The UNIVERSITY of OKLAHOMA
School of Civil Engineering & Environmental Science

Communiqué
Summer
2012

A newsletter for alumni and friends of the School of Civil Engineering and Environmental Science at the University of Oklahoma

Director's Chair

Robert C. Knox

Dear Friends:

It is my pleasure to provide this annual report for the School of Civil Engineering and Environmental Science. Once again, the talented CEES faculty led the College of Engineering in almost every category of productivity. Our external research expenditures exceeded $4.75 million last year, which equates to almost $264,000 per faculty member. In CY2011, CEES faculty published 60 refereed journal articles or book chapters. This equates to an average of 3.3 refereed journal publications per faculty. Also in CY2011, CEES faculty publications were cited 1,060 times in the refereed literature, which equates to an average of 58.9 citations per faculty.

As with every issue of the Communiqué, I once again take great pride in announcing awards for the CEES faculty and students. Professor David Sabatini (University of Illinois) and associate professor Amy Cerato (University of Massachusetts, Amherst) were both recognized by their alma maters as outstanding alumni. These are both top-tier schools, and these awards speak to the significant accomplishments of these two outstanding CEES faculty members. Professor Robert Nairn won a national award for his contributions to mining and reclamation research and associate professor Kianoosh Hatami received the ASCE/GI 2011 Thomas A. Middlebrooks Award. CEES doctoral student Laura Brunson was named a recipient of the prestigious Science To Achieve Results (STAR) graduate fellowship from the U.S. Environmental Protection Agency.

I have included articles on three different real-world applications of CEES faculty expertise. First, associate professor Chris Ramseyer was involved in the design of a very innovative structure for a pedestrian bridge constructed across the new Interstate 40 Crosstown and recently completed in Oklahoma City. Second, Nairn supervised students from the Sooners Without Borders student organization in the construction of limestone channels to treat mine drainage in Potosi, Bolivia. I have also included a brief article about the success of professor Baxter Vieux's spinoff company (Vieux & Associates), which performs stormwater runoff modeling using software (VfloTM) developed from his research here in CEES.

Associate professor Hatami is conducting cutting-edge research in the area of soil stabilization. He has teamed with chemical engineering professor Brian Grady to develop a novel technology called Sensor-Enabled Geosynthetics. Their SEG technology has received nationally competed research funding and a U.S. patent. I think you will find the article about their research and potential applications of the SEG technology to be very informative.

Once again, I invite you to stay in touch with CEES. We would love to hear from our devoted alumni and friends.

Robert C. Knox, Ph.D., P.E.
Ted A. Kritikos Chair, Presidential Professor, Director
School of Civil Engineering and Environmental Science

School News

Legend of the Thunderbird

Completed canoe interior with stain

The University of Oklahoma Concrete Canoe Team recently returned home from the American Society of Civil Engineers' Mid-Continent Conference, which was held at the University of Nebraska–Lincoln April 19 to 21. The conference included both the regional concrete canoe and steel bridge competitions. This year, the canoe team chose to pay tribute to Oklahoma's rich, Native American heritage using the title, Legend of the Thunderbird, and highlighting this theme in all elements of the competition. After nearly two semesters of hard work and dedication, the team introduced a canoe of superb design and the highest quality seen in years.

The impressively detailed aesthetics, combined with a multitude of colors, made Thunderbird a favorite backdrop for pictures (even those of rival teams) at the regional conference.

Not only did the team excel in the final product portion of the competition, they also dominated the five paddling races.

The team was very proud of their accomplishments this season, and they look forward to returning to next year's regional competition stronger than ever.

CEES Achievements

2012 Mid-Continent Conference

1st Place:	**Final Product**
	Paddling
	Coed Sprint Race
	Women's Endurance Race
	Women's Sprint Race
2nd Place:	**Men's Endurance Race**
	Men's Sprint Race
6th Place:	**Technical Paper**
4th Place:	**Overall**

CEES also would like to note the efforts of this year's Steel Bridge Team. For the first time since 2003, the CEES Steel Bridge Team completed all safety tests and construction speed requirements and were able to load their bridge. The renewed success of this year's team bodes well for future steel bridge competitions.

"The OU Concrete Canoe and Steel Bridge Teams would like to thank all of their supporters for the 2012 season; without their contributions to and enthusiasm for our projects, we would not have experienced our successes. It has been an honor to work with all of our supporters and we hope to maintain these relationships for many years to come," said team captain Nicholas Ibarguen.

BOOMER SOONER!

2012 ASCE Concrete Canoe Team and *Thunderbird*

Sooners Without Borders Travels to Bolivia

OU at 14,000 feet

SWB students hauling limestone

In May 2011, six students from the Sooners Without Borders student group and OU CEES professor Robert Nairn made a project implementation trip to Potosi, Bolivia. In this high-elevation (14,000 ft) desert environment, crucial water resources have been rendered unusable by nearly five centuries of precious and base metals mining. Partnering with personnel from Engineers in Action, the Universidad de Autonoma Tomas Frias, St. Francis University, Norman Rotary clubs and local indigenous communities, the team installed open limestone channels to address acidic discharges from abandoned mines. The limestone channels will benefit approximately 8,500 people living downstream by providing safer irrigation water. The students presented their work at the October 2011 OU International Water Technologies for Emerging Regions Conference held in Norman. SWB students involved in the project are Rachel Rogers, Engineering Physics; Kelsey Raus, Chemical Engineering; Dillon Carroll, Engineering Physics; Travis Montgomery, Petroleum Engineering; Sofia Alegre, Computer Science; and Aissata Cisse, Environmental Engineering.

