NC STATE UNIVERSITY
COLLEGE OF ENGINEERING

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CCEE NEWS

Civil, Construction, and Environmental Engineering
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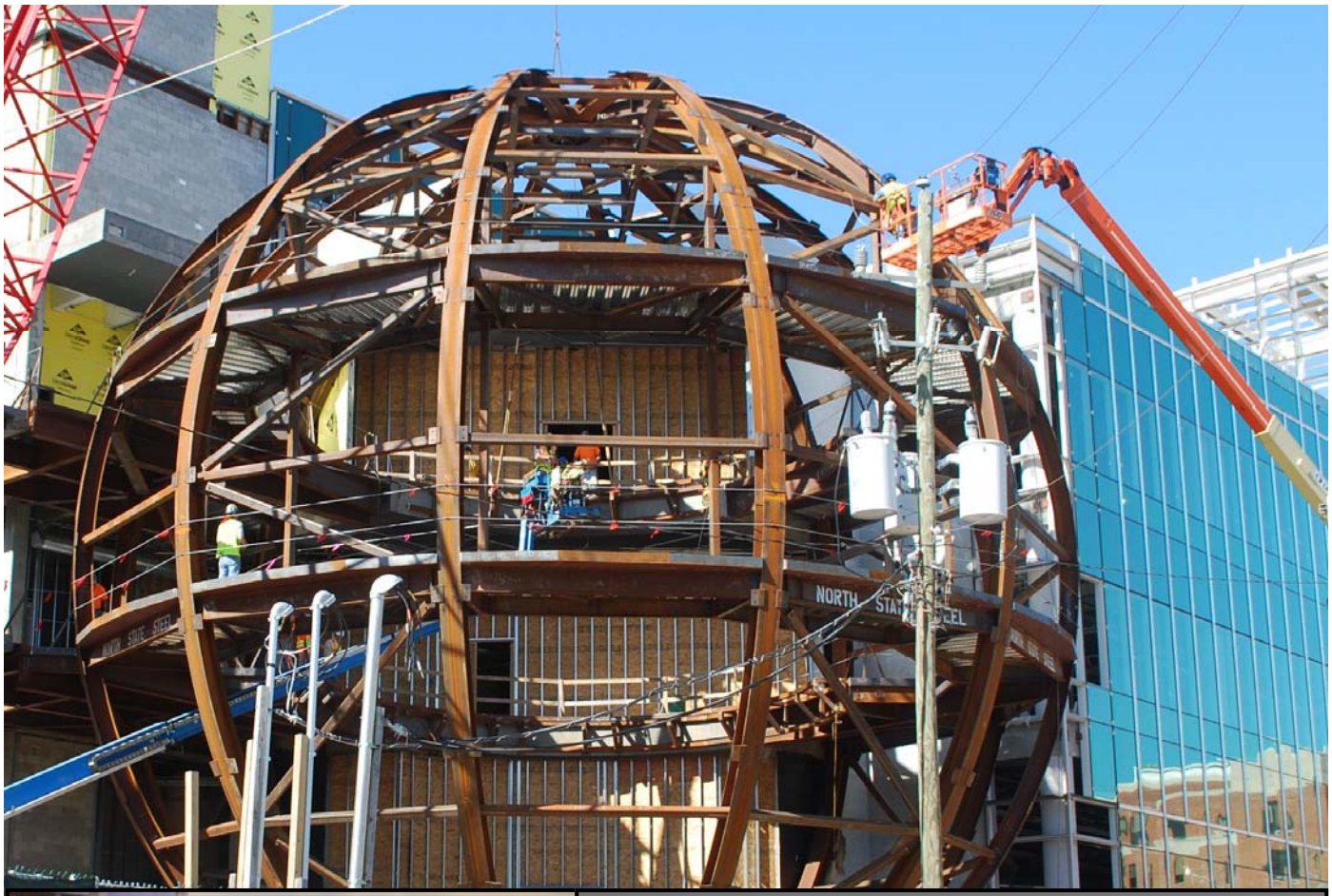

In This Issue:

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Department Head's Message

We are near the end of the 2010/11 academic year. It has been a successful year for the department and I would like to begin by thanking all of the faculty, staff, advisory board members, departmental fellows and other friends who have expressed their support and made my first year as head so fulfilling and productive. As I look through the three previous newsletters plus this issue, it is fun to reflect on the successes and impacts of our faculty and students.

We hired a total of seven faculty and lecturers this year. You have learned about several in previous newsletters including Mr. **Matthew Poisel** (Construction Extension Specialist), Mr. **Irving Nazario** (Lecturer), Dr. **Ed Jaselskis** (Jimmy Clarke Chair in Construction), Dr. **Emily Zechman** from Texas A&M, and Mr. **Mohammad Pour-Ghaz** who is finishing his doctorate at Purdue. I am pleased to announce that Ms. **Brina Mortensen** will be joining us in January, 2012. Brina is completing her doctorate at UC-Davis in the geotechnical area with a focus on bioimprovement of soils. Dr. **Andy Grieshop** will also join NCSU in January, 2012. Andy has a Ph.D. from Carnegie-Mellon University and is currently completing a postdoc at the University of British Columbia in Vancouver. Andy works in the environmental area with a focus on the characterization of particulate matter. I think that any CCEE program in the country would be excited to have this group of people join their faculty.

Saturday, May 14 is graduation. The university graduation begins at 9:00 A.M. at the RBC Center. Our departmental graduation will follow at 4:00 PM at the McKimmon Center. We are honored that **Heather Denny**, the president of **McDonald York**, has agreed to speak to our graduates. Heather graduated from our department in 1995. We expect to graduate 148 students with B.S. degrees in Civil Engineering (104), Construction Engineering and Management (30), and Environmental Engineering (14), in addition to 39 students at the Masters level and 5 with Ph.D. degrees. Including the December graduates, we will have awarded 250 B.S., 94 Masters and 15 Ph.D. degrees during the academic year. Graduation is a proud moment for many, and it is fun to watch the students celebrate with their friends, families, and professors. I am in awe of the accomplishments of many of our students. We have six graduates who were designated as **University Valedictorians** based on an overall grade point average of 4.0. This is outstanding, and there are many more students with extraordinary accomplishments.

The accomplishments of our faculty continue to be a source of tremendous pride. Dr. **Mohammad Gabr** was selected for a Board of Governors Award for Excellence in teaching, an ward made to only seven faculty across the university. Other faculty receiving teaching awards in the last year include **Joe DeCarolis**, **Abhinav Gupta**, **David Johnston**, and **Detlef Knappe**.

Sankar Arumugam, **Joe DeCarolis**, and **Jie Yu** received prestigious **National Science Foundation CAREER Awards** within the last year. **Sami Rizkalla** received many recognitions and awards this year, including election as Fellow to the Precast/Pre-stressed Concrete Institute. **Roberto Nunez** was elected as Fellow of the American Concrete Institute. **Robert Borden** received the Brown and Caldwell Lifetime Achievement Award. Many faculty, along with their students, have won best paper awards at national conferences, including **Roy Borden**, **Matthew Evans**, **Richard Kim**, **Ranji Ranjithan**, and **Nagui Rouphail**. Several faculty were interviewed by local and national media because of their expertise relevant to current events, including **Chris Frey**, **Joe Hummer**, **Mervyn Kowalsky**, and **Vernon Matzen**.

At the time of this writing, our budget for next year remains uncertain although the only question is how large a cut we will be asked to absorb. In that some of our decisions for next year must be made in April, we have reduced the number of new graduate students that we will bring to NCSU, and plan to reduce our teaching assistants by about 25% relative to 2010/11. In addition to the short-term impacts on our students, faculty and staff, I fear that a severe budget cut will set us back ten to twenty years in our march to increasing excellence. While painful and discouraging, we hope for a better economy and have intensified our efforts to increase extramural funding and contributions. As we transition to an era of less state support, the contributions of our friends will take on an ever-increasing role.

Thanks again for your interest and continued support; it means a lot to us.

Morton A. Barlaz

Professor & Head

About the cover: Firm-of-the-Month **Clancy & Theys Construction Company** (page 22) is the Construction Manager at Risk for the **Nature Research Center** and **The Daily Planet** under construction on Jones Street in downtown Raleigh. The NRC, located diagonally across the street from the NC Legislative Building, is an extension of the **NC Museum of Natural Sciences**. The project involves structural engineering, geotechnical engineering, and construction engineering and management. The iconic three story globe will be a downtown landmark and symbol of the environment. Photo by **Chris Frey**. Inset graphic courtesy of **Clancy & Theys**.

Matzen Advised Media on Aftermath of Japanese Earthquake and Tsunami


Vernon Matzen

The day after the devastating March 11 earthquake and tsunami in Japan, Dr. **Vernon Matzen** was interviewed by several local news outlets – TV news stations NBC 17 and WRAL FOX and the *Charlotte Observer* - for his assessment of the effect of these events on the Fukushima Dai-ichi nuclear power plants. Matzen is the Director of the **Center for Nuclear Power Plant Structures, Equipment, and Piping** and has extensive experience in the seismic response of piping and other components in nuclear power plants.

The reporters wanted to know how their listeners should think about the safety of nuclear power plants in North Carolina in light of the events in Japan. Matzen pointed out that, even though it was too early at the time to draw any final conclusions, the power plants appeared to withstand the 9.0 magnitude earthquake with little or no damage, even though the magnitude of the earthquake was well beyond the design basis. The tsunami, and not the earthquake, was the dominant cause of the damage to the auxiliary diesel generators used for emergency cooling, which led to the subsequent failures at the plant. He stressed that North Carolina is much less seismically active than Japan, and that tsunamis are rare events on the Atlantic coast. No structure is absolutely safe, of course, but nuclear power plants are among the most robust in the built infrastructure.

