CCEE NEWS

DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING

COLLEGE OF ENGINEERING • NORTH CAROLINA STATE UNIVERSITY • FALL 2012

TRACKING **TRANSPORTATION**

CCEE research aims to improve travel time reliability.

NC STATE UNIVERSITY

125 YEARS

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

CONSTRUCTION ENGINEERING AND MANAGEMENT PAGE 18

The department's Construction Engineering and Management group prepares future engineers who can develop and apply engineering knowledge and technologies to construct a wide variety of infrastructure projects.

ABOUT THE COVER TRAFFIC WEAVES AROUND THE DOWNTOWN RALEIGH SKYLINE. ON THE BACK COVER, VEHICLES MOVE DOWN HILLSBOROUGH STREET NEAR NC STATE'S MAIN CAMPUS. *SEE RELATED STORY ON MEASURING TRAVEL TIME RELIABILITY ON PAGE 04.*

A MESSAGE FROM THE DEPARTMENT HEAD

MORTON A. BARLAZ

WELCOME to the Fall 2012 newsletter. It is a pleasure to catch up with all of our friends. First, I am pleased to welcome Dr. **Cassie Hintz** to our faculty. Cassie joins us from the University of Wisconsin where she completed her PhD on fatigue damage mechanisms in asphalt binders and the development of analytical models to characterize crack growth in asphalt materials. In addition, welcome to **Jackie Weaver** as our new bookkeeper and **Allen Piper** who will provide support in the asphalt labs. We bid farewell to Dr. **Joe Hummer** who is the new department head at Wayne State University and to Dr. **Matt Evans** who has accepted a position as an associate professor at Oregon State University.

I am pleased to congratulate Drs. **Francis de los Reyes, Murthy Guddati**, and **G. Mahinthakumar (Kumar)** on their promotion to professor. De los Reyes' research focuses on understanding biological processes using molecular biological tools to characterize the structure and function of biological communities in engineered and natural systems. Guddati's research is in the area of computational mechanics, where he is interested in the development of computational algorithms and the simulation of complex physical systems. Recent applications include wave propagation, multi-scale modeling, subsurface imaging and pavement mechanics. Kumar's research is on the development of algorithms, methods and tools for large-scale computational applications of interest in civil and environmental engineering with a recent emphasis in water resources.

I am also pleased to congratulate Drs. **Chris Frey** and **Richard Kim**, both of whom were designated as Distinguished University Professors. This is an honor reserved for 4 percent of the university's faculty and awarded in recognition of outstanding career accomplishments. Frey conducts research on measurement and modeling of the energy use and emissions of vehicles; air pollution exposure and risk analysis; quantification of uncertainty, variability, and sensitivity in models; and evaluation of energy and environmental systems. Kim's research is on the performance evaluation of asphalt materials and pavements with expertise in the characterization and performance modeling of asphaltic materials and asphalt pavement systems; condition assessment of asphalt pavements; pavement evaluation by accelerated pavement testing; and pavement preservation.

We started the semester with a welcome back ice cream social for all of our students and thank **FDH Engineering** for their sponsorship. I used the opportunity to introduce our new undergraduates to the department and encouraged them to take advantage of the programs that make NC State a great university, including our student organizations and undergraduate research. I also described a new undergraduate thesis option.

I have updated the PowerPoint presentation that describes our academic and research programs. We continue to be a leader in research on many aspects of society's infrastructure, working across disciplines at scales ranging from nano-scale to field-scale. Please check out the presentation at www.ce.ncsu.edu/about and let me know what you think.

As you read this newsletter, I hope that you get a sense of all of the wonderful activities in our teaching, research, and extension programs. As everyone is aware, the economy is not as strong as we would like and our budget remains extremely tight. 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. Please make a contribution to the department an annual event. Your gifts provide help with the special things that make us excellent, 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. Thank you.

Morton A. Barlaz
Department Head

Cassie Hintz Joins CCEE Department

Her research focuses on fundamental characterization of asphalt materials to improve the durability and sustainability of asphalt pavements.

DR. CASSIE HINTZ joined CCEE in August 2012 as an assistant professor. She came to the department after finishing her PhD in civil and environmental engineering at the University of Wisconsin - Madison (UW-M), where she also received her master's and bachelor's degrees. While attending Wisconsin, Hintz received the Elizabeth Huppler, Gilbert and Genevieve Buske, and Wisconsin Asphalt Paving Association scholarships.

Hintz's research focuses on fundamental characterization of asphalt materials to improve the durability and sustainability of asphalt pavements. Asphalt is used in more than 90 percent of the world's paved roads, oil prices are climbing, and traffic demand and the need for long pavement life are increasing. Thus, there is a critical need for sustainable pavement systems with increased durability and lower energy and resource consumption. Hintz's research at UW-M's Modified Asphalt Research Center (MARC) led to significant advancement in our fundamental understanding of the mechanisms involved in asphalt binder failure.

When not in the laboratory, Hintz was probably running. She competed as a varsity athlete on UW-M's cross country and indoor and outdoor track teams. As a varsity athlete, Hintz had a notable 2007 season during which she won the Crazylegs Classic (8,000-meter), the Syttende Mai 20-mile run, and the Pioneer Invitational.

As a graduate student she served as a research assistant and task leader at MARC with responsibility for coordinating research efforts on several projects. Hintz also served as the lead teaching assistant for the undergraduate construction materials course for which she directed student lab activities, developed and managed the course web site, and assisted in the development of assignments and exams.

Hintz joined the CCEE department for many reasons: "I was impressed with the diversity within the department, the opportunities for collaborative research, and the positive and friendly interactions among faculty." Hintz also observed that "the department is committed to both teaching and conducting high quality, innovative research" and "Raleigh seemed like a great place to live (and run!)."

Hintz's goal is to build a broad pavement materials research program. The foundational thrust area in her research will be multi-scale characterization and modeling to develop a fundamental understanding of the behavior of asphalt binders and their interaction with mineral aggregates as related to pavement performance. She will build on this foundation through research in sustainable materials, including asphalt modification technology and innovative cementitious materials, such as bio-based binders. Looking forward, Hintz understands that close and ongoing communication with transportation agencies and the pavement industry will be critical to developing an innovative and high impact research program.

In the spring 2013 semester, Hintz plans to develop and teach a new graduate course titled "Multiscale Characterization of Asphalt Materials." In this course, students will study asphalt materials at three different length scales: asphalt binder, mastic, and fine aggregate mortar. In teaching at the graduate and undergraduate levels, Hintz understands the importance of considering and engaging all learning styles with the goal of guiding the student from knowledge through comprehension to application while encouraging critical thinking. •

(Left) Dr. Michael Creed delivered the baccalaureate address at the Spring 2012 graduation ceremony.› (Right) Dr. Morton Barlaz (far left) greeted the audience and introduced valedictorians. Front row, left to right: Natasha Boger, Ryan Blair, Bryant Miller and Matthew Nifong. Back row, left to right: Ruth Small, Matthew Authement and Matthew Woelfle. Missing from picture: Andrew Sen.

More Than 180 Receive Degrees at Spring 2012 Graduation

ON Saturday, May 12, the Department of Civil, Construction, and Environmental Engineering hosted the Spring 2012 Baccalaureate Ceremony at the McKimmon Center. The department awarded 89 Bachelor of Science in Civil Engineering degrees, 15 Bachelor of Science in Construction Engineering & Management degrees, and 12 Bachelor of Science in Environmental Engineering degrees. In addition, 57 master's degrees were awarded, including Master of Civil Engineering, Master of Environmental Engineering, Master of Science in Civil Engineering and Master of Science in Environmental Engineering. Eight Doctor of Philosophy degrees were conferred. Doctoral candidates were recognized and hooded by their advisors.

The audience, numbering about 1000, was greeted with opening remarks from Dr. **Mort Barlaz.** Dr. **Jim Nau**, associate head for undergraduate programs, recognized members of Chi Epsilon, the national civil engineering honor society, and introduced undergraduate valedictorians. The Class of 2012 graduated seven valedictorians, including five in civil engineering and two in environmental engineering, all of whom earned a perfect 4.0 cumulative grade point average. The valedictorians are **Natasha Boger, Bryant Miller, Matthew Nifong, Andrew Sen, Matthew Woelfle, Matthew Authement** and **Ruth Small.** Boger, from Gold Hill, NC, Miller, from Claremont, NC, and Nifong, from Lexington, NC, will return to NC State this fall to pursue master's degrees. Sen, from Cary, NC, will attend graduate school at the University of Washington. Woelfle, from Wake Forest, NC, will pursue a PhD in atmospheric science at the University of Washington in Seattle, WA. Authement, from St. Petersburg, FL, will attend medical school. Finally, Small, from Greensboro, NC, will work as an engineer for Hazen and Sawyer in Raleigh.

Boger delivered the valedictory address and Ryan Blair delivered the Chi Epsilon Honor Society Address. The Baccalaureate Address was given by Dr. **Michael W. Creed** (BSCE '73, MSCE '84), chairman and CEO of McKim & Creed. Creed described the evolution of civil engineering to serve increasing populations and meet ever-changing societal demands while incorporating efficient technologies. He talked about how the CCEE department has grown to meet emerging challenges facing the civil engineering profession. Creed highlighted the importance of public speaking skills and the role of experts in addressing stakeholders with conflicting viewpoints.

Degrees were presented by Dr. **Michael Leming,** coordinator of advising, and Dr. **Vernon Matzen,** associate department head. Barlaz closed by encouraging the graduates in their future endeavors, stating that engineers recognize the need to "critically analyze problems," and "sometimes half of the solution is figuring out what question to ask." He also said, "I hope that we have instilled the importance of working in groups, communicating clearly and honestly, and thinking outside the box." He closed with "today is a milestone along the path of what I hope will be a fruitful and satisfying career for each of you." •

Research Updates

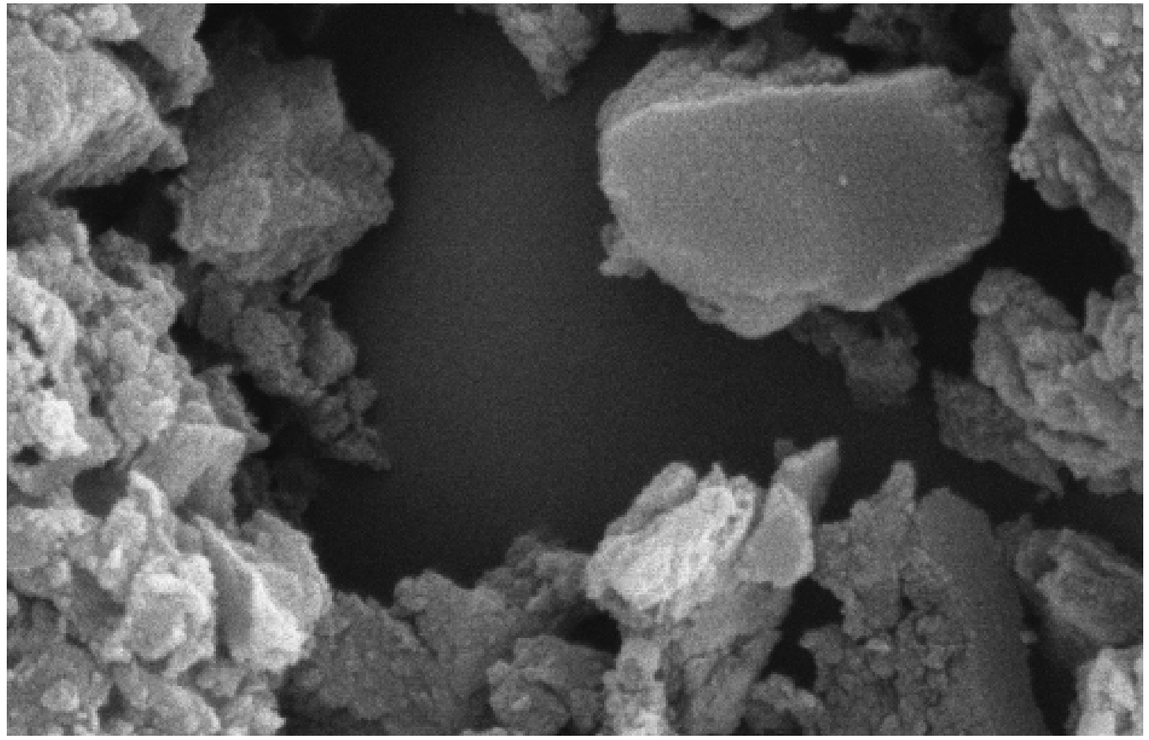
Department researchers are measuring travel time reliability, enhancing drinking water quality, using wave propagation to solve problems, and predicting customer responses to contaminated water.

