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THE CHARLES E. VIA, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING
VIRGINIA TECH™

DEPARTMENT HEAD'S MESSAGE



Throughout another unexpected year, I continue to be impressed by the dedication and accomplishments of the Charles E. Via, Jr. Department of Civil and Environmental Engineering faculty, staff, and students. Overcoming challenges is the fundamental core of civil engineering and we have witnessed these groups adapt and emerge with heightened creativity and focus as we enter a new school year.

It has been exhilarating to have the chance to turn to in-person learning for the Fall 2021 semester. The collaboration in person has helped us continue to produce groundbreaking research, recruit and retain the brightest scholars in the country, and create a welcoming home for all Hokies. You can read about these accomplishments throughout this report and take the opportunity to meet our remarkable group of Via Scholars. You can find profiles about each of them on page 18 and will see that the future is bright for our department.

That bright future is a culmination of the great work that has been done in our department and at the university in the past and continues into the present. Until December 2022, the university will be celebrating a Sesquicentennial Celebration.

As one of the first departments on campus, we will be embracing the opportunity to celebrate our department as well to celebrate the past and chart a course toward greater engagement and positive impact. Among these celebrations will be marking the 50th anniversary of the Occoquan Watershed Monitoring Laboratory in Manassas, Virginia.

Join us this year as we commemorate the history of our department and acknowledge the bright future ahead of us. Please visit cee.vt.edu and join us on Facebook and Twitter to follow the latest news and research going on in the department.

With kind regards,

Mark Widdowson
Department Head

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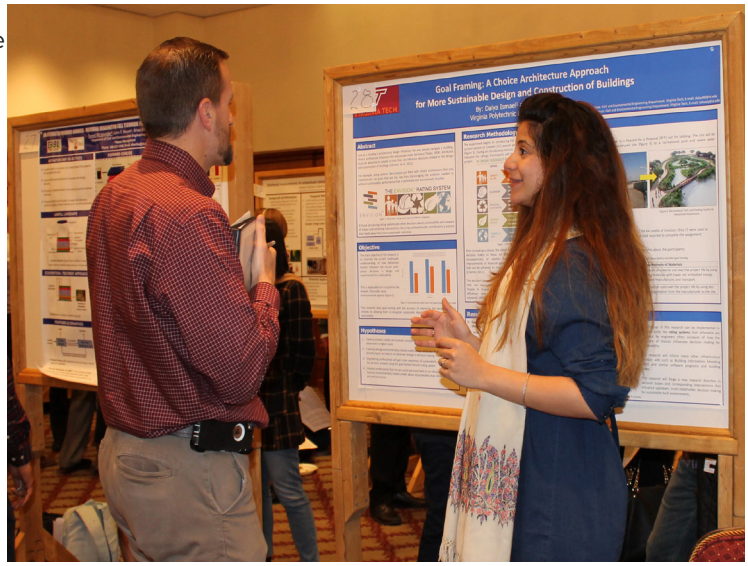
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COVER PHOTO: Sunil Sinha. Photo taken by Peter Means.

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CI SUMMIT

The Vecellio Construction Engineering and Management Program is hosting the 2022 Construction Research Congress (CRC), which is one of the leading international conferences in the area of construction engineering and management. The Congress is held every two years, and it provides VCEMP the opportunity to serve and host colleagues from across the world for the interactive exchange of ideas, knowledge and research findings.



The conference will be held in Arlington, VA on March 9-12, 2022. CRC 2022 will be part of the first-ever joint conference of the Construction Research Congress and the Construction Institute Summit. The theme of the CI & CRC Joint Conference is: "Next Generation Construction." The joint conference's technical program is expected to provide insights on the latest research and industry practices that will lead to next generation techniques, technologies, and strategies to meet the many 21st century challenges in construction and the built environment. This unique setting will allow academic and industry peers from around the world to share insights with one another to promote progress in both research and practice.

