

CCEE NEWS

DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING
COLLEGE OF ENGINEERING NORTH CAROLINA STATE UNIVERSITY | SPRING 2014



ROAD WORK

*CCEE RESEARCHERS DEVELOP FIELD TESTS THAT
WILL MAKE STREETS SAFER, MORE DURABLE*

**NC STATE
UNIVERSITY**

RESEARCH AWARDS HELP FACULTY MEMBERS MAKE A DIFFERENCE **06**

CCEE PLAYS BIG ROLE AT TRB ANNUAL MEETING **09**

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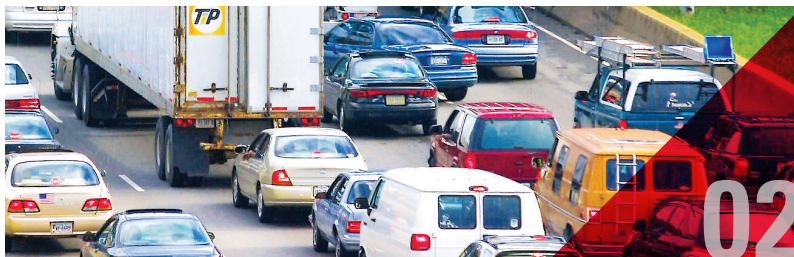
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CCEE News is published by the Department of Civil, Construction, and Environmental Engineering to share information among faculty, staff, students, alumni and friends of the Department.



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ABOUT THE COVER

CCEE RESEARCHERS ARE WORKING ON FIELD TESTS OF ASPHALT EMULSIONS THAT WILL IMPROVE ROAD QUALITY.

LETTER FROM THE DEPARTMENT HEAD MORTON A. BARLAZ



Welcome to the Spring 2014 newsletter. It is a pleasure to update our friends on happenings in the department. I am writing this letter

just after our December graduation, and it is always satisfying to watch as the next generation of engineers graduates (see article on page 17). Graduation is an uplifting reminder of our mission.

This newsletter features four research briefs from our faculty, highlighting the Department's contributions to civil infrastructure in improved asphalt road pavement, the detection of leaks in water distribution systems, highway travel time reliability, and air quality and climate models. These articles are great examples of how civil, construction, and environmental engineers are working to improve public welfare and environmental sustainability.

I am pleased to announce that Dr. **Andrew Grieshop** received a Career Award from the National Science Foundation to pursue research on aerosols from household energy use in undeveloped regions. Drs. **Sankar Arumugam** and **Francis de los Reyes** have been recognized as University Faculty Scholars.

This is a prestigious honor reserved for only 20 faculty across the university, and we are proud to have two faculty recognized from our department (see article on page 11).

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.

Recruiting new faculty to continue and build upon our research and education programs is one of the most important things that we do. As we go to press, we are hoping to fill four faculty positions. The department is seeking to augment its strength in coastal engineering, water quality, structural engineering and mechanics, and construction engineering and management. I look forward to sharing information about new faculty in next Fall's newsletter.

I have explained the budget reductions that we have experienced in past letters and asked our friends and alumni for help. Many of you have responded and your contributions are sincerely appreciated. We are becoming increasingly 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 in the world. We need your support as we strive for excellence in times of decreasing public funding for our mission.

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 am proud of all that we are able to accomplish. Thank you. •

A handwritten signature in black ink, appearing to read 'M. Barlaz', with a long, sweeping horizontal line extending to the right.

Morton A. Barlaz
Department Head

CCEE AT NC STATE SUSTAINABLE INFRASTRUCTURE FOR SOCIETY

- \$17.8 million** in research expenditures
- 146** ongoing research projects
- 12** winners of CAREER and other NSF young faculty awards
- 47** faculty
- 315** graduate students
- 762** undergraduate students







Research Updates

Department researchers are making improvements to travel time predictions, air quality and climate models, field application of asphalt emulsions and leakage detection in water distribution systems.

MONITORING HIGHWAY TRAVEL TIME RELIABILITY

NC State recently led a \$1.8M three-year research project under the **Strategic Highway Research Program 2** to develop tools and techniques for studying travel time reliability. During this project, Dr. **George List** developed guidance for how operating agencies should collect the data needed to assess reliability, how to create reliability metrics, and how to interpret the findings. A guidebook was developed, and pilot studies and use case analyses were conducted. The focus was on learning how to measure reliability, how to diagnose its causes, and how to pinpoint mitigating actions. The team's recommendations are now being tested in nationally sponsored projects in Miami, San Diego, Minneapolis, and Seattle.

Challenges to reliable travel time predictions occur during periods of high congestion compounded by extra demand, incidents (e.g., traffic accidents), adverse weather and special events (e.g., sporting events). Network managers can use information to identify actions such as weather advisories and sporting event announcements that can help mitigate the adverse impacts of high congestion. In contrast, during uncongested conditions, non-recurring events such as weather and incidents do not have nearly as significant an impact. Hence, focusing on actions to mitigate impacts during uncongested conditions are not nearly as important. •

Photo: Traffic backup on I-95 North at the intersection with the Downtown Expressway in Richmond
Photo Credit: Tom Saunders, Virginia Department of Transportation

RESEARCH UPDATES

GRIESHOP RESEARCH GROUP PARTICIPATES IN MULTI-INVESTIGATOR SOUTHERN OXIDANT AND AEROSOL STUDY



Provav Saha (foreground) operates aerosol instrumentation.

Dr. **Andrew Grieshop** and his PhD student **Provav Saha** participated in a large, multi-institution atmospheric research field campaign that took place in July 2013 to study interactions between biogenic (from plants) emissions and human-sourced air pollution in the Southeastern US. The **Southern Oxidant and Aerosol Study (SOAS)**, part of the Southeast Atmosphere Study (SAS) campaign, was coordinated and funded by The National Science Foundation, the Environmental Protection Agency, the National Oceanic and Atmospheric Administration and the Electric Power Research Institute. The SOAS involved

more than 100 researchers from over 40 research institutions from across the US and Europe. Measurements were collected at several field stations in Alabama, North Carolina and Tennessee in coordination with flights by four research aircraft. Grieshop's group deployed custom instrumentation developed in the lab to measure the chemical and physical properties of atmospheric particles at the main ground site near Centerville, Ala. The goal of the study is to improve air quality and climate models and to improve our understanding of how air pollution emissions interact with natural systems. •

IMPROVED QUALITY CONTROL OF EMULSION APPLICATION RATES



Emulsion Application

Asphalt emulsions are used as bonding agents between hot-mix asphalt layers and to seal pavement surfaces in preventative treatments, known as chip seals. The rate of emulsion application is critical in determining pavement performance. Field emulsion application rates are highly variable and not captured using current measures for quality control, which

typically consist only of measuring the volume of emulsion in the distributor before and after paving. Thus, there is a need for development of a test method for measuring emulsion application rates. With funding from NC DOT, Drs. **Cassie Hintz** and **Jeong Hyuk Im** are working on developing a field test to enable in-situ measurements of emulsion application