MEASURING TRANSPORTATION SYSTEM MOBILITY AND RELIABILITY

There is an explosion of transportation data and information. Data such as vehicle counts, average speeds and accurate travel time estimates are measured by pole mounted radar units along freeways and, via companies such as Inrix, millions of instrumented probe vehicles. These real-time data inform GPS navigation devices and smart phone apps that provide routing guidance. Not so obvious to travelers is the remarkably enhanced capability the new data provides to transportation management agencies for measuring and monitoring system performance.

The CCEE department at NC State is a leader in this area through the research of Drs. **Billy Williams**, **Nagui Rouphail** and **George List**. Their projects are sponsored by the NCDOT and the National Research Council's Strategic Highway Research Program 2 (SHRP2). Their research is enabling long-term tracking of mobility measurements such as system delay and average travel time. The core of their research is focused on the emerging area of travel time reliability. Travel time reliability measurement aims to characterize the variability of travel times taken at essentially the same time of day. Travel times that are highly variable lead to extra travel costs because of the need to allow extra time for important trips.

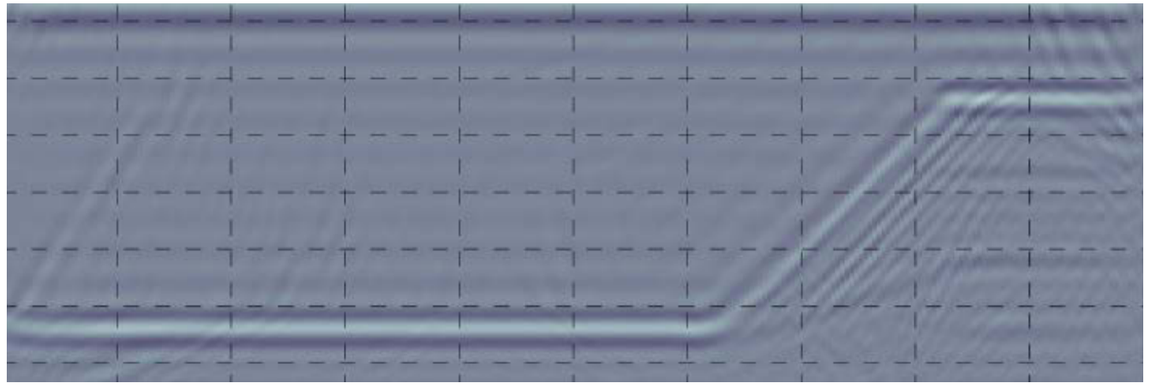
Photo: Increasing urban freeway congestion leads to delay and variability in travel times.



Electron microscope image of superfine powdered carbon.

ENHANCING THE QUALITY OF OUR DRINKING WATER

During drinking water treatment, a disinfectant, such as chlorine, is added to water before it is sent through the distribution system to the consumer's tap. The disinfectant kills disease-causing organisms and prevents them from growing in the distribution system. However, chlorine also reacts with otherwise harmless natural organic matter, such as that originating from decaying vegetation, to form byproducts such as trihalomethanes (THMs) and haloacetic acids (HAAs). THMs and HAAs have been linked to bladder cancer and other adverse human health effects. To reduce human exposure to THMs and HAAs, the EPA promulgated the Stage 2 Disinfectants/Disinfection Byproduct (D/DBP) Rule. As a result, many drinking water treatment plants need to lower the amount of byproducts formed. With funding from the Water Research Foundation, Dr. **Detlef Knappe**'s research group is developing a new technology – superfine powdered activated carbon - to accomplish this goal by removing the natural organic matter before the disinfectant is added. Many commercially available powdered activated carbons, which have an average powder size of 20 µm, are not effective for natural organic matter removal. Graduate student **Susan Dunn** (MS ENE 2011, BS ENE 2009) showed that superfine carbons with an average size of less than 1 µm can lower the THM and HAA formation potential in NC surface water by 30-40 percent. These removal percentages are sufficient to assure compliance with the Stage 2 D/DBP Rule for many utilities. Ongoing research shows that superfine carbon is not only effective for lowering disinfection byproduct formation, but also for removing a range of trace organic contaminants from drinking water.



A visualization of wave propagation modeling method applied to subsurface imaging of a valley.

APPLYING WAVE PROPAGATION MODEL TO MULTIPLE ENGINEERING CHALLENGES

Dr. **Murthy Guddati** and his research team are actively developing new and efficient numerical algorithms for problems such as soil-structure interaction, subsurface imaging, and multi-scale fracture modeling. With support from the National Science Foundation (NSF), they are building on successful prior work in devising arbitrarily wide angle wave equations (AWWE). These equations propagate waves in a specified direction while suppressing propagation in the opposite direction. This property is leading to significant contributions in meeting engineering challenges such as: (a) adopting the finite element method to simulate dynamic interaction of soil and structure under earthquake excitation; (b) detecting hidden features, in the contexts of ultrasonic nondestructive evaluation, ground penetrating radar and seismic exploration of hydrocarbon reservoirs; and (c) modeling the complexities of the fracture tip region using molecular dynamics combined with the finite element methods. The theoretical foundation of AWWE has been well established, but many challenges remain in making them applicable for practical use. The NSF project is aimed at refining AWWE-based methodologies for the above-mentioned applications, making them ready for testing with real-world applications, eventually leading to routine use in engineering practice.

PREDICTING CUSTOMER RESPONSES TO CONTAMINATED WATER

Dr. **Emily Zechman** (NC State PhD 2005), assistant professor in the CCEE department, recently led an NSF-funded project entitled, "An Agent-based Modeling Framework for Response Planning to Contamination Events for Water Utilities". This research was designed to address this question: "When bacteria or harmful chemicals get into public water systems, how can public officials best protect residents from becoming sick?"

Zechman worked with experts in public policy, hydraulic engineering, and social science, including Drs. Mumpower, Lindell, and Brumbelow at Texas A&M University, to create new cross-disciplinary research methods. Through this project, surveys were fielded to determine how people perceive warnings about contaminated water and what actions they would take to protect themselves. Zechman's research created a new sociotechnical model that integrates results from the surveys with a pipe network model to predict how the reactions of consumers and social networks affect the number of exposed customers. Her research evaluated methods for protecting customers, such as broadcasting boil water orders, deploying emergency vehicles to warn a community, and opening hydrants to flush contaminated water. These methods were demonstrated for a virtual city, Mesopolis, and were developed to aid management of municipal water systems for cities across the US. •

Researchers at CCEE's Constructed Facilities Laboratory Improving Infrastructure Health

CCEE researchers use a technique called structural health monitoring to find better ways to inspect, repair and forecast the long-term health for bridges, parking decks and other large structures.


Dr. Mervyn Kowalsky


Dr. Mohammad Pour-Ghaz


Dr. Sami Rizkalla


Dr. Rudi Seracino


Dr. Paul Zia

WHEN the American Society of Civil Engineers graded the nation's infrastructure health in 2009, the United States was nowhere near the honor roll. It earned a "D."

More recently, the North Carolina Department of Transportation (NCDOT) labeled nearly four in 10 North Carolina bridges "deficient." Findings like these indicate that our nation's "backbone" — bridges, roads and other infrastructure — could use some TLC.

NC State engineers believe the hi-tech tools and materials they have developed will help solve the problem. They're using a technique called structural health monitoring to find better ways to inspect, repair and forecast the long-term health for bridges, parking decks and other large structures.

Some examples: sensor technology that finds a tiny bridge crack; space-age composite materials that repair structures previously considered irreparable; and data-gathering that helps transportation engineers develop customized bridge maintenance and repair schedules. The work should lead to structures that last longer and save taxpayers big bucks.

The Constructed Facilities Laboratory (CFL) located on NC State's Centennial Campus is a leader in research on structural health monitoring. It is one of the few large-scale structure-testing facilities in the country with the ability to perform tests in accordance with the International Organization for Standardization (ISO), the world's largest developer and publisher of international industrial and commercial standards. Researchers in the lab are so well regarded that they were called upon to help investigate the devastating I-35 bridge collapse in Minneapolis that killed 13 people in 2007.

"I wouldn't scare the public by saying that there's going to be a bridge collapse every day," said Dr. **Sami Rizkalla**, Distinguished Professor of Civil Engineering and Construction and director of the CFL. "But it's like if you have high blood pressure — you're not healthy, and if you don't do something, your life expectancy may be shorter."

Researchers at the CFL have been testing big structures since the facility opened in 1996. The 20,000-square-foot research complex has state-of-the-art spaces like the Large Structural Systems Laboratory, which has powerful equipment that allows researchers to watch how the concrete in a parking deck reacts to an earthquake. Pushing super-strong materials to their breaking points – and beyond – is part of the lab's mission.

The lab also has a walk-in environmental chamber, which gives engineers a chance to see how well a bridge support handles strong winds or brutally cold temperatures. Environmental effects that occur over years in the real world can be created at the CFL in a few weeks.

Today the CFL is one of the few university labs in the country accredited to standards set forth by the International Code Council, which publishes building safety and fire prevention codes that have been used by companies and agencies across the nation. The accreditation means that all the lab's testing results can be applied to real structures. This distinction has also attracted international attention — the Korea Institute of Construction Technology and Nippon Steel, the giant Japanese steel producer, are among the lab's clients.

Faculty at the CFL use the facility to explore new materials found in today's buildings and bridges and those that will be used in the future. They include advanced composite materials such as high-performance concrete and fiber-reinforced polymers. These kinds of materials are stronger, lighter and more efficient than traditional materials, such as steel and concrete.

In 2001, Dr. **Mervyn Kowalsky**, professor of structural engineering, and Dr. **Paul Zia**, Distinguished University Professor Emeritus of Civil Engineering, were part of a team that constructed North Carolina's first high-performance concrete bridge. The bridge, located over the Neuse River in northern Wake County, used fewer support beams, cost less to build and should perform better over the long term than its predecessors.

Hi-tech materials can also save money by allowing engineers to repair bridges, rather than replace them.

"The goal is to return structures back to their original performance and increase their service life," said Dr. **Rudi Seracino**, associate director of the CFL and associate professor in the department.

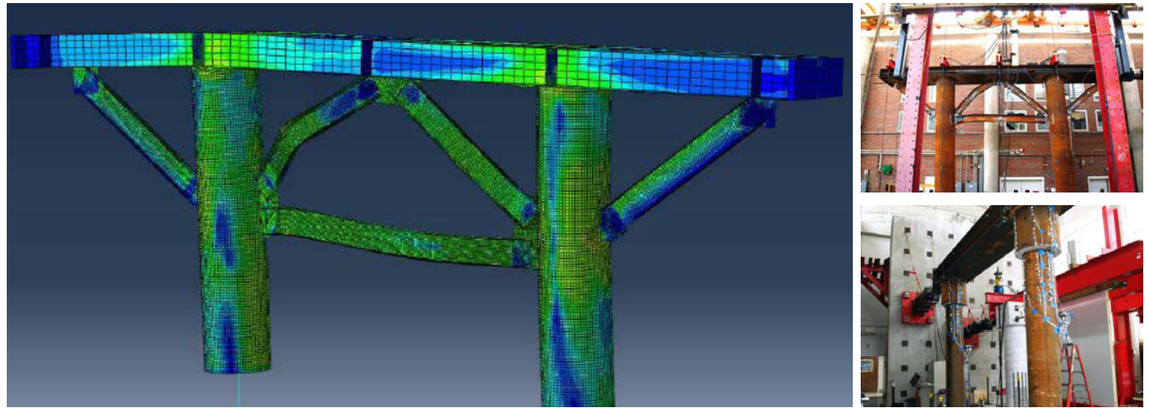
While the CFL often tests materials found in soaring bridge columns, NC State engineers' work extends underground, as well. Dr. **Mohammad Pour-Ghaz**, an assistant professor in the department, is working with electrically conductive concrete and grout to help engineers detect cracks quickly and easily in underground pipelines.