Mike Garvin, co-chair of the Steering Committee for the joint conference, noted: "The partnership with ASCE's CI is both novel and exciting. It provides a forum for wide-ranging discussions between leading academic and industry experts about finding real solutions to pressing societal and industry problems. I hope this is just the first of many joint conferences with CI."

Farrokh Jazizadeh and Tripp Shealy, co-chairs of the 2022 CRC Technical Committee, managed over 400 conference technical papers, which will be published by ASCE in conference proceedings. "A wide variety of papers were submitted for the conference, ranging from areas such as infrastructure systems, sustainability and resilience to health, safety and workforce issues," said Jazizadeh. "I am looking forward to the technical sessions and the author presentations. This is a great opportunity for dialogue about completed or on-going research among peers." All submissions went through a two-step review process with a minimum of two external reviewers per paper, by a scientific community of hundreds of international construction experts. "Our technical committee did a tremendous job during the review process over this past summer. Without their efforts, we could not have met ASCE's tight deadline to have the proceedings published by the conference," said Shealy. "We owe a great thanks to all of the reviewers as well."

In addition to the technical presentations, the conference's program will include plenary sessions, networking opportunities, social events and a tour of an active project. The conference venue is located less than five miles from Washington, DC, so participants can also experience the many things it has to offer. "This promises to be a vibrant conference," said Garvin. "This is a great opportunity for VCEMP to showcase the research in our community and to work closely with CI to deliver a high quality program and experience to all who attend."

You can find more information about the summit at https://cisummit-crc.asce.org/.

Written by Michael Garvin

CONSTRUCTION ENGINEERING AND MANAGEMENT



Vecellio Construction Engineering and Management Program graduate students

The Vecellio Construction Engineering and Management Program (VCEMP) had another successful year amidst the COVID pandemic. The program welcomed 21 new graduate students who joined 29 existing students in the program. In addition, VCEMP faculty were actively preparing to co-host the 2022 Construction Research Congress with ASCE's Construction Institute (https://cisummit-crc.asce.org/). Mike Garvin is serving as co-chair of the conference while Farrokh Jazizadeh and Tripp Shealy are serving as co-chairs of the technical committee. The VCEMP faculty team managed the review process for over 400 conference papers, which will be presented at the conference in March 2022. You can read more about the event on page four of this report.

Planning and coordination of the 20th Vecellio Distinguished Lecture also resumed. The lecture will take place in October 2021 where DJ Gribbin will speak about the challenges of infrastructure policy formation. In addition, five undergraduate Vecellio Scholarships and four Vecellio Fellowships were awarded to students who have demonstrated leadership, academic excellence and an interest in pursuing a career in the construction industry. Scholars are Johnathan Arner, Kelly Crocker, Alex Eng, Shadia Jrab and Rosie Lyman while Fellows are Tianzhi He, Paulo Ignacio, Jr., Daniel Keku and Ushma Manandhar.

Faculty from the program remain active in research, teaching, and outreach. Mike Garvin continued to work on enhancements to a Federal Highway Administration (FHWA) decision support tool called Contracting Alternatives Suitability Evaluator (CASE) that helps public agencies evaluate and document the risk and value associated with various alternative project delivery methods (design-build, progressive design-build, construction manager/general contractor, and public-private partnerships) He also conducted several training workshops about CASE for state DOTs. Mike was also elected into the National Academy of Construction, which recognizes national leaders in design and construction. He will be inducted into the Academy in Colorado Springs in October, 2021.

Farrokh Jazizadeh continued his research on two NSF grants that focus on enabling intelligent physical and virtual environments that support human interactions with the built environments for energy efficiency enhancement and learning new skills. He has received funding from the Department of Transportation - Federal Railroad Administration to develop Artificial Intelligence tools for human-in-the-loop and data-driven assessment of infrastructure performance to move towards automation and supporting human operators with improved decision making in day-to-day maintenance activities. His research team has developed multiple algorithmic frameworks to achieve these objectives. This project has moved to the second phase. Through field experimentations and data-driven algorithm development, his team has worked on a Covid-19 related project to enable smart building systems to assess and mitigate viral exposures in indoor environments for safe operations in buildings and improved Indoor Air Quality.