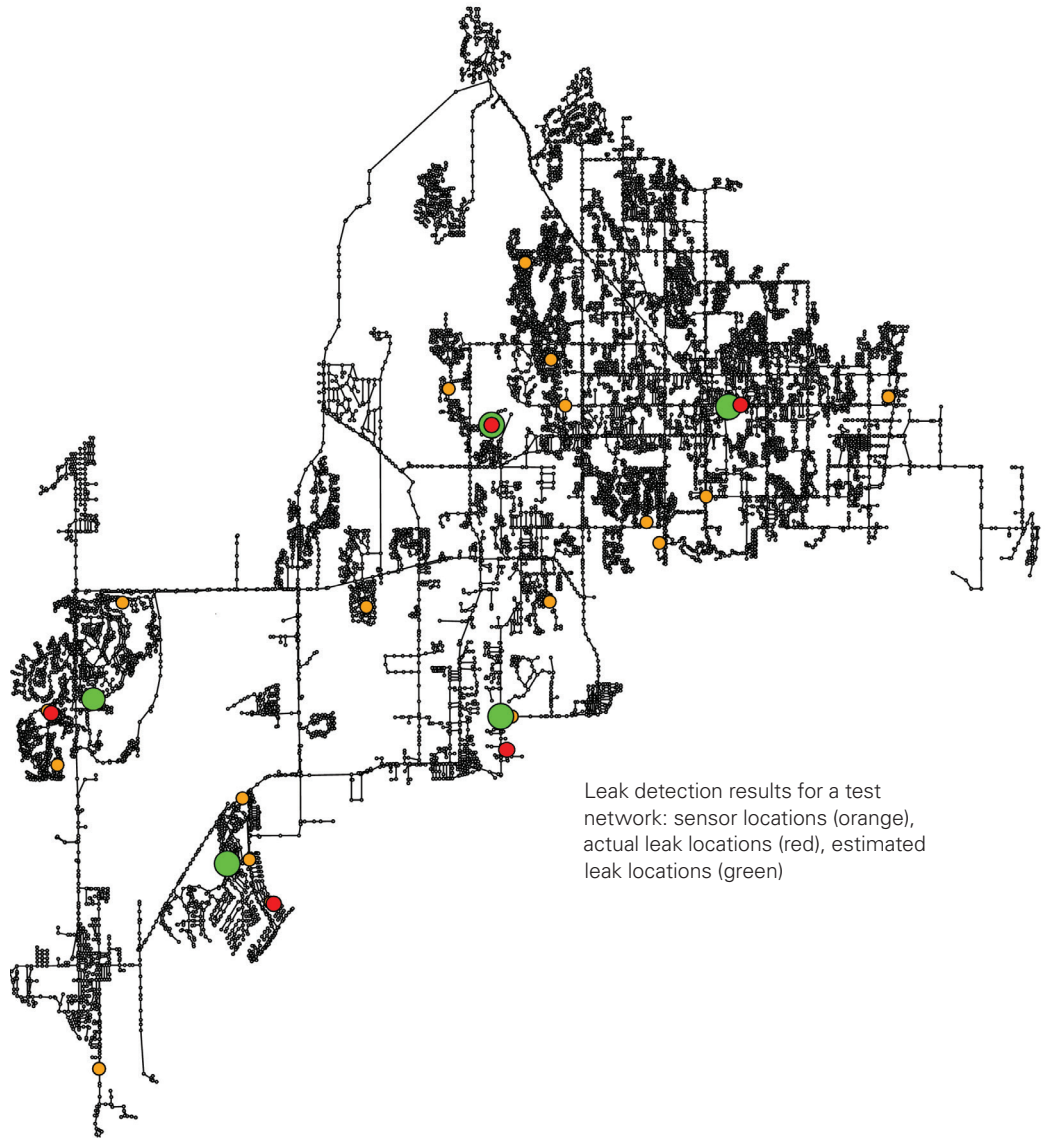
Tack Lifter

rates. The research team has developed a device called the "tack lifter," with the help of Instron, for spot checks of emulsion application rate. Improved quality control of emulsion application rates will result in prolonged service life, decreased life cycle costs, and enhanced safety. •

LEAKAGE CHARACTERIZATION IN URBAN WATER DISTRIBUTION SYSTEMS

Leakage detection and management is an important problem in water distribution systems since it has been documented that up to 40 percent of a system's water supply may be lost to leakage in many aging systems. CCEE researchers are investigating simulation-optimization approaches to use routinely measured pressure, flow, and water quality data to characterize leakage in water distribution infrastructure. While major pipe bursts are easy to locate, small gradual leaks, which represent more than half of all leaks, are difficult to locate. Furthermore, intrusive methods such as acoustic methods or pressure transient analyses are costly and are often restricted to isolated regions of the network. In the new approach being developed with support from the National Science Foundation, the leak locations are identified by minimizing the difference between real and computer-simulated measurements for a known sensor configuration.

Simulation-optimization approaches are computationally demanding, as millions of simulations of a water network simulator may be required to achieve a satisfactory solution. This is alleviated by using a high performance computing framework that enables many parallel computer simulations of the water network. Using this framework and realistic data obtained in collaboration with a water utility in North



Leak detection results for a test network: sensor locations (orange), actual leak locations (red), estimated leak locations (green)

Carolina, CCEE researchers are finding that in the presence of large volumes of routinely measured data, locations and sizes of leaks can be determined with reasonable levels of accuracy in large urban water systems. The CCEE research team consists of professors **Kumar Mahinthakumar**, **Downey Brill**, and **Ranji Ranjithan**; former doctoral students Dr. **Brian Piper** (now a data scientist at Forio), and Dr. **Sarat**

Sreepathi (now a computer scientist at Oak Ridge National Laboratory); and graduate students **Hana Chmielewski** (PhD) and **Micah Jasper** (MS). •

RECENT RESEARCH AWARDS TO CCEE FACULTY MEMBERS

Over the last few months, CCEE faculty members received six research awards totaling \$1.1M, which will allow 11 faculty members and their graduate and undergraduate students to study roadway subgrades, bridge foundations, deteriorated bridge slabs, aerobic granulation in wastewater treatment reactors, and a pit latrine emptying system for use in developing countries. The projects are sponsored by NC DOT, Alaska DOT, National Science Foundation (NSF), the Bill and Melinda Gates Foundation, and ABB, Inc.

