

OUTLOOK

CIVIL & ENVIRONMENTAL ENGINEERING

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UNIVERSITY OF
DELAWARE

College of Engineering

DEPARTMENT OF CIVIL & ENVIRONMENTAL
ENGINEERING

LETTER FROM THE CHAIR



**HARRY (TRIPP)
SHENTON III**

BCE '82, MCE '84

PROFESSOR AND CHAIR

Welcome to the 2014 edition of the CEE Newsletter, the *Outlook*. Yes that's correct, 2014! We were a little delayed in getting out the newsletter in the fall, but that's only because we had a very exciting and busy fall semester. As they say—"better late than never."

So, you ask, why were we especially busy this fall? Well, it could be due to completing senior check-outs for what will be one of our largest graduating classes ever; or preparing for a very busy winter session, which includes a number of new classes; or because we were making plans for some major renovations in Dupont Hall. As you see, we had cause to be a little late!

This May, we expect to graduate the largest number of civil and environmental majors ever from UD. Our combined senior class totals 139, of whom 110 are civil and 29 are environmental majors. They're entering their final semester at

UD—working through the demanding schedule of senior design—and actively on the job hunt. We are extremely proud of these students, and, while bittersweet, we look forward to sending them off into the professional world or to graduate school in anticipation of the great things they will do.

Historically, CEE has not offered many electives during the winter session, but that has changed in recent years. Last winter, for the first time, we offered the National Highway Institute (NHI) *Safety Inspection of Bridges* course, as a for-credit elective for our students on campus. This is a great class for graduates who want to work in the bridge design/management area, giving them a leg up on others when it comes to finding internships and full-time employment in the bridge industry. We are also unique in that this is one of the first times an NHI course has been offered

for credit at a university. The course also attracts practitioners needing the training, so it is a wonderful opportunity for student to interact with engineers from the field. The course was offered again this winter (2015).

Two other new courses are also being offered: *CAD Applications in Civil and Environmental Engineering* is a three-credit course where students gain hands-on experience in MicroStation and AutoCAD; and *Life Cycle Assessment*, in which students learn the principles and applications of life-cycle assessment (LCA), while gaining hands-on experience with the leading software tool, SimaPro LCA.

Many of you, I am sure, have fond memories of roaming the halls of "Old" Dupont Hall – CEE's home for many years. The original building has served us well since it was built in 1957. Since then, we have seen many changes and renovations. Some of the environmental research labs have seen some upgrades since then, but others have not. This spring, we will embark on a major renovation of several of these laboratories. We were fortunate to receive a major gift from the Unidel foundation that will cover most of the costs. Our hope is to renovate two wet labs and complete major face-lifts on two other labs. Having high-quality lab space is key to being able to hire the best faculty into our programs. In addition Dupont Hall is getting a new "engine," you might say, this winter. Major work is underway to replace all of the electrical switch gear in the building. With these upgrades, we hope—and expect—to be able to call Dupont Hall the home of civil and environmental engineering for many more years to come.

So, you can see it was a busy fall. I hope you enjoy reading about the other activities and achievements of our students, faculty and department in the following pages. As always, please feel free to contact us—we welcome your questions, concerns and suggestions. To stay connected via social media, be sure to follow us on Facebook and on Twitter at UDelawareCEE.

Sincerely,

Harry (Tripp) Shenton III
PROFESSOR AND CHAIR

Environmental transportation planning

Delaware Center for Transportation shares in federal funding for environmentally sustainable transportation research

The Delaware Center for Transportation (DCT)—a research center housed in the University of Delaware's Department of Civil and Environmental Engineering—will share in \$5.2 million in federal funding for environmentally sustainable transportation research as part of a regional consortium of universities.

Awarded by the U.S. Department of Transportation (USDOT), the funding supports research by the newly formed Mid-Atlantic Transportation Sustainability University Center (MATC-UTC), led by University of Virginia. Other consortium members include Marshall University, Morgan State University, Old Dominion University and Virginia Tech.

According to [Ardeshir Faghri](#), DCT director and professor of civil and environmental engineering, the center's strength lies in its emphasis on environmental practices in transportation engineering and its established relationships with the Institute for Public Administration in UD's School of Public Policy and Administration.

"This combination of engineering, plus planning and policy has distinguished UD's transportation center among state and federal transportation agencies," Faghri said.

With \$1 million in new funding, DCT faculty research will address alternative fuels, multimodal transportation facility resilience, mode choice among commuters, land use planning and environmental sustainability, and infrastructure and development patterns to support reduced driving.

"Transportation engineering has been a core strength of UD's civil engineering program for years. This new funding provides needed resources to make major advances in sustainability, both in infrastructure and the environment," said [Tripp Shenton](#), professor and chair of the Department of Civil and Environmental Engineering.

The research program will focus on five main areas of interest to the USDOT:

- Sustainable freight movement
- Coastal infrastructure resilience
- Energy efficient urban transportation
- Enhanced water quality management
- Sustainable land-use practices



Alumni share valuable insight during Practitioner in Residence Day

At the 4th annual Practitioner in Residence Day last November, the department welcomed alumni (from left) [Darrell Mobley '96](#), director of the Department of Public Works and Transportation for Prince George's County, Md.; [Robert Healy '77](#), RK & K director of Structures; [Sheila Shannon '86 '87](#), Tidewater Utilities director of Water Quality; and [Shante Hastings '00](#), chief of Performance Management for the Delaware Department of Transportation.

Roundtable discussions allowed students to engage the four practitioners in open dialogue about their work, offering valuable insight into what students can expect once they join the workforce, and what will be expected of them as they enter the profession.

