




2016 VOL. 15

# CIVIL REMARKS

THE DEPARTMENT *of* CIVIL & ENVIRONMENTAL ENGINEERING

A. JAMES CLARK SCHOOL *of* ENGINEERING

[www.cee.umd.edu](http://www.cee.umd.edu)



## IS PROJECT MANAGEMENT GOING VIRTUAL?

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Project Management

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Going Green

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# CHAIR'S MESSAGE



Charles W. Schwartz

The University of Maryland Department of Civil and Environmental Engineering (CEE) celebrated many great achievements over the past year.

In early 2016, our National Transportation Center (NTC@Maryland) hosted U.S. Department of Transportation Secretary Anthony Foxx for the NTC-led Transportation Innovation and Policy Summit. In front of a packed house at UMD's Stamp Student Union, Secretary Foxx drove home key messages relat-

ing to "Innovating Multimodal Solutions for Reducing Congestion." Throughout the year, NTC@Maryland researchers also joined forces with our Center for Advanced Transportation Technology Laboratory (CATT Lab) to analyze how the Washington Metropolitan Area Transit Authority (WMATA) Metrorail SafeTrack work plan has impacted both public transportation riders and drivers across the region. Their efforts helped area commuters chart alternative routes and earned NTC@Maryland and the CATT Lab both local and national recognition.

Additionally, NTC@Maryland spearheaded efforts to track multimodal travel trends in partnership with researchers from George Mason University, the University of Washington, and the University of Arkansas. Their initiative, backed by funding from the U.S. Department of Transportation Federal Highway Administration, involves tapping into public domain data sources to estimate monthly multimodal rates and frequencies for all metropolitan areas across the United States.

Beyond the scope of transportation, CEE research has benefited local and national regions in countless other ways. Drs. Sandra Knight and Gerry Galloway of our Center for Disaster Resilience mobilized a force of local political leaders and representatives of various federal agencies to address imminent flood risks in the nation's capital. On Sept. 13, 2016, D.C. Congresswoman Eleanor Holmes Norton proudly spoke at a CDR-led briefing on Capitol Hill about the importance of such efforts to educate policymakers on the potential spillover effects of flooding from the Potomac and

Anacostia Rivers, as well as storm water flooding across the city.

On the home front, we have further cause to celebrate. Our American Society of Civil Engineers' chapter hosted a tremendous Suit Up & Be Civil event, which featured keynote speaker Allyn Kilsheimer, leader of the design and construction team responsible for rebuilding the Pentagon in the wake of the Sept. 11, 2001 terrorist attacks. UMD ASCE also earned its second-consecutive first-place finish at the Mid-Atlantic Regional Concrete Canoe Competitions, while demonstrating outside-the-box creativity with this year's "Whiskey River" themed canoe.

Every day, we are proud to see examples of how members of our CEE community work together to better the wider world around us. CEE alumnus Peter Emmons (B.S. '73) echoed this sense of pride during our recent Kirlin Distinguished Lecture as he enthusiastically told students: "Find a world need that fits you and bring value to the world and yourself!"

As civil engineers, we are uniquely positioned to do just that – and our examples touch so many aspects of life both here and abroad. Our Engineers Without Borders students and faculty devote time and energy to supporting a variety of causes in areas such as Sierra Leone, Ethiopia, Ghana, and Peru. Meanwhile, in our own backyard, CEE students and alumni – like Maya Lieber (B.S. '16) – are working to support close-to-home construction projects including the university's A. James Clark Hall, and CEE's own infrastructure laboratory renovation initiative.

It is this dedication to both the field of engineering and the wider world that makes our department unique and ensures our engineers will continue to impact lives for generations to come. I thank you for your continued support and shared enthusiasm for our department, and welcome you to visit as we prepare to break ground on our new laboratory.

Charles W. Schwartz, Ph.D.

Professor and Chair

Department of Civil and Environmental Engineering

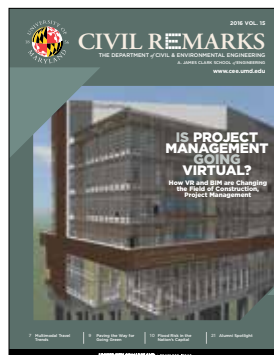
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## 2016 ON THE COVER

*Clark Construction Group provides a walk-through of A. James Clark Hall using virtual reality.*

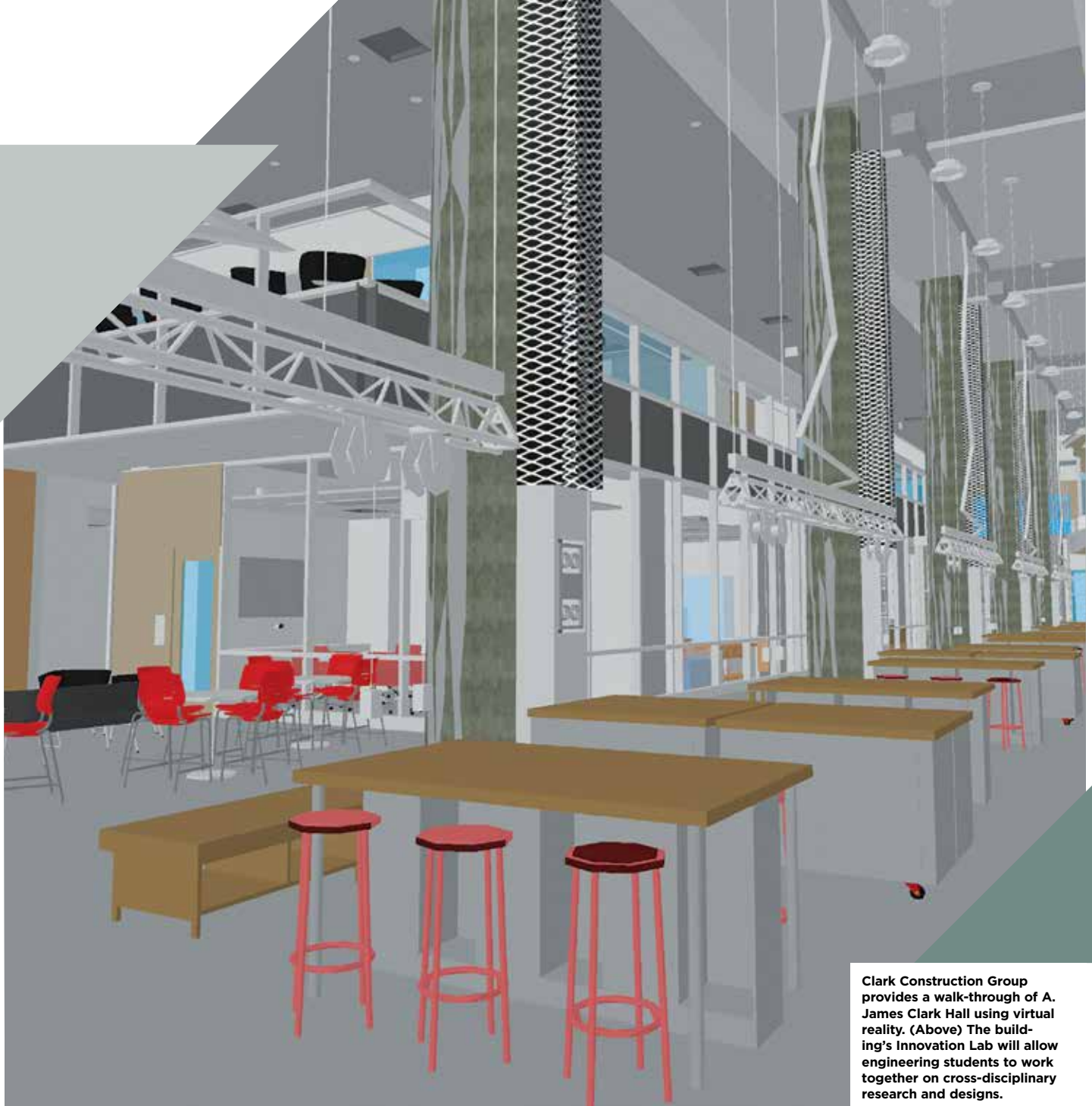
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Clark Construction Group provides a walk-through of A. James Clark Hall using virtual reality. (Above) The building's Innovation Lab will allow engineering students to work together on cross-disciplinary research and designs.

## A New Era for Project Management Is Technology Taking the Field by Storm?



A. James Clark Hall features a second-floor overlook.

On Nov. 21, 2014, the A. James Clark School of Engineering celebrated a milestone: the ceremonial groundbreaking of what now stands as the tallest academic building on the University of Maryland campus, A. James Clark Hall.

In less than two years' time, the UMD community witnessed the transformation of a parking lot into a 184,000-square-foot state-of-the-art facility to foster world-class engineering research and educational

programs. The building itself is a marvel in structural engineering. Behind the scenes, one of construction's "latest and greatest" tools – virtualization – was put to use, making all the difference in the design, construction, and building maintenance planning process.

For many, the words "virtual reality" call to mind video gaming. In truth, "VR" has been used for everything from preparing soldiers for combat with the help of battlefield

*Continued on next page.*

Continued from page 2.

simulations, to allowing NBA basketball players the opportunity to practice free throws from the comfort of their own living room.

And, in the engineering world, virtual reality is changing the way buildings are designed and brought to life.

"Virtual - and augmented - reality applications in construction project management are among the hottest topics being discussed by academic researchers and industry practitioners alike," said Mirosław Skibniewski, Department of Civil and Environmental Engineering (CEE) Professor in Construction Engineering and Management. "The journal *Automation in Construction* reports each year on new technical developments in the field, and annual conferences on this very topic have been held around the world for the last 16 years."

"My job is constantly evolving," added Brian Krause who, as Clark Construction Group's Director for Virtual Design and Construction, works to find new ways to apply cutting-edge technology to improve all aspects of the building process.

"The field is constantly changing and it's getting better and more efficient," he said. "The tools we use are getting better. Computers are getting faster. There are new things like virtual reality and augmented reality and drones and 3D printing and big data... and, it's all changing the way we communicate through every step of the [construction] process."

Under Krause's watch, Clark Construction

used VR to help with the planning and pre-construction process of Maryland's own Clark Hall. Appropriately so, Krause and his team chose to use Oculus Rift for their building walk-throughs. Oculus co-founders Brendan Iribe, Michael Antonov, and the late Andrew Reisse first met as students at the University of Maryland.

