Greetings from Department Head JOSEPH LABUZ

Dear Alumni and Friends,

This is the first magazine under our new banner as the Department of Civil, Environmental, and Geo-Engineering (CEGE). It is exciting when an established department can experience so many new beginnings.

In addition to our new department name, we now offer three undergraduate majors. The newest is the Bachelor of Environmental Engineering, but as you will see in this issue, our faculty and alumni have long been involved in areas of environmental engineering. This issue features stories on the environmentally-related research of Professor Paige Novak and the established water treatment consulting practice of alumnus Naeem Qureshi. You will also read about research projects in other areas that are being conducted by faculty and students here in CEGE.

This issue also highlights our scholarships and donors. CEGE regularly awards one of the highest number of scholarships among all the departments in the College of Science and Engineering, and two new awards are announced in this issue. We are so grateful to the generous donors that make this possible. There are many ways to give back to the department, and we welcome your time and financial resources in helping us accomplish our mission. You will also see in this issue a list of the upcoming Warren Lectures, which you are always welcome to attend.

We enjoyed connecting with several alumni and friends when we had an open house for our remodeled environmental engineering laboratories (see pages 12-13). I hope that many of you will be able to join us on Homecoming day, October 18, for breakfast in the courtyard of the Civil Engineering Building. It would be great to see you on campus!

Thank you to all our supporters who make these activities possible.

Best regards,

Joe

Joseph Labuz
MSES/Kersten Professor & Department Head
OF SPECIAL NOTE

The department is pleased to announce that two of our alumni have received Outstanding Achievement Awards from the University of Minnesota, the highest honor bestowed by the University.

MARK P. BOARD (BGeoE 1975, MS 1977, PhD 1994) received this distinctive honor in recognition of his accomplishments as an outstanding professional engineer and his leadership and innovation in the field of geoengineering. Board made distinguished contributions to the field early in his career, being awarded the Rocha Medal of the International Society for Rock Mechanics for best PhD thesis. His dissertation described measures to reduce the risk of rockbursts in mines (essentially earthquakes induced during mining), a problem that lead to 69,000 deaths in South Africa from 1990-1994. He is the only American to win a Rocha Medal. His excellence continued throughout his career. In 2012, Board received the prestigious Rock Mechanics Award of the Society for Mining, Metallurgy, and Exploration to recognize the most outstanding person internationally in rock mechanics. In February 2014, Board was elected Member of the US National Academy of Engineering for contributions to the design of large-scale mines based on application of advanced rock mechanics principles. Board is currently Corporate Director for Geotechnical Engineering, Hecla Mines, Coeur d’Alene, Idaho.

PATRICK M. FOLEY (BCE 1971; P.E., D.WRE, M.ASCE,) is the former Chief of the Hydraulics Section, St. Paul District, US Army Corps of Engineers. During his 41 years of service in the Corps, Foley distinguished himself through technical excellence, staff development, and contributions to his profession. Foley was inducted as a Diplomat by the American Academy of Water Resources Engineers in 2010. Foley’s technical ability and reputation earned him positions on the Corps Hydrology Committee, several Corps research committees, the Corps Task Force on Hydrology and Hydraulics Capability, and as a writer of the Levee System Evaluation Engineering Circular. Foley contributed to the field of hydraulics through involvement with American Society of Civil Engineers (ASCE). Locally, at the Minnesota level, he was a member and chair of the Water Resources Committee of ASCE, committee member of the Water Resources Conference, and a member of the Climate Change Adaptation Committee. Foley is recognized as an expert in the field of hydraulics and as an outstanding supervisor that will leave a legacy of high performing, high achieving professionals. Foley epitomizes what engineers aspire to be.

The department is truly proud of these two alumni and all the good they have contributed through their engineering careers.

SUSAN PARK RANI (BCE 1982), president of Rani Engineering in Minneapolis, was among 11 “Champions of Change” honored by the Obama Administration at a White House ceremony on May 12, 2014. These champions were chosen for their “leadership to ensure that transportation facilities, services, and jobs help individuals and their communities connect to 21st century opportunities.”

JOHN GULLIVER was honored for his Lifetime Achievement in Improving Minnesota Water Quality. Gulliver received the Dave Ford Award for his notable contributions on preserving and improving water quality. Gulliver received the award during a ceremony at the 2013 Minnesota Water Conference in St. Paul, Minnesota. The award was presented by another Dave Ford Award winner, CEGE Professor Emeritus HEINZ STEFAN. The next Minnesota Water Conference is October 14-15, 2014, in St. Paul.

PROMOTIONS

LEV KHAZANOVICH has been promoted to Professor. Khazanovich earned his PhD from the University of Illinois in 1994. He has been researching and teaching at UMN since 2003. His research interests include non-
destructive testing of concrete; structural analysis and design of concrete pavements; application of neural networks to pavement engineering; and nonlinear fracture mechanics with emphasis on modeling pavements. This fall Khazanovich will be teaching Civil Engineering Materials and Pavement Analysis, Design, and Rehabilitation.

SONIA MOGILEVSKAYA was promoted to Research Professor. Mogilevskaya has been working as a Senior Research Associate in the department since 2004. Mogilevskaya's expertise is in the area of applied mathematics and computational mechanics. Her current research projects include modeling of fluid-driven 3D fracture, with special emphasis on problems involving geomaterials and composite materials. Mogilevskaya has been invited to share her work at the conference, Applications of Complex Variables: Modeling, Theory and Computation in January 2015 at the Banff International Research Station (BIRS). BIRS addresses the imperatives of collaborative and cross-disciplinary research with a focus on the mathematical sciences and their vast array of applications in the sciences and in industry.

RESEARCH

In May, Governor Dayton signed a bill banning triclosan-containing products, beginning in 2017. WILLIAM ARNOLD started investigating triclosan in 2000. Arnold's latest project was funded by the State of Minnesota through the Environmental and Natural Resources Trust Fund. His research was influential in helping lawmakers, other researchers, and regulators understand the levels of triclosan and triclosan related dioxins in Minnesota lakes.

PAIGE NOVAK is leading a team in related research, exploring the effects of triclosan on the beneficial bacteria used in sewage treatment plants. Read a summary on the NovaNext blog (June 20, 2014).

TIM LAPARA points to wastewater—and our treatment of it—as the culprit in antibiotic resistance in Minnegrab a publication of the UMN Water Resources Center.

Governor Dayton apportioned funds from Minnesota’s Environment and Natural Resources Trust Fund, which has been accumulating from the Minnesota State Lottery since 1991. Five projects by three CEGE researchers will benefit. WILLIAM ARNOLD received funding for two projects: “Solar Driven Destruction of Pesticides, Pharmaceuticals, and Contaminants in Water” ($291,000) and “Antibiotics and Antibiotic Resistance Genes in Minnesota Lakes” ($300,000). PAIGE NOVAK received funding for two projects: “Methods to Protect Beneficial Bacteria from Contaminants to Preserve Water Quality” ($279,000) and “Evaluation of Wastewater Nitrogen and Estrogen Treatment Options” ($500,000). TIM LAPARA received funding for his project “Triclosan Impacts on Wastewater Treatment” ($380,000).

