kemp & Associates**; Silver Sponsors, including **Atkins**, **DigiWest**, **HNTB**, **HW Lochner**, **IEM**, **Kittelson & Associates**, **Mulkey Engineers & Consultants**, **Parsons Brinkerhoff**, **Stantec**, **TRAFFAX**, **Troxler Electronic Labs** and **Union Pacific**; and Bronze Sponsors, including **AgileAssets**, **Dewberry**, **Transpo**, **UNC Charlotte** and **Volkert**. •

Student chapter engages elementary school students in model water tower competition

Examples of model water towers created by 4th and 5th graders (photo credit R.J. Hennessy Photography)

NC State's NC SafeWater Chapter has long been a valuable source of volunteers for Raleigh's regional Model Water Tower Competition, hosted yearly by the North Carolina American Water Works Association and Water Environment Association (NC AWWA/WEA). The annual water tower competition is designed to show elementary and middle school students the importance of reliable drinking water and the rewarding opportunities available in the water profession. The competition does this by having students develop a functioning water tower.

As part of a new partnership with the Washington Elementary Boys & Girls Club, a mini-bus of 4th and 5th graders arrived early on November 1st at the Neuse River Wastewater Treatment plant with model water towers in hand. The students worked in teams to develop the model water towers. One of the teams, Soccer Masters, worked on and completed their model water tower at home. Other groups worked after school the week before the competition, using supplies that the NC SafeWater chapter had collected or purchased. Club treasurer **Dominic Libera**, who earned the nickname "Builder D," brought a table saw to cut wood for the groups after they made design decisions. Five teams from the club built water towers with the help of Club Director **Eric DeShield**.

The student towers were assessed based on hydraulic efficiency, structural efficiency, design ingenuity and cost efficiency. One of the volunteers, **Michelle Schmidt**, said she particularly enjoyed the Boys & Girls Club teams at her testing station because they were so involved with the judging process.

And despite a few leaky towers, none of the club teams lost points during their hydraulic efficiency testing, a major feat. The Soccer Masters earned the $100 third place prize. NC State SafeWater is discussing new programs for coming months. Both organizations hope these collaborative efforts will develop into a permanent partnership and provide opportunities for students to get excited about science and engineering. •

Undergraduates visit construction site

The Aloft Hotel being constructed across from the Bell Tower served as the building for the CE 420 site visit on November 25, 2014, hosted by Matthews Construction Company.

On November 25th, students from Mr. **Steve Welton's** CE 420 Senior Structural Engineering Project class visited the site of the Aloft Hotel being constructed directly across from the Bell Tower. Various structural materials are being used in the construction of the seven-story building. The students were able to see precast hollow core floor slabs supported on light gauge load bearing stud walls along with structural steel framing. Masonry and cast-in-place concrete were also observed. The seniors were able to identify significant aspects of their CE 420 design project in the plans and construction of the actual building during the site visit. The format, organization and typical material selections shown on the structural drawings were found to be consistent with the design information that the class had previously discussed. The students found that the loads referenced to the building code for floor loading, wind loading and seismic loads were similar to the loads that they had computed for their project. During the visit and subsequent discussions, the students were able to observe some typical examples of the standard steel connections and steel framing. The visit was hosted by **Lucy Mix**, project assistant with Matthews Construction Company, the general contractor for the project. •

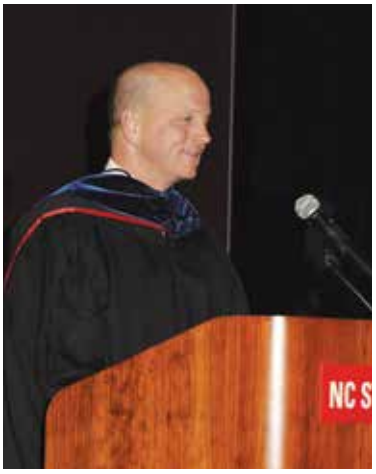
Overall view of the Aloft Hotel being constructed across from the Bell Tower served as the building for the CE 420 site visit on November 25, 2014, as hosted by Matthews Construction Co. Students from CE 420 visited the construction site and were able to see precast hollow core floor slabs supported on light gauge load bearing studwalls along with structural steel framing.