Severe events like the Japan earthquake are opportunities for engineers to refine their knowledge of structural behavior and improve design codes. Matzen chairs the Seismic Engineering Technical Committee in the ASME Pressure Vessels and Piping (PVP) Division and is on the Board of Directors of the International Association for Structural Mechanics in Reactor Technology (IASMiRT). Both PVP and IASMiRT host conferences that provide venues for experts from the US, Japan and elsewhere, to share their insights. Nuclear Center graduate students in the department benefit from participation in these conferences by presenting papers and interacting with international experts. The outcome of research performed in the Nuclear Center and elsewhere has contributed to improvements in current power plants as well as those that are still on the drawing boards. Center researchers continue to strive for a more robust energy infrastructure in North Carolina, the US, and the world.

Frey to Chair Review of Lead National Ambient Air Quality Standard


H. Christopher Frey

Dr. **H. Christopher Frey**, professor in the Department of Civil, Construction, and Environmental Engineering at North Carolina State University, has been appointed chair of the Lead Review Panel of the US Environmental Protection Agency (EPA) Clean Air Scientific Advisory Committee (CASAC).

Frey, an expert in pollution control, emissions sources and systems analysis, will chair the panel throughout the multi-year review cycle. The panel will review and provide independent expert advice on EPA's technical and policy assessments that support the agency's review of the National Ambient Air Quality Standard for lead. EPA will rely on the panel members to review drafts of the integrated review plan (IRP), integrated science assessment, risk/exposure assessment, policy assessment and rulemaking.

The panel's first action will be to review the IRP, which is EPA's proposal for how the agency will conduct a scientific assessment of the health effects associated with human exposure to airborne lead. Subsequently, EPA will conduct a detailed review of the science, prepare an exposure and risk assessment, and evaluate policy options for retaining or revising the existing standard for lead. During each step of the review process, Frey will prepare a letter for the EPA administrator with recommendations from the panel.

CASAC was established in 1977 and provides independent advice to the EPA administrator on the technical bases for EPA's national ambient air quality standards. The committee also addresses research related to air quality, sources of air pollution and the strategies to attain and maintain air quality standards and to prevent significant deterioration of air quality.

Frey earned his BS in mechanical engineering in 1985 from the University of Virginia, his MS in mechanical engineering in 1987 from Carnegie Mellon University, and his PhD in engineering and public policy in 1991, also from Carnegie Mellon. He joined the faculty at NC State in 1994.

CCEE Students "Live in the Moment" by Hosting Carolinas Conference

The Carolinas Conference is an annual weekend event where the American Society of Civil Engineering (ASCE) chapters of eight regional universities participate in competitions. The Conference member universities rotate hosting responsibilities every year. NCSU's ASCE Student Chapter hosted the 2011 Conference for 300 participants on April 14-16.

Conference Chair **James Cox** established the Carolinas Conference Planning Committee in spring 2010. The committee recruited sponsors and planned competitions. Whereas national competitions for Concrete Canoe and Steel Bridge are staples of the Carolinas Conference, secondary competitions are developed by the host university. "Living in the Moment" was the conference theme. While the primary purpose of the conference is to test students' engineering skills, the organizers encouraged participants to enjoy themselves and make friends among competitors. The Conference was also supported by **Fluor**, **S&ME**, **McKim & Creed**, **Kimley-Horn & Associates. FDH Engineering, Inc.**, **SteelFab**, **Hirschfield Industries**, **CRSI**, **Newport News Shipbuilding**, and **Norfolk Southern**.

Thursday, April 14 was dedicated to registration and various meetings, followed by dinner at Poe Hall and an opening ceremony featuring guest speaker **Joe Bennet** (BSCE Const. Option, '77), Vice President of Operations for **Fluor Corporation**'s Power Division. Bennett emphasized the importance of practicing ethics in school and in the field. He described his professional journey from an entry level engineer at Fluor to where he is today.

NCSU celebrates as concrete canoe "High Tensions" passes the swamp test.

Fridays at Carolinas Conferences are planned around the Concrete Canoe competition. NCSU's ASCE chapter president, **Jeffrey Chang**, organized "A Day at the Lake." Teams arrived at the boat ramp at Lake Wheeler at the crack of dawn to unload their canoes and prepare for evaluation of aesthetics and swamp tests to determine if each canoe was safe for racing. The windy conditions proved to be a major factor in the slalom races. Several teams such as Clemson's Women's endurance team exhibited rowing skills similar to that of a varsity level crew team, while other schools appeared to have little rowing experience. Friday's winning teams included Clemson for the Concrete Canoe, NC State for the Environmental Challenge, The Citadel for Surveying and UNC-Charlotte for the Geotechnical and Transportation competitions. As part of the social program, bowling night was held at Western Lanes on Hillsborough Street.

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ASCE Concrete Canoe Contest – Carolinas Conference

Teams from eight regional colleges and universities participated in the concrete canoe contest in Lake Wheeler on Friday, April 15. The contest included endurance (3 rowers on each team) and sprint (2 rowers on each team) races for women and men and a Co-Ed race (2 men and 2 women rowing).

NC State's team consisted of: **Jessica Abbott**, **Warren Atkinson**, **James Cox** (Captain), **Courtney Drummond**, **Joe Fulk**, **Amanda Houston**, **Chris Lisi**, **Austin Mack**, **Lauren Mahon**, and **Nick Zinser**. Dr. **John Stone** was the faculty advisor for the team. The team placed sixth in a competitive field topped by Clemson.

NCSU Concrete Canoe at Lake Wheeler

Carolinas Conference (cont'd)

The Steel Bridge competition is the focal point of Saturdays at the Carolinas Conference. The Steel Bridge competition took place at the Holshouser Building at the NC State Fairgrounds. Other events took place on campus at Mann Hall. Despite early confidence, the NC State Bridge Team's hopes were shattered when their bridge failed the Lateral Deflection test early Saturday morning. A new competition was the Reinforced Concrete Beam, in which teams designed and constructed a beam prior to conference and tested it at the Constructed Facilities Laboratory. This event was delayed when the CFL lost power due to the deadly tornado that stormed through Downtown Raleigh late Saturday afternoon.

Keynote speaker Scott Stabler at the Award's Banquet

After an hour of hiding from the storm in the basement of Mann Hall, conference participants wrapped up the competitions. The Awards Banquet held at the McKimmon Center featured keynote Speaker **Scott Stabler** (BSME '82), Vice President of Corporate Operations at **Huntington Ingalls**. Stabler gave a captivating presentation about his involvement in the construction of the ***U.S.S. George H.W. Bush***, the final Nimitz-class aircraft carrier. Subsequently, over 75 awards were presented to the winners of each competition along with 2nd and 3rd place trophies. In keeping with ASCE tradition, tiebreakers were determined using the rock-paper-scissors and arm wrestling methods. However no tiebreaker was needed to determine that Clemson was the overall conference winner for the second year in a row.

2011 Student Steel Bridge Competition—Carolinas Conference


NCSU's Steel Bridge Team in Action

Six teams participated in the **2011 Carolina's Conference** Student Steel Bridge Competition in Raleigh on April 16th. The teams were from the University of South Carolina, Clemson, Georgia Tech, The Citadel, North Carolina A & T, and NC State. The contest included construction speed, lightness, stiffness, display, economy, and efficiency.

NC State's team consisted of **Gokan Inan**, **Jake Griffin**, **Jonathan Jarman**, **Robbie Johel**, **Marc LaBlanc**, **Mike O'Connor** (Captain), and **Art Simmons**. Most team members are seniors. Mike O'Connor is a graduate student in the Masters program in Civil Engineering. **Matt Poisell** was the faculty advisor for the team.

The team received guidance and support from Dr. **John Stone**, Ms. **Lora Bremer**, and Mr. **Jake Rhoads**. The NCSU team placed 2nd in Construction Speed and Economy and 4th overall.

Students Deliver at Annual Water Resources and Environmental Engineering Symposium

The **Water Resources and Environmental Engineering** (WREE) Group held the **10th Annual WREE Spring Symposium** on Friday, March 18 in Mann Hall. The Symposium featured 46 student poster presentations that filled the Mann Hall lobby. Dr. **Cliff Davidson** of Syracuse University delivered a key note talk on "Educating Engineers for the 21st Century: The Challenge of Sustainability."

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 **NCSU 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 presentation 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. Approximately a dozen such students visited during the symposium and met with faculty and currently enrolled students.

The Spring Symposium fills the Mann Hall Lobby with Posters, Students, and Guests.

The student posters covered a wide range of topics. Examples of presented topics include protection of critical infrastructure, coastal fluid mechanics, solid waste management, energy system modeling and evaluation, measurement and modeling of vehicle emissions, human exposure to fine particles in the atmosphere, improving predictions of surface and stream water flow and water quality, estimating the effect of climate change on streamflow, bioremediation of contaminated groundwater, improved modeling of wastewater treatment systems, quantification of formation of fat, oil, and grease deposits in sewer lines, evaluation of the effectiveness of drinking water treatment methods, and others. Most of the presenting students are research assistants working with faculty on sponsored research projects. The content presented by each student will be part of their master's thesis or PhD dissertation. An undergraduate research assistant, **Evan Ged**, also participated.

