

# DEPARTMENT OF CIVIL, CONSTRUCTION, AND ENVIRONMENTAL ENGINEERING

North Carolina State University

*Annual Report*  
2006–2007

<b>George F. List</b> , Professor & Head
<b>David W. Johnston</b> , Professor & Associate Head for Graduate Programs
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The Department of Civil, Construction, and Environmental Engineering is pleased to publish its 2006-2007 annual report which summarizes the hard and dedicated work of its faculty, staff and students. Our commitment continues to integrate strong engineering education and research into all areas of the Department. These efforts are clearly recognized by our continued success in obtaining outside funding which strengthens our traditional engineering programs while allowing us to invest in emerging fields which prepare our students for the workforce of the future. We thank our alumni and friends for their continued generous support which has allowed us to meet many of our challenges.

The following data highlights research and related activities for the current year. Ten-year trends are presented in subsequent sections of this report. Some of the significant observations are as follows:

- Undergraduate enrollment increased to 542 matriculated students and **829** total students in Fall 2006. BS degrees awarded in 2006-2007 totaled 182 including 132 CE, 38 CEM, and 12 ENE degrees. Scholarship support continues to expand.
- Graduate enrollment increased to a new high of **246** in Fall 2006, maintaining the substantial increase to 239 which occurred in Fall 2005. PhD enrollment continued to be strong with 83 post-master's students. Seventy-four graduate degrees were awarded this year. Graduate enrollment in distance education courses continues to expand with students in over 20 states.
- Our externally funded programs continue to prosper as faculty receive national recognition with grants, contracts, and other funding from federal, state, industry and private sources. The creative work of our faculty and students is being recognized by publication in some of the most respected scholarly journals in the profession as well as through leadership roles in professional societies. External funding generated by the faculty totaled **\$17,078,610** in active research, evaluation, and training contracts and grants with expenditures of **\$4,604,674** for the fiscal year 2006-2007.

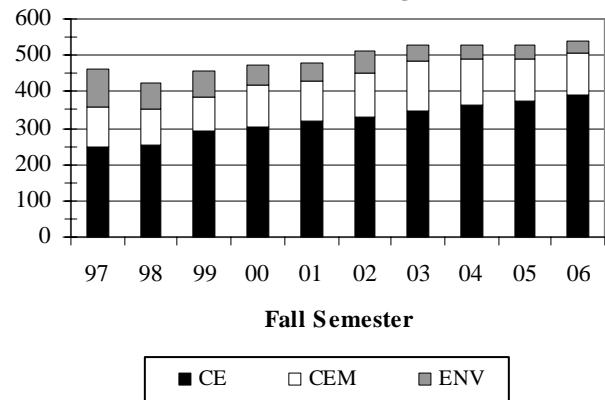
## UNDERGRADUATE PROGRAM

Total matriculated enrollment increased slightly to **542** in Fall 06 compared to **529** in Fall 05. Total undergraduates students increased to **829** in Fall 06 compared to **746** in Fall 05 due to a surge in freshmen enrollment. There were a total of **182** degrees awarded in 2006-07 which was a slight increase from the **179** degrees awarded in 2005-2006.

### Enrollment – 2006-2007

<b>Matriculated</b>	<b>F06</b>	<b>S07</b>
Civil Engineering (CE)	391	414
Construction Engineering and Management (CEM)	115	118
Environmental Engineering (ENE)	36	36
	<b>542</b>	<b>568</b>
<b>Undesignated</b>		
Civil (CEU)	207	160
Construction (CMU)	51	44
Environmental (ENU)	29	36
	<b>287</b>	<b>240</b>
<b>Total:</b>	<b>829</b>	<b>808</b>

**ENROLLMENT TRENDS**  
Matriculated Undergraduates

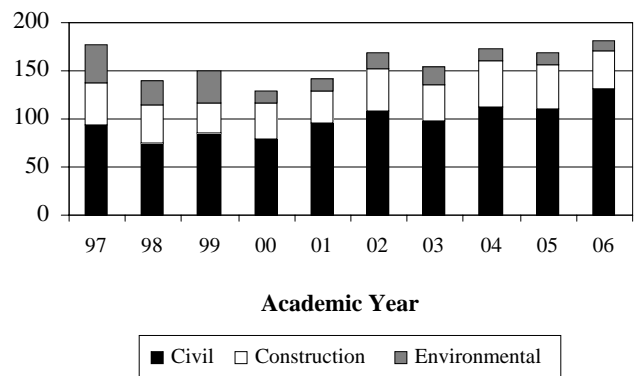


Note: 06 refers to the 2006-2007 academic year.

### Degrees Awarded – 2006-2007

Bachelor of Science	
Civil Engineering (CE)	132
Construction Engineering and Management (CEM)	38
Environmental Engineering (ENE)	12
<b>Total:</b>	<b>182</b>

**Degree**  
**Bachelor of**



## Scholarships & Awards

Many undergraduates were awarded scholarship funds during the 2006-07 academic year. A list of the recipients and scholarships follows:

- **Alaa Ali** - *J.C. Brantley*
- **Alaa Ali** – *Thompson*
- **Brandon Ashton** - *Jones Group*
- **Brandon Ashton** - *Jones Group*
- **Christopher Aycock** - *Thompson*
- **Tyler Barker** - *Louis E. Wooten*
- **Rodney Bass** - *Thompson*
- **Carey Blackmar** - *A.C. Kraynik*
- **Colleen Bowker** - *Thompson*
- **Colleen Bowker** - *Whatley*
- **Brandon Bowland** - *Paul Stephens*
- **Cory Bowman** - *K.P. Dixon*
- **Wesley Brown** - *Thompson*
- **Christopher Burgess** - *Thompson*
- **Scott Burwell** - *G.H. Blessis*
- **Justin Clark** - *Steelfab*
- **Justin Clark** - *Thompson*
- **William Clark** - *APWA*
- **Patricia Clayton** - *Futrell*
- **Nicholas Constantine** - *Welch*
- **Charles Cunningham** - *J.C. Brantley*
- **Charles Cunningham** - *Thompson*
- **Jason Deane** - *C.C. Mangum*
- **Charles DeVoto** - *C.F.Eubanks*
- **Charles DeVoto** – *Thompson*
- **Adam Dobbs** – *PCEA Triangle Chapter*
- **Paul Duncan** - *Shelco/Gardner*
- **Philip Gaston** - *Thompson*
- **Hartley Grimes** - *C.K. Little*
- **Hartley Grimes** - *Thompson*
- **Ernest Hahn** - *R.E. Smith*
- **Ernest Hahn** - *Thompson*
- **Matthew Haley** - *Mulkey/Shelton*
- **Matthew Haley** - *Phoenix*
- **Nathanial Harvey** - *E.I.Clancy*
- **Nathanial Harvey** - *J.T. Moore*
- **Nathanial Harvey** - *Thompson*
- **David Heath** - *J.C. Brantley*
- **Daniel Heath** - *Thompson*
- **Daniel Heath** - *VCSSFA*
- **Aaron Heustess** - *Thompson*
- **Michael Hinsley** - *C.C. Mangum*
- **Michael Hinsley** – *CFMA Triangle Chapter*
- **Michael Hinsley** – *PCEA Triangle Chapter*
- **James Huggins** - *BD Rodgers*
- **Robert Jarzemsky** - *Welch*
- **David Joyner** – *Thompson*
- **Joshua Kallam** - *G.H. Blessis*
- **Joshua Kallam** - *G.H. Blessis*
- **Andrew Knupp** - *R.A. Bryan*
- **Andrew Krebs** - *C.R. Bramer*
- **Matthew Lamy** – *N & S Samet*
- **Matthew Lamy** – *C.T. Wilson*
- **Alexander Lanka** – *Sullivan*
- **Kyle Levitt** - *Thompson*
- **Angela Lewis** - *Thompson*
- **Nicholas Lutzweiler** - *Brad Hatcher*
- **Nicholas Lutzweiler** - *Thompson*
- **Matthew Lytle** - *Thompson*
- **Kaitlin Marley** - *Jones Group*
- **Michael Martin** - *E.I. Clancy*
- **Micah McCool** - *Thompson*
- **Daniel McGlamery** - *Thompson*
- **Douglas McLain** - *Thompson*
- **Kevin Miller** - *R.A. Bryan*
- **Jessica Moebs** - *Thompson*
- **Robert Mozeley** - *Thompson*
- **Evan Musselwhite** - *Eskridge & Long*
- **Omojojada Ogbon** - *Thompson*
- **Joshua Outlaw** - *J.D. Goins*
- **Joshua Outlaw** - *Jones Group*
- **Robert Parker** - *Louis E. Wooten*
- **Robert Parker** - *Thompson*
- **Crystal Penton** - *Thompson*
- **Patrick Phillips** - *Eskridge & Long*
- **Michael Plaisted** - *H. Bremer*
- **Lois Poore** - *Browning*
- **William Price** - *Paul Stephens*
- **Justin Ramsey** - *AGC Foundation*
- **Kyle Ramsey** - *Curlee*
- **Russell Rocket** - *AGC Foundation*
- **Justin Rowell** - *Welch*
- **Justin Rowell** - *Carolina Tractor*
- **Christopher Schoonover** - *Thompson*
- **Robert Secrist** – *Thompson*
- **Clayton Simmons** – *PCEA Triangle Chapter*
- **Scott Simmons** - *E.I.Clancy*
- **Adam Simpson** – *J & B Covington*
- **Laura Smith** - *K.P. Dixon*
- **Ashley Steele** - *G. Mullen*
- **Ashley Steele** - *Thompson*
- **Justin Story** - *Welch*
- **Elliott Taylor** - *Jones Group*
- **Matthew Tom** - *Thompson*
- **Hillary Upton** - *Thompson*
- **Ryan Vargochik** - *C.C. Mangum*
- **Ryan Vargochik** - *Shelco*

- **Francesco Viola** - *Sepelak*
- **Francesco Viola** - *Thompson*
- **David Wall** – *Thompson*
- **Jonah Warren** – *PCEA Triangle Chapter*
- **Mary Williams** - *R.E. Smith*
- **Jeffrey Wilson** - *R.A. Bryan*
- **Clayton Woodward** - *Thompson*
- **David Wyatt** - *Shelco/Rose*

The following awards were received by the students as indicated:

- AGC Outstanding Senior in Construction Engineering and Management Award – **George Blackard**

## **Student Organizations**

### **Alfred P. Norwood Chapter of Chi Epsilon Chapter Report**

The North Carolina State University Chapter of Chi Epsilon, endowed by the first chapter president **Alfred P. Norwood** and directed by **John Baugh**, is pleased to have welcomed twenty-five new members this year. The following served as chapter officers: Charles DeVoto, president; Hartley Grimes, vice-president; Patricia Clayton, secretary; Jessica McClure, treasurer; Matthew Haley, associate editor; and Ernest Hahn, marshal.

On December 3, 2006, the following fifteen students were initiated into the Alfred P. Norwood Chapter: **Emily Adams, George Blackard, Brandon Bowland, Wonchang Choi, William Clarke, James Crouse, Kent Dickens, Paul Duncan, Orion English, Mark Honeycutt, James Huggins, Thomas Knight, Andrew Krebs, Nicholas Lutzweiler, and Francesco Viola.**

The initiation held on April 22, 2007 welcomed the following ten students into membership: **Tyler Barker, Bryan Burnitt, Blake Bush, Nathaniel Harvey, Catherine Hoffman, Bradley Little, Douglas McLain, Adolfo Obregon-Salinas, Nicholas Schultz, and Mary Williams.** After the initiation ceremony, the following members were installed as chapter officers for the 2007-08 academic year: Hartley Grimes, president; Kent Dickens, vice-president; Blake Bush, secretary; Beth Visintine, treasurer; Nicholas Schultz, associate editor; and Catherine Hoffman, marshal.

### **AGC and NAHB Chapter Activities**

The **C. T. Wilson Construction Student Chapter of the Associated General Contractors of America (AGC)** and the **National Association of Home Builders Student Chapter (NAHB)** again helped coordinate and handle the Fall and Spring semester Fundamentals of Engineering Exam (FE) sign-up in Mann Hall. Monies raised by offering photo and notary services for the students submitting applications for the exam were used to cover costs of the Wednesday luncheons and defray some of the travel expenses to the National Conventions.

In February, a contingent of members from the NAHB student chapter led by **President Ryan Vargochik**, traveled to Orlando to attend the International Builder's Show. The students were exposed to new innovations and equipment related to the residential construction industry as well as some continuing education opportunities. In March, four members of the AGC student chapter led by **President Derek Kristeller** and accompanied by **student chapter advisor Edwin Weaver**, attended the AGC of America National Convention in San Antonio, Texas. The students attended some of the student competitions, sat in on some educational sessions, and manned a display booth where the students promoted the Construction Engineering and Management program by talking with convention attendees and providing literature about the program.

The student chapter luncheons were again a huge success as the Department was fortunate to have many distinguished industry professionals speak with the students including **Henry McNair of Premier Homes, Chuck Wilson of C. T. Wilson Construction, Bob Hambright of Centex Construction, Mike Gwyn of J. A Jones Construction, Greg Messer of Palladium Homes, Shannon Sweitzer of the NC Turnpike Authority, and Doug Journey formally of Ceco Building Systems**, just to name a few.

### ASCE Chapter Activities

The NC State University student chapter of the American Society of Civil Engineers (ASCE) is dedicated to helping students to grow as professionals and as people. Our goal is to help students to interact outside of the classroom both with other students and professionals in the field of Civil Engineering. From interacting with recent PE's at young member socials to PE Roundtable Discussions to our monthly professional presentations, the chief purpose of ASCE is to benefit its members by bridging the gap between their studies at NC State and their professional careers. This past year, our Student Chapter of ASCE received a national branch award for significant achievement and improvement. We hope to carry this on to this year and the many years to follow.