The SAFL Baffle is a product that keeps sediment pollution out of lakes, rivers, and oceans. It was developed in and named after UMN’s St. Anthony Falls Laboratory (SAFL). The product has support from UMN’s Office for Technology Commercialization, from Upstream Technologies (New Brighton, Minnesota), and since July 2014, from Uponor, Inc., a company based in Apple Valley, Minnesota. The effectiveness and affordability of the SAFL Baffle make it an appealing product. JOHN GULLIVER is a co-inventor.

JOHN GULLIVER received funding for two projects from the MPCA/US EPA: “Performance of an Agricultural Drainage Tile Filter” and “Internal Phosphorus Load Reduction with Iron Filings.”

He also presented on “Gismsos for Stormwater Treatment” at Carnegie Mellon University and Villanova University.

JOHN HOURDOS was heard speaking out on a recent dip in traffic congestion in the Twin Cities (MPR News, May 15, 2014). Hourdos said MnDOT projects along Interstate 35W in South Minneapolis, I-35E, and I-694 have eased thousands of hours of congestion. Hourdos also encouraged increased use of public transit.

JIA-LIANG LE and JOSEPH LABUZ, with their former Master’s student JONATHAN MANNING, won the best paper award at the 48th US Rock Mechanics/Geomechanics Symposium, which was held at UMN in June. Their paper is titled “Scaling of Fatigue Crack Kinetics of Sandstone.”
Traffic issues continue to be timely topics of discussion in the media, and David Levinson is a popular and prolific commentator on these issues. He has recently contributed comments to the Star Tribune, the Boston Globe, the Sioux City Journal, KSTP-TV, and MPR News.

Chen-Fu Liao, a senior engineer at the department’s Minnesota Traffic Observatory, has been working on a smartphone app to help blind and visually impaired people navigate streets in Minneapolis. The story was picked up by many media outlets, as well as the Minnesota Daily, July 9, 2014.

Julian Marshall and PhD student Lara Clark’s groundbreaking study found that on average nationally, people of color are exposed to 38 percent higher levels of nitrogen dioxide (NO₂) outdoor air pollution compared to white people. The study was covered extensively by national media including MSNBC, Washington Post, and The Economist.

Karl Smith’s (professor emeritus) work on training STEM educators and the I-Corps for Learning Program is making a big impact. “Karl and his teaching team really nailed it. So much so that the NSF is now rolling out I-Corps for Learning on a larger scale… NSF will provide up to $1.2 million to support 24 teams” (Huffington Post, July 23, 2014).

Fotis Sotiropoulos, Michele Guala, and PhD student Kevin Howard are conducting a first-of-its-kind study using snow during a Minnesota blizzard to study airflow around large wind turbines. Their research involves going out in nighttime blizzard conditions to track falling and blowing snow particles near a 130-meter-tall wind turbine. This research is essential to improving wind energy efficiency, especially in wind farms where airflows from many large wind turbines interact with each other. The study was published in Nature Communications in June 2014, and it has gotten a lot of attention in other media outlets. To view the full research paper in Nature Communications, visit z.umn.edu/windstudy14; to view a short video of the wind turbine research during the blizzard, visit http://z.umn.edu/windvideo.

Co-authors Arturo Schultz, Henryk Stolaski, and their graduate student Bulent Mercan (PhD 2011) won the Precast/Prestressed Concrete Institute’s Charles C. Zollman Award for 2014. Their paper, “Long-Term Lateral Deflection of Precast, Prestressed Concrete Spandrel Beams,” was published in the Fall 2013 issue of the PCI Journal and was determined to be most “worthy of special commendation for its merit as a contribution in advancing the state-of-the-art of precast and prestressed concrete.” The award will be presented at the 60th Anniversary PCI Convention and National Bridge Conference in September.

DAN ZIELINSKI, a post-doctoral researcher, and Vaughan Vollert have been working with Peter Sorensen, UMN professor and researcher with Minnesota Aquatic Invasive Species, and Russ Snyder, US Army Corps of Engineers, on an experimental Asian Carp sonic deterrent system. The system was successfully installed at Lock & Dam #8, near Genoa, Wisconsin.

Program News

Kimberly Hill and Tim Lapara represented CEGE at CSE Sneak Peek, a time for students to peek into majors they are interested in, talk with professors, and tour departments.

Students

Rachel Gaulke (BCE 2009) and her model of the former I-35W bridge, which she built when she was a junior, will be featured in an add for TKDA, a St. Paul-based engineering firm. The ad will appear in Twin Cities Public Television’s fall member magazine. Gaulke currently works as a Research Coordinator and Project Manager for the department’s MAST Laboratory.

The July issue of Mining Engineering highlighted the first Scholarship Awards Ceremony of the SME Twin Cities local section. Four CEGE students, all active in the SME student chapter, were recognized: Sam Paitich, Noah Kimmes, Brian Zemaitis, and Brittany Wagner.

The CEGE Concrete Canoe Team placed 2nd in the 2014 ASCE Midwest Regional Concrete Canoe Competition!
ALUMNI

STEVE HANKEY (PhD August 2014) began a new job as an assistant professor in Urban Planning at Virginia Polytechnic Institute and State University (Virginia Tech).

DAVID TAN (PhD August 2014) was awarded the Central States Water Environmental Association (CSWEA) Academic Excellence Award. Tan will be doing post-doctoral research with PAIGE NOVAK, who nominated him for the award.

BROCK HEDEGAARD (PhD July 2014) is now an assistant professor in the Department of Civil and Environmental Engineering at the University of Wisconsin – Madison.

MICHELLE MACIEJ (BCE 2013; profiled in our Fall 2013 issue) is a Graduate Engineer in the Municipal Group at WSB Engineering. Maciej stated her internship and her work ethic prepared her well for this position. She continues to “learn a ton every day!” Maciej will marry fellow alum JUSTIN KOLANDER (BCE 2010), who is Project Manager and Project Management Quality Manager at Braun Intertec in St. Paul.

In August, KARL J. ROCKNE (BCE 1990, MS 1992) became the interim department head for Civil and Materials Engineering at the University of Illinois at Chicago.

JOHN HOULE (BCE 1983, MCE 1984; profiled in our fall 2013 issue) has recently taken a new position at 3M as Vice President of Global Service Delivery.

48TH US ROCK MECHANICS/GEOMECHANICS SYMPOSIUM

UMN was proud to host the 48th US Rock Mechanics/Geomechanics Symposium, sponsored by the American Rock Mechanics Association (ARMA). Nearly 500 registrants gathered, 40% coming from outside the US. A wealth of technical information and discussions characterized the gathering.

The theme, Rock Mechanics across Length and Time Scales, led participants to consider the role of scaling in a range of natural and engineered processes: from the very fast (acoustic emission) to the very slow (salt creep), from the very small (microcracking in rock fracture) to the very large (a reservoir for CO$_2$ sequestration).

The MTS Lecture, delivered by R. Zimmerman, opened the symposium with a retrospective of rock mechanics. Daily keynotes included a review of energy technologies by E. Eide and R. Jung, consideration of induced seismicity by S. Shapiro and S. Maxwell, and an examination of hydraulic fracturing by N. Warpinski and R. Jeffrey.

L. Laloui and A. Ferrari taught a short course on Multiphysical Geomechanics, which drew significant numbers. Workshops were offered on Petroleum Geomechanics Testing (T. Addis and R. Ewy) and on the Role of Geomechanics in Geothermal Reservoirs (Itasca Consulting). The technical sessions were noteworthy in both depth and breadth. Topics drawing the most attention were hydraulic fracturing (33 papers), salt mechanics (23 papers), and wellbore mechanics (19 papers). Select papers from the conference will be published in a special issue of Rock Mechanics and Rock Engineering.

