inside

CE Building: THEN & NOW
Professor Efi Foufoula-Georgiou
Alumnae Nancy Daubenberger, MSCE ’97
Greetings from Department Head JOSEPH LABUZ

Dear Alumni and Friends,

After an extra long, cold winter in Minnesota, spring is so welcome—and new things are springing up within the Department!

First of all, the Department will have a new name. Effective July 1, 2014, we will be the Department of Civil, Environmental, and Geo-engineering (CEGE). A new major has also been proposed, Bachelor of Environmental Engineering. When it’s approved, three undergraduate degree programs will be available in the Department, the venerable Bachelor of Civil Engineering plus two degrees unique within the state of Minnesota: Bachelor of Environmental Engineering and Bachelor of Geoengineering.

We also have a new initiative that increases students’ opportunities to participate in work assignments: Internship Opportunities Program (IOP). The IOP practice path connects students with positions at companies or agencies within the Twin Cities area (and we welcome more work assignments). The IOP research path pairs a student with a CEGE faculty member (all of whom are actively engaged in research).

Additional department activities are reported within this issue. Faculty members won significant research awards, were recognized for contributions, and tapped for national service. Our students are speaking out and working on projects that benefit society. You will read about Distinguished McKnight Professor Efi Foufoula-Georgiou; alumnae Nancy Daubenberger, Minnesota’s Bridge Engineer; and three graduating students.

We invite you to visit the WSB Study Lounge, remodeled through generous support from WSB & Associates and leadership from Bret Weiss (BCE 1987). One highlight is a beautiful mural depicting the campus. Another stunning addition is a granite study table in the Rosene Student Lounge.

We also extend an invitation for you to visit Northrop Auditorium. Alumnus Mike Heuer (BCE 1978) from Braun Inter tec was instrumental in its renovation.

We are grateful for the support of our alumni and friends. Have a pleasant summer!

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

MARK P. BOARD  
(BGeoE ’75; MS GeoE ’77; PhD ’94) was elected to the National Academy of Engineering in recognition of his contributions to the design of large-scale mines based on application of advanced rock mechanics principles. He is currently the Corporate Director of Geotechnical Engineering, Hecla Mining Co., Coeur d’Alene, Idaho.

Election to the National Academy of Engineering is among the highest professional distinctions accorded to an engineer. Sixty-seven new members were inducted in February, bringing the total US membership to 2,250.

FACULTY HONORS

WILLIAM ARNOLD received the 2013 Super Reviewer Award from the journal Environmental Science & Technology, for his significant contribution to the journal over the past year.

As part of the 24th annual Leonard A. Ford Lectureship, WILLIAM ARNOLD delivered two lectures at Minnesota State University Mankato, Department of Chemistry. He discussed how certain chemicals affect the environment.

WILLIAM ARNOLD was appointed as an Associate Editor of the new American Chemical Society journal, Environmental Science and Technology Letters.

ROBERTO BALLARINI has been approved by the ASCE Executive Committee as the ASCE Liaison to the American Association for the Advancement of Science (AAAS) for a three-year term that runs through 2017.

ROBERTO BALLARINI has been re-elected (for a second term) as the President of the ASCE Engineering Mechanics Institute.

CATHERINE FRENCH received the George W. Taylor Award for Distinguished Service. The Taylor Award, established in 1982, recognizes outstanding service to the University and voluntary public service to governmental or other public groups.

MICHELE GUALA received a Faculty Early Career Development (CAREER) Award from the National Science Foundation. Gualas received the award for his novel research on mechanisms to manipulate meandering fluid flows and the resulting erosion and deposition of sediments on streambeds and banks. The 5 year, $408,180 project, funds theoretical and experimental research on meandering flow dynamics for application in river and stream restoration efforts and in marine and hydrokinetic renewable energy installations. Guala will build upon the concepts of Geophysical Flow Control (or GFC, an approach for manipulating large scale turbulent flows to achieve a desired flow objective) to identify the triggers that magnify and mitigate meanders in natural flow environments. Read more: www.safl.umn.edu/michele-guala-career-award-grant
JULIAN MARSHALL received the Charles E. Bowers Faculty Teaching Award, which was established in 2000 in honor of Professor Emeritus Charles E. Bowers, by his son John Bowers (Physics ’76). This award recognizes an outstanding CSE professor who has demonstrated exceptional interest and commitment to teaching.

JULIAN MARSHALL was the 2013 winner of the prestigious Joan M. Daisey Outstanding Young Scientist Award from the International Society of Exposure Science. The award recognizes outstanding contributions to the science of human exposure analysis by a young scientist (highest degree conferred less than 10 years prior). The award is named in honor of Joan Daisey, one of the nation’s leading experts on indoor air quality.

FACULTY NEWS


ROBERTO BALLARINI will be part of a documentary series being prepared by MN2050 and Twin Cities Public Television (tpt). In 2011, a video on water, wastewater, and stormwater was created (“Liquid Assets Minnesota”). Two more infrastructure documentaries are being prepared for release in 2014 and 2015. Ballarini will appear in the Roads & Bridges documentary. The trailer and some information about the project can be found at http://mn2050.org/

An influential study completed in 1999, but previously only available through the French government, is now freely available through the University of Minnesota Libraries. “Underground Nuclear Testing in French Polynesia: Stability and Hydrology Issues” was published by the International Geomechanical Commission. PROFESSOR EMERITUS CHARLES FAIRHURST (chair) and EMMANUEL DETOURNAY contributed. http://hdl.handle.net/11299/162862

McKnight Professor EFI FOFOULA-GEORGIU, was the lead Principal Investigator on the research project “Mapping Water & Food: Global Challenge, Local Solution.” The study was done through the Institute on the Environment (IonE) and was an opportunity to collaborate with colleagues at UMN, Indian Institute of Technology in Hyderabad, International Water Management Institute in Delhi, and Columbia University in New York. The project contributes to understanding the pressing problem of groundwater exploitation in India and its relation to environmental sustainability, food supply, and overall economic growth in the region. Unique to the study is the incorporation of a hydrological model of the aquifer that captures the main features of water withdrawal and water recharge into the general equilibrium model. The full report can be found at http://environment.umn.edu/mappingwater/