Tripp Shealy was selected by alumni, faculty, and students for the Alumni Teaching Excellence Award for 2021, which recognizes his dedication to teaching and the promotion of the civil engineering profession. Dr. Shealy's teaching is heavily influenced by his research. He completed two sponsored projects exploring how students learn about climate change and students' ability to think in systems. Dr. Shealy's research found that civil engineering students nationally tend to not understand the causes or ways to mitigate the effects of climate change. In another project, Dr. Shealy measured the effect of concept mapping on student cognition by examining the change in brain function using a tool called functional near-infrared spectroscopy. Dr. Shealy's team is also using this tool to measure the effect of indoor environments on human cognition, which could lead to new insights about how to design spaces to promote mental health. Dr. Shealy published seven peer-reviewed journal papers this year and advised two Ph.D. students to their completion.



Sunil Sinha leads team to collect data from water utilities for insights on the health of the nation's pipelines

As part of a five-year project funded by the United States Bureau of Reclamation, a team of researchers has compiled and analyzed data from more than 500 U.S. water utilities and 100 federal facilities to provide a fuller picture of the health of the country's pipeline infrastructure systems.

The image that's surfaced is one of 985,000 miles of transmission and distribution of water pipes in the U.S., and of installed water pipeline infrastructure in need of replacements worth an estimated $3.6 trillion over the next 25 years. These findings are among dozens of key insights distilled into reports on pipeline performance, risk, and economics, designed by the team for more detailed, drill-down reading by the country's water utility managers.

The release of the reports coincides with national policy considerations for how to address aging infrastructure. In early April, the Biden administration released a $2 trillion infrastructure plan that lays out intentions to modernize aging drinking water, wastewater, and stormwater systems and support clean water infrastructure in rural America through $56 billion in grants and loans to states and communities. With the national spotlight on infrastructure, the project's principal investigator, Sunil Sinha, believes the reports will provide timely insights.

Sinha said the reports will also lay the foundation for a longer-term effort to bring the data and its analysis online. The team is building the Pipeline Infrastructure Database, or PIPEiD, to create a secured, standardized, and easily accessible online database that can help water utility managers better monitor pipeline infrastructure systems.

"It is critical for society that we transform our siloed water management and infrastructure systems into smart, connected, sustainable, and resilient systems," said Sinha, who leads the Sustainable Water Infrastructure Management Center. "This transformation will allow us to ameliorate the effects of increasing extreme climate events, ecosystem demands, rapid global urbanization, and infrastructure deterioration from age and neglect."

Just as national health databases allow users to glean information from emerging patterns and trends among large, anonymous swaths of the U.S. population, Sinha hopes PIPEiD can enable water utilities to learn from the local, regional, and national patterns it presents through modeling and visualization, using tools like artificial intelligence and GIS mapping. PIPEiD will allow users to run queries that provide helpful analysis for decision-making.

Collecting data at national scale and tapping into the information age to present it could transform the industry, Sinha believes, enabling water utilities to become more proactive in tracking and acting on pipeline performance.

"Now, I have a national database, so I can easily go in and make a query," Sinha said. "If I have corrosive soil and unlined cast iron pipes, and I can find two, three, four different locations in the U.S. with similar conditions, I can bring in

that data and enhance my confidence. I can say with more confidence how long the pipes will last."

Today's water utilities work much differently, according to Sinha – each operating on its own, without a set of standards to follow for the data the water utility collects or how to format it. The team received data in many different forms from water utilities around the country: as water quality reports and main break orders, and as CAD design files and geospatial databases. The team collected field performance data for potable, raw, and reuse water pipelines made from materials reflecting the wide range of pipes currently in the ground throughout the U.S., including cast and ductile iron, prestressed concrete cement pipe, reinforced concrete, steel, and thermoplastic.

The researchers worked to collect data distributed across different ecological areas, organized based on the climatic conditions of the 500 water utilities' locations, including coastal, arid, arctic, and mountainous regions. The cohorts factored in environmental conditions affecting pipeline, such as soil corrosivity, traffic loading, and frost action.

