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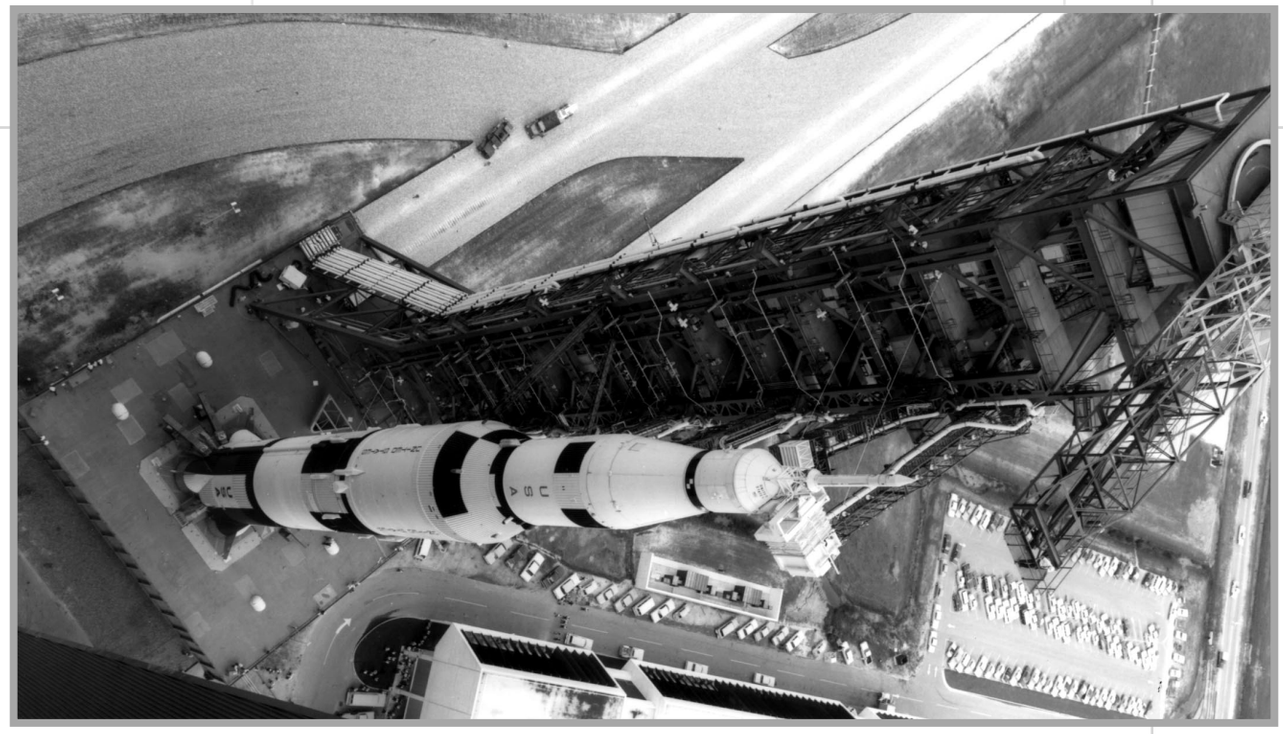
NC STATE UNIVERSITY



# CIVIL ENGINEERING NEWSLETTER

2001

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## ABOUT THE COVER

### *A Tradition of Excellence*

Considered by many as the greatest technological achievement of the 20th century, the moon landings of the Apollo program were made possible by scientists, engineers, and other highly skilled individuals devoted to overcoming complex challenges. **Colonel William "Bill" D. Alexander III** *(CE 1953)*, the 1976 recipient of the College of Engineering's Distinguished Alumni Award, contributed his engineering skills to this effort in the 1960s as project manager for the design of the Launch Support Facility. The facility includes the Crawlerway, the Launch Control Center, and the Vehicle Assembly Building (VAB).

The cover photograph was taken from inside the top of the VAB, looking down toward the 4-story Launch Control Center on the right and the Crawlerway on the left. In the center on the Crawlerway is the Saturn V rocket mounted on the Mobile Launch Platform and Crawler-Transporter. The Crawlerway is composed of two parallel lanes, each 40 feet wide and 7 feet deep. Each lane contains 2.5 feet of hydraulic fill, 3 feet of graded limestone, 1 foot of selected fill, asphalt sealer, and 6 inches of river rock on the surface to reduce friction. The VAB, which is over 50 stories, is constructed of 98,590 tons of steel and 65,000 cubic yards of concrete. It sits on a foundation of 4,225 open-end 16-inch-diameter steel pipes, which were driven 160 feet into bedrock.

We are proud to be able to claim Col. Alexander as our alumnus, and we plan to feature projects of other Distinguished Alumni in future issues of our newsletter. These historical achievements illustrate the tradition of excellence in civil engineering and the individual contributions of just a few of our many outstanding alumni.

## DEPARTMENTAL MESSAGE

The destruction of the World Trade Center Towers on September 11 has shaken the sense of security Americans had taken for granted. Our worldview has changed—perhaps forever. As a nation we are turning our energies to preventing potential future losses. As engineers and educators, we have an important responsibility to help make this happen. Various activities along these lines are underway in our department.

*Downey Brill*

**Debra Laefer**, one of our newest faculty members, will be teaching a class in the spring called "Protection of Critical Infrastructure and Populations from Terrorist Attack." Her policy-oriented class is designed to provide engineers and non-engineers with general technical background on high explosives, chemical compounds, and biological agents and their potential impacts on infrastructure and populations. One of her goals is to generate and examine policies and management approaches, taking into account technical and logistical issues. Lectures will involve technical and policy professionals working full-time in these areas.

Through coordination with Dr. Laefer and her seminar on protection of civil infrastructure, **John Stone** will guide the Senior Transportation Project Class through an examination of transportation planning and design issues regarding an emergency on a public transportation facility. The senior students will assess threats, risk, and vulnerability of the study area; analyze transportation impacts; and recommend proactive protection measures, emergency response, and recovery measures.

John Stone, Debra Laefer, and **Nagui Rouphail** intend to explore protection of highway infrastructure that is vulnerable to damage and disruption. Their approach will produce an identification method and a prioritized list of high-risk transportation facilities. Next, they intend to generate a detailed case study that combines the threat assessment method with transportation network models to test existing emergency preparedness, procedures, and plans. The case study will also test proactive countermeasures (such as highway surveillance devices) and post-attack emergency response strategies for diverting traffic and repairing damaged facilities.

Other related research is in the area of structural materials and design. One example is the work on using fiber-reinforced polymer materials to wrap and retrofit existing structures to prevent excessive damage. The feature article on some of the work underway in the Constructed Facilities Laboratory provides more details.

We hope that these projects and other current and future projects will help restore the sense of security our country once enjoyed.

## SPECIAL CAMPUS FEATURE

### ⏮ CFL Enters New Era of Partnership with Industry and Government

The Constructed Facilities Laboratory (CFL) on Centennial Campus was opened four years ago. Under Director **Sami Rizkalla**, it is organized and ready to serve the local and national industrial sectors, as well as the Departments of Transportation in the southeastern United States and the Federal Highway Administration. The CFL is currently staffed with an administrative assistant, two technicians, three research associates, and over 25 graduate students.