Practitioners spoke to freshman students during *EGGG-101: Introduction to Engineering*, a course that reached engineering students from all majors in the College of Engineering, as well as to seniors in *CIEG-402: Introduction to Sustainability Principles in Civil Engineering*.



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CEE Co-Op Program off and running with 40 employers

Department leaders are currently interviewing the third cohort of CEE's Co-Op Program, which pairs up to 16 students each session with local and regional employers for a six-month work experience and the option for hire upon graduation.

The co-op came to fruition in the fall of 2012, when department chair [Tripp Shenton](#) and professor [Michael Chajes](#) strategized plans and enlisted faculty support. Chajes and [Lynn Sydnor-Epps](#), associate director of Bank of America Career Services, spearheaded the program planning and implementation, placing 16 students with various local and regional employers in the summer/fall of 2013. A second class of 16 co-op students found positions in 2014. Between the first two cohorts, 20 different employers hired at least one co-op student. In total, more than 40 employers actively participate in the program.

During the co-op, students work for six months with a single employer and participate in other activities on campus with their fellow students allowing them to share and reflect on their work experiences. By making use of winter and summer sessions, students are still able to graduate in four years.

Student and employer feedback is enthusiastic. As one student wrote in a post-program evaluation, "The co-op program has had a great impact on both my educational and professional career. The experience of working in the field, as well as managing my time as both a student and an employee, were crucial steps in making it to where I am now. I cannot thank the department enough for implementing a program that provides students with great opportunities that otherwise would not have been possible."

Equally enthusiastic, one of the employers shared, "We hired a co-op student last semester and it worked out really well! He did a great job and the team really appreciated the extra help. We would love to hire someone from the program again this year."

A new career counselor, [Ryan S. Mooney, '12M](#), joined UD in September, assuming a significant management role in the co-op program. A UD alumna, she brings a great deal of energy to the position. With Mooney, Sydnor-Epps and Chajes all working together, the co-op program is off and running.

For more information on becoming a UD co-op employer, contact Professor Michael Chajes at chajes@udel.edu or Ryan Mooney at rmooney@udel.edu. We would love to have many more organizations involved.



Ryan S. Mooney, '12M

International internship

Engineering students travel to Taiwan for hands-on research internship

A team of five engineering students traveled to Taiwan this past summer to participate in a collaborative international two-week research exchange program at National Chung Hsing University in Taichung.

Working under the guidance of a professor of civil and environmental engineering at NCHU, the students studied hydrology with peer exchange students from China and Japan. They created one- and two-dimensional hydrologic models, studied wave phenomena and fluid flow, and toured the labs of various researchers in the field.

"A contemporary engineering education must prepare students to explore and discover how they can contribute solutions to the world's grand challenges. Global opportunities of this kind represent an important part of this educational process."

— MICHAEL VAUGHAN, ASSOCIATE DEAN FOR ACADEMIC AFFAIRS,
COLLEGE OF ENGINEERING

"One day we teamed up with civil engineering students who taught us how to use software tools to study the forces within bridge structures," explained environmental engineering junior **Tim D'Agostino**. "We used software to design our own bridges, and even had the opportunity to build a prototype of the design and stress test it in the laboratory."

The international experience went much further than the classroom. While abroad, the students explored the city, experienced the rich culture and visited a museum built at the site of a school destroyed in the Chi-Chi Earthquake.

"Seeing firsthand the damage caused by the earthquake was a unique experience and it was fascinating learning more about the area during our tour," D'Agostino said.

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Anna M. Wagner, '14, is third from left in this group of high index seniors recognized at the May Commencement.

Environmental engineering senior presented highest grade point index award during Commencement

Anna M. Wagner, '14, who graduated in May with a bachelor's degree in environmental engineering, was among 10 graduating University of Delaware seniors to achieve the highest grade point index earned in full-time study toward a University degree. Wagner, of Pennington, New Jersey, works in water resources engineering at Century Engineering and is now pursuing a master's degree in environmental engineering.

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Engineers Without Borders students develop renovation plan for park

As part of their Engineers Without Borders course (CIEG465), nine University of Delaware engineering students worked alongside UD faculty and local community members last spring to create a baseline survey map to drive renovation plans for a two-city-block park in Wilmington, Del.

According to [Aimee Lala-Milligan](#), BAAS '96 (History Education), MA '02 (Education & Human Development – Urban Affairs & Public Policy), UD alumna and commercial district revitalization manager for the local community organization Cornerstone West/West Side Grows Together, the park had only a small play area, no athletic areas and no working restrooms. Despite community efforts to improve its upkeep and safety, frequent storm water drainage issues, trash and illegal activities continue to burden the park.

A local engineering consulting firm, Pennoni Associates of Newark, Del., showed the students the basics of surveying, including how to set up surveying equipment. "This experience has definitely given me a broader perspective of how much work goes into a project and how different groups of people have to coordinate in order to make the project a success," said Robyn Hume, Senior Environmental Engineering major.

Working under the advisement of [Steven Dentel](#), professor of civil and environmental engineering, and with adjunct faculty member [Abigail Clarke-Sather](#), the students created and presented a new site map of the park and a renovation plan to community groups and the City of Wilmington. They also recommended improvements to the park's current landscaping and existing play area, including additions such as a new drainage system and a performance area.