Fall 2014 baccalaureate ceremony

The fall 2014 departmental baccalaureate ceremony was held on Wednesday, December 17, 2014. A total of 70 students were awarded their undergraduate degrees, with 53 in civil engineering, 10 in construction engineering and management, and seven in environmental engineering. A total of 47 master's degrees were awarded, with 40 in civil engineering and 7 in environmental engineering. Nineteen doctor of philosophy degrees were conferred. Doctoral candidates were hooded by their advisors.

The audience, numbering about a thousand, was greeted with opening remarks from Dr. **Mort Barlaz**, department head. Dr. **Rudi Seracino**, associate department head, recognized members of Chi Epsilon, the National Civil Engineering Honor Society, and introduced **Zachary Kemak**, who delivered the Chi Epsilon Honor Society address. Kemak specialized in water resources engineering and is planning to pursue a master's degree in environmental engineering.

The commencement address was given by **Hannibal G. Warren, Jr.** (BSCEM 1984), who is currently president of Warco Construction, a Charlotte, NC-based construction firm specializing in sprayed fireproofing and interior commercial construction. His father graduated with a degree in engineering in 1950, and his two sons graduated from CCEE in 2011 and 2014. Warren spoke about his experience as an engineer and encouraged the graduating class to pursue a balanced life and opportunities for diverse experiences. He advised graduates to seek out mentors for support and guidance as they begin their careers. Finally, Warren welcomed students to the Wolfpack family. •



Hannibal G. Warren, Jr. delivers the commencement address.

CCEE history – 1958 faculty photo

Front row left to right: F1 – unknown; F2 – Gene W. Jones, instructor; F3 – Charles Smallwood, Jr., associate professor; F4 – Daniel N. Cote, instructor; F5 – Charles R. Bramer, professor; F6 – Mehmet E. Uyanik, associate professor; F7 – Michael V. Smirnoff, associate professor; F8 – Alton Barton Merritt, Jr., instructor

Back row left to right: B1 – Charles R. McCullough, associate professor; B2 – John William Horn, assistant professor; B3 – Ralph E. Fadum, professor and head; B4 – unknown; B5 – Herbert B. Wyndham, Jr., instructor (partly hidden); B6 – A. G. Farkas, assistant professor; B7 – Carroll L. Mann, Jr., professor; B8 – Charles Page Fisher, Jr., instructor

The Department of Civil Engineering faculty posed for the photo above in March 1958. They are standing at the entrance to the old Mann Hall (now the east wing of Daniels Hall). With the help of Drs. **David Johnston**, **Harvey Wahls**, **J.C. Smith**, **Paul Zia**, **Gene Jones** and **Don Kline**, we have been able to identify all but two of those pictured. The positions are the ranks held at the time of the photo. Can you identify either of the unknowns? If so, please contact David Johnston at **johnston@ncsu.edu**. •

Firm of the Month: views from participating firms

The idea for the Firm of the Month was suggested by the CCEE Departmental Advisory Board. The Firm of the Month program is our way of thanking and promoting our corporate partners while educating our students about current engineering practice. This program provides participating firms with name recognition for recruiting and business opportunities, demonstrates to students the ways that they can use their degrees after graduation and provides information on employment opportunities.

Leidos Engineering is honored to be recognized by the Department of Civil, Construction, and Environmental Engineering at North Carolina State University. Leidos Engineering is an established, award-winning technology applications and DesignBuild[SM] company with 3,000 professionals in more than 75 U.S. office locations. Our team includes engineers, architects, scientists, business consultants, and technologists and we apply leading science, smart technologies and industry best practices to our core engineering disciplines — chemical, civil, electrical, geotechnical, mechanical, nuclear, process and structural. Our engineering capabilities allow us to deliver a diverse portfolio, from energy infrastructure to manufacturing plants to one-of-a kind projects such as NASA's vibro-acoustic research facility. Our DesignBuild capability is unique among peers and symbolically significant, bringing two worlds together as one to represent the seamless union of our design and construction professionals who clearly understand each other's roles and work toward a common purpose.