The special nature of the materials allows engineers to easily monitor the conductivity. If there's a change, they can pinpoint the exact location of the damage and have a very good idea of the severity of the damage. "It's like having a wire and passing electricity through it," Pour-Ghaz said. "If someone cuts the wire, there won't be any electricity passing through it. Therefore, we know something happened."

NC State engineers are developing new materials and techniques to keep the nation's infrastructure around much longer.

"The CFL is unique," Rizkalla said. "We can help to design, monitor and repair the country's infrastructure using advanced methods that will save money." •

The 20,000-square-foot Constructed Facilities Laboratory has state-of-the-art spaces like the Large Structural Systems Laboratory, which has powerful equipment that allows researchers to watch how the concrete in a parking deck reacts to an earthquake.



(Left) Finite element analysis stress contours of current pier design. ❯ (Right Top) Full-scale replica of currently used truss pier. ❯ (Right Bottom) Newly developed steel bridge design.

Making Bridges More Robust to Earthquakes

CCEE researchers model, build and test better larger structures.

ALASKA is the nation's most earthquake-prone state, having suffered a 9.2 magnitude earthquake in 1964, the largest ever recorded in North America and second largest worldwide since 1900. Given the importance of bridges in transportation infrastructure, and Alaska's earthquake history, engineers at the Alaska Department of Transportation and Public Facilities (DOT&PF) decided to evaluate how a currently used steel truss-style bridge pier design would perform during a large earthquake.

As a result, Alaska DOT&PF and the Alaska University Transportation Center funded a study at NC State to evaluate the seismic performance of steel bridge systems. The project is directed by Drs. **Mervyn Kowalsky** and **James Nau** and has supported PhD student **Steven Fulmer.**

Over this past summer, a full scale version of a currently used pier design was constructed and tested at the Department's Constructed Facilities Laboratory (CFL). The CFL is a state-of-the-art structural testing laboratory, where full-scale experimental evaluation of structures and components can be performed. Detailed Finite Element Analysis (FEA) was conducted prior to the test to predict the behavior of the pier. The forces likely to be encountered during an earthquake were simulated using a 440,000 pound capacity hydraulic actuator at the top of the pier, with smaller hydraulic jacks used to simulate the weight of the superstructure. An optical motion sensing system was used to monitor critical regions of the pier.

Both the FEA and experimental results indicated that, when subjected to lateral loading, the bracing elements of the truss pier system would buckle. Following buckling of the brace members, weld cracking developed which ultimately led to connection failure. The consistency of the analytical and experimental results indicated that the design of this truss-style steel pier should be improved for use in bridges in earthquake active regions.

The NC State team and Alaska DOT&PF jointly developed a new pier design, which NC State constructed and tested in the CFL. The new design concept performs well when subjected to simulated earthquake loading. The structure utilizes a combination of steel studs and cement grout to form the connection between the bridge columns and the cap beam. FEA modeling and experimental results indicate that the new design will perform much better than the current design. The Alaska DOT&PF plans to employ this new system as a design option for future bridge construction. •

(Left) Portable emissions measurement system instrumentation in truck cab. ❯ (Middle) Truck instrumented to measure emissions during driving. ❯ (Right) NO_x concentration sensor next to selective catalytic reduction reactor.

Diesel Technologies Substantially Cut Emissions in Real-World Conditions

DR. CHRIS FREY, a Distinguished University Professor in the department, recently completed research that shows that federal requirements governing diesel engines of new tractor trailer trucks have resulted in major cuts in emissions of particulate matter (PM) and nitrogen oxides (NO_x) – pollutants that have significant human health and environmental impacts.

"These requirements for new emission control technologies have increased costs for truck owners and operators, and we wanted to know whether there was any real benefit," said Frey. "We found that there is a huge reduction in both PM and NO_x emissions."

Frey and PhD student **Gurdas Sandhu** used a portable emissions measurement system to sample exhaust from diesel trucks while the trucks were in use on roads and highways. The new emission requirements apply to new trucks, meaning that trucks purchased in 2010 and trucks purchased in 1999 were subject to different emission requirements.

Frey and Sandhu found that a truck in compliance with 1999 standards emitted 110 grams of NO_x per gallon of fuel used, and 0.22 grams of PM per gallon of fuel used. NO_x is a significant contributor to low-level ozone, which adversely impacts respiratory health. PM also adversely impacts respiratory health and, because it is largely made up of black carbon, also contributes to global climate change.

Trucks in compliance with newer standards had far lower emissions. For example, a 2010 truck emitted 2 grams of NO_x per gallon of fuel – a decrease of 98 percent. The PM emissions were 95 percent lower.

The NO_x reductions stem from the implementation of exhaust gas recirculation and selective catalytic reduction technologies. The PM reductions are the result of installing diesel particulate filters into the tail pipes of diesel trucks.

"While these technologies are a significant investment for truck owners, this study shows that they are achieving a remarkable drop in emissions of contaminants that have meaningful health and environmental consequences," Frey said.

A paper describing the work, "Real-World Measurement and Evaluation of Heavy Duty Truck Duty Cycles, Fuels, and Emission Control Technologies," is forthcoming from *Transportation Research Record*, the journal of the Transportation Research Board (TRB). The research was supported by the North Carolina Department of Transportation and the National Science Foundation. •

CCEE Faculty Lead National Effort to Evaluate Fresh Water Sustainability in the Southern US


Dr. Sankar Arumugam


Dr. Kumar Mahinthakumar


Dr. Tushar Sinha


Dr. Emily Zechman

RESEARCHERS in the department are leading a four-year federal research effort to evaluate freshwater sustainability across the southern United States. The objective is to develop policy recommendations on what can be done to make the best use of water supplies in the face of population growth and the effects of climate change over the next 10 to 30 years. Arizona State University and the University of Georgia are also part of the project.

The project will analyze historical hydroecological observations, water management policies, and population and climate change projections to assess the sustainability of water resources over the next 10 to 30 years. The research is supported by a $1.5 million grant from the National Science Foundation.

A significant aspect of the research is to evaluate adaptive water management strategies in the arid Southwest and to evaluate whether they could be used to improve the sustainability of water resources elsewhere. This will include a historial analysis to see which of the strategies used in the Southwest would have been most effective in addressing water sustainability issues related to ecological and human use over the past 50 years.

"Steve Jobs once said, 'You can't connect the dots looking forward - you can only connect them looking backward,'" said Dr. **Sankar Arumugam**, an associate professor in the department, principal investigator and project director. "We will be looking at more than 50 years' worth of climate, water and ecological data and trying to connect the dots."

Researchers will also be creating tools to develop near-term climate change projections customized for the southern US, so that integrated surface water and groundwater models can be developed for better managing water infrastructure systems to supply water for human and ecological demands.

In addition, researchers will use models that simulate the actions and interactions of a population to better understand the effect of public attitudes on the success of water management policies.

Other NC State researchers involved with the project include Dr. **Kenneth Kunkel**, research professor of marine, earth and atmospheric sciences; Drs. **Kumar Mahinthakumar** and **Emily Zechman** in CCEE; and Dr. **Tushar Sinha**, a postdoctoral researcher in CCEE. The grants will support one additional postdoctoral researcher and two PhD students at NC State. •

New Interdisciplinary Project to Investigate Public Perception of Reclaimed Water

CCEE Assistant Professor Dr. **Emily Zechman** and Dr. **Andrew Binder**, an assistant professor of communication at NC State, have received a grant from the National Science Foundation (NSF) to help utilities better understand and predict public response to new water reclamation projects, so that utility and water managers can plan accordingly.

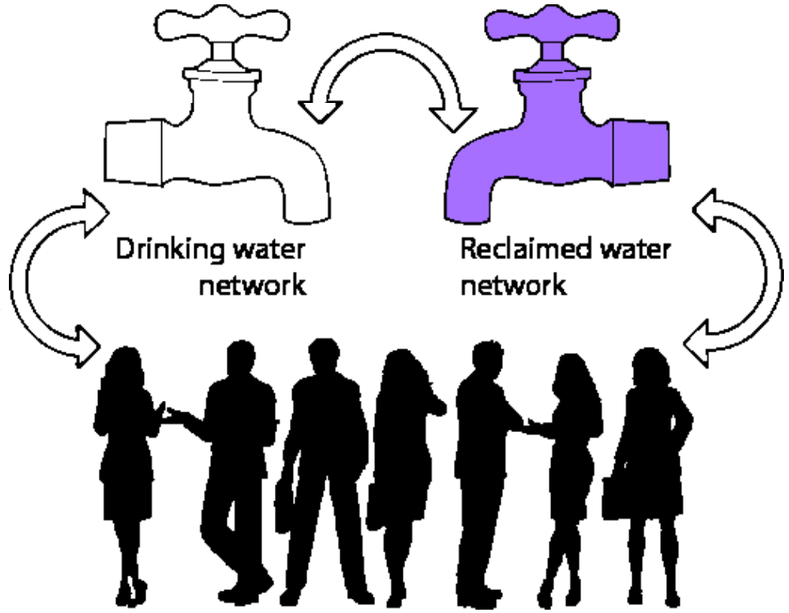
Water reclamation takes treated wastewater and uses it to meet non-drinking water demands, such as watering lawns or golf courses. However, despite the fact that reclaimed water has been treated and is not used as drinking water, there can still be a perceived "yuck factor." Some people may have trouble accepting the idea that reclaimed water is safe.

For example, if a utility can expect significant pushback from its constituents, it may want to opt for a small-scale water reclamation project. Why? Because if a large-scale reclamation project is built, and a significant percentage of the water remains unused due to public opposition, the water would build up - placing increased pressure on pipes and other infrastructure, and preventing the infrastructure from functioning efficiently.

Binder will be leading a national survey on water reclamation. The survey will include questions aimed at determining how consumers communicate with each other about the risks and benefits of reclaimed water, and what steps might be taken to incorporate public input into a water utility's decision to augment water supplies using reclamation. For example, would consumers be more likely to accept water reclamation if a utility's rate structure offers a reasonable incentive for using the water? And what would that incentive look like?

Zechman will use the survey data to develop a computer model that accounts for the design of existing infrastructure, the design of proposed reclamation projects and regional variations in attitudes toward water reclamation. The model will provide water managers and utilities with information on how specific water reclamation plans would likely be received.

The researchers hope to develop a prototype model by late 2013, and have a refined model in place by late 2014. •



AWARDS & HONORS

CCEE faculty and students racked up university, national and international awards and honors over the past year.

› Dr. **Paul Zia**, Distinguished University Professor Emeritus, received the **Medal of Honor Award** from the Precast/Prestressed Concrete Institute (PCI) at its 2012 Annual Convention in Nashville, Tennessee. The honor, the highest bestowed by PCI, is given to recognize outstanding service to the institute or contributions to the industry over a long period of time.

› Drs. **Chris Frey** and **Richard Kim** have both been designated as Distinguished University Professors of Civil, Construction, and Environmental Engineering. This is an honor that is reserved for 4 percent of the faculty across the university and is made in recognition of outstanding accomplishments over a career.