Civil engineering professors CATHERINE FRENCH and CAROL SHIELD and graduate student BROCK HEDEGAARD are collecting and analyzing data from 500 sensors installed on the new I-35W Bridge. The sensors collect data related to the bridge’s strain, load distribution, vibrations, temperature, overall movement, security, lighting, and automatic anti-icing system. Read about their project in the Nov. 2013 issue of Catalyst, a publication of the Center for Transportation Studies. http://www.cts.umn.edu/Publications/catalyst/2013/november/35w/


JOHN GULLIVER, CE professor and resident fellow in the Institute on the Environment (IonE) has spent more than a decade working on ways to protect our waters from the ravages of runoff. He is featured in a series of profiles of UMN faculty. John Gulliver: Runoff Wrangler. http://blog.lib.umn.edu/ione/eyeonearth/2013/10/john-gulliver-runoff-wrangler.html

JOHN HOURDOS talked with KSTPTV about a traffic study along I-94 looking at the shock wave effect—when a car in front of you brakes hard and you’re forced to hit your brakes. The shock wave effect causes hundreds of crashes a year. The Minnesota Traffic Observatory (MTO)
and MnDOT are testing a new shock wave warning system, using electronic message boards with Intelligent Lane Control Signs (ILCS). http://kstp.com/news/stories/s3366309.shtml?cat=1

DAVID LEVINSON is often sought out to comment on topics related to traffic and transportation. Here are a few of his recent public interviews:

Imagine: A world where nobody owns their own car
If connected vehicle technology becomes mandatory in American cars, as the DOT recently suggested, the most obvious benefit would be safety. In that sense, a world without car crashes may just be the first step to a world without car-ownership. UMN transportation scholar David Levinson comments.


Opinion: Atlanta's total lack of preparedness
David Levinson, professor in UMN's Department of Civil Engineering, weighed in on Atlanta's response to winter weather.
CNN.com http://www.cnn.com/2014/01/30/opinion/levinson-atlanta-transportation/index.html?hpt=op_t1

Look for less, not more, traffic in the future
Civil Engineering professor and Center for Transportation Studies researcher David Levinson talks about a reversal of a traffic trend that has lasted through most of the lifetimes of every living American.

JULIAN MARSHALL is part of a collaborative project that recently received $1.5 million to be split among the partner universities. Marshall will be working on “Interventions for Cooking and Indoor Air in India.” The project seeks to investigate the feasibility, health benefits, air quality impacts, and climate impacts of cookstove interventions in India. The social acceptability and utility of various stove technologies will be assessed using focus groups and surveys. Emissions of air pollutants will be measured during home use. Pollution concentrations, both inside and outside homes, will be measured to show the extent to which these sources impact indoor and ambient air quality. The impacts on regional and global climate and air quality will be simulated using a global climate model.

JULIAN MARSHALL and coauthors Professor Dylan Millet (Soil, Water, & Climate) and LARA CLARK (PhD student in CE) have published a groundbreaking nationwide study which found that people of color live in neighborhoods with more air pollution than whites. 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 gap results in an estimated 7,000 deaths each year among people of color from heart disease alone. The story was picked up by several local and national media outlets. Read the entire research paper in the PLOS ONE journal.

http://dx.plos.org/10.1371/journal.pone.0094431

CHEN-FU LIAO, a research fellow with the UMN Minnesota Traffic Observatory, and MnDOT are researching an app that will make it easier for visually impaired individuals to navigate through work zones. KSTP http://kstp.com/news/stories/s3394010.shtml?cat=1

DEPARTMENT NEWS

The University of Minnesota is on the Huffington Post’s list of Most Interesting Place to Go to College. http://www.minnpost.com/political-agenda/2014/01/university-minnesota-makes-most-interesting-place-go-college-list

The UMN Twin Cities ASCE Student Chapter received the 2014 ASCE Distinguished Chapter Award for Region 3 based on activities recorded in the Student Chapter’s 2013 annual report. ROBERTO BALLARINI is the faculty advisor.

Upcoming Event: The Evolution of Rock Mechanics in the U.S., a Tribute to Steven Crouch, Peter Cundall, and Charles Fairhurst
The 48th U.S. Rock Mechanics Symposium will be held at UMN June 1–4, 2014. On Wednesday evening we will celebrate the contributions of Crouch, Cundall, and Fairhurst. The event will include a social hour, and dinner. Registration required: $60 per person; guests are welcome.

http://www.armasymposium.org/index.html

STUDENT NEWS

CHRIS IVERSON (BCE 2014) was interviewed on Minnesota Public Radio on February 17, 2014. Chris discussed his idea of putting “lids” on some Twin City freeways to provide green space and connect neighborhoods. This was not Chris’s first opportunity to speak out; he is a columnist for the Minnesota Daily. Read Chris Iverson’s

ALUMNI NEWS

EGOR DONTSOV (PhD 2012; advised by BOJAN GUZINA) won the 2103 Cook Award for Innovative Research in Geomechanics. Dontsov’s doctoral thesis is “Mechanics of the Acoustic Radiation Force in Tissue-like Solids,” which deals with the analysis of high-intensity ultrasound in medical diagnosis. Dontsov received a number of awards including the Sommerfeld Fellowship (2008-09), Doctoral Dissertation Award (2011-12), and the Best Dissertation in Civil Engineering (2013), and has published 5 articles in leading technical journals based on his PhD work. Currently, Dontsov is a Postdoctoral Fellow in the Department of Mathematics at the University of British Columbia. His current work deals with the modeling of proppant transport for hydraulic fracturing applications.