"Early on, we used Oculus Rift to walk through the building with some of the University of Maryland staff to help them understand what exactly we were building," Krause said. "More recently, we used it to look at the lab spaces and the vivarium. We've used VR to help inform and drive decisions. There is a lot of information to present, but VR allows us to communicate that information to many different stakeholders in a way everyone can visualize and understand."

Long before Krause donned his first VR headset, however, he encountered a digital tool that's changed the way project managers operate in the construction realm: building information modeling, otherwise known as BIM.

Put simply, BIM is a 3D model-based process that allows architects, engineers, and construction managers to plan, design, construct, and manage buildings and infrastructure. For civil engineers, BIM is a leap of technological advancement from CADD - computer-aided design and drafting - the software that essentially first replaced drawing by hand. Whereas CADD allows engineers to work with objects and dimensions, BIM takes things a step further. Objects are



**Brian Krause speaks to UMD Project Management Symposium attendees about the use of BIM and VR in construction.**

not merely objects; rather, they are interactive elements that respond to a user's design changes and take into account a wealth of building data.

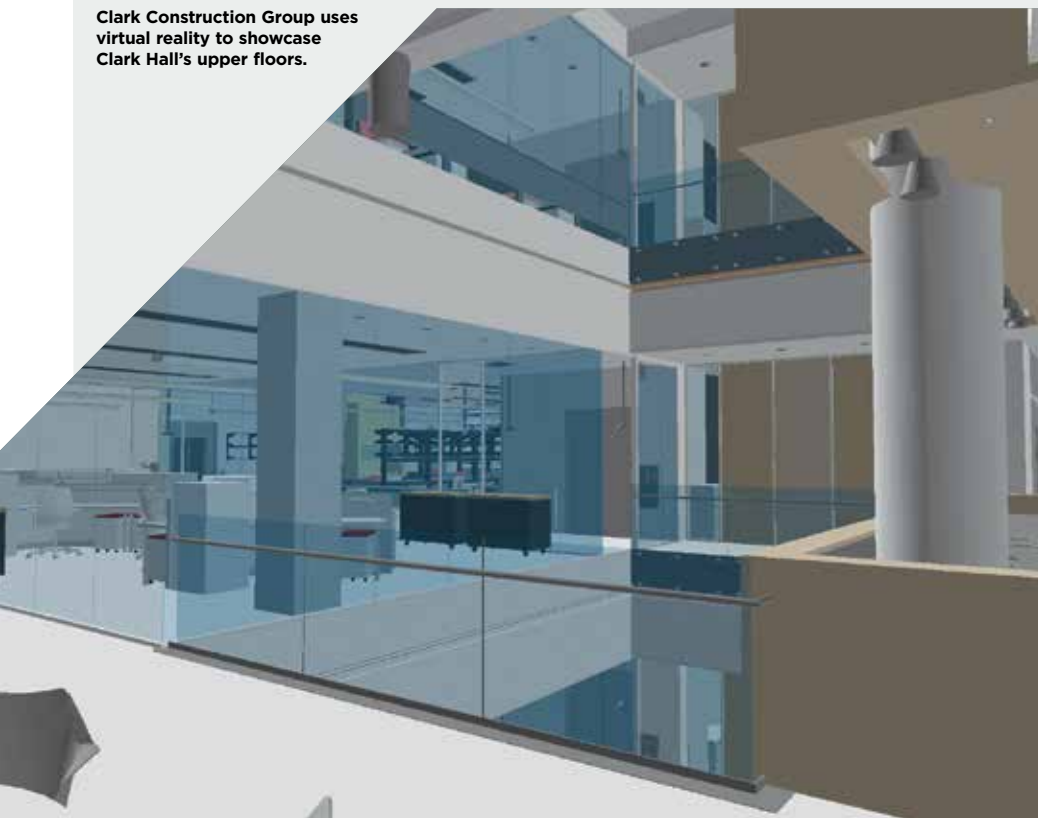
"Building Information Modeling is a rapidly advancing application of technology that not long ago we used to only dream about," said John Cable, Director of the University of Maryland Project Management Center for Excellence. "Today, architects, engineers, construction managers, subcontractors and suppliers have realized that utilizing BIM is the smart way to develop projects. In addition to the visualization capability, we can run many different models that analyze options for the designers and provide data that can lead to the best combination of decisions for the owner."

"If you click on a light fixture in BIM, [the program] might tell you what type of light fixture it is and whether or not that light fixture is conflicting with any duct work," Krause explained. "It's an object that has intelligence built into it. It has quantities associated with it, such as the number of total light fixtures there are in the building. Unlike in CADD, objects in BIM hold - and are influenced by - data."

But while BIM allows designers to see every detail before them - from light fixtures to flooring to countertops - it provides a lot of clarity to the "big picture" planning for buildings, long before the groundbreaking celebration.

"In preconstruction, one of the big things we use BIM for is site utilization planning, which is [the process of] understanding how things are going to happen on the job site," Krause said. "BIM allows us to ask questions such as, 'Where will our cranes be? Where will the site fence be? What will our traffic flow be like?' We use the model to help us visually understand how we're going to set up the site safely for both the workers and non-workers around the site."

**Clark Construction Group uses virtual reality to showcase Clark Hall's upper floors.**



**Recognizing the myriad ways technology is shaping – and reshaping – project management, the University of Maryland Project Management Center for Excellence offers a Master of Engineering in Project Management program designed to assist engineers and technical professionals in the development of their careers. Now in its eleventh year of operation, the Center offers 16 areas of concentration or options in addition to Project Management that cover a broad spectrum of engineering technology that reflects faculty experience and changing needs within the professional engineering community.**

**Additionally, the Center hosts the University of Maryland's annual Project Management Symposium each spring to bring together experts in areas ranging from agile and IT, and risk and big data, to areas that Krause and his colleagues have touched on, such as construction management, BIM, and big data. The Center's fourth annual symposium is set to take place May 4-5, 2017. More information is available online at [www.pmsymposium.umd.edu](http://www.pmsymposium.umd.edu).**

Second in the preconstruction phase is model-based estimating – using the models and extracting quantities from those models to help project managers make informed cost decisions for their estimates.

"Instead of having to look at drawings and count every light fixture, for example, the models now just tell us, 'There are 100 light fixtures,'" Krause explained. "It saves us a lot of time we might otherwise spend counting."

Looking beyond a site's construction, BIM not only enables architects and builders to plan for possible hazards – such as weather or normal wear-and-tear of different fixtures – it also allows facilities management teams to keep one step ahead of the building maintenance process.

"Normally, at the end of the job, an owner might receive operation and maintenance manuals and as-built drawings," Krause said. "Then, he or she would take that and use it to manage the facility moving forward. Instead, now, that data can feed right into a management system and tell an owner, 'This filter needs to be changed every year,' or, 'This valve needs to get serviced every five years' because it's data – it's not information that's buried in a PDF file or a binder that's stowed away somewhere. Once you have that data layer, you can do a lot of stuff with it – you can start visualizing different things with your model. You can say, 'Show me all the valves that need to get serviced in the next six months,' or, 'Show me areas where we've had issues.' Facilities management can use the visual aspects of the model to make informed decisions, and they can tie that in with building sensors or temperature data, or other sources of data. You can say, 'Show me where someone leaves the lights on every night' and you can make energy decisions based on the information BIM provides."

And yet, there's still so much room for

growth, Krause notes.

"We're just at the beginning of this space in the industry, and it all revolves around data," he said. "[Beyond BIM and VR] there is also augmented reality, drones, 3D printing, sensors, and the internet of things (IoT)... there are so many different technologies for

so many different things that can shape the field. Central to all of it is data and how we automate that data and automate some of the analysis, and then feed that into potential robotics as they relate to construction."

## Coming Full Circle: CEE Alumna Gives Back through Work on Clark Hall



Maya Lieber (B.S. '16)

Recent University of Maryland graduates can reminisce about the groundbreaking of A. James Clark Hall. But, alumna Maya Lieber (B.S. '16) has a unique perspective: for the past year, she's worked behind-the-scenes on the construction process. During her senior year, Lieber worked as an intern with Clark Construction, where she helped manage the building's LEED priorities and assisted in updating Clark's digital documentation system with requests for information clarifications.

"I was very fortunate to have the internship as a student," Lieber said. "I was really involved in the engineering community at Maryland, and so it was great to be able to share insights about Clark Hall while I was still a student at the university." Today, Lieber works as an engineer at the Clark Hall site, managing a variety of tasks including specialty items ranging from accessories to signage.

Thus far, one of the most eye-opening experiences for Lieber happened during the building's topping off ceremony in May 2016, during which everyone who aided in the building's construction gathered together. "Clark School Dean Darryll Pines spoke, and he put it all into perspective," Lieber said. "He told us that, while we might have been working on the construction of a building, it's not just a building; it's a place where students and researchers will work together to contribute to saving lives."

Lieber followed a unique path to become the first engineer of her family. In high school, when asked to complete a survey before taking the PSATs, she realized she did not know what to write down as the field of study she hoped to pursue in college.

"My teacher said, 'You like math, circle engineering,' and so I did, having no idea what engineering was," Lieber said. "After that I received a billion emails from different schools about their engineering programs, so I started Googling things like, 'What is engineering?' That's when I learned how engineers could help people in so many different ways... Once I understood that you could apply math to solve real-world problems and contribute to the betterment of society, it really stuck with me."



# Not Your “Average” Engineer:

## Project Management Alumni Pursue Nontraditional Career Paths

University of Maryland project management alumni wear a wide variety of hats – including many of the non-construction variety. While the project management program is housed within the Department of Civil and Environmental Engineering and designed with engineers and architects in mind, 80 percent of UMD project management graduate students hail from technical backgrounds other than civil engineering.

Yet, in cases where graduates go on to assume career roles outside the realm of engineering, there seems to be a common sentiment: the skills one masters through engineering education come in handy when faced with a host of problem-solving challenges.



Claire Kfouri

“For me, it’s the training in engineering; it just makes you methodical,” said Claire Kfouri (Ph.D., projected graduation December ‘16), Program Coordinator for the Middle East Region at the World Bank. “If you’re given a problem, you immediately identify the constraints, the criteria, the budget, the geographic location... You put a plan together – as engineers, we’re almost planners by nature. I find myself to be very methodical and very drawn towards collecting an

evidence base for what it is that I want to do.”