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CEE students take top honors at 2014 competitions

Congratulations to the CEE student teams bringing home top honors from regional competitions in 2014:

1st place, strength category and 3rd place, prediction category — Student Beam Competition sponsored by the Eastern Pennsylvania and Delaware Chapter of the American Concrete Institute

2nd place — Mid-Colonial District ITE Traffic Bowl, sponsored by the Institute of Transportation Engineers

3rd place — Mid-Atlantic Region Steel Bridge Competition sponsored by the American Society of Civil Engineers

CEE ACES serve as department ambassadors

Response was overwhelming to a call to students to form a brand new student-led ambassador program to welcome and encourage potential Blue Hens to join CEE. More than 40 students expressed interest, and, after careful consideration, 19 of the most enthusiastic and energetic were selected. The students branded themselves Ambassadors for Civil and Environmental Students, a.k.a. ACES. Their initial responsibilities include department tours during open house events and one-on-one tours for potential students and their families.



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Boot Camp prepares upperclassmen for upcoming job search

Last October, more than 50 juniors and seniors participated in mock job interviews and had their resumes critiqued by representatives of local firms—many department alums themselves—at the department's first Career Skills Boot Camp. Co-sponsored by the University's Bank of America Career Services Center, the event helps prepare the students for real-world interviews in the coming months leading to graduation.

Tripp Shenton, department chair, welcomed the students and thanked representatives from All4 Inc., Duffield Associates, Inc., Pennoni Associates, Inc., RK & K Engineers and Whiting Turner Contracting Company for volunteering their time and for their support to help the students to gain valuable interview experience.

Both students and company reps found the event to be very beneficial. Said **Bob Healy '77**, director of Structure at RK & K, "We had a great experience meeting the University of Delaware students at the Career Skills Boot Camp. As a company that is always looking to hire high quality engineering graduates, RK&K appreciates the opportunity to assist the UD civil and environmental engineering students in improving their resumes and interviewing skills as they prepare to enter the work force."

Senior environmental engineering student **Achyuth Madabhushi** commented, "The career skills boot camp was very helpful because of its frank nature. I really understand now what it takes to develop a stronger resume. I learned how crucial competency in computer programs like CAD, Excel and Matlab will be to my future career."



Plans for Boot Camp 2015 are already underway. If you'd like to have your firm represented, please contact, Tripp Shenton, chair, at shenton@udel.edu or **Sarah Palmer**, undergraduate academic advisor, at sbpalmer@udel.edu.



IN MEMORIAM



W. David Teter, former assistant professor of civil and environmental engineering from 1968–1999, passed away July 12, 2014 at the age of 77.

A native of West Virginia, Teter was a local CAD pioneer. He introduced the software's capabilities to many at University of Delaware, including an undeclared freshman back in 1978—Harry W.

"Tripp" Shenton III—who today chairs the Department of Civil and Environmental

Engineering. Recognizing the primitive limitations of the available graphics software, Teter developed his own 3-D software for the early engineering design and graphics courses. He also taught conventional drafting and surveying, and is remembered by fellow faculty and students as a thoughtful and affable professor.

An avid car rallying fan, he co-founded the Mon Valley Sports Car Club in Morgantown, West Virginia, and helped organize the Brandywine Motorsport Club and the Sports Car Club of America and was instrumental in formulating the rules by which these organizations abide. Through the years he led many Appalachian National Rallies and, locally, March Lamb Road Rallies, the last of which traversed Cecil County, Md., Chester County, Penn. and New Castle County, Del., just this past spring. A frequent competitor and rally champion himself in the Sports Car Club of America, he was honored in 1985 with the Robert V. Ridges Memorial Award.

National Research Council names Di Toro to environmental studies board

Dominic Di Toro, Edward C. Davis Professor of Civil and Environmental Engineering with a joint appointment in oceanography in the College of Earth, Ocean, and Environment, has been appointed a member of the National Research Council's Board on Environmental Studies and Toxicology (BEST).

A part of the National Academies' Division on Earth and Life Studies, BEST is the principal study unit on pollution problems affecting human health and the environment. The 23-member BEST board advises the federal government about science and technology matters affecting public policy on important environmental and ecological problems.

Di Toro, who joined the UD faculty in 2003, is known for his expertise in developing water quality standards and mathematical models of chemicals in water. His work



has been supported through funding from the Department of Defense, the National Science Foundation (NSF) and the state of Delaware, among others.

Di Toro currently directs the Center for the Study of Metals in the Environment (CSME) and is affiliated with the Delaware Environmental Institute (DENIN). His recent research projects have included a study of the Chesapeake Bay with the National Research Council and the development of water quality criteria for the Environmental Protection Agency (EPA).

The findings gathered from his recent study with the EPA were applied toward the Deepwater Horizon oil spill disaster in the Gulf of Mexico in 2010 and have been used to develop government regulations and water quality standards.

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UD's Faghri named fellow of American Society of Civil Engineers

The American Society of Civil Engineers (ASCE) has named Civil & Environmental Engineering professor **Ardeshir Faghri** to its 2014 Class of Fellows.

Faghri specializes in transportation systems engineering, global positioning and geographical information systems, soft



computing and applied probability theory. He also has served as director of the Delaware Center for Transportation Research, which fulfills the research and technical training needs of the federal, state and local transportation agencies since 2001.

Widely regarded as a mentor, Faghri has advised more than 60 undergraduate and graduate students who have gone on to successful careers in academia, government and private sector companies around the world.

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IN MEMORIAM

As this issue of CEE Outlook was being finalized, the department lost a beloved senior faculty member and friend—Steve Dentel, who passed away February 18 after a long struggle with prostate cancer. He was 63.