MICHAEL M. HEUER, (BCE ’78) PE, Vice President, Braun Intertec, was the geotechnical engineer-of-record for the design and construction of Northrop Auditorium. He started on the project in 2009 as the lead geotechnical engineer for Braun Intertec. He worked with the University’s Capital Planning and Project Management staff to compile and summarize the existing geotechnical information relevant to Northrop Auditorium, which provided the design team an understanding of the potential soil conditions within the footprint of Northrop. He oversaw the taking of soil borings north of the auditorium where the new addition would be built, and soil borings taken inside the auditorium. All of this information contributed to the final geotechnical report for the renovation project. In addition, he oversaw the special inspection and testing services required by code and provided by Braun Intertec, which covered the structural concrete, structural masonry, foundations, structural steel, soils, fireproofing and many other typical construction related activities.

We hope you get to campus soon to see the newly renovated Northrup!

HAROLD R. KOKAL (BS ’64, MS MetEng ’70) writes, “I am currently employed as a research engineer with specialization in ironmaking raw materials for Global R&D-ArcelorMittal USA in East Chicago, Indiana, and have had the opportunity to visit many countries and work on many interesting projects during my careers with ArcelorMittal and with USS prior to that. The education I received at the University has served me well.”

EDUARDO PETIL (BCE ’80), President, Petil Construction and Engineering, Inc. sent in the following update.

“I started working for the California Department of Transportation (Caltrans) as a Transportation Civil Engineer . . . was involved in the design of the Century Freeway 105/405 Interchange adjacent to LAX . . . became a District Materials Engineer for a newly established Caltrans District 12 in Orange County. In 1990 . . . position with De Leuw, Cather & Co. (now Parsons Transportation Group) to manage design of a multi-rail station project in Old Town, San Diego, and to coordinate various drainage consultants for the construction of San Joaquin Toll Road in Irvine, California. In 1995, I worked as a design project manager for H. W. Lochner, Inc. in Las Vegas . . . including a supporting role in the design of I-215 in preparation for the Winter Olympics in Utah. In 1998, I returned to Caltrans to work in construction and traffic until I retired in 2010. I’m keeping busy during my post retirement as a licensed general engineering contractor working on Caltrans’s minor projects.”

DAN ZIELINSKI (PhD 2013; advised by VAUGHAN VOLLER and MIKI HONDZO) researches one of Minnesota’s red-hot environmental topics, control of invasive fish species. Dan’s doctoral thesis explored the use of bubble curtain and acoustic deterrent systems to control carp movement. His work combined biological science and engineering to assess engineered barriers for the control of invasive fish. Dan built on his engineering knowledge and developed a significant understanding of fish behavior and physiology. His graduate training helped Dan develop a unique skill set suited to developing effective engineered strategies for controlling the invasion of Asian Carp into Minnesota waters. Dan continues his research working as a Post-Doctoral Researcher at UMN with Peter Sorensen, who is a professor in Fisheries, Wildlife and Conservation Biology, and the director of UMN’s Invasive Species Center.
The Stone Arch Bridge across the Mississippi River is a popular spot for running, cycling, or just viewing St. Anthony Falls. Nancy Daubenberger (MSCE ’97) appreciates the old bridge for those reasons, but also as a beautiful example of arched concrete and masonry construction.

Since February 2011, Nancy Daubenberger has served as State Bridge Engineer in MnDOT’s Bridge Office, so she knows her bridges. “Stone arch bridges are stout, strong, and elegant-looking structures but, typically, not as cost-effective as modern alternatives.”

As the Minnesota State Bridge Engineer, Daubenberger is responsible for building, monitoring, and maintaining all the bridges in Minnesota—more than 20,000. “We have a very large bridge program right now with bridges in all phases. In my job I get involved in discussions and decisions on all stages for new bridges, as well as on inspection and maintenance of bridges that are in service. I also get involved with the legislature and respond to any bills pertaining to bridges. I have a good team of technical people who are very good at supporting me. My role is to remove hurdles and do what I can to deliver and manage the program.”

“I think bridges are a lot of fun! I emphasized in structures within Civil Engineering because of the challenges they present. Transportation has an impact on so many people; I felt I could make a big impact working in that field.”

Talk about impact! A conversation with Nancy Daubenberger about some of Minnesota’s bridges reveals the span of her knowledge and influence—and how her education from UMN’s Department of Civil Engineering created a good foundation on which to build her career.

Daubenberger took over as State Bridge Engineer a few years after the collapse and rebuilding of the I-35W Bridge. However, that event instigated a program to inspect and repair or replace Minnesota’s structurally deficient and fracture critical bridges, which still drives MnDOT’s efforts.

“It was a little daunting taking on this role on the heels of the I-35W Bridge collapse, especially when I saw what was required of my predecessors following the collapse. However, I knew
we had good, technical people in the Bridge Office who would help me out (and they always do!). Because of that, I knew I could step up. So I applied and was pleased to get the job. It is interesting and challenging—day to day there are challenges! I work with good people at MnDOT, in the local and federal agencies, at the University, and with the public, too. It has been an enjoyable job."

A duty lingering from the collapse was that Daubenberger needed to distribute the physical remnants of the collapsed bridge. Families of victims and directly-impacted survivors were given first chance at the pieces of the twisted metal that served as a remembrance of the catastrophe. MnDOT also offered some steel remnants from the I-35W Bridge to the University. "I was touched to learn the Department of Civil Engineering had used a piece of the steel to create an oversized Order of the Engineer ring for use in the graduation ceremony." Graduating students put their hand through the oversized ring as they take the Oath of the Engineer and pledge to use their knowledge ethically and responsibly. "That was a great, forward looking use of the steel remains."

Of course, not all of the bridge restoration projects are that dramatic. The Lafayette Bridge, which crosses the Mississippi River at St. Paul, was determined to be in need of replacement. The reconstruction project began in 2011 and will continue into 2015. Throughout the entire project, the bridge will remain open to traffic. The challenging logistics may not be immediately apparent, but consider that this bridge is the longest in St. Paul (3,366 feet), carries about 90,000 cars per day, and navigates around a large river, railroads, several loading docks, and a barge terminal. Such complicated configurations are not uncommon in Minneapolis-St. Paul, where traffic can become congested even without construction.