**Amir Mirmiran**, who recently joined the Civil Engineering Department as a professor of structural engineering, was appointed director of Technical Service and is working closely with faculty and staff to manage the facilities and to serve the industrial community and government agencies such as the North Carolina Department of Transportation.

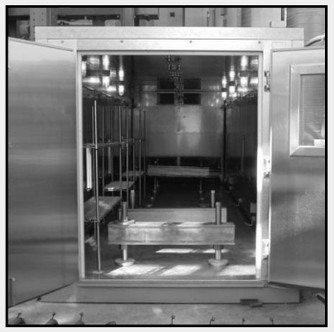


*Fig. 1. Environmental chamber*

*Fig. 2. GFRP bridge deck*

*Fig. 3. Aluminum truss joint strengthened with CFRP/GFRP*

*Fig. 4. Masonry walls*

The CFL, outfitted with state-of-the-art testing equipment under a National Science Foundation grant obtained by **David Johnston**, **Roy Borden**, **Paul Khosla**, and **Leonhard Bernold**, is considered to be a premier testing facility in the country. The equipment includes a unique environmental chamber *(Fig. 1)*, which is now in full operation and can be used to test large-scale structural components subjected to severe environmental conditions such as salt spray, cycling humidity, cycling temperatures, and various loading conditions to evaluate the performance of new products or an innovative structural system. The new shake table is also in full operation; it is used to examine structures under simulated earthquake excitation.

Companies already are signing on to work with the CFL. Martin Marietta of North Carolina is developing a new generation of bridge deck from glass fiber-reinforced polymer (GFRP) materials *(Fig. 2)* as an alternate to conventionally reinforced concrete bridge decks. Use of these materials provides solutions to the civil engineering infrastructure "crises" of deteriorating structures caused by corrosion of steel. Fyfe Company, based in California, is working with Dr. Rizkalla to develop a new technique to strengthen concrete, masonry, and aluminum structures. Some of the work includes using carbon and glass fiber-reinforced polymer (CFRP/GFRP) to strengthen aluminum truss joints as shown in Fig. 3. These materials are six times the strength of steel, non-corrosive, and also 20 percent lighter. For the last ten years, the materials have been researched and used by Drs. Rizkalla and Mirmiran for rehabilitation of several bridges.

Bally Refrigerated Boxes, Inc., a Morehead City producer of environmental chambers and refrigeration units, is in consultation with the CFL to examine quality control and new code applicability for new lines of composite panels. Another company, MMFX Steel, Inc., headquartered in Charlotte, is considering an alliance with CFL to test their new high-strength, non-corrosive steel reinforcement bars and cables.

Drs. Rizkalla and Mirmiran also are currently working on using fiber-reinforced polymer (FRP) materials produced in a very thin-sheet configuration, which can be used as "wallpaper" to wrap and retrofit existing structures to prevent excessive damage caused by terrorist attacks and bombing.

Another example of many projects underway at the CFL is research on innovative design schemes to increase the resistance of masonry structures subjected to earthquake loads, which involves testing of full-scale masonry walls *(Fig. 4)*. **Mervyn Kowalsky** heads this project, which is sponsored by the National Science Foundation Partnership for Advanced Technology in Housing.

The CFL is in the process of obtaining certification from the International Conference of Building Officials (ICBO). The ICBO certifies laboratory management and proper calibration of equipment according to the International Organization for Standardization. This certification benefits the CFL because it could provide industry with product approval according to official testing methodology and equipment certified both nationally and internationally.

For more information about any of the above projects, CFL services, and equipment, please contact Dr. Sami Rizkalla at the Constructed Facilities Laboratory, North Carolina State University-Centennial Campus, Campus Box 7533, Raleigh, NC 27695-7533 (e-mail: Sami_Rizkalla@ncsu.edu).



# DEPARTMENTAL NEWS

## Construction Program Support

The **Triangle Chapter of the Professional Construction Estimators Association** has continued its history of assisting the Construction Engineering and Management program in meeting a matching gift requirement for purchase of new educational equipment. The chapter contributed $1,000 toward the purchase of new computer estimating equipment that was matched by the College of Engineering. This equipment is used in several courses by Construction Engineering and Management (CEM) majors.

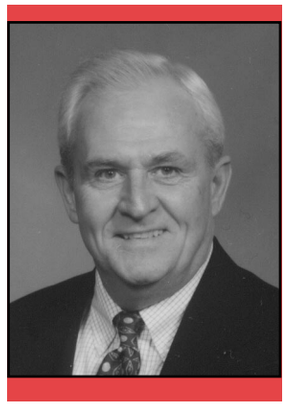
The **North Carolina Licensing Board for General Contractors** has provided a gift to the NC State Engineering Foundation to enhance department programs related to construction. With encouragement of the Board, the Foundation is making these funds available for development activities toward an Institute of Construction. The funding from the Licensing Board is allowing important opportunities for CEM program equipment matching in response to challenge grants, for seed support to potential construction research studies, and for development of industry training programs. The Department, with backup funding of the Institute, has established a second Construction Extension Specialist position to expand these activities. For example, industry seminars recently have been developed and presented on the new *Standard for Bracing Masonry Walls Under Construction, on What Engineers and Architects Should Know About OSHA, and on Wood Design Fundamentals*. These activities provide a return to the industry giving the support, both in direct industry continuing education available and in enhancing the education of future industry leaders. Our thanks to the Board for this support.

## Barnhill and Mulkey Join NC State Engineering Foundation Board

The North Carolina State Engineering Foundation board welcomes two civil engineering graduates to its ranks. New members **Kelly Barnhill** and **Barbara Mulkey** join fellow CE's **Steve Browning**, **Glenn Futrell**, **Berry Jenkins**, **David G. Jones**, **Henry Liles**, **Deborah Pannell**, **Roger Scovil**, and **Bob Wright** on the board. These two newest members are profiled in this year's newsletter.

A Greenville, North Carolina native, **R. Kelly Barnhill Sr.** (BSCEC '65), has always appreciated the practical aspect of his education. His first position with Honeywell Commercial Control immediately put to work his construction and estimation courses from NC State. This usefulness carried over several years later, as Mr. Barnhill expanded his family business, Hendrix-Barnhill Co. Inc., from equipment sales into construction. "Basic engineering courses are helpful," he says, but the hands-on courses of estimating, surveying, and concrete construction were the ones on which he relied as he built his company into a strong presence in the region. Mr. Barnhill also stresses the need for communication skills, as well as knowledge of accounting and economics in his work. To date, his service on the NCSU Board of Visitors has been his most rewarding involvement as an alumnus. However, as a member of the North Carolina State Engineering Foundation, Mr. Barnhill feels he may be able to contribute even more than before. He feels his experience in running his own firm and taking care of its investments provides him with particular strengths suitable for the Foundation's investment committee. With the large amount of money the Foundation controls, he believes it is paramount to ensure the best return on those funds for the overall good of the Foundation.

Mr. Barnhill's son, **Kelly Barnhill Jr.** (BSCE '89), has carried on the family's commitment to engineering and now serves as president of Hendrix-Barnhill Co. Inc. As current president of the Professional Engineers of North Carolina (PENC), Mr. Barnhill Jr., is focused on raising the image of the engineer through PENC's support of the national organization's "American Engineering Campaign."