Amigos

SkyDance – An "Iconic" Bridge for OKC and CEES

There is a new 390-foot-long, 20-foot-wide pedestrian bridge crossing the new Interstate 40 near Robinson Avenue in downtown Oklahoma City. SkyDance Bridge includes a glorious interpretation of Oklahoma's state bird, the scissor-tailed flycatcher, and rises 197 feet above the ground. The bridge is a component of Oklahoma City's Core to Shore redevelopment effort between the core of downtown and the shore of the Oklahoma River.

SkyDance bridge night view with lightning in the Oklahoma sky

The SkyDance Bridge was designed by SXL (Spatial Experiments Laboratory), an eight-member Oklahoma City-based consortium led by Hans Butzer, AIA, associate professor of architecture and urban design at the University of Oklahoma College of Architecture. The lead structural engineer for SXL on this project is CEES's own Chris Ramseyer, P.E., associate professor of civil engineering in the OU College of Engineering. Ramseyer also is the director of the Donald G. Fears Structural Engineering Laboratory.

When Ramseyer received an invitation from the executive director of development for the College of Engineering in 2008 to participate in the international competition to design the bridge, he knew that this was a once in a lifetime opportunity to positively impact the city and state on a major project.

Ramseyer appreciates Butzer's philosophy of including engineers from the beginning of a project. "Most structural engineers aren't brought into the project until the size, shape and look of a project are determined by the architect. They traditionally are left with the task of figuring out if it is possible. Involving structural engineers early in the process improves the design by allowing them to coordinate with the architect and determine the structural feasibility as the design develops."

The strategy worked. SXL's design was selected from an original field of 16 applicants and a final group of four that included the engineering company that designed the Beijing National Stadium (known as the "Bird's Nest") for the 2008 Olympics, a firm specializing internationally on the design of pedestrian bridges, as well as one of Oklahoma's most renowned and prolific architectural firms. Ramseyer's involvement in the conceptual design of the bridge was deemed significant by the SXL team and resulted in him being granted a percentage of the intellectual property rights, specifically the image copyright.

SkyDance bridge evening view

"The competition required that the design evoke something about Oklahoma, and we knew the bridge would be a landmark for the city and state," Butzer recalls. The concept for the structure was developed during the summer of 2008. The design evolved from Butzer's recognition of the ability of scissortail flycatchers to effectively steer through Oklahoma winds and Ramseyer's basic understanding of their habits from his hobby of bird watching and ornithology.

As lead engineer within SXL, Ramseyer focused on all engineering issues while Laurent Massenat, the other engineer in SXL, oversaw the business aspects of the partnership. Ramseyer created the three-dimensional analytical models for the SkyDance Bridge and designed all the elements of the sculpture. The architectural team within SXL was focused on the "visual mass" and "form" of SkyDance. Ramseyer personally laid out the location and orientation of all the interior (web) members of the truss structure that makes up the SkyDance Bridge. He performed the engineering design of the stainless steel "feathers" and designed the concrete-filled steel tube base plate system, which is based in part on research he had performed at the Donald G. Fears Structural Engineering Laboratory at OU several years earlier. Ramseyer also gave several presentations to the Oklahoma Department of Transportation and the Federal Highway Administration concerning structural engineering design issues related to SkyDance.

"One could argue that the nature of this concept required that it be developed in 3D-heavy media. The bird alone screams three-dimensionality and all the assets that 3D modeling bring," Butzer says. This type of structural modeling made the design challenging and the development of plans difficult. Due to the complexity of the feathers and substructure, a major portion of the design was conveyed to the fabricator, W&W Steel, using electronic files that allowed direct fabrication of elements via computer numerical control. Electronic files also were used to ensure extremely tight fabrication tolerances. A total of 10,640 holes, all at unique non-repetitive locations, were all lined up without the need to modify any of the holes.

"Early in the competition, we established the priority that the project would reflect as much about Oklahoma as possible," Butzer relates. "We knew the design would be inspired by something Oklahoman, but we also thought about how we could design it so that local companies would have a great shot at competitively bidding the project, keeping Oklahomans employed with great jobs about which they could be very proud. We were the only one of the four final teams that focused on this aspect of sustainability." It did not hurt the design process that Ramseyer has taken his OU-CEES steel design course students to W&W Steel each year for the past 12 years

and intimately understands their fabrication capabilities.

The materials for the bridge, from the steel beams to the 665 stainless steel feathers, were all made in Oklahoma. And every person involved was happy to play a role. Butzer says that this pride is well-founded. “This project not only is a symbol of Oklahoma City and Oklahoma and the great things of which we are capable,” he states. “The fact that the bridge was made here celebrates what we can do and what we are doing here.”

From the design through the construction, the SkyDance Bridge also celebrates the real-world experiences it brings to OU architectural and engineering students. “A major focus for Hans and I from the beginning of this project was bringing this creative design experience into the classroom,” Ramseyer recalls. “For the past three years, we have been able to incorporate aspects of SkyDance into our classes at OU.” Ramseyer also was able to use the knowledge he gained, and significant portions of the design process designing SkyDance, in the CEES 5020 Bridge Engineering graduate class that he developed. The class gained valuable direct experience when they visited the fabricator, W&W Steel, while SkyDance was being constructed in their Oklahoma City shop and the construction site where the contractor, Manhattan Bridge, was building the foundation. This project also has generated enthusiasm within the structural engineering student body, providing a local example of the versatility and breadth of their chosen profession.

Ramseyer is “extremely proud to be part of the SXL team that developed the idea and made SkyDance a reality. Only time will tell if we have been successful in creating an “iconic” structure that resonates with the citizens of Oklahoma City. At the very least, I have had a wonderful opportunity to work creatively with some very talented architects, engineers, fabricators and contractors. SkyDance is

L – R Colleague Vinay Joseph and Chris Ramseyer

literally the most striking structure, and in many ways the most challenging structure, I have engineered. The experience and challenges have made me a better engineer and educator.”