The St. Croix River Crossing project highlights another kind of complication: the collision of modern traffic demands with history and nostalgia. The picturesque lift bridge near Stillwater holds memories for many Minnesotans, and proposed changes encountered some emotionally-charged resistance. But the amount of traffic and limited river crossings necessitated a change. Public debate went on for years before the current plan was approved.

Daubenberger says, "At MnDOT, we hold and participate in a lot of public meetings. I talk with the media, too. More and more in my career, I have the opportunity to speak to the public. I enjoy doing that; it is good to meet the public and hear and respond to their questions. I enjoy being the face of the Bridge Office."

"Most classes in the Civil Engineering Master’s program required me to get up and speak—a highly valuable experience. I would advise students to take as many speaking opportunities as possible, even if they are afraid. Explaining technical things to non-technical audiences is a big challenge to us engineers, who are trained very technically. The more practice we get, the more effective we can be in communicating to the public."
It can be a challenge to keep up with—much less explain—new technologies related to bridge building and maintenance. The Hastings Bridge, which opened last year, employed some newer techniques.

“NANCY DAUBENBERGER RECOGNIZES THE IMPORTANCE OF MONITORING FRACTURE-CRITICAL BRIDGES. SHE HAS BEEN A STRONG SUPPORTER OF THIS RESEARCH AND CAREFULLY FOLLOWS OUR DEVELOPMENTS AS SHE CONSIDERS POTENTIAL IMPLEMENTATION IN MINNESOTA. SHE RECOGNIZES THE IMPORTANCE OF COLLABORATION BETWEEN MNDOT AND UMN BECAUSE THE SYNERGY THAT IS CREATED BY POSITIVE INTERACTION BETWEEN BRIDGE ENGINEERS AND ENGINEERING RESEARCHERS LEADS TO DEVELOPMENTS THAT TRANSCEND-capabilities of either group.”

― PROFESSOR ARTURO SCHULTZ

MnDOT used a design-build delivery method for that project. The contractor proposed a method of building the bridge offsite while the foundations, piers, and abutments were being built at the location of the new bridge. When the foundation, substructures and arch were complete, the arch was moved onto barges, using self-propelled modular transporters, floated down the river to the new location, skidded into position and lifted onto the piers.

Daubenberger watched the float-in operation from the deck of the old bridge. “I watched the new bridge being put into place. It was pretty exciting and a little nerve wracking. I was very relieved when it was done and everything was OK.”

MnDOT tapped into Professor Emeritus Ted Galambos as a steel expert on the Hastings Bridge project. “I took quite a few classes with him at the University; he was one of my favorite teachers. He is a pioneer in the steel industry.”

Keeping up with research is imperative, and is made somewhat easier by MnDOT’s ties with the University. “New solutions are needed to be viable, adaptable, and sustainable,” says Daubenberger.

Currently MnDOT and the University are partnering on research in the use of bridge monitoring technology. Monitors are being used on the new I-35W Bridge, which Catherine French (who was Daubenberger’s graduate school advisor) and Carol Shield study. Monitors are also in place on the Cedar Avenue Bridge, which Arturo Schultz is studying.

But a bridge engineer needs to look back as well as forward. Some historic bridges are preserved even though they cannot meet today’s traffic demands.

“We have quite a few historic bridges in Minnesota,” notes Daubenberger. “MnDOT committed to the preservation of a couple dozen historic bridges. We are proactive about preserving those bridges, knowing we will have them long-term. Historic bridge maintenance projects can be complicated. The State Historic Preservation Office needs to concur that repairs meet standards set by the Secretary of the Interior and that the historic character is being preserved. These bridges represent our engineering heritage; it is important to preserve them.”

Modern technology has a role in supporting these historic bridges. MnDOT posts information on bridge projects on the internet, where the public can keep up with plans and progress. The historic bridge project can be found at http://www.dot.state.mn.us/historicbridges/rehabprojects.html.

“When I look forward to challenges that will be facing engineers in the near future, two big things come to mind. One is the aging of our infrastructure and finding resources to preserve or rebuild in innovative and sustainable ways. A second big challenge is the loss of institutional knowledge as many MnDOT engineers retire. Data management is more sophisticated now than when the baby boomers came

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NYMORE BRIDGE (1916) | ROOSEVELT BRIDGE (1934) | LAKE LOUISE STATE PARK ENTRANCE BRIDGE (1935) | SWAYBACK BRIDGE (1938)
NANCY DAUBENBERGER CONT...

Daubenerberger is friendly, welcoming, and generous with her time. She seldom fails to seize opportunities for greater interaction with the faculty and students at UMN. In December 2013 Daubenerberger was asked to speak at the Department’s commencement ceremony. “It was a great experience. I knew some of the students who graduated that day. One had been a student worker at MnDOT and now has a job with a consulting firm. It was good to see her graduate.”

Daubenerberger’s daughter has shown interest in becoming a civil engineer. “Neither my husband (also an engineer) nor I pushed her that way. What really piqued her interest were her high school STEM classes, especially her class in civil engineering. My daughter laid out the municipal development of a site and used software to design buildings. She especially enjoys the design part of it. Maybe she will be a bridge designer someday! It was interesting for us to see her find that on her own, although I’m sure that we influenced her unintentionally. For instance, over spring break we traveled to see the Hoover Dam. As far as our kids know, that’s what all families do on vacation—look at dams and bridges and other civil engineering structures!”

“Daubenerberger is a good embodiment of her own advice. She surrounds herself with good people, who she speaks of often and positively. And collaborators speak highly of her, too. Nancy Daubenerberger is indeed making a big impact.