Dentel was a professor of Civil and Environmental Engineering and a well-known expert in water and biosolids treatment processes. A teacher and researcher for more than 30 years, he was instrumental in the creation of UD's undergraduate major in Environmental Engineering and in 2006 became the faculty advisor for the newly formed Engineers Without Borders (EWB) UD chapter. Known as "Dr. Steve" to his EWB students, he traveled to Cameroon 11 times to build water systems in two villages, and was designated a "Prince and Village Notable" by the people of Bakang II, Bamendjou (see related story on his research on water and sanitation issues in the developing world, page 11).

He recently was awarded the Order of the First State—Delaware's highest civilian honor—by Governor Jack Markell. In 2014, Steve was awarded the inaugural Steven K. Dentel AEESP Award for Global Outreach by the Association of Environmental Engineering and Science Professors (see story, page 10).

Contributions can be made to either the Steven K. Dentel AEESP Award for Global Outreach endowment fund (www.aeespfoundation.org/content/aeesp-foundation-donations-memory-dr-steven-k-dentel) or to UD's Engineers Without Borders (www.udel.edu/makeagift – select "Other" and fill in "Engineers Without Borders in Memory of Steve Dentel").



***A memorial service will be held at 5:00 pm on Monday, March 9, 2015
at the Gore Recital Hall in the Roselle Center for the Arts.***

**Steven K. Dentel
1951 – 2015**

[CLICK HERE FOR THE COMPLETE UDAILY ARTICLE //](#)

UD's Dentel honored with global outreach award

Steven K. Dentel, professor of civil and environmental engineering, was the namesake and inaugural recipient of the Association of Environmental Engineering and Science Professors (AEESP) Steven K. Dentel Award for Global Outreach.

This prestigious award recognized Dentel for his “outstanding contributions and leadership through involvement in environmental engineering and science outreach activities to the global community” and will be presented to future recipients who display similar exemplary activities.

Dentel served on AEESP’s board of directors from 2009 until his death, making several contributions to the organization, including the creation of their electronic ballot system.

A recognized expert in water processing, he played a key role in UD’s environmental engineering community. He was instrumental in the development of the environmental engineering bachelor of science program and UD’s Engineers Without Borders (EWB) chapter, where he served as a faculty adviser and has led more than 40 students on multiple trips to Cameroon where they developed systems for clean and sustainable water supplies for local villages.

“Steve dedicated his life to making a difference in the lives of students and of those who are less fortunate around the world. UD’s EWB chapter would not be what it is today were it not for Steve and its dedicated students.”

— TRIPP SHENTON, CHAIR, CIVIL & ENVIRONMENTAL ENGINEERING

Dentel recently received Phase 2 funding from the Bill & Melinda Gates Foundation (see related story, page 11), for research focusing on a breathable fabric to help protect water sources. This novel fabric can be used in sanitary facilities, such as latrines, to promote waste drying and stabilization, mitigating the spread of diseases.



UD's Steven Dentel received his namesake award from Jennifer Becker, professor at Michigan Technological University and current president of AEESP. Looking on are former AEESP presidents Joel Burken (left), professor at Missouri University of Science and Technology and Mark Wiesner of Duke University.

With help from the non-profit organization WaterAid, Dentel was working to install the technology in Kanpur, India, and hoped to introduce it to wastewater treatment facilities in the U.S. and overseas.

[CLICK HERE TO READ MORE //](#)

Bacteria fighting fabric

Gates Foundation funded environmental engineering professor's novel wastewater treatment fabric

Each year in India, waterborne diseases sicken approximately 37.7 million people. One and a half million children die of diarrhea alone, according to a report by the nonprofit organization, WaterAid. In the developing world, open pit latrines are common, but they pose a significant risk to public health and the environment. Open pit latrines can be as sophisticated as an outhouse or as simple as a trench in the ground.

A team at the University of Delaware, led by the late environmental engineering professor **Steve Dentel**, reinvented the common latrine by adding a breathable fabric as a simple way to protect the nearby groundwater and wells from contamination, while also protecting sanitation workers from exposure to pathogens.



The work was originally funded through the Bill & Melinda Gates Foundation's Grand Challenges Explorations Fund. The \$250,000 in additional funding from the nonprofit allows Dentel's team to collaborate with WaterAid to pilot the membrane technology in Kanpur, India, one of the country's largest industrial cities.

WaterAid contacted Dentel after learning about his research team's innovative approach, which uses a breathable membrane in a fabric similar to that used in sports and camping gear.

"In first world countries, we use this type of fabric to keep from getting wet. But in the developing



world it could be a key to basic health and sanitation," said Dentel, a recognized expert on waste processing, a few months before his death.

The membrane captures the waste and allows water to evaporate over time, leaving everything else behind. The waste gradually dries, and clean water is released.

In Kanpur slums, the human waste is deposited into a 55-gallon drum lined with the breathable fabric. Ventilation holes allow the waste to dry out, while retaining and decreasing pathogens.

While the process relies on a sophisticated technology, the application must be simple and affordable if it's to be sustainable in developing countries. The membrane also must be reusable many times, which the research team's tests indicate it is.

Dentel was also working with UD engineering colleagues **Daniel Cha** and **Paul Imhoff** to apply the technology in wastewater treatment facilities in the U.S. and in advanced economies overseas, particularly South Korea.

[CLICK HERE TO READ MORE //](#)

Philadelphia Inquirer features UD research team's work to reduce surf-related injuries

University of Delaware researchers teaming with Beebe Healthcare's Emergency Department in Lewes, Del., were featured by the *Philadelphia Inquirer* last summer for their work to provide lifeguards a tool to warn beachgoers on which days they should exercise more care.