The team fleshed the data set out further with the help of external sources like the United States Geological Survey and the Soil Survey Geographic Database from the United States Department of Agriculture, as well as additional field data collected by a group of 25 water utilities they selected to fill more gaps.

This push for ample usable data reflects Sinha's broader objective of giving an accurate national picture of water pipeline infrastructure systems. To do so, one of his team's main objectives was to collect data across the entire life cycle of pipelines, from design to development, to construction, to operation and maintenance, to renewal as a way to get ahead of costly failures.

Sinha compares the effect to getting regular checkups to maintain our own health. "If you go to see a doctor, there is protocol," Sinha said. "They take your X-ray or they take your blood sample. In our water industry, especially for these pipes, everyone collects data in a different way. And they don't collect data unless there is a problem, yet they need to predict when the pipe is going to fail. That's not going to happen. You have to make regular visits to the doctor."

As the researchers moved on from data collection to analysis, they worked from 150 pipe performance parameters. Their descriptive analyses covered a wide range of factors affecting pipeline management. Analyses included studying how factors influencing deterioration of pipes – like frost action or soil metallic corrosivity – stack up for different pipe materials; where and how pipes fail over space and time; common failure modes; overall spending on operation and maintenance; and service life estimates for various pipe materials and diameter categories.

The team conducted risk analysis to examine the criticality of water pipelines in different risk scenarios, and produced renewal recommendations for pipes falling in different risk zones.

They also conducted lifecycle economic analysis, which provided cost comparisons for managing different pipeline materials and diameters throughout the entire lifecycle. The intent with the findings detailed in the team's recent reports is to help inform decision-making, as managers try to estimate remaining pipeline useful life, determine how well materials perform in specific environmental conditions, or decide on pipe material to replace based on lifecycle costs.

Figure depicting analysis of correlation between key water pipeline performance influencing factors and pipe deterioration for different pipe materials

The produced analyses including a look at the correlation between key influencing factors for water pipe performance and pipe deterioration for different pipe materials. Photo courtesy of the Sustainable Water Infrastructure Management Center.

The researchers will work next to bring PIPEiD to life, giving managers a platform for interacting with the national data and its in-depth descriptive, performance, and lifecycle economic analyses through modeling and visualization.

For such a platform to work well for users in the future, Sinha and his team laid out recommendations in their reports for changes in practice among water utilities. They suggested measures like upping periodic collection of time-dependent data during pipeline condition assessment and maintenance activities, for more accurate models and a better understanding of performance over 50 and 100-year time scales.

With PIPEiD, Sinha sees potential for information-sharing beneficial to water utilities of all sizes. Small water utilities, for instance, could extract insights from a database that brings in data from larger, bigger-budget utilities with comparable pipeline materials and conditions.

"PIPEiD's artificial intelligence platform for water pipeline management is cloud-based and will give access to decision-making capabilities to even the most resource-limited water providers," Sinha said. "The PIPEiD platform will enable a paradigm shift on how resilience and sustainability can be operationalized in water systems through development of a 'system of systems' approach, and could effectively catalyze a data revolution in the water industry."

Written by Suzanne Irby

ENVIRONMENTAL AND WATER RESOURCES

The Environmental and Water Resources program area had another active year for faculty, staff, and students. Read more about some of the accomplishments below.

Jody Smiley retired in December after more than twenty years as a Senior Analytical Chemist in CEE.

Jennifer Irish was named Virginia Tech's Faculty Athletic's Respresentative. The Virginia Tech team goe first place in the Virginia AWWA Student Water Challenge, which is a design competition focused on using an combination of engineering and science to address a real-world water-related issue.

The pandemic has influenced many faculty research projects. Among them are Landon Marston who is studying the water use by data centers as a result of the spike in use of cloud services during the pandemic.

Linsey Marr also continues to test mask effectiveness for both adults and children and share her knowledge on the spread of airborne particles.