The Symposium Organizing Committee was comprised of graduate students. The committee was chaired by **Brandon Graver**. The program subcommittee included **Kitty Hiortdahl**, **Florentino de la Cruz**, and **Antonio Sobremisana**. **Kevin Hunter** was in charge of organizing poster production. **Leigh-Ann Dudley**, **Meredith Fotta**, and **Jason Patskowski** organized catering. **Susan Dunn** and **Angela Mastropole** were in charge of arranging space for the luncheon and poster locations. Dr**. Joe DeCarolis** and Dr. **Francis de los Reyes** served as faculty advisors to the organizing committee.

Dr. Joe DeCarolis, Symposium Co-Advisor

The symposium was supported by nearly a dozen sponsors. Gold Sponsors included **McKim & Creed** and **FDH Companies**. Silver Sponsors include the **Environmental Research & Education Foundation**, **Hazen and Sawyer**, and **Geosyntec Consultants**. Bronze Sponsors included **Solutions-IES**, **GHD Incorporated**, and **Withers & Ravenel**. Other sponsors included **Brown and Caldwell** and the **Research Triangle Chapter of the Society for Risk Analysis**. **Kimley-Horn and Associates** was the corporate partner.

Twenty professionals from area companies, government agencies, foundations, and professional societies reviewed the student posters, talked with the students, and served as judges for the best poster awards. These judges included **Ann Borden**, **Larry Brown**, **Rhett Butler**, **Wes Cook** (BSCE '03), **John Fisher**, **Marti Gibson**, **Walt Gray**, **Doug Johns**, **Ryan Lewis** (BSEE '04) **Andy Lindstrom**, **TJ Lynch**, **Tom Pace**, **Wayne Powell**, **Richard Rohrbaugh** (BSCE '81), **Reinhard Ruhmke**, **Don Safrit**, **Andrew Shull** (BSEE '03), **Bryan Staley** (PhD '09), **David Svendsgaard**, **Jonathan Treadway**, and **Ken Walsh**.

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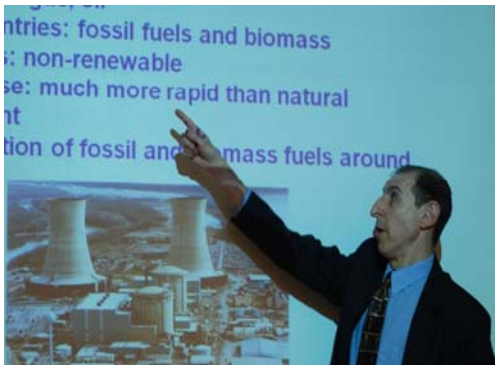
WREE Symposium (cont'd)



Keynote Speaker Dr. Cliff Davidson of Syracuse University

Dr. Davidson's talk provided an operational definition of 'sustainable engineering' based on using "technology to improve our quality of life without degrading quality of life for future generations." A key attribute of sustainability is to avoid accumulation of material, such as solid waste or air pollution. Progress toward sustainability can be tracked by quantifying indicators such as water, material, and energy consumption, discharges to water, land, and air, and accumulation of mass within a geographic area. Other useful metrics related to quality of life could include, for example, average commuting distance. Civil and environmental infrastructure that influences sustainability include electric and water utilities, and transportation facilities. Dr. Davidson cited several examples of incorporation of sustainability concepts into design, construction, operation, and disassembly and reuse of infrastructure. For example, emerging building design concepts emphasize flexibility of space utilization using moveable walls and ease of reusing materials by planning for disassembly at the end of the building's life. Another example is the office and shopping complex of the Eastgate Centre in Harare, Zimbabwe, which was designed based on 'biomimicry.' The complex does not have conventional heating or cooling; instead, it is a space-conditioned based ventilation design analogous to that of a termite mound.

Students, Judges, and Faculty at Dr. Davidson's Keynote Talk

Dr. Davidson identified several barriers to achieving sustainability in practice, and cited the need for engineers to find solutions to overcome these barriers. For example, while the Leadership in Energy and Environmental Design (LEED) certification program of the U.S. Green Building Council is very useful, it is largely based on anecdotal evidence. "There is quantitative work that engineers could do that would advance LEED standards." Even if green buildings are available, in many cases "occupants don't know how to use building controls" to the greatest effect. Thus, there is a need for better engineering solutions to building operation. Davidson cited high priority needs in managing land use, reducing "local entropy" of energy use, improved management of water, and more care in using resources that are not renewable, such as oil, gold, and others. Poverty is also a key challenge to sustainability: over 2.5 billion people lack proper sanitation, and 2 billion subsist on less than $2/day. "People living on the edge cannot change lifestyles." While "engineers design for clients who can pay," there is an unmet need for low-cost appropriate engineering solutions in many parts of the world. Dr. Davidson's talk stimulated a lengthy question and answer period in which students and faculty probed underlying assumptions, needs and opportunities, and practicality of achieving effective solutions.

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

- 1st Prize: **Brandon Graver**, "Measurement and Comparison of Locomotive Engine Emissions"
- 2nd Prize: **Xia He**, "Experimental Evidence for How Fat, Oil and Grease (FOG) Deposits Form in Sewer Lines"
- 3rd Prize: **Mark J. So**, "Separating Active Nitrite-Reducing Bacteria in Mixed Culture Samples using Sequential mRNA Fluorescence in-situ Hybridization and Fluorescence-Assisted Cell Sorting (SmRFF)"
- 4th Prize: **Kara Kopf**, "Quantification of Denitrifying Bacteria using qPCR Targeting the nosZ Gene"

The **11th Annual WREE Spring Symposium**, to be held in 2012, is in the planning stages. The event has grown so large that it has outgrown the available space in Mann Hall, and organizers are considering other on-campus venues. The Department and WREE group are seeking financial and in-kind support to continue this highly visible and beneficial event. Anyone interested in supporting or helping with the annual WREE Spring Symposium should contact Ms. **Lora Bremer** at lora_bremer@ncsu.edu.

Honors, Awards, and Events

- Dr. **Joseph F. DeCarolis**, Assistant Professor in the Department of Civil, Construction, and Environmental Engineering, received the **2011 American Society for Engineering Education** (ASSE-SE) **Outstanding New Teacher Award**. This award was presented during the events awards banquet on April 11 at the 2011-South East Annual Meeting at the Citadel in Charleston, South Carolina.
- The **2011 Paul Zia Distinguished Lecture Series** will be held on September 26, 2011 starting at 1:00 PM at North Carolina State University's McKimmon Center. The main topic for the lecture is "Current and Future Trends in Movable Structures" presented by **Lee Slade**, Senior Principal at **Walter P. Moore** in Houston. The second part of the lecture will be "Who's That Man Behind the Curtain: Making Large Structural Elements Move" presented by **Bart Riberich**, President of **Uni-Systems LLC**. Following the events of the day will be a cocktail reception and banquet starting at 6:00 PM at the State Club in Raleigh to honor Dr. **Paul Zia** and our distinguished speakers. Sponsorship opportunities are available. For additional information contact: **Lora Bremer** at 919-513-0983 or lora_bremer@ncsu.edu.
- Dr. **William Rasdorf** has received the **Environmental Systems Research Institute (ESRI) Award for Best Scientific Paper** in Geographic Information Systems (GIS). This award is given by the American Society of Photogrammetry and Remote Sensing (ASPRS). The ESRI Award recognizes papers of scientific merit in the advancement of knowledge about GIS. Dr. Rasdorf was also an invited participant in a two-day Leadership Forum for Construction Engineering & Management programs held at Purdue University, West Lafayette, Indiana, from March 20-22. The objective of this forum was to establish a body of academic leadership in the area of construction engineering and management and to discuss and share issues of common concern in research, teaching, academic administration, and opportunities for collaboration.
- The **9th Annual CCEE Golf Tournament** will be held May 19 at the Lonnie Poole Golf Course on Centennial Campus at NC State. The tournament is a 4 man captain's choice format. The registration fee is $100 per player, with a special student rate of $50. The proceeds benefit CCEE student activities. If you do not have a foursome you can be paired with other registrants, which is a great networking opportunity. The entry deadline is May 13. More information is available via the CCEE homepage (www.ce.ncsu.edu).

Graduate Student News and Awards

- **Mahdi Khalilzad-Sharghi**, a doctoral student, won a paper competition by the **Association of State Dam Safety** based on work he is doing for the Department of Homeland Security (DHS) Center of Excellence on Natural Disasters, Coastal Infrastructure and Emergency Management. His paper, "Deformation-Based Probability Analysis of Earth Embankments using Limit States," focused on an approach for defining performance levels of protective earth structures under severe storms. He will present the paper at the Association's conference at National Harbor, MD on September 25-29.
- PhD students **Ingrid Arocho**, **Brandon Graver**, and **Stephanie Vereen** were selected as fellows in the NCSU "**Preparing for the Professoriate" (PTP) Program** for the upcoming 2011-12 academic year. Arocho and Vereen are co-directed by Drs. **William Rasdorf** and **Joe Hummer** and Graver is advised by Dr. **H. Christopher Frey**. PTP provides fellows with a hands-on teaching opportunity under a faculty mentor.
- PhD Candidate **Adel Elsaid**, who is advised by Dr. **Rudi Seracino**, was awarded the **Certificate of Achievement** for Excellence in Research at the Department of Homeland Security **5th Annual Student Paper Competition** for his paper on *Vibration Based Damage Detection of Scour in Coastal Bridges*.