Kfouri, who holds advanced degrees in water resources and environmental engineering from the Massachusetts Institute of Technology and the University of Guelph, is an environmental engineer by training. For nine years, she led the World Bank’s water and sanitation portfolio in Lebanon and, more recently, she branched into water projects in South Asia.

“The foundation for my success and the foundation for my knowl-



Michael O'Connor

edge base has been my engineering background,” added Michael O'Connor (Ph.D. '14), Director of Strategy and Project Management for Medtronic, a medical device company headquartered in Dublin, Ireland, with operational headquarters in Minneapolis, Minn. “I think like an engineer, I write like an engineer – it’s definitely been the key to my success.”

While O'Connor has worked at Medtronic for nearly 14 years, his background stems from a

unique academic career. After first pursuing two years of engineering study, O'Connor earned a business degree while also attending a vocational school that allowed him to acquire hands-on engineering experience. He went on to earn an M.S. in technology management from the University of St. Thomas engineering school and an M.S.

in project management from the University of Wisconsin-Platteville before his then-advisor recommended he pursue a Ph.D. in project management through the University of Maryland.

"One of the reasons I went and earned my doctorate was because I was still curious about engineering," he explained. "Project management might not be as technical as traditional engineering, but when you are faced with problem-solving challenges and analytical processes, having that background is so helpful. And, when you're working with so many people who are engineers by trade, it helps to know how they think."

"For me, what works well is that, because of my engineering background, I'm trained to come up with a solution," Kfouri said. "I focus primarily on how to fix a problem as opposed [to focusing on] why a problem exists in the first place. My friends and colleagues who are economists or social scientists are more into understanding why something is happening – and it's very complementary for us to work together. People like myself are able to address a problem and say, 'We understand the context, so how do we move forward? What are our potential solutions?'"

For both Kfouri and O'Connor, their motivations are personal.

As a child, Kfouri lived in Beirut with her father and mother, who are Lebanese and Canadian, respectively. Given that the Middle East is home to one of the world's most arid climates, the experience opened her eyes to the water crises impacting various regions and communities across the globe.

"Living in Lebanon, I really learned the value of water," she said. "You kind of develop this acute understanding from an early stage: water needs to be managed well. I remember seeing bottles of water lined up on the kitchen sink. We had to ration our water use. And, from traveling to Canada to visit my grandparents and family, I saw that this wasn't the way things were around the world. There were ways that water could be managed better."

The experience led Kfouri to pursue a path in environmental engi-

neering; but, for her Ph.D., she chose instead to focus on how international development projects are managed from a portfolio perspective.

"It's very different managing a project in the developing world than it is in, say, Virginia," she said. "My focus and interests evolved from that and today I am applying those project management skills at the World Bank and in the developing world."

Unlike how Kfouri pursued a pathway to the World Bank, O'Connor first landed a role in the medical device field because of a trip he took to the library nearly 25 years ago.

"When I first finished my undergraduate degree, I went down to the library to do some research on what might be a good industry for me to get a job," he said. "I found that the medical device area was a very hot area and it seemed like it would provide stable job opportunities. More than that, I liked the idea of working in an industry that was helping people day in and day out."

The idea of impacting human health drove O'Connor to look at companies in his area of St. Paul, Minn. From there, fate began to play a role.

O'Connor secured a job with a local company, and his boss at the time had been in a human factors engineering course he took just a few months prior. Fast-forward several years and, a man who once sat next to O'Connor at his first job out of college later became a senior vice president at Medtronic. Since those early days, O'Connor has developed a passion for the industry.

"I remember working with a patient at a [veterans affairs] hospital who had a malignant cancer that affected his esophagus," he said. "He and other patients faced huge challenges in trying to do even the simplest things, like try to swallow water. We inserted this first-of-its-kind, covered, self-expanding esophageal stent and this patient sat straight up and drank a glass of water and said, 'That's the first time I've been able to do that in a long time.' Those kinds of things are just heartwarming – that we can take products and give them to people and make lives better."

### CEE Alum David D. Dee, Jr. Elected as President of ASCE's Environmental Water Resources Institute



David D. Dee, Jr.

CEE alumnus David D. Dee, Jr. (M.Eng. '98) was elected national president of the American Society of Civil Engineers' (ASCE) Environmental Water Resources Institute (EWRI). Prior to his one-year term as president, Dee served as vice president before assuming the role of president-elect in October 2014. Beginning October 2016, he will transition to the role of past president. Formed in 1999, EWRI comprises several ASCE divisions, including the water resources planning and management division, where Dee has been active since 1994.

"EWRI's vision is to advance water resources and environmental solutions to achieve a sustainable future," Dee said. "It's a vision that also fits well with the various types of transportation and infrastructure projects I have designed and managed with my employer, WSP Parsons Brinckerhoff, over the past 26 years."

### Kuo Named WMATA's Chief of Internal Business Operations



John Kuo

CEE alum John Kuo was named chief of Internal Business Operations for the Washington Metropolitan Area Transit Authority (WMATA). As part of his job, Kuo oversees Human Resources, Information Technology, Procurement, and Labor Relations at the transit agency, according to a recent Washington Post article.

Metro General Manager Paul J.

Wiedefeld circulated a memo to staff, in

which he recognized Kuo's achievements, saying: "John's career spans more than three decades in challenging transportation environments managing complex regulatory, administrative, operational, research and regulations development, organizational development, procurement and contracting issues. He also has extensive experience in policy formulation, and fiscal, budget, and personnel management."

# NATIONAL TRANSPORTATION CENTER AT MARYLAND

## LEADS UNPRECEDENTED EFFORT TO TRACK MULTIMODAL TRAVEL TRENDS



(Above) CEE transportation engineering researchers are leading cutting-edge efforts to monitor, track, and predict travel behaviors and trends.

Pictured at right is U.S. Secretary of Transportation Anthony Foxx, shaking hands with University of Maryland President Wallace Loh during NTC@Maryland's Transportation Innovation and Policy Summit (see page 18).

PHOTOS COURTESY OF JOHN T. CONSOLI, UNIVERSITY OF MARYLAND.



Researchers from the University of Maryland's National Transportation Center (NTC@Maryland) are paving the way for a sustainable and timely travel monitoring program that places unprecedented emphasis on multimodal travel trends – such as ride-sharing, bicycling, and pedestrian travel.

Using cutting-edge technology, transportation engineers are able to collect travel behavior data to understand why, how, and when people travel. This data plays a critical role in traffic monitoring, transportation planning, and policy decisions. However, traditional travel behavior surveys are both expensive and are typically conducted once every five to ten years.

To combat these challenges, a research team led by Department of Civil and Environmental Engineering Herbert Rabin Distinguished Professor Lei Zhang, NTC@Maryland Director, is collaborating with George Mason University (GMU), the University of Washington (UW), and the University of Arkansas at Little Rock (UALR) to tap into public domain data sources to estimate monthly multimodal trip rates and frequencies for all metropolitan areas in the U.S. This research is supported by a new grant from the U.S. Department of Transportation Federal Highway Administration, awarded in March 2016 as part of a national competition.

“Today, transportation policies focus heavily on multimodal solutions and data-driven approaches,” Zhang said. “But, there is not yet a system in place through which state and federal agencies can adequately track multimodal passenger travel behavior in a timely and consistent fashion. Fortunately, there is a great deal of driver, public transit, for-hire modes and even non-motorized travel data that exist in the public domain. Our goal, now, is to pinpoint where and how to collect these existing data and develop new data fusion and statistical methods that take advantage of both emerging and traditional information sources. In the end, we want to enable all decision-makers and the general public to track total trips made on all travel modes month by month for every major U.S. metropolitan area. It is an ambitious, yet worthwhile endeavor.”

Such public domain data sources include





PHOTO BY JOHN T. CONSOLI, UNIVERSITY OF MARYLAND.

the Federal Highway Administration's Highway Performance Monitoring System, the Federal Transit Administration's National Transit Database, Federal Aviation Administration's air ticket sales data, American Community Survey, and traditional household travel surveys, and emerging data sources regarding ride hailing services and publicly accessible location records on social media.

"Using methods that can accurately estimate multimodal trips and mode choice trends frequently using public domain data ensures that transportation agencies at federal, state, metropolitan, and local levels can develop strategies to combat traffic congestion and transportation emissions with multimodal strategies and track their performance over time without incurring additional data costs," Zhang said.

The UMD-led research team will develop practice-ready methods for estimating monthly multimodal travel statistics such as number of trips, trip frequency, and mode splits at the metropolitan level. The method will be applied first to the Washington, D.C., Seattle, and New York areas, before it is standardized for applications to other U.S. metropolitan areas.

"With new travel modes such as vehicle sharing, ride hailing, and dynamic ride-sharing entering the market, it is especially important to track these multimodal travel trends and competition between old and new travel modes, for decision-making and for market analysis," Zhang said.



## NTC@Maryland, CATT Lab Share Resources to Help WMATA Commuters

Researchers from the University of Maryland's National Transportation Center (NTC@Maryland) and the Center for Advanced Transportation Technology Laboratory (CATT Lab) are using transportation modeling and simulation technologies to enable commuters to make informed decisions while the Washington Metropolitan Area Transit Authority (WMATA) SafeTrack plan is in effect.

On June 4, 2016, WMATA began implementing a track work plan centered on 15 "Safety Surge" periods and expanded weekday maintenance opportunities, extending into 2017. On an average weekday, more than 712,000 passengers board a Metrorail train, according to 2015 data reported by WMATA.

NTC@Maryland Director Lei Zhang noted that WMATA's SafeTrack plan presents a unique opportunity for transportation engineers. Unlike day-to-day occurrences - such as breakdowns or weather events - SafeTrack's maintenance schedule allows engineers an opportunity to analyze commuter behaviors over a prolonged period of time. Even more, NTC@Maryland researchers are conducting surveys before and after each SafeTrack phase to measure how affected travelers plan to adjust their commutes and how that compares with actual traveler behaviors.

"We've seen a lot of evidence of inertia," Zhang told UMD's *Terp*. "A lot of people don't want to use other modes until it really hurts them."

NTC@Maryland and the CATT Lab's combined efforts were highlighted across many local and national media outlets, including the *Washington Post*, NPR, and *Politico*.

# Pounding the Pavement to Reduce Greenhouse Gas Emissions



As climatologists paint a grim picture of the potential impacts global warming could have across the world, both politicians and scientists face a unique challenge that is far easier to declare than it is to achieve: they must work together – and across national boundaries – to reduce greenhouse gas emissions.