According to **Jack Puleo**, associate professor of coastal engineering, a key factor in swimmers getting slammed into the sand by the power of the waves seems to be that beaches in Delaware and on the Jersey shore are fairly steep, which causes waves to break once near the water's edge in wading depth. He explained that on more gently sloping beaches, such as those in Oregon, waves tend to break multiple times before reaching shore, dissipating their energy along the way.

So among the data that civil & environmental engineering students gathered every day last summer, along with daily measurements of sand and surf to determine rip currents and rough surf that increase risk of injury, was a detailed profile of the slope at five Delaware beaches using a high-precision GPS antenna. They also anchored sophisticated sensors to the sea floor—200 to 300 feet offshore—to measure the height, frequency and direction of waves, along with the speed and direction of the current. And, to help the medical team calculate an injury rate, the researchers counted the number of people in the water in a fixed, 100-meter section at each of five studied Delaware beaches.

Surf-related beach injuries range from sprains and broken bones, liver laceration or ruptured spleen to broken necks. While away from the beach, trauma injuries are most common among the young and old, early results from the beach study show plenty of injuries among people in their 40s and 50s.

Some of them are using boogie boards or skim boards, but many are simply wading, said Beebe's Emergency Department Chief, Paul Cowan, D.O. He said it is



possible that people are cautious when conditions are clearly rough, thereby avoiding injury, but they let their guard down when the surf is normal.

"Most of these people don't have any idea that what they're doing is in any way risky behavior," Cowan said, adding, "Never, ever turn your back to the waves."

The Delaware Sea Grant program is helping fund the research.

[READ THE FULL PHILLY.COM ARTICLE HERE //](#)

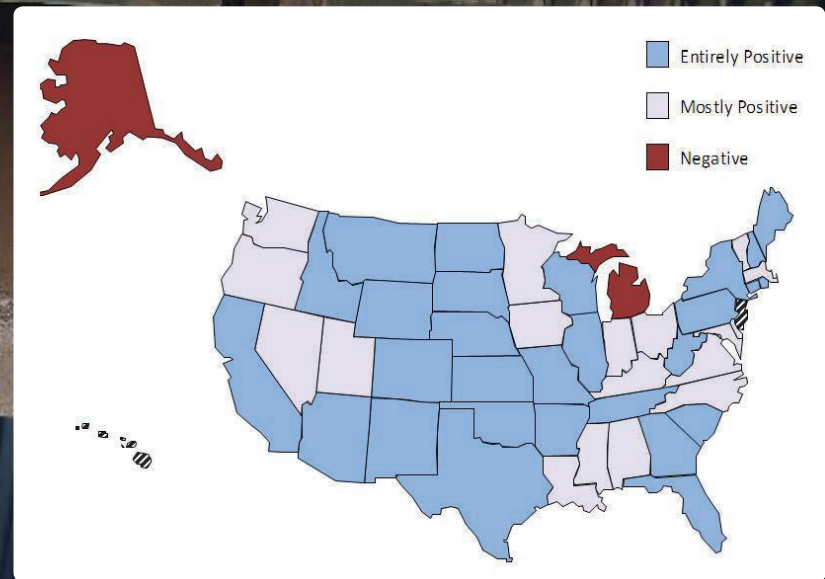
Uncoated weathering steel bridges pass test of time

Research by UD's Center for Innovative Bridge Engineering indicates that unpainted weathering steel (UWS) bridges are well tolerating exposure to the elements in all but two U.S. states.

CEE faculty **Jennifer Rightman McConnell**, associate professor; **Dennis Mertz**, professor; and **Tripp Shenton**, professor and department chair, shared findings from their "Evaluation of Unpainted Weathering-Steel Highway-Bridge Performance" in a recent issue of *Modern STEEL Construction*.

Working with the Federal Highway Administration's (FHWA) Long Term Bridge Performance Program and Rutgers University, the UD team has compiled a national database of the approximately 10,000 UWS bridges currently in use throughout the US. Michigan and Alaska were the only two states with a negative perception of uncoated weathering steel. The team points out that neither state has constructed a UWS bridge since guidance on their proper maintenance was published by the FHWA in 1989.

[READ THEIR FINDINGS HERE... //](#)



Owners' perception of the performance of UWS bridges in their state.

Bridge to success

CEE alumni on front line of high-profile I-495 emergency bridge repair project

photo courtesy of DelDOT

During a late-night brainstorming session this past June to determine the safest, fastest way to repair and re-open a heavily traveled bridge over the Christina River on I-495 in Wilmington, Delaware, [Robert McCleary](#), BCE '87, chief engineer with the Delaware Department of Transportation (DelDOT), couldn't help thinking back to his structural analysis course at the University of Delaware.

His professor, [Arnold Kerr](#), was known to introduce a concept to students, saying, "Someday when you have to design a bridge over a weekend, you're going to have to know how to do this!"

At the time, McCleary and his classmates surely thought Kerr was kidding. Who would ever be given just a weekend to design a bridge? But the late legendary professor wasn't far off with his challenge to focus students on formulating a problem and coming up with a solution under pressure. Last summer's I-495 emergency bridge repair project required the engineering team to make quick decisions that would significantly impact regional interstate traffic flow in little more time than their professor's imaginary deadline.