Mulkey Engineers & Consultants (Mulkey) is one of the top civil engineering firms in the Southeast with offices in North Carolina, South Carolina and Georgia. Mulkey's connection with North Carolina State University goes back to our founder, **Barbara Mulkey** (BSCE, 1977; MSCE, 1983), a proud member of the Wolfpack community and member and former chair of the North Carolina State University Board of Trustees. For the last 21 years, Mulkey has enhanced the quality of life within our communities by providing innovative engineering and environmental solutions. We believe that every project, regardless of size or complexity, deserves unmatched expertise and quality assurance from concept to completion, and we know that relationships are key to making this belief a reality. That's why we value our relationship with NC State Engineering and why almost 20 percent of our employees are Wolfpack alumni. Thank you, NC State, for your continued excellence in developing the next generation of civil engineers. To learn more about Mulkey and our career opportunities, please visit www.mulkeyinc.com/careers.

Withers & Ravenel is privileged to participate as a "Firm of the Month." We are honored to display our projects and practice areas on the walls of Mann Hall. Withers & Ravenel is a proud supporter of the Department of Civil, Construction, and Environmental Engineering. We desire to foster relationships with students and alumni while honoring the wonderful heritage and encouraging growth of the department. Withers & Ravenel also participates in NC State's engineering career fairs, which provide us an opportunity to showcase our firm and its employees. By attending the career fair we identify students who are interested in an internship, participating in our mentoring programs, or are looking for full-time employment with an opportunity to become leaders at Withers & Ravenel. Withers & Ravenel is an award-winning firm providing consulting services in civil and environmental engineering, landscape architecture, planning, and surveying. We serve both private and public sector clients throughout the Carolinas. Withers & Ravenel is an employee owned company headquartered in Cary and maintains branch offices in Greensboro and Wilmington, North Carolina. Our staff includes professional engineers, landscape architects, planners, surveyors, GIS specialists, geologists, environmental scientists and construction administrators.

Letter from the **Chair of the Department Advisory Board**

Heather Denny

The CCEE Industry Advisory Board is engaged and active. I want to thank all of our members who have given of their time and talents. These individuals are working to improve the student experience and our profession.

One area of focus for the Industry Advisory Board is working with the student organization leaders. An advisory board subcommittee led by **Stacey Smith** with support from **Bill Pope** and **David Simpson** meets with the student organization officers on a monthly basis with the objective of helping the students in their roles as leaders of the various student groups. The groups provide students with opportunities to network with industry and build their leadership development skills, enhancing the overall student experience. According to Stacey Smith, the groups are now better organized and have developed a succession plan, or "President's Package," to share semester to semester and year to year with new leaders. The groups have also been challenged to plan their budgets for each semester so that needs for outside funding are identified. Lastly, the subcommittee has helped the student chapter of Engineers without Borders to obtain both departmental and industry assistance to establish a new groundwater (drinking) well in Sierra Leone (West Africa) (see article page 13).

In the fall, we put new emphasis on our Publicity and Promotion committee. We must continue to get the CCEE message into the public. This is important as we recruit new students, stay connected with alumni and cultivate donors. How can you help? Take a look at the three action items below and let me know if you are interested.

1. Donate photos related to Civil Engineering for the CCEE web site and for Mann Hall.
2. Encourage young alumni to engage and build their own story of how their education enhances their professional life.
3. Identify additional volunteers to become part of the alumni support for the Department.

We look forward to connecting with you.

Heather Denny
President and CEO
McDonald York Building Company

The Department receives valuable input from its Advisory Board. The Board maintains and fosters relationships with students, faculty, the Dean of the College of Engineering, the community, alumni and supporters. The Advisory Board assists the department head in achieving department goals and objectives and provides counsel and advice from its unique perspective. The Board also advocates for the Department with the College of Engineering, the university and the community. Board members are also typically engaged in other ways, such as advising students in design courses, helping to connect faculty with industry stakeholders and development. The Advisory Board meets each semester. Members serve for a four-year term.