*R. Kelly Barnhill Sr.*

**Barbara H. Mulkey** (BSCE '77, MCE '84) is President and CEO of Barbara H. Mulkey Engineering, Inc., in Raleigh, North Carolina. Ms. Mulkey will lend her expertise to the Foundation's marketing committee. The success of her engineering firm speaks to her marketing skills.

Ms. Mulkey took her home-based business that she began in 1993 and turned it into a successful 145-employee full-service engineering firm. She and her partner, **W. S. "Bill" Hood** (BSCEC '83), decided early to

*Barbara H. Mulkey*

create an atmosphere that attracts and keeps cream-of-the-crop employees. To get high-quality clients, they recognized that they needed high-quality employees. One way they attract and retain those employees is by keeping pace with technology—their people always have up-to-date equipment and software and know how to use it. Another way is being sensitive to the needs of their employees by creating perks such as flextime.

Because marketing is her "great love," Ms. Mulkey is excited to be on the Foundation's marketing committee. She particularly likes the "challenge of being creative within a limited budget." She is very interested in how to attract and retain students and maintain their loyalty as alumni.

She believes that CAD, public speaking, and technical writing skills make students more competitive in the job market. Economics and law courses related to engineering help prepare students for management tasks. Understanding politics is important, too. According to Ms. Mulkey, various lobbies always are pushing for the interests of their industries, so engineers must make sure that their interests are not diluted. "An email or a phone call to a representative does make a difference." Ms. Mulkey also is interested in raising the public view of NC State's contributions. As she puts it, "NC State already has the status and quality, but we could learn how to toot our own horn so that people know who we really are and what we really do."

### ABET Advisory Committees Meet

The Accreditation Board for Engineering and Technology (ABET), the national accrediting body for engineering programs, has created a new accreditation procedure designed to promote continual improvement in academic engineering programs. A crucial step in this procedure is to identify the program educational objectives that will establish the goals by which our Bachelor of Science programs will define and gauge their continual improvement. Because the program educational objectives should reflect the needs of the graduates and their employers, three ABET Advisory Committees have been formed, one for each of the department's degree programs. A total of 22 professionals from private practice and government will represent the various constituencies of our programs. The three ABET Advisory Committees held their inaugural meetings in the department on Wednesday, October 24 to review the ABET general criteria and to discuss the educational objectives for each program. Draft objectives for the three programs can be accessed at our Web site: **www.ce.ncsu.edu/abet/.**

*ABET advisory members at work*

*Civil engineering students from Venezuela*

### Venezuelan Senior Program

Many students attend summer school, but few travel to another country to do so. A group of civil engineering students from Venezuela did just that—they came to Mann Hall for summer school in July and August. The Civil Engineering Department hosted the first Civil Engineering Summer Practicum for 19 senior engineering students from the Universidad Católica Andrés Bello (UCAB) in Caracus, Venezuela. This international program began last year with a conversation between **Downey Brill** and his civil engineering counterpart at UCAB, **Jose Ochoa**, to build a bridge between continents with great potential for additional participation in faculty exchanges, research collaboration, and graduate programs.

In early 2001 **John Stone** and Jose Ochoa worked out the details of the Civil Engineering Summer Practicum. Over three weeks **Joe Hummer**, **Dan Loughlin**, **Jim Nau**, **Mervyn Kowalsky**, and TAs **Krista Tanaka**, **Greg Saur**, **Kevin Wilkins**, and **Matthew Modlin** presented a variety of topics—traffic engineering, geographic information systems, structures, earthquake design, air quality, and waste management. Others, including **Roberto Nunez** and **Burt Tasaico** (NCDOT), lent support on field trips and socials. According to Dr. Stone, the primary goal of the program is to open lines of communication between NC State and the Venezuelan University. "We appreciate the opportunity to work with such great students," he said. "We hope to expand the program next summer to other universities now that this exchange has been established."

## THE STUDENT REPORT

### The American Society of Civil Engineers Student Chapter Report

The ASCE student chapter enjoyed an exciting 2000–2001 academic year under the direction of officers **Ashley Miller** (president), **Christina Hearn** (vice president), **Jason Pace** (secretary), and **Josh Davis** (treasurer), and faculty advisors **Allen Chao** and **Mervyn Kowalsky**.

This year's ASCE Carolinas' Conference competition was a big hit. Civil engineering students from throughout the southeast competed at UNC-Charlotte on March 30–31 for the bragging rights of being the overall Carolinas' Conference Champions. During the conference, ten teams competed in several events, which included the concrete canoe and steel bridge competitions. NC State placed second this year in the regional canoe competition. In this event, schools are judged not only on the racing of the canoes but also on a five-minute presentation, a display, a paper about the canoe, and a final-product judging on the canoe and its construction.

NC State's second-place win enabled them to attend their third consecutive national Concrete Canoe Competition, which was held in San Diego, California, on June 14–16. The team's goal was to keep improving on the previous years' results. The team took 15th place overall, which was an improvement over last year's 17th place finish.

*June 2001 National Concrete Canoe Competition Team (clockwise from top): Kristen Knieriemen, Leigh Morris, Brian Alexander, Ashley Miller, Jason Wimberly, David Myrick, Erskine Brooks, Mark Johnson, team advisors Jim Nau and Ed Weaver, Kim Grau, Anna Cook, Doug Cubbage, Jason Pace, and Meghan Rider*


*Left image ~ March 2001 Carolinas' Conference Concrete Canoe Competition (l to r): Angela Keller, Jason Pace, Kristen Knieriemen, and Doug Cubbage are congratulated by Team Captain Erskine Brooks (standing) after a successful four-man coed sprint race*

The chapter had a successful year and plans to get involved in more charitable activities and participate in fund-raising drives in 2001–2002. ASCE's efforts in Fall 2001 have already sparked ASCE's membership to grow to 140 members. Officers for 2001–2002 are president **Jason Pace**, vice president **Doug Cubbage**, secretary **Josh Davis**, and treasurer **Erskine Brooks**.

## The Associated General Contractors Student Chapter Report

Under the leadership of their officers, AGC student chapter members enjoyed an active year in 2000–2001. Chapter officers were **Meredith M. Nasekos** (president), **Josh Lipsky** (vice president), **Kimberly Grau** (secretary), **Brian Alexander** (treasurer), and **Scott Smart** (publicity).

Activities this year included faculty/student officer meetings at the start of each semester to choose and discuss possible topics and speakers for the luncheon speaker series, a week-long membership drive during the second week of classes, attending the luncheon speaker series featuring leaders from the construction industry, joining the NAHB student chapter in attending the International Home Builders Show in Atlanta, and celebrating the scholarships received by several officers and members from construction-related endowments. Chapter members look forward to another active year in 2001–2002 with their new officers: president **Meghan Rider**, vice president **Eric Brinker**, treasurer **Andy Singleton**, and public relations chair **Hannah Randall**. Faculty advisors are **Ed Weaver** and **Roberto Nunez**.

## Alexander Receives Outstanding Senior Award

**Brian F. Alexander** of Franklin, North Carolina, received the 2001 Carolinas Associated General Contractors Outstanding Senior Award in Construction. Alexander received this award for his outstanding academic achievement and his involvement in the AGC student chapter. He majored in Construction Engineering and Management.