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Daubenerberger’s Connections to UMN Stretch toward the Future

Daubenerberger is the first woman to hold the office of State Bridge Engineer. Although Daubenerberger’s road may have been “unpaved” in that sense, she seems to be plotting a straight course.

- 1993 — BSCE, North Dakota State University
- Worked 5 years with materials testing and engineering consulting firms, designing roads and bridges while attending grad school
- 1997 — MSCE, University of Minnesota
- 1999 — Started with MnDOT Bridge Office
- Worked with MnDOT Metro District
- 2011 — Took over as State Bridge Engineer
- 2014 — Marked 15 year anniversary with MnDOT
WSB & Associates, Inc., donated designers and funded the renovation of the WSB Study Lounge, which included a new mural depicting the UMN campus and surrounding neighborhoods (featured on our cover). New furniture and updates to better utilize the space completed the renovation. WSB is a leading civil engineering firm in the state of Minnesota and has been a long-term supporter of the department through continued giving to their established scholarship. **BRET WEISS** (BCE ’87), President, was very committed to this project from its inception. As a former student, he recognized the importance of student workspace and wanted our UMN students to have a space that supports studying and group work. Capital projects can be overlooked by alumni, so the Department is grateful for WSB’s willingness to fund something so vital to our students and future engineers. The Department is pleased that WSB took the time and effort to make this space the best it can be. Students have been making good use of the new study areas.

See more pictures of the renovations on our Facebook page, [https://www.facebook.com/umn.cive](https://www.facebook.com/umn.cive)

Recently a new study table was installed in the Department of Civil Engineering’s **ROBERT AND JOYCE ROSENE** Student Lounge. The table base is UMN’s entry in the 2012 Steel Bridge Competition. The frame had to be reinforced to hold the 1-ton granite top from Cold Spring Granite in Cold Spring, Minnesota. The Rosene Student Lounge also received new furniture and paint, thanks to the generous ongoing support of Robert and Joyce Rosene.
When originally conceived, designers envisioned that all campus utilities and transportation could be placed underground, leaving the surface area for green space and pedestrians.

The building descends 110 feet, equal to 7 stories—but there is no 4th or 5th floor. A 30-foot limestone shelf was pierced and the 6th and 7th floors were excavated in the St. Peter sandstone.

Underground construction was then driven by energy concerns, but is now driven by space concerns.

The building won several awards including ASCE’s 1983 Outstanding Civil Engineering Achievement and the 1982 Owens-Corning Energy Award, given to only four buildings across the country. Quotations come from 1983 press coverage.
Eduardo Patil (BCE ’80) recalls explosions during the excavation of the underground space. Tremors were felt across the street in the aerospace engineering building.

Charles Fairhurst was the department head when the building was constructed. His enthusiasm and magnetism were responsible for raising money and support for the visionary building project, and also for bringing many outstanding faculty—like Ted Galambos—to the Department.

Charles Fairhurst in 2014

Only 5% of the Civil Engineering Building is visible above ground.

Harold Kokal (BS ’64; M.S. Met. Eng. ’70) recalls visiting “with my advisor, the late Dr. Gust Bitsianes from Mines and Metallurgy…Dr. Bitsianes and I went down perhaps six floors to see the new laboratory spaces being furnished. I was impressed at how bright it was, perhaps due to some light shafts.”

Ted Galambos at 85 years

“symbol of the great potential for underground space”

The King of Sweden visited the campus in 1982 and toured the underground structure in progress.

Eduardo Patil (BCE ’80) recalls explosions during the excavation of the underground space. Tremors were felt across the street in the aerospace engineering building.
Q. You recently finished your term as Director of an NSF Science and Technology Center, the National Center for Earth-surface Dynamics (NCED). Was that a rewarding experience?

A. NCED was a demanding but fun ride. It was a collective effort that brought out the best of everyone involved. It gave birth to the new science of Earth Surface Dynamics, which studies the interwoven hydrological, biological, geochemical, and anthropogenic processes that shape the Earth’s surface (in short, the interactions of earth-water-life). NCED’s legacies go beyond major scientific discoveries. It created the next generation of earth science researchers, initiated the largest University-Science Museum partnership, and established award-winning programs for engaging Native Americans in the Geosciences. Above all, it made UMN and SAFL the place-to-go for research and education on earth surface dynamics and environmental change.

Q. What is after NCED for you?

A. Fun rides have their own way of prolonging the journey. After 10 years as a NSF Science and Technology Center, the science community and NSF could not spare us! Thus NCED has become NCED2 now (http://www.nced.umn.edu/), led by Chris Paola (from Earth Sciences Dept.), Vaughan Voller, and myself. I am proud to say that in addition to NCED2, all other research components of NCED have secured major funding too. I will be leading three of these initiatives.
One is a multi-institutional project called REACH (Resilience under Accelerated Change) funded by NSF’s Water Sustainability and Climate (WSC) program. The scope of this project is to understand how climate and human dynamics might act as amplifiers of natural change, and how vulnerable spots in a landscape can be detected and mitigated. It focuses on the Minnesota River Basin, where high sediment loads impair water quality and aquatic life. The other two projects are international with many foreign institutions as partners.

**Q.** Tell me more about the other international projects.

**A.** The first project is called LIFE, Linked Institutions for Future Earth, funded by NSF’s SAVI (Science Across Virtual Institutes) program. LIFE is an umbrella of efforts geared toward understanding environmental processes and their response to change. This includes prediction under changing climate and human actions, using the past to predict the future, possible abrupt changes that can result from unexpected interactions. We are developing opportunities for graduate students, visiting professorships, and a summer institute that attracts 40 young researchers from all over the world to UMN for 2 weeks of intense science.

The second, DELTAS project, is more ambitious yet: “Catalyzing action towards sustainability of deltaic systems with an integrated modeling framework for risk assessment.” This project investigates how climate change combined with the pressures of engineering, development, and human population growth makes deltaic ecosystems vulnerable—how can we make these systems more resilient and reduce future risks?