I-495 is a major interstate route for some 90,000 private and commercial vehicles traveling each day between Washington, D.C. and New York City. A 55,000-ton stockpile of dirt, 400 feet long by 150 feet wide and 35 feet high dumped near key

supports of the four-span continuous structure caused lateral squeezing of soft soils around deep foundation piles, breaking footings and causing displacement of the bridge superstructure. Inspectors found an 18-inch difference in elevation and a greater-than 3-inch gap in the north and southbound median barriers.

Safety of the traveling public was the number one concern for engineers. Regional commuter and business interruptions and the demands placed on alternate routes were a close second.

DelDOT closed the bridge on June 2. Southbound lanes were in repair through July. Northbound lanes reopened August 23, ahead of schedule. President Barack Obama toured the site midway through the \$30 million project. The engineering team didn't enjoy a relaxing meal or full night's sleep all summer. Yet reflecting on the experience, each downplayed the exhaustion, instead focusing on the energizing satisfaction that results from teamwork and a job well done.



photo courtesy of AECOM

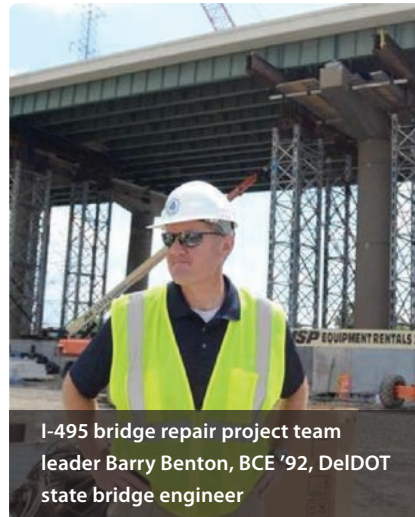
House full of alums

Like McCleary, much of the brainpower on the I-495 project hailed from UD. In fact, at least one alumnus from the Department of Civil & Environmental Engineering was involved at the highest levels in every aspect, from initial inspection to structural repairs, construction management to rerouting traffic.

Barry Benton, BCE '92, DelDOT state bridge engineer, served as team leader. Other alumni, also from DelDOT, were **Jason Arndt, BCE '00, MCE '06**, bridge management engineer; **Jason Hastings, BCE '00, MCE '01**, bridge design engineer; **Calvin Weber, BCE '92**, bridge maintenance engineer and **Tristan Siegel, BCE '08, MCE '14**, from bridge design; **Mark Luszc, BCE '93, MCE '95**, chief traffic engineer, **Adam Weiser, BCE '03, Monroe Hite III, BCE '96**, also from the traffic team. **Matt Buckley, BCE '03**, was with Whitman Requardt & Associates. Representing the construction management firm, AECOM, from UD were **Nicholas Hetrick, BCE '02**, construction manager, **Greg Black, MCE '09**, structural engineer and **Mark Wisniewski**, now a senior UD CEE student who interned with AECOM during the project, cutting his teeth on what could only be described as the opportunity of a lifetime.

Current and former UD civil and environmental engineering department chairs **Tripp Shenton** and **Michael Chajes**, faculty member **Chris Meehan**, and **Jerry DiMaggio**, retired from the Federal Highway Administration (FHWA), former UD adjunct faculty and an expert in geotechnical engineering, were called in to lend their structural and geotechnical expertise during the initial brainstorming session.

"It was a proud moment for the department to experience the leadership and expertise of so many of our alumni in that brainstorming session on a project with



I-495 bridge repair project team leader Barry Benton, BCE '92, DelDOT state bridge engineer

photo courtesy of DelDOT

such far-reaching regional, if not national implications," said Shenton. "Building upon the foundation they received while at UD, these fine alumni have built impressive careers in design, maintenance and operation of our transportation systems.

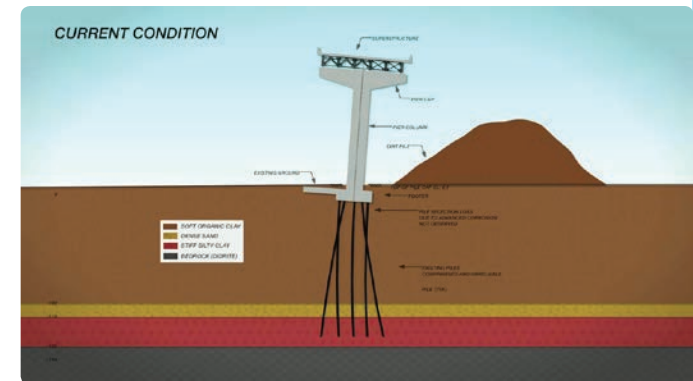


photo courtesy of AECOM

"This was a challenging engineering project executed under extreme pressure," he added. "It is something that we can take back to our current students as an example of how a career in engineering can be exciting and challenging, and at the same time, have a direct impact on the public."

Coming together as a team

Gathered in AECOM's conference room for a brainstorming session that early summer evening, the team quickly filled a 40 x 10 foot white board wall. A project flow chart outlined critical path steps ranging from environmental permits to hiring the consultant. The structural guys drew details of beams and the jacking system.

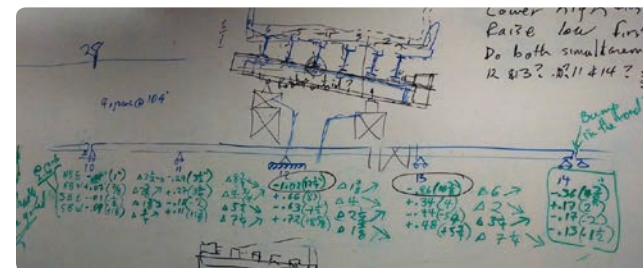


photo courtesy of DelDOT

"It was the most creative—and high pressure—environment I've ever been in," said McCleary. "The ideas that went

on that wall were the beginning of the design that eventually ended up on paper.”