## The Air & Waste Management Association Student Chapter Report

The A&WMA student chapter had a great year in 2000–2001. Under the leadership of president **Scott Ryals**, vice president **Paul Roelle**, secretary **Jenny Parmar**, treasurer **Julie Larsen**, and faculty advisor **Chris Frey**, they have continued to maintain a local section of highway that the organization adopted last year as part of the NC Adopt-A-Highway program and have held three trash parties during the year. In addition, the A&WMA-sponsored luncheon speaker series had a soil and water remediation theme.

Other activities included co-sponsoring the 2001 Water Resources and Environmental Engineering Spring Symposium entitled "Environmental Research for a Sustainable Future." The symposium was held on April 7 to coincide with the NC State College of Engineering Open House. Twenty-six graduate students entered the poster competition, which was judged by a panel of faculty and industry representatives. More than 100 prospective students toured the department and spoke with students and faculty about the department. Some attended the seminar by **Robert Hall** of the US Environmental Protection Agency. The awarding of the prizes for the best posters concluded the symposium. First prize went to **Laurel Wright** for her poster on "Integrating 3-Dimensional Models and GIS to Examine the Impact of Hurricane Fran on Topsail Island." The chapter also provided support for three students and one local science teacher to attend the national conference in Orlando, Florida, in June 2001. Officers for the 2001–2002 year are president **Scott Ryals**, vice-president **Julie Larsen**, and secretary-treasurer **Quansong Tong**.

## The Institute for Transportation Engineers Student Chapter Report

Throughout 2000–2001 members of the ITE student chapter worked hard under the direction of president **Justin McCurry**, vice president **Cory Highfill**, secretary-treasurer **Sonam Delma**, service and social coordinator **Cipriana Thompson**, webmaster **Matt Davis**, and faculty advisor **Joe Hummer**. The ITE student chapter brings students in contact with professionals from the transportation industry and introduces them to a variety of industry topics. Throughout both semesters the chapter met monthly and invited guest speakers. Topics included the proposed Raleigh-Durham Regional Rail Line, the North Carolina Global Transpark, and research to increase pedestrian and bicycle safety. Activities included fundraisers, chapter meetings, and social events. The chapter continued to maintain its stretch of road in the Adopt-A-Highway program and enrolled in the program for another four years. Members attended and made presentations at the annual meeting of the North Carolina's Section of ITE (NCSITE). The student chapter also received recognition again as an outstanding chapter when NCSITE presented them with the Cribbins Cup for the fifth consecutive year. In addition, one member was awarded an NCSITE scholarship.



## The National Association of Home Builders Student Chapter Report

Under the leadership of their officers, president **Meghan Rider**, vice president **Mark Dunnagan**, secretary **Brian Alexander**, treasurer **Travis Nelson**, and faculty advisor **Ed Weaver**, the NAHB student chapter volunteered for the Ideal Home Show, attended the Raleigh/Wake County Home Builders Association Casino Night Party at the Raleigh Convention Center, and attended the International Home Builders Show in Atlanta. The goals of the chapter are to be even more involved with Habitat for Humanity, send the student chapter officers to the AGC National Convention in Las Vegas, begin a shadowing program for students to spend a day with local contractors on the job, be involved with the Wake County High School mentoring program for future home builders, and develop stronger relationships with home builders in the industry, as well as the Raleigh/Wake County Home Builders Association. The officers for 2001–2001 are president **Travis Nelson**, vice president **Kimberly Grau**, secretary **Mattie Lee**, and treasurer **Mark King**.

## The National Society of Professional Engineers Student Chapter Report

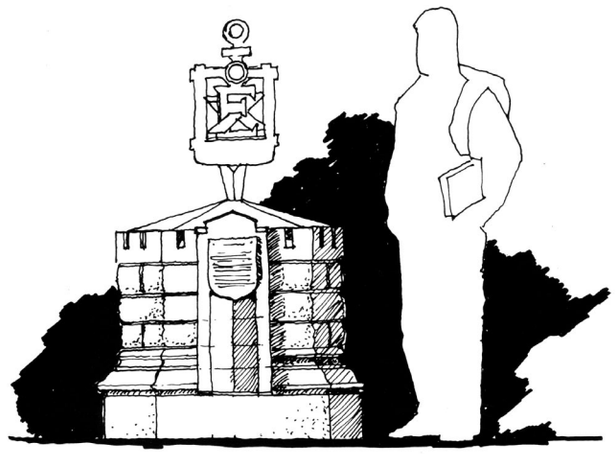
In February the following officers were chosen to lead the NSPE student chapter: president **Lance Pittman**, vice president **Julia Tsai**, secretary **Jana Jenkins**, and treasurer **Neal Carter**. The goals of this slate of officers were to plan the upcoming year's student activities, including a student membership drive and a field trip related to engineering. Their membership drive stressed the benefits of joining the NSPE, which include opportunities to network with other engineers, the advantages of having a professional engineer's license, and the advancement opportunities and salaries available to the professional engineer. **Himanshu Patel** became treasurer this fall.

## The A. P. Norwood Chapter of Chi Epsilon Student Chapter Report

Chi Epsilon is the National Civil Engineering Honor Society. During 2000–2001 Chi Epsilon officers were president **Kimberly Grau**, vice presidents **Sonam Delma** (Fall 2000) and **Justin McCurry** (Spring 2001), secretary **Joseph Nixon**, treasurer **Travis Wagner**, pledge marshall **Scott Wirgau**, and transit editor **Elaina Holburn**. During the year, the chapter inducted 37 new members and 2 honorary members. **Alfred P. Norwood**, who endowed the chapter last year with a contribution of $25,000, was made a chapter honor member in the fall; and **Robert Shaw**, who has campaigned for chapter support and who has pledged $5000 to the endowment established by Alfred Norwood, was made an honor member in the spring. The officers for the 2001–2002 academic year will be president **Kimberly Grau**, vice president **Brian Mazzochi**, secretary **Anna Cook**, treasurer **Grady McClamrock**, pledge marshall **Brent Gatlin**, and editor **Sara Anderson**. **Jim Nau** is the faculty advisor.

## New Chi Epsilon Key and Stone Base

This year we are raising funds for a new Chi Epsilon bronze key and stone base to be placed in a prominent location in the courtyard of Mann Hall. The new key and base will celebrate 50 years of Chi Epsilon at NC State. The Alfred P. Norwood Chapter of Chi Epsilon is the only endowed chapter in the country. The endowment pays part of the student dues associated with chapter membership. The goal is to raise sufficient funds for the new key and base with any additional funds to be added to the endowment. The chapter hopes that all former members will contribute generously. Please make out checks to the NC State Engineering Foundation, Inc., Campus Box 7901, NC State University, Raleigh, NC 27695. Please note on the memo portion of the check the words "Chi Epsilon."



*Artist's rendering of new Chi Epsilon key and stone base*

# THE GRADUATE PROGRAM

## Graduate Students

Last year we had a large number of graduate degrees awarded: 61 masters and 17 doctorates. Our graduate program enrollment increased slightly this year to a new record of 204 graduate students. Currently, 75% are full-time and 25% are part-time. Our mix of students is often of interest: 63% masters and 37% doctorates and 64% US and 36% international. In the area of under-represented student groups, 5% are African Americans and 20% are women, with both gradually increasing. Approximately 120 of our graduate students are supported by assistantships.