While much of the dialogue surrounding greenhouse gas reduction centers on hybrid and electric vehicles, Department of Civil and Environmental Engineering (CEE)

researchers have teamed up with Chamberlain Contractors, Inc. and Global Resource Recyclers, Inc., to refocus attention not to the vehicles themselves, but to the roads on which they travel.

The construction and maintenance of paved roadways is a carbon-intensive process. Nearly 17 million metric tons of greenhouse gas is emitted from pavement-related activities, making it the second largest construction-related emissions contributor after residential and commercial buildings. In the United States alone, the “pavement network” comprises up to 45 percent of land cover in urban regions, and the majority of this is surfaced with what is known as hot mix asphalt (HMA).

Put simply, there are two types of hard-surfaced pavement: rigid and flexible. A rigid pavement structure is composed of a Portland cement concrete (PCC) surface slab and underlying base and sub-base layers; whereas, a flexible pavement is constructed with a bituminous – or asphalt – bound surface over one or more unbound base courses. As it turns out, HMA is the most common flexible pavement type in the United States, and it consists of a mixture of aggregate and liquid asphalt cement, which are heated and mixed at a temperature of 300 degrees Fahrenheit or higher.

“HMA production emitted 754 million metric tons of greenhouse gases in 2012 alone,” said CEE Associate Professor Qingbin Cui. Cui, CEE Professor and Chair Chuck Schwartz,

and Ph.D. student Xiaoyu Liu published their findings in a recent *International Journal of Pavement Engineering* article, in which they revealed that the number of metric tons of greenhouse gases produced by HMA is expected to rise at an annual rate of 1.7 percent until 2020.

As such, Cui and his team of researchers recognize that growing attention paid to greenhouse gas emissions has heightened interest in the adoption of low-carbon techniques in pavement construction.

One of these techniques is known as foam stabilized base (FSB), which is manufactured from reclaimed asphalt pavement (RAP) and/or recycled concrete to achieve similar performance measurements when compared with HMA. Unlike HMA, FSB requires only a small amount of hot bitumen oil, water, and, occasionally, Portland cement.

To put into perspective what this means, Cui explained that the construction materials selected during pavement designs account for approximately 80 percent of the total emissions from a typical project. Additionally, the pavement design impacts the construction process, the usage of equipment, and the upstream material production.

“For example, FSB eliminates the need to quarry and transport newly mined materials and reduces the asphalt content by 60 percent when compared with hot mix asphalt,” Cui said.

“In today’s society, when we’re having to think smarter and do things more efficiently – and at a lower price-point – incorporating foam asphalt base into the mix design matrix is an important component to both reduce one’s carbon footprint and to lower the cost for construction or reconstruction of a road or parking lot, or whatever the case might be,” said Harold Green, founder and chief executive officer of Chamberlain Contractors, Inc., in Laurel, Md. Green has helped Cui and his team champion an initiative to not only promote the use of FSB in place of HMA, but also shed new light on the potential for carbon trading to help businesses – and the planet.

“We’re working to perfect a methodology that will basically allow us



ALL PHOTOS BY: DAVID CHOY



to document the quantities of FSB that we're applying and then submit that to the Verified Carbon Standard so that we can capture those carbon emission credits and sell those credits online," Green said.

Liu applied her unique expertise to develop the methodology to allow the team to do just that.

"If you're Mr. Smith with ABC company and you have a section of road in Virginia that you're looking to do, and you've submitted the bid or you want to submit a bid using an alternate with FSB, we will help you develop the alternate mix design," Green said. "We will submit all the documentation that's necessary and, if you subsequently get the work, we will actually mobilize a plant to your site where we will make the materials for you. While we provide the engineering support on the front end, we look at the value on the back end to quantify those carbon emission credits, submit them to the Verified Carbon Standard and sell those emission credits here in the states or around the world."

Such an innovative business model requires cutting-edge tools; and, that is where additional CEE researchers step in.

Ph.D. student David Choy has long worked with Cui, Green, and the research team to develop a state-of-the-art mobile app that would allow a contractor or developer to estimate not only the potential reduction of carbon dioxide emissions, but also the likely payback.

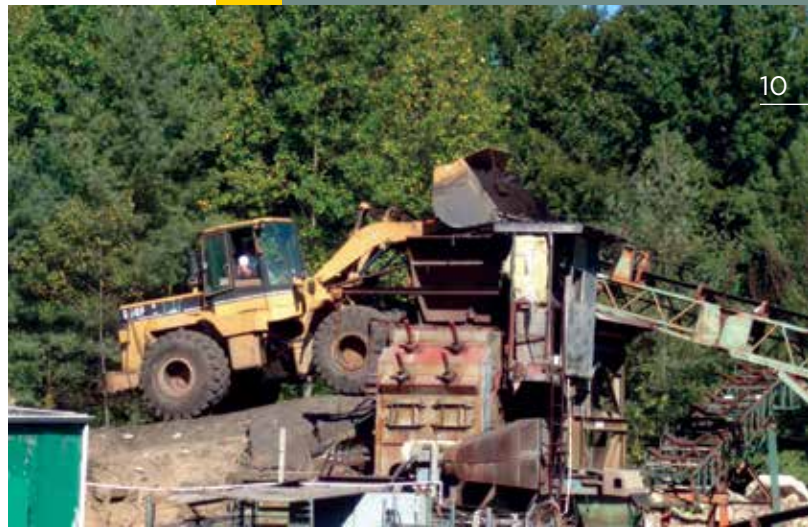
This tool is critical for two reasons. On the smaller scale, it allows developers to see upfront the potential to reduce their carbon footprint before they undertake a project. From the 30,000-foot level, the app helps illustrate that greenhouse gas reduction and cost savings can, in fact, go hand-in-hand.

When putting aside the engineer's hat, this is the key challenge Green and his team members are eager to tackle. After all, FSB has been used for decades in areas such as Asia, Europe, and South America, but it has not yet been widely embraced here in the United States.

"The simple reason is that there is no inertia to change," Green explained. "The senior project engineers who are currently the decision-makers are typically near the end of their careers and they have long dealt with a product and process that has served them well, and that is hot mix asphalt with a granular aggregate base. Even more, someone with the county or state is likely to say that he or she needs to write their own specifications and quality assurance procedures for FSB, even though we already have so many international standards. That can be a laborious process, so it creates a hesitancy to adopt FSB – even when FSB is both better for the environment and cost efficient."

But, change is on the horizon – including right here in Maryland. In fact, the University of Maryland has looked into new ways to use FSB in its goal of becoming carbon neutral.

"This project is just one of the countless examples of ways in which civil engineers – including those here at the university – are working to inspire real change to benefit our planet for generations to come," Schwartz said. "So often, we hear in the news about how the cars we drive and the gasoline we purchase can have an adverse impact on our environment; but, we see now that there are many other areas in which engineers can find solutions – and pavement engineers are working to do just that."



ALL PHOTOS BY: DAVID CHOY





# UMD Center for Disaster Resilience Leads Hill Discussion on D.C. Flood Risk



(Left) Congresswoman Eleanor Holmes Norton (D-DC) discusses flood risk in the national capital region. (Right) Dr. Sandra Knight walks through maps of D.C.-area regions affected by recent flooding.

The University of Maryland Center for Disaster Resilience (CDR) joined forces with D.C. Congresswoman Eleanor Holmes Norton to lead a Capitol Hill discussion on the risks flooding poses to D.C. and national security interests.

The forum featured participants from local and federal agencies and addressed how climate change and urbanization will impact the frequency and severity of flooding in D.C. CDR led the forum on Sept. 13 with support from the University of the District of Columbia, George Mason University, and the D.C. Silver Jackets, an interagency team made up of members from federal, District and regional agencies and academia to identify sustainable solutions to reduce flood risk and assist local communities.

“We entitled this briefing, *Assessing Flood Risks in the District of Columbia and the National Capital Region*, and the reason we did so – and the reason that [the agencies and academe] work as a region – is because water, and floods, don’t recognize boundaries,” Norton said. The Congresswoman discussed a new bill to amend the Coastal Zone Management Act of 1972 to include

the District of Columbia in the definition section of a coastal state, which would make D.C. eligible for federal coastal zone management funding. Norton chose the day of CDR’s flood forum to introduce the bill.

The District of Columbia faces three types of flood risks, CDR Director and Department of Civil and Environmental Engineering (CEE) Senior Research Engineer Sandra Knight explained: riverine – caused by the convergence of the Potomac and Anacostia Rivers – tidal and coastal storm surge, and interior flooding, otherwise known as storm water flooding.

“In the National Capital Region (NCR), we’re a part of the Potomac watershed, and we have a lot of upstream watershed that pours into our neighborhood,” Knight said. “We’re also well connected to the Chesapeake Bay, which becomes a major factor for us when we talk about tidal and coastal flood risk. We face a great deal of risk – we have the D.C. airport, we have Hains Point, where a lot of the National Park Services’ pieces are... flooding is a regional issue that impacts so many of D.C.’s assets, but it’s a federal issue as well.”

In fact, 30 percent of federal lands inside the District of Columbia are subject to flooding, Knight said.

“When we think of floods, we always want to think of human safety first,” she said. “But, we have critical infrastructure, as well – the airport and various transportation networks, and critical government operations. If things get shut down in the District of Columbia and the NCR, things get shut down at the national level, and that presents national security issues. We have residents, we have regional economies, and we have national treasures.”

Along with Norton’s and Knight’s presentations, the flood forum featured a five-member panel discussion, moderated by CEE’s Gerry Galloway, Glenn L. Martin Institute Professor of Engineering. The members were Nick Bonard (National Capital Planning Commission), Amy Guise (U.S. Army Corps of Engineers), Phetmano Phannavong (D.C. Department of Energy and Environment), Rick Scabibit (Federal Emergency Management Agency [FEMA]), and Tanya Spano (Metropolitan Washington Council of Governments).



# Redesigned: Infrastructure Engineering Laboratories Renovation Project Sees New Developments

Less than a year after the launch of its Infrastructure Engineering Laboratories renovation initiative, the Department of Civil and Environmental Engineering unfurled a new, state-of-the-art design for its integral teaching space.

The proposed new layout connects all laboratory spaces along a dramatic glass-walled, curved hallway, grouping together structures, materials, soils, asphalt, and sample preparation areas into “dirty” and “clean” lab areas. The redesigned space will provide all CEE undergraduate students greater access to top-of-the-line equipment, while enabling faculty to leverage innovative laboratory testing techniques to complement classroom lectures. Furthermore, the renovated labs will provide students with increased opportunities for hands-on learning about the behaviors of steel, timber, concrete, asphalt, soil composites, and other materials employed in infrastructure design.