Attendees also had opportunity to tour some of Minnesota’s geoenengineering features including Soudan Mine in northern Minnesota, Taylors Falls area on the St. Croix River, and Cold Spring Granite Quarry & Manufacturing. The closing event was a tribute to the contributions of S. Crouch, P. Cundall, and C. Fairhurst.


Fairhurst (center front) with several of his former students, all CEGE alumni. Front row: B. Haimson, C. Fairhurst, S. Crouch; Middle: W. Wawersik, J. Daemen, J. Hudson, M. Hardy, J.C. Roegiers; Back row: F. Comet, E. Detournay
Photo by Hill Montague, ARMA 2014.
He landed in the United States with $21 in his pocket. He had left his mother, his wife, and his child in Pakistan. That was December 1973. Today Naeem Qureshi, PE, is the President of Progressive Consulting Engineers, Inc. Qureshi talks about his experience and his passion for helping others.

Naeem Qureshi (MCE, 1985) grew up in Pakistan. After graduating, he worked for an American company in Pakistan. When their contract ended, he got a job teaching at the University of Engineering and Technology. He came to feel he needed a master’s degree to move ahead.

His mother, educated only through 6th grade herself, believed strongly that education was necessary for progress. She agreed that he should go to the US to complete his degree. His mother’s belief in education shaped Qureshi’s commitment and proved to be a strong motivator.

“When I went to the University, I found out how long it would take me to get a master’s degree. I had come to Minnesota because my brother was here; he had come in 1955. He graduated from UMN, completing his Master’s in Civil Engineering in only 9 months, so that was my expectation. I thought of my wife and baby back in Pakistan. I had no money. I had to look for a job.

“Job hunting was one of my first encounters with cultural differences. I quickly got my first interview. The guy said come for an interview at 4:00 PM at the Community State Bank Building at 9726 Lyndale Avenue South. In Pakistan, all the banks at that time were downtown. So, I got ready and left about 1:00 (plenty early) and went downtown to find the bank building.

“It was December and very cold! I had never seen snow in my life! I wandered around looking for the Community State Bank Building for about an hour. When I finally found someone to ask, I was told I was 20 miles away!

“By the time I arrived only the cleaning people were left. So, you learn! I did not get that job, but I kept trying.”

Just ten days after arriving in the US, Qureshi got a job as an engineering technician with a consulting firm. Within four months, he became an engineer with that firm.

After a year, Qureshi travelled back to Pakistan. In spite of his success, his mother was disappointed he was not in school. “She told me, ‘You promised; that is why I let you go. I did not want to stop you from progressing. Now where is your degree?’ So, I came back to the University and enrolled in night courses.

“With a wife, a child, and a demanding job, one course at a time was all I could manage. I went to work in the morning, then directly to the U after work. Classes went until 9 pm. Then I would go to the library, finish my assignments, get home about midnight, and start again the next day.

“There is some detriment to being a night student. I knew only the people...
Education for PCE Employees

Qureshi encourages education and professional development among his employees, approaching leadership through three key roles: talent management, thought leadership, and research and publishing.

Qureshi helps his employees set and meet professional goals, a strategy that helps PCE keep qualified professionals. “We talk with employees, determine where they should be or want to be, and together we make a plan to reach those goals.”

“For me, thought leadership is very important,” says Qureshi. “It helps us keep up on new technologies and research. Our approach is to spend a couple hours the last Thursday of each month discussing articles in professional journals and new research that we can apply in our work.”

“I ENCOURAGE MY EMPLOYEES TO PUBLISH RESEARCH AS WELL AS READ IT. WE OFTEN CO-PUBLISH. IT HELPS US KEEP UP ON RESEARCH AND HELPS ESTABLISH US AS EXPERTS.”

Education for a wider audience

Qureshi also understands the importance of educating the public about engineering, and sees writing and speaking as important ways to help people understand the value of what engineers do. Qureshi has published 18 papers in professional publications and has made over 200 presentations at professional gatherings. “All my writings are about using engineering expertise in innovative ways to help people do things better with lower costs. I have written about the need for infrastructure in a paper published in the January 2014 issue of the Journal American Waterworks Association (AWWA). The bulk of our infrastructure was designed 50-60 years ago, and the cost has been predicted at one trillion dollars over 20 years! So, opportunities in the field of water quality engineering are unlimited. Engineers will be needed to design all those needed facilities.”

The Future of Water Supply Engineering

“One of the biggest challenges in the area of water treatment is that the pool of qualified people is not very large. Mistakes in hiring can be expensive, so I try to hire people through my contacts. I hired one of my guys through the UMN Alumni Association. I heard him do a presentation, he was good, and I hired him right there.

“Internships are another way to find good people. Internships give us an opportunity to evaluate a person, their work, their ethics, and their abilities.” (See information on CEGE’s Internship Opportunity Program at http://www.cege.umn.edu/current/undergraduate/internships.html.)
To keep qualified individuals, Qureshi gives his engineers flexibility and the ability to make decisions on their own. His job is to ensure everything gets done right, and things seem to be going right at PCE. With new projects coming on, PCE is expecting to expand to 15 or so people. “We could grow more,” says Qureshi, “but I like to be able to deal with everybody and remain flexible.”

Relationships
Qureshi has learned that good relationships make work easier and make life better. “I am able to build good relationships at work and at home because I value relationships. I try to know about people and show interest in their lives. Even in a business meeting, I start by asking, ‘how is your daughter doing in college?’

“I wrote about some of these things in “Can Operators Play a Role in Plant Design?” (in Opflow, an AWWA publication, October 2013). Operators can give you a lot of information that can improve the plant design. An engineer has to go to the operator, has to know him and his history, has to develop a relationship. If you have a relationship with someone, they will help you much more than if you do not. That is the approach that I take. That is the only way.”

Education and Water in Pakistan
Qureshi’s commitment to education extends to Pakistan. “I sponsor a school through the Citizen’s Foundation (www.citizensfoundation.org), an organization that constructs schools in very poor, very rural areas.

“The school teaches modern education to boys and girls. The schooling is not free, but is offered at a very low charge ($1USD/month). The fee includes a uniform, books, and lunches. In the beginning, we had to bring teachers in to the rural areas. Now, we have a pool of graduates, and we can draw teachers from the local areas. After they complete high school, we try to get the students into trade schools, and the bright ones into college. The school is doing an excellent job! One of the girls got a scholarship to Harvard. It is very fulfilling to sponsor education in this way.”

Qureshi, his wife, and their firm are also involved in Water for People (www.waterforpeople.org), which was designated “charity of choice” by the American Water Works Association. “We fund water projects in third world countries, where access to water can change the whole economy.”

Eventually, after stepping back from the leadership of his firm, Qureshi would like to be more active in helping third-world countries with their water systems.

“In Pakistan people get only two hours of water per day, there is no water pressure, nor any water meters. Each home has a big tank underground and another tank on the roof. They pump the water from the lower tank to the upper tank, and then they use it. Half of the water is wasted through leaks. I wrote a paper that was published in Pakistan that showed through research that this existing system could be made much more efficient and cost effective and provide 24-hour water supply.”