Drs. **Francis de los Reyes** and **Joel Ducoste** will study aerobic granulation in lab-, pilot-, and full-scale activated sludge systems. The outcomes of the project will impact wastewater treatment plant design and operation through increasing settling, improving organic contaminant removal efficiencies, decreasing reactor volume, and increasing organic and nutrient loading capacity. The project is funded by the NSF. •

Drs. **Mervyn Kowalsky**, **James Nau**, and **Mohammed Gabr** will study seismic behavior of reinforced concrete bridge foundations. The research project will utilize the Soil-Structure Interaction (SSI) Test Facility at the Constructed Facilities Laboratory to study the effects of earthquakes on bridge foundations. Several large-scale tests and computational

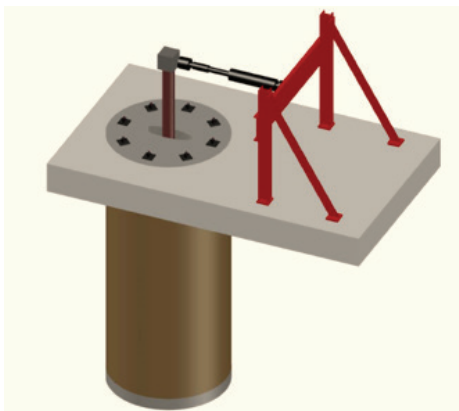
modeling will be performed to develop a design procedure for reinforced concrete filled steel tube foundations. Multiple soil properties will be considered through a new test setup shown at bottom left. The project is funded by the Alaska Department of Transportation. •



Gas insulated switchyard

during and after an earthquake. The proposed methodology is intended to provide such a framework. •

Drs. **Mo Gabr** and **Roy Borden** will work on an NC DOT-funded research project to develop criteria for soft soils to be replaced and/or stabilized with mechanical or chemical measures. The research will validate approaches for improving soil bearing properties with select fill, in conjunction with Aggregate Base Course and the use of geosynthetics, and chemical stabilization using cement or lime. Field testing will be used to verify performance of alternative stabilization approaches with the goal of maximizing cost benefit. A comparative cost analysis and recommendation of the relative performance effectiveness of each stabilization measure will be developed as a part of the research program. •



NC State's SSI- Facility showing physical test setup

Dr. **Abhinav Gupta** was awarded a project by ABB, Inc. to study the seismic qualification of gas-insulated switchyard equipment, particularly in relation to the substation that supplies power to the San Francisco International Airport. The project is aimed at evaluating the validity of data from laboratory tests with respect to the qualification of actually installed equipment. The current standard (IEEE 693) for equipment qualification does not provide guidelines for assessing the functionality of electrical equipment



Compaction of the stabilization layer at the finished grade



Dr. Pour-Ghaz examines the deteriorated bridge slabs

Through a recently awarded NC DOT project, Drs. **Rudi Seracino**, **Gregory Lucier**, and **Mohammad Pour-Ghaz** will assess and implement visual inspection and other non-destructive evaluation (NDE) techniques on two cored slab bridges located in Carteret County, NC. These bridges are scheduled for replacement due to deterioration. Cored slab units from the bridges will be tested to failure at the Constructed Facilities Laboratory to validate NDE techniques and quantify the remaining capacity and failure modes required to make informed decisions related to future maintenance, repair or replacement of similar bridges. •



Pit emptying auger being used in Durban, South Africa

With a 2nd phase Bill and Melinda Gates Foundation Grant, Dr. **Francis de los Reyes** will continue building a low-cost, portable auger-based technology that can reliably and hygienically empty a wide variety of pit latrines and septic tanks (pits) containing wastes with a range of moisture contents. The machine to be built can be used in watery, low solids pits (e.g., as occur in Malawi) and high solids and trash pits (e.g., as occur in eThekweni municipality in South Africa). This machine is envisioned to be used by local entrepreneurs or local governments in emptying pits all over the world, thus reducing the dangerous, unhygienic, and undignified practice of manual pit emptying. •

GRIESHOP RECEIVES NSF CAREER AWARD



Dr. Andrew Grieshop

Dr. Andrew Grieshop, assistant professor in the Department of Civil, Construction, and Environmental Engineering at North Carolina State University, has received the Faculty Early Career Development Award from the National Science Foundation (NSF). The award,

known as the NSF CAREER Award, is one of the highest honors given by NSF to young faculty in science and engineering.

NSF will provide \$400,000 in funding over five years to support his project, "From the kitchen to the clouds: research and teaching on the emission and evolution of aerosols from household energy use by the global poor."

The goal of Grieshop's project is to explore and help minimize the human health and global climate impacts of indoor biofuel use by the poor. Biofuels such as wood, coal and dung are burned by billions of people, often indoors, to cook food and heat homes. Each year, however, indoor biofuel use kills millions of people worldwide while contributing to global and regional climate impacts.

The project endeavors to build fundamental understanding of biofuel com-

bustion emissions and how they evolve in the atmosphere. The work also aims to bridge the gap between the laboratory and household settings. The resulting knowledge and tools will support the activities of those developing and monitoring new stoves.

Grieshop received a BS in mechanical engineering from the University of California, Berkeley, and an MS in mechanical engineering and PhD in mechanical engineering and engineering and public policy from Carnegie Mellon University. •

SAVE THE DATE: CONSTRUCTION PROGRAM 60th ANNIVERSARY

The CCEE Department is planning to celebrate a milestone event for the Construction Engineering and Management program. The program marks the 60th anniversary of its modern founding in 1954. The event will be held on **April 8 and 9, 2014** on campus and will include an

informal lunch, panel discussion, tours of the campus, dinner and a golf outing. All "CEM" and "CEC" alums as well as CE alums associated with the construction profession are welcome. Come meet faculty and friends from your class, and tour Mann Hall and the new Hunt Library. •

For more information, please contact Lora Bremer, Senior Director of Development and Alumni Engagement, Department of Civil, Construction, and Environmental Engineering, PO Box 7908, Raleigh, NC 27695-7908, email: lfbremer@ncsu.edu. If you have any questions, please call her at (919) 513-0983.

Please send Dr. David Johnston (johnston@ncsu.edu) any photos that might be appropriate for a slide show or presentation on the construction program. Please include a caption including the approximate date.

Please go to go.ncsu.edu/cem60 to register for this event:

CCEE ONCE AGAIN AT THE FOREFRONT OF THE TRB ANNUAL MEETING



The Transportation Research Board's yearly meeting was held in January in Washington, D.C.

The Transportation Research Board (TRB), a division of the National Research Council (NRC), has a mission "to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal." The focal point of TRB's yearly activities is the annual meeting held in January of each year in Washington, DC.