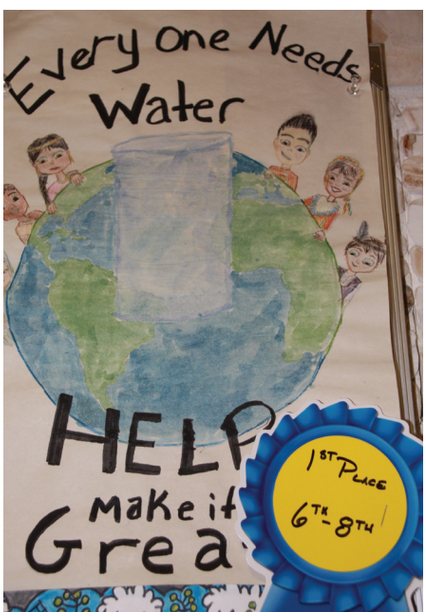
An update on the project was received while heading to press. As noted in a June 18, 2012, news release from the City of Oklahoma City, “Oklahoma City SkyDance Bridge, a public artwork and pedestrian bridge commissioned by the City of Oklahoma City, has been named as one of the 50 best public art projects by the 2012 Public Art Network Year in Review by Americans for the Arts, the nation’s leading nonprofit organization for advancing the arts and arts education.”

The annual Year in Review program recognizes the most exemplary, innovative, permanent or temporary public art works created or debuted in the past year. The 2012 Year in Review awardees were chosen from more than 393 works from 147 cities across 40 states and three countries.”

2011 OU International WaTER Conference

The Second Biennial University of Oklahoma International Water Technologies for Emerging Regions Conference was held Oct. 24 through 26, 2011, on the OU Norman campus. The conference theme, "Synergy at the Interface: Integrating Technology, Social Entrepreneurship and Behavior Change," was designed to bring together participants from multiple disciplines responding to the U.N. Millennium Development Goals of bringing water and sanitation to emerging regions. The conference provides a forum for sharing experiences and discussing challenges and solutions.

More than 200 water and sanitation experts from academia, industry, non-governmental organizations, governments and foundations representing more than 35 countries converged in Norman for the event. The conference included contributed oral and poster presentations addressing the full suite of water-related topics, such as social entrepreneurship, behavior change, water treatment technologies, climate change and hydro-philanthropy in the developing world; six keynote talks from leading water, sanitation and health professionals; an educational Clean Water Poster Contest for local school children; and two half-day workshops on social entrepreneurship and pump, well, water treatment and latrine technologies.



One of nine Clean Water Poster Contest winning entries


L-R: Robert Knox, David Sabatini, OU International Water Prize-winner Ben Fawcett, Robert Nairn and Randall Kolar

The highlight of the conference was the awarding of the 2011 OU International Water Prize to Ben Fawcett from the University of Queensland, Australia, co-author of the milestone book *The Last Taboo: Opening the Door on the Global Sanitation Crisis*. Fawcett's address, titled "Another 'Great Stink' is Needed: Sanitation and Hygiene in Poor Urban Areas," emphasized the importance of improved sanitation for public health and the global economy.

Conference attendees responded positively to the conference's emphasis on applied research especially to the number of presentations based on in-country research and to the attention to both the cultural and scientific aspects of water and sanitation issues.

The Third Biennial OU International WaTER Conference is scheduled for Sept. 23 through Sept. 25, 2013.

For details and updates go to http:// WaTER.ou.edu.

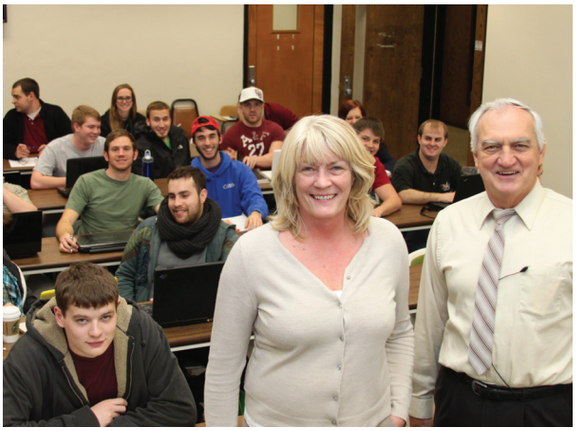
BP Partners With the School of Civil Engineering and Environmental Science to Create Air Quality Course

Civil Engineering and Environmental Science took the initiative to develop a course with technical input provided by BP, one of the world's largest energy companies and employers of environmental students at OU. Terry Adamson, regulatory compliance and environmental director for BP's North America Gas Operations, stated, "When contacted by Dr. Knox at OU's School of Civil Engineering and Environmental Science, we embraced the opportunity to provide quality input and grant funding during course development that would truly prepare students to work in the field of air quality management not only in the energy sector but other industries as well."

The School of Civil Engineering and Environmental Science has two "environmental" undergraduate degree programs: environmental engineering and environmental science. Both programs prepare graduates to have an introductory level of knowledge of environmental issues associated with air, land and water systems and to be able to critically analyze and interpret data in more than one major environmental engineering focus area, e.g., air, water, land, environmental health.

The sparse coverage of air quality in the EnvE curriculum has created a challenge for EnvE students on the air quality questions included in the Fundamentals of Engineering examination. More class coverage in the ES curriculum is needed to improve students' performance/progress during their professional internships with employers.

CEES director Robert Knox said, "This is an extraordinary effort by BP. Their support for the new air quality course shows their commitment both to protecting the environment and to supporting the University of Oklahoma."



Instructors for the class were Evelyn Wilke of One World Resource, LLC, and Michael Webb of Star Environmental, LLC.

The course is taught through a combination of lectures, reading assignments, applied homework assignments, field trips, guest speakers and a project to be developed throughout the semester. Spring 2012 enrollment was 28 and included students from civil engineering, environmental engineering, environmental science, chemical engineering and mechanical engineering.