“I WOULD LIKE TO HELP PAKISTAN MAKE A PARADIGM SHIFT; RIGHT NOW THEY CANNOT EVEN THINK ABOUT HAVING 24-HOUR WATER ACCESS. THAT IS THE KIND OF THING I AM LOOKING FORWARD TO! MY GOAL IS TO IMPROVE THE LIVES OF THE PEOPLE.”

“Education and clean water; these are my passions.

“One thing I know is that people cannot live without water. You can live without a lot of things—you can live without electricity, you can live without roads, but you cannot live without water.

“Another thing I know is that education is key to success. When I came to America, I had only $21. There was no chance for me if I didn’t get an education.

“Education is paramount. That is my last word.”

Read More...


University of Minnesota College of Science and Engineering | DEPARTMENT OF CIVIL, ENVIRONMENTAL, AND GEO-ENGINEERING 9
THREE NEW FACULTY EXPAND THE DEPARTMENT’S EXPERTISE

SEBASTIAN BEHRENS will join the Department of Civil, Environmental, and Geo-Engineering and the BioTechnology Institute at the University of Minnesota in January 2015.

Behrens comes to the University of Minnesota after six years as a junior group leader in the Department of Geosciences at the University of Tübingen. He obtained his PhD in Microbial Ecology at the Max Planck Institute for Marine Microbiology in Bremen, Germany, under Rudy Amann. Later he did postdoctoral research at Stanford University with Alfred Spormann.

Behrens’s research combines the disciplines of biogeochemistry, microbiology, and molecular biology to understand the basic microbial ecology principles driving the biogeochemical cycling of metals and metalloids, the biodegradation of organic contaminants, and the emission of greenhouse gases from the molecular to the ecosystem scale. “My research is focused on questions at the interface of environmental biotechnology, biogeochemistry, and microbial ecology. Through my research I gain insights into the ‘lifestyle’ of environmental microorganisms by linking the quantification of biogeochemical processes to the in situ activity (ecophysiology) of microorganisms at various scales relevant to microbial life in natural and engineered environments (from the gene/genome via the single cell to the population/community level).”

Behrens has experience teaching undergraduate and graduate level courses in Europe and the United States. The Department of Civil, Environmental, and Geo-Engineering and the BioTechnology Institute are excited to welcome him to UMN.

ADAM BOIES is returning to UMN; he earned his PhD degree in Mechanical Engineering here in 2010 under the direction of Steve Girshick. His doctoral research concerned novel nanoparticle synthesis methods. Boies also worked with CEGE professor Julian Marshall on air pollution research. After completing his PhD, Boies joined the faculty at Cambridge and developed a strong research group engaged in research on particles in gas streams. His group is researching emissions from transportation sources (cars and jet planes, for example) and modeling the emissions, pollutant transport, and pollutant fate in the atmosphere. His group has developed a novel device for separating semi-volatiles from gas streams to permit accurate particle measurements. This patented device resulted in the creation of a start-up company to market the technology. In other research projects, Boies is concerned with predicting changes in air pollutant emissions (e.g., greenhouse gases) that result from use of alternative fuels like ethanol. He has been involved in research funded by a private company to optimize a process for producing sheets of aligned carbon nanotubes.

In addition to his research activities, Boies has been teaching engineering courses on related topics for about three years. His goal is to help students link the engineering principles they are learning with real world understanding.

We are pleased to welcome Boies back to UMN, where his skills as an instructor and his productive and innovative research will be a great asset to areas of transportation and environmental engineering.

[Text corrected 10/20/2014]

Santiago Romero-Vargas Castrillón has a BS, an MS, and a Ph.D. degree in Chemical Engineering. His doctoral research was completed at Princeton University under the direction of Pablo Debenedetti, and it concerned the study of nano-confined, interfacial and hydration water using molecular simulation. Romero-Vargas has most recently been doing postdoctoral research in environmental engineering at Yale, under the direction of Menachem Elimelech. His postdoctoral work pertained to the development of low-fouling membranes for water separations. At UMN, he plans to establish a research group in which numerical simulation and surface analytical techniques are used to understand the interactions of colloids, biomolecules and bacteria with aqueous interfaces of environmental relevance. Romero-Vargas is looking forward to the possibilities for collaboration with environmental, water resources, geomechanics, and transportation (pavements) colleagues within CEGE, and with faculty in chemistry and chemical engineering.

In 2011, Romero-Vargas won the Princeton University Engineering Council Excellence in Teaching Award. At the University of Western Ontario, he was a founding member of the local chapter of Engineers Without Borders Canada.

We look forward to the excellence and experience that Romero-Vargas brings to CEGE.
VISITING STUDENT RESEARCHERS

Two French graduate students joined CEGE for a summer research experience. Jean-Claude Carret and Margot Kadziolka are graduate students studying engineering at the Ecole Nationale des Travaux Publics de l’Etat (ENTPE, the National School of Public Works), which is part of the University of Lyon.

Jean-Claude Carret studied pavements under the direction of Professor Mihai Marasteanu, working on the Huet model to develop a protocol to fit accurately DSR data. They also investigated the limits of the Huet model and worked to connect BBR and DSR data through the model. Carret and Marasteanu presented their work at the Petersen Asphalt Research Conference in Laramie, Wyoming. Carret said, “Professor Marasteanu treated me not as a student but as a partner; his trust is really a valuable asset for my work.”

Kadziolka is majoring in urban planning, and this summer worked with Professor David Levinson in the Accessibility Observatory, part of the Networks, Economics, and Urban Systems Research Group (NEXUS). She worked on several projects related to job accessibility. Kadziolka worked with Andrew Owen, for example, mapping the number of jobs reachable in 30 minutes by transit for each block in a city, and searching for international data to extend the mapping to additional countries.

Kadziolka stated, “I really had the experience of being part of the team because Andrew gave me some entire projects to do, which was really valuable to me.”

In spite of the large campus (“We don’t have a lot of campuses of this size in France!”), Kadziolka found her adaptation to Minnesota to be quite easy. “I improved my English and also my skills in transportation and accessibility.”

Carret declared that the best thing about the University and the department was the kindness of people he met here. “We’ve been hosted so well! Everyone has always been here for us to help with whatever question or to give us information or simply to treat us as friends. And that is so cool to feel at home so far away from home! I am very grateful to everyone from the department. They contributed so much to make our experience a wonderful experience abroad.”

University of Minnesota College of Science and Engineering | DEPARTMENT OF CIVIL, ENVIRONMENTAL, AND GEO-ENGINEERING
The Civil Engineering Building: Then & Now

Students, alumni, and professors (past and present) gathered at an open house to christen the newly renovated Environmental Engineering Labs.

Andy McCabe, PhD student, working to better use and design wetlands to remove pesticide and pharmaceutical contaminants.

Denice Nelson worked on her MS and PhD with Paige Novak.

Current MS student Christa Gomez.

Alumnus Bo Johnston, who now works at Black and Veatch.

Professor Raymond Hozalski (far right) with former students, Chris Herrington (far left) and Chris Ryan, and current student Jacqueline Straight.

Professor Raymond Hozalski (far right) with alumnus John Glatzmaier and his wife Ellen Longmire (Professor in AEM at UMN).