The redesign is the latest phase in the renovation initiative, which kicked off in spring 2015. Through the initiative, the department will redesign both its physical and virtual facilities to provide students greater exposure to modern laboratory- and field-based infra-

structure engineering techniques.

“Civil engineering is both technical and tactile; in order for our students to develop true understanding of the engineering science of structures, soil, and materials, they must benefit from both hands-on and virtual learning experiences,” said Charles W. Schwartz, CEE Professor and Chair. “The new infrastructure engineering laboratories will provide our students with greater access to the very same equipment they will encounter early in their careers. Through this initiative, we will continue to position our graduates as leaders in the engineering of the buildings we inhabit, the roads and bridges on which we drive, the airports via which we travel, and the ports through which our goods are shipped.”

Additionally, students will master Quality Assurance testing techniques for infrastructure construction and learn innovative non-destructive evaluation approaches for monitoring the structural health of bridges, buildings, and other critical infrastructure assets, Schwartz noted.

The renovation initiative marks a new era for the department, which has seen student enrollment double in the past decade.

The redesigned Infrastructure Engineering

Laboratories will become the new home to ENCE300: Fundamentals of Engineering Materials, a required course for all CEE undergraduates, and to ENCE444: Experimental Methods in Geotechnical and Structural Engineering, a required course for all CEE undergraduates in the Infrastructure track. The faculty for these courses – Drs. Ahmet Aydilek, Dimitrios Goulas, Sherif Aggour, Yunfeng Zhang, and Brian Phillips – played a major role in the development of the conceptual design for the renovation and enhancement of the laboratories.

## THANK YOU

CEE would like to thank all who have contributed to the infrastructure engineering laboratories renovation initiative, including:

The Whiting-Turner Contracting Company  
Maryland Asphalt Association  
Scott Greenhaus '82, '86  
Joe Makar '78  
Whitman, Requardt and Associates  
GeoConcepts  
VIKA

To learn more about the initiative or to pledge your support, please visit [www.civil.umd.edu/labrenovations](http://www.civil.umd.edu/labrenovations).

## Maryland Asphalt Association Pledges Support for Lab Initiative

In June 2016, the Maryland Asphalt Association pledged a five-year gift totaling \$50,000 to support the Department of Civil and Environmental Engineering Infrastructure Laboratories Renovation initiative.

“The Maryland Asphalt Association has always strived to advance the education and employment of bright minds in the industry,” said Marshall Klinefelter, Vice President of Technical Services for the association.

The generous gift to advance the lab renovation project builds on the association's longstanding commitment to support University of Maryland students. In 1991, the Maryland Asphalt Association established the Frank P. Scrivener Memorial Scholarship Fund to help junior or senior civil engineering UMD undergraduates pursue their career aspirations. Additionally, the association and its member companies have maintained a track record of hiring UMD engineers.





**EWB leads construction of market pavilion in the Oromiyya region of Ethiopia.**

## Engineers Without Borders Makes Impact in Ghana, Ethiopia

In early 2016, the University of Maryland chapter of Engineers Without Borders (EWB) sent a team of eight to Ghana as part of its partnership with the community of Suma Ahenkro. During the trip, the team assessed Sumaman Senior High School, the community's only secondary school, for a water supply project. EWB members also continued the implementation of a 3 kW solar electricity system that the chapter designed. The project aim is to provide consistent electricity to Sumaman Senior High School, which currently operates on an unreliable power grid that experiences outages averaging six to 10 hours per day.

During the assessment portion of the trip, EWB gathered information for the design of a potential water supply project. Currently, the school sources its water from a community well, owned by the town's water company. Access is prohibitively expensive and the well experiences frequent technical problems, requiring students to travel to a stream two and a half miles away to collect water. While in-country, the assessment team held discussions with past and present school principals, staff, and a local well-driller; sourced materials in Suma Ahenkro, Sampa, and Accra; investigated different site options; and collected and tested water samples from each of the sites. In the spring, EWB progressed through the design phase for the water supply project. Meanwhile, the implementation team installed the next part of the photovoltaic system, consisting of a solar array and battery bank to power two classroom blocks.

Ghana travel team members included Nick Lutschauig (Department of Government and Politics), Christina Krueger (Department of Mechanical Engineering), Nipun Kottage (Biochemistry, Anthropology), Evan Zhang (Department of Electrical and Computer Engineering), and Ryan Duffy (Department of Aerospace Engineering). ECE Director of Technical Operations Bryan Quinn served as faculty mentor, and Padraic Gray of Whitman, Requardt & Associates, LLP served as the team's professional mentor.

EWB also sent a team of seven to the Oromiyya region of Ethiopia,

to implement a market pavilion and drainage path to improve conditions for vendors who travel miles to sell in the Addis Alem market. Vendors have long dealt with disruptive – and even dangerous – weather conditions, as well as animal waste and soil shipped along the same travel route via livestock.

Soon after arriving in Ethiopia, the team met with Dr. Abebe Dinku, professor of civil engineering at Addis Ababa University, and with the Addis Alem mayor and municipality workers. With their support as well as the support of community members, EWB poured a concrete slab, connected wooden pieces for the pavilion, and dug a drainage ditch. Local skilled and unskilled workers served an integral role in the completion of the project, and EWB worked to introduce them to a more efficient and cost-effective pavilion design. The Ethiopia team consisted of project leader Umar Ahmad (Department of Geographical Sciences), Matthew Wormser (CEE), Zachary Spawn (Chemical Engineering), Katherine Woods (Department of Electrical and Computer Engineering), and Madeleine Guy (Department of Geographical Sciences). CEE Associate Professor Peter Chang and Traylor Brothers civil engineer Nicholas Tabor also served on the trip.

Through the spring and summer of 2016, EWB sent additional support to Addis Alem to conduct final implementation for the repurposing of a detention pond near the marketplace. Their aim is to filter dirty rainwater and introduce it into a nearby channel. EWB also worked on a weir design to introduce to the community; the team also provided research on sustainable construction methods for implementation.

EWB would like to thank the Weissberg Foundation and St. Margaret's Episcopal Church in Annapolis, Md. for providing funding support for the Ghana travel team. EWB also thanks Changing Lives Together, Inc. for providing logistical support, and Morningstar Corp. for its donation of two charge controllers. EWB also expresses gratitude to Ethiopia project mentors Nicholas Tabor, Peter Chang, Martin Patt, Ed Miller, Ed Elder, David Lovell, John Sankey, Brian Tetrick, and Abebe Dinku.



## Ruiyang Zhang Applies Ruttan L. Khosa Scholarship to Study Performance of Structures Subjected to Earthquake Loads



Ruiyang Zhang

CEE graduate student Ruiyang Zhang was named a recipient of the Department of Civil and Environmental Engineering Ruttan L. Khosa fellowship. The fellowship, which carries a \$3,000 scholarship, is awarded to CEE students specializing in Structures.

Zhang's interests lie in the structural control technologies and real-time hybrid simulation (RTHS). Through his graduate studies, Zhang has investigated the mitigation of damage under medium- to long-standoff distance blasts on civil infrastructure through base isolation and supplemental passive devices. His findings relating to the benefits of using base isolation for seismic protection were published in the *Journal of Engineering Mechanics*.

"I am extremely honored to be awarded the Ruttan L. Khosa graduate scholarship in Structural Engineering for the 2015-2016 academic year," Zhang said. "I would like to express my appreciation and gratitude to Mr. Khosa for his generous support. This scholarship will help to cover some of the costs for my academic studies, such as conferences where I can gain great experience."

Ruttan L. Khosa established the Ruttan L. Khosa '71 Graduate Endowed Scholarship in Structural Engineering in January 2014 to provide awards for graduate students entering or enrolled in the master of science program in civil and environmental engineering with a focus on structures in the A. James Clark School of Engineering. Khosa is the epitome of the American dream. A native of Kashmir, he left India with \$8 in his pockets. Through his own perseverance and the encouragement and support of his parents, faculty members, especially Professor Conrad Heins, and fellow students, Khosa graduated with a master of science degree in structural engineering in 1971.



Qi Yao



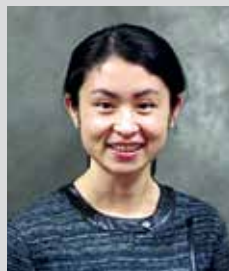
Adrian Romero

### CEE Graduate Students Qi Yao and Adrian Romero Received the American Chemical Society (ACS) AGRO Division 2016 Education Award.

Both Yao and Romero presented their work at the 2016 ACS National Meeting in Philadelphia. Yao was recognized for her work titled, "Assessing the Effectiveness of Vegetative Environmental Buffers in Mitigating Air Pollutant Emissions from Poultry Houses." Romero was recognized for his work, "Improving continuous monitoring of VOC's emissions from alternative fertilizers."

Yao and Romero, both of whom are students in Professor Alba Torrents' research group, were chosen for the award based on a careful ACS review of extended abstracts and letters of nomination. ACS is the world's largest scientific society with more than 158,000 members in all fields of chemistry.

### Lu Liu Invited to IIASA's Young Scientists Summer Program



Lu Liu

CEE Ph.D. student Lu Liu, advised by Assistant Professor Bart Forman, was recently invited to participate in the Young Scientists Summer Program (YSSP) hosted by the International

Institute for Applied Systems Analysis (IIASA) in Vienna, Austria.

IIASA's annual three-month YSSP offers research opportunities to talented young researchers whose interests correspond with IIASA's work on issues of global environmental, economic and social change. At Vienna, Liu worked with experienced IIASA scientists across disciplines, focusing on climate, energy and water interactions and policy implications. Liu said the program provided a unique opportunity for her to strengthen her Ph.D. dissertation and broaden her research interests.