This year's meeting, the 93rd overall, was held on January 12-16 with nearly 12,000 participants from around the world and approximately 5,000 presentations in about 900 sessions and workshops. The meeting spotlight theme was Celebrating Our Legacy, Anticipating Our Future. The department continued its legacy as a major player in this critically important gathering of transportation leaders and innovators with another very strong presence. The NC State TRB contingent included both students and faculty.

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, 36 students made the trip. Personal costs to the students were kept low through the generous support of the Southeastern Transportation Research, Innovation, Development and Education Center (STRIDE) as well as the chapter's student-led fundraising activi-

ties. Chapter President **Michael Corwin** provided coordination and leadership in organizing and directing the trip with able assistance from the chapter Vice President **Elizabeth Hunter** and Secretary **Shannon Warchol**. Special events targeted for student members included STRIDE's student poster showcase. Elizabeth Hunter represented the department in the showcase with a poster titled "Driver Yielding Models for Midblock Pedestrian Crossings."

In total, about two dozen papers were presented by researchers affiliated with the department, and student researchers were co-authors on many of these papers. Last year's ITE student chapter president, **Abseen Anya** (MS 2013) delivered a podium presentation titled "Application of AIM-SUN Microsimulation Model in Estimating Emissions in Signalized Arterial Corridors." Anya's co-authors on the paper were **Nagui Rouphail**, **Chris Frey**, and **Bastian Schroeder** (BS 2004, MS 2005, and PhD 2008).

For the second year in a row, a paper presented by NC State researchers at the prior year's meeting received a technical committee best paper award. The best paper award for this year went to "Methodology for Developing an HCM-based Oversaturated Speed-Flow Model" and was awarded by the Highway Capacity and Quality of Service Committee. **Yilun Xu** (MSCE 2013); Professors **Billy Williams** (BS 1984 and MCE 1990)

and **Nagui Rouphail**; and **R. Thomas Chase** (BS 2011 and MS 2013) are the authors.

In addition to supervising the research presented at TRB, CCEE faculty are national leaders through their service as members of numerous technical committees. As is our tradition, CCEE, the Institute of Transportation Research and Education (ITRE) and the NC State Engineering Foundation hosted a reception for alumni, friends, and supporters. The reception provided an opportunity for faculty and students to say "thank you" to alumni, friends, and supporters of the department's integrated education and research mission. The reception would not have been possible without the generous help of our sponsors.

The 2014 reception sponsors were:

- **Platinum** - Norfolk Southern
- **Gold** - FDH, Kimley-Horn and Associates, Kittelson & Associates, McKim & Creed, and Ramey-Kemp & Associates.
- **Silver** - AECOM, Digiwest, HNTB, HW Lochner, Longistics, Mulkey Engineers & Consultants, Stantec, Traffax, TransTech Management, Troxler Electronics Laboratories, and Union Pacific
- **Bronze** - IEM, R.M. Clarke Consulting, Restoration Systems, Transpo Group, and UNC Charlotte. •

AWARDS



CCEE faculty and students racked up university, national, and international awards and honors in recent months



Paul Zia

› Drs. **Paul Zia** and **Sami Rizkalla**, along with two former PhD students, were selected by The American Concrete Institute for the Chester Paul Siess Award for Excellence in

Structural Research. This award was for a paper entitled “A General Equation to Determine the Development Length of Unconfined Reinforcement”.



Sami Rizkalla



Francis de los Reyes

› Dr. **Francis de los Reyes** has received several national and international awards recently. He received the Transatlantic Partnership Excel-

lence in Engineering (TEE) Scholarship to spend part of his scholarly leave at the University of Gent, Belgium in fall 2013. The award is funded by the Erasmus Mundus program of the European Union. Dr. de los Reyes received the NC

State University At Home in the World Faculty Fellowship, which he will use to develop a new undergraduate course for juniors on “Water and Sanitation for Developing Countries.” He also received the Association of Environmental Engineering and Science Professors (AEESP) Outstanding Service Award as Chair of the MS Thesis Awards Committee.



Christopher Frey

› Dr. **H. Christopher Frey** has been appointed as visiting professor to the Department of Civil and Environmental Engineering at Hong Kong University of

Science and Technology (HKUST) for the spring 2014 semester. HKUST is a top-ranked university in Asia and internationally. Frey will conduct research on transportation, air quality, and exposure to air pollution.

› **Yuriy Veytskin**, a PhD advisee of Dr. **Chris Bobko**, received a Fulbright Scholarship to spend a year in Australia with the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and the University of Melbourne. He is conducting research on atomic force microscopy of gas shale. Veytskin is one of 17 Americans to be selected as a Fulbright Scholar to Australia.

› **Ingrid Arocho**, a PhD candidate with Dr. **William Rasdorf**, was among a small group of students selected nation-wide to attend a Focus Fellows Workshop at the Georgia Institute of Technology in Atlanta in January 2014. The objective of the workshop was to encourage minority engineering candidates to consider academia as a career and learn how to be successful in such a career.

› Dr. **Wan Jiao**, a recent PhD student of Dr. **Chris Frey**, won a 2013 Student Merit Award from the Exposure Assessment Specialty Group of the Society for Risk Analysis for her paper entitled “Comparison of Predicted Exposures Versus Ambient Fine Particulate Matter Concentrations.” She presented the paper at the SRA Annual Meeting in Baltimore, Md. on December 9, 2013.

› **Elisa Arevalo**, an MS student working with Dr. **Detlef Knappe**, won first prize in the poster award competition at the North Carolina American Water Works Association (AWWA) and Water Environment Association (WEA) annual conference, which took place on Nov. 10-13 in Concord, NC. The title of her poster was “Occurrence of perfluorinated compounds in the Cape Fear river basin and effectiveness of treatment approaches.” **Richard Jenny**, a student working with Dr. **Joel Ducoste**, won third place. •



HONORS

ARUMUGAM AND DE LOS REYES RECOGNIZED AS UNIVERSITY FACULTY SCHOLARS

Associate Professor **Sankar Arumugam** and Professor **Francis L. de los Reyes III** were recently recognized as 2013-14 University Faculty Scholars, part of an NC State strategic initiative to invest in and retain top faculty.

Dr. Arumugam's research is focused on understanding, modeling and forecasting hydrological fluxes at large spatial scales based on land surface and climatic indices. His research in hydroclimatology is supported by NSF, NOAA and the NC Water Resources Research Institute. He joined the CCEE faculty in 2005.

Dr. de los Reyes's research is focused on biological processes and combines modeling, bioreactor experiments, and molecular microbial ecology tools in addressing fundamental and practical issues in environmental biotechnology and environmental engineering. His research in sanitation

in developing countries was supported by a *TED Fellowship*.

A class of 20 University Faculty Scholars was announced by Chancellor Randy Woodson. The recognition and reward program is part of the university's strategic initiative to invest in and retain top NC State early- and mid-career faculty, who will receive \$10,000 in donated funds for each of the next five years to support their academic endeavors.