Several of our current students have received fellowships. The current Deans Fellows include: **Jennifer Becchio, Jacob Carpenter, Joel Howard, Ann Mullen, Daniel Musiker, Rachel Smith, Jacob Steinbech, Travis Wagner, Gudell Ward, Randall Wilson, Christopher Yow, Emily Zechman, and Jason Zink**. In addition, **Tori Rhoulac** has received the prestigious Eisenhower Fellowship for study in Transportation Engineering from the US Department of Transportation, **Ko Sok Chae** has received the Southeast Transportation Center Fellowship, and **Kimberly Ann Warren** has received the General Electric Faculty for the Future Teaching Fellowship.

## Construction Students Receive Fails Graduate Fellowship

The FMI Corporation has established a Graduate School fellowship in honor of its founder, **Dr. Emol Fails**. FMI, management consultants to the construction industry headquartered in Raleigh, designated that the fellowship be awarded to students with an interest in construction majoring either in engineering or in management. We are pleased that the first two fellows, **Nathan Kirtley** for 2000–2001 and **Brian Alexander** for 2001–2002, are students in our department pursuing a masters with a specialty in construction engineering and management. Both were also graduates of our BS in Construction Engineering and Management degree program. The late Dr. Fails was, early in his career, a faculty member at NC State in accounting, but he left to found Fails Management Institute (now FMI) in the 1960s.

*(I to r) Robert Sowell, Dean of the Graduate School; Brian Alexander and Nathan Kirtley, the first two recipients of the Emol Fails Fellowship; and Chip Andrews, CEO of FMI Corporation*

## New Distance Education Opportunity for the MCE Degree

Increasingly, individuals living and working in areas of the state distant from Raleigh have hoped for opportunities to pursue a Master of Civil Engineering (MCE) from NC State without relocating. The department has offered graduate courses through distance education for several years, but never a degree. Plans have now been approved for offering the MCE degree by distance education. The classes are the same as on campus but are offered on video, DVD, or the Internet. For civil engineering, the most available courses are currently in transportation engineering and in environmental engineering. However, other areas—construction, geotechnical, structures, water resources, and computer-aided engineering—are increasing offerings gradually so that an interdisciplinary focus is possible. More information about the MCE degree will be mailed soon and will be available on our Web site: www.ce.ncsu.edu/distance/. Spring 2002 distance education courses in CE are listed on the Web site.



# THE FACULTY REPORT

## NSF CAREER Award Winners

The National Science Foundation (NSF) Faculty Early Career Development (CAREER) program supports early academic careers by making awards that encourage the integration of education and research. In recent years five CE faculty members have won this prestigious award: **Chris Frey, Ranji Ranjithan, Joel Ducoste, Francis de los Reyes, and Amir Mirmiran**.

In 2001 Joel Ducoste and Francis de los Reyes joined these previous CAREER awardees. Dr. Ducoste's award is called "A Unified Approach to Understanding, Education, and Design of Disinfection Processes Using Computational Fluid Dynamics." Computational fluid dynamics (CFD) is a way of numerically describing fluid flow. In this project he will use CFD in conjunction with chemical reaction engineering models and new turbulence models to predict the removal of microorganisms and the production of carcinogenic disinfection by-products in drinking water. These new models will be integrated into courses for graduate students and professional engineers, as well as an introductory course on drinking water disinfection processes also will be developed for high school students.

Dr. de los Reyes' award is for a project called "Molecular and Engineering Approaches for Analyzing Microbial Selection in Activated Sludge: Competition Between Filaments and Floc Formers." The project will combine modeling and lab-scale reactor studies with new molecular techniques to identify and quantify microbial populations in wastewater treatment systems. The focus will be to re-assess current theories of competition between two important groups of microorganisms: filaments and floc-formers. The project also involves conventional and distance education training of undergraduate and graduate students on molecular techniques, the integration of treatment process modeling, and exposure to full-scale treatment plants.

*Debra F. Laefer*

*Amir Mirmiran*

## New Faculty Appointments

**Debra F. Laefer** (PhD Civil Engineering '01 Illinois, Urbana-Champaign) joined the Department in September 2001 as an assistant professor of geotechnical/geoenvironmental engineering. She completed her doctorate at Illinois, where she pursued degrees in both geotechnical and structural engineering and served for five seasons as right defense on the women's ice hockey team. Her research interests focus on soil-structure interaction, including preventative measures for the protection of the built environment from man-made ground movements, vibrations, and direct attacks. Dr. Laefer's classes this spring include "Rock Mechanics, Tunneling, and Blasting" and "Protection of Critical Infrastructure and Populations from Terrorist Attack."

**Amir Mirmiran** (PhD Civil Engineering '91 Maryland) joined the department as a professor of structural engineering in August 2001. His research is in the areas of fiber composites and their applications in infrastructure. He received a CAREER award in 1996 on "Hybrid Columns of Fiber-Reinforced Polymers and Concrete." The project is extended through 2003 and relates to piles and columns made of concrete-filled fiber-reinforced polymer tubes. Dr. Mirmiran has received two US patents on his innovative work on hybrid concrete and composite columns. Previously, he worked at the University of Cincinnati and the University of Central Florida. He also has eight years of consulting engineering experience. His teaching interests include structural analysis and design.

### Rasdorf and Knappe Win Awards

**William Rasdorf** and **Detlef Knappe** received awards from professional associations this year. Dr. Rasdorf received the 2001 ASCE Computing in Civil Engineering Award, which was established by the Technical Council on Computer Practices to recognize outstanding achievement and contribution in the use of computers in the practice of civil engineering. Dr. Knappe received the 2001 AWWA Water Science and Research Division Best Paper Award from the American Water Works Association for the paper "Atrazine Removal by Preloaded GAC." The paper appeared in the October 1999 issue of *Journal AWWA*.

### Baugh and Gabr are Promoted

**John W. Baugh Jr.** (PhD Civil Engineering '89 Carnegie Mellon) was promoted to professor on July 1, 2001. Dr. Baugh is group coordinator for the Department's program in Computer-Aided Engineering and is an associate member of both the Department of Computer Science and the University's interdisciplinary program in Computational Engineering and Sciences. His research interests include systems engineering and computing applications in civil engineering; development of concurrent and distributed algorithms and systems; mathematical modeling, optimization, and support for engineering design; and formal approaches for reasoning about computer systems. His teaching activities include graduate courses in computer-aided engineering and design and an undergraduate course in engineering systems and problem solving. He enjoys puzzles and writes about them in the *Problem Corner*, a column in the newsletter of ASCE's North Carolina Section.

**Mohamed A. Gabr, P.E**. (PhD Civil Engineering '87 North Carolina State University) was promoted to professor on July 1, 2001. Dr. Gabr's research program addresses the innovative applications of geosynthetics for environmental soil remediation and soil improvement and the behavior of foundations in residual profiles. He has worked in different capacities at the Norwegian Geotechnical Institute, Woodward Clyde Consultants, West Virginia University, and Army Corps of Engineer Waterways Experiment Station. He is currently the chair of the Transportation Research Board committee on physicochemical properties of soils, vice chair of the ASCE committee on geosynthetics, and editorial board member of the *ASCE Journal of Geotechnical and Geoenvironmental Engineering and the ASTM Geotechnical Testing Journal*. He has received national recognition, including the ASCE Edmund Freidman Professional Recognition award as well as being named West Virginia Young Civil Engineer of the Year in 1996. He is also the geotechnical/geoenvironmental program coordinator in the department.