### Daniel Smith Recognized with AWA, Tau Beta Pi, Atkins Minority STEM Scholarships



Daniel Smith

CEE undergraduate Daniel Smith was recognized for his tremendous work in environmental engineering. In June 2016, Smith was named the recipient of the

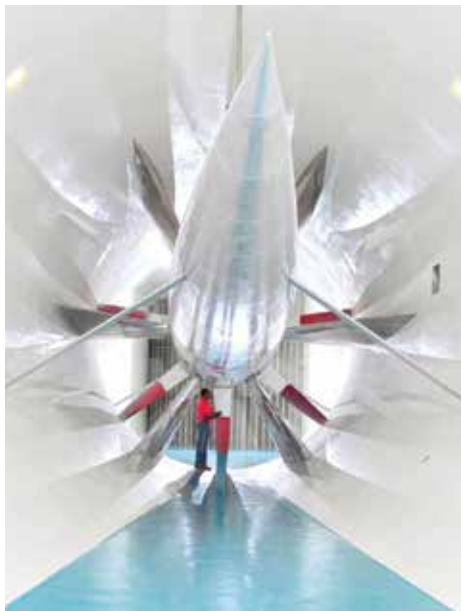
American Water Works Association's SUEZ/Vernon Lucy III Scholarship. This award, established in recognition of Vernon D. Lucy III's involvement in the water industry and his mentorship to young industry professionals, carries a \$5,000 award and travel assistance to the AWWA conference.

Smith's research interests center on applying environmental engineering and soil science principles to research focused on improving water quality and protecting our aquatic ecosystems. Specifically, he is interested in research projects relating to all aspects of ecological engineering, including green infrastructure and low impact design in urban areas, stream/wetland restoration, fate and removal of contaminants from soil, and the role of soil microorganisms in pollutant removal in water/wastewater.

Earlier this year, Smith was recognized with the Tau Beta Pi C. Norman Eckert Undergraduate Scholarship. This opportunity is awarded to A. James Clark School of Engineering students on the basis of merit, service to the university and to the greater community, and need. The scholarship is funded by the C. Norman Eckert Endowment, which was established to honor the late Mr. Eckert, who passed away only months after his graduation from the University of Maryland.

In addition to the C. Norman Eckert Scholarship, Smith was also named a recipient of the Atkins Minority STEM Scholarship. This scholarship is provided to students of African American, Asian, Pacific Island, Native American, Native Alaskan, or Hispanic descent who maintain a minimum 3.0 GPA in pursuit of a B.S. degree in civil or environmental engineering.

## Phillips Applies Cyber-Physical Systems Method to Design Structures to Withstand Wind Hazards



University of Maryland Wind Tunnel

PHOTO BY: ALAN P. SANTOS



Brian Phillips

CEE Assistant Professor Brian Phillips was awarded a three-year, \$520,000 National Science Foundation grant to pioneer a cyber-physical systems (CPS) methodology for the optimal design of structures subjected to wind hazards.

With research support from the University of Florida, Phillips is working to develop a CPS approach that will combine wind tunnel testing with computer-augmented design. The aim is to produce optimal structural designs faster and with greater confidence than purely experimental or purely computational methods.

"Experimental wind tunnel testing provides unparalleled accuracy in the development and evaluation of building and bridge designs under steady wind loads, gusts, and complex wind-structure interaction," Phillips said. "At the same time, computational optimization methods enable the rapid creation and evaluation of competing designs to best meet specified objectives. Advances in the science of CPS can lead to seamless integration of physical wind tunnel testing into computer-driven design and optimization."

The CPS approach can supplement or replace laborious trial-and-error design approaches, which often require extensive iterations and communication burdens between the architects and structural engineers.

"This project will advance the capability to build stronger, lighter, and more resilient structures in the face of wind hazards," Phillips said. "By weighing cost-effectiveness directly in the design approach, selected designs will make more sustainable use of resources and ultimately have a better chance of being constructed."

Phillips and the research team will organize a stakeholder group to ensure that the parameters, constraints, and performance objectives relevant to wind engineering from various academic, industrial, and governmental organizations are considered and appropriately balanced in the approach. Phillips believes this work will advance theory, research, and practice in wind engineering.

## Allison Reilly Joins CEE Faculty



Allison Reilly

The Department of Civil and Environmental Engineering and the A. James Clark School of Engineering welcomed Assistant Professor Allison Reilly ahead of the fall 2016 semester.

Reilly's research focuses on hazard risk assessments, decision-making, and infrastructure system performance and protection. She first became interested in these areas while serving as a risk analyst at the Homeland Security Institute, a federally funded research and develop-

ment center for the U.S. Department of Homeland Security.

Prior to joining the University of Maryland, Reilly worked as a research fellow in the Department of Industrial and Operations Engineering at the University of Michigan, and as a post-doctoral research associate in the Department of Geography and Environmental Engineering at Johns Hopkins University. She completed her Ph.D. in civil engineering and infrastructure systems at Cornell University in Ithaca, N.Y., under the advisement of Dr. Linda Nozick. Reilly also holds an M.S. in civil engineering from Cornell University, and a B.S. in structural engineering from Johns Hopkins University.

## Zhang Named Rabin Distinguished Professor



Lei Zhang

CEE Associate Professor Lei Zhang was appointed the Herbert Rabin Distinguished Professor in the A. James Clark School of Engineering. The four-year appointment recognizes Zhang's sustained and influential scientific and scholarly work in transportation engineering.

"Dr. Zhang has served as a champion for transportation engineering research and education," said CEE Chair Charles Schwartz. "He works

tirelessly to address critical transportation challenges that impact everything from our commutes to work, the shipment of goods, economic development, and national security. His work, along with that from our other Transportation faculty and our Center for Advanced Transportation Technology, have positioned the University of Maryland as a leader in transportation engineering."

Zhang is Director of the National Transportation Center at the University of Maryland, one of only five national centers funded by the U.S. Department of Transportation University Transportation Center program.

## Baecher Receives GEOSNet Distinguished Award for Lifetime Achievement



Gregory Baecher

Professor Gregory Baecher received the 2015 GEOSNet Distinguished Award for lifetime achievement in recognition for substantial contributions to the geotechnical risk and reliability community in research,

education, and leadership.

A specialist in risk management for civil infrastructure – particularly in the water resource and hydropower sectors – Baecher was presented the award during the Fifth International Symposium on Geotechnical Safety and Risk in Rotterdam, Netherlands.

GEOSNet is an international association with a mission to promote, coordinate, and support activities relating to geotechnical safety. The association responds to the need for geotechnical design codes and standards to be harmonized across national boundaries, to rising public expectations for health and environmental safety regulation, and to the increasing complexities of mega-project financial and insurance risk.

## Davis Named Charles A. Irish, Sr. Chair in Civil Engineering



Allen Davis

CEE Professor Allen Davis was named the Charles A. Irish, Sr. Chair in Civil Engineering. Established by the late Willard Hackerman, long-time leader of The Whiting-Turner Contracting

Company, the Charles A. Irish, Sr. professorship pays homage to the 1952 graduate, a longtime supporter of the University of Maryland. Davis' research interests focus on water quality and interfacial environmental chemistry. A 1993 recipient of the National Science Foundation Young Investigator award, and 2010 recipient of the Clark School's Engineering Faculty Outstanding Research award, Davis has worked on various issues related to urban stormwater quality and the concept of Low Impact Development.

## Lovell Promoted to Full Professor

David Lovell, a joint appointee of the Department of Civil and Environmental Engineering (CEE) and the Institute for Systems Research (ISR) was promoted to the rank of full professor by University of Maryland President Wallace Loh on July 1.

Lovell, who joined the University of Maryland in 1997, focuses much of his research interests on transportation engineering, with applications in facility design, operations, and aviation traffic management. He has also conducted research on sensors, vehicle electronics, electrophoretic materials, and probabilistic studies in sports tournaments.

## Global Accreditation Center for Project Management Education Programs Honors John Cable



John Cable

In early 2016, the Global Accreditation Center for Project Management Education Programs (GAC) honored John Cable, Director of the University of Maryland Project Management Center for Excellence, for

his 15 years of service to the GAC Board.

The GAC is the world's leading specialized accrediting body for project management and related degree programs, accrediting programs at institutions of higher education around the world. The GAC Board of Directors organized a dinner to celebrate Cable's 15 years of service to the Board. Upon announcing his retirement from the GAC, effective Dec. 31, 2015, Cable became the last founding member of the Board to step down.

Cable's service traces back to the task team that created the GAC before he assumed the role of vice chair from 2001 – 2006, and chair from 2006 – 2012. Since Cable's appointment as GAC Chair in 2006, the number of accredited project management programs has expanded from fewer than 10 to more than 100 across 16 countries.

"Project management can no longer afford to be the accidental profession that we learn by osmosis," Cable said during the GAC celebration. "Research has shown repeatedly that businesses can't afford the mistakes of the past; they must be able to implement strategy to be successful or they will fail. Project management matters simply because good project managers get things done, and get things done well."



PHOTO COURTESY OF U.S. ARMY CORPS OF ENGINEERS

## Galloway Honored for National Service, Achievement

CEE Research Professor and Glenn L. Martin Institute Professor of Engineering Gerry Galloway was named a 2015 recipient of the U.S. Army Engineer Regiment Gold Order of the de Fleury medal. As the highest honor given by the regiment, the Gold de Fleury medal recognizes individuals who exemplify boldness, courage, and commitment to a strong national defense. Galloway, a retired brigadier general, was one of two individuals presented the medal during the U.S. Army Engineer Regiment's 147th Annual Engineer Castle Ball in Arlington, Va.

"They are accomplished men who gave much to the nation both during and after their military careers, and represent the best of the U.S. Army Corps of Engineers and the Engineer Regiment," said Lt. Gen. Tom Bostick, 53rd Chief of Engineers.

Galloway also received the Renewable Natural Resources Foundation's 2015 Sustained Achievement award and was elected to the National Academy of Construction Engineering last fall.

Later, Galloway also received the *Engineering News Record's* Mid-Atlantic Legacy Award, which is given by editors to individuals who have achieved a lifetime "legacy" of service to the construction and design industry, to their specific profession, and to the communities in which they live. Galloway was honored for his decades-long dedication to water infrastructure, resiliency, and related policies.



# UMD Concrete Canoe Team Celebrates Second Consecutive ASCE Mid-Atlantic Win

CEE's Concrete Canoe team celebrated its second consecutive first-place victory at the American Society of Civil Engineers (ASCE) Mid-Atlantic Regional Competitions.

Hosted April 22-24 at Drexel University in Philadelphia, Pa., the competition showcased the University of Maryland's drive as the team placed first in both the races and the design paper category, and second in the product display category. The win also qualified the University of Maryland for its second consecutive visit to the national Concrete Canoe competition, which took place this year at the University of Texas – Tyler, June 9-11.