It brings together experts from the physical and social sciences, engineering, economics and management, as well as stakeholders from government and non-profit organizations from Bangladesh, Brazil, Canada, China, France, Germany, India, Japan, Netherlands, Norway, the United Kingdom, USA, and Viet Nam.

**Q.** In 2013, you were appointed by President Obama to the Nuclear Waste Technical Review Board. What can you tell us about that?

**A.** America’s nuclear future is in a state of flux. Nuclear waste—which can stay radioactive for thousands of years—is currently stored temporarily at more than 100 sites around the nation, under the assumption that a permanent national repository would be operational soon. The stalling of the Yucca Mountain project as a deep geologic repository for high level nuclear waste and spent nuclear fuel has brought to the forefront critical issues ranging from extended temporary storage, to intermediate centralized storage, to packaging regulations, to a new permanent repository, even to the debate of how big a role nuclear power should play in the nation’s energy mix. It is an interesting time to serve on the Board.

**Q.** You were elected president of the Hydrology section of the American Geophysical Union (AGU). What does that involve?

**A.** The mission of AGU is “promoting Earth and space science for the benefit of humanity,” and that mission could not be more timely in view of the multiple stressors our planet faces, including those affecting climate, water, and our
natural resources. Our Hydrology section is very strong, but there is always room for improvement. My three main goals are: to foster and reward scientific excellence, to advance partnership with international societies, and to nurture leadership in our young scientists. It is a tall order and I am honored that the community entrusted me with this responsibility.

Q. What about your own research program?
A. I have a fairly large research group right now with 4 PhD students and 4 post-docs. All are excellent researchers and it is a pleasure to work with them. The main three topics of our research are: (1) precipitation estimation from space and the optimal use of satellite data for improving model predictions, (2) theory of river network dynamics and flux propagation, and (3) developing frameworks for vulnerability assessment and identifying weak links in a complex system under change. The precipitation project is funded by NASA’s Global Precipitation Mission (GPM), whose main satellite was launched February 28, 2014. It is an exciting time for blending new theories with increasing data streams on the one hand (for some variables and in some regions of the world) and lack of data on the other (in most regions of the world), and for developing simple models that capture the essence of complex phenomena to guide effective mitigation.

Q. You joined the University of Minnesota 25 years ago. What do you think about that decision now?
A. Twenty-five years—time flies when one keeps busy and enjoys work! The University has been a great supporter of my career, and I am honored and thankful to the Ling family for establishing the Joseph T. and Rose S. Ling Endowed chair in Environmental Engineering, which I hold. The College of Science and Engineering has been home to my whole family: my husband, Tryphon Georgiou, is a professor in the Department of Electrical and Computer Engineering, my daughter Katerina studied Chemical Engineering (now at Berkeley for her PhD), and my son, Thomas, is a junior in Aerospace Engineering and Mechanics. We owe a lot to UMN!

Q. Looking back, what words of wisdom do you offer young researchers who are starting to build their families and careers?
A. Spoil your kids; involve them in your work; treat them as adults in conversation but kids in everything else. Open your doors to your research group so everyone is part of a bigger family and a bigger picture. Flexibility makes the life-work space easier and more fun.

Brief CV
Efi Foufoula-Georgiou’s major research interests are in hydro-meteorology and hydro-geomorphology with special emphasis on scaling theories, multiscale dynamics and space-time organization of precipitation and landforms. She received her diploma in Civil Engineering from the National Technical University of Athens, Greece, in 1979, and her PhD in Environmental Engineering from the University of Florida in 1985. She joined the faculty in Civil Engineering at UMN in 1989 and is currently a Distinguished McKnight University Professor and the Joseph T. and Rose S. Ling Chair in Environmental Engineering. More information can be found on her web site http://personal.ce.umn.edu/~foufoula/.
Lectures

Fall 2014

If you missed any of these lectures, you can replay them on our website, ce.umn.edu.

The Warren Lecture Series is made possible by a generous, renewing gift given by Alice Warren Gaarden in 1961. Each year we are able to bring distinguished scholars to our campus to address important issues in engineering.

NING LU, Civil and Environmental Engineering, Colorado School of Mines, “Advancing the Predictability of Rainfall-induced Landslides.”

MARTIN SCHANZ, Institute of Applied Mechanics, Graz University of Technology, “Partially Saturated Porous Media: A Dynamic Boundary Element Formulation.”

JIA-LIANG LE, Department of Civil Engineering, University of Minnesota, “Energetic-statistical Size Effect in Quasibrittle Fracture.”

STEFANO GONELLA, Department of Civil Engineering, University of Minnesota, “Stretched, Compacted and Skewed the Erratic Life of Waves in Nonlinear Phononic Chains.”

YURI BAZILEVS, Department of Structural Engineering, University of California, San Diego, “Isogeometric Analysis and Fluid—Structure Interaction: From Blood Pumps to Wind Turbines.”

SATISH NAGARAJAIAH, Civil and Environmental Engineering, Rice University, “Adaptive Passive Stiffness Shaping and Apparent Weakening for Seismic Protection.”

RAJ DONGRE, Dongre Laboratory Services, Inc., “QC/QA Test for Asphalt Binders Using Laser Technology.”

TOMASZ HUECKEL, Civil and Environmental Engineering Department, Mechanical Engineering and Materials Science Department, Duke University, “Soil Suction and Cracking from the Onset to the End of Drying: Micro-Scale Evidence and Model”


TIM SCHEIBE, Pacific Northwest Laboratories, “Pore-Scale Fluid Flow Simulation: Model Validation and Multiscale Coupling”

May 2

The Sehlin Lecture

The Katherine and Arthur Sehlin Memorial Lectures are supported by a fund established in 1986 by the Sehlin family to reflect the values expressed by Katherine and Arthur Sehlin in their professional and volunteer activities. The yearly lecture alternates between the Department of Civil Engineering and the School of Social Work.