ASCE also allows all of our members a great opportunity to participate and get hands on learning as well as helping our community. ASCE annually participates in events such as the Habitat for Humanity Shack-A-Thon as well as Service Raleigh. We feel like these efforts in community service are helpful in developing Civil Engineers who are assets to society and who represent NC State University and the Civil Engineering Department in the best way possible. ASCE also offers scholarships each year based on participation and the ideals that ASCE represents. This year, Vince Grainger received the scholarship.

ASCE, however, is not all work and no play. We participate in many competitions throughout the year on a regional and also a national scale. In April, ASCE traveled to Atlanta Ga. to the campus of Georgia Tech University to participate in our regional conference. This conference consisted of several smaller competitions headlined by a Concrete Canoe and a Steel Bridge Competition. This year, through hard work and dedication, our concrete canoe team placed first, knocking off Clemson who had won the previous 14 years. This was a huge win for the team and gives us a lot of momentum rolling into Nationals in Seattle and into next year. The Concrete Canoe team will travel to Seattle Washington July 14<sup>th</sup> thru 17<sup>th</sup> to compete with the top teams in the nation and to socialize and share ideas. This past year has been a very successful one for our chapter. I think it has been a positive experience for everyone involved.

### A&WMA Student Chapter Report

The Student Chapter of A&WMA at North Carolina State University (NCSU) plays an active role in serving the student body on campus with their academic interests. Activities hosted by the student chapter include academic seminars, poster contest, participation of the A&WMA annual conference, and others. This document summarizes the main activities that the student chapter has organized during August 2006 to May 2007.

### **Student Chapter Organization**

The student chapter had 18 members during the year 2006 to 2007. The officers and advisor are listed below:

#### Officers:

President:	Ping Liu
Vice-President:	Haibo Zhai
Secretary:	Evelyn Frazier
Treasurer:	Srinath Krishnan

Advisor:

Dr. H. Christopher Frey

**Operational Activities**

The chapter officers had regular meetings during each academic year discussing issues related to the activities hosted by the chapter, including the selection of topics of the seminars, candidate speakers, fundraising and logistical support for the activities.

The officers also maintained a website that is open to students and the public ([http://www.ncsu.edu/stud\\_orgs/awma/index.html](http://www.ncsu.edu/stud_orgs/awma/index.html)). The information provided on the website includes important announcements such as seminars and scholarship opportunities, the available courses related to air and waste management on campus, professors whose research is on related topics, and etc.

In addition, the chapter has a mailing list to announce coming activities, including seminars and conferences locally and nationally. Particularly, many student members also participate in seminars hosted by the A&WMA Research Triangle Park (RTP) Chapter.

**Professional and Social Activities**

Seminars:

Three seminars were hosted for the year 2006 to 2007. The topics covered alternative fuels, agricultural air quality, and environmental statistics. The following is a brief description of these seminars:

- (1) Title: Alternative Fuels for Motor Vehicles  
Speaker: Morgan Crawford, Triangle Biofuels Inc.  
Time: 09/27/2006
- (2) Title: Agricultural Air Quality: Current Status and Future Needs  
Speaker: Dr. Lingjuan Wang, assistant professor from Department of Biological and Agricultural Engineering, NCSU  
Time: 11/29/2006
- (3) Title: Air Quality Mapping and Evaluation of Air Quality Numerical Models  
Speaker: Dr. Montserrat Fuentes, associated professor from Department of Statistics, NCSU  
Time: 4/25/2007

Invited Seminars by RTP Chapter:

The RTP Chapter hosted a seminar series on “Transportation and Emissions Research at NCSU” at EPA in 2007, and four students from the Department of Civil, Construction, and Environmental Engineering were invited to give talks on their research. The following is a brief description of these seminars:

- (1) Title: Best Practices for Greenhouse Gas Emissions Reductions in Freight Transportation  
Speaker: Po-Yao Kuo  
Time: 03/20/2007
  - (2) Title: Life Cycle Inventory Energy Use and Emissions for Biodiesel versus Petroleum Diesel Fuels  
Speaker: Shih-Hao Pang  
Time: 03/20/2007
  - (3) Title: In-use Emissions and Fuel Use for Selected Motor Graders Based on Real-World Duty Cycles  
Speaker: Kangwook Kim  
Time: 04/17/2007
  - (4) Title: Speed- and Facility-Specific Emission Estimates for On-Road Light-Duty Vehicles based on Real-World Speed Profiles  
Speaker: Haibo Zhai  
Time: 04/17/2007
- Poster Contest:

The Department of Civil, Construction, and Environmental Engineering at NCSU hosts a symposium each spring for water resource and environmental engineering (WREE) students, namely WREE Spring Symposium. The symposium features research posters by students in the WREE program. The symposium also invited judges outside the university, such as the A&WMA RTP chapter, EPA, and some local consulting firms to select the best poster. The student chapter members have been active in participation of this event. For this year, six student members presented in the spring symposium. The following is a brief description of those posters:

- (1) Title: Oxidation of Methane in Landfill Covers: A Strategy to Maximize Energy Revenue  
Speaker: Hossain M. Azam
- (2) Title: Methodology for Assessing the Impact of Vehicle Emissions on Near Roadside Air Quality  
Speaker: Hyung-Wook Choi
- (3) Title: Assessment of Real-World In-Use Emissions and Fuel Use for Selected Motor Graders based on A Engine-Based Modal Model Evaluation  
Speaker: Kangwook Kim
- (4) Title: Assessment of Potential Reductions in Greenhouse Gas Emissions in Freight Transportation  
Speaker: Po-Yao Kuo
- (5) Title: Development of In-Use Energy Use and Emissions Modes of Nonroad Construction Vehicles  
Speaker: Shih-hao Pang
- (6) Title: Analysis of Modal Emissions Models of Fuel Use and Emissions for A Hybrid Electric Vehicle  
Speaker: Haibo Zhai

Annual Conference:

Each year, the student chapter encourages student members to attend the A&WMA annual conference to present their research and interact with students from other universities. The A&WMA RTP chapter also provides the financial support for the students who have oral presentations at the annual conference. In June 2007, three student members will attend the annual meeting and give oral presentations in the regular technical session.

### **Engineers Without Borders Student Chapter Report**

Ninety percent of the population of Bolivia lives in poverty and its extreme incidence of water-borne diseases is the cause for its having the highest child death rate in South America. The NC State Chapter of **Engineers without Borders** (EWB) is taking steps to change this with leadership from faculty and students in the department of Civil, Construction, and Environmental Engineering, who play a key role with expertise in water resources and design. The chapter is working in cooperation with Save the Children through Partners America.

Following a year of fund raising from multiple sources, several students traveled last December to the Arampampa district of Bolivia with objectives to collect engineering design data and determine needs for improving water quantity and quality in the area. Also with the goal of providing basic health and hygiene education in mind, during their five days there, the group collected community assessment information in compliance with EWB guidelines to support their water quantity and quality objectives.