› Drs. **Greg Lucier**, **Sami Rizkalla**, and **Paul Zia** received the Precast/Prestressed Concrete Institute (PCI) **Charles C. Zollman Award** for 2012. This award is given to the technical paper published in the PCI Journal that is most "worthy of special commendation for its merit as a contribution in advancing the state-of-the-art of precast and prestressed concrete."

› Dr. **Rudi Seracino** was elected a Fellow of the International Institute for FRP in Construction (IIFC) at the 6th International Conference on FRP Composites in Civil Engineering (CICE 2012) in June 2012 in Rome, Italy. IIFC Fellows are "senior members of the Institute who have achieved a position of high responsibility and have contributed significantly to the advancement of the field."

› **Roberto Nunez**, a lecturer and senior extension specialist in the department, is the recipient of the **Outstanding Global Engagement Award** from NC State. Nunez was recognized for implementing professional education programs for international students and practitioners, helping develop construction engineering libraries in other countries, and taking US students to international construction projects.

› The NC State Traffic Bowl Team, comprised of transportation engineering graduate students **Abseen R. Anya**, **Zachary H. Bugg**, **Richard T. Chase**, and **Tyler J. Fowler**, won the **2012 Traffic Bowl Grand Championship**. The Traffic Bowl team is part of the NC State student chapter of the Institute of Transportation Engineers.

› Structural engineering PhD student **Nehemiah Mabry** won MTV's *Engineering Stay With It* video contest. His video focused on the theme of how to meet challenges, graduate, and start a successful engineering career. He received a $2,500 college bookstore credit and an ultra notebook computer. See the winning video at www.mtv.com/asm/mtvu/intel/stay_with_it.

› MS student **Natasha Boger** (BSCE 2012) received the Concrete Reinforcing Steel Institute (CRSI) Fellowship for 2012-2013. Natasha is also the recipient of a College of Engineering Graduate Merit Award for the 2012-2013, awarded to outstanding graduate applicants.

› PhD student **Jim Levis** and Dr. **Mort Barlaz** were recognized by the prestigious journal *Environmental Science and Engineering* as authoring one of the **Top Papers of 2011** in environmental policy. Their paper addressed the question of whether biodegradability is a desirable attribute for discarded solid waste.

› Recent PhD graduate **Xia He** received the inaugural **W. Wes Eckenfelder Graduate Research Award** from the American Academy of Environmental Engineers. She was recognized for her work on fat, oil, and grease (FOG) removal from wastewater. The award included $1,500 and a plaque for her advisor, Dr. **Francis de los Reyes**.

› MS student **Allison Marie Reinert** was selected as the 2012 recipient of the **Hazen and Sawyer Scholarship**. The award included travel expenses for the American Water Works Association annual conference in Dallas, TX, in June 2012 and a $5,000 grant to support her research.

› **Paul R. Barrett** (BSCE 2009) and **Raasheduddin Ahmed**, PhD students in structural engineering and mechanics, won **best student paper awards** at the 2012 American Society of Mechanical Engineering Pressure Vessels and Piping (PVP) Conference held in Toronto, Canada, during July. Barrett won first prize and Ahmed won honorable mention in the PhD category for their papers.

› Dr. **Emily Zechman** was selected as an American Society for Civil Engineers (ASCE) **Outstanding Reviewer**, in recognition of extensive and high quality reviews of journal manuscripts. In addition to a Certificate of Recognition, she will be inducted in the list of ASCE's 2011 Outstanding Reviewers.

› PhD student **Stephanie Vereen** received the 2012 University Graduate Student Association (UGSA) **Outstanding Teaching Assistant Award**. She has been a TA and instructor in CE 301 Civil Engineering Surveying and Geomatics.

› The International Institute for Fiber-Reinforced Concrete in Construction (IIFC) conferred upon Dr. **Sami Rizkalla** and PhD student **Dillon Lunn** the **best referred paper award** for their paper in the proceedings of the third Asia-Pacific Conference on FRP in Structures, held in Sapporo, Japan, in February 2012. Rizkalla and visiting scholar **Lining Ding** from Southeast University in China also won the **best poster award** at the same conference.

› Three department staff members received NC State **Pride of the Wolfpack Awards**. **Lora Bremer** is the director of development and is responsible for obtaining endowment funding to support students, faculty and programs. Dr. **Greg Lucier** is lab manager of the Constructed Facilities Laboratory (CFL). **David Black** has worked in the Environmental Engineering Laboratories for 16 years.

Francis de los Reyes Receives Jackson Rigney Award for International Service

The award is conferred by the Eta chapter of Sigma Iota Rho, the honor society for international studies.

DR. **Francis de los Reyes** is the recipient of the 2012 Jackson Rigney Service Award. This award is conferred by the Eta chapter of Sigma Iota Rho, the honor society for international studies. The award recognizes the distinguished contributions of a faculty or staff member at NC State to the promotion of international understanding and service to the University and/or to the international community.

De los Reyes conducts research 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.

De los Reyes is active in collaborative research in the Philippines, China and India. He is engaged in research, teaching and extension with both the Philippine government and with Philippine universities. Recently, he was named adjunct professor in the Department of Microbiology at the University of the Philippines-Los Banos (UPLB). De los Reyes also reaches out to high school students in the Philippines. He has delivered more than 20 talks to various university and high school audiences, including the Guest of Honor speech at the Philippine Science High School Convocation which was attended by more than 2000 people. Most recently, he received the 2011 Gawad Lagablab Award for Environmental Engineering and Environmental Biotechnology from the Philippine Science High School.

De los Reyes promotes international awareness. He is the Triangle Area Coordinator of Gawad Kalinga, a non-profit organization dedicated to the transformation of slums to thriving villages through holistic approaches that include education, health, community building, and sustainability.

Here at NC State, in the fall of 2011, he taught a dual level (grad/undergrad) course on Water & Sanitation for Underdeveloped Regions.

De los Reyes was a visiting professor at the Shanghai Academy of Environmental Sciences and has lectured at Southeast University in Nanjing. He is working in India and contributed to the creation of a Master's in Development Program at TERI University in Delhi. Finally, he served as a US State Department consultant for work on wastewater treatment in Montenegro. In these various capacities, de los Reyes serves as a role model for students and colleagues regarding the value of public service, especially in the context of developing countries.

De los Reyes received a bachelor of science degree in agricultural engineering from the University of the Philippines at Los Banos, a master of science degree in civil engineering from Iowa State University, and a PhD in environmental engineering from the University of Illinois at Urbana-Champaign. He joined NC State in 2000. •

Y. Richard Kim Named to Alumni Association Distinguished Graduate Professorship

DR. Y. RICHARD KIM, a Distinguished University Professor in the department, is one of two NC State faculty members named this year to the Alumni Association Distinguished Graduate Professorship. The professorship recognizes outstanding graduate level teaching and mentoring at NC State.

Kim conducts graduate research in pavement design and rehabilitation, bituminous materials, pavement preservation, nondestructive evaluation of pavements, and pavement performance modeling. He has taught a wide range of graduate courses, including CE 594C Nondestructive Evaluation of Civil Infrastructure, CE 595A Asphalt and Bituminous Materials, CE 755 Highway Pavement Design, CE 757 Pavement Management Systems, and CE 759 Inelastic Behavior of Construction Materials. He mentors numerous graduate students in research in the general area of transportation materials.

As examples of his accomplishments, Kim has been rated as a highly effective instructor by students in his courses, developed several new courses, and edited an American Society of Civil Engineering book, *Modeling of Asphalt Concrete*, that is an authoritative text. He has advised more than 80 graduate students and more than 30 undergraduate research assistants. He has been active in mentoring women and underrepresented minority students. The richness of Kim's scholarly career has been paralleled by an exemplary record of teaching and mentoring that has had a profound impact upon his students.

Kim received his bachelor of science in civil engineering from Seoul National University (Korea), master of science in civil engineering from Texas A&M University, and PhD in civil engineering, also from Texas A&M. He joined NC State in 1989. •

Toni Pascucci Receives College Award for Excellence

THE College of Engineering recognized **Toni Pascucci** in the Department of Civil, Construction, and Environmental Engineering (CCEE) as a winner of the 2012 Award for Excellence. Brian Koehler in the Academic Affairs office and P. Andrew Sleeth in the Department of Computer Science are also 2012 winners.

Pascucci, student services assistant in CCEE, has made it a priority to lend outstanding support to the department's undergraduate students.

That's nearly 1,000 students, and she's constantly praised for distributing timely information on job openings, scholarships and other opportunities highly valued by students working toward graduation.

Pascucci always greets students with a bright smile and a positive attitude. When students need help the most, during the first week of classes, she works late to help finalize class schedules. Her hard work is reflected in the success of the students and the department as a whole. The students' love for Pascucci was recently reflected in their bringing her flowers for her birthday.

The awards were announced at a ceremony held April 5 in Engineering Building III on Centennial Campus. Dr. **Louis A. Martin-Vega**, dean of the College of Engineering, presented the winners with plaques and $250 gift checks. The winners also received eight hours of paid time off. •

IN THE SPOTLIGHT
Construction Engineering and Management

The Department of Civil, Construction, and Environmental Engineering (CCEE) is comprised of six "groups" that represent key disciplinary areas. This is the sixth in a series of articles. In this issue, we present an overview of the Construction Engineering and Management Group (CEM). Previous newsletters are located at www.ce.ncsu.edu/news.

THE CONSTRUCTION INDUSTRY accounts for 6 percent of our nation's gross national product and employs around 10 million workers with annual volume that has exceeded $800 billion in recent years. The future of construction is tied closely to adopting sustainable building methods to minimize energy use, waste, pollution and damage to the environment. The Construction Engineering and Management (CEM) group in CCEE consists of six full-time faculty members. CEM prepares future engineers who can develop and apply engineering knowledge and technologies to construct a wide variety of infrastructure projects. CEM graduates select and organize resources efficiently and economically to deliver projects on time, within budget, and with the required quality and safety.

PREPARATION OF STUDENTS FOR PROFESSIONAL PRACTICE

The CEM program offers a broad range of courses providing both sound theoretical foundations and practical application skills to help students become successful construction engineers and construction managers. Students are afforded hands-on experience in different aspects of sustainable construction materials and methods, project management techniques, and contract specifications and law. The BS CEM capstone design course provides valuable career connections with a participating company and introduces students to the practice of construction engineering.

INDUSTRY SUPPORT FOR CEM PROGRAMS

A number of guest lectures are provided by former students and professionals from various organizations in the construction industry who bring hands-on experience, donate materials (e.g., plans and specifications), and significant time to work with students in CE 463 (Estimating, Planning and Control), and in CE 469, the CEM capstone project course. Interactions with practicing construction professionals allow students to develop deeper understandings of concepts and interrelationships in construction engineering.

The student chapters of the Associated General Contractors (AGC), National Association of Home Builders (NAHB) and American Concrete Institute (ACI), offer students the chance to learn more about the construction industry through industry interactions and to practice their leadership skills.

PUBLIC SERVICE AND OUTREACH

Professor Emeritus Dr. **David W. Johnston** is chair of the National Council of Examiners for Engineering and Surveying Committee on the Construction Engineering module for the Professional Engineer (PE) Exam. He is past chair of the ACI Committee on Formwork for Concrete, the ASCE Construction Institute (CI) Construction Engineering Education Committee and the ASCE Construction Research Council. He is an ABET evaluator for construction, civil, and architectural engineering degree programs. Dr. **Min Liu** is co-chair of the Scientific Committee for the 2012 International Conference on Construction and Real Estate Management. Dr. **Edward Jaselskis** recently chaired the Transportation Research Board joint subcommittee related to Construction Information Technology. **Roberto Nunez** serves as a long-time member of the North Carolina Code Officials Qualifications Board, representing the NC State College of Engineering. He serves as a quality auditor for ACI Certification Programs both domestically and internationally. Dr. **William Rasdorf** served for 21 years as the founding Editor of the ASCE *Journal of Computing in Civil Engineering*.