Led by project managers Danielle Neumeister and Demetra Tzamaras (B.S. '16), the team based the design of this year's canoe around an outside-the-box theme: a 1920s speakeasy. Dressed in era-appropriate fashion, the members of this year's team introduced spectators to this year's canoe – named "Whiskey River" – with the hope that their performance in the regional competition would reflect the spirit of resilience and liveliness so commonly associated with the Roaring Twenties.

"Each year, I am proud of the [ASCE Maryland] members who are instrumental to our success," Neumeister said. "This is such a large project to complete and it's great to watch students who just stop by [the team] once and then, before you know it, they are with you, covered in dust until late in the night. I am so proud of everyone for their hard work."

The team's steadfast determination to win was made all the more evident by how the members handled a new change to ASCE's Concrete Canoe Rules and Regulations, Tzamaras noted.

"This year, the [new rules] prohibited the use of concrete stain – which is how we have historically created designs on our canoe," she said. "As a result, we had to develop an aesthetics layer purely for visual purposes. There was definitely a lot of trial and error along the way but, in the end, we were very happy with the resulting canoe."



Moving forward, the members of this year's team hope to build on their success at the national competition. Last year marked the first time in 12 years that the University of Maryland team won regionals, and they landed in a respectable 18th place on the national stage. This year, the team proudly improved to 16th at the competition.

"Now that we have achieved the goal of going to Nationals, the next step is to continue to do even better this year than we did last year," Tzamaras said. "We hope to continue to build the legacy of the Concrete Canoe team and continue to strengthen the program."

This year's Concrete Canoe team received corporate support and technical assistance from Structural Group, as well as several other firms that have served as long-time supporters. Additionally, the race team received valuable coaching tips from alumnus Carl Gutschick (B.S. '75), a former world-class competitive paddler.

Adding to her success at Philadelphia, Neumeister teamed up with four other UMD students to establish an American Concrete Institute (ACI) chapter this year and participate in the technical society's new concrete mix design competition.

The team, which consisted of Neumeister, Brandon Quinn, Patrick Katafiasz, Marshall Markham, and Brian Gausman, was tasked with creating several concrete cylinders with a



PHOTOS COURTESY OF UMD CONCRETE CANOE TEAM

goal to design a batch that had a strength as close to 7000 psi as possible. The team placed second, but their batch had the most consistent strength results in the competition.

All five team members received scholarships in addition to funds to help support the Concrete Canoe team's travel to Texas.

## U.S. Secretary of Transportation Anthony Foxx Headlines University of Maryland Transportation Summit

Nearly 200 transportation experts from government, industry, and academe joined forces for the University of Maryland (UMD) National Transportation Center's (NTC@Maryland) Transportation Innovation and Policy Summit, held on April 14 at the university campus in College Park, in support of the theme, "Innovating Multimodal Solutions for Reducing Congestion."

U.S. Secretary of Transportation Anthony Foxx, Maryland Secretary of Transportation Pete Rahn, Maryland State Highway Administrator Gregory Johnson, and FHWA Office of Transportation Management Director Robert Arnold were among the featured keynote speakers. They were joined by NTC@Maryland and peer university transportation center representatives, as well as experts from the UMD Center for Advanced Transportation Technology and National Center for Smart Growth.

"Traffic congestion is an old problem, for which we see promising new solutions based on big data analytics, connected vehicles and automation, sharing economy, and behavior research breakthroughs," said Lei Zhang, Director of NTC@Maryland and CEE Herbert Rabin Distinguished Professor. "The successful development and implementation of many of these innovative congestion mitigation solutions require partnerships among federal, state, local governments, the private sector, and universities. Such partnerships ensure that we are collectively working toward a future that supports economic growth and opportunity equity. It is wonderful that so many decision-makers came together for our summit to discuss these issues and share their perspectives."

"From the advent of aviation to the transcontinental railroad, we've been on a steady march throughout most of our nation's history to create methods and mechanisms by which we can move to places faster," Secretary Foxx said. "That's a huge accomplishment for any civilization. A big part of [improving transportation] is how we integrate those systems. How do we make them like the fingers of a hand



PHOTOS BY: JOHN T. CONSOLI/UNIVERSITY OF MARYLAND



that can create a fist to punch better or higher or more impactful than the individual parts?"

"In order for us to break through and achieve greater results for our overall system, we're going to have to rely on the state and local governments to think in an integrated fashion about their assets," he said, touching on the critical importance of the Department of Transportation's (DOT) Beyond Traffic framework. The document, which maps U.S. DOT's 30-year frame-

work for U.S. transportation, underscores critical decision points driven by data analysis, research, and expert opinions.

"The challenges [we face] are significant. One is, population growth," Foxx said, noting that over the next 30 years, 70 million more people will compete for use of the same space on which U.S. commuters and freight transportation travel today. "We need to understand that the challenges of congestion are going to be worse."

On Feb. 9, 2016, the University of Maryland chapter of the American Society of Civil Engineers (ASCE) hosted its second annual "Suit Up & Be Civil" networking event. This year, ASCE welcomed a capacity crowd and capped off the event with keynote speaker Allyn Kilsheimer, founder of KCE Structural Engineers, PC. Kilsheimer spoke about his experiences leading the Phoenix Project team, the design and construction team responsible for rebuilding the Pentagon in the wake of the terrorist attacks of Sept. 11, 2001.

PHOTO BY ALAN P. SANTOS





## Emmons Presents Kirlin Distinguished Lecture, "The Continuum of Education"

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**CEE alum Peter Emmons (B.S. '73), Founder and CEO of Structural Group, presents 2015 Kirlin Distinguished Lecture.**

CEE welcomed alum Peter Emmons (B.S. '73), Founder and CEO of Structural Group, as the fall 2015 Kirlin Distinguished Series lecturer.

More than 65 students, faculty, alumni, and industry friends gathered to take part in Emmons' presentation, "The Continuum of Education: How Career-Long Learning Can Fill the Gap between College Education and Career Success."

Embracing the ideal that education does not end with a university degree, Emmons' passion for learning has helped him pave the way to build a culture of education at Structural. Since its founding 40 years ago, the company has built and

implemented formal educational programs that have the look and feel of a university curriculum.

"One of the things we realized was that we wanted to bring the university environment to the company," he said. "We created what we call Structural University, which is set up to offer courses. We modeled it after the Arts & Learning Center here at the University of Maryland. You can imagine all the specialty things we do as a company - you can't go out elsewhere and find this training, so we decided to offer it ourselves."

Emmons stated that, since childhood, he has always known that he wanted to one day start a business. Once an aspiring aerospace engineer, Emmons' father served as his mentor for years, encouraging him to instead pursue civil engineering which, at the time, represented a more promising field.

"Find a world need that fits you and bring value to the world and yourself," Emmons advised. "If you connect with something important, it really drives your passion and purpose. Throughout your whole life, you're testing your path."

At just 24 years old - and within a year of graduating from UMD's civil engineering program - Emmons founded Structural Preservation Systems, Inc., now known as Structural Group.

Since then, Emmons has learned through experience the importance of building an environment that supports career-long education.

"If you want to be on a path to your purpose, you have to continue to develop and learn," Emmons said. "The companies that do the best job making their environment conducive to helping others find their purpose and making others happy are the ones that are going to retain employees. We're trying to be there."

Emmons went on to stress the importance of finding a work culture that fits with one's own aspirations in order to achieve happiness in the field.

Structural Group has certainly succeeded in this department. According to Emmons, the company holds a 50 percent retention rate over 20 years, a feat in this day and age.

"I know I've been in companies earlier in my career where the culture didn't feel right to me," Emmons said. "Everybody has a different set of expectations, needs, and desires. Culture is important. Your job is to match up world needs, and your own capabilities and competencies with the right cultural fit. Those are a lot of things, and they create a lot of different pathways and outcomes in terms of your happiness."



### Traffic Safety and Operations Lab Awarded \$1.25 Million by Maryland State Highway Administration

The Traffic Safety and Operations Lab, led by CEE Professor Gang-Len Chang, was recently awarded the Phase-III contract of \$1.25 million by the Maryland State Highway Administration (MSHA) to continue the Applied Technology and Traffic Analysis Program (ATTAP) and technical support to the Office of Traffic and Safety (OOTTS-MSHA).

ATTAP's focus is to develop design guidelines and evaluation procedures for unconventional intersections - an increasingly popular new design strategy to minimize the local arterial bottlenecks.

The focus of Phase-III, effective from Nov. 1, 2015, will be on customizing state-of-the-art control and operational strategies for MSHA to improve traffic safety and mitigate recurrent highway congestion. The core activities of this phase also include conversion of all ATTAP research products into operational tools to facilitate their applications. Additionally, the phase will involve work with OOTS engineers to assist other MSHA offices in determining how to best use the capacity of the state's transportation infrastructure systems.



**Members of the 2016 Department of Civil and Environmental Engineering Capstone class had a surprise visit from A. James Clark School of Engineering Dean Darryll Pines (left) and University of Maryland President Wallace Loh (right).**

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## Project Management Symposium Features Lockheed Martin, NNSA, PMO Strategies Keynotes

The University of Maryland's third annual Project Management Symposium drew a record-breaking crowd May 12-13 as more than 260 project management professionals from the Baltimore-Washington region and areas around the world joined forces to tackle challenges impacting the field at large.

Held by the university's Project Management Center for Excellence in College Park, Md., this year's event featured more than 70 esteemed speakers and keynotes, and covered topics ranging from project management methodology and disaster management to Building Information Modeling (BIM) and agile/IT.

New this year, Aviation Week Network sponsored the Aerospace and Defense Best Practices track in response to high demand for custom-made sessions that could touch on the specific challenges and opportunities project managers face in the aviation realm. Additionally, the Project Management Institute's Government Relations Office in Washington, D.C., sponsored this year's federal programs track and a one-of-a-kind networking reception to wrap Day 1 of the event.

"One of the reasons our symposium is able to cover such a wide range of topics in project management year after year is because so many leading minds in the field come out for this event, willing and eager to share experiences and lessons learned with others in the industry," said John H. Cable, Director of UMD's Project Management Center for Excellence.

To start things off, Bob McGannon of Mindavation discussed the importance of practicing "intelligent disobedience."