CCEE faculty Roberto Nunez, Matt Evans, Detlef Knappe and Francis de los Reyes provided essential leadership and technical information about international project planning, surveying, soils, water quantity, and water quality issues. Students tested for *E.coli* and coli form, a fecal bacterium on 24 sites in six different communities, each with its own water distribution system. They discovered that 96 percent of the sites tested positively for coli forms while 17 percent contained *Ecoli*, and all communities were determined to have a high risk of contamination by pathogenic sources for several reasons like spring boxes, taps, tanks and household practices.

They found that during the dry season, there is not enough water for personal hygiene nor agricultural practices and most families lack the education, finances and water supply to produce healthful food for a population of about 5,000. This results in malnutrition and intestinal illness among children.

In addition to their technical involvement, the NCSU students were able to provide the Bolivian community with basic health education and training using the area's capacitation center which is a year-round school for 20 young adults in the region covering various disciplines in a two-year program. The students incorporated this center into the sustainability portion of their project. EWB plans to utilize this center to disseminate project information to local students and teachers, who will share it with their constituents and serve as liaisons with local government officials.

EWB students are currently working on a plan that would allow future student teams to implement resulting recommendations such as: Installation of a basic water treatment system, optimization of the water distribution system, implementation of simple solid waste management practices, incorporation of sustainable hygiene education and home water use education programs, and the building of bridges for better community access. EWB plans to raise additional funds and resources so student teams can work on these projects over the next five years along with local leaders who will be trained to take over these projects to ensure sustainability.

"Our overall goal with these projects is to acquaint students with another culture, teach them to manage with constrained and varied resources, learn ingenious and practical ways to implement engineering technologies; all of which can help our students to simply be better people and better engineers", said Nunez.

# GRADUATE PROGRAM

## Enrollment and Degrees

The Department offers the Master of Civil Engineering (MCE), Master of Science (MS), and Doctor of Philosophy (PhD) degrees in all specialty areas of Civil Engineering. Total enrollment in Fall 2006 increased to **247** from **239** in Fall 2005. There were **74** graduate degrees awarded. The Distance Education Track of the MCE degree continues to see expanded enrollment. In Spring 2007, **46** MCE distance students were enrolled. In 2006-2007, there were over **250** individual student enrollments in distance classes with students from over 20 states (degree seeking and non-degree seeking). In the last three years, the first 19 distance track MCE students graduated.

Enrollment by Degree		
	F06	S07
Masters (MCE/MS)	164	149
Doctoral (PhD)	83	79
<b>Total:</b>	<b>247</b>	<b>228</b>

Enrollment by Area		
	F06	S07
Computer-Aided Engineering	13	10
Construction	26	27
Geotechnical	20	20
Structures & Mechanics	67	61
Trans. Systems & Materials	54	50
Water Resources & Env. Eng.	67	60
<b>Total</b>	<b>247</b>	<b>228</b>

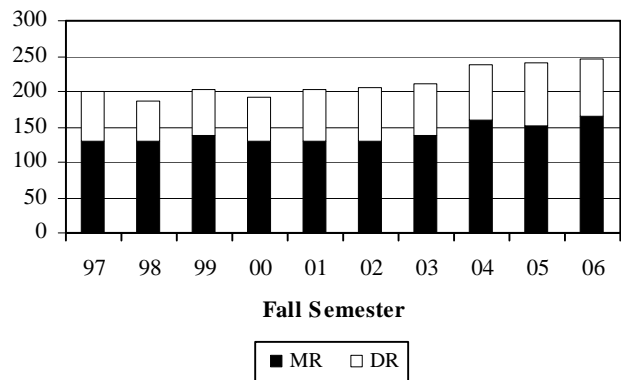
Sources of Support		
	F06	S07
Teaching Assistants (TAs)	35	37
Research Assistants (RAs)	79	82
Dean's Fellows*	10	9
Other Fellows & Scholarships*	16	16

\*Some Fellows are also TAs or RAs.

Degrees Awarded		
	F06	S07
Masters (Total)	35	24
MCE	20	16
MS (thesis required)	15	8
Doctoral (PhD)	8	7
<b>Total:</b>	<b>43</b>	<b>31</b>

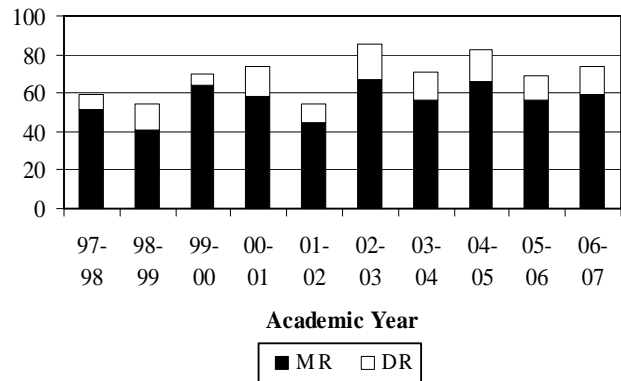
Summer 2006 Degrees Conferred have been grouped with Fall 06 Degrees

**ENROLLMENT TRENDS**  
Graduate



Note: MR represents combined MS and MCE enrollment statistics. 06 refers to the 2006-2007 academic year.

**DEGREE TRENDS**  
Graduate



## Fellowships and Awards

College of Engineering Dean's Fellowships were awarded to the following new Civil Engineering graduate students in 2006-2007:

- Zachary Clark
- Lauren Hart
- Bernard Frankl
- Joshua Griffin
- Andrew Jerome
- Caleb Pike
- Benjamin Possiel
- Beth Visintine
- James Levis
- Aaron Weispfenning

The Following Civil Engineering graduate students received Fellowships from the Southeastern Transportation Consortium:

- Ilhyoung Shin
- Ting Yi
- Chun Chen
- Zachary Clark
- Daniel Findley
- Elizabeth Harris
- Hyejung Hu
- Harikrishnan Krishnankuttyanair
- Jisun Lee
- Sangyum Lee
- Jaepil Moon
- Bharath Paladugu

Special recognition goes to the holders of these prestigious fellowship awards:

- |                      |   |
|----------------------|---|
| • Elizabeth Harris   | National Foundation Graduate Fellowship                   |
| • Cesar Leon         | Fulbright Graduate Fellowship                             |
| • Luis Meta          | PCA Graduate Fellowship                                   |
| • Henri Belrose      | Transportation Founders Fund Scholarship Award            |
| • Bastian Schroeder  | Transportation Founders Fund Scholarship Award            |
| • Andrew Jerome      | Emol A. Fails Graduate Fellowship                         |
| • Ana Carolina Baeza | National Water Research Institute Fellowship              |
| • Benjamin Possiel   | Sean McGrath Memorial Fellowship                          |
| • Zachary Clark      | Ed Vick Fellowship  |
| • Scott Alpert       | Smallwood Fellowship                                      |
| • Vivi Nguyen        | Smallwood Fellowship                                      |
| • Beth Visintine     | NC Airport Association Bruce Matthews Aviation Fellowship |
| • Brent Robinson     | Eisenhower Fellowship-US Dept. of Transportation          |
| • Bastian Schroeder  | Eisenhower Fellowship-US Dept. of Transportation          |
| • Benjamin Underwood | Eisenhower Fellowship-US Dept. of Transportation          |
| • Bastian Schroeder  | COE Mentored Teaching Assistantship                       |
| • Michael Lewis      | COE Mentored Teaching Assistantship                       |
| • Benjamin Underwood | COE Mentored Teaching Assistantship                       |
| • Sharmin, Nadia     | COE Mentored Teaching Assistantship                       |
| • Hollar, Donna      | NC Licensing Board for General Contractors Fellowship     |