Honors, Awards, and Events (cont'd)

- **Fadi Jadoun** won second place in the Engineering competition during the 2011 **Graduate Student Research Symposium**. His poster was entitled "Local Calibration of the Mechanistic-Empirical Pavement Design Guide for North Carolina." He will receive his PhD in Civil Engineering in August 2011.
- PhD students **Brandon Graver**, **Wan Jiao**, **Bin Liu**, and **Xiaozhen Liu** , and MS student **Yuanfang Sun**, have each received scholarships from the **Research Triangle Park Chapter** of the **Air & Waste Management Association** to support travel to the 2011 A&WMA Annual Conference in Orlando, June 21-24. All five are advised by Dr. **H. Christopher Frey**. Each will present a technical paper during the conference on topics including air pollutant emissions from cars and locomotives and human exposure to fine particles.

Undergraduate Student News and Awards

- The **Alumni Association** presented four graduating seniors with the **Mathews Medal** for their contributions to NC State during their time as undergraduate students. This award, named for **Walter J. Mathews**, who was an active alumnus and the first student enrolled at North Carolina College of Agriculture and Mechanic Arts in 1889, encourages student leaders to go on to become alumni leaders. One of seniors receiving the award was **Justin Michael Boucher**, a senior in environmental engineering and a **University Scholar**. Boucher served as president of the GLBT Community Alliance, as an Alternative Service Break team leader and as an Engineering Ambassador. Boucher also worked as a DJ at campus radio station WKNC-FM and as a site coordinator with the University Scholars Program language exchange to promote collaboration between students and housekeeping staff members. Recipients were honored in a reception at the Dorothy and Roy Park Alumni Center.
- **Evan Ged**, a senior in environmental engineering, was recognized by Sigma Xi, the scientific research honorary society, as winner in the area of Civil, Construction, and Environmental Engineering at the spring **Undergraduate Research Symposium** on April 12, 2011. Ged has conducted research with Dr. **Detlef Knappe** and presented his work on "Effectiveness of superfine powdered activated carbon for the removal of sulfamethoxazole" at the symposium.
- **CCEE Faculty Senior Scholar**
  - Matthew Authement
- **CCEE Senior Awards**
  - Anahid A. Behrouzi (Scholarly Achievement)
  - Jeffrey Walton (Leadership)
  - Daniel Claff (Humanities)
  - Kellie M. Renzi (Citizenship and Service)
- Six of the department's graduating seniors are valedictorians, with GPAs of 4.0 or above, including **Christopher Drew Anderson**, **Anahid Anousheh Behrouzi**, **Amelia G. Clark**, **Christopher Kelly Herrick**, **Andrew Charles Lipetzky**, and **Christopher S. Markham**. All six are graduating with BSCE degrees.

The CCEE May 2011 **Commencement Ceremonies** will be held at **4:00 PM** on **Saturday, May 21** at the **McKimmon Center.** The Commencement Address will be given **Heather Denny,** President of **McDonald York**. Ms. Denny graduated from NC State in 1995 with a BS degree in Civil Engineering with a construction option.

Anahid Behrouzi Receives the Tau Beta Phi Graduate Fellowship

Anahid Behrouzi

Anahid Behrouzi is an undergraduate student at NCSU currently pursuing a B.S. in **Civil Engineering** with a concentration in structures as well as a B.A. in **Spanish Language & Literature**. In 2007, she was awarded the nationally competitive **Park Scholarship** to attend NCSU. In May 2010 she began working with Dr. **Vernon C. Matzen** in the **Center for Nuclear Power Plant Structures, Equipment and Piping**, and is investigating the performance of non-structural components. She is conducting research on reconciliation of experimental and analytical behavior of piping systems through monotonic testing to model semi-rigid boundary conditions experienced in the field. Additionally, she is examining the effects of torque applied to threaded piping connections and its contributions to failure. These investigations are the initial stage for studies to determine the seismic fragility of non-structural piping components, specifically threaded tee-joints, through monotonic and cyclic testing.

Anahid has been active within both the College of Engineering and the Department of Civil Engineering. She currently serves as vice-president of **Chi Epsilon**—the National Civil Engineering Honor Society, vice-president of Company Relations of the **Society of Women Engineers**, and an Engineering Ambassador. Outside of the university, she is passionate about science and technology education through youth outreach, reading about new practices in sustainable building and architecture, and learning other languages. In the future, she hopes to pursue graduate studies in the fields of seismic or sustainable structural design. It was recently announced that Anahid was the winner of a $10,000 **Tau Beta Pi Graduate Fellowship.** She also received a **Certificate for Scholarship Achievement** from the College of Engineering for technical competence, academic achievement, and demonstrated scholarly performance that goes far beyond a 4.0 GPA. She has an interest in earthquakes and nuclear power and is currently deciding where she will attend graduate school.

Kellie Renzi Receives the COE Certificate of Citizenship and Service

Kellie Renzi

Kellie Renzi will graduate **Magna Cum Laude** in May 2011 with a degree in **Construction Engineering and Management**. She moved to Raleigh to start a full-time job and entered NC State as a transfer student. What makes Kellie stand out as an individual is not just her excellent academic record but her perseverance to do her best at whatever she tries to accomplish. As a more mature student, she often refers to herself as a "big sister" offering advice and sharing her experiences with her peers. She is well respected by her professors and the staff as well.

Kellie is married, works a 40 hour week, and still managed to take 9 credit hours a semester plus summer sessions. She plans to continue her education at NC State to obtain her Master's degree in Civil Engineering (MCE). She has said that "some of the most rewarding parts of my education have been my work with the Durham chapter of Habitat for Humanity, coaching and recruiting coordinator of two local softball teams, and team captain of Race for the Cure at the office where I work." She takes pride in the fact that she has helped two high school seniors receive full scholarships and play ball at the collegiate level.

Kellie received the **George H. Blessis Scholarship** as well as the **Kenneth P. Dixon Scholarship.** For her many significant contributions to improve the welfare of her fellow citizens in the community, Kellie was awarded the **College of Engineering's Certificate of Citizenship and Service.**

Daniel Claff Receives the 2011 Engineering Senior Award for Humanities

Daniel Claff

Daniel Claff (BSCE & BA Arts Applications-concentration Music) was selected by the College of Engineering as the recipient of the **2011 Engineering Senior Award for Humanities.** Claff, a **Benjamin Franklin Scholar**, was drawn to NC State because of the program's focus on developing multidisciplinary engineers through complimentary studies in the humanities. The award recognizes his high achievement, academic standing in engineering, and commitment to a broad, liberal education in social sciences, arts, and the humanities. Claff was nominated by the CCEE Department and selected by a committee comprised of representatives from the College of Humanities and Social Sciences, the Office of Student Affairs, and the College of Engineering.

In addition to his involvement with the Benjamin Franklin Scholars, he is also a **Caldwell Fellow**. It is through this program that he feels he discovered the potential to think on a global scale. The program allowed him to pursue international studies in his double major. In 2008, he studied art history in Vienna, Austria, and in 2009 participated in the civil engineering study abroad program to Nanjing, China. According to Claff, these programs have expanded his view of the world and allowed him to explore relationships between his two majors on an international level.

Claff will begin doctoral studies at the **University of Oxford** in England as a **Clarendon Fund** recipient. He acknowledged that "having the opportunity to pursue dual degrees at NC State made all of this possible, and I am looking forward to representing NCSU in another enriching learning experience."

CCEE Graduate Students Win at Engineering Day at the NC Legislature

Anna Harris, Adel Elsaid, Speaker Thom Tillis (NC General Assembly), Jeffrey Harmon (FREEDM Systems Center), and Susan Dunn

On Wednesday 27 April 2011, the **2nd Engineering Day at the Legislature** was held in Raleigh. The College of Engineering at NC State was invited by the **American Council of Engineering Companies of North Carolina** (ACEC/NC) and the **Professional Engineers of North Carolina** (PENC) to promote engineering to State Senators and Representatives. Activities included a poster design competition with a focus on promoting the National Academy of Engineering (NAE) Grand Challenges for Engineering in the 21st Century. Specifically, three grand challenges themes were selected: (1) providing access to clean water; (2) restoring and improving urban infrastructure; and (3) making solar energy economical. Students from the Department of Civil, Construction and Environmental Engineering (CCEE) submitted 25 posters covering a broad range of research activities in all three categories. CCEE students won in two of the three categories. MS candidate **Susan Dunn** with advisor Dr. **Detlef Knappe** won in the "Access to Clean Water" category with their poster entitled "*Effect of powder activated carbon base material and size on disinfection byproduct precursor removal*." PhD candidate **Adel Elsaid** and MS candidate **Anna Harris** with advisor Dr. **Rudi Seracino** won in the "Restoring and Improving Urban Infrastructure" category with their poster entitled "*Rapid assessment of critical bridges in coastal regions under extreme loading*." These posters, along with the winner of the third category (submitted by the FREEDM Systems Center), were on display at the NC Legislative Building. The **ACEC/NC Student Design Champion** grand prize was awarded to **Elsaid** and **Harris**, and the **People's Choice** award went to **Susan Dunn**. The Department is proud of the enthusiastic student participation in this event showcasing the high impact research being undertaken, and congratulates the winners of the two awards.

Undergraduate Students Visit Field Sites on Campus

Students in two courses recently had the opportunity to visit major building facilities on campus, to see first-hand basic engineering principles applied to real structures and systems.

One of four tour groups from the CE 367 class with host Bill Ferrell, Assistant Plant Engineer, in front of a 2000-ton steam-driven chiller at the Yarbrough Plant.