MARK D. ZOBACK, Department of Geophysics, Stanford University, “Managing the Risk of Triggered Seismicity.”

Upcoming Lectures

A listing of the current series can be found on the Department’s website (ce.umn.edu). Please join us Fridays at 3:30 in room 210 of the Civil Engineering Building. We look forward to seeing many of you on campus for these events!
Steven Borntrager's Approach: Personal Connections

BCE Dec. 2013, Structures and Pavement

Steven came back to school after a career in the United States Air Force. He completed preliminary coursework at Inver Hills Community College, and then transferred to UMN.

In his Air Force career, he was responsible for “everything behind the cockpit: we managed weight and balance on the plane, set up rigging for airdrop loads, and opened the door for paratroopers. The C-130 is the smallest cargo plane in the Air Force. It could go where bigger planes could not. We could drop up to 42,000 pounds out the back of the plane in midair and land it on a drop zone. If you couldn’t land on a runway, or if you wanted equipment to build a runway, this is how it was done. A lot of what I learned on the airplane was practical application of engineering principles and that applied to my CE classes. Now, I know why it all works.”

Steven found studying with others to be extremely valuable. He sought out a student study group, and says they deserve half the credit for getting him to graduation—but Steven is a generous guy!

Steven also participated in the CSE Mentor Program, where he was paired with Jihshya Lin (MSCE 1986, Principal Engineer, MnDOT Bridge Office) as his mentor. They began meeting just three weeks after Steven started at UMN. “We met on a weekly basis and Jihshya would ask me about my classes, help with homework, or talk about my career. Jihshya was very receptive to whatever I needed. He helped me with my resume and prepped me for interviews. He introduced me around and got me out in the community—I hadn’t planned on that when I started the CSE Mentor program, but it has been great. He even came and talked to the steel bridge team—it never hurts to have a 30-year engineer looking over your designs!”

“I’ve encouraged other students to get involved with the CSE Mentor Program; everyone has a positive experience in that program! Jihshya pays it back—he must believe he got treated pretty well here!”

Steven, too, has been paying it back—and forward—throughout his time in CE. On the day of this interview, he was on campus volunteering with the Minnesota Society of Professional Engineers’ MATHCounts! program.

The next phase in Steven's life will take him to Massachusetts; his wife is leading this expedition. “She’s left three jobs to follow me. Now it is her turn.” They will move when the children finish their school year. Until then, Steven has been working part time with Professional Engineering Services; he was an intern last summer and now works as an Engineer In Training.

Steven is especially interested in testing and monitoring structures or, perhaps, designing airports, which would build on his Air Force experience. He wants a job he can be enthusiastic about. Given Steven’s positive attitude and penchant for connecting with people, such a job should not be hard to find!
Kathryn Klarich’s Approach: Overseas Travel and Entrepreneurship
BCE May 2014, Hydrology

Kathryn started her academic career at UMN as a freshman in the College of Science and Engineering in 2009. She was good at science, but confesses that she never liked math.

“Until my senior year in high school, I thought I wanted to go into something in liberal arts—I was really interested in writing. I was also really interested in environmental science, and so when I was applying to colleges, my dad suggested engineering. I was watching some videos from Engineers Without Borders and thought that looked pretty cool. So it was my dad’s suggestion and my research that led me here.”

Kathryn has participated in several research and travel projects in her time as an undergraduate.

“I worked with Professor John Gulliver starting out as a freshman. He let me co-author the paper on our research project. He let me have a lot of independence, even though I’m sure he could have done things ten times faster. Having skills in research and writing helped me to advance. I attribute a lot of my success to having that really valuable experience early on."

“When I was a first year student, I went to Central Europe on a May term with Professor Henryk Stolarski (from Poland) and Senior Research Associate Sonia Mogilevskaya (from Russia). We went to 5 different countries learning about civil structures.”

“The Acara program had a huge impact on me. The idea of the Acara program is to identify a problem that can be addressed by a business solution. We tried to find a business incentive for vendors to improve food safety in India.”

Kathryn’s Acara team continued working together and developed a new business called Twin Fin Aquaponics. “We are raising fish and greens indoors. We hope it will allow us to deliver greens in the Minneapolis area, especially in winter when greens would normally have to be shipped from California or even further. On the Twin Fin team, I am mostly responsible for water quality related issues.”

“Over the 2013 winter break I traveled to Tanzania with Paul Strykowski, the Associate Dean for Undergraduate Programs in CSE. Our job was to design a new drinking water system for the village we stayed in. My team of 4 went and stayed in a small village for 3 days. We talked to people in the community, asked about their current situation, and tried to design a cost-effective solution for them.”

(http://blog.lib.umn.edu/itcomm/learningabroad/2014_global_seminars/tanzania_2014/)

“In my Capstone course, I am working on a city waste water treatment plant. The city is exceeding the limits set on the amount of nitrogen. The problem is complicated and it is difficult to nail down one cause; I think that is the way a lot of problems are, so it is good to go through that process.”

“It is difficult to balance not only schoolwork, but also social life and activities, too. It took me about 4 years to figure out how to sleep and have friends and go to school. I used to just not sleep a lot! Perfectionists, like me, fear that things will really fall apart. And for me, not liking math, I felt I was maybe not as smart as everyone else, so I tried to overcompensate. I finally realized that if I could stay focused for 2 hours I would be more effective than if I sat for 6 hours at half focus. And I could be more focused if I slept more. That was a key realization. You have to be well rested to focus.”

Kathryn already has a job lined up. “I am currently working for Barr Engineering. I work there part time now and will start full time once I graduate. I will be a Water and Waste Water Engineer.”

“A lot of the classes I’ve taken have been directly related to the water work I do now. Being a student at the U has opened up a lot of opportunities I would not have had otherwise. I would say probably half of what I know how to do is from my classes and half is from the various internships, research projects, and start-up companies I have been involved with.”