Gabriel Isaacman-VanWertz received a National Science Foundation CAREER Award and Department of Energy grant to measure concentrations of reactive organic gases that account for most of the reactivity of the atmosphere and have the most potential for aerosol formation.



Students conduct a lab in CEE 3304: Fluid Mechanics

Kevin Young was awarded a 2021 Certificate of Teaching Excellence by the College of Engineering. His Measurements course was also featured by Virginia Tech and the Today Show for the success of the lab-based course throughout the pandemic.

Graduate student and Via Scholar Ayella Maile-Moskowitz was named the Graduate Student of the Year, along with Awad Adelhalim, who is also a CEE student focused in Transportation Engineering.

Amy Pruden won several awards this year including the Alumni Award for Excellence in Research from Virginia Tech, 2020 International Environmental Award winner, and Virginia Tech's University Distinguished Professor.

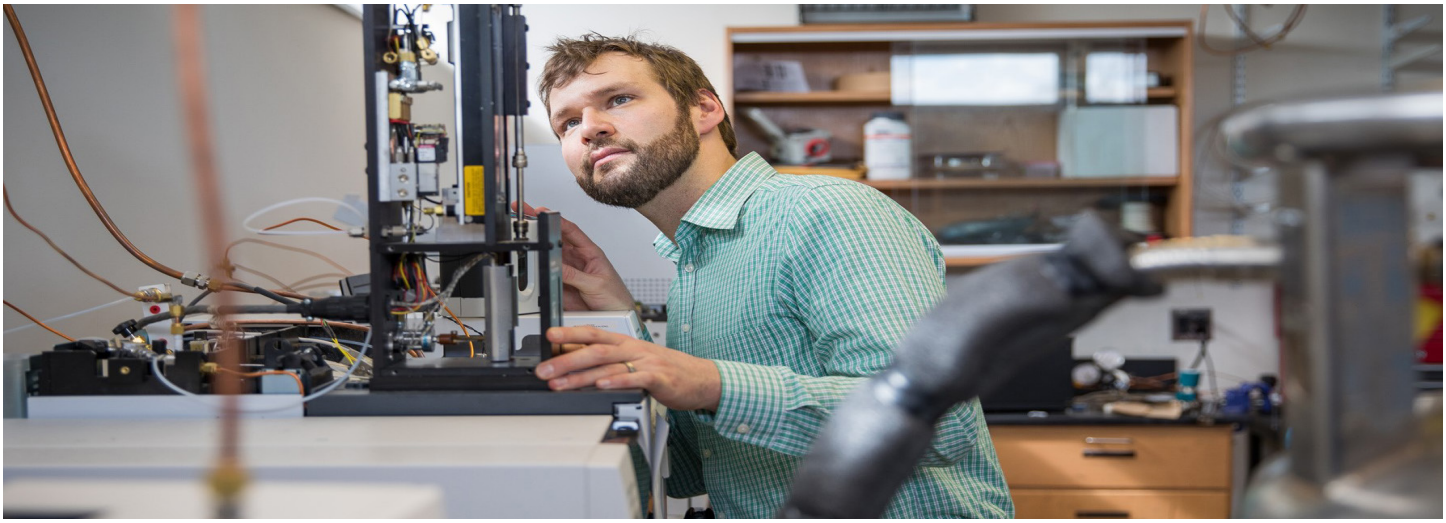
Andrea Dietrich is working on a collaborative project to address "metal mouth," which is a side effect of cancer treatment that causes many things to taste metallic.

Sunil Sinha led a team that officially released the National Water Pipeline Infrastructure database in April. You can read more about this in this on page 7 of this report.

The Occoquan Watershed Monitoring Laboratory continues to do a variety of research projects and is looking forward to celebrating its 50th anniversary in 2022.

Graduate student and Via Scholar Jennie Purchase was named Outstanding Graduate Student for her excellent scholarship, research, and service, and was also selected as a Bouchet Honor Society member.