"These 20 extraordinary faculty members, who do so much to benefit North Carolinians through their teaching, research and service, are worthy recipients of this investment," Woodson said. •



Sankar Arumugam



Francis de los Reyes



William F. Baker describes his role as the lead engineer for the Burj Khalifa in Dubai

NC STATE ZIA LECTURE ON WORLD'S TALLEST BUILDING DRAWS 600 ATTENDEES

William F. Baker, the lead engineer for the Burj Khalifa in Dubai, discussed his role in leading a multidisciplinary team to design the world's tallest building before an audience of about 600 at the annual Paul Zia Distinguished Lecture on September 16, 2013. In his lecture, "Creating the Language of Architecture," Baker emphasized the role of structural engineering in the design and construction of tall buildings.

Baker has been involved in the design of structures such as the Broadgate-Exchange House in London and the GM Renaissance Center Entry Pavilion in Detroit, as well as skyscrapers like the Trump Tower in Chicago and the Pearl

River Tower in Guangzhou, China. At a height of 2,722 ft (830 m), the Burj Khalifa was constructed to be more than 1,000 ft (305 m) taller than any other skyscraper.

"Architecture is written with the vocabulary of structure," Baker said. "One thing that men can do that nature cannot is create whole new 'species.' We can synthesize completely new systems from our intuition and studying the problem."

Support from 38 corporate sponsors enabled the Zia Committee, headed by Dean Penny of Kimley-Horn and Associates, to endow the Paul Zia Educational Fund, which provides scholarships to graduate students in structural engineer-

ing, as well as to present the lecture free to engineers, architects and the general public. In addition, the committee established the Paul Zia Student Enhancement Fund, which provides funding for activities that enhance the graduate experience, such as research conference participation.

"One of the objectives of this series is to expose our students to the working professional," Zia said in his introduction of Baker. "The engineers doing the design, when faced with extreme design and even the possibility of failure, brings out the best in engineering creativity and innovation." •

SAVE THE DATE >>> September 22, 2014 | Zia Lecture "One World Trade Center."

Ahmad Rahimian, director of building structures at WSP USA, will describe the creative design process with examples of projects including 1 World Trade Center. Yoram Eilon, senior vice president at WSP USA, will discuss the design of 1 WTC and Allan M. Paull, senior vice president at Tishman Construction, will discuss construction aspects.



Paul Zia, center, listens to the discussion of structure as the vocabulary of architecture.



Engineering Dean Louis Martin-Vega and CCEE Department Head Mort Barlaz, center, enjoyed the lecture after delivering brief introductions of the lecture series and the speaker.



The Paul Zia lecture was held in the McKimmon Center and was attended by more than 600 people.



NEWS FROM CCEE STUDENT GROUPS



Students from the NCSU-CCEE Student Chapter of the American Concrete Institute at the Fall Convention in Phoenix, Ariz.

AIR & WASTE MANAGEMENT ASSOCIATION

Robert Hall was the keynote speaker at a chapter meeting regarding major environmental issues, how the US and China are addressing them, and the role played by A&WMA. Hall is a past president and past executive director of A&WMA, and is the general conference chair for the A&WMA 2015 Annual Conference & Exhibition that will be held in Raleigh in 2015. The student chapter assisted with the 38th A&WMA/EPA Information Exchange held in early December in Research Triangle Park. Students had an opportunity to discuss with experts the latest research and environmental regulations.

AMERICAN CONCRETE INSTITUTE

In October 2013, 16 students from the NC State-CCEE Student Chapter of the American Concrete Institute (ACI) attended the Fall Convention in Phoenix, Ariz. While there, the students participated in the student competition, attended committee meetings and seminars, shared in social events, and participated in several career

development opportunities. Two NC State teams participated in the pervious concrete cylinders competition by submitting mix designs they had worked on during the fall semester. Designs were evaluated based on cost, permeability, and tensile strength. The teams included **Alan Hern-don, Camila Perez, Daniel Whiteley, Elizabeth Phelps, James Freeman, Jon Holtvedt, Kristen Measimer, Lauren McCauley, Mehrdad Nasiri, Nick Blaser, Nidhi Chaklasia, Patrick Culton, Spencer Bowman, Tricia Artim, Virginia Chriscoe, and Zach Anderson.** The teams received 1st and 4th place in permeability with overall scores of 14th and 20th.

ASSOCIATION OF GENERAL CONTRACTORS / NATIONAL ASSOCIATION OF HOMEBUILDERS

The Associated General Contractors (AGC) and the National Association of Home Builders (NAHB) chapters had a busy semester. The chapters hosted presentations by Ammons Development Group, PCL Construction, and Balfour Beatty. Over the fall, the chapters partici-

pated in the Habitat for Humanity Shack-a-thon, attended the Annual AISC Steel Day hosted by Buckner Steel in Graham, NC and worked with Brasfield & Gorrie to host a networking bowling night. Students also participated in Habitat for Humanity Build Days, jobsite tours, and a food drive for families during Thanksgiving. Next semester, the AGC and NAHB chapters plan to continue their involvement with Habitat for Humanity. As the weather warms up, the AGC chapter plans to hold the 2nd Annual Kickball Fundraiser.

CHI EPSILON

NC State's Alfred P. Norwood Chapter of Chi Epsilon continued its tradition of honoring excellence by welcoming 10 new members in the spring 2013 semester: **Jarel R. Duncan, Meredith L. Richardson, Michael A. Corwin, Kyle A. Hovey, David T. Overby, Sarah D. Lempert, Liya Weldegebriel, James E. Corbett, Samuel K. St. Clair II, and Andrew R. Rice.** The new members were honored at the April 26th initiation ceremony and banquet at the NC State University Club. Banquet attendees recognized Dr. **Jim Nau** for receiving the 2013 Chi Epsilon Excellence in Teaching award for the Cumberland District. **Robert Macia**, president of Stewart Engineering, delivered a presentation that explored the importance of creativity and innovation in civil engineering design. He provided examples that included the expansion and renovation of the Talley Student Center and the 40-ft tall glass wall in the atrium of the Hunt Library.

ENGINEERS WITHOUT BORDERS - USA

Engineers Without Borders-USA NC State (EWB-NC State) looks forward to sending two teams to Allen Town, Sierra Leone, in May 2014 to provide energy

and water systems to serve the Dele School and the surrounding community. Sierra Leone is currently rebuilding after a decade-long civil war, and the country continues to struggle with crumbling infrastructure and widespread water insecurity, including a cholera epidemic in 2012. The Sierra Leone Renewable Energy team, led by **Dylan Cawthorne** (environmental engineering), will implement a solar voltaic system to provide a reliable source of electricity to expand the school's capacity to educate. The Sierra Leone Water team, led by **Vinicius Taguchi** (biological and agricultural engineering student), plans to drill a well to provide a clean and sustainable water supply to the community. The chapter was recently awarded a \$10,000 Challenge Grant from the Kenan Institute for Engineering, Technology and Science and a \$5,000 grant from the Boeing Company to support the projects. The chapter held a benefit dinner in November, which provided an opportunity to present the chapter's work to the broader community and to raise funds for the projects.