Research

Plastic Surgery: Use of Smart Geosynthetics in Health-Monitoring of Infrastructure

Many U.S. public agencies are faced with the challenging task of developing and maintaining the country's infrastructure with limited financial resources. The latest report card by the American Society of Civil Engineers[1] has given the state of the U.S. infrastructure a dismal grade of "D". The grades from 2011 state-specific report cards are similarly alarming. Other countries across the globe also face similar challenges in the upkeep of their infrastructure. Given the increasing costs of repair, reconstruction or rehabilitation of failed or inadequate structures, health monitoring of infrastructure facilities and their timely repair and maintenance are crucial for their upkeep and satisfactory operation to ensure public safety, economic growth and sustainable prosperity. A significant portion of construction materials used in infrastructure projects are earthworks such as embankments, foundations, retaining walls and engineered slopes in roads and highways, bridge abutments, landfills, airports, levees, coastal structures and canals, among many others.

Due to rapid advances in polymer engineering and manufacturing technologies during the past few decades, polymers have earned their rightful place as viable and cost-effective construction materials in civil engineering. In many applications, they have replaced conventional materials and transformed design and construction methods because of their ease of handling, transportation and installation; creation of additional useable space due to their smaller dimensions; durability; and lower costs. A branch of modern geotechnical engineering specializes in the application of polymers as synthetic construction materials. These materials,

Figure 1. Geosynthetic samples: Geogrids, Geonet, Geotextiles, Geomembranes and Geosynthetic Clay Liners (GCL)

termed Geosynthetics, are high-performance polymeric products that are specifically manufactured to provide a wide range of mechanical and hydraulic properties in civil engineering projects (Figure 1).

Soil reinforcement is an example of the mechanical application used in geosynthetics to stabilize retaining structures and highway embankments. It also controls deformations caused by construction-induced and service loads, or extreme loading conditions such as earthquakes. Geosynthetic reinforcement is used to increase the bearing capacity of foundation soils and roadway subgrades. Hydraulic applications include waste containment and controlled transport of leachate from landfills, and use of separator and drainage fabrics in highways to prevent pavement saturation and failure.

Geosynthetic engineering and manufacturing currently is a multi-billion-dollar industry worldwide. This area of geotechnical engineering has experienced significant growth since its inception in the mid-1960s. An increasing number of geotechnical projects involve applications of geosynthetics as modern solutions to recurring infrastructure problems with proven advantages in the construction and retrofitting of infrastructure facilities. In several cases (e.g., geomembranes in hazardous and municipal waste containment applications) the use of geosynthetics is mandated by law.

As structures and facilities constructed with geosynthetics become more widespread globally, it becomes increasingly important to ensure that these structures are not only safe but also offer a satisfactory level of serviceability through health monitoring and timely measures to prevent catastrophic failures and costly repairs (Figure 2). Failure and inadequate structural performance could arise from uncertainties in site conditions, material properties, construction practices, environmental effects and loading conditions. Health monitoring of structures is a viable method to detect and avert the consequences of these uncertainties and take timely actions to address them.

Figure 2. Example failures of geosynthetic structures: (a) A landfill failure in the Philippines resulting in 30,000 m2 of debris, 200 deaths and hundreds more missing people[4], (b-e) Failed MSE structures (Photos courtesy of R.M. Koerner and R.J. Bathurst). Development and installation of health monitoring systems in such structures could help prevent future failures and disasters.

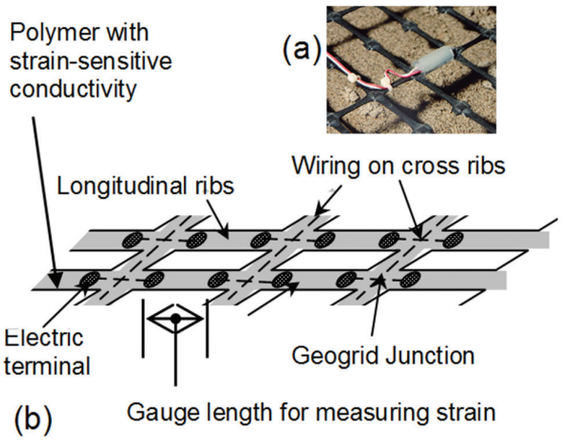


Figure 3. (a) Strain gauging of geogrid reinforcement (current technology), (b) Schematic concept of Sensor-Enabled Geosynthetics

However, current technology for monitoring the performance of geosynthetics in field projects is not very accurate or reliable. An important objective in health monitoring of structures reinforced with geosynthetics is to measure the deformation (i.e., strains) of the reinforcement layers during their service life and extreme (e.g., seismic) events. Such measurements are essential in order to predict and prevent excessive deformations in the structure or its possible failure. Geogrids are a common form of geosynthetics that are used to reinforce earthworks-–similar to steel rebars, which are used for the same purpose in concrete structures. Strains in geogrids are currently measured using strain gauges (Figure 3a), which have several drawbacks: they are costly, tedious to install, and they influence the measured strain due to their mechanical interactions with the surrounding soil. Additional problems include: premature detachment from geogrids, narrow range of strain operation and different in-air versus in-soil calibration factors. As a result, strains measured in field applications are typically not very reliable. In addition, the measurement system is too costly for large-scale deployment.