Gabriel Isaacman-VanWertz receives NSF CAREER Award, Department of Energy grant to study atmospheric gases



"The picture we have in our mind of air pollution is black smoke billowing out of a smokestack or tailpipe," said Gabriel Isaacman-VanWertz, assistant professor of civil and environmental engineering. "But the truth is that it is much more complicated."

The atmosphere behaves like a giant chemical reactor driven by the sun, Isaacman-VanWertz explained, and major air pollutants like ozone and particulate matter are mostly products of this chemistry. Gases emitted from natural sources mix with emissions from human activities and "cook" in the atmosphere. Precipitation has the potential to wash out these gases before the chemistry produces ozone and particulate matter, but the process is not yet well understood, he said.

Isaacman-VanWertz received a National Science Foundation (NSF) CAREER Award and a Department of Energy Early Career Research Program grant to quantify the removal of those gases from the atmosphere, better understand how quickly this process occurs, and estimate its impacts on concentrations of air pollution around the globe. "We hope this will lead to improved models and better predictions of regional air quality," he said. His research may also provide fundamental insights into the impact of different types of emissions on the chemistry of the atmosphere.

Isaacman-VanWertz has been studying the way the atmosphere interacts with organic compounds for several years, however some of his previous projects led him to wonder whether processes that couldn't be easily captured in the lab, like rain-out from precipitation, happened fast enough or often enough to interrupt the sun-driven chemistry and reduce the amount of air pollution formed. He found that there was not much data on it so he envisioned a project to fill that gap by measuring the washing-out of gases in real-world and laboratory-generated rain storms. He also realized there was a network of measurements around the globe supported by the Department of Energy that might be useful to understand the global impacts of rain on pollutants.

Isaacman-VanWertz will measure concentrations of the reactive organic gases at an established forested field site and in Blacksburg that account for most of the reactivity of the atmosphere and have the most potential for aerosol formation. He will also build a chamber to simulate rain events and measure how they wash out gases. "As far as I know, this is something that has never been done before, but I have done modeling and reading to convince myself that it is possible," he said. Using data from the Department of Energy Atmospheric Radiation Measurement network, he will estimate how fast gases get washed out around the globe and model how this process affects the formation of pollution.

He hopes the research will contribute to scientific understanding across a range of disciplines, from ecology to public health to climatology. Furthermore, the goal is to translate the core scientific issues into a variety of materials to engage with the public. The NSF grant will support collaborations with regional partners to bring his science to the public and provide valuable opportunities for outreach and broad engagement.

"A major focus of my lab is to develop new methods and approaches for state-of-the-art instrumentation and lower-cost tools to make atmospheric measurements more available," he said. "I hope this project will help the public develop a new picture of air pollution in their mind closer to reality, of gases and particles cooking together in the atmosphere," Isaacman-VanWertz said.

GEOTECHNICAL ENGINEERING

The Geotechnical Engineering Program had another successful year in its research, teaching, and service missions, despite the continuing challenges from COVID-19. On the research side, faculty activity is illustrated by multiple active grants, with funding from several institutions including the National Science Foundation (NSF), the Department of Defense, the U.S. Army Corps of Engineers, and the United States Geological Survey (USGS), among others. Some examples include:

Sherif Abdelaziz leads a national effort to strengthen earth structures against natural hazards and climate change using eco-friendly biopolymers as part of a project funded by the U.S. Army Corps of Engineers. Recently, he was awarded three grants from three different U.S. Army Corps of Engineers Laboratories: The Geotechnical and Structural Lab (GSL), The Environmental Lab (EL), and the Cold Regions Research and Engineering Lab (CRREL). The GSL grants aim to use biopolymers to improve performance of the national earthen dams and levees including reducing the surface and internal erosions of such critical infrastructure. The EL grant focuses on lab-scale demonstration of using biopolymers for military applications. The CRREL grant aims to develop a framework to detect properties of frozen grounds using remote sensing techniques.

Alba Yerro Colom is working on a project funded by NSF in collaboration with Russell Green and Eileen Martin for the exploration of an interdisciplinary approach to evaluating the liquefaction hazard of challenging soil sites. She is leading the Anura3D MPM Research Community for the development of open-source software for modeling of large deformations and soil-water-structure interaction problems.