### Hassan is promoted and receives Bill Horn Kimley-Horn Faculty Award

**Tasnim Hassan** (PhD Engineering Mechanics '93 University of Texas at Austin) was promoted to Associate Professor on July 1, 2001. He has been with the Civil Engineering Department since January 1994, first as a post-doctoral research fellow with the Center for Nuclear Power Plant Structures, Equipment and Piping for a year, then as a tenure-track faculty member. Dr. Hassan's teaching and research focus on strength of materials and failure mechanisms of structures. He is developing new plasticity models and analysis codes that can be used to predict fatigue life of structures more accurately. His research will improve the understanding of the failure mechanisms of steel structures under seismic and other cyclic loads and will develop new analysis and design methods that are not overly conservative. Dr. Hassan also received the **Bill Horn Kimley-Horn Faculty Award** for his excellence in undergraduate and graduate teaching as well as other accomplishments.

*John W. Baugh Jr.*

*Mohamed A. Gabr*

*Tasnim Hassan*



# STAFF NEWS

### Rowe Receives Award Nomination

Congratulations go to **Barbara A. Rowe**, our program coordinator, whose exceptional service to our department was publicly recognized when she was nominated for a University Award for Excellence this year. Ms. Rowe coordinates over 200 projects and monitors more than $4 million in annual transactions for projects worth over $14 million. She is a go-to person and a team player. During a two-year period, when there were critical staff shortages, Ms. Rowe, with incredible patience and grace, performed her own duties and led a team effort to handle a wide range of duties normally carried out by the administrative assistant, contract manager, and bookkeeper. Ms. Rowe's abilities enhance our department enormously.

### Department Welcomes Joyner and Smith

**John E. Joyner III** (PhD Architecture '99 Georgia Tech, MS Architecture '93 Georgia Tech, BSEE '82 NC State) joined the department as director of development and alumni relations for civil engineering on July 16, 2001. Ed comes to NC State from the consulting field. Prior to that he worked in marketing and business development in the telecommunications industry. A key focus of his development efforts will be alumni relations, and he intends to heighten the awareness of the leadership roles that graduates of the department have played in projects of national prominence, as illustrated by the cover story of this issue.

In September 2001 **Jane L. Smith** (BS Commerce University of Virginia '77, MBA Virginia Commonwealth University '86) joined the department as an administrative assistant. Her background is in finance and administration, and she will help with administrative assistance of emerging programs.

*Barbara A. Rowe*

*John E. Joyner III*

*Jane L. Smith*

# FIELDS OF SPECIALIZATION

Members of the faculty welcome interaction with our alumni and friends of Civil Engineering Department. We invite you to contact the faculty in one or more of the discipline areas below when you have a tough technical question or other matters of concern in your practice.

The department's Web site is **www.ce.ncsu.edu**, the telephone number is (919) 515-2331, and the fax number is (919) 515-7908. Correspondence may be sent to Civil Engineering Department, NC State University, Campus Box 7908, Raleigh, NC 27695-7908.

#### Computer-Aided Engineering

John Baugh
Leonhard Bernold
Downey Brill
Murthy Guddati
Abinav Gupta
Dan Loughlin
Kumar Mahinthakumar
Vernon Matzen
Margery Overton
Shamimur Rahman
Ranji Ranjithan
William Rasdorf
John Stone

#### Transportation Systems and Materials

Joe Hummer
Paul Khosla
Richard Kim
Nagui Rouphail
John Stone
Akhtar Tayebali

#### Structures and Mechanics

John Baugh
Bill Bingham
Murthy Guddati
Ajaya Gupta
Abhinav Gupta
Kerry Havner
Tasnim Hassan
Neven Krstulovic-Opara
Mervyn Kowalsky
Vernon Matzen
Amir Mirmiran
Jim Nau
Sami Rizkalla
David Tung
Paul Zia

#### Geotechnical

Bob Borden
Roy Borden
Mohammed Gabr
Debra Laefer
Shamimur Rahman

#### Construction

Leonhard Bernold
David Johnston
Mike Leming
David Lombardi
Roberto Nunez
William Rasdorf
Sami Rizkalla
Ed Weaver

#### Water Resources and Environmental

Mort Barlaz
Bob Borden
Downey Brill
Allen Chao
Francis de los Reyes
Joel Ducoste
John Fisher
Chris Frey
Mo Gabr
Detlef Knappe
Dan Loughlin
Kumar Mahinthakumar
Rooney Malcom
Margery Overton
Ranji Ranjithan

# BASIC AND APPLIED RESEARCH

Our faculty members have about 150 current research projects underway. One is highlighted here. For a list of project abstracts and their investigators, see our Web site at **www.ce.ncsu.edu**.

### Permeable Pavement Environmentally Friendly Option for Parking Lots

Most of us don't consider a parking lot a thing of beauty, but the honeycomb design of some new parking lots in eastern North Carolina is easier on the environment than standard asphalt and could be considered an attractive alternative to traditional designs.

NC State researchers **William F. Hunt III**, extension specialist in urban stormwater in the Department of Biological and Agricultural Engineering, and **John R. Stone**, associate professor in the Civil Engineering Department, are working to discover how well these new parking lots, constructed of "permeable pavement," are performing. Permeable pavement is a construction material that allows storm water to drain naturally through the soil rather than becoming polluting runoff.

The construction technique involves layering materials to create a lot that is both permeable to water and sturdy enough to support heavy cars. A geotextile fabric that keeps the gravel layer stable but allows water to pass through is spread on a base layer of gravel; then a layer of sand and a concrete or plastic lattice grid complete the pavement. The next step is to plant a spreading variety of grass such as Bermuda to add stability and texture.

For about two years the research group has been observing the permeable employee parking lot they installed for the Hannibal Building in Kinston, North Carolina. This lot contains 26 spaces and was designed by NC State civil engineering students in spring 1999. So far the lot has performed well; it is in good condition with no runoff contaminating the surrounding area. In January 2001 civil engineering undergraduate students **Jamey T. Westmoreland, Jason A. Houston, and Eric T. Taylor** selected as their senior project designing a similar parking lot at Wilmington's Legion Stadium, which is near Greenfield Lake nature reserve. The researchers hope to observe this lot for several years to study its performance.

If these studies indicate long-term high performance both structurally and environmentally, permeable pavement could become a common sight and one that is certainly more attractive and gentler on the environment than the miles of asphalt that currently surround us.



# CENTERS' UPDATE

### Civil Engineering Department Partners with ITRE

On July 1 **Nagui Rouphail**, professor of civil engineering, was appointed interim director of the Institute for Transportation Research and Education (ITRE) on Centennial Campus. Before assuming his administrative duties, Dr. Rouphail was an active participant in an ongoing cooperative relationship between the NC State Civil Engineering Department and ITRE. Dr. Rouphail has taught a number of ITRE short courses during the past seven years and has worked on several research projects jointly with ITRE staff.