CEES associate professor Kianoosh Hatami and CBME professor Brian Grady have been working since 2006 on developing

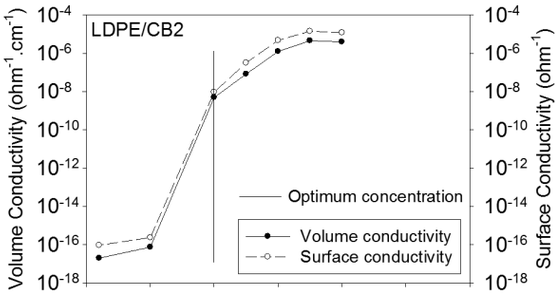


Figure 4. Conductivity results for CB-filled specimens

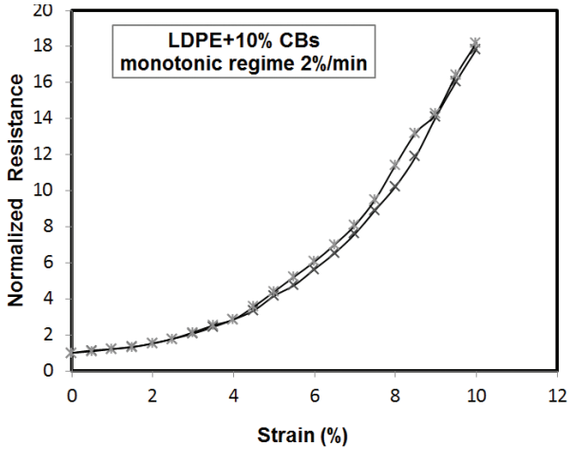


Figure 5. Strain-resistivity results for CB-filled SEG specimens

"smart" geosynthetics for health-monitoring of geotechnical and transportation-related structures since. The objective of their novel approach, termed Sensor-Enabled Geosynthetics, is to develop a new generation of geosynthetics that could provide an inexpensive, reliable and easy-to-implement method to measure and monitor geogrid strains. To this end, SEG materials need to have piezoresistive properties. This allows their deformations to be monitored without having to attach mechanical instruments such as strain gauges. The SEG technology will allow geosynthetic strains (i.e., deformations) to be measured more conveniently, with significantly less complex and expensive ancillary electronic systems and at a greater number of locations within the structure. In addition, the inaccuracies and problems due to interaction of conventional sensors with the local soil will be minimized.

Piezoresistive geosynthetics are made by dispersing nano-scale conductive additives such as carbon nanotubes, carbon black or metal particles within the host polymer. The OU research team has so far investigated polyolefins [i.e., high-density and low-density polyethylene (HDPE and LDPE) and polypropylene (PP)] and polyvinylchloride (PVC)] as polymers for SEG materials. A critical issue in the development of SEG materials is to determine a suitable concentration of conductive particles that would result in optimum piezoresistivity and conductivity. At the same time, the concentrations of the additives should be kept as small as possible to minimize any negative effects on the rheology and mechanical properties of the polymer composite. Strain-conductivity of SEG specimens is measured in the laboratory by stretching the material in a tensile tester and measuring their conductivity or resistance. For maximum strain sensitivity (i.e., the maximum change in conductivity with strain) and conductivity, the region immediately above the percolation region[3] is experimentally identified as the proper concentration for the conductive additives for each formulation. Examples of a percolation region and strain-conductivity results for CB-filled polymer specimens are shown in Figures 4 and 5, respectively. Scanning electron micrographs of example filled polymers are shown in Figure 6.

So far, the outcome of the OU team's work on the SEG technology has been very encouraging. The project was funded through two competitive College of Engineering seed funding grants in 2006 and 2009. In 2010, the team received a grant from the National Science Foundation to improve the accuracy and reliability of SEG specimens and to address materials-related challenges in their production. This project is currently in

progress. In 2011, Hatami and Grady obtained a patent on the SEG technology with the U.S. Patent and Trademark Office through the OU Office of Technology Development. The research team is part of the Carbon Nanotube Technology Center at OU with funding from the U.S. Department of Energy. The OU team also has been awarded a competitive Faculty Challenge Grant by the Office of the Vice President for Research at OU. In addition, a leading international geosynthetic manufacturer (TenCate Geosynthetics) has shown interest in collaborating with the OU team to develop full-scale SEG products once laboratory-scale specimens are successfully developed and tested with satisfactory performance. TenCate has pledged more than $137,000 to produce factory-scale SEG products after the laboratory-scale products are developed and tested. Other geosynthetic manufacturers such as Tensar International Corp. also have shown interest in adopting this technology.

The work to date also has resulted in several peer-reviewed journal and conference publications with student co-authors, one M.S. thesis and several student awards and recognitions. Atefeh Fathi, a graduate student in CEES, completed her master of science degree in May 2011. She was one of only two recipients of a competitive scholarship awarded by a well-known geotechnical company (Terracon) in December 2010. She currently is a geotechnical engineer at Terracon in Tulsa, Okla. In addition, Fathi won the student poster competition award (1st place) at a national geotechnical conference (Geo-Frontiers 2011) in Dallas in February 2011. More than 1,900 individuals and 150 companies attended that conference. Two doctoral students (Arash Hassanikhah and Hessam Yazdani) currently are working on the SEG project. Hassanikhah was invited to participate in a national student poster competition at the 2012 Geo-Congress in Oakland, Calif., in March 2012. In 2009, the research team, including an undergraduate

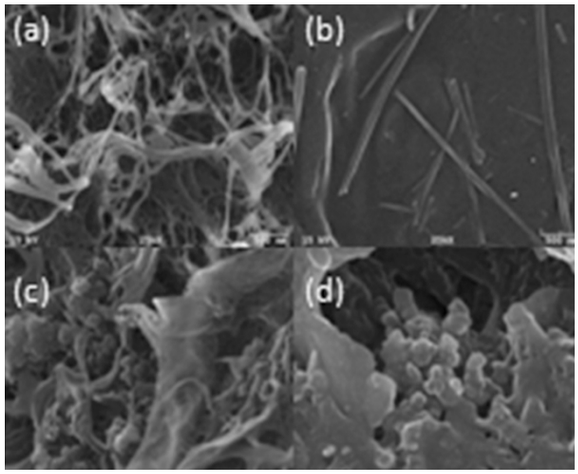


Figure 6. Scanning electron micrographs (SEM) of SEG specimens: (a) CNT/HDPE, (b) CNT/PP, (c) CB/HDPE, (d) CB/PP

research assistant (Corey Ulmer), introduced the concept of SEG and results of a proof-of-concept study in a peer-reviewed paper in the ASCE Journal of Geotechnical and Geoenvironmental Engineering. The paper was the most downloaded paper in that journal at the time of its publication[2]. The same paper also won the ASCE/Geo-Institute Thomas A. Middlebrooks Award in 2011.