## FACULTY

### New Faculty Appointments

- **Dr. Jie Yu** joined the Department in March 2007, coming from the University of Manchester, UK, where she held a position of university lecturer in School of Mechanical Aerospace and Civil Engineering. Her research interests are fluid mechanics in natural environmental systems, presently focusing on coastal waves, currents, morphology and their multi-scale interactions. She received a PhD in Civil and Environmental Engineering at MIT, a M.S. in Computational and Applied Mathematics at Florida State University, and a B.S. in Mechanical Engineering at University of Science and Technology of China.

### Promotions

- **Dr. Francis L. de los Reyes III** was promoted to Associate Professor effective August 16, 2006. He joined the Department in January 2000 after receiving his Ph.D. in Environmental Engineering from the University of Illinois at Urbana-Champaign. He received his MS in Civil Engineering from Iowa State University and his BS in Agricultural Engineering from the University of the Philippines-Los Banos. His research and teaching interests are in biological waste treatment, molecular microbial ecology, and environmental biotechnology in aerobic and anaerobic processes. He received the NSF CAREER Award in 2001 for work on bacterial competition in activated sludge and the Kimley-Horn Faculty Award in 2004 for his research, teaching, and other contributions to the Department. He is an associate faculty member of the Department of Microbiology and a member of the Biotechnology program at NCSU. He is a member of the Water Environment Federation, American Society for Microbiology, International Water Association, International Society for Microbial Ecology, American Society for Engineering Education, and Association of Environmental Engineering and Science Professors.
- **Dr. Murthy N. Guddati** (PhD, Computational and Applied Mathematics '98, University of Texas at Austin) was promoted to Associate Professor effective July 1, 2006. Guddati joined the department in 2000 as an Assistant Professor, after spending two years in the modeling and mechanics group at Schlumberger Oilfield Services. He teaches undergraduate courses in structural mechanics and graduate courses in finite element analysis and wave propagation. His research efforts are in the general area of computational mechanics, with specific emphasis on wave propagation, subsurface imaging, hydraulic fracture mechanics, and materials science/engineering. While at NC State, Guddati held invited positions at UT-Austin's Institute for Geophysics and Princeton's Program in Applied and Computational Mathematics. He is a member of several professional organizations and national technical committees. Guddati is the recipient of several fellowships and the 2006 Biennial John Argyris Young Investigator Award for best work in computational mechanics, awarded by the International Association for Computational Mechanics.
- **Dr. Kumar Mahinthakumar** was promoted to Associate Professor effective July 1, 2006. Mahinthakumar joined the department in 2000 as an Assistant Professor after working as a computational scientist at the Oak Ridge National Laboratory (ORNL) for 5 years. He obtained his Ph.D. in Civil Engineering from University of Illinois at Urbana Champaign in 1995. Since joining the department, he has focused his teaching and research in the areas of high performance computing and water resources engineering with specific application to groundwater and water distribution systems. He received an NSF CAREER award in 2003 for

developing high-end computing techniques for subsurface characterization. His research on parallel computing enabled simulation-optimization techniques for solving large scale groundwater inverse problems has led to improved subsurface characterization than previously possible. He is currently a faculty member in the NCSU computational engineering and science program and a distinguished visiting scientist at ORNL.

## Departures

**Edwin Weaver, PE**, Lecturer and Senior Construction Extension Specialist left the Department at the end of June 2007 to join the faculty in the Del E. Webb School of Construction at Arizona State University in Tempe as a Senior Lecturer. In addition to teaching in the construction management program, one of his main duties will be to focus on teaching and course development for the Concrete Industry Management (CIM) degree program. We will miss Ed as a valued colleague and for his efforts for the department and the CEM program.

## Faculty Honors & Awards

- **Francis de los Reyes III** won a Kimley-Horn and Associates Faculty Award.
- **Chris Frey** was selected as a Fellow of the Society for Risk Analysis in December 2006.
- **Mo Gabr** has been appointed editor of the ASCE Journal of Geotechnical and Geoenvironmental Engineering and won a Kimley-Horn and Associates Faculty Award.
- **Murthy Guddati** received the 2006 John Argyris Award from the International Association for Computational Mechanics. The award is given once every two years for the best work in computational mechanics by a young researcher.
- **Richard Kim** won the 2006 Walter J. Emmons Best Paper Award on the paper entitled "A Simple and Reliable Testing Method to Evaluate Fatigue Fracture and Damage Performance of Asphalt Mixtures" by the Association of Asphalt Paving Technologists.
- **Vernon Matzen** served as President of the International Association of Structural Mechanics in Reactor technology and Chairman of the Structural Mechanics in Reactor Technology Conference from August 2005-August 2007.
- **Roberto Nunez** was selected by the President of the American Concrete Institute to serve in the International Activities Committee of ACI.
- **Sami Rizkalla** received the IIFC Lifetime Achievement Award in December 2006 for his outstanding contributions to the field of FRP composites for construction.
- **Sami Rizkalla** was a Keynote Speaker at the International Construction Innovations Conference Peoria, Illinois in October 2006. The title of his presentation was "Application of Fiber Reinforced Polymer in Infrastructure."
- **Edwin Weaver** won a Kimley-Horn and Associates Faculty Award.

**Courses Taught** (Graduate courses indicated in **Bold** were also offered by Distance Education)

Course No.	Course Title	Instructor	
		Fall 06	Spring 07
CE 201	Civil Engineering Measurements and Surveys	Rasdorf	Letchworth
CE 203	Global Positioning and Geographical Information Systems Applications	Hummer/Rasdorf	
CE 214	Engineering Mechanics-Statics	Nau, Parish, Holt	ABGupta, Brown,Cunningham
CE 215	Engineering Mechanics-Dynamics	Chao	Parish
CE 261	Construction Engineering Systems		Leming
CE 297	Current Topics in Civil Engineering	List	List
CE 305	Traffic Engineering	Williams	Williams, Demer, Foyle
CE 313	Mechanics of Solids	Hassan , Rahman	Tayebali, Holt
CE 324	Structural Behavior Measurement	Pike, Royster	Matzen
CE 325	Structural Analysis I	Matzen	Matzen
CE 327	Reinforced Concrete Design	Wilkins	Rizkalla, Wilkins
CE 332	Materials of Construction	Kim, Tayebali	Khosla
CE 342	Engineering Behavior of Soils and Foundations	Gabr, Borden	Rahman, Evans
CE 373	Fundamentals of Environmental Engineering	Knappe	Knappe, Baeza
CE 374	Environmental Engineering Lab	Knappe	
CE 375	Civil Engineering Systems	Ranjithan, Zechman, Baugh	Zechman
CE 381	Hydraulics Systems Measurements Lab	Ranjithan	Ranjithan
CE 382	Hydraulics	Kumar, Overton	Ducoste, Kumar
CE 383	Hydrology and Urban Water Systems	RC Borden	Arumugam, Briggs
CE 400	Transportation Engineering Project		Stone, Hummer
CE 401	Transportation Systems Engineering	Stone	
CE 413	Principles of Pavement Design	Khosla	
CE 420	Structural Engineering Project		Nau
CE 421	Structural Engineering Project	Kowalsky	
CE 425	Structural Analysis II	Matzen	
CE 426	Structural Steel Design	Sumner	Sumner
CE 440	Geotechnical Engineering Project	RH Borden	
CE 463	Construction Estimating, Planning and Control	Nunez	
CE 464	Legal Aspects of Contracting	Weaver	
CE 465	Construction Equipment and Methods		Leming
CE 466	Building Construction Engineering	Johnston	
CE 469	Construction Engineering Project	Leming	Weaver
CE 476	Air Pollution Control	Vandervaart	
CE 477	Principles of Solid Waste Engineering		Barlaz