Russell Green and Adrian Rodriguez-Marek are working on a USGS-sponsored project to develop a liquefaction triggering evaluation procedure for subduction zone earthquakes, and Russell Green and Jim Mitchell are working on a similar project to develop a liquefaction triggering evaluation procedure for induced seismicity.

Adrian Rodriguez-Marek led a project funded by the Nuclear Regulatory Commission tasked with establishing criteria for the conduct of site response analyses for commercial nuclear power plants in the U.S. Dr. Rodriguez-Marek is also working with Pacific Gas & Electric on a project that uses machine learning to inform predictions of site response to earthquake ground motions.

Tom Brandon along with alumni Dan VandenBerge, Bernardo Castellanos, Rick Valentine, and John Rice are finishing the NAVFAC manual 7.01 (Soil Mechanics). This is the first time that this legacy document has been overhauled in 35 years, and it has been a three-year effort. Work will be starting on the next NAVFAC manual in succession (7.02 - Foundations and Earth Structures) which is also expected to be a multi-year effort.

Nina Stark and Adrian Rodriguez-Marek have been awarded a grant from the Dept. of Defense's Strategic Environmental Research & Development Program to improve portable free fall penetrometer data analysis for unexploded ordinances classification and increase understanding between geotechnical seabed properties and benthic biogenic processes. Nina Stark is also participating with a team of students in the multi-agency, multi-investigator During Nearshore Event Experiment (Dunex).

Joe Dove continued to be heavily involved in undergraduate teaching activities and serves the department as the Director of Curriculum and Assessment. His research over this past year included studies to improve the engineering properties of soils and the future of big data..

Contributions of the Geotechnical Faculty have been acknowledged through awards, various keynote lectures, and invited lectures. Nina Stark presented a TechTalk at the ASCE Convention; and Adrian Rodriguez-Marek gave a keynote lecture at the International Conference on Recent Advances in Geotechnical Earthquake Engineering.

Our graduate students enhanced their professional development by attending the annual ASCE Central Pennsylvania Geotechnical Conference. The Duncan Endowment for Graduate Student Travel provides financial support to help make this possible. More information about the endowment and ways to contribute can be found at cee.vt.edu/duncan-endowment. Please send your email address to Rachel Atwell (raesquivel@vt.edu) if you would like to be added to our alumni listserv to receive invitations to events and for other program information.

VT's Center for Geotechnical Practice and Research (CGPR) continues to have impacts on professional practice and our program.



Liz Smith and Reem Jaber collect geotechnical and geoacoustic seabed data in the York River



Via Scholar Nick Brilli looks to help inform coastal communities on how to respond to hurricanes

Growing up as a resident of New Orleans, Louisiana, graduate student Nick Brilli has always had a love for the coast.

He was nine years old when Hurricane Katrina hit the Gulf Coast and he was forced to evacuate his home. “I’ve experienced firsthand how devastating coastal storms can be and how important it is to develop engineering solutions to protect the people that live in vulnerable coastal areas,” Brilli said.

That vulnerability persists in the current hurricane season. After an active season in 2020, experts predicted another above-normal season in 2021, and coastal towns have braced for its impact. These extreme events threaten coastal areas with erosion and other geologic effects.

Since 2019, Brilli has participated in the U.S. Coastal Research Program’s During Nearshore Event Experience project in Duck, North Carolina, to help develop better methods for characterizing the erodibility of coastal sediments. The project brings coastal researchers from different universities together to collect measurements on the beach and in the nearshore.

Brilli has spent time in Duck doing field work to collect water content and bulk density measurements, as well as obtain estimates of sediment strength with a free-fall penetrometer.

The goal is to identify areas susceptible to erosion and where sediment is likely to deposit. While he was on the North Carolina coast, Brilli surveyed the beach daily, performing topographic surveys to measure bed-level change and water content. This year, he will also begin collecting physical samples from the beach to take to the lab, to determine erosion properties that will give a better idea of the measured geotechnical properties and bed-level change.