CEM students are afforded hands on experience in different aspects of sustainable construction materials and methods, project management techniques, and contract specifications and law.

FACULTY AWARDS AND RECOGNITION

CEM faculty have been awarded many honors for their research, teaching and professional service. For example, Jaselskis is a member of the National Academy of Construction. Johnston is a recipient of the ACI Construction Practice Award and provided key leadership in the creation of a path for professional engineering licensure of construction engineers. Johnston and Dr. **Michael Leming** are ACI Fellows. Johnston and Rasdorf are Fellows of ASCE. Leming is currently the Coordinator of Advising for the department and the winner of the George Blessis Award for Advising. Liu was elected as co-chair of R&D for the Carolinas Chapter of the Lean Construction Institute. Nunez was the recent recipient of NC State's prestigious "Faculty Global Engagement Award" for his work in expanding the reach of NC State knowledge and technology in Latin America. Rasdorf received ASCE's Richard R. Torrens Journal Editor Award, the ASCE Computing in Civil Engineering Award, and the ASCE Walter Huber Civil Engineering Research Prize.

RESEARCH ACTIVITIES

Leming is performing research along with Rasdorf and Frey on the effects of construction operations on pollutant emissions from nonroad diesel equipment. This research has provided unique analysis considering practical constraints to help establish guidelines for Departments of Transportation, permit-granting agencies, and contractors to minimize environmental costs. Leming is also the lead investigator on the evaluation of sustainable concrete, examining the effects of differences in concrete crack networks on differences in mechanical properties of various sustainable concrete mixtures exposed to a variety of aggressive environments.

Liu is leading research to demonstrate the value of reliable planning for construction activities by using computer simulation to indicate how the value of planning is sensitive to complexity level of the project. She is also building tools to accurately and efficiently estimate preliminary engineering costs for NCDOT highway projects. Liu has also been evaluating Vela Systems, a construction field management software, to increase worker productivity and field efficiency.

Jaselskis has been performing research on a Construction Industry Institute project to develop a comprehensive how-to manual, Playbook of Leading Industry Practices on the Innovative Management of Indirect Construction Costs. Jaselskis also participated in a research project to understand how the Inca engineers succeeded in building roads and other structures in harmony with nature, with the objective of identifying sustainable engineering practices. He is currently developing a centralized virtual construction management system that can act as a real time communication tool to assist experts in virtual participation of on-site activities.

Rasdorf has developed models to determine the night-time reflectivity of highway signs and pavement marking lines to assist in ensuring an adequate level of visibility for motorists. He also assisted NCDOT in studies to determine the safety of highway curves and to identify remediation activities to mitigate their danger. The objective of his research on databases and modeling

Left to Right: Roberto Nunez, Dr. William Rasdorf, Dr. Michael Leming, Dr. Edward Jaselskis, Dr. Min Liu, and Matt Poisel.

is to determine what data are needed to solve problems and how that data can be used to derive models that predict future performance and impacts.

EXTENSION

Roberto Nunez and **Matt Poisel** lead the CEM extension program, as detailed on page 21. One important extension program activity involved organizing and facilitating teaching lean construction in China. **Greg Howell**, President of the Lean Construction Institute, and Liu gave seminars to various construction companies in NanJing, China. They also taught lean construction to over 140 faculty and students from six universities in China in November 2011. There have been several sessions on lean construction presented to the Lean Construction Institute Carolinas Chapter. Some other renowned programs include the development of the now nationally recognized Design Methodology for Pervious Concrete, Design of Slabs on Grade and a program on Acceptance Criteria and Non-Destructive Evaluation of Concrete.

Rasdorf has worked extensively with the NCDOT in designing and modernizing a road inventory database, in developing business process definition documentation for road inventory and traffic survey data, and in designing the base linear referencing system used by the GIS Unit for map data storage.

FUNDING AGENCIES

CEM research activities are funded by several agencies including the National Science Foundation, Project Management Institute, Construction Industry Institute, North Carolina Department of Transportation, Skanska Inc. and McDonald-York.

MOVING FORWARD

Faculty in the CEM area are working nationally and internationally on practices to reduce emissions associated with construction projects, to improve the utilization of sustainable materials, to use extensive historical data to improve project performance and to maximize efficiency and minimize cost of large complex projects. •

Department Extension Activities

Led by our Construction Engineering Faculty.

ROBERTO NUNEZ and **Matthew Poisel,** with logistic and training support from graduate students**,** in collaboration with CCEE faculty and industry professionals**,** and with administrative help from **Diane Gilmore,** had a productive year conducting and managing department extension activities.

In the last year, Nunez and Poisel organized, and managed more than 90 one-day extension educational events, reaching more than 1,200 civil engineering and construction professionals. A special partnership with the NCDOT Office of Business Opportunity & Workforce Development allowed the extension group to continue a series of hands-on business and construction management courses. Additionally, Nunez provided business re-

Matt Poisel (right) performs a field demonstration on correct testing procedures.

engineering services to two NCDOT contracting companies to help them achieve growth and profitability objectives.

To help designers stay up-to-date on technology and best practices, several short courses were taught with CCEE faculty and leading industry-recognized experts including: **Michael Leming**, **Richard Kim**, **William Dunlap**, **David Tilotta**, **Irving Nazario, Fadi Jadoun, Billy Williams, Dave Parish, Sami Rizkalla, Rudolf Seracino, David Johnston, Joel Ducoste, Mort Barlaz, Joe Hummer, and Roy Borden.**

Many distinguished industry professionals contributed to CCEE extension efforts, including **Eric Berger** (Lhoist North America), **Shelton Russell** (NCDOT), **George McAlpine** (Danby of North America), **Russell Briggs** (B&F Consulting), **John Cullian** (LitCon Group), **Todd Jones** (Anderson Jones), **Arnie Katz** (Advanced Energy), **Selva Lee Tucker** (Tuks Floor Inspections Service), **Tom Caldwell** (Atlas Engineering), **Scott Duckworth** (Brasfield and Gorrie), **Stuart Phoenix** (FMI), **Gordon Grubb** (Grubb Ventures), **Dave Hurley** (DH Griffin), **Barney Hale** (Terracon), **Roberto Canales** (NCDOT), **Michael Bradshaw** (Willis), **Jeffrey Parsons** (Parsons Corporation), **Everette Knight** (Hazen & Sawyer), **Malcolm Lim** (Universal Construction Testing), **Paul Siwek** (Proceq), and **Willy Stewart** (Stewart Engineering)**.**

The Extension Program hosted its annual May golf tournament. Approximately 110 alumni and friends gathered at the new Lonnie Poole Golf Course at NC State's Centennial Campus.

This year, 30 CCEE students gained credentials and became "ACI Grade I Concrete Technicians." Previously accredited students supported concrete extension courses as supplemental examiners or instructors. Students **Travis Cox, Kenneth Horne, Kellie Renzi, Katherine Massengill**, and **Elizabeth Wester** contributed to the success of ACI related activities and other extension programs.

Extension activities included special field projects. Sixteen students visited the Yadkin River bridge construction site. Poisel led 12 students on a visit to the Newport News Naval Shipyard. Nunez led 30 student participants at the ACI Conventions held in Pittsburgh, Tampa, Cincinnati and Dallas.

Extension activities also included international outreach efforts. Nunez continued supporting ACI certification programs in Panama, Costa Rica, and Guatemala. A cooperative agreement to pursue joint study abroad engineering programs was signed between NC State and the Escuela Politecnica del Ejercito (ESPE) in Quito, Ecuador. During 2011 and 2012, 30 engineering students from ESPE participated in concrete technology courses prepared by Nunez and Poisel for ESPE's Construction Engineering graduate students. •

Annual Symposium Showcases Research in Water Resources and Environmental Engineering

The symposium helps existing students gain experience delivering presentations and attracts new students to the WREE program.

THE Water Resources and Environmental Engineering (WREE) Group held the 11th Annual Spring Symposium on Friday, March 16, in Mann Hall. The symposium featured 45 student poster presentations that filled the Mann Hall lobby. Dr. **Arpad Horvath** of the University of California at Berkeley delivered a key note talk on "How Much Energy Does Water Cost? How Much Water Does Energy Cost?"

The symposium provides an opportunity for students to gain experience in preparing and delivering presentations. Other goals of the symposium include enhancing the visibility of the WREE program with the local professional community and nationally, and helping to recruit new students to the WREE program. The concept of a symposium started in 1998 as an open house sponsored by the NC State student chapter of the Air & Waste Management Association, featuring a student poster competition, a keynote talk, and a reception. In 2001, WREE faculty and students sponsored the first in an annual series of symposia that feature a buffet lunch, student poster presentations and best poster competition, and a keynote speaker. The timing of the symposium in recent years has coincided with the height of recruitment activity for prospective graduate students. Nearly 20 such students visited during the symposium and met with faculty and current students.

The student posters covered a wide range of topics. Examples of presented topics include improved techniques for drinking water treatment, modeling and evaluation of energy systems, watershed management, measurement and modeling of vehicle emissions, protection of critical infrastructure, decomposition and greenhouse gas emissions processes in landfills, quantification of formation of fat, oil, and grease deposits in sewer lines, identification of ocean energy resources, improved wastewater treatment processes, improved detection of microbial processes, bioremediation and groundwater, assessment of graywater reuse, quantification of human exposure to ambient fine particles, and others. Most of the presenting students are research assistants working with faculty on sponsored research projects. The content presented by students will be part of their master's thesis or PhD dissertation. An undergraduate research assistant, **Trevon Nelson**, also participated.

Leigh-Ann Dudley accepts the 1st Prize Best Poster Award from Dr. Joe DeCarolis.

The Symposium Organizing Committee was comprised of graduate students. The committee was chaired by **Leigh-Ann Dudley** and included **Trupti Desai, Christopher Dominic, Kristen Drake, Stewart Farling, Meredith Fotta, Brandon Graver, Kristen Hiortdahl, Elvin Hossen, Cho Oo, Allison Reinert, Nick Spore, Ling Wang**. Dr**. Joe DeCarolis** worked with the organizing committee as faculty advisor.

The symposium was supported by more than a dozen sponsors. **FDH Companies** was the Gold Sponsor. Silver Sponsors included the **Environmental Research & Education Foundation**, **Hazen and Sawyer**, **Geosyntec Consultants**, and **McKim & Creed**. Bronze Sponsors included **GHD Incorporated**, **Richardson, Smith, Gardner & Associates**, and **Solutions-IES**. Other sponsors included **Brown and Caldwell**, **HDR**, the **Research Triangle Chapter of the Society for Risk Analysis**, the **Research Triangle Chapter of the Air & Waste Management Association**, and the **US Environmental Protection Agency**.

Participants and attendees at the spring symposium.

Twenty-four professionals from area companies, government agencies, foundations, and professional societies served as judges for the best poster awards. These judges included **Ed Alperin, Sealy Chipley, Anthony Deangelo, Maryane Donigan, Val Garcia, Les Hall, Jim Halley, Steve Hilderhoff, Dale Hyatt, Doug Johns, Andrew Lindstrom, TJ Lynch, Mark McIntire, Greg Mills, David Mobley, Wayne Powell, Richard Ruhmke, Dave Skurky, Eric Solano, David Svendsgaard, Cheryl Vetter, Angela Walsh, Art Werner, Bryan White,** and **Jon Williams**.