On April 14th, students in the **CE 420 Structural Engineering Project** course were given a tour of the construction site for the new **Hunt Library** on the Centennial Campus, accompanied by their instructors, Dr. **James Nau** and Mr. **Irving Nazario**. With much of the steel frame still exposed, the students were able to get a good appreciation for a building under construction. The tour was led by Mr. **Mark Collins** (BSCE, '88), the Project Executive, and Mr. **Mahmoud Farawi**, Project Manager, both of whom represented the general contractor, **Skanska USA Building** Inc. They provided detailed explanations of how the building is being erected, and of the problems in the field, and the subsequent solutions that arise with such a large and complex project.

CE 420 class in front of Hunt Library, with hosts from Skanska.

Students in the **CE 367 Mechanical and Electrical Systems** course, taught by Mr. **Nazario**, toured the **Yarbrough Central Utility Plant** on April 19th, near Mann Hall. This plant provides steam and chilled water to heat and cool many buildings on the Main Campus. Led by the Utilities & Engineering Services Plant Engineer, **Erik Hall**, and the Assistant Plant Engineer**, Bill Ferrell** (BSME '85), the students were shown the massive boilers, chillers, cooling towers, tanks, pumps, and electrical equipment that are required to deliver these vital services to the campus. This is the fourth consecutive year that the Yarbrough Plant operators have hosted students from this course.

Investing in the Department:

We ask you to invest in our future and make a commitment to the NC State College of Engineering. 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 an outright gift. Log onto:
h**ttp://www.engr.ncsu.edu/foundation/index.php**
To talk to someone or for additional information, contact:
Lora Bremer, CCEE, Director of Development • **Phone**: 919-513-0983 • **Email**: lora_bremer@ncsu.edu

American Concrete Institute Student Chapter Visits Panama Canal

NCSU Students and Hosts in Panama, with the Panama Canal in the background.

The 2011 spring break will bring a special memory to ten CCEE students. During the Fall of 2010, these young engineers, all members of the **NCSU Student Chapter of the American Concrete Institute** (ACI), decided to start a planning process aimed at visiting the **Panama Canal** expansion project during the second week of March 2011. After almost six months of hard work, this unique engineering and cultural experience was achieved with financial support from the traveling students, the CCEE Department, and its alumni. Under the supervision of their faculty advisor, Mr. **Roberto Nunez**, the students secured valuable logistical cooperation from the **Panamanian Association of Concrete Producers** (APACRETO), the **Autori**dad **del Canal de Panama** (ACP), and **Grupo Unidos Por El Canal** (GUPC). ACP is the entity in charge of the Panama Canal Administration and Expansion, and GUPC is the Panama Canal Expansion Project General Contractor.

The student's ambitious agenda included: a meeting with representatives from ACP, a visit to the Panama Canal main lock operations, a field trip to the canal's construction site, a ceremony to donate NCSU-collected books to enhance the engineering library of the Universidad Tecnológica de Panama (UTP), a meeting with the expansion project General Contractor (Mr. **Antonio Zaffaroni**, GUPC's General Manager), a conference on "High Rise Concrete Building Design and Construction" (by Dr. **Oscar Ramirez**, renowned structural engineer and Trump Ocean Club designer), a field trip to the nearly finished Trump Ocean Club, and a visit to historical places around Panama City.

NCSU students and hosts on the tower of the Trump Ocean Club undergoing construction in Panama City.

The NCSU students also wanted to "break new ground" through an innovative cooperative effort. As a trip pre-requisite, all members of the NCSU student team were certified as ACI Grade-1 Concrete Field Technicians. Then, these students were trained as supplemental examiners through the NCSU Concrete School that annually certifies approximately 200 concrete technicians and engineers. At that point, the students set an innovative goal for their trip: organize a concrete school in Panama to provide certification to a group of Panamanian concrete technicians and engineers. This unique program was successfully achieved, after the NCSU students (in cooperation with APACRETO and the UTP) administered an ACI Grade-1 Concrete Field Technician examination to a group of 13 Panamanian concrete professionals.

The trip and the experience proved to be valuable to the NCSU students. **Jake Hofmann**, President of the NCSU-ACI Student Chapter stated, "Teaching the ACI course is a great opportunity for students like me to learn how to communicate with concrete professionals. Traveling to Panama, seeing concrete infrastructure projects that are unique in the world, meeting a group of extraordinary engineering professionals, and performing the ACI certification was a once-in-a-lifetime experience." When asked about the Canal expansion, **Travis Cox**, Senior in Construction Engineering replied, "The magnitude of the Canal site was overwhelming. It was a great experience to visit the site of one of the largest engineering projects in the world." The visit to Trump Tower also impressed NCSU engineering students; Senior **Errikos Anagnostopoulos** stated: "being able to see the construction of such a big project from the inside was a great experience; I was impressed to hear of a building that large being made of concrete and it looks even more impressive than I had imagined."

Students Visit World Trade Center Site and George Washington Bridge

On April 7th and 8th, a group of twelve seniors from the Civil Engineering and Construction Engineering and Management degree programs, accompanied by faculty members Dr. **Rudi Seracino** and Mr. **Irving Nazario**, traveled to New York City to visit the **World Trade Center** construction site and the **George Washington Bridge**. This trip was made possible by the very generous support of Mr. **Peter Lehrer** (BSCE '63) and Mr. **Otis Crowder** (BSCE Const. Option '70). The students were selected on the basis of their academic standing and essays they wrote expressing what such a trip would mean to their professional development. Preference was also given to students who had not travelled out-of-state on another departmental sponsored activity.

Student group with faculty advisors at Site of National September 11 Memorial & Museum, with Freedom Tower Construction in background.

The group was given extraordinary access to the construction site of the **National September 11 Memorial and Museum**, which is in the center of the World Trade Center construction site. **Daniela Carvalho**, assistant project manager at the Memorial and Museum, guided the group through the site and explained the intricacies of the design and the complex construction process of the massive project. An evening reception was held for the group and alumni of the College of Engineering at the University Club, an impressive Italian palazzo structure built in 1899. Ms. **Lora Bremer**, CCEE Director of Development and Alumni of the College of Engineering also attended.

Student group with faculty advisors and hosts atop the New Jersey side tower (604 ft) of the George Washington Bridge.

On the second day, the group visited the **George Washington Bridge Port Authority Administration**, which is located at the New Jersey anchorage of the bridge. **Andrea Giorgi Bocker**, chief resident engineer, and **Hector Eugui**, supervisor of maintenance planning, escorted the group on an extensive tour of the busiest bridge in the world. Highlights included watching a video of film shot in the 1920's of the construction of the bridge, a descent into the bottom of one of the anchorages where the individual suspension wires are looped around eye bars embedded in the rock, and an ascent by elevator and stairway to the top of one of the 604 ft. towers.

Interspersed between the formal visits, the group had an opportunity to take several walking tours of Manhattan, during which they saw the Brooklyn Bridge, and the Woolworth Building, Empire State Building, and other iconic buildings of the city. During their transit to and from the airport, they also saw the many types of bridges that connect the boroughs of the city. This was truly a wonderful opportunity for the students to see first-hand the construction and operation of some of this country's major infrastructure.

Transportation and Economic Development

Transportation and economic develop were the focus of a keynote address and panel discussion hosted by the **Transportation Founders Fund** (TFF) speaker series and the **Institute of Transportation Research and Education** (ITRE), held April 14 on NCSU's Centennial Campus. TFF is a membership-based outreach organization that provides scholarships to outstanding graduate students and enhances access to and interaction with leading transportation experts.

ITRE Advisory Board Chairman and Deputy North Carolina Secretary of Transportation, **Jim Westmoreland** moderated the event. Secretary Westmoreland recognized three "super stars" who recently won the **Traffic Bowl competition** at the Southern District of the Institute of Transportation Engineers (SDITE) annual meeting in Lafayette, Louisiana on April 12. The traffic bowl competitors were CCEE students **Zach Bugg**, **Soheil Sajjadi**, and **Katy Salamati**. The NC State Traffic Bowl team will represent SDITE at the International ITE meeting in St. Louis, Missouri in August.

Janet Kavinoky

Janet Kavinoky, Vice President of Americans for Transportation Mobility and Executive Director for Congressional and Public Affairs for the U.S. Chamber of Commerce, delivered a riveting, humorous, and informative keynote address on current transportation policy and legislation in Washington, D.C.. She concluded with an exhortation for all to join the essential task of developing a compelling "narrative" about the centrality of transportation system health to the nation's long term global competitiveness and economic well-being.

Three panelists elaborated on the role of transportation in the economy after the keynote talk. CCEE professor **George List** provided a summary of transportation's history and its relationship to economic activity. He observed that after several decades of focusing heavily on personal travel, there is a return "to our roots" with a renewed focused on goods movement and logistics.

Gene Conti

North Carolina Secretary of Transportation **Gene Conti**, reflected that "since ancient times, transportation has been one of the chief means of building prosperity." Secretary Conti highlighted the creation of a statewide logistic plan. He emphasized that transportation systems attract and support success of businesses. Recent initiatives include development of a state-of-the-art air cargo intermodal facility at Charlotte Douglas International Airport and an agreement between Norfolk Southern and the North Carolina Railroad that will enable a $461 million Federal investment in the Charlotte to Raleigh rail corridor.

Joe Stephens

Joe Stephens, Director of FedEx's air cargo hub at the Piedmont Triad International Airport, reinforced the importance of healthy relationships between government and the business community to enable major infrastructure improvements that support global competitiveness. Mr. Stephens used the Indianapolis FedEx Hub expansion in his home state as a case study. Fedex has implemented seven expansion projects since acquiring the facility and beginning operations in 1988. These expansions have approximately tripled throughput. None of these major expansions would have been possible without a strong public and private sector alliance.