He's by no means the exception. **John Fisher**, professor of civil engineering, has been the director of the Center for Transportation and the Environment (CTE), housed at ITRE since it began operation in 1992. In 2001 the Center, in cooperation with the NC Department of Transportation Research and Analysis Unit, announced nine new environmental research project awards. In addition, the Center's education program announced three new graduate research fellowship awards. CTE also conducted a two-week Summer Scholars Program in July 2001 for undergraduate students of diverse disciplines interested in the environmental aspects of transportation. The Center's technology transfer program continues to conduct a regular schedule of satellite broadcasts (with Web simulcasts) and conferences and workshops. In September 2001 CTE served as lead organizer for the First International Conference on Ecology and Transportation, conducted in Keystone, Colorado. For more information on these and other Center activities, please visit the CTE Web site at **www.itre.ncsu.edu/cte/**.

Civil engineering professors teaching short courses offered by ITRE is quite commonplace. And ITRE staff members contribute to the teaching mission of the Civil Engineering Department as well. For example, **Bob Foyle,** associate director of ITRE, presently teaches a graduate course in civil engineering.

By far the most intense cooperation between the Civil Engineering Department and ITRE takes place in research. Joint nationally and state-funded projects are currently under way. **Joseph Hummer**, Nagui Rouphail, and **Joe Milazzo II** (ITRE Senior Research Associate and 1997 CE graduate with an MS) are teaming up on a Federal Highway Administration (FHWA) project, investigating pedestrian and bicycle paths and guidelines for improving shared path facilities. This follows a previous national study of pedestrian and bicycle facilities carried out by the same team and funded by FHWA with its results published in the *Year 2000 Highway Capacity Manual*.

*Nagui M. Rouphail*

Research projects sponsored by the Governor's Highway Safety Program (GHSP) are also combining the talents and research skills of both groups. Examples of these studies include research on red light running policies and on aggressive driving.

ITRE has had a long history of involving and supporting graduate and undergraduate civil engineering students in various projects. The Transportation Founders Fund (TFF), under the leadership of **C. Edwin Vick** (BSCE '56, MSCE '60) and **Larry Goode** (MSCE '75, PhD '80), was chartered last year and created, in part, to support the recruitment of outstanding graduate students in civil engineering and to give TFF members the opportunity to interact with national transportation leaders at an annual gathering each fall.

Both ITRE and the CE Department have been strong promoters of transportation and civil engineering research and education. It is only natural that they would collaborate. To learn more about ITRE, visit their Web site at **www.itre.ncsu.edu**.

### Matzen Becomes New Director of the Nuclear Structures Center

**Vernon C. Matzen** became the new director of the Center for Nuclear Power Plant Structures, Equipment and Piping (C-NPP-SEP) October 1, 2001. He succeeds **Ajaya Kumar Gupta**, the founding director, who has served the Center for more than 10 years and is returning to full-time research and teaching. Dr. Matzen has been associate director of the Center since 1996. He has participated in research on the ultimate behavior of piping systems and the seismic response of unanchored structures and is active on the American Society of Mechanical Engineers and Pressure Vessel Research Council committees that relate to the Center research. Dr. Matzen has received the highest teaching awards, and he has played a leadership role in establishing structural laboratories for teaching and research.

Dr. Matzen plans to build on the Center's well-established reputation and enhance funding and participation of the industry and government organizations in the US and abroad. The Center faculty and students perform advanced research on topics related to structural safety of nuclear plant building and components. Better understanding of the behavior and failure modes leads to safer plants, lower operating and construction costs, and simpler-yet-more-accurate design methods.

Dr. Gupta is not only credited for founding the Center but also for building it into an internationally recognized institution. It started as a research program in 1991 with four members, received the approval of the University of Carolina Board of Governors in 1993 to formally become a center, and over the years has had upward of 20 members from the United Kingdom, Sweden, France, Switzerland, Mexico, and the United States. Dr. Gupta initiated a successful biennial series of International Symposiums on Current Issues Related to Nuclear Power Plant Structures, Equipment and Piping in 1986 that preceded the Center. The Center faculty has attracted grants from the US Department of Energy and National Science Foundation.

### C-NPP-SEP Hosts SMiRT 16

The Center in cooperation with the Office of Continuing and Professional Education, hosted the 16th International Conference on Structural Mechanics in Reactor Technology (SMiRT 16) in Washington, D.C., August 12–17, 2001. The conference theme was "Challenges to Structural Mechanics: Safety and Cost." In her Opening Session Address, US Nuclear Regulatory Commissioner Greta Joy Dicus stressed the timeliness of the conference. Existing reactors are aging, license renewals are under review, and nuclear scientists are in transition. Dicus noted that " . . . commercial nuclear power appears to be on the verge of a significant resurgence in the United States and other parts of the world." SMiRT 16 was the most successful among the recent SMiRT conferences. More information on SMiRT 16 can be obtained from the Web site (**www.engr.ncsu.edu/SMiRT-16)** or from Bonnie Diaz at C-NPP-SEP, NC State University, Campus Box 7908, Raleigh, NC 27695-7908.

# CIVIL ENGINEERING AND CONSTRUCTION EXTENSION ACTIVITIES

NC State University enhanced its commitment to Civil Engineering and Construction (CE&C) in August 2000 with the addition of **Roberto Nunez**, P.E., and **Edwin Weaver**, P.E. Nunez and Weaver have appointments that are joint with the Industrial Extension Service (IES). Services provided include training, institutional support to the Civil Engineering Department, educational support to North Carolina organizations, applied research and product development assistance, generic technical support, and international outreach.

Several new courses have been developed, including Concrete Technology Training, Masonry Wall Bracing Safety Training, OSHA Safety Training, and training to professional engineers through the "Design Your Own Educational Experience" program. Nunez and Weaver also initiated two important internal projects. The first concerns the restructuring of the Construction Systems Laboratory with a UTC Grant; the second is the development of the first distance learning construction course, "Fundamental Aspects of Concrete Technology," for which they, along with **Mike Leming**, secured a college grant.

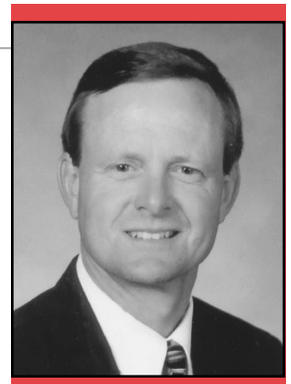
During 2000–2001 Nunez and Weaver developed, modified, and enhanced a number of partnerships designed to expand IES coverage and to offer educational and technical assistance services to various audiences within the construction industry. For example, they have developed short courses to be offered twice a year as part of the North Carolina Home Builders Association's Graduate Home Builders Institute. The Builders Mutual Insurance Company has agreed to use CE&C specialists as their sole resource for safety training of their Spanish-speaking members. In partnership with the student organization, Engineers Without Borders, a free safety class for Spanish-speaking workers is being taught once a week, on Sundays. This effort has caught the attention of the NC Department of Labor and is being used as a model to attract and train an elusive Spanish-speaking work force. In addition, support has been provided to the NC Associated General Contractors to recruit and inform young students on the benefits of working in the construction industry.

Overall, Nunez and Weaver bring great enthusiasm to expanding services for the construction industry. For more information about CE&C extension activities, please visit Web site **www.ies.ncsu.edu/conted/construction.cfm**.

# ALUMNI NEWS

## Alumni Notes

John R. Browning (BSCE '75, MCE '76) was named president of S&ME, Inc., in January 2001. S&ME is a 650-member southeastern regional firm that specializes in engineering and environmental services. The headquarters for its 18 offices in five states is in Raleigh, North Carolina. After receiving his master's degree in civil engineering from NC State, Mr. Browning joined S&ME as a staff engineer. Over the years, he has had increasing managerial responsibilities and has performed a wide range of engineering work in the firm's service areas. Mr. Browning served as S&ME's executive vice president for four years prior to becoming president. He also is active in state and national engineering professional organizations.