Alumnus Andrew Ort, now working at Arcadis.
Professor Henryk Stolarski and Assistant Professor Dominik Schillinger

Alumna Sara (Firl) Ramsden with instructor Dr. Erin Surdor

Faculty members (left to right): Paige Novak, Jia-Liang Le, Lauren Linderman, and Sonia Mogilevskaya

Professor Mihai Marasteanu and Emeritus Professor Theodore Galambos

Nic Brissette, Geologist with Gunn Oil, and Department Head Joe Labuz

Youchul Seon, PhD student, working on biofilm in pipelines

Alumni Mark Brigham, Sherri Kroening, and Bruce Monson

Alumnus Steven Kloiber, now working at Minnesota Dept. of Natural Resources
Our lecture series is both the cause and the result of interesting discussions and collaborations. Please join us if you can. This is the proposed schedule for our upcoming lectures, which are held Fridays at 3:30 p.m. in the George J. Schroepeffer Conference Theater (Room 210), Civil Engineering Building. A reception follows.

September 5  WILLIAM WINDES
Idaho National Laboratory

September 12  XIANG CHENG
Chemical Engineering and Materials Science, University of Minnesota

September 19  ROBERT MULLEN
Civil and Environmental Engineering, University of South Carolina

September 26  CHRISTOPHER HIGGINS
Civil and Environmental Engineering, Colorado School of Mines

October 3  PIERRE COTE
Cote Membrane Separation, Ltd.

October 10  CUMARASWAMY VIPULANANDAN
Civil and Environmental Engineering, University of Houston

October 15  KARL FRANK: DEXTER LECTURE
(5pm in 100 Architecture Building)
University of Texas at Austin

October 17  ANASTASIA MULIANA
Mechanical Engineering, Texas A&M

October 24  PAUL MARTIN
Applied Mathematics and Statistics, Colorado School of Mines

October 31  RENÉ DE BORST: VARDOUKIS LECTURE
School of Engineering, University of Glasgow

November 7  JOHN EVANS
Aerospace Engineering Sciences, University of Colorado Boulder

November 14  MICHAEL DODD
Civil and Environmental Engineering, University of Washington

November 21  ALBERTO SALVADORI
Civil Engineering, Architecture, Land and Environment, Brescia University

December 5  ZDENEK BAZANT
Civil and Environmental Engineering, Northwestern University

Updates and live streaming are available on our web site at www.cege.umn.edu.
Although she can state it simply, Professor Paige Novak's research uncovers mysteries of bacteria too small to see with impacts too big to ignore. Here she explains a bit more about her research.

**Hydrogen from Waste**

Currently, what happens in a wastewater treatment plant is that we take the energy-rich material that comes in—wastewater has a lot of chemical energy associated with it—and we expend a lot of electrical energy to get different kinds of bacteria (aerobic, oxygen breathing bacteria) to consume that waste and make CO₂.

Professor Bill Arnold and I designed a membrane module where bacteria are encapsulated into a polymer and produce hydrogen gas from wastewater. Basically we take waste, generate hydrogen from it, capture it, and put that energy into a usable flow.

Technology development is not an area that I normally work in, so developing this module has been exciting and fun! Capturing the hydrogen turns out to be the tricky part. We’ve designed our module so we can collect the hydrogen gas at the same time the bacteria make it. After that, fuel cell technologies can be applied to use the hydrogen to generate energy. Our new technology also uses anaerobic bacteria, which means we do not have to expend energy to give the bacteria oxygen—that is a different approach than what has been done before.

It has been really successful so far. Our calculations are made with the optimistic-but-not-crazy assumption that we can access all the waste. Optimistically, our calculations show that from the waste of a treatment plant, we could generate 10 times the amount of energy currently used by the plant. Our module has the potential for a dramatic impact on the field—if it pans out.

This collaboration between Bill and I came about pretty naturally; in the department we often talk about the work we are doing. I have done a lot of research on bacteria degrading pollutants; that is my primary area of research. And I have done—and still do—a lot of research on bacteria degrading PCBs (polychlorinated biphenyls) and other chlorinated compounds. That work is intensely microbial: figuring out which bacteria
do what and how they do it, what the bacteria are consuming, the effects different chemicals have on them—the nitty-gritty stuff of biology.

Bill had been working on passive membrane barriers, putting compounds in the polymers that would react when harmful chemicals diffused through the membrane. He thought, “If we could put Paige’s bacteria in the polymers, and layer chemicals with bacteria, maybe we could do a better job, maybe the membranes could be more effective.”

So he and I did that and it worked. We had bacteria in the membrane eating PCBs as they diffused through the membrane.

Then I proposed we put bacteria that make hydrogen into the membrane. But we had to find a way to remove the hydrogen so other bacteria wouldn’t eat it before we could use it; hydrogen is like candy to them! Bill had the idea to insert tubes into the membrane to whisk the hydrogen away. That allows us to pull the hydrogen out of the system so that we can use it.

A three-year grant from the Legislative-Citizen Commission on Minnesota Resources (LCCMR) has supported a lot of our work. We now have a patent filed on the idea. We are also starting to work with another encapsulation researcher from mechanical engineering here at UMN, Alptekin Aksan. We are working on a new patent with Aksan on a similar idea, with a new twist.

It has been fun thinking about technology development, and it has led to new collaborations!

Leaky Cells

I have always tended to look at what bacteria can do to chemicals, for example, bacteria eat chemicals. I am working on a project with Tim LaPara to look at the effects chemical mixtures have on bacteria.

“THIS IS A NEW PERSPECTIVE!”

A lot of time and a lot of money are put into getting bacteria to degrade waste in wastewater, landfills, or natural systems. If we can better understand how chemicals affect bacteria in those processes, we could head off some problems that arise.

Other researchers have seen that perfluorinated compounds can get into the membranes cells and make the cells “leaky” (that is, let chemicals or compounds in and out through the membrane). Cells probably do not suffer a huge, general leakiness, but probably something more chemically specific.

So Tim and I are wondering if leaky cells are more susceptible to other chemical insults. And then we want to know which perfluorinated compounds might induce leakiness, at what concentrations, and which co-contaminants (other chemicals) would likely get led into the leaky cells. One of the questions we are researching is “does leakiness of the cell lead to more antibiotic resistance?” (See a brief discussion of this work. http://cse.umn.edu/admin/comm/features/CSE_CONTENT_472679.php)

We have been working in this area for a few years. My colleague, Matt Simssik in Public Health, and I just got a new 3-year grant (started July 1). We are hopeful that we will be able to nail down these questions in that time. I have a graduate student working with me in this area, and this summer, I also have a high school student working in this area. It is always fun to have students working in the lab, fun to watch as they begin to see the reality of science and what it can do.

Standing Committee on Chemical Demilitarization

I was contacted a couple years ago to serve on a National Research Council study committee. Committee members were to look at a plant designed to treat chemical weapons and suggest things to look for during systemization, a period of testing to make sure the plant would run well once it “went hot,” as they call it. After that study, I was asked to serve on the standing committee, a group that meets twice per year to hear updates from the two remaining facilities. We provide advice, point out things to think about, and decide if additional study committees are needed to look at a particular issue.

Prior to my involvement in the National Research Council’s Standing Committee on Chemical Demilitarization, I was not aware that the US still had chemical weapons. In fact, 90% have been destroyed and about 10% of the original stockpile is left. I am on a committee that gives feedback on the process of getting rid of the last of those chemical weapons.

Most of the stockpile has been destroyed by incineration. In 1997, a law was passed stating that the US could not incinerate chemical weapons at two of the stockpile locations, so those locations had to find other means of disposal. These last two plants have a lot of first-of-its-kind equipment,
which, obviously, hasn’t been used to destroy chemical weapons before.