At the conclusion of the question and answer period, **Nagui Rouphail**, Director of ITRE and a professor in CCEE, presented the 2011 TFF scholarship to graduate student **Thomas Chase**. Thomas is a first year masters student conducting research on an NCDOT sponsored project on transportation system mobility and reliability monitoring.

Enhancing Resiliency of Structures to Earthquakes

CCEE Professors **Mervyn J. Kowalsky** and **James M. Nau**, along with several graduate students, have been conducting earthquake engineering research for the state of Alaska for several years. Recently, **NBC News** conducted an interview at the **Constructed Facilities Laboratory** on Centennial Campus with Dr. Kowalsky and one of his PhD students, **Steven Fulmer**, following the magnitude 9.0 earthquake in Japan. Over the last several years, six projects have been conducted with funding from the **Alaska Department of Transportation** (AKDOT), and more recently, the **Alaska University Transportation Center** at the University of Alaska, Fairbanks.

Steel Cap Beam undergoing testing at the Constructed Facilities Laboratory

The research has covered reinforced concrete and steel bridge structures and has aimed to address problems such as the effects of cold temperatures on the performance of bridges subjected to earthquakes, the effects of earthquake loading histories on bridge column performance, the behavior of steel column to cap beam connections, and starting later this year, the performance of concrete filled steel pipe piles.

Steel Cap Beam in Alaska

The most immediate impact of this work is a decision by AKDOT to suspend use of steel cap beams in moderate and high seismic regions until improved, reliable details can be developed. To date, the research team has established a possible solution and is working on several others. The team is also investigating the interaction between earthquake characteristics and reinforced concrete column performance within the context of performance-based seismic design. The research is enabled by a state-of-the-art motion capturing system that tracks the spatial position of up to 500 independent targets applied to a specimen, thus allowing for accurate calculation of large structural deformations during testing as well as other engineering parameters, such as material strains, following testing. The team will be making a second week long trip to Alaska later this year to discuss the current findings of the research program while also holding a seminar on seismic design for state structural engineers.

Geotechnical Seminar Highlights Role of Reinforced Soils and Geosynthetics

Harvey Wahls, Al DiMillio, Bob Holtz, Matt Evans, Mo Gabr, and Roy Borden

Robert D. Holtz, PhD, PE, D.GE, Professor Emeritus of Civil Engineering at the University of Washington in Seattle delivered a seminar entitled "Geosynthetic Reinforced Soil: From the Experimental to the Familiar" on April 12 at Mann Hall. His lecture was the same as the 46th Terzaghi's Lecture that he delivered during the ASCE Geo-Institute annual meeting last year. The lecture provided a historical review of reinforced soil technology and the early uses of geosynthetics for soil reinforcement in France, Sweden, and the USA. Dr. Holtz discussed successes and failures of reinforced soils structures and reasons that failures may occur. The lecture ended with several examples of successful applications of reinforced soil technology.

CCEE Constructed Facilities Laboratory Developing Better Concrete Materials

Faculty and students in CCEE, in collaboration with other universities, are developing new longer lasting structural materials with a wide variety of potential civil infrastructure and military applications. NC State hosts the multi-institutional "**Center for Integration of Composites into Infrastructure**" (CICI), sponsored in part by the **National Science Foundation** (NSF) Industry/University Cooperative Research Centers (I/UCRC) Program. The consortium includes NCSU, West Virginia University, Rutgers University, and the University of Miami. Dr. **Sami Rizkalla** is the site director for the NCSU unit which includes professors and students from the CCEE and Mechanical and Aerospace Engineering departments.

Testing of Fiber-reinforced precast concrete wall panels

The main objective of CICI is to collaborate with industry to introduce advanced-composite fiber reinforced polymer (FRP) as construction materials. These new materials address problems inherent in current construction materials, such as deterioration due to corrosion. FRP will contributes to an efficient infrastructure system, including bridges, buildings, pipelines, flood control systems, and utilities, that are essential for a sustainable built-environment and for supporting a strong economy. The primary source of funding for CICI is annual membership fees from participating companies, with each member contributing $50,000 per year. The current CICI members at the NCSU site include **Martin Marietta Composites**, **Grancrete**, Inc., **AltusGroup**, Inc., **Freyssinet**, Inc., **Fyfe Company**, LLC, **Korea Institute of Construction Technology**, **Nippon Steel Materials Co**., Ltd. (Japan), and **Spirit AeroSystems**, Inc.

The center provides unique opportunities for industry and university collaboration and for member access to state-of-the-art research facilities of the university. It also provides graduate students with the opportunity to work directly with the industry to solve real-life problems that greatly benefit the State and national economies. The research provides solutions that enhance the international competitiveness of the American industry in the area of composites, including modular construction and rapid development techniques using natural and biomaterials. These materials reduce carbon footprints and enable engineers to create safer, more durable, and less expensive structures with longer service life.

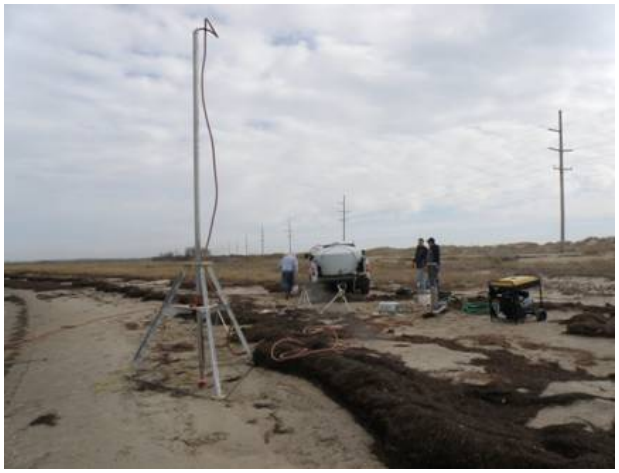
Examples of the research and development that have been implemented by the industry include the use of FRP to produce sustainable and efficient precast concrete wall panels and the use of FRP in the production of precast pre-stressed concrete double tee members commonly used for parking structures.

Load testing of a lightweight composite flatbed truck trailer

Based on research and development conducted with **Martin Marietta Composites**, new 3-D composite sandwich panels were developed and used to construct fully composite trailers, which are 70 percent lighter in weight than steel trailers. The weight reduction conserves energy consumption and reduces the shipping cost of industrial goods. The center has also proposed the use of a new material produced by **Grancrete** as an adhesive for the repair and strengthening system for concrete structures. It is an effective replacement for epoxy, which is sensitive to temperature and is not fire resistant. Additionally, the center has investigated the use of new, natural fibers such as basalt, which are economical and are promising as reinforcements for concrete structures.

The center has extended its research internationally and is currently collaborating with research agencies in Japan and Korea to explore the use of FRP materials for strengthening of civil engineering infrastructure and for new, innovative structural systems.

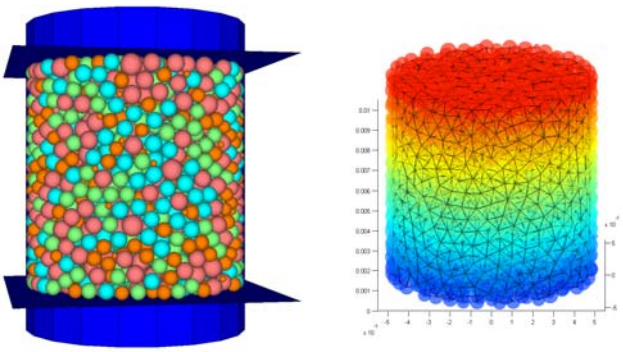
In the Spotlight: Geotechnical Engineering



Faculty and students from the Geotechnical Engineering group use a new scour probe to test the erodability of sands near Buxton, NC. Results from these tests can be used to predict the scour potential of soils around bridge piers.

The **Geotechnical Engineering** (GE) group has four full-time faculty members and one active emeritus professor and is involved in research, teaching, and service in the CCEE department. GE faculty members seek to provide a robust education to our undergraduate, graduate, and distance education students while performing research that has direct local, statewide, and national impact, both now and in the future. We expect that graduates from our program will be well-versed in classical geotechnics – such as foundations, earth dams, walls – and also in areas of emerging importance to geotechnical engineers and the world as a whole – such as alternative energy, resource recovery, sustainability of the built environment, and carbon sequestration. In short, the modern geotechnical engineering graduate from NCSU should be capable of solving current problems related to the continuing development of our nation's infrastructure and have the knowledge and creativity necessary to solve emerging problems whose parameters may not yet be well-defined.

Research and teaching activities by the GE faculty span a range of applications and spatial scales, including theoretical, numerical and experimental work on topics such as foundation design, soil and site improvement, seabed mechanics, geosyntheics, and granular mechanics. Experimental research ranges from the specimen scale to full field-scale testing of concepts. The GE group makes extensive use of the large-scale geotechnical lab at the NCSU **Constructed Facilities Laboratory** (CFL), including the fluidized test bed and fully-instrumented model-scale test pit, to study diverse topics from bridge scour to the drainage characteristics of unsaturated geosynthetics. In the small-scale laboratory, we make measurements of fundamental material properties including shear wave velocity, thermal conductivity, and moisture retention characteristics of natural soils, granular mixtures, and geosynthetics. Our theoretical and computational work is equally diverse, as we work on topics such as seabed mechanics, fuzzy-neural network models, the multiphysics response of granular assemblies, extraterrestrial geomechanics, and the mechanics of partially saturated soils. Through this work, we seek to provide solutions to problems that arise as geotechnical practitioners continue to engineer the interface between the natural and built environments.