After the keynote talk, five prizes were awarded for the best posters, based on scoring by the judges:

1st Prize: Leigh-Ann Dudley, "Removal of Perfluorinated Compounds by Powdered Activated Carbon and Anion Exchange Resins"

2nd Prize: Tate Rodgers, "Earth Auger Modification for Sanitary Sludge Removal of Pit Latrines in Developing Countries"

3rd Prize: Ling Wang, "Anaerobic Co-Digestion of Sewage Sludge with Grease Trap Waste"

4th Prize and SRA Award: Gurdas Sandhu, "Real-World Efficacy of Heavy Duty Truck NO_x and PM Emissions Controls Based On In-Use Measurements"

EPA Award: Brandon Grant, "Exploring Wave Energy in North Carolina and its Effects on Shoreline Change"

The 12th Annual WREE Spring Symposium will be held Friday, March 15, 2013. The guest speaker will be Professor Nancy G. Love of the University of Michigan. The Department and the WREE group are seeking financial and in-kind support to continue this highly visible and beneficial event. Anyone interested in contributing to the annual WREE Spring Symposium should contact **Lora Bremer** at lora_bremer@ncsu.edu. •

We Are WE

"We are Women in Engineering" networking program brings 14 female students to the NC State campus from across the US.

THE "We are Women in Engineering" (We are WE) Networking Luncheon and Seminar was hosted by the department on March 15-16, 2012. A total of 33 students applied from universities across the US, and 14 students were invited to attend the event. Participants came from the University of Cincinnati, Rice University, Cornell University, Ohio Northern University, Clemson University, Western Kentucky University, University of Alabama at Huntsville, Tufts University, Duke University and Johns Hopkins University.

Visiting students began with a tour of the NC State campus, led by Dr. **Laura Bottomley**, who is the director of Women in Engineering and The Engineering Place outreach program in the College of Engineering. A luncheon was hosted at Porter's Tavern for visiting students, current female civil engineering graduate students and faculty, and an invited speaker, Dr. **Jennifer Irish**. Following the luncheon, Irish presented the We Are WE Seminar. Irish is an associate professor of coastal engineering at Virginia Tech with expertise in physical responses to extreme events such as hurricanes. Her expertise is in storm surge dynamics, storm morphodynamics, vegetative effects, and coastal hazard risk assessment. Irish started her career at the US Army Corps of Engineers, and was on the faculty at Texas A&M before joining Virginia Tech. Her seminar focused on the theme of "Two roads diverged in a wood, and I, I took the one less traveled by, and that has made all the difference." She described her experience in engineering research and practice on her path to a career in academics.

We Are WE participants in front of Mann Hall. Dr. Emily Zechman (second from left) organized the event. Megan Jaunich (far right) attended the event and joined the NC State CCEE graduate program in Fall 2012.

The We are WE Networking Program was held in cooperation with the Annual Water Resources and Environmental Engineering Spring Symposium, which is hosted every year by the Water Resources and Environmental Engineering (WREE) group (see article on Page 22). Visiting students attended the symposium, at which graduate students in WREE presented their research, professionals visited campus to judge presentations, and an outside speaker presented a research seminar. Students also met individually with professors to discuss research and graduate school opportunities.

Participants commented that the event improved their knowledge about NC State University and graduate school and their confidence in their academic abilities. Several students mentioned Irish's seminar as the most beneficial aspect of the event. Students were inspired by her speech and also appreciated her efforts to find balance and pursue an active personal life.

Travel costs for all students were provided through an NC State Office of Diversity grant awarded to Dr. **Emily Zechman**, in addition to support provided by the Department, **McKim & Creed, FDH,** and the **NC State Engineering Foundation**. The We are WE Networking Program will be held again in the Spring 2013, in cooperation with the WREE Spring Symposium. Individuals and organizations interested in supporting the We are WE Networking Program can contact the NC State Engineering Foundation through **Lora Bremer**. For information about applying to attend the program, please contact Zechman at emzechma@ncsu.edu. •

CCEE Graduate Students Prepare for Future Leadership

The Preparing Future Leaders program helps students develop adaptability, teamwork and leadership skills.

OVER the past year, more than a dozen students and faculty in the Department participated in Preparing Future Leaders (PFL) initiatives organized by the NC State Graduate School. PFL helps graduate students to lead effectively with integrity, insight, and compassion. Participating students, along with their faculty mentors, were recognized at a ceremony held on April 18 and attended by Provost **Warwick Arden**.

Teaching assistant professor Dr. **Tarek Aziz** delivered the keynote address. Aziz participated in PFL programs when he was a CCEE graduate student.

PFL's Graduate Leadership Development Series (GLDS) develops communication, self-awareness, adaptability, teamwork, and leadership skills, thereby preparing students to become effective employees. CCEE graduate students recognized for successful completion of GLDS include **Kristen Drake**, **Favio Intriago**, and **Haritha Malladi**. "By taking assessment tests and working with a personal development coach, I was able to understand myself better and confirm that my career goals are aligned with my leadership goals," Drake said.

The Certificate of Accomplishment in Teaching (CoAT) program offers students a path to teaching excellence through training, evaluation, and recognition. Students participated in workshops, completed two semesters of teaching, and created a teaching portfolio. **Ingrid Arocho**, **Meredith Fotta**, **Brandon Graver**, and **Dillon Lunn** completed the CoAT program this year. "The CoAT program affirmed my desire to become a professor in civil engineering," stated Lunn. "There is no doubt in my mind that the CoAT program helped to improve my teaching."

From left to right: Dr. Sami Rizkalla, Dillon Lunn, Brandon Graver, Dr. Tarek Aziz, Ingrid Arocho, Dr. Chris Frey, Dr. Joe Hummer, Dr. William Rasdorf, Stephanie Vereen and Haritha Malladi.

Preparing for the Professoriate (PTP) gives doctoral students selected as PTP Fellows the opportunity to focus on teaching over the course of an academic year. During the first semester, the Fellow observes an undergraduate course taught by the faculty mentor. In the second semester, the Fellow teaches or co-teaches an undergraduate course. PhD student **Ingrid Arocho** was mentored by Dr. **Joseph Hummer** and Dr. **John Stone**. Arocho observed and taught in CE 305 Traffic Engineering. **Brandon Graver** was mentored by Dr. **H. Christopher Frey**. Graver observed CE 476 Air Pollution Control and taught in CE 479 Air Quality. **Stephanie Vereen**, who taught CE 301 Surveying and Geomatics, was mentored by Dr. **William Rasdorf**. Vereen "enjoyed completing the peer review component of the program" and found that "working with and engaging the students all semester was lots of work, but it was also fun and exciting."

"I highly recommend that all CCEE graduate students take advantage of the great opportunities that the Graduate School is providing," said Malladi, who volunteered her time to PFL's advisory board.

Aziz observed, "my goal is to be an outstanding teacher. I believe my PFL experiences have provided me with the tools to move in that direction." Furthermore, Aziz pointed out that these programs "provide NC State graduates a real edge in pursuing careers in academia and certainly won't hurt with regard to non-academic careers as well." •

NC State students and faculty in Hong Kong.

Civil Engineering 2012 Study Abroad in Hong Kong and Nanjing

More than a dozen students and faculty traveled to Asia in May as part of the 3rd Civil Engineering Study Abroad Program.

FROM May 17 to June 30 a group of 13 students and four faculty from the department participated in the 3rd Civil Engineering Study Abroad program. The previous two programs were held in China and Australia. This year, the group visited Hong Kong during the first three weeks and Nanjing, China, during the remaining three weeks of the program. In addition to an academic program featuring delivery of NC State undergraduate courses by faculty, several social activities were organized including visits to religious, cultural and historical sites, museums and unique tourist attractions in Hong Kong and Nanjing.

In Hong Kong, the students were accompanied by Drs. **William Rasdorf** and **Rudi Seracino.** Students enrolled in one, or both, of CE 301 Civil Engineering Surveying and Geomatics and CE 327 Reinforced Concrete Design. The NC State group stayed in the Student Halls of Residence at Hong Kong Polytechnic University (HKPU), and held classes at the Department of Civil and Architectural Engineering at the City University of Hong Kong. The Hong Kong experience focused on three themes: (1) high-density residential communities with an emphasis on architectural engineering; (2) city planning emphasizing site development within densely populated urban areas; and (3) public transportation networks including rail, ferry and bus. HKPU delivered seminars to, and hosted tours for, the NC State student and faculty group. Tours included laboratory and other facilities in the Departments of Building and Real Estate, Civil and Structural Engineering, and Land Surveying and Geo-Informatics. Further, HKPU organized a construction site visit of the West Kowloon terminus station of the Hong Kong section of the Express Rail Link scheduled to open in 2015.

NC State students and faculty tour a highway flyover construction site in China.

NC State students and faculty with Chinese hosts on a field trip near Nanjing.

In Nanjing Drs. **Joseph Hummer** and **Ranji Ranjithan** accompanied the students and offered CE 305 Traffic Engineering and CE 390 Engineering Economics. The Nanjing theme was rapid transportation infrastructure development and investment that is currently common in China. The students and faculty stayed at the Southeast University (SEU) campus hotel, and the classes were held at the SEU School of Transportation Engineering. Faculty and staff from this school provided coordination and logistical support and language translation assistance. The SEU hosts arranged a two-day field trip to several fast-growing metropolitan areas between Nanjing and Shanghai. Students saw first-hand the rapid infrastructure construction projects, such as highway flyovers and high speed railway. Senior engineers and project managers gave presentations that described the planning and design process.

In addition to the student experience, NC State faculty met with faculty counterparts in Hong Kong and Nanjing to discuss opportunities for further research and education collaboration. The hospitality and generosity of the hosts far exceeded expectations. •

Environmental Engineering Undergraduate Researching New Water Treatment Technique

ENVIRONMENTAL Engineering graduate **Matthew Authement** was featured in the latest issue of *NC State Engineering* magazine for his undergraduate research on better ways to safely treat drinking water.

Authement is the son of two veterinarians. Growing up, he watched his parents diagnose and treat hundreds of animals; it was almost as if he learned biology by osmosis.

"I always found it interesting browsing through their office and watching them work," he said.

Authement applied that bio-heavy childhood to new ways to treat water. He worked with other NC State environmental engineers in the Department of Civil, Construction, and Environmental Engineering (CCEE) to gauge the potential of a new drinking water treatment technology called a UV light-emitting diode (UV LED) reactor. The reactor, developed at NC State, would disinfect water passing through UV light to kill bacteria and other microorganisms that could make humans sick.

UV light has long been used to treat wastewater and is gaining use in drinking water. However, the new reactor's LED component means that it has the potential to use less energy. In addition, the new reactor does not contain the mercury found in traditional reactors that often poses environmental problems when disposed.

Dr. **Joel Ducoste**, Authement's advisor and the developer of the new treatment tool, introduced Authement to the project. When he realized his student could handle much more complicated tasks than what he had assigned, he gave him a tougher job: modeling the hydraulic characteristics and disinfection performance of the new system.

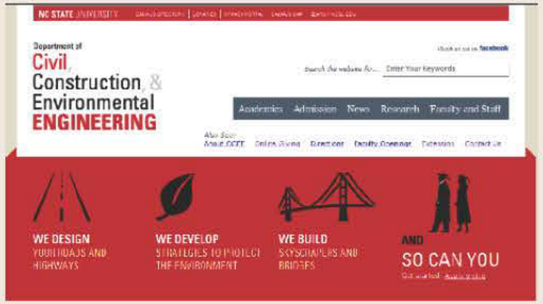
"He rose to the challenge and performed this additional task very well," Ducoste said.

The CCEE Department has a long track record of providing opportunities for undergraduate students to engage in research. Often, the first step is as simple as a student asking a faculty member a question.

Authement's career plans have him treading closer to his parents' footsteps. Medical school is his next stop. •

AN ALL NEW DEPARTMENT WEBSITE: WWW.CE.NCSU.EDU

A newly designed website (www.ce.ncsu.edu) has been in operation for the CCEE Department since Fall 2011. Designed and developed by College of Engineering web staff in Information Technology and Engineering Computer Services (ITECS) under the guidance of Drs. **Kumar Mahinthakumar, Joe DeCarolis** and **John Baugh**, the new site boasts a completely new look and easy navigation features. Dynamic content such as faculty publications, projects, courses and contact information are automatically pulled from university databases, minimizing error and eliminating the need for constant maintenance and updates. News and announcements are fed to the website through the Towncrier system, developed by web staff in the Department of Electrical and Computer Engineering. Additional enhancements are underway for graduate and undergraduate academic and admission pages.