So far, the SEG research at OU has been primarily focused on fabricating and testing small-scale specimens in isolation (i.e., not in contact with soil). However, once a SEG formulation is finalized with satisfactory results, prototype SEG grids will need to be fabricated to test their performance when placed in soils and aggregates in environmental conditions that would simulate actual field applications. This is an important step that will help the research team to identify and address challenges related to the influences of factors, such as the soil moisture content and confining pressure on the conductivity and mechanical performance of the SEG prototypes. Afterward, SEG prototypes can be manufactured for field testing and verification.

Through its advantages, the SEG technology holds promise to facilitate health monitoring of

geotechnical structures using smart materials. This will lead to a better understanding of these structures' field responses and improved methodologies for safer and more economical design. This will help engineers prevent costly failures and repairs of geosynthetic infrastructure facilities, resulting in significant savings in public and private sectors. Research on SEG also will contribute to a better understanding of the piezoresistivity of conductive-filled polymers at very low strains; a region that is of practical significance in multi-disciplinary applications including civil and chemical engineering.

References:

1. ASCE (2009a), http://www.infrastructurereportcard.org/.

2. ASCE (2009b) Geotechnical Book News, June 2009.

3. Hatami K, Grady BP and Ulmer MC, 2009. Sensor-Enabled Geosynthetics: use of conducting carbon networks as geosynthetics sensors. ASCE, Journal of Geotechnical and Geoenvironmental Engineering, 135(7): 863-87.

4. Kölsch F. and Ziehmann G., 2004. Landfill stability - Risks and challenges, Journal of Waste Management World, May 2004.

What Do Professors Do During Breaks and Time-off?

Elementary school children often believe their teachers live at their school. It can be hard for students to imagine their teacher in a different role. But, of course, teachers at all levels have lives away from their primary roles as educators. Interesting avocations among professors abound and range from tornado chasing, cycling, writing novels, golfing, musical performance and beyond. CEES Professor Baxter Vieux has an avocation mentoring private-sector applications in radar hydrology. "It is gratifying to see new technology being effectively adopted in the everyday work of engineers," Vieux says.

Vieux & Associates Inc. was established by Vieux and his wife, Jean, in 1992. Married since 1976 and having raised five children and worked as a hospital staff nurse, Jean embraced an opportunity to change career paths by earning a master of science degree from CEES. This degree, along with previous life experiences, prepared her to run the firm. She is the primary owner and president/CEO of the company. She manages a highly skilled team of software developers, engineers and hydro-meteorologists. Most of the Vieux team earned degrees at OU.

Vieux & Associates Inc. is an engineering technology company that builds software systems and provides services that predict floods. During one summer break, in a two-room office in west Norman, the birth of a new

Professor Vieux verifies model predictions after a flood

commercial software, Vflo™ occurred. This patented software is an advanced approach to answering the questions: Where is it going to flood and when?


Jean Vieux inspects a stream gauge

Publicly available weather forecasts of severe storms generally are not specific enough for clients that need flood information to take action to protect people and infrastructure. More accurate and timely information saves lives and money. The City of Austin, Texas, was an early adopter of Vflo™ in their Flood Early Warning System.

As well as being a football rival and capital or our neighboring state to the south, the city of Austin is home to 800,000 residents, many high-tech and Fortune 500 companies, and the main campus of the University of Texas. Bike trails, parks and pedestrian pathways contribute to the city being consistently listed among America's greenest cities. Austin is located in central Texas along the Colorado River, which crosses the Balcones escarpment that separates the Texas Hill Country from the Blackland Prairies to the east. Steep slopes in the western part and only a thin covering of topsoil on limestone rock hills combine to produce fast-moving runoff during heavy rainfall events, creating dangerous conditions and flash floods.

Because of tremendous runoff potential, Austin is one of the most flash-flood prone regions in North America. Steep slopes and intense rainfall have earned the area its nickname, "Flash Flood Alley", a phrase coined by the Public Entity Risk Institute.

Better flood prediction information means more time to close roads, reroute traffic, activate high-water signals and deploy emergency personnel before an impending flood. To achieve this goal, both accurate rainfall measurements using radar and rain gauges, together with Vflo™ model forecasts, help to protect the public from flood hazards.

Put to the Test

On May 23, 2009, a hydrologic forecast for central Austin's Shoal Creek provided a one-hour lead time for a downstream location along the 11-mile-long channel. Austin Flood Early Warning System operators took action based on their prior experience with the Vflo™ forecasting technology. They provided advanced warning to occupants of pedestrian walkways along the creek. The flood response was accurately forecast, which confirmed results obtained during model setup and calibration.

Continued Success

As is often the case, rainfall in "Flash Flood Alley" is highly variable and intense. Remnants of Tropical Storm Hermine produced flooding in Austin on Sept. 7 and 8, 2010. Nearly 13 inches of rain fell in some areas of Austin over the several-day period, producing widespread flooding. City staff used Vflo™ to enhance their situational awareness, decision support and rapid analysis of the flood event.

"Vflo™ offers hydrologists, planners and engineers a powerful and efficient modeling platform for storm water planning and operations," said Jean Vieux. "Its adoption and effective use by the city of Austin demonstrates that our products are performing at a high level to help engineers plan for and manage storm water, even in the most challenging conditions."

Austin and other major cities are turning their geospatial data into hydrologic information that supports regulatory requirements, emergency actions and quick response. Combining accurate maps of rainfall with the gridded model, Vflo™ provides an advanced platform for achieving client success.