A numerical assembly of a collection of spheres (L) and the computed thermal field for heat flow from top to bottom (R). Thermal conductivity in soils has a significant role in applications such as ground source heat pumps, carbon sequestration, and underground waste disposal.

Preparation of Students for Professional Practice: The GE group seeks to educate not just future geotechnical engineers, but all future civil, construction, and environmental engineers in our program. Students are required to have a firm grasp of theory and the fundamentals of geotechnical engineering, which enables them, as practicing engineers, to solve new and complex problems. Because soil mechanics and geotechnical engineering involve a degree of empiricism, we also impart to our students an appreciation for the importance of engineering judgment and exploitation of existing local knowledge. GE graduates are hired by geotechnical consulting firms, federal, state, and local transportation authorities,

Geotechnical Engineering (cont'd)

drilling and construction contractors, research centers, and other universities. Many also become active in professional societies, including recent past President of the American Society of Civil Engineers (ASCE), Dr. **William Marcuson, III**, who received his Ph.D. in civil engineering from NCSU.

Research Activities: The diverse research activities of the GE group include projects that range from sub-millimeter to engineering scale. A common theme is to improve the safety, sustainability, and economic feasibility of new and existing geostructures. The group is currently engaged in engineering-scale projects on the chemical and mechanical stabilization of soft subgrade soil, development of new sensors for assessment of scour potential, determination of performance limit states for protective earth structures for improving vulnerability assessment and efficacy of retrofit measures, improvement of subsurface moisture and capillary barriers for extending the service life of roads, and multi-scale mechanics of extraterrestrial geostructures. Small-scale research in the GE group focuses on the fundamental behavior of granular materials, including thermal properties, small-strain response, stress path dependency, and shearing behavior adjacent to a continuum counterface. Applications of this work include development of engineered soil mixtures for backfills and soil improvement, improved field-scale design procedures for geomechanical interfaces (e.g., friction piles, gravity walls), thermally active geostructures (e.g., energy piles and ground source heat pumps), and design of geosystems when only incomplete site information is available (e.g., in remote regions or on other planets). Funding for the group has come from the National Science Foundation, the National Aeronautics and Space Administration (through the NC Space Grant Program), the Department of Energy, the Department of Defense, the Department of Homeland Security, the Environmental Protection Agency, the Federal Highway Administration, and the North Carolina Department of Transportation. Faculty in geotechnical engineering collaborate with faculty from a variety of other programs at NCSU, including Mechanical and Aerospace Engineering, Physics, Zoology, Biomedical Engineering, and Forest Biomaterials. The GE faculty also collaborate with other geotechnical engineers across the state, across the country, and around the world.

Solar-powered remote data acquisition, storage, and transmission infrastructure for a piezometer installation at Lake Raleigh Dam.

Extension and Public Service: Members of the GE group are actively involved in service to the community and the profession. Dr. **Mohammed A. Gabr** is an Editor of the ASCE *Journal of Geotechnical and Geoenvironmental Engineering* and an Editorial Board Member of the ASTM *Geotechnical Testing Journal*. Dr. **Matt Evans** is webmaster for the United States Universities Council for Geotechnical Education and Research and also faculty advisor for the NCSU chapter of Engineers Without Borders. All members of the group are actively involved in professional committees and the review of manuscripts and proposals for a variety of archival journals, professional conferences, and national and international funding agencies.

Highly Distinguished GE Faculty: The GE group is fortunate to be home to several highly distinguished faculty, including Emeritus Professor **Harvey Wahls**, an Honorary Diplomate of the Academy of Geo-Professionals, and Alumni Distinguished Undergraduate **Professor Mohammed A. Gabr**.

CCEE Department History—Buildings: 1928—1963

Civil Engineering Building
ca. 1947 (Archives image 5016)

By the 1920s, Winston Hall, shared by Civil Engineering and other departments, was no longer meeting the needs of the program. Construction of a new facility, named the **Civil Engineering Building**, was started in 1927 and completed in the fall of 1928. Designed and engineered by the firm Hobart Upjohn of New York, it was initially a two story building located south of the 1911 Dormitory and joined to the previously constructed Physics and Electrical Engineering (EE) Building by a connecting wing housing the EE Machinery Lab.

The new CE Building was described at the time as follows: "The first floor is occupied on the south end by the Engineering Experiment Station, consisting of the offices of the Director, laboratories, and museum. The west side is designed for the library, student records, and student chapter of ASCE. The north end contains the highway laboratory and computation rooms, with modern equipment and apparatus's for this division. The east side provides for department shops and surveying instruments. On the second floor are the offices and class rooms, two large drawing rooms, a general assembly room, permanent records rooms, and blue print room." From 1928 to 1950, the building also housed the office of the North Carolina Board of Registration for Engineers and Land Surveyors (now Board of Examiners). First, it was simply in the offices of Professor Harry Tucker and then Professor Carroll Mann who served consecutively as Board Secretary for many years and then in a dedicated office space.

Physics & EE left, CE Building right
ca. 1934 (Archives image 2510)

After World War II, NC State was flooded with students as military personnel returning from service sought to catch up on their delayed education. Demand for graduates increased rapidly due to the construction boom that soon followed and the two story building was short on space for the programs offered. Experimental laboratory space for education was needed to support the increased specialty areas and the expanding research to meets the State's construction needs. The Engineering Experiment Station space evolved to a **Materials and Structures Lab**. A view of the lab shows an array of testing equipment, including one item still in service today. Visible to the left of the column is the BLH universal testing frame manufactured in 1947 that, after multiple control system replacements, still serves the materials and construction engineering labs in the current building.

Materials and Structures Lab
ca. 1949 (Archives image 5038)

Civil Engineering Building
ca. 1953 (Archives image 4111)

In 1951, construction began on two additional floors and renovation which would be completed in 1953 for $762,601. The architectural and engineering design was by Northup & O'Brien of Winston-Salem and Southeastern Construction was the general contractor. Among the features of the added space was a large lecture hall on the 4th floor. The enlarged building, long called the Civil Engineering Building, was dedicated on November 16, 1956 and renamed **Mann Hall** in honor of Civil Engineering alumnus, Professor, and Department Head **Carroll Lamb Mann** in recognition of his 47 years of continuous service to teaching, devotion to NC State, and his work to advance the profession of engineering.

Mann Hall Air Photo Lab
ca. 1950's (Archives image 8229)

This article is one of a series intended to describe the department's history. The first few will focus on the buildings that have served as our homes followed by other articles on faculty, students, development of programs, and educational and research facilities. In parallel, a history section will be developed on our website. We are indebted to the NC State Libraries Special Collections Research Center for permission to use the images included. If you have photo images of old Mann Hall activities, the current Mann Hall under construction or in use that you could share, please contact the writer David Johnston (johnston@ncsu.edu) with a description.

CCEE Advisory Board Reviews "State of the Department"

The Civil, Construction, and Environmental Engineering Department **Industry Advisory Board** met on April 14 in Mann Hall. The first order of business was to thank past board members **Bob Wright** (BSCE Const. Option '68), **Smedes York** (BSCE '63), **John Brantley** (BSCE Const. Option '64), **Jack McDonald** and **Tim Clancy** for their years of service to the department and the board and welcome new members. New board members are: **Sepi Asefniaza**, **David Simpson,** and **Tony Warner**. Dr. **Barlaz** presented the "State of the Department" and discussed new faculty appointments and challenges for the next fiscal year. The Board met with faculty members for updates on ABET accreditation, curricula, newsletter, the department's website, and spent time with student leaders. The board members were on hand to attend the opening ceremony for the **Carolinas Conference** as well as volunteer for events during the competitions.

The next meeting of the Advisory Board will be held on September 26, 2011 in conjunction with the **Zia Lecture**.

CCEE Industry Advisory Board — 2011 - 2012

- **Sepi Asefnia**
  (BS BioAg '85; BSCE '93)
  SEPI Engineering & Construction
  Raleigh, NC
- **Suzanne M. Beckstoffer** (BSCE '82)
  Newport News Shipbuilding
  Newport News, VA
- **Thomas W. Bradshaw, Jr.**
  Morgan Stanley Smith Barney
  Raleigh, NC
- **Thomas C. Church, Jr.**
  (BSCE Const. Option '64)
  Ashland Construction Company
  Raleigh, NC
- **Michael W. Creed**
  (BSCE '73; MSCE '84)
  McKim & Creed
  Raleigh, NC
- **Barry W. Gardner**
  (BSCE Const. Option '75)
  Shelco Construction Company
  Raleigh, NC
- **Michael B. Gwyn** (BSCE Const. Option '80; MSCE '94)
  CCEE Board Chair
  Benham Constructors, LLC
  Charlotte, NC
- **John T. Jenkins II** (BSCE '90)
  Stewart Engineering
  Raleigh, NC
- **Samuel O. McCachern** (BSCE '85)
  Thomas & Hutton
  Savannah, GA
- **Richard Rohrbaugh** (BSCE '81)
  Kimley-Horn Associates
  Raleigh, NC
- **Elizabeth A. Sall** (BSCE '03)
  San Francisco County Transportation Authority
  San Francisco, CA
- **David Simpson** (BSCE '81)
  Simpson Engineers & Associates
  Cary, NC
- **Eliza Jane Whitman** (BSCE '89; MSCE '91)
  Parsons
  Pasadena, CA
- **Tony Warner**
  (BSCE Const. Option '66)
  Warner Construction
  Rockville, MD

Lunch-and-Learn at Stewart Engineering

On March 23, Dr. **Mort Barlaz** attended a lunch-and-learn session at the Raleigh headquarters of **Stewart Engineering**. Approximately 20 NC State alumni, mostly from the Department of Civil, Construction, and Environmental Engineering heard the latest news of the College of Engineering and the "State of the Department." Dr. Barlaz spoke of the success he has had since becoming Department Head in August and the challenges that are ahead. At the end of lunch, **John Jenkins** (BSCE '90) thanked Dr. Barlaz and presented him with a financial donation from the alumni present at the event along with a matching gift from **Stewart Engineering**. The donation was designated for discretionary use by Dr. Barlaz to help with the current needs of the Department.