CE 479	Air Quality		Vandervaart
CE 480	Water Resources Engineering Project	RC Borden	Staley
CE 481	Environmental Engineering Project	RC Borden	Staley
CE 484	Water Supply and Waste Water Systems		De Los Reyes
CE 487	Introduction to Coastal and Ocean Engineering		Overton
CE 488	Water Resources Engineering	Ranjithan	
CE 497	Current Topics in Civil Engineering	Barlaz	Nau
CE 501	Transportation Systems Engineering	Stone	
<b>CE 502</b>	<b>Traffic Operations</b>	<b>Roughail</b>	
CE 504	Airport Planning and Design	Stone	
<b>CE 509</b>	<b>Highway Safety</b>		<b>Hummer</b>
<b>CE 522</b>	<b>Theory and Design of Prestressed Concrete</b>	<b>Rizkalla</b>	
<b>CE 523</b>	<b>Theory and Behavior of Steel Structures</b>	<b>Sumner</b>	
<b>CE 525</b>	<b>Structural Analysis II</b>	<b>Matzen</b>	
<b>CE 528</b>	<b>Structural Design in Wood</b>		<b>Nau</b>
CE 537	Computer Methods and Applications	Baugh	
CE 548	Engineering Properties of Soils I	Evans	
<b>CE 561</b>	<b>Construction Project Management</b>	<b>Leming</b>	
<b>CE 564</b>	<b>Legal Aspects of Contracting</b>	<b>Weaver</b>	
CE 571	Physical Principles of Environmental Engineering		Ducoste
<b>CE 573</b>	<b>Biological Principles of Environmental Engineering</b>	<b>De Los Reyes</b>	
CE 574	Chemical Principles of Environmental Engineering	Barlaz	
CE 576	Engineering Principles of Air Pollution Control	Vandervaart	
<b>CE 577</b>	<b>Engineering Principles Of Solid Waste Management</b>		<b>Barlaz</b>
CE 579	Principles of Air Quality Engineering		Vandervaart
CE 583	Engineering Aspects Of Coastal Processes		Overton
<b>CE 584</b>	<b>Hydraulics of Ground Water</b>	<b>Gabr</b>	
CE 586	Engineering Hydrology	Arumugam	
CE 588	Water Resources Engineering	Ranjithan	
CE 590	Special Topics In Civil Engineering	Johnston	Johnston
CE 591I	Special Topics In Numerical Computing		Kumar
CE 592A	Special Topics in Construction Engineering		Nunez
CE 593R	Special Topics in Geotechnical Engineering	Parish	
CE 595A	Special Topics in Transportation Eng.	Hummer, Stone	

CE 595R	Special Topics in Transportation Eng.		List
CE 596B	Special Topics in Water Resource and Environmental Engineering	Knappe	
CE 596M	ST in Water Resource and Environmental Engineering		Overton
CE 596R	ST in Water Resource and Environmental Engineering		De Los Reyes
CE 603	Construction Engineering Seminar	Johnston	Leming
CE 605	Structures and Mechanics Seminar	Hassan	Hassan
CE 607	Water Resource and Environmental Engineering Seminar	De Los Reyes	RC Borden
CE 635	Advanced Reading In Civil Engineering	Johnston	Johnston
CE 701	Urban Transportation Planning		Stone
CE 705	Intelligent Transportation Systems		Williams
CE 715	Advanced Strength of Materials	Hassan	
<b>CE 720</b>	<b>Matrix and Finite Element Structural Analysis I</b>		<b>Seracino</b>
CE 721	Matrix and Finite Element Structural Analysis	Guddati	
CE 722	Structural Dynamics		AB Gupta
<b>CE 723</b>	<b>Advanced Structural Dynamics</b>	<b>AB Gupta</b>	
CE 725	Earthquake Structural Engineering	Kowalsky	
<b>CE 726</b>	<b>Advanced Theory Of Concrete Structures</b>		<b>Kowalsky</b>
CE 737	Computer-Aided Engineering Systems		Baugh
CE 741	Advanced Soil Mechanics		Gabr
<b>CE 744</b>	<b>Foundation Engineering</b>		<b>RH Borden</b>
CE 746	Dynamics of Soils and Foundations	Rahman	
<b>CE 751</b>	<b>Theory of Concrete Mixtures</b>		<b>Leming (Summer)</b>
CE 753	Asphalt and Bituminous Materials	Tayebali	
CE 755	Highway Pavement Design	Khosla	
<b>CE 757</b>	<b>Pavement Management Systems</b>		<b>Kim</b>
<b>CE 761</b>	<b>Design of Temporary Structures in Construction</b>		<b>Johnston</b>
CE 771	Physical-Chemical Water Treatment Processes		Knappe
<b>CE 774</b>	<b>Environmental Bioprocess Technology</b>		<b>De Los Reyes</b>
CE 775	Modeling and Analysis of Environmental Systems	Overton/Brill	
CE 776	Advanced Water Management Systems		Ranjithan
CE 784	Ground Water Contaminant Transport		RC Borden
CE 791B	Advanced Topics in High Perf. Com.		Kumar
CE 794A	Advanced Topics in Structures and Mechanics		Hassan
CE 796A	Advanced Topics in Mth Water		Arumugam

CE 796B	Advanced Topics in Water Resource and Environmental Engineering		Barlaz
CE 796C	Advanced Topics in Water Resource and Environmental Engineering		Rosenfeldt, Knappe
CE 803	Advanced Construction Engineering Seminar	Johnston	Leming
CE 805	Advanced Structures and Mechanics Seminar		Hassan
CE 807	Advanced Water Resource and Environmental Engineering Seminar		RC Borden
CE 839	Advanced Reading In Civil Engineering	Johnston	Johnston

## Summary of Professional Activities

In 2006–07, members of the Civil, Construction, and Environmental Engineering faculty published or had accepted **230** refereed journal and conference papers. A reference list of faculty publications and reports can be accessed at the Department web site (<http://www.ce.ncsu.edu/reports/>).