The team continued to work through problems on a daily basis throughout the summer, with one moment sticking in Hetrick’s head.

“We were in the process of jacking and realigning the southbound span. It was the first attempt to jack, day one into the operation, when we experienced issues we weren’t expecting. We could not get one of the bridge bearings to break free of the pier. It was determined that the pier was rebounding and following the bridge up, so we had to come up with a solution, and quick! The consequences of the wrong move could have not only delayed the job, but been catastrophic,” he said.

“So we all gathered in the field trailer to work through the problem,” he continued. “And when I say we all, I mean all—everyone from an iron worker to a foreman to the superintendent and contractor’s engineering team, to DelDOT’s bridge engineers and the FHWA’s engineers to the Secretary of Transportation.

“The solution worked!” he said. “That’s one of many stories where the project team came together to work through issue after issue—and it shows. The bridge reopened a month early in each direction.”

Building upon the UD foundation

Arndt described the challenge faced by the team as “a very rare occurrence” and the factors involved as the “perfect storm” in bridge management. He said he definitely called upon the geotechnical and structural analytical knowledge he gleaned from his time at UD in courses taught by DiMaggio; [Dennis Mertz](#), professor; and soil expert [Dov Leshchinsky](#), emeritus professor.

“There was no textbook to tell us what to do. However, once we confirmed what was going on, we relied on our engineering knowledge and skills, put the right players



photo courtesy of DelDOT

on the job and nailed it right from the start,” he said.

When faced with a project of such magnitude, where you must consider both the safety of the traveling public and putting the bridge back in service as quickly as possible, Weber said that an engineer must draw on the basics of his engineering education, as well as past career experience.

“UD prepped us well with a good foundation,” he said. “Dr. Kerr taught us to properly formulate the problem; determine the constraints and consider what we’re trying to do here.”

Although he couldn’t have appreciated it at the time, Luszczyk agreed that several of his UD activities provided the foundation for the leadership and management skills he’s called upon throughout his career. “Our Senior Design project, for example, required collaboration, development of a vision, delegation of assignments, coordinating conflicting ideas, and developing and selling our final product to professors and classmates.”

Hastings said he, too, appreciated the good foundation of basic theories of how things work that he learned at UD. The I-495 situation offered little time for research and calculations, instead requiring the team to respond by instinct in developing concepts and figuring out the correct path.

“From an engineer’s perspective, you can’t ask for a more interesting challenge,” he said.

“We were drawing upon knowledge in soil, steel and concrete, how these components deteriorate, and their load path,” continued Hastings. “The Secretary of Transportation trusted our judgment as engineers. That speaks a lot of words.”

Based on the engineers’ recommendations, Delaware’s Secretary of Transportation dedicated all resources to repairing the leaning bridge and the team embarked on

what will likely be the defining—and says Benton, the most rewarding—professional moment of their collective engineering careers.

Right people on the job

With such a massive undertaking ahead of them and the financial and public relations pressures of time—not to mention safety—heighting the stress of the project, calling in trusted contacts and having the right people on the job was crucial.

“With so much happening so fast, we had to be able to trust everybody to do their part,” said Benton.

“The project evolved at such a fast pace,” said Hetrick, “that we were building and constructing features before plans were even finalized. Add to that, problems would arise that would potentially impact the schedule. As a team, we would sit down and

work through the problems and develop solutions, ever mindful that every second counted—second, not minute or hour.

“We were constructing features that were not common on normal highway projects and at a pace that was unheard of,” he continued. “All of that made problem solving and the ability to critically think about a design or operation more important.”

Benton said UD’s focus on teaching engineering students to solve problems played a key role in the project’s success.

“There is no training for something like this situation, but when the time comes, it all comes down to your training as an engineer and your ability to solve problems,” Benton said.

“There are no decisions I would redo,” concluded the team leader. “We had the right people in the room.”

“From an engineer’s perspective, you can’t ask for a more interesting challenge.”

JASON HASTINGS, BCE ’00, MCE ’01

CEE alums Nick Hetrick, BCE ’02; Tristan Siegel, BCE ’08, MCE ’14; Barry Benton, BCE ’92; and Jason Hastings, BCE ’00, MCE ’01 were just a few of the Blue Hens overseeing the I-495 bridge repair.



Arthur G. Lembo, BCE '79

Arthur G. Lembo, BCE '79, is president and general manager of the Power Business Unit of AECOM's Energy Industrial and Infrastructure Construction Group. His business unit's principal markets include fossil and nuclear generation, air quality control and energy delivery projects. He serves on the board of directors for the Nuclear Energy Institute and is a member of the American Nuclear Society.

Art recently took a few minutes during a visit to campus to share thoughts on reconnecting with the college years.

Q. What impact did UD's civil & environmental engineering program have on your career?

A. In engineering, when we have a problem to solve within a set of constraints, and we set out to evaluate and select the best options for a solution. In terms of life experience, the discipline of problem solving is applicable to every aspect of our business.

While working on my MBA to broaden my management engagement in my field, I found that many of the non-engineering students struggled with concepts of problem solving, which I found particularly easy. The engineering training at UD prepared me well for my chosen career path.

Q. Were there specific professors or fellow CEE students who particularly challenged, inspired or mentored you?

A. At a reception at UD in December I was reminiscing with a fellow alumnus about civil engineering professor (now emeritus faculty) Tom Brockenbrough. I found him to be incredibly interesting and enlightening. He was what I would

call an "inspirational professor," full of wisdom and experiences that brought the profession to life.