Awards and Honors

Laura Brunson Receives EPA's STAR Fellowship Award

CEES doctoral student Laura Brunson recently was named recipient of the 2011 EPA Science to Achieve Results Fellowship for research on safe drinking water with a focus on the Rift Valley area of Ethiopia. She will receive up to $42,000 per year for a three-year period to support her demonstrated commitment and ongoing research on safe drinking water solutions for developing countries.

"This award recognizes Laura's unique abilities, contributions to date and future potential as an international leader in her field. We are so fortunate to have her as part of the OU WaTER Center team, where she is making significant contributions to improve the lives of those living in poverty in Ethiopia," stated David A. Sabatini, professor of Civil Engineering and Environmental Science and director of the OU WaTER Center.

Brunson is working with the OU WaTER Center to develop a technique using aluminum-coated bone char to remove naturally occurring fluoride from drinking water. She recently traveled to Ethiopia to test low-cost, low-energy, sustainable solutions for communities in the Rift Valley.

The level of fluoride in drinking water in the Rift Valley is extremely high, and severe overexposure to fluoride can result in damage to the bones and darkening of the teeth. Animal bone charred at a high temperature is effective at removing fluoride from water, but sustainable treatment plants and implementation methods are needed in rural Ethiopian communities.

According to Brunson, a trip to the Boundary Water Canoe Area in 1992, along with years of outdoor experiences and a belief in the importance of using one's talents and gifts to contribute positively to society, led her to study environmental science with an emphasis on water quality.


Laura Brunson

Brunson is an adjunct instructor in the OU Price College of Business, where she teaches social entrepreneurship. She is working with a group of students from the OU Center for the Creation of Economic Wealth to develop and implement a social entrepreneurial model for the bone char technology.

For more information about Brunson's research project or research activities of the OU WaTER Center, visit http://water.ou.edu or contact Laura Brunson at lbrunson@ou.edu.

Amy Cerato Receives Outstanding Young Alumni Award


Amy Cerato

Associate professor Amy Cerato, Ph.D., P.E., OU Rapp Foundation Presidential Associate Professor of Civil Engineering, was awarded an Outstanding Young Alumni Award from the College of Engineering at the University of Massachusetts- Amherst on Nov. 5, 2011. Recipients of this award are worthy ambassadors for the UMass Amherst College of Engineering and have shown extraordinary effort and notable success in their early careers.

David Sabatini Receives Distinguished Alumnus Award


David Sabatini

Professor David Sabatini, Ph.D., P.E., received the Distinguished Alumnus Award from the University of Illinois Civil and Environmental Engineering Alumni Association at a March 14 awards banquet held at the Union League Club in Chicago. He was honored for his contributions in the field of hazardous waste remediation using surfactants, as well as the development of appropriate and sustainable technologies for addressing water quality issues in remote villages. Drawing on experiences from both research areas, Sabatini serves as editor-in-chief of the Journal of Contaminant Hydrology and on the editorial board of the Journal of Water, Sanitation and Hygiene for Development. Civil Engineering at Illinois has a long and rich history, having been established in 1867 and recently ranked No. 1 in the United States (tied with UC-Berkeley) by U.S. News and World Report. Sabatini is a David Ross Boyd Professor, holds the Sun Oil Company Endowed Chair in Civil Engineering and Environmental Science, is director of the Water Technologies for Emerging Regions (WaTER) Center, and associate director of the Institute for Applied Surfactant Research.

We'd love to hear from you! If you have news to share in the next issue of ***Communiqué***, please contact us:

334 Carson Engineering Center
202 W. Boyd St.
Norman, OK 73019-1024

or cees@ou.edu

Alumni News

Stanley J. Grossman
Oct. 29, 1930 – Oct. 15, 2011

Stan Grossman, P.E. (BSCE 1952), died, Oct. 15, 2011, at age 80, after a long battle with malignant melanoma and a degenerative spine disorder.


Stan Grossman

Grossman was born on Oct. 29, 1930, in New York City and grew up in the Inwood Park neighborhood at the northern tip of Manhattan Island. He graduated from Brooklyn Technical High School in 1947 at age 16, and after one year of junior college in upstate New York, he entered OU. Grossman walked on to legendary coach Bruce Drake's basketball team at OU and earned an athletic scholarship, eventually starting as the point guard in his junior and senior seasons. In his junior season, he earned all-Big 7 conference tournament team honors, and was most proud that he was able to return to his hometown and help the Sooners upset eventual NIT and NCAA national champion City College of New York at Madison Square Garden for a second consecutive year.

Grossman received his bachelor's degree in civil engineering from OU in June 1952 and entered the U.S. Army Corps of Engineers as a lieutenant, serving for two years, first at Fort. Belvoir, Va., and then briefly in Japan and Korea. He married Mary Suzanne Brown while on leave on Jan. 31, 1953, a union that continued for 58 years. After leaving the service, Grossman went to work for Treat Engineering in Oklahoma City, where he was able to work on many important public works projects, and where he met his eventual business partner, Guy N. Keith.

Later, Grossman returned to OU to obtain his master's degree and briefly taught civil engineering before starting his own engineering consulting business in Norman. His master's thesis concerned the use of computers in highway bridge engineering, and he was an early pioneer in the use of computers as a private consulting engineer. After linking up with Keith to establish Grossman & Keith Engineering Co., with offices in Oklahoma City and Norman, Grossman participated for over 40 years in many key transportation and building projects throughout the state and nation. He also was an inventor, holding numerous patents, most prominently for the Inverset™ bridge system, a prestressed, modular product that could be erected in a few days instead of the months ordinarily required to complete or replace a highway bridge.