Dr. Barlaz accepts donation from John Jenkins of Stewart Engineering

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.

Clancy & Theys Construction Company is particularly pleased to be ***Firm of the Month*** at North Carolina State University's Department of Civil, Construction, and Environmental Engineering, where its roots are deep.

Company founder **E.I. Clancy** graduated from State College as a Civil Engineer in 1938. Equipped with a fine education, he worked for the U.S. Geological Survey on New Deal Power Plants for the Tennessee Valley Authority, and for the Civil Aeronautics Administration on Alaskan airfields during World War II. He and brother-in-law **John Theys** were eager to make a positive mark on the world after their wartime duties. They started **Clancy & Theys Construction Company** in 1949. Among the company's very first non-residential projects was the construction of a barn for NC State in 1951. The company has built or renovated buildings for the University in every decade since that time.

Tim Clancy

Mr. Clancy's sons, **Tim** and **Tick**, have led the company since 1986. **Tim** is President and **Tick** is Executive Vice President. Since they took over, Clancy & Theys grew from $30 million in annual volume to a recent peak of nearly $600 million. Geographic expansion was part of the growth strategy, and NC State graduates started three of the company's four divisional offices.

The NC State connection is still very meaningful to the company beyond E.I. Clancy's legacy, according to Tim Clancy. "We have many key employees who are State graduates, and we always have," he says. "I've stayed in contact with the College of Engineering by serving on the Board of Advisors for Civil, Construction, and Environmental Engineering. Tick and I also had the company endow a student scholarship and a professorship in Civil Engineering."

Clancy & Theys entered a new era of construction delivery methods with NC State when it added to and renovated David Clark Labs in 2005. That project, and most other major construction projects, are now delivered with a Construction Manager at-Risk approach, where the contractor provides detailed planning, analysis and cost modeling during the design of the project. Clancy & Theys is proud to have built Engineering Building II on the Centennial Campus, and it recently finished SAS Hall for the College of Physical and Mathematical Sciences, as well as the renovation of Park Shops and realignment of Stinson Drive.

"We've come a long way from building pole barns for NC State," says Tim Clancy. Clancy & Theys is a leader in the use of 3-D modeling technology, its leaders say. "On our next project for State, we'll use a cutting-edge system of Building Information Modeling and Virtual Design Construction, which has become the norm on our major projects."

Your Company name and logo could appear here — Sponsorship opportunity...

We hope you have enjoyed receiving the *CCEE News*. Interest in the newsletter is growing steadily, and we have had many requests for a hard copy version to be made available for our alumni and friends. Our goal is to print 500 copies of each newsletter, and we are looking for a sponsor to cover the cost of printing or who will print it for us.

Sponsorships are available on an annual basis. The first time you sponsor a newsletter, we can include an item in the newsletter about you or your company to introduce you to our alumni. In each subsequent issue, space permitting, we can feature a short blurb along with your company name and logo. For additional information please contact **Lora Bremer** at 919-513-0983 or **lora_bremer@ncsu.edu**

Firm of the Month: Views from Participating Firms (cont'd)

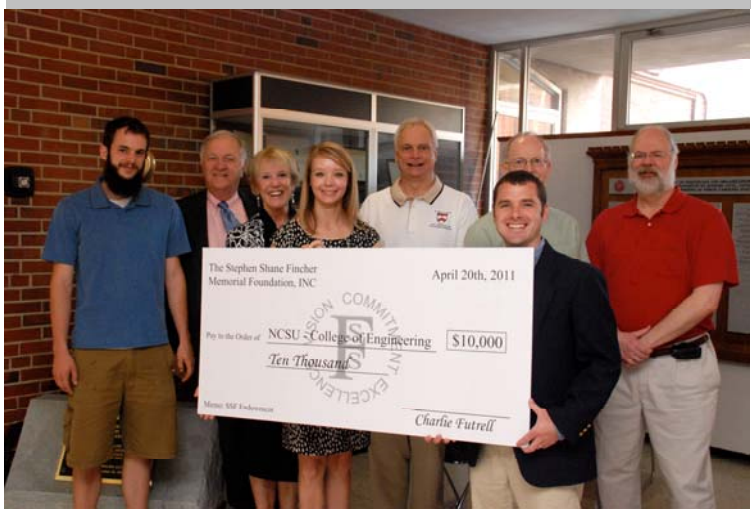
Raymond Bryan, Jr.

T.A. Loving Company was honored to be selected as "Firm of the Month." T.A. Loving Company has a long history with North Carolina State University, starting with **Raymond Bryan, Sr**. who attended NC State in the College of Engineering and who received the 1957 **Alumni Association's Meritorious Service Award** and the 1977 prestigious **Watagua Medal**.

Today Chairman of the Board **Raymond Bryan, Jr.** (BSCE construction option '53) overseas its executive team where all but one are graduates of the Department of Civil, Construction, and Environmental Engineering. Mr. Bryan has continued in his father's footstep by returning back his time and good fortune to North Carolina State University. Mr. Bryan is a past member of the NC State Engineering Foundation Board and engineering advisory council, past president of the Wolfpack Club, a lifetime Alumni Association member, and a member of the Peele and Pullen Societies at NC State. Mr. Bryan is also honored to be the recipient of the North Carolina State **Distinguished Engineering Alumnus Award** for recognition of Outstanding Achievements that have brought distinction to the Profession of Engineering and to North Carolina State University. "I am extremely proud of my involvement with NC State and the quality of the students who have graduated from here and who have gone on to become successful and contributing members to T.A. Loving Company."

T.A. Loving Company is currently one of the largest privately held companies in North Carolina and is consistently ranked among the top 400 general contractors in the nation. T.A. Loving Company has become a leader in the construction of healthcare and university facilities. The company is headquartered in Goldsboro, NC and has a branch office in Morrisville, NC.

Stephen Shane Fincher Memorial Foundation



Jared Brewer (scholarship winner), **Harry Sherrill** and **Carolyn Fincher** (parents), **Jennifer K. Fincher** (Board member), **Jim Nau**, **Vernon Matzen**, **Richard Gephart** (Board member), and **Mike Leming**

A check in the amount of $10,000 was presented to the Department to complete funding of the endowed scholarship established in honor and remembrance of **Stephen Shane Fincher** (BSCE '88). These scholarships provide financial assistance to students pursuing Bachelor's, Master's, or Doctoral degrees in civil engineering at NC State University. Last year the SSF Foundation awarded their first two scholarships to **Jared Brewer** and **Bryant Miller**.

Additional information about the SSF foundation can be found at:
http://stevefinchermemorial.com/index.html

Alumni Updates

- **Michael Corry** (BSENE '98) began working for the U.S. Army Public Health (command Region-Europe) in November 2010 as a **Drinking Water Program Manager.** Corry is based in Landstuhl, Germany where he supervises a team of both military and civilian engineers, scientists, and technicians who support the Department of Defense's overseas environmental compliance program, ensuring safe drinking water throughout Western Europe.
- **John Cameron** (BSCE '63; MSCE '68; PhD '75) is currently a Managing Partner with **TransTech Management, Inc**. in Greensboro, NC. He has also worked as Deputy Secretary with the **NC DOT** and as a partner with **Ernst & Young**. He has served as Chair of the **ITRE Advisory Council**, Chair of the **Louisburg College Board of Trustees**, and as a Member of the **NC Community Foundations Board**. He married Joan Mabes in 2009 and has four sons and one daughter.
- **Keith Overcash** (BSCE '73) retired on July 1, 2010, after 37 years with the **Department of Environment and Natural Resources**. He spent the last 8 years of his career as Director of the **NC Division of Air Quality**. All of his time with the state was in either the water quality or air quality fields. He received a **Lifetime Achievement Award** (first one ever given) in April 2010 from the **Carolinas Air Pollution Control Association** (CAPCA). He was also awarded The Order of the **Long Leaf Pine** by Governor Perdue upon retirement last June.
- **Mark T. Spencer** (BSCE '77) lives in Indianapolis and has worked in the pharmaceutical industry for the past 20 years.
- **Jay Dawkins** (BSCE '10) is working for **Stantec Consulting** and has recently joined **Hodge & Kittrell Realtors** as a part-time broker.

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

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. This issue was produced by Chris Frey, Editor and Bonnie Diaz, Managing Editor. Additional contributors to this issue are: Warren Atkinson, Mort Barlaz, Lora Bremer, Matthew Evans, Mo Gabr, David Johnston, Mervyn Kowalski, Paul Khosla, Min Liu, Vernon Matzen, Irving Nazario, Roberto Nunez, William Rasdorf, Sami Rizkalla, Rudy Seracino, John Stone, and Billy Williams.