From left to right: Chad Goodnight, Yuhao Feng, Dr. Mervyn Kowalsky, Kelly Herrick, Steven Fulmer and Nicole King.

New Student Group Aims to Understand the Impact of Earthquakes

STUDENTS from the Department of Civil, Construction, and Environmental Engineering and from the College of Humanities and Social Sciences have joined to form a student chapter of the Earthquake Engineering Research Institute (EERI) at NC State. EERI is a national organization formed in 1948 to advance the science and practice of earthquake engineering, improve understanding of the impact of earthquakes on the physical, social, economic, political, and cultural environment; and advocate comprehensive and realistic measures for reducing the harmful effects of earthquakes. Students and faculty from NC State have now joined this large group of researchers, geologists, geotechnical engineers, educators, government officials and building code regulators to advance earthquake engineering.

NC State has been involved in earthquake engineering research for many years, and this area of research has grown significantly in the last several years, thanks to the support of funding agencies such as the Alaska Department of Transportation, Alaska University Transportation Center, National Science Foundation, and several industrial organizations.

Several faculty members and students in the CCEE Department are conducting research in structural earthquake engineering including Drs. **Mervyn Kowalsky, James Nau, Vernon Matzen, Abhinav Gupta** and **Tasnim Hassan**. In addition, Dr. **Thomas Birkland**, associate dean for research, extension, and economic development in CHASS, leads research regarding the hazards, risks and policies surrounding earthquakes. The EERI student chapter will allow students from all research areas to collaborate on ideas and share new findings, and to inform and engage the local community. This fall, the inaugural lecture to the student chapter will be given by Professor **Gian Michele Calvi** of the University of Pavia, Italy, on the topic of the reconstruction intervention after the L'Aquila earthquake of 2009, after which approximately 4,500 apartments were built in only eight months. Calvi is a world-renowned earthquake engineering professor and his visit with the NC State-EERI student chapter will be a wonderful kickoff to the activities of the chapter. Calvi will also deliver the 2012 Shaw Lecture.

The chapter has seven inaugural members: President **Nicole King**, Vice President **Kelly Herrick**, Treasurer **Chad Goodnight**, Secretary **Machel Morrison**, **Steven Fulmer, Yuhao Feng** and **Meg Warnement**. Kowalsky is the faculty advisor and the practitioner advisor is Dr. **Satrajit Das** (principal engineer with WSP Sells). •

News from CCEE Student Groups

Student groups in CCEE have had an active start to the academic year. A sample of their accomplishments to date and plans for the rest of the year follow.

AIR & WASTE MANAGEMENT ASSOCIATION

Four environmental engineering graduate students of the NC State Chapter of the Air & Waste Management Association presented technical papers at the 105th Annual Meeting of A&WMA in San Antonio, TX, in June. Each received travel scholarships from the RTP Chapter and South Atlantic States Section of A&WMA. **Wan Jiao** spoke on quantifying human exposure to fine particulate matter in ambient air. **Brandon Graver**, **Bin Liu**, and **Behdad Yazdani** presented papers on various aspects of vehicle emissions, including measurement of railroad locomotive emissions, modeling of highway vehicle emissions, and quantification of the effect of road grade on emissions. At the first chapter meeting this fall, environmental engineering senior **Karoline Johnson** presented a portable air quality monitor that she designed and built during an internship at the US Environmental Protection Agency.

Behdad Yazdani, Wan Jiao, Brandon Graver, Dr. Chris Frey and Bin Liu at the A&WMA Annual Meeting.

American Concrete Institute: (Left to right) Back Row: Alan Herndon, Brian Beaver, Travis Wetteroff, Luke Perkins, Harrison Steele, Travis Cox, Joseph Thomas, Heath Kent; Front Row: Kristen Measimer, Lauren McCauley, Josh Robbin, Baxter Mclean, Joe Fulk, Roberto Nunez and Andrew Steele.

AMERICAN CONCRETE INSTITUTE

In March of 2012, 13 students from the NC State CCEE Student Chapter of the American Concrete Institute (ACI) attended a convention in Dallas, Texas. These students participated in a competition to design and construct a fiber reinforced concrete bowling ball, which was tested for accuracy and strength. NC State's two student-led competition teams included **Alan Herndon**, **Andrew Steele**, **Baxter Mclean**, **Bobby Jones**, **Brian Beaver**, **Harrison Steele**, **Heath Kent**, **Jake Hofmann**, **Joe Fulk**, **Joseph Thomas**, **Josh Robbins**, **Kristen Measimer**, **Lauren McCauley**, **Luke Perkins**, **Michael Lopez**, **Travis Cox** and **Travis Wetteroff**. The two teams scored 7th and 8th place out of 34 teams from US and Latin American schools.

During the Opening Session and Annual Awards Program, NC State was recognized as an "Excellent University" by the ACI for 2011. During the convention, students were given the opportunity to talk with individuals from numerous companies. This networking experience provided a chance for the students to gain valuable knowledge about the concrete and construction industry.

ACI students were able to attend this competition and participate through support from the ACI NC Chapter, **Baker Concrete Construction**, the CCEE Department, the department's **Crowder Fund, IQ Contracting, LLC,** and **S.A. Sloop Heating and Air Conditioning, Inc.**

AMERICAN SOCIETY OF CIVIL ENGINEERS

In Spring 2012, the American Society of Civil Engineers (ASCE) student chapter sponsored several seminars by alumni and professional organizations, including speakers from **Huntington Ingalls Industries, Kimley Horn & Associates,** and **Fluor Corporation**. The students built a concrete canoe and designed and fabricated a steel bridge for regional competitions. The ASCE student competitions were hosted at the annual Carolinas Conference at Clemson University. The chapter also participated in a Habitat for Humanity building event, visited construction sites, hosted a cookout, and participated with the local ASCE Younger Member's Group.

ASSOCIATION OF GENERAL CONTRACTORS

The AGC student chapter met four times in the 2012 Spring semester and hosted speakers from local corporations. The students visited local construction projects at Valentines Commons and Talley Student Center, participated in a bowling night, and held an end-of-the year cookout special.

INSTITUTE FOR TRANSPORTATION ENGINEERS

The Institute of Transportation Engineers (ITE) student chapter sponsored travel for 34 graduate and undergraduate students to the 91st Annual Transportation Research Board (TRB) Annual Meeting in Washington, DC. The chapter hosted the ITE North Carolina section (NCSITE) annual student-led meeting at NC State, which featured many NC State students and was attended by dozens of transportation professionals. Later in the semester, the students joined a round table discussion of policy and funding with the US Deputy Secretary of Transportation and the North Carolina Secretary of Transportation. In April, the Traffic Bowl team won their second consecutive Southern District Traffic Bowl, which was held in Lexington, KY, and went on to win the 2012 ITE Collegiate Traffic Bowl Grand Championship this summer. The chapter raised funds for future activities by conducting a traffic study for the Dan Allen Busway project. The chapter maintains a stretch of Jones Franklin Road in Raleigh and Cary as part of Adopt-a-Highway.

NC SAFEWATER

In the 2012 Spring semester, NC Safewater hosted several speakers. In January, the **City of Raleigh** Water Reuse Coordinator talked about the Raleigh water reuse program. Engineers from **Hazen and Sawyer** spoke about anaerobic digestion, the use of gas for energy production, and perchlorate regulations. **Ted Feitshans**, an NC State extension associate professor, discussed regulations governing hydraulic fracturing in North Carolina.

NC Safewater cleaned up a portion of Walnut Creek with a group of young professionals. In addition, the group helped coordinate the environmental engineering and water reuse senior design competition. Ten local professionals served as judges and one team was selected to represent NC State at the annual Water Environmental Federation Technical Exhibition and Conference (WEFTEC) in September 2012.

New officers for the 2012-2013 academic year are **Allison Reinert** who will serve as president, **Tate Rogers** as vice president, **Stewart Farling** as treasurer, and **Nathan Hampton** as secretary.

PROFESSIONAL ENGINEERS OF NORTH CAROLINA

In the Spring Semester of 2012, the PENC student chapter sponsored several seminars by alumni and professional organizations including speakers from **McKim and Creed, Engineered Concepts** and **Brasfield and Gorrie.** There were also socials with members of professional organizations in the Raleigh area, providing networking opportunities for current students. At NC State's Boy Scout Engineering Day, PENC served as the organization responsible for the Engineering Merit Badge. More than 60 scouts attended. •

The Traffic Bowl Championship Team (left to right): Tyler Fowler, Abseen Anya, Zachary Bugg and Thomas Chase. Bugg is holding a $2,000 check.

The CCEE Department Industry Advisory Board Report

MICHAEL CREED, PHD, PE
CHAIRMAN
CCEE INDUSTRY ADVISORY BOARD

IN the winter of 2007 I accepted an invitation to join the department's Industry Advisory Board (IAB). It has been an exciting and fulfilling time for me to re-engage with the department in these few years. The IAB has increased its involvement with the students and faculty over the past few years. This increased involvement has reinforced my opinion that the students our department is nurturing and educating are better prepared than ever before to take their rightful leadership position in planning and designing our future civil engineering and environmental infrastructure! I have truly enjoyed my time on the IAB. My last IAB meeting as chairman will be this fall coinciding with the Zia Distinguished Lecture. I thereafter serve one year as past chair and Fellows Liaison, a position that **Mike Gwyn (SAIC Constructors)** currently holds.

Our IAB has enjoyed support from an illustrious group of departmental graduates, including **Smedes York, John Brantley, Tom Church, Bob Wright, Barbara Mulkey** and **Sam McCachern,** to name a few. Other notable IAB members have included **Tim Clancy, Phil Freelon,** and **Jack McDonald** even though they had different school or departmental allegiances. Many of these former IAB members remain actively involved with the department through financial and mentoring support.

The IAB organizational structure includes six standing committees. The Development Committee is chaired by **John Jenkins (Stewart Engineering)**. IAB member **Heather Denny (McDonald York Construction)** also serves on this committee and **Hans Warren (Warco Construction)** is a past member. A number of non-IAB members serve on the Development Committee including **Tom Bordeaux, Chuck Wilson, Steve Thomas, Eddie Wetherill, Ben Mixon, Tom Coffey, Daniel Perry, Rhett Fussell, Ramey F. Kemp, Will Letchworth, Dan Rountree** and **Tom Church.** The mission of the Development Committee is to increase support for the department. That support can be financial, educational, or mentoring in nature. One example of company involvement that stems from the Development Committee is the Firm of the Month recognition whereby company marketing information is displayed in Mann Hall for an entire month in exchange for financial or in-kind contributions to the department.

The Nominations Committee is chaired by **Suzanne Beckstoffer (Newport News Shipbuilding).** The Nominations Committee chair is also vice chair of the IAB by definition. The Nominations Committee also has the chair of the IAB, the department chair **(Mort Barlaz),** and the department development officer **(Lora Bremer).** Other IAB members serving on the Nominations Committee include **Sepi Asefnia (Sepi Engineering), David Simpson (Simpson Engineers), Tony Warner (Warner Construction),** and **Pam Townsend (AECOM).** The mission of the Nominations Committee is to keep the IAB vibrant with new participants every year.

The Publicity Committee is our newest addition to the IAB committee structure. The Publicity Committee is chaired by **Richard Rohrbaugh (Kimley-Horn). Elizabeth Sall (San Francisco County Transportation Authority)** also serves on this committee. The mission of the Publicity Committee is to increase the visibility of the IAB and the department by embracing social media and other channels to the maximum extent practicable.