Grossman was intensely public-spirited, serving for many years on the board of the Central Oklahoma Master Conservancy District, which is responsible for managing public water sources for the communities south and east of Oklahoma City. He instigated and participated in various less–formal groups and campaigns concerning local public issues in Norman, ever-vigilant about public spending that he believed was inefficient or the product of undue influence from private interests.

Throughout a busy professional and public life, Grossman maintained a lifelong love of competitive athletics. He helped spearhead the campaign to build the current practice facility for the basketball team, named for his former coach, Bruce Drake, as well as the campaign to build the current practice facility for the wrestling team, named for former wrestling coach and assistant athletic director, Port Robertson.

Inverset™ bridge with laminated timber beams

2011-2012
Faculty Awards and Honors

Elizabeth C. Butler received the Association of Environmental Engineering and Science Professors Distinguished Service Award

Amy B. Cerato received the 2011 Outstanding Young Alumni award from University of Massachusetts- Amherst

Kianoosh Hatami received the ASCE/GI 2011 Thomas A. Middlebrooks Award

Tohren Kibbey received the American Geophysical Union Editors' Citation for Excellence in Reviewing for reviews in Water Resources Research, 2010

Robert W. Nairn received the 2012 Research Impact Award from the OU Vice President for Research

David A. Sabatini was named the University of Illinois 2012 Civil and Environmental Engineering Alumni Association's Distinguished Alumnus and received the 2011 Award of Merit with Distinction for Work in Developing Countries from the Water Environment Federation

Musharraf Zaman received the 2011 Outstanding Contributions Award from the International Association for Computer Methods and Advances in Geomechanics

2011-2012
Student Awards and Honors

- Chodchanok (Mink) Attaphong was awarded the American Oil Chemists Society 2012 Ralph Potts Fellowship
- Laura Brunson received an EPA STAR Fellowship
- Carlos Chang and Juan Pereira received an ID-UROP award by the OU College of Engineering
- Brendan R. Furneaux received a 2011-2012 Grand River Dam Authority Graduate Fellowship
- Julie LaBar received the 2011 American Society of Mining and Reclamation National PhD Level Memorial Scholarship
- Botao Lin, Colin Osborne, Lei Zhang and Wassim Tabet were named 2011 Oklahoma Transportation Center Fellows
- Leah Oxenford received Second Place in the 2012 American Society of Mining and Reclamation National Best Student Oral Presentation competition
- Allison Quiroga was named Outstanding Senior in Architectural Engineering
- Seth Roswurm was named Outstanding Senior in Civil Engineering
- Megan Salisbury was named Outstanding Senior in Environmental Science
- ASCE Geo-Institute students (Hessam Yazdani, Arash Hassanikhah, Carlos Chang, Juan Pereira) finished third in the paper competition and have been invited to the national GeoWall construction competition
- Sarah Yepez received an American Society of Mining and Reclamation 2012 National Meeting Student Travel Grant

2011 Graduates

Summer

B.S. Civil Engineering
Shwan E. Conover
Timothy W.S. Johnson

B.S. Environmental Engineering
Aissata Cisse

M.S. Civil Engineering
Parnaz Boodagh
Patrick Crowder
Casey Dick
Amy Hufnagel
Laura London
Zachary Thompson
Humberto Vergara Arrieta

M.S. Environmental Engineering
Elizabeth B. Baccus

Ph.D. Civil Engineering
Son Ky Hoang
Woosuk Kim
Krisda Piyawat
Shideh Shadravan
Evan Tromble

Fall

B.S. Architectural Engineering
Tia J. Madl

B.S. Civil Engineering
Jose D. Ferrufino Villarruel
Clint R. Gilliam
Robert T. Holmboe
Joshua D. Long

B.S. Environmental Engineering
Steven M. Aeschbach
Raymond P. Tole

M.S. Civil Engineering
Marc Breidy
Alseny Diop
Hollis Henson
Moustapha Ibrahim Ary
Andrew Nghiem

M.S. Environmental Engineering
Damon Webster

M.S. Environmental Science
Alea Smith

Ph.D. Civil Engineering
Dharamveer Singh

2012 Graduates

Spring

B.S. Architectural Engineering
Jacquelyn M. Baker
Jennifer E. Bergen
Chuen-Ping E. Chan
Krystyn M. Hobbs
Natalie N. Hodgen
Diana Lucero
Brandy D. Masih
Matthew W. McSherry
Allison J. Quiroga
Alesha B. Spears

B.S. Civil Engineering
Kyle R. Barton
Tommy D. Bounds
Kyle F. Bowen
Cody A. Burch
Adam T. Burke
Juan P. Crespo del Granado
Benjamin G. Engstrand
Hassan J. Essaili
Nicholas A. Garmon
Ashley K. Garber
Michael D. Hendrick
Ian E. Jehn
Keaton L. Mai
Daniel P. McCarthy
Michael L. McCoy
Yoohong Min
Charles P. Mish
Max L. Newton
Juan M. Pereira Villaroel
Brandon T. Rhodes
Jesse E. Roswurm
Seth M. Roswurm
Luo F. Yugar Arias

B.S. Environmental Science
Aislinn B. McLeod
Grayson J. Rutelonis
Megan N. Salisbury

M.S. Civil Engineering
Paul Boer
Adjamoussi D. Adje
Trevor Grout
Hai Wei Lim
Katrina McNeil
Colin Osborne
Foroud M. Sarmeidani

M.S. Environmental Science
Preston Carter
Lu Liu
Bridgett Neighbors
Laura Stamper
Sarah Carter Yepez

Ph.D. Environmental Science
Keisha Kohler Beasley

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Contributing writer and editor: Robert Knox, Ted A. Kritikos Chair, Presidential Professor, Director, School of Civil Engineering and Environmental Science

For more information contact:
University of Oklahoma
School of Civil Engineering and Environmental Science
334 Carson Engineering Center
202 W. Boyd St.
Norman, Oklahoma 73019-1024
www.cees.ou.edu Email: cees@ou.edu