It is interesting to think about these chemicals as just another pollutant, and to consider how everything one knows from a fundamental perspective—about how bacteria work, how reactors work, and how to design a reactor to do certain things—is all relevant to looking at this strange stuff.

**Jobs AND a Clean Environment**

I am co-directing a MnDRIVE Initiative called Advancing Industry, Conserving Our Environment. Our goal is to find a way to embrace progress and environmental protection. We need to find a way to have both together, although they sometimes seem counter to one another. (Read about MnDRIVE http://mndrive.umn.edu/)

We think of ways to support and stimulate research that will have a positive impact on the environment and on industry. We want to support industries that hire Minnesotans, like agriculture, mining, or other industries. Our efforts have a microbial slant, using microorganisms to clean the environment, with a primary focus on water in agriculture, industrial waste, municipal waste, and mining. We’ve funded a couple of demonstration projects that are working on larger scale treatment, and we’ve also funded more basic research.

**Early Interest**

I really got fascinated in the early 80s when an oil spill was in the news and a superbug was being developed to degrade the oil. I found it so fascinating! Somehow this idea of tinkering with bacteria to solve this big problem resonated with me. My dad was a professor of environmental engineering, so I knew that this was a job that you could have.

As a kid, I was either going to be an artist or an engineer. Those fields may seem incompatible at first, but all research is, at its heart, very creative. That is what really resonates with me: the excitement of being creative, of coming up with a wacky idea to solve a problem, to save the world! To make hydrogen from waste! It is a cool thought!

As an engineer, the thing that comes first to my mind is “how can I apply this, how can I fix this problem?” I love to play around with bacteria in the lab and look at the data. I like to figure out all the nitty-gritty science, but for me, the main drivers are always, ‘how can we apply this?’ and ‘how can we solve this problem?’

**New Major in Environmental Engineering**

CEGE’s new EnvE major is a good thing! There is a lot of interest in environmental issues, which is great, and we have specific knowledge that will help students practice environmental engineering when they graduate.

It seems pretty easy to connect environmental studies coursework with reality, but students might not make connections as directly on their own. Learning to set up a mass balance could seem dry and unimportant, but it is really critical. It is important to help students make those connections. I’ve even been able to bring some of my recent experiences with the chemical demilitarization committee into my classes to help students think about how we can apply general, fundamental knowledge to something strange and new that we haven’t thought about before.

There are not that many environmental engineering programs throughout the country. As news of our new name and our new major percolates out, more people will come to UMN for environmental engineering. The new program will also highlight our existing geoengineering major, as people become aware that we offer three different majors. (CEGE offers majors in civil, environmental, and geo-engineering http://www.cege.umn.edu/prospective/undergraduate/index.html).

UMN is a huge university, which can be daunting, but it also means there are amazing resources here. Students just need to nose around a little and they can have incredible experiences here. CEGE is a great place to be!
THE SPRING COMMENCEMENT CEREMONY

The departmental commencement ceremony was held in the Bell Auditorium on May 16, 2014. Alumnus Thomas Lorentz (BCE 1990, MS 1992), Senior Vice President of AEC Engineering, Inc., gave the keynote address; Alexandra Miller added a student perspective. After the ceremony, students and their families were invited to a reception in the Civil Engineering Building.

You can see pictures of the graduates and their families on our Facebook page (www.facebook.com/umn.cege, under Photos).

Charles Fairhurst, Officer de Légion d’Honneur

In a ceremony at the Mineralogical Museum at Ecole de Mines in Paris, Charles Fairhurst, Professor Emeritus of the Department of Civil, Environmental, and Geo- Engineering, received the highest national decoration awarded in France. Fairhurst was inducted as an Officer into the French National Order of the Legion of Honor (Ordre national de la Légion d’honneur) by decree of the President of the French Republic.

The Ceremony began with remarks by Dr. Loren Lorig, Chief Executive Officer of Itasca International Inc., a geoengineering consulting company which Fairhurst and his colleagues started over 30 years ago. Lorig began with these remarks: “Anyone who knows Charles is aware of his affection for France and his respect for French scholarship, including rock mechanics and rock engineering. He has been associated with a wide variety of academic, scientific advisory and consulting activities with French colleagues and groups both in France and internationally, extending over almost sixty years. ‘Such interactions,’ he has said, ‘were their own reward. Never in my wildest dreams did I imagine that I might receive such a high honor. It is a gesture of remarkable generosity on the part of colleagues and a country that I respect and admire. I will strive to be worthy of it.’ ”

French speakers included M. Romain Soubeyron, Director of Ecole des Mines de Paris, and M. Edouard Brézin, Former President of the French Academy of Sciences. Also present were Steven L. Crouch, CEGE Professor and Dean of the College of Science and Engineering at the University of Minnesota, members of the Fairhurst family, and many dignitaries and admirers.

The French Medal of Honor rewards outstanding merits of citizens in all areas. Fairhurst was selected for this honor based on his personal commitment to French-American relations, his exceptional cooperation with French companies, and his contributions to many public-private partnerships in the field of rock mechanics, which he studied and taught at the University of Minnesota.
In this issue, two students discuss their experiences in CEGE, including their leadership roles in the Minnesota Student Chapter of the American Society of Civil Engineers (ASCE).

Justice Harvieux (JH)

Civil engineering major
with interest in geomechanics
Graduation May 2015
Student Resources Officer, ASCE Student Chapter

**How did each of you choose to major in civil engineering?**

**AV**
I knew in high school that I wanted something related to science and engineering, but no one in my family had done engineering and I didn’t know a lot about it. I thought the main thing civil engineers did was to build water towers! I grew up in Duluth on the shores of Lake Superior. I learned in one of my classes that even keeping something like Lake Superior as healthy as it is takes engineering. I never realized that was engineering. That helped me narrow down to a major in water resources.

**JH**
I decided to be a civil engineer because it is a good combination of my interests and abilities. I’ve always been talented at math, science, and design. I used to draw a lot and paint and even did some sculpture. I was able to depict what I had in my mind. I knew that I wanted to work on big projects, to have an impact on the world. Civil engineering is a broad field, and gives me a lot of options. I began working with Professor Labuz in the Rock Mechanics Lab and that led me to an interest in geomechanics. The program has been a good fit for me. I am challenged and am able to use my abilities.

**How did you get involved in ASCE and what has that involvement meant to you?**

**AV**
I was interested in civil engineering and wanted to know more about it. I did some research on the internet and found that ASCE was the big group for civil engineering students to be in. So, my first semester at UMN, I reached out to the student chapter. They were great about answering my questions and lined me up with an officer position that was very low commitment. My first semester I was the Freshman Representative; my role was mainly to advertise ASCE events to my freshman and sophomore classmates.

**JH**
I just began attending ASCE meetings in the fall of 2014. They got me into a leadership role right away, too. I am the Student Resources Officer.

**How did you choose to come to UMN?**

**AV**
I have some cousins who had gone to UMN. When I was applying to colleges, I talked to them and they helped me make the decision to come here.

**JH**
I am from New Richmond, Wisconsin, about an hour’s drive from campus. I wanted to go to a big school to challenge myself. I also considered the engineering programs at MIT, Northwestern, and Madison. Minnesota seemed to be the best fit. I got into the honors program, which has meant great opportunities in the form of exclusive, smaller honors courses. I feel challenged and that is what I was looking for.