GEO-INSTITUTE

The Geo-Institute Graduate Student Organization (G-I-GSO) is a new student organization in the CCEE Department. The goals of the G-I-GSO are to provide networking and career development opportunities for geotechnical graduate students through academic events and industry interactions. Fall 2013 was the first semester for the G-I-GSO, and student members developed bylaws, organized social events, and hosted a research symposium for geotechnical graduate students. The G-I-GSO will continue activities in the spring 2014 semester and participate in the CCEE Department's Structural Engineering and Mechanics (SEM) Symposium on March 7, 2014.

INSTITUTE FOR TRANSPORTATION ENGINEERS AND THE AMERICAN SOCIETY OF HIGHWAY ENGINEERS

During the fall 2013 semester, the Institute for Transportation Engineers and the American Society of Highway Engineers (ITE/ASHE) student chapter hosted two guest speakers, both former student members from local companies, including Atkins and Kittelson & Associates, Inc. Student chapter president **Michael Corwin** was recognized with a merit award in November. The ITE Traffic Bowl team was victorious in the NCSITE Annual Meeting Traffic Bowl competition. The chapter cleaned a stretch of Jones Franklin Road as part of the Adopt-a-Highway program. Student members had the opportunity to network with professional members of the North Carolina Section of ITE (NCSITE) during "Trivia Night" at a local restaurant. A football tailgate was held early in the semester, and chapter advisor **Dr. Billy Williams** hosted a holiday party for the students. The ITE/ASHE student chapter recently partnered with the American Railway Engineers and Maintenance-of-Way Association (AREMA) to become ITE/ASHE/AREMA.

NC SAFEWATER

NC Safewater, which is the NC AWWA-WEA Student Chapter at NC State, continued monthly meetings and hosted a joint social for students and young professionals during the fall 2013 semester. In October, **S. Wayne Miles**, who leads CDM Smith's infrastructure services group in the Southeast, gave a talk about hydraulic and hydrologic modeling tools. In November, **David Hamilton** from ARCADIS, Inc. gave a talk entitled "Balancing Buffer Rules: The Story of A Greensboro Sewer Project." In December, **Dwayne Shelton** and **Ken Rickvalsky** from McWane Pipe gave a presentation on the applications of ductile iron pipe in water and sewer utili-

ties. On November 11th, several student members attended the 93rd NC AWWA-WEA Annual Conference in Concord, NC. Congratulations to **Elisa Arevalo** for winning 1st place and **Richard Jenny** for winning 3rd place in the Student Poster Competition.

PROFESSIONAL ENGINEERS OF NORTH CAROLINA

Representatives from both Moffatt and Nichol and the Professional Engineers of North Carolina Central Carolinas Chapter spoke at student chapter meetings. The NC State chapter participated in two socials with the Central Carolinas Chapter, and students met with local professional engineers. The chapter will host NC State's Boy Scout Engineering Day during the spring 2014 semester.

TAU BETA PI

Two student officers, **Landon Talley** and **Kyle Barth**, represented NC State at the 2013 Tau Beta Pi National Convention at Iowa State University in Ames, Iowa. The NC State chapter accepted a Project Award for tutoring students through the Boys and Girls Club during the spring 2013 semester. Tau Beta Pi members and initiates participated in service projects, including Habitat for Humanity and STEM nights at local elementary schools. In addition, the chapter's professional development series continued with an Engineering Futures session led by **J.P. Blackford** on the subject of team chartering. During the fall 2013 induction ceremony, 42 undergraduate students from departments across the College of Engineering were inducted into Tau Beta Pi. The total number of NC State student members is 5,902 over a span of 88 years.

CONCRETE CARES

On November 14th, 2013, members of NC State's American Concrete Institute (ACI) Student Chapter met to observe the pour of the Coaches' Corner Project's pink concrete footings at the new Talley Student Center. This event was coordinated with the national Concrete Cares Effort, which was founded to help expand the awareness of the need for cancer research and fundraising by the concrete industry. The goal of the Concrete Cares Effort is to pour one pink concrete project in each state. Students selected the Coaches' Corner Project to remember Kay Yow, the NC State women's basketball coach from 1975-2009, and Jim Valvano, the NC State men's basketball coach from 1980-1990. Both coaches succumbed to cancer. The ACI Student Chapter coordinated with NC State to raise funds to pour the Coaches' Corner Project. •



Members of the NC State-ACI Student Chapter attended the pour of pink concrete at the new Coaches' Corner project on campus. Pictured from left to right, are Elizabeth Phelps, Mehrdad Nasiri, Jon Holtvedt, Alan Herndon, Greg Adams, Camila Perez, Lauren McCauley, Tricia Artim, and Spencer Bowman.

AGC MEMBERS WIN STUDENT COMPETITION AWARDS



From left to right: McCarthy Project Manager Will Gaither, Chad Lambert, Kristen Measimer, Virginia Chriscoe, Varadha Ananthalakshminarayanan, Anand Gorthi, and Shitanshu Jain.

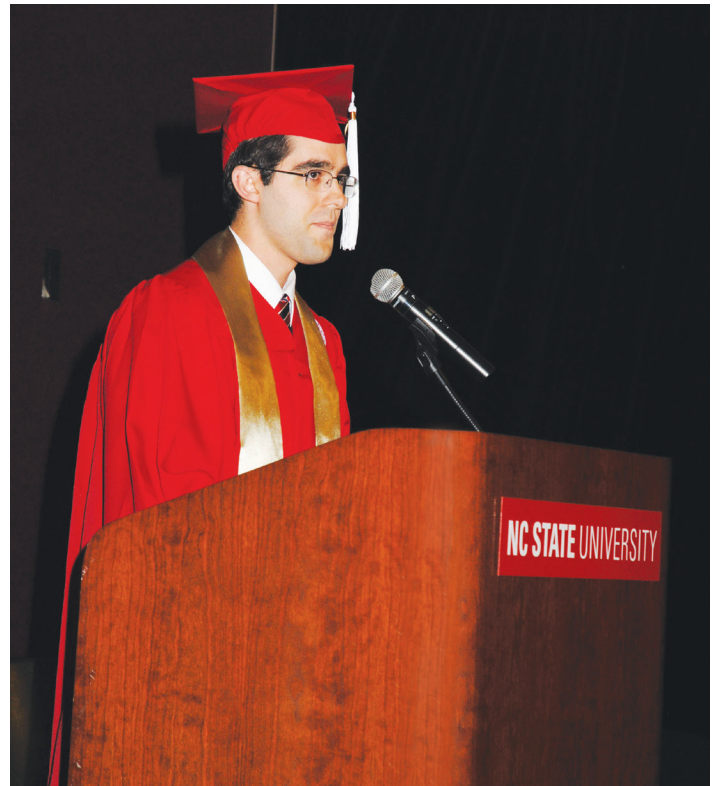
A team of six students from NC State's American General Contractors (AGC) Student Chapter represented NC State in the Green Building Competition and won the Best Presentation Award. They received the award at the Associated Schools of Construction Region 2 competition in Peachtree City, Georgia. Team members