In addition to producing publications, faculty members made **196** conference presentations and lectures. Most are active members of professional societies, and **32** served on **114** technical committees. More statistics follow.

Number of tenure-track faculty members	37
Number of faculty members chairing at least one graduate committee	34
Number of faculty members participating in peer review of journal papers or research proposals	39
Number of faculty members serving as journal editors or members of editorial boards	17
<b>Publications</b>	
Number of refereed journal/conference papers published (including in-press or accepted for publication)	230
Number of non-refereed scholarly publications	79
Number of books or book chapters	12
Number of publications submitted or in preparation	128
<b>Presentations and Lectures</b>	
Number of international lectures	36
Number of lectures in the US	66
Number of other scholarly presentations	96
<b>National and International Technical Committee Service</b>	
Number of faculty members serving on at least one technical committee	32
Total number of committees on which faculty members serve	114

## Seminars/Symposiums

**36<sup>th</sup> Henry M. Shaw Lecture**  
**Engineering for Sustainability**  
**The Future of Civil and Environmental Engineering:**  
**Relevance and 21st Century Problems**  
**Dr. Richard G. Luthy**  
**Silas H. Palmer Professor and Department Chair**  
**Department of Civil and Environmental Engineering**  
**Stanford University**

Since their inception more than 150 years ago, the civil and environmental engineering professions have addressed a broad spectrum of societal needs. Challenges in America in the 20th century revolved around building our growing society. Now, at the beginning of the 21st century, we see important transitions in the practice of civil and environmental engineering, changes that are coming about because

of ever-increasing societal needs and population pressures not only in America, but in other developed nations and the developing world. The major challenge today is to sustain the environment and the natural cycles on Earth on which all life depends, while providing the necessities for human life [water, food, shelter, energy, clean air] in more efficient and renewable ways. We must answer the question ‘why are we relevant?’

We face a related challenge in academia. CEE departments often are viewed as a number of disparate groups held together only loosely by work on infrastructure problems. In the late 1940s and early 1950s, civil engineering programs flourished in response to the need for new infrastructure in the aftermath of depression and war. The theme at that time was “rebuild America” and it made sense for environmental, structural, geotechnical, construction, and transportation engineers to share a common home on university campuses. Today, with the increased specialization of researchers in their fields, the affiliation among the different disciplines is less obvious, and CEE departments nationwide are no longer benefiting from their union. Engineering for Sustainability is a new focal point that reunites the disciplines within CEE departments as well as increases the visibility, attractiveness, and relevance of our curriculum.

Collectively, civil and environmental engineers are the engineers that help society to function, so it is our natural goal to engineer for a sustainable future. What exactly each of us does, and how a CEE department embraces this theme, depends on current strengths, opportunities for cross-disciplinary work, and strategic redirection. It is incumbent upon us to help lead departmental and university initiatives toward Engineering for Sustainability. Examples at Stanford University include green buildings and sustainable construction, renewable and efficient energy systems, efficient water management and supply, smart chemical and material design, and healthy coastal systems. Our active participation in green building and dorm projects serves as a touchstone to demonstrate through tangible examples what civil and environmental engineers can achieve together for the benefit of society.

## **EXTENSION ACTIVITIES**

CCEE Extension faculty continue to effectively help designers stay up-to-date on technology and best practices, support the career development of construction professionals and aid developing countries in adopting construction technologies.

Six years ago departmental extension efforts of Edwin Weaver and Roberto Nunez created a unique partnership between CCEE and the Materials and Tests Unit of the NC Department of Transportation to provide training and certification to concrete field technicians from all across the state. This program has developed a solid national reputation, certifying over 1,000 engineers and technicians who are actively maintaining the quality of the infrastructure in North Carolina. Roberto Nunez, with assistance from the ACI and CCEE student groups, also expanded certification opportunities in Ecuador, Guatemala and Panama. Now those countries have hundreds of certified engineers and technicians working on domestic and international projects, ensuring the highest level of built quality in their concrete structures. In 2005, the Department of Civil, Construction, and Environmental Engineering was recognized by the ACI for its "Outstanding Contributions to the Development of Certification Programs." CCEE international outreach efforts also include the establishment of basic engineering libraries at universities in Ecuador and Afghanistan through donations of used books by faculty.

A need was also identified to educate North Carolina's mid-level construction professionals who some, at the project manager and supervisory levels lacked a structured background in several fundamental areas in construction project management. Through the Office of Professional Development at NC State and expert training from CCEE faculty members Roberto Nunez, Edwin Weaver and Michael Leming, six noncredit courses were developed and are offered twice a year towards a university-recognized diploma covering fundamental aspects of 1) estimating and bidding, 2) planning, scheduling and project control, 3) cost, cash flow and financial controls, 4) contracts and negotiation, 5) construction safety and 6) blueprint reading. Over 500 professionals from several hundred construction-related organizations in North Carolina have benefited from this pragmatic program. The estimating and bidding class "hits key aspects and processes of estimating that are necessary to run a successful business" said J. Todd Roberts, a program student.

Last year, about 300 design professionals benefited from short courses developed by CCEE extension specialists. These were aimed to refresh and update North Carolina's professionals in best practices and technologies relevant to infrastructure design and construction as affected by elements such as wind, earthquakes and water in various construction materials like concrete, masonry, steel wood and others. CCEE faculty were also instrumental this spring in bringing together more than 100 construction and design firms to the NC State Design-Build Forum, which was designed to facilitate participation in an upcoming multi-million dollar military design-build construction plan.

North Carolina companies appreciate the direct one-on-one support they receive from faculty, who field calls daily to answer questions. This friendly approach to industry is reflected by the consistent support of corporations who provide speakers to student groups regularly. This outreach culminates annually at the CCEE Golf Tournament, which attracts over 100 alumni and friends who support students together. Outreach was extended to K-12 students through interactive CFL laboratory tours while international outreach is conducted through the IAESTE Exchange Program and a three-week practicum for students visiting from Venezuela.

## STAFF NEWS

### New Hires

- **Bonny Downing** joined the Department in February 2007 as an Administrative Support Specialist. Originally from Gaylord, Michigan, Bonny spent most of her Air Force career in the Washington DC metropolitan area. She relocated to NC from Virginia last summer.
- **Greg Lucier** was appointed as a Research Scientist in May 2006. He graduated from NCSU in 2004 with a Master's Degree in Structural Engineering. He holds a B.S. in Construction Engineering, also from NCSU. His primary research focuses on end-region design of slender, precast concrete spandrel beams, but he is also involved with other research including a study of high-strength, large-diameter bars for use as concrete reinforcement, and a study of foam-core concrete sandwich panels reinforced with carbon fiber and subjected to axial and reverse cyclic lateral loadings.