"Intelligent disobedience, more often than not, is a means of protecting a business from itself," he said, explaining that, so often, project managers have a vision of what is happening within a given environment that a supervisor or company leader might not see. "The idea of intelligent disobedience is to be able to sift through that, enhance your own personal success in terms of how you can deliver a project, and ultimately, work with the nature of the businesses that employ you and [focus on] the ultimate business outcomes that they're looking for. Finally, if we're doing this successfully as a set of colleagues in project management, [intelligent disobedience] will help this profession as well."

This message of elevating the field by demonstrating through collective success the impact project managers can have rang true throughout the two-day event.



Switching gears, Uma Hiremagalur, Vice President of Programs at the Washington, D.C. chapter of the Project Management Institute (PMI Washington), and Kendall Lott, CEO and President of M Powered Strategies, Inc., spoke about the importance of project management engagement in a different venue: volunteerism. In their session, "It's a Leadership Thing: Promoting PM Leadership through Volunteerism," the two talked about how volunteerism offers project managers an opportunity to be agents of change.

"The value is enormous - from the altruism of helping others, to problem-solving where others couldn't, to helping some desperate need be met," Lott said.

"It's about really giving back how much you can give back and keeping your focus on what you want to get out of being a volunteer," Hiremagalur elaborated. "The work you do can be similar to your daily work, but volunteerism offers a unique opportunity to gain special experience and have fun. Volunteering is the perfect way to get comfortable working with people you don't know to achieve something awesome. Working toward a common goal with others will help you appreciate diversity, develop mutual respect, and gain the cooperation needed to succeed."

And, in volunteering as "doers" and project leaders, project managers help further demonstrate the importance of the field at large, the duo noted.

Building on this concept, Laura Barnard, CEO and Founder of PMO Strategies, offered a riveting presentation on "helping those that



help themselves" and creating effective and sustainable change for organizations.

"I say that if we have a positive impact, if we can show value, we will return the name 'PMO' or whatever you want others to call it to a place with which organizations and people want to operate," she said. "Why do we create PMOs in the first place? To get results, to align with strategy, to maximize business impact... It's about identifying your priorities and, then, managing stakeholders. After that, we must perform relentlessly - it's about getting results. We have to be okay and agile enough to shift when the needs of the organization shift. And then, we must communicate, communicate, communicate - but, with a purpose. Then, and only then, can we transform our own mindset and others'."

The Project Management Center for Excellence proudly thanks this year's symposium sponsor, The Whiting-Turner Contracting Company, for its support. The 2017 University of Maryland Project Management Symposium is slated for May 4-5. Visit <http://pmsymposium.umd.edu/> for more details.

PHOTOS COURTESY OF DAVID CHOY, BROOKS CLARKE, AND HANNAH KU

## ALUMNI SPOTLIGHT

# CEE Alumni Gutschick, Little, and Weber Celebrate Firm's 30th Anniversary



From left to right: Carl Gutschick (B.S. '75), Dave Little (B.S. '76), and Dave Weber (B.S., '77), founders of Gutschick, Little & Weber, P.A. hold a photo from when they first established their firm 30 years ago.

Walking the hallways of Gutschick, Little & Weber, P.A., a few things are made obvious immediately.

First, the sense of Maryland pride is nearly palpable throughout the firm's mid-sized Burtonsville, office. Gutschick, Little & Weber has called the place home since its establishment in 1986 and, as the company grew, space in the multi-story complex became available serendipitously.

Perhaps a more defining characteristic of the office, though, is the fact that co-workers are so much more than co-workers. As retired principal Dave Weber (B.S., '77) walks from desk to desk, waiting for fellow founders Dave Little (B.S. '76) and Carl Gutschick (B.S. '75) to report for the day, he high-fives everyone from project engineers to administrative staff, sharing inside jokes and updates on family, vacations, and sports teams. Everyone is smiling and energetic – at 8:20 in the morning, no less – and hardly anyone settles for a generic greeting of, "Hello. How are you?"

This "family" culture traces back to the firm's origins.

As University of Maryland undergraduates – all within a year of each other – Gutschick, Little, and Weber first met through the civil engineering program. They stayed in touch after graduating but each began working for different engineer-

ing firms before the stars aligned.

In 1981, Gutschick and Weber found themselves seated across from each other in a testing room in Timonium, Md. They were taking the professional engineering licensing exam, and they were both confident they were going to pass.

"We went out to lunch and, on the way back I said, 'So, Carl, you know we're going to pass this exam. We ought to go into business with each other,'" Weber said. "Carl very seriously told me that he had already spoken a bit with his boss about the prospect of coming into partial ownership with the company he worked for, at some time in the future. So, I thought, 'Okay, that really dashes my hopes.'"

Fast-forward four years to a picnic in Clarksville, Md., where, over a few rounds of beers, Little and Weber spoke openly about their dreams of starting a new company.

"We were pretty jazzed about the idea," Weber said.

The conversation took place on a Sunday, and the two agreed to speak to their wives about their ideas, and report back to one another in a week.

Just two nights later, however, Weber received a phone call.

It was Gutschick. He was ready to talk about starting a business together.

"The thoughts were firing on and on,"

Weber noted, adding that he quickly thought through the fact that Little had experience working in Montgomery and Prince George's counties, while Gutschick worked on projects in Howard County.

"So, I told Carl, 'I've already talked with someone, but, I think a three-way partnership could work here,'" Weber said. "I said, 'I'm not going to tell him your name, and I'm not going to tell you his name. But, let me call him and see if he's open.'"

And, as soon as Weber made the call, Little's response was straightforward: "The more the merrier."

Weber arranged for the three to meet at a Barnaby's restaurant in Wheaton, Md. the following Saturday. Without knowing who the other was, Little and Gutschick walked in, one behind the other.

Since that day in August 1985, the three met once a week in Wheaton to talk about what they wanted to put into the company, and what they expected to get out of the company in return.

"That was the only way a partnership could work," Weber said.

To guide them through the process, Little connected the three with a contact at First American, who helped land the trio the loan they needed to get things started the way they envisioned.

Unlike many engineering firms that start with the principals and one or two additional players to cover day-to-day operations, Gutschick, Little, and Weber knew that they wanted a team of about a dozen people right from the get-go.

But, such a plan required more dollars than they had within their means. And, before First American pulled through, ten other banks turned down the trio's loan requests.

"We had to put a little more blood in the plan," Little said, noting that the three signed over their houses as collateral because they



had no other assets. “None of us came from wealth,” he said. “We were just kind of scraping together whatever we could scrape. At the time, it hardly even fazed us. We just knew this was going to be a success.”

“We had a lot of confidence that the company would be successful once it got off the ground,” Gutschick added. “But, [the loan] was not something within our power. We were confident that, once we got the loan, we could handle whatever it was that we needed to do to make the company successful.”

To start, Gutschick, Little, and Weber knew their company would set the bar high on standards of quality engineering and service – and that would enable them to stand apart from their competitors.

“In 1985 and 1986, things were booming,” Weber said. “Companies were hiring people and giving a lot of responsibility to people who didn’t have the experience to handle that responsibility.”

Knowing this, the three pledged to be involved with every project their company took on. And, more than 30 years later, they continue to live by that promise.

“We knew who our competitors were out there and we knew that, if we could provide good quality engineering and great service to our clients, it could be a home run,” Little said. “A lot of principals of companies just aren’t involved on a day-to-day basis with every project. So, we decided from the get-go that would be our philosophy: we were going to stay in tune with every project and provide our clients with principal service... That seemed to us like a winning formula.”

To live up to their reputations, the three have always looked out for capable professionals and support personnel who are not only willing, but enthusiastic about working with others on everything from small projects to large-scale commitments.

“We were constantly looking for people who could jump in immediately and, without a whole lot of supervision, they could do the tasks we were doing, the type of work we do,” Little said.

For a firm that handles everything from single-family subdivisions and apartment complexes, to shopping centers and industrial parks, versatility is key.



**Gutschick, Little & Weber, P.A. proudly displays the company's many local and national awards.**

To achieve their goals, Gutschick, Little & Weber hired University of Maryland co-ops and interns to provide invaluable support to project leaders.

“Having gone through the co-op program myself and having really believed in the program, we wanted to work with the University of Maryland to bring our young engineers through,” Little said. “They became the backbone of our company.”

Through the decades, Gutschick, Little & Weber has hired 25 to 30 University of Maryland co-op students, Weber estimates. Many stayed for a decade or more, and today, more than a third of the firm’s 56 employees are University of Maryland students or alumni.

Beyond hiring Terps, the trio gives back to their alma mater in other ways. Earlier this year, for instance, Gutschick, Little & Weber committed \$25,000 over five years, to support the Department of Civil and Environmental Engineering’s infrastructure laboratory renovation initiative.

And, in the spring of 2016, Gutschick tapped into a unique area of expertise – competitive paddling – to support the Concrete Canoe team. As a former world-class kayaker, Gutschick offered the team pointers on how to gain speed on tight turns, and how to distribute both weight and power more effectively in the canoe.

“The three of us are devoted Terps,” Gutschick said. “When I was young, I not only knew I wanted to be an engineer, I also always knew I was going to be a student at College Park. I never considered another school, I never applied to another school. And, since having gone there, and having hired interns and graduates from the University of Maryland, supporting the renovation initiative

[and the Concrete Canoe team] seemed like natural things to do.”

Today, the three smile as they talk about how far their company has come in 30 years. They continue to enjoy great success, even as Weber embraces life as a young retiree. In 2007, Gutschick, Little & Weber named a new principal, Kevin Foster, to help carry the firm as Weber stepped away from the everyday commitment to work. While it is clear how much Weber loves being in the office with the team, when asked how he defines success, he jokingly answers, “Retiring at age 57.”

After taking a moment to get serious again, he provides a more heartfelt answer.

“Success is enjoying what I did and what I do... being able to rely on incredible partners, seeing people that I personally trained go on to graduate from school, come to work here, learn, get comfortable with clients, pass their licensing exams and gain responsibility,” Weber said.

Gutschick remarked that, for him, success includes gaining the respect of peers, clients, government authorities, as well as the firm’s employees.

“Gutschick, Little & Weber is very proud of providing good, stable jobs, with the benefits our employees deserve,” he said. “With that foundation and hard work, financial success follows.”

“Coming to work every day and seeing the staff and how they have grown and become successful means so much,” Little added. “It’s like walking in to see your other family every morning. That just gives you such a great feeling – the realization that you’ve made something special together through the years. When you get to feel that every day – for pretty much most of your life – that’s pretty rewarding.”



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A man in a dark hoodie is seen from the side, looking at a large screen that displays a map. The screen is the background for the lower half of the page.

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