**What goes on behind the scenes, and hear from a company or professional engineer.**

As the Student Resources Officer, my three main activities are helping Vice President Chelsey Palmateer organize the Career Fair, coordinating activities for our members, and conducting demonstrations of civil engineering activities for various groups.

One of the activities I arranged for our group was a tour of the Bridges Apartments, a new building being built near campus. We were able to see the structure in progress and hear the process described. It was great to see in practice some of what we were learning in our classes.

I have done demonstrations for all ages. For a group of first graders, we brought a make-your-own-earthquake table that the students jumped on to create a quake. We also did a quicksand demo that they really liked. Demonstrations for middle school students are similar, but I add more detail. I also do demonstrations at events like the Minnesota State Fair. I enjoy helping people understand technical concepts.

**My role in ASCE also led to me being invited to talk to groups. I participated in a panel discussion to answer questions for admitted students. I enjoyed telling why I like engineering and this department. It is helpful for new students to be exposed to all kinds of majors and have a chance to ask questions of students in those programs. ASCE has also been coordinating tours for school groups that want to come and see what we do.**
Tell me about some of the classes, professors, or assignments that really delighted you.

JH I have really liked all my introductory classes and the professors who taught them. I worked with professors Barnes, Davis, French, Labuz, and Marshall. I was able to get through my introductory classes studying mostly on my own. Even if the answer was given, I would challenge myself to come to the answer and to understand it. As I get into some of the advanced classes there are fewer “go to” answers. We need to reason it out. For those problems, it is good to get input from others.

AV I really enjoyed Hydrologic Design with Professor Voller. That was my first class in water resources. It was fun to make connections between that class, what I was doing in my internship, and the research I had done with Professor Gulliver. That was the course where I first got to see what I will really be doing as an engineer.

How about some that challenged you?

AV Steel and Reinforced Concrete Design was the most challenging class I have taken. It was a little out of my comfort zone and involved a lot of time-consuming work. I relied on my group of friends to keep motivated, keep trying, and keep studying!

JH Computer Applications in Civil Engineering was group intensive. We were given very challenging high-level problems and had to determine how we could develop a computer-based solution to the problem. In the beginning of the class, we talked about group dynamics and how to work efficiently in a group. That helped us work together.

AV Uncertainty and Decision Analysis in Civil Engineering was the first civil engineering course I had taken and it was really challenging. Professor Barnes challenged us to think differently about problems and to be OK with not having the perfect answer. As an engineer, I will have to approach problems that I haven’t dealt with before, use my own judgment, and explain or defend my motivations and my decisions. This department seems to stress that a lot. You learn the basics but also how to apply them to something you haven’t seen before.

JH I have seen that in the Honors courses, too.

You have both done research as undergraduates. How did you get involved in that?

AV I really liked the idea of doing research, but I didn’t know how to get started. It seemed like all the professors were working on so many different projects, and I didn’t know how to help or why they would even want to let me help because I hadn’t really taken any civil engineering classes and I didn’t know much. I took a leap and contacted Professor Barnes. He invited me to his office and helped me choose a professor to work with.

I began researching with Professor John Gulliver and still work with him during the school year. I began working on a project to determine the infiltration capacity (the capacity to absorb water into the ground) of ditches along highways—the technical word for them is swales. The purpose of swales is to route water away from roads and route it to a catch basin, or in Minneapolis, to the river. Dr. Gulliver argued that while the swales are routing water, they are also infiltrating water, which is good for water quality. Pollution from the roads ends up in the soil and the top layer of grass. You can imagine how dirty water is as it comes off the roads. It would be good if some of that pollution could settle out before being dumped into the river.

Of course I didn’t understand everything about infiltration when I started, but every year it becomes more intriguing to me—what effect could this have if the swales are infiltrating water? Typically engineers design completely different systems for infiltrating water versus just putting a sloping ditch on the side of a highway.

My work involved taking measurements by the side of that highway the summer after my freshman year. Since then, I have been doing computer modeling work related to using the numbers and data we collected and putting that into a model that could be used to predict what will happen with certain storms.

It is fun to see the project change over time. I will pursue this topic for my senior honors thesis, too. I plan to finish up the project in the fall and write the paper in the spring.

JH In one of my first classes, I was assigned to write a research proposal. So I wrote a proposal and sent it to a few professors.

AV You both had internships this summer. What did you work on?

JH I worked at MnDOT in the Concrete Office which is part of the Office of Materials and Road Research in Maplewood, Minnesota.

I went on several site visits. It gave me a different perspective to see concrete paving being done rather than studying the components and chemical reactions in class.

One of my tasks was compiling data for developing new standards and specifications for concrete. I researched and compared what other states have established. Variation arises due mostly to different climates leading to different needs and equipment and specifications.

Professor Labuz had an opportunity for me to work in his lab right away, so I started working in the Rock Mechanics Lab the spring of my freshman year.

Much of my work was supporting two graduate students who were working in the lab, Ali Tarokh and Roman Makhnenko (Roman has since earned his PhD and is doing post-doctoral research in Switzerland). I prepared rock samples, which involved making them the right size or shape needed for a particular test, or positioning sensors, for example, on the rock. I also helped prepare technical drawings related to the research. I developed good background knowledge about what is involved in testing rock.

I also worked on my own independent UROP research (Undergraduate Research Opportunity Program). My project built from the data the graduate students were collecting. I ran my own tests, analyzed the data, and presented my results at an undergraduate student symposium. It was a great experience. I worked independently, determined my own schedule, and tracked the progress of my research.

I have arranged another UROP project for my senior year. That project will continue to build on Roman’s data. He was trying to measure the pore space bulk modulus of rock, which is difficult to do. We will be running a test that has rarely been done. We hope to write about our results if they turn out well, but either way I will learn a lot about research and measuring material properties.

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My biggest project was analyzing data to develop a specification related to alkali-silica reaction (ASR). The reaction occurs over time and can cause failure in concrete. Flyash can be used to mitigate ASR. MnDOT is researching how to revise current specifications about how to use flyash, how much, etc.

I also had the opportunity to work in the field measuring thickness of concrete using a Magnetic Imaging Tomography (MIT) device, which is a metal detector of sorts. The crew laying concrete will place a metal plate under the concrete and then thickness can be measured. This method would allow tests to be done on poured concrete while reducing the number of cores taken from the concrete. My task was to analyze the gathered data for accuracy. The data may later be used to develop specifications for metal detector test protocols.

I worked a summer internship at Barr Engineering. My internship at Barr started in my sophomore year, when professional engineers came to campus to critique our resumes. My resume included that I had been on the UMN cycling team. When I sat down to talk with a professional from Barr, we discovered that we both had an interest in cycling. We ended up talking more about cycling than about my resume, specifically. A year later, that connection helped me get an internship. So, you have to be vigilant about promoting your image; you never know where a job or internship will come from.

At Barr, I was a water resources engineer. I did some modeling, working with some water quality data. I had a lot of exposure to mining companies in northern Minnesota, but also to smaller municipalities working on flood prevention and storm water plans. I was able to update some hydraulic models for flood protection measures in the city of Rochester.

Previously, I interned with WSB and was a water resources intern, there, as well. Mostly I worked on a stormwater monitoring system for the City of St. Paul. A couple times a week, I would be outside taking water samples. It was fun to be in the field.