## RESEARCH CONTRACTS AND GRANTS

There are 115 active research projects for the 2006-07 fiscal year. The total value of contracts, grants, and other external funding is \$17,078,610 with annual expenditures of \$4,604,674. The following tables break down contract value and expenditures into sources of funding. Charts on research funds by source follow the tables. Research abstracts can be accessed at the departmental web site (<http://www.ce.ncsu.edu/abstracts>).

**Table 1. New and Continuing Projects**

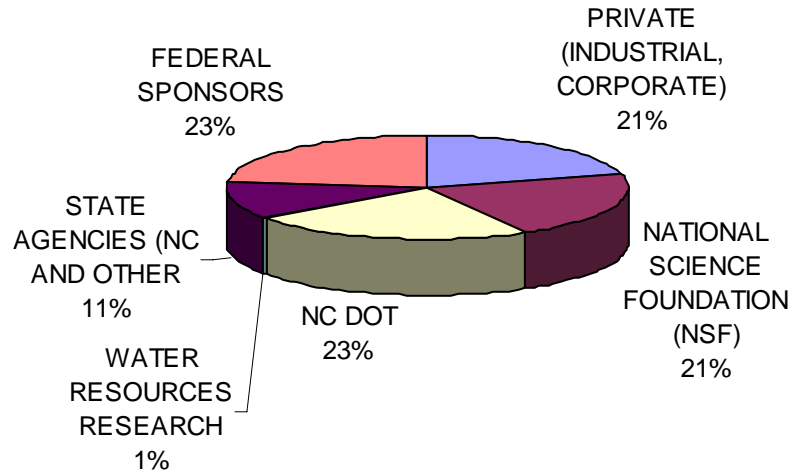
	Number	Total Contract Value (\$)	Annual Expenditures (\$)
TOTAL NEW RESEARCH FUNDS	23	\$ 1,734,736	\$ 677,237
TOTAL CONTINUING RESEARCH FUNDS	92	\$ 15,343,874	\$ 3,927,437
<b>TOTAL RESEARCH FUNDS</b>	<b>115</b>	<b>\$ 17,078,610</b>	<b>\$ 4,604,674</b>

**Table 2. Sources of Funding**

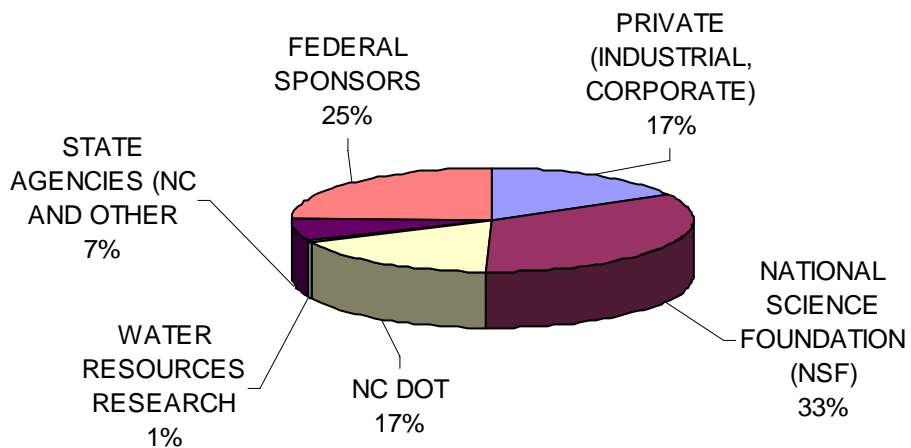
	Number	Total Contract Value (\$)	%	Annual Expenditures (\$)	%
PRIVATE (INDUSTRIAL, CORPORATE)	27	\$ 2,904,263	17.0%	\$ 962,403	20.9%
NATIONAL SCIENCE FOUNDATION (NSF)	22	\$ 5,734,316	33.6%	\$ 969,813	21.1%
NC DOT	22	\$ 2,937,191	17.2%	\$ 1,051,755	22.8%
WATER RESOURCES RESEARCH	2	\$ 99,084	0.6%	\$ 26,976	0.6%
STATE AGENCIES (NC AND OTHER STATES INCLUDING UNIV.)	16	\$ 1,216,009	7.1%	\$ 525,220	11.4%
FEDERAL SPONSORS	26	\$ 4,187,747	24.5%	\$ 1,068,508	23.2%
<b>TOTAL</b>	<b>115</b>	<b>\$ 17,078,610</b>	<b>100.0%</b>	<b>\$ 4,604,674</b>	<b>100.0%</b>

## Research Funding and Expenditures by Source

### FY2007 CCEE Research Expenditures by Source



### FY 2007 CCEE Research Funding by Source



**DEPARTMENTAL SPONSORS**

The following donations were received by the Department during 2006-2007

Name	Donor(s)
ACI Student Chapter	Archer Western Contractors Inc.
ACI Student Chapter	Bovis Lend Lease Inc.
ACI Student Chapter	IQ Contracting LLC
ACI Student Chapter	Thomas Concrete of Carolina Inc.
Ann Conner Kraynik Memorial Scholarship	Carmel Contractors
ASCE Student Chapter	Cavanaugh & Associates, PA
ASCE Student Chapter	Ready Mixed Concrete
Beam Construction Company Scholarship	Beam Construction
CCEE Water Resources & Environmental Engineering Fellowship	National Water Research Institute
CE Advancement Fund	CH2MHILL
CE Advancement Fund	Exxon Mobil
CE Advancement Fund	Subsurface Construction Company
CE Advancement Fund	URS
CE Special Events	S&ME
CE Special Events	United Forming Inc.
CT Wilson Construction AGC Student Chapter Endowment	Carmel Contractors
Delta Airport Consultants Endowment Fund	Avion Inc.
General Contractors Association of Raleigh Scholarship	General Contractors Association of Raleigh
John R. McAdams Company Scholarship in Civil Engineering	John R. McAdams Company
Kimley-Horn & Associates Inc. Scholarship	Kimley-Horn & Associates
Kimley-Horn Faculty Award	Kimley-Horn & Associates
NC Airports Association Bruce Matthews Aviation Fellowship	NC Airports Association
NC Licensing Board for General Contractors Fund	NC Licensing Board for General Contractors
Niels Hansen Norman Memorial Scholarship	Greenville Pitt County Home Builders
Paul M. Stephens Scholarship	Landmark Builders
Progress Energy Scholarships CE	Progress Energy Foundation
Sean McGrath Memorial Geotechnical Fellowship Endowment	Atlas Engineering Inc.
Sean McGrath Memorial Geotechnical Fellowship Endowment	S&ME
Shelco CCEE Student Lounge Renovation	Shelco Inc.
Shelco Student Experience Endowment Fund	Shelco Inc.
Shelco Student Experience Endowment Fund	Shelco Inc.
Solid Waste Research and Education	Geosyntec Consultants
VCSSFA Scholarship CE	VCSSFA
Withers & Ravenel Department Promotional Fund	Withers & Ravenel
WREE Student Activities Fund	Hazen and Sawyer PC
WREE Student Activities Fund	Philip Morris Inc.
WREE Student Activities Fund	Stearns & Wheler LLC
WREE Student Activities Fund	Withers & Ravenel