include **Kristen Measimer, Virginia Chriscoe, Chad Lambert, Varadha Ananthalakshminarayanan, Anand Gorthi, and Shitanshu Jain**. To compete, each team had one day to design a 225,000-square-foot research laboratory to achieve LEED Platinum status and maximize the return on investment. The

NC State team prepared a design and presented its proposal before a panel of judges, including an architect and three project team members from McCarthy Engineering Associates. Other teams that attended represented the University of Florida, Georgia Tech, Virginia Tech, and Clemson. •

FALL 2013 GRADUATION

Department of Civil, Construction, and Environmental Engineering



Catherine McMillan, left, delivered the Chi Epsilon address at the Department's fall baccalaureate ceremony. Victor Fraga, right, delivered the valedictory address.

The fall 2013 departmental baccalaureate ceremony was held on Wednesday, December 18. A total of 67 students were awarded undergraduate degrees, including 55 in civil engineering, six in construction engineering and management, and six in environmental engineering. A total of 63 master's degrees were awarded, including 51 in civil engineering and 12 in environmental engineering. Fifteen doctor of philosophy degrees were conferred.

The audience, numbering about a thousand, was greeted by **Dr. Mort Barlaz**. **Dr. Emily Berglund** recognized members of Chi Epsilon, the National Civil Engineering Honor Society, and introduced **Victor Fraga**, who delivered the valedictory address. Victor is from Miami, Fla., and he plans to continue in civil engineering at NC State, work-

ing on a master's degree with a focus on structural engineering. Representing Chi Epsilon and delivering the Chi Epsilon address was **Catherine McMillan**. Catherine is from Raleigh, and after graduation, she will pursue a master's degree at NC State in civil engineering, with a focus on environmental engineering.

The commencement speaker was **Major General Jim Trogdon** (BSCEC 1984, MSCE 1990), who is currently vice president of Atkins North America, a consulting engineering firm providing engineering services in the areas of transportation, aviation, and infrastructure design. He is a registered professional engineer with more than 30 years of experience in the field of transportation. He began working at the North Carolina Department of Transportation in 1991 as a highway engineer

and recently retired as NCDOT's Chief Operating Officer. In addition to his extensive work in transportation engineering, Major General Trogdon is the Deputy Adjutant General of the North Carolina National Guard. His military awards include the Bronze Star, two Meritorious Service Medals, five Army Commendation Medals, a Meritorious Unit Commendation, and the Combat Action Badge. In his speech, Major General Trogdon emphasized that "it is up to you to build the experience and commitment to lifelong learning to maximize your potential, serving others as a civil engineer." Major General Trogdon ended his address with advice that "giving life and serving life are the two noblest objectives to which we can aspire." •

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 at the same time educating our students. 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.



BRASFIELD & GORRIE is pleased to participate as the Firm of the Month for October 2013. Brasfield & Gorrie is one of the nation's largest privately held construction firms, providing general contracting, design-build, and construction management services for a wide variety of markets, including healthcare, commercial, institutional, federal, municipal, industrial, and wastewater treatment. This was an excellent opportunity to not only promote employment at Brasfield & Gorrie, but to also reach a new client base in the Raleigh market. This selection has allowed us to recruit the best students and alumni NC State has to offer, while building our name in Raleigh's fast-growing construction industry. Brasfield & Gorrie is committed to its continued collaboration with the department and employing more Wolfpack students and alumni in the future.



FDH is honored to participate as Firm of the Month for a second year. In addition to showcasing its work in Mann Hall, FDH sponsored several pizza lunches in November. Two FDH engineers hosted each lunch and interacted with students and staff. In addition, vice presidents Chris Ply and Rhett Butler were guest speakers at the PENC student chapter meeting. FDH was impressed with the ideas and enthusiasm expressed by the students about their career paths and looks forward to attracting some of this outstanding talent to the firm. FDH has a long and constructive history with CCEE. Twenty years ago, FDH founders John Fisher and Robert Douglas, professors in the department, and Darrin Holt, a graduate student at the time, started a small university research initiative that today has become a thriving multidisciplinary engineering, investigation, and construction firm. Nearly 25 percent of FDH staff are graduates of NC State University. FDH continues to provide financial support for student scholarships and other departmental activities. The firm was a platinum sponsor of the 2013 Paul Zia Distinguished Lecture and also sponsors an annual ice cream social and underwrites the CCEE newsletter.



CLANCY & THEYS CONSTRUCTION COMPANY was pleased to participate as the Firm of the Month for January as our roots in the department are deep. Company founder E.I. Clancy graduated from State College (now NC State University) as a civil engineer in 1938. Equipped with a fine education, he worked on New Deal power plants for TVA and for the Civil Aeronautics Administration during WWII. He and brother-in-law John Theys started the company in 1949 and started their first project at NC State in 1951. Clancy's sons Tim, president, and Tick, executive vice president, have led the company since 1986. They grew from \$30 million in annual volume to a recent peak of nearly \$600 million. NC State graduates started three of the company's four divisional offices.

The NC State connection goes beyond E.I. Clancy's legacy. According to Tim, "We have many key employees who are NC State graduates. I've served on the CCEE Advisory Board, and Tick and I had the company endow a scholarship and a professorship in CCEE. We entered a new era of construction delivery methods with NC State when we renovated David Clark Labs in 2005." That project was delivered with a Construction Manager at-Risk approach. Clancy & Theys is proud to have built Engineering Building II on the Centennial Campus, and SAS Hall for the College of Sciences, as well as the renovation of Park Shops and realignment of Stinson Drive. "We've come a long way from building pole barns for NC State." Clancy & Theys is a leader in the use of 3-D modeling technology.

LETTER FROM CHAIR OF DEPARTMENT ADVISORY BOARD



It is hard to believe that it has been 18 years since I was a new NC State Civil Engineering-Construction Option graduate. So much has changed in that time—the simple things like how we communicate. “Text” was the content of a document, not a major form of communication, yet

today’s graduate’s first response is a text. As the chair of the Industry Advisory Board (IAB), it is this type of change that comes to the forefront of our focus. What is important to today’s students and our industry?