The Student Liaison Committee is chaired by Heather Denny (McDonald York Construction). The mission of this committee is to create direct links between the IAB and the life of CCEE Department students whereby individuals and companies can aid and support the students in meaningful ways. For example, this committee has arranged for IAB members to participate as judges for various student competitions such as the Carolinas' Conference.

The Fellows Liaison Committee is chaired by Mike Gwyn, immediate past chair of the IAB. The Departmental Fellows is a designation for those people who have been tremendous supporters of the department and who continue to support the work of the department in ways appropriate to the amount of time and resources they have to contribute. Former IAB members automatically become Departmental Fellows. Like the "fellows" designation in many organizations, this is an indication of the highest and most honored status of department supporter.

The Executive Committee is lead by me as the IAB chair, immediate past chair (Mike Gwyn), nominations committee chair (Suzanne Beckstoffer (Newport News Shipbuilding)), and development committee chair (John Jenkins (Stewart Engineering)). **Tom Bradshaw** is also on the executive committee. Tom is the newly appointed director of transportation planning for the state of North Carolina.

It is impossible to identify all the contributions made by IAB members to the CCEE Department. The most important contribution of all is attendance at meetings and active listening to the students and to the faculty during our day-long meetings. I am delighted to have served for the last five years on the IAB and want to thank all those who have served alongside me over that time. It has been an honor and a blessing to reconnect to the department that launched my career. •

CCEE Advisory Board 2012

*The Department of Civil, Construction, and Environmental Engineering 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 are currently serving on the Board:

Sepi Asefnia, BSCE 1993
SEPI Engineering & Construction

Suzanne M. Beckstoffer, BSCE 1982
Newport News Shipbuilding

Thomas W. Bradshaw, Jr.
North Carolina's interim
Statewide Logistics Coordinator

Michael W. Creed, BSCE 1973
(Chairman)
McKim & Creed

Heather Denny, BSCEC 1995
McDonald-York Building Co.

Barry W. Gardner, BSCEC 1975
Shelco Construction Co.

Michael B. Gwyn, BSCEC 1980, MSE 1994
(Past Chairman)
SAIC Constructors, LLC

John T. Jenkins II, BSCE 1990
Stewart Engineering

Richard Rohrbaugh, BSCE 1981
Kimley-Horn Associates

Elizabeth A. Sall, BSCE 2003
San Francisco County
Transportation Authority

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

Pam Townsend, BSCE 1984, MSCE 1987
AECOM

Tony Warner, BSCEC 1966
Warner Construction

Hans Warren, BSCEC 1984
Warco Construction Inc.

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

Alumni Updates

› Dr. **Anwar Zahid**, PE (PhD CE 2005), has been working as the project manager and overall designer of record for ARCADIS in the Inner Harbor Navigation Canal (IHNC) – Seabrook Sector Gate Complex project in New Orleans. Zahid also worked as the lead structural engineer from ARCADIS in the West Closure Complex Pump Station project, which is considered to be the world's largest drainage pump station.

Inner Harbor Navigation Canal in New Orleans

› **Shane Underwood** (PhD CE 2011) is an assistant professor of civil engineering in the Arizona State University Ira A. Fulton Schools of Engineering in the School of Sustainability and the Built Environment. He is conducting research on modeling and study of construction materials, sustainable pavement materials, modeling the behavior and performance of pavements, intelligent pavements, and sustainably built infrastructure.

› **Maryam Sakhaeifar** (PhD CE 2011) is an assistant professor in the Zachry Department of Civil Engineering at Texas A&M University. She is conducting research on bituminous materials characterization, pavement design and management, pavement preservation, nondestructive evaluation of pavements, and tire-pavement noise.

› **Caroline Broughton**, PE, PMP (BS CHE 1991; MSCE 1996), has worked for Progress Energy/Duke Energy for 12 years as an environmental engineer. She is currently a project engineer and responsible for the design of ash handling systems and monofills.

› **Jim Trogdon** (BSCE 1984, MSCE 1990), the chief operating officer for the NC Department of Transportation, and major general in the NC National Guard, was named "Tar Heel of the Week" by the Raleigh *News and Observer* on June 16.

› **Jon Williams**, PE (BS ENE 2001, MS ENE 2005), works with GEI Consultants, Inc. in the Cary, NC, office. GEI is a 500 person nationwide firm specializing in geotechnical, water resources, environmental and ecological work. His work is primarily in remediation of contaminated sites for railroads and utilities, with a focus on manufactured gas plants.

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 lora_bremer@ncsu.edu:

Name, Mailing & Email Address
Company Name & Address
Work & Cell Phone Numbers
Degree, Major & Class Year
Announcements

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 ways that they can use their degrees after graduation and provides information on employment opportunities. The participating firms share their perspectives on interacting with CCEE and its students.

BRASFIELD & GORRIE was excited to be selected as the Firm of the Month for February 2012. 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. •

FRANK L. BLUM CONSTRUCTION COMPANY is motivated to participate in the CCEE Department's Firm of the Month program for several important reasons. First, it is our duty and privilege to support the department that helped mold some of Blum's key employees. In that sense, NC State is an integral part of our firm's growth and success. Second, it is our corporate culture to give back to the industry that supports our company and its families. We have a responsibility to our employees to invest fully in strengthening our state's overall construction industry. And, third, it is to our continued benefit to keep our name and reputation in front of students who are prospective interns or new hires. •

FDH ENGINEERING, INC. was very pleased to have been invited to be the firm of the month this past March. FDH is a multi-disciplinary company that provides a combination of engineering, investigation and construction management services, all with sustainability in mind, to clientele in the commercial, governmental, industrial, and telecommunications markets. The opportunity to meet with CCEE students and discuss the opportunities with our firm as well as in our profession in general was very valuable to FDH and we hope to the students as well. We were very impressed with the ideas and energy exhibited by the students and look forward to being able to attract some of this outstanding talent to our firm. FDH Engineering is also sponsoring publication of this newsletter – find out more about us on Page 36. •

FLUOR appreciates the opportunity to participate in the Civil, Construction, and Environmental Engineering Department's Firm of the Month program. Fluor is a FORTUNE 500 company that delivers engineering, procurement, construction, maintenance, and project management to governments and clients in diverse industries around the world. For nearly a century, clients have selected Fluor as their company of choice to complete challenging projects in remote parts of the world. As an active sponsor of several student organizations and department enrichment activities, one of our priorities is to familiarize the students and faculty with who Fluor is and what we do around the world. The Firm of the Month program provides an excellent opportunity to communicate with a large audience. We view this as one of our most efficient and effective methods of telling the Fluor story and look forward to engaging in the program each year. •

FDH Engineering Sponsors *CCEE News*

FDH Engineering, Inc., is the proud sponsor of *CCEE News*. FDH Engineering, Inc., a multi-discipline 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 170 professionals at the forefront of their industry in structural engineering, geotechnical engineering, water resources engineering and non-destructive testing. Additionally, FDH offers a broad array of services to the construction industry, including construction management, sustainable engineering and LEED consulting services. FDH has offices in Baton Rouge, LA, and St. Louis, MO, in addition to its headquarters in Raleigh. 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 are available in a variety of sizes and colors. All apparel items are embroidered with "NC State University," the Department's Achievement of Arms, and "Civil, Construction, and Environmental Engineering." 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 have a tremendous impact in helping 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.

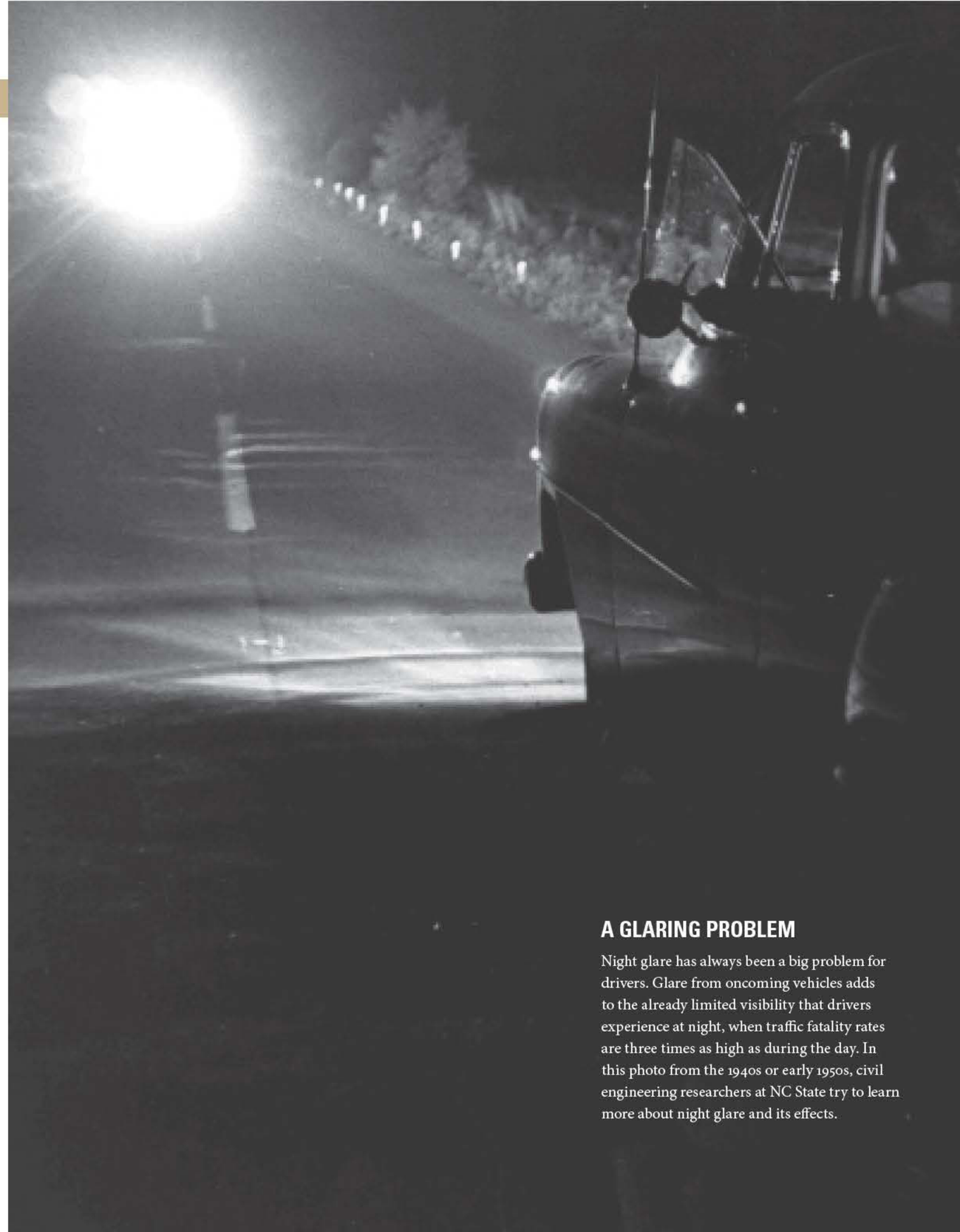
Checks should be made payable to:
NC State Engineering Foundation, Inc.
designated for CCEE and mailed to:

North Carolina State
Engineering Foundation, Inc.
Campus Box 7901
Raleigh, NC 27695-7901

You can also use your credit card to make a gift.
Visit **www.engr.ncsu.edu/foundation**

To talk to someone or for additional information, contact: **Lora Bremer,** CCEE, Director of Development
Phone: 919.513.0983
Email: lora_bremer@ncsu.edu

1,000 copies of this document were printed at a cost of $4,276.



A GLARING PROBLEM

Night glare has always been a big problem for drivers. Glare from oncoming vehicles adds to the already limited visibility that drivers experience at night, when traffic fatality rates are three times as high as during the day. In this photo from the 1940s or early 1950s, civil engineering researchers at NC State try to learn more about night glare and its effects.

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