**How do you balance the challenging workload, your duties with ASCE, and all the other activities that you are involved in?**

**JH** School and studies have come pretty naturally to me—although I do put my time in. I think you need to be efficient; that is also an important part of engineering. As engineering students, we are often solving problems for various efficiencies. I have priorities and values and set aside time to accomplish what I want to do.

**AV** I’ve found that I have to get into a schedule. Most classes have homework due on a regular schedule and I can get into a rhythm: I know that on Wednesday I will be doing this kind of homework and on this day I will be doing the homework for another class. I’m lucky in that most of my friends are civil engineering students, so it is pretty easy to study and then go out and have fun.

It can be a tough to balance school, ASCE, and having a personal life. But again, planning helps. I make a schedule and give myself a night off. I find I do better when I have given myself a break from studying and come back to it later, versus working all night or working 8 hours on one topic. Of course this is easy to say when I am not in the middle of a semester!

**Who have been your mentors?**

**AV** Growing up, I looked up to my grandfathers a lot; they were both successful. When I got to UMN, I didn’t know what life would be like as a student or what things would be like after I graduated. It helped me to talk to older students in ASCE and hear them talk about different companies and which were good to work for, or about the importance of going to the career fair even as a freshman. My peers have been supportive, too; it is great to be able to bounce ideas off them.

**JH** No one in my family was an engineer. My father was in realty, but was very handy and came up with a lot of creative solutions. He influenced me in that way. Professor Labuz challenges me. I like being pushed to do more or better. Roman and Ali, the graduate students in the Rock Mechanics Lab, have also been good mentors. They taught me a lot about technical things (tests, programs, models, etc.). Working with them has broadened my interest in rock mechanics.

**What are your aspirations after you graduate?**

**AV** It has always been my goal to leave things better than I found them. Another broad goal would be to make sure more people know what civil engineering is—especially high school students—and to convince more of them to choose civil engineering as a major. People need to know more about civil engineering because it is so tied to everything we do in life. More kids would choose civil engineering if they knew what it is and how important it is.

Specifically, I plan to go to graduate school for a Master’s degree in civil engineering or water resources engineering.

**JH** I am looking forward to seeing my work come to life. I’ve always wanted to have a purpose and to help people out. It is important to me to use my interests and abilities—math, science, and design—to develop solutions that other people may not be able to see or accomplish. I am thinking about going to graduate school to get my master’s degree. After that I’d like to work in industry. I might like to be involved in research and development on the industry side. I think the research efforts might be more applied in an industry setting compared to what happens in academic settings, where the positive impact for people may require a longer timeframe. I want to continue to be challenged and to learn every day.
Each year the Department of Civil, Environmental, and Geomatics Engineering awards one of the largest numbers of undergraduate scholarships within the College of Science and Engineering. These scholarships are made possible by our generous donors. The department and our students are extremely grateful for their generosity.

ASCE Minnesota
ASCE Structures Scholarship
Kendra Schiell

Goodman award:
Nathan Warner

Outstanding student award:
Justice Harvieux
Adam Foris
Kendra Schiell
Anthony Vecchi

Activities award:
Elizabeth Burton
Lydia Larson
Aaron Gahwiler
Anthony Vecchi
Clifton T. Barker Scholarship
Justice Harvieux
Sophie Mitsuko Kasahara
Anthony Vecchi

Clair and Simon Benson Award
Katherine Klarich

Bonestroo, Rosene, Anderlik Undergraduate Scholarship
Justice Harvieux
Eric Hauser
Jacqueline Nowak
Tyler Olsen
Anthony Vecchi

Archie & Marie Carter ASCE Scholarship
Eric Hauser

City Engineers Association of Minnesota (CEAM) Scholarship
Justice Harvieux
Eric Hauser
Jacqueline Nowak
Tyler Olsen
Anthony Vecchi

Miles Kersten Memorial Scholarship

Reuben Verdoljak, 2014 recipient of the Dexter Scholarship, pictured with Professor Catherine French.
Charles Fairhurst Earth Resources Engineering Fellowship

This new fellowship was established in honor of Charles Fairhurst, who established the premier program in rock mechanics at the University of Minnesota, recognized globally for its excellence. The passion he brought to the institution when he began in 1956 continued throughout his distinguished career. Today he still works in various academic and leadership roles.

Fairhurst values teaching and mentoring and has always been dedicated to guiding the next generation of geoengineers. During the course of his academic career, he advised more than 50 graduate students and influenced countless others.

Fairhurst remains active as Professor Emeritus and as a consultant with Itasca International. His continuing influence on engineering can be seen in the newly established Center for Engineered Fracturing of Rock (CEFoR) at the University.

Recently Fairhurst received an extraordinary honor: the rank of Officer in the National Order of the Legion of Honor, by decree of the President of France. This is the highest decoration awarded in France and acknowledges Fairhurst’s personal commitment to French-American relations, in particular, his extensive contribution and leadership in nuclear waste and rock mechanics within public-private partnerships in France (see more on page 18).

To honor his achievements and contributions to geoengineering, Itasca International led an initiative to establish the Charles Fairhurst Earth Resources Engineering Fellowship at UMN with a contribution of $250,000. The University agreed to transfer funds from an endowment previously established in Fairhurst’s name, bringing the total to $420,000. The goal is to reach $700,000 so that a full fellowship may be awarded annually to a promising graduate student in geoengineering. As we begin to close in on this goal, we invite you and/or your company to honor Charles Fairhurst through your financial support. Contact Sally Euson (euson@umn.edu) or contribute at cege.umn.edu.

Jesse E. Fant Memorial Scholarship

This future gift, established by Jesse’s son David (pictured), will be used to support future undergraduates in the Department of Civil, Environmental, and Geo-Engineering.

Professor Jesse Fant came to the University of Minnesota in 1945 to pursue his graduate degree under the guidance of Lorenz Straub, director of the St. Anthony Falls Laboratory. Fant remained with the department throughout his academic career. Many civil engineering alumni credit their successful educations and careers in part to Professor Fant’s teaching and mentoring. He was known for his tough but fair approach in teaching surveying, an essential part of the curriculum during the years he was with the department.

David Fant (BA Speech Communication, 1973) is the owner of Market Mapping Plus, LLC, in Grand Rapids, Michigan, where he lives with his wife, Patty. David credits his success in business to the principles he learned from his father. David attended high school on campus until his senior year when the University’s high school was merged with Marshall High School. David enjoyed his many connections with the University of Minnesota, and is glad to honor his father through this scholarship.

Gerald W. Everson/Ames Construction Scholarship

In a May celebration, representatives from Ames Construction came to campus to honor Everson/Ames scholarship recipients. The Everson and Ames families understand the importance of giving for students. The scholarship honors Gerald Everson as the company’s first civil engineer. Pictured (from left): Justin Englund (BCE 2011, former Everson/Ames scholar, now Project Engineer at Ames Construction); Morgan Kuehn (BCE 2016, 3-time Everson/Ames scholar); Butch Ames, President Ames Construction; Charlie Vermace (BCE 2014, 4-time Everson/Ames scholar); and Jane Volz, daughter of Gerald Everson.
RENÉ DE BORST, Regius Professor of Engineering and Mechanics at the University of Glasgow, will deliver the 2014 Vardoulakis lecture: “Multi-Scale Mechanics and Evolving Discontinuities”

Reception follows.

Friday, October 31, 3:30 PM
in the George J. Schroepfer Conference Theatre (CE 210)

All are welcome!