The following distinguished alumni and friends of the Department currently serve on the Board:

Suzanne M. Beckstoffer, BSCE 1982
Newport News Shipbuilding

Thomas W. Bradshaw, Jr.
Formerly Secretary of Transportation
NC State Ports Authority

Heather Denny, BSCEC 1995 (Chair)
McDonald-York Building Co.

Barry Gardner, BSCEC 1975
Shelco Construction Co.

John Jenkins II, BSCE 1990
Stewart Engineering

Christopher Murphy, MSCE 1999
FDH Engineering, Inc.

Dan Pleasant, BSCE 1972
Dewberry

Bill Pope, BSCEC 1983
Pope Custom Homes

Richard Rohrbaugh, BSCE 1981
Kimley-Horn and Associates

David Simpson, BSCE 1981
Simpson Engineers & Associates, P.C.

Stacey Smith, BSCEC 1992, MCE 2004
Smith Gardner, Inc.

Alan Stone, BSCE 1987
Hazen & Sawyer

Hans Warren, BSCEC 1984
Warco Construction, Inc.

Tony Warner, BSCEC 1966
Warner Construction

ALUMNI NEWS

INGRID AROCHO (Ph.D., 2015) has been appointed as an assistant professor of construction engineering and management at Oregon State University. Ingrid conducts research on the environmental impacts of construction equipment and processes.

Susan Dunn Auten (MSCE, 2011) (left) and Taylor Auten (BSCE, 2009) (right) with NC State basketball forward Kyle Washington (center) in New York City.

SUSAN DUNN AUTEN (MSCE, 2011), is a staff engineer with Black & Veatch in the New York City office. She works on water and wastewater treatment projects. She married **Taylor Auten** (BSCE, 2009) in 2013. Taylor graduated from Duke University School of Law in 2012 and now works with Sullivan and Cromwell in New York City, where he advises clients on a variety of transactional and regulatory matters.

NIDHI BEEDU (MCE, 2011) is currently working as an assistant project manager at D&K Construction, a construction management firm in New Jersey. She is handling a $15M contract with the New York City (NYC) Department of Environmental Protection. She has worked on various construction contracts for the NYC Health and Hospitals Corporation, NYC Metropolitan Transportation Authority and NYC Offices of General Services.

DANIEL LOUGHLIN (MCSCE, 1995; Ph.D., 1998) and **OZGE KAPLAN** (MSCE, 2001; Ph.D. 2006), both of whom work at the U.S. Environmental Protection Agency in Research Triangle Park, were featured in the January 2015 issue of the Air & Waste Management Association's *EM* magazine for their work on energy modeling. Their work includes identifying ways to meet air quality, greenhouse gas emissions and other energy and environmental goals at national and community scales.

CALEB LOWMAN (BSCE, 2014) has been working with Kimley-Horn and Associates Inc. since graduation. He is currently working with the roadway group in the Cary office. He works on a variety of projects, including those in local cities and municipalities, western North Carolina and Africa.

KYLE MUENCH, EIT, (BSCE, 2014) is a Structural E.I. at AECOM Technology Corporation. He currently works on-site as a bridge inspector for an emergency highway bridge project.

SHALIN PARIKH (MCE, 2010) is a senior planning engineer with AFCONS Infrastructure Ltd. based out of Mumbai, India and is working in the Marine & Industrial Infrastructure division. He is currently involved in the construction and development of ports, harbors, jetties and integrated LNG terminals across the Asia Pacific, Middle East and North African markets.

AMIR H TABARESTANI, EIT, (MCE, 2012), is in Cary, NC, working for American Tower Corporation as a structural engineer. He performs structural analysis on existing communication structures and designs modifications for tower structures and foundations. He also conducts quality control on engineering reports.

YUQING XIONG (MSCE, 2007) is employed by Skanska USA Inc. and has worked as a field engineer in the Washington DC area for six years. She recently relocated to Virginia Beach with her husband and is working in Skanska's Estimating Department.

Share Your News

Keeping your contact information current enables us to keep you up to date on events in the department and elsewhere. Have a professional or personal update? We would like to hear from you!

Please send us your latest news (e.g., career accomplishments, awards, recognitions, marriage, births, retirement) so we may share your news in future issues. Send the following information and/or news stories to lfbremer@ncsu.edu:

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