Acara is a social entrepreneurship program of the University of Minnesota Institute on the Environment. http://acara.environment.umn.edu/
Noah Kimmes’s Approach: Geoengineering and Master’s Degree
BGEOE May 2014, Geoengineering

Noah came from the Upper Peninsula of Michigan to go to school in the big city. He completed his preliminary coursework at Anoka-Ramsey Community College before transferring to UMN.

“My dad pushed for me to go into engineering because I was always good at math and science. When I found the UMN Geoengineering program I found a way to put my abilities and my passion, geology, into real world applications.”

“Geoengineering is one of the coolest majors anyone could do. It is a great, great major and more people should know about it. I got to meet two totally different groups of people—civil engineering people and geology people—and take classes with each of them.”

Noah noted a significant difference between the two fields. “The geology classes seem more theoretical and engineering more practical, although there is a balance in each. In geology a lot of theories cannot be proven in the same way that things can be tested in engineering. We cannot travel to the center of the earth. Most problems in engineering, however, can be tested with research.”

“Rock mechanics was the class I was most looking forward to when I started the program. Professor Joseph Labuz taught us the theory, and then Dr. Lee Peterson (PhD ’91), from Itasca Engineering, came in and talked about projects he worked on, kinds of rock bolts, and excavations and tunnels. Professor Labuz also taught Soil Mechanics 2 with the same sort of set-up: he taught us Mohr’s Circle and stress and strain of soils and retaining walls. Then Derrick Dassenbrock, Foundations LRFD Engineer from MnDOT, came in to talk about deep and shallow foundations and slope stability. Labuz is very passionate about what he likes, very bright, and willing to help. It’s great when a teacher really likes teaching and likes what he’s talking about.”

“Computer Applications 2 with Professor Barnes was another great class—really challenging but really rewarding. The homework was hard so I had to go see him. I would have spent countless hours trying to figure out something that required just a little bit of guidance. Through that experience, I discovered the value of office hours. If you show interest in something, professors are very willing to help you and get you involved in what they are doing. It is much easier to get them to respond than I thought. And I discovered how helpful they can be with the job search!”

“My advisor is Associate Professor Kimberly Hill. I am working with her on an Undergraduate Research Opportunities Program (UROP) project about debris flow. I have been using different water and glycerin formulas to model the effects of different viscosities of the interstitial fluid. We use the flume in the Fluid Mechanics Lab for modeling. It’s been pretty cool.”

For his Capstone project, Noah and his team are working on the expansion for a sand processing plant, which is Noah’s first exposure to structural engineering. He will be working on the foundational design and getting exposure to another new area of engineering.

Noah has been applying his education in his job with MnDOT, where he started as a Student Worker in May of 2013. “I work in the Research Office Design Group. I do a lot of lab work related to asphalt research, which is something I did not see myself getting into as a geoengineer—but you never know!”

He will work with MnDOT through the summer and plans to attend graduate school in the fall. Noah has been looking at three pretty different options for his continued studies, all stemming from his experiences in the GeoE program. If he were to continue his studies at UMN, he would be interested in studying rock mechanics with Professor Labuz or possibly continuing asphalt research under Professor Lev Khazanovich. His Rock Mechanics class ignited an interest in pursuing a degree in Underground Construction and Tunneling at the Colorado School of Mines. That program combines civil, mining, and geological engineering. His UROP project led him to the possibility of studying slope stability related to forest management. He has considered the possibility of pursuing that interest at Oregon State University.

“I have a lot of interests and I just have to narrow it down.”

Update: Noah will be attending the program at Colorado School of Mines in the Fall of 2014.
THANK YOU TO ALL OUR GENEROUS FINANCIAL SUPPORTERS!

It takes all kinds of involvement to make a program like this happen. The Department of Civil Engineering—all our students, staff, faculty, and graduates—want to take a moment to recognize the individuals and companies who have donated financial support of our programs. Although your faces may not be seen around the department, your generosity is seen and appreciated every day. THANK YOU!

The college of Science and Engineering Deans’ Club is a special community of our most generous benefactors who support CSE and the Department of Civil Engineering with gifts of $1,000 or more annually. We are sincerely grateful for your generous support.

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The Dennis R. and Catherine M. Martenson Fund

A special and heartfelt thank you is due to DENNIS MARTENSON (BCE '67; MSCE '68), who has been a long-time supporter of the Civil Engineering Department in so many ways. He lives out our stated mission of practicing engineering for the benefit of society. He is a wonderful mentor to young engineers, supporting them not only through financial contributions to the Department, but also through teaching, leadership within the field, and service on professional boards.

This year Dennis and his wife, Catherine, made a generous donation establishing The Dennis R. and Catherine M. Martenson Fund to support undergraduate and graduate students in the College of Science and Engineering who are studying civil engineering, particularly those with an interest in environmental engineering. This fund participates in the University of Minnesota Foundation’s Fast Start 4 Impact program, which provides a ‘Fast Start’ to students during the first four years of the fund.

Through their generous support, this endowed fund will provide support for future civil and environmental engineers in perpetuity. We are grateful for alumni like the Martensons who know the impact that scholarships and fellowships make in education.
In the early 1900s, a bridge across the St. Lawrence River in Quebec collapsed during construction, killing scores of workmen. Legend has it that one of the twisted iron beams was sliced into rings and worn by engineers to remind them of their solemn responsibilities. Today, engineers wear a stainless steel ring as a reminder of their calling.

In 2013, the University received some steel from the collapsed I-35W Bridge, which the Department of Civil Engineering fashioned into an oversized Order of the Engineer ring. The steel that forms the ring is chromed and the base on which it sits remains unfinished.

This ring has been incorporated into the Civil Engineering commencement. After accepting the obligation and reciting the Oath of the Engineer, graduates place their dominant hand through the memorial steel and receive their Engineer’s ring.

“The Order of the Engineer is a solemn obligation to serve humanity by making the best use of earth’s precious wealth.”

(http://www.order-of-the-engineer.org)