With these thoughts, the IAB continues to build on the achievements that past-presidents Mike Gwyn, Mike Creed and Suzanne Beckstoffer have led. Over the past year, we have worked to further our engagement with the students. Working through the student leaders, we have increased communications around student advising, supported collaboration of individual student organizations and improved involvement among the student population. Through these conversations, we are learning what is important to today’s students while helping them to understand what is important to potential employers as future graduates. This focus will continue as the board supports Dr. Barlaz and his team that works tirelessly to provide the best education from our department.

While we have a great board in place, we are always looking for alumni who are interested in getting involved. If you have that desire, please reach out and let me know. For starters, help us continue to expand our message to a broader audience. Last fall, Suzanne asked that we help tell the NC State story of

- Preparing workforce-ready students,
- Conducting world-changing research, and
- Accelerating job creation.

Our Development Committee is out knocking on doors to tell the story, but, as with any fundraising, more voices get more dollars. The department needs our financial support as alumni to continue its work.

Finally, as a graduate of the Construction Program, I would be remiss if I did not mention the 60th Anniversary celebration for the Construction Program. Save the date for April 8th and 9th. We are planning a great event that will include a panel discussion, dinner reception and even incorporate our annual golf tournament into the celebration. This is a great opportunity to reconnect with friends and support OUR Department.

Heather E. 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, and 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 broader 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:

Sepi Asefnia, BSCE 1993
SEPI Engineering & Construction

Bill Pope, BSCEC 1983
Pope Custom Homes

Suzanne M. Beckstoffer, BSCE 1982
Newport News Shipbuilding

Richard Rohrbaugh, BSCE 1981
Kimley-Horn and Associates

Thomas W. Bradshaw, Jr.
NC State Ports Authority

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

Michael Creed, BSCE 1973
(Past Chair)
McKim & Creed

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

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

Pam Townsend, BSCE 1984, MSCE 1987
AECOM

Barry Gardner, BSCEC 1975
Shelco Construction Co.

Hans Warren, BSCEC 1984
Warco Construction, Inc.

John Jenkins II, BSCE 1990
Stewart Engineering

Tony Warner, BSCEC 1966
Warner Construction

Christopher Murphy, MSCE 1999
FDH Engineering, Inc.

Dr. James Wilson
NC State University
Edward P. Fitts Department of
Industrial and Systems Engineering

ALUMNI NEWS AND UPDATES



➤ **Neal W. Andrew**, PE (BSCE 1993) was appointed by Governor McCrory as one of six new members of the NC Coastal Resources Commission in October 2013. Neal

also has served on several committees for the North Carolina State Building Code Council. He received a master's degree in structural engineering from the Georgia Institute of Technology in 1995. Neal is the president of Andrew Consulting Engineers of Wilmington, NC.

➤ **Jo Daniel** (PhD 2001) was recently promoted to professor in the Department of Civil Engineering at the University of New Hampshire. Dr. Daniel serves as graduate coordinator and associate chair of the department, and is chair of Transportation Research Board committee AFK50 pertaining to asphalt. Her research focuses on material characterization and climate change impacts on pavements.

➤ **Tracy Davis** (BSCE '87) was recently awarded the prestigious Professional Engineer in Government Achievement and

Service in the United States (PEGASUS) Award by the National Society of Professional Engineers. Tracy serves as the Director of the Division of Energy, Mineral, and Land Resources for the NC Department of Environment and Natural Resources.

➤ **Philip D. Gaston**, PE (BSCE 2008) worked with the LPA Group (a design building engineering firm) in Raleigh and Orange County from 2008 to 2011. Since 2011, he has been a civil engineer in the Construction section of the Transportation division for the County of Santa Barbara Department of Public Works. He lives in the Central Coast of California with his beautiful wife, Danielle.

➤ **Wan Jiao** (PhD 2013) is a postdoctoral research fellow at the U.S. Environmental Protection Agency in Research Triangle Park, NC. She is working on development and demonstration of low-cost sensors for air quality monitoring.

➤ **Luis A. Montejo** (PhD 2008) is an assistant professor at the Department of Engineering Science and Materials at the University of Puerto Rico at Mayaguez. He was recently given an outstanding professor award in recognition of his teaching and research accomplishments. His research focuses on signal processing and

nonlinear modeling as applied to structural system prognosis. His research has been sponsored by the National Science Foundation, the Nuclear Regulatory Commission and the Department of Homeland Security.

➤ **Jenny Padgett** (MSCE 2009) has been working with Geosyntec Consultants in their Columbia, MD office since her graduation from NC State in 2009. She was recently promoted to engineer and is managing projects related to landfills, transfer stations and environmental remediation. She also got married this past July to Jeremy MacLively.



➤ **Stephanie Vereen**, P.E. (MS 2002, PhD 2013) has been appointed as an assistant professor of construction engineering and management at the University

of Alabama. Her appointment began in the fall 2013 semester. Stephanie conducts research on skilled construction labor issues, infrastructure asset management, and alternative project delivery methods. While at NC State, she worked with Drs. William Rasdorf and Joseph Hummer.

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:

Name, Mailing and Email Address
Company Name and Address
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Announcements

1,000 copies of this document were printed at a cost of \$3,533.

FDH ENGINEERING SPONSORS CCEE NEWS



FDH Engineering, Inc., is the proud sponsor of CCEE News. The multidisciplinary consulting firm, founded in 1994, has an international presence, having worked on projects throughout the United States as well as Puerto Rico, the Virgin Islands, South America, Korea and Japan. Its staff includes more than 200 professionals at the forefront of their industry in structural engineering, geotechnical engineering, water resources

engineering and nondestructive testing. Additionally, FDH offers a broad array of services to the construction industry, including construction management, sustainable engineering and LEED consulting services. FDH headquarters are in Raleigh, with branch offices in Baton Rouge, La.; St. Louis, Mo.; Los Angeles, Ca.; and Phoenix, Ariz. Printing of this issue of *CCEE News* is sponsored by FDH Engineering, Inc.

CCEE DEPARTMENT LOGO STORE



DepartmentLogoStore.com features apparel with the name and logo of the Department of Civil, Construction, and Environmental Engineering. Available items include polo and twill shirts, t-shirts, hooded sweatshirts, jackets and windbreakers. Items can be shipped within the United States or can be picked up, free of shipping, in Cary, NC.

To view the available selection and to place an order, visit www.departmentlogostore.com.

INVESTING IN THE DEPARTMENT

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.

Thank you for supporting CCEE.

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For more information, contact:
Lora Bremer, CCEE, Director of Development
Phone: 919.513.0983
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