Starting in my sophomore year, I was a teacher's aide for (the late) David Teter. He took me under his wing and gave me the opportunity to put my mark on my own college education. He engaged me in interesting projects that made me part of the university community. He was a great gentleman; very impactful.

Q. What advice would you offer current CEE students preparing for a career in civil and environmental engineering?

A. It's important to mix growth in your technical knowledge with an understanding of the industry you want to serve as early in your career as possible. Look for diversity in what assignments you take on. That's what gives you a broad perspective.

In my career, I've found that my civil engineering training gave me the perspective to take on expanded and significant management roles. Is that by coincidence, or by the discipline and training that comes with civil and environmental engineering? Who can say, but it has certainly served me well in my career!

Q. What drives your interest in reconnecting with your alma mater?

A. A few years ago, I took over a major engineering and construction operation in Princeton, N.J., for one of the world's bigger design and construction firms. UD's engineering program prepares a real mix of regional engineering candidates that would serve us well, so I reached out to build that relationship with UD. I have a real respect for UD's engineering program.

Q. Thoughts for other alumni who might be considering giving back to UD?

A. There's something very positive in reflecting on the early development stage of our careers, being on campus and talking with folks about professors we shared. Keep your connection to the university, or reestablish your connection as early in your career as you can. Your roots are important. It's never too late to reconnect.

CEE's Cedrick Johnson honored with Presidential Citation

Ten distinguished University of Delaware alumni, including **Cedrick A. Johnson BCE '95**, president, Airport Design Consultants Inc., in Columbia, Maryland, were honored with the Presidential Citation for Outstanding

Achievement on Friday, Oct. 17, as part of Homecoming Weekend.



Johnson, who came to the department as part of the Resources to Insure Successful Engineers (RISE) program, recently established the Raymond Thomas Johnson Scholarship, in memory of his father, to help future engineers.

He credits **Judith Carberry** and **Ardeshir Faghri** for generating his interest in transportation and environmental engineering. "The challenges I faced here prepared me to succeed in the real world," Johnson said. "I will always be thankful to UD for that gift."

CEE alum leads nation's busiest commuter railroad

Patrick A. Nowakowski, BCE '75, has been named president of the Metropolitan Transportation Authority's Long Island Rail Road, the busiest and one of the oldest commuter railroads in the nation.



Nowakowski is a career railroad professional with broad experience in operations, engineering, infrastructure and planning. He also holds a professional engineer license from Pennsylvania. Previously, he was executive director of the Dulles Corridor Metrorail Project, building a 23-mile rail line to connect with the Washington, D.C. Metro system. He also served more than 27 years with the Southeastern Pennsylvania Transportation Authority (SEPTA), including seven years as assistant general manager of operations.

[CLICK HERE TO READ MORE //](#)

Civil and Environmental Engineering Golf Outing brings alumni together

More than 50 CEE alumni—from as far back as the class of '72 and as recent as the class of '13—gathered June 6 at Deerfield Golf and Tennis Club near campus for the annual civil & environmental engineering golf outing during Alumni Weekend. UD Women's Golf Team member, **Andi Slane**, joined the fun during tournament play,

where golfers purchased typical mulligans, and, for the first time this year, also purchased mulligan strings to help their teams move closer to the pin.

[CLICK HERE TO REGISTER FOR THE 2015 GOLF OUTING //](#)



**CIVIL AND ENVIRONMENTAL
ENGINEERING**

**Alumni and Friend
Golf Outing**

Friday, June 5, 2015

9:00 a.m. start

*Held in conjunction
with Alumni Weekend*

Civil & Environmental Engineering
Alumni Weekend Reception and
Alumni Awards Presentation
4:30 – 6:00 p.m.
301 DuPont Hall

For further information, contact
Marikka Beach at 302-831-2442 or
marikka@udel.edu

Dare to be first.
**UNIVERSITY OF
DELAWARE**

Beer and wine tasting offers another opportunity for alumni to stay connected

In 2014 we launched a new and exciting event to celebrate our alumni.



On Nov. 15, eighteen alumni and friends gathered for a beer and wine tasting to mingle with colleagues and stay connected to their alma mater. The beer and wine connoisseurs at State Line Liquors shared their in-depth knowledge with participants, and

everyone enjoyed the selection of craft beers and regional wines. Plus all left with a door prize and memento of the event.

Closing Note of Thanks

Thank you to all of our alumni, friends and supporters for your generous donations and the time you have given to the department. Your support is instrumental in helping our department grow and excel. If you would like to reconnect by participating in the co-op program, supporting the career boot camp, or otherwise engaging with students, please feel free to contact me.

Thank you,
Tripp Shenton, Professor and Chair
shenton@udel.edu

2015 Reunions at UD

VOLUNTEERS ARE NEEDED

If you're interested in volunteering time to help make your reunion celebration extra special, please contact Alex Hoffmaster at arhoff@udel.edu or 302-831-6340.



Welcome UD Alumni, Family & Friends

Save the date
June 5–7, 2015



Alumni & Friends

We wish to thank the many CEE friends and alumni who have made generous contributions over the past year. Your gifts are used for many worthwhile purposes, including support of our research and educational programs.

Please visit www.engr.udel.edu/alumni to learn how you can make a difference. To make your gift today, please contact Barbara Maylath, College of Engineering Director of Development, at 302-831-7273 or by email at bmaylath@udel.edu.

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