*John R. Browning*

## Alumni Update

*David S. Haworth III* (BSCE '58) retired from the US Army Corps of Engineers in 1998 as chief of the Engineering Division of the Vicksburg District. Activities now include an unpaid position as US Army Reserve Ambassador for Mississippi, volunteer work with church and the local chamber of commerce, and continued participation in several technical societies.

*Randolph D. Broome* (BSCEC '71) is currently vice president of Sales & Services for Duke Power Company, based in Charlotte. Randolf has been with Duke Power for 18 years. He serves as treasurer for Charlotte Engineers Club and serves on the Board of Directors for Communities in Schools. He plays trombone in Matthews Brass Ensemble and sings in Matthews United Methodist Church Sanctuary Choir. Daughter Charlotte graduates from Winthrop University this year, and son Wesley will attend NC State next year as a freshman.

*Donald W. Spence, P.E., P.L.S.* (BSCE '73) retired from the NCDOT effective December 31, 1999. He is now employed as director of Engineering by Kubilins Transportation Group, Inc.

*Henry V. Liles Jr., P.E.* (BSCE '74) has been appointed to vice president in charge of North Carolina Operations at HNTB.

*Grady L. McClamrock Jr.* (BSCEC '74) graduated from Wake Forest University School of Law in 1977. He has practiced law in Mocksville, North Carolina, for 23 years and loves it! He has five children; the oldest is now a junior in CEM at NC State. He is married to Cathy McClamrock, lives on a farm, and is semi-retired from law. His hobbies are rental properties and raising cattle.

*Steve Gossett* (BSCE '79) is an environmental associate with Eastman Chemical. Steve has been appointed to the Tennessee Air Pollution Control Board. He is married to Michele and has four children—ages 17, 15, 5, and 3.

*Stephen Chris Setzgr* (BSCEC '84) has rejoined Barnhill Contracting Company of Tarboro as a senior project manager in its Raleigh-based Building Division.

*Perry G. Davis, P.E., P.L.S.* (BSCE '87) is the owner of Cape Fear Engineering Inc., a civil engineering and land surveying firm with offices in North Carolina and South Carolina.

*Gregory L. Williams* (BSCE '87) recently completed a PhD from Texas A&M University in ocean engineering. Gregory is presently employed with PBS&J in Herndon, Virginia. He is married to Peggy and has three children—ages 5, 3, and 14 months.

*Dale W. Privette* (BSCE '88) is currently the first ever traffic engineer for the Town of Cary. He was recently married to Stephanie Harris (BSCE '94). Stephanie is a project manager with Kimley-Horn & Associates in Cary.

*Calvin Gilley, P.E., CFM* (BSCE '89) was recently promoted to engineering manager for a design build team with Industrial Design Corp., a CH2M-Hill company. The team specializes in all facets of engineering to support a 24/7 semiconductor manufacturing facility in northern Virginia. He has been married to Tina R. Gilley (BA Business Mgmt '89) for 25 years. They have two children: Robin age 16, and Jacob age 13. Calvin retired from the USAF in 1996. He was a base civil engineer for the D.C. ANG at Andrews AFB, Maryland, in his last assignment. His email address is cgilley@dominionsc.com.

*James David Rogers* (BSCE '90) lives in Unicoi, Tennessee, with wife A. Renea (Jones) Rogers (BS Horticultural Science '89, MS Crop Science '92) and their two children, Nicholas and Laura. Both work for Jones & Church Farms, Inc., and are co-owners of Dry Creek Woodworking in Erwin, Tennessee.

*Jeff Moeller* (BSCE '90) was recently promoted to senior project manager at the Water Environment Research Foundation (www.werf.org). WERF funds and manages water quality research, and Jeff will be working to develop and implement a new stormwater research initiative at the foundation.

*Mark Teague* (BSCE '91) was recently promoted to division traffic engineer with the NCDOT in Asheville. He and his wife, Denise, recently adopted their first child, Matthew, who is 3 years old.

*Kevin W. Benedict* (BSCEC '92) is currently working as a construction lawyer with the firm of Maupin, Taylor & Ellis, P.A., in Raleigh, North Carolina.

*Wes Denton, P.E.* (BSCE '92, MSCE '95) is currently the manager of Programming for Sprint's World Headquarters Campus in Overland Park, Kansas. The campus will house approximately 14,500 associates when completed in 2002. Wes also manages several other construction projects in the Kansas City area.

*Timothy Robert Wyatt, PhD* (BSCE '92, MSCE '94) earned a PhD in civil engineering from Georgia Tech in May 2000. He has returned to Raleigh, accepting a position as a senior engineer with Applied Research Associates, Inc.

*Brian F. Gardner* (BSCEC '92) is president of the Hilton Head, Charleston, & Myrtle Beach Divisions of D.R. Horton, Inc., one of the largest national homebuilders. Brian is married to Marla "Gatlin" Gardner and has two daughters, Mackenzie age 4, and Carson age 2. He currently lives in Hilton Head but is planning on moving this summer to Charleston.

*Aaron Beam* (BSCEC '93) is currently working as a project manager for Hickory Construction Company in Hickory, North Carolina. He is married to Cyndi and has a daughter, Bayleigh.

*Chris R. Spencer* (BSCE '94) is currently employed with the City of Greensboro as a transportation engineer and received his professional engineering license in 1999. He is married to Molithia and has two children, Shelby age 4, and Ethan 9 months.

*Dena Firebaugh Guth* (MSCE '94, PhD '99) worked as a structural engineer for JE Sverdrup Civil Inc. in St. Louis, Missouri, since February 1999. Dena recently became a voting member of ACI Committee 345—Concrete Bridge Construction Maintenance and Repair.

*Mark Thompson* (BSCE/ENE '96) is currently serving as a naval officer on board the nuclear fast attack submarine USS Connecticut, which is the newest submarine in the US Navy.

*Troy G. Crawford* (BSCE '97) recently graduated from law school in May 2000 and successfully passed the July bar exam. He is a founding member of Crawford, Christopher & Johnson, P.L.L.C., and specializes in District Court practice and real estate and construction litigation. He was married in August 2000 to Jennifer Leigh Brown of Portsmouth, Ohio.

*Elaina Holburn* (BSCE '01) works as a water resource engineer for JE Sverdrup Civil, Inc., in Jacksonville, Florida.

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The North Carolina State Engineering Foundation has specified that those wishing to earmark their support for use by the Civil Engineering Department should indicate on the check made out to the NC State Engineering Foundation, Inc.:

⏮ For the CE Advancement Fund
⏮ For the Dean Fadum Endowment Fund
⏮ For the Bill Horn Faculty Development Fund
⏮ For Chi Epsilon

*or*

Please call or write if you would like to discuss a contribution.
We greatly appreciate your support of Civil Engineering!

NC State Engineering Foundation, Inc.
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Raleigh, NC 27695-7901
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2001
CIVIL ENGINEERING
NEWSLETTER

Civil Engineering Department

NC State University, Campus Box 7908, Raleigh, NC 27695-7908

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