Brilli, who received his bachelor’s degree in civil engineering from Virginia Tech, decided to stay for graduate school to continue to work with Anthony and Catherine Moraco Fellow Nina Stark.

“In one sentence, my research is focused on developing better methods for characterizing the erodibility of coastal sediments,” Brilli said. This involves many hours of field work to collect data and survey beaches. While this type of field work can be tedious, and he admits that he frequently needs to vacuum sand out of his carpets after analyzing samples, the data he is collecting as part of the DUNEX project will ultimately guide coastal communities by providing information to guide decisions related to safety and economics and develop strategies for coastal resilience.

“Most of the models and methods we currently have to predict erodibility focus on the interaction between the fluid and individual sediment particle,” Brilli said. “The goal of my work is to better understand how the geotechnical properties of coastal sediments can affect their mobility.”

These sediments change through daily occurrences or through extreme events like hurricanes. Hurricanes can raise water levels and allow tides to operate further onshore, threatening the surrounding coastal communities.

“My hope is that the work we are doing will allow us to provide better information to coastal communities on how the coastline is going to respond to coastal extreme events and processes associated to climate change,” he said. “If we can identify areas of the coast that are more susceptible to erosion during storm events, it will allow coastal managers, engineers, and community leaders to make more informed decisions about how to proceed with coastal protection measures.”

Written by Courtney Sakry

STRUCTURAL ENGINEERING AND MATERIALS

Dr. Carin Roberts-Wollmann continues to conduct research in prestressed concrete bridges and buildings. Her projects include investigations of the behavior of fiber reinforced concrete two-way post-tensioned flat slabs, repair of corrosion damaged prestressed beams, and hooked bar lap splices. Dr. Roberts-Wollmann continues to serve on several code writing committees of the American Concrete Institute, including ACI 318 - Building Code for Structural Concrete, ACI 319 - Precast/Prestressed Concrete Building Code and ACI 320 - Post-Tensioned Concrete Building Code.

Dr. Maryam Shakiba's research group focuses on developing models to predict the degradation of civil infrastructure materials under environmental conditions, and mechanical loading. Her research group is working on multiple projects including; simulations of fiber-reinforced composites to shed light on the delamination and failure in such composites, funded by the Air Force Office of Scientific Research Young Investigator Program (YIP) award; understand and design of ceramic/metal composites for energy dissipation applications, funded by NSF; and modeling the adhesive bond between fiber-reinforced composites and corroded steel to design resilient retrofitting materials and techniques, funded by Virginia DOT.

Dr. Scott Case continues to work with other COE faculty on a $3.8M composites manufacturing education project. The effort combines instruction, project design teams, and industrial courses. He also is working on a wood-based composites center project to develop bench-scaling screening tests to predict structural fire performance in large-scale ASTM E-119 tests. He also is leading an investigation into factors influencing the long-term durability of impact-resistant glazing. During the year, he worked on Phase I SBIR project to investigate testing and modeling of the structural response of composites subjected to extreme temperatures. That project has been selected for a potential Phase II award.

Dr. Eric Jacques received an Office of Naval Research Young Investigator Program (YIP) Award to advance the science of detonation-based combustion of suspended metal particle clouds. He was also a recipient of the 2021 Virginia Tech College of Engineering Certificate of Teaching Excellence. Dr. Jacques and his group and collaborating with other CEE faculty to develop design guidelines for the retrofit of deficient reinforced concrete diaphragms and accelerate precast concrete construction using non-contact hooked bar lap splices.

Matthew Eatherton's research group focuses on developing new structural systems with enhanced performance during extreme natural hazards and improving resilience and sustainability of conventional structural systems. Dr. Eatherton's group is currently working on multiple projects related to the design, retrofit and behavior of diaphragms in buildings subjected to earthquakes. His group is also developing innovative structural fuses, investigating new configurations of steel moment connections, and more.

Dr. Roberto Leon continues his duties as associate head for undergraduate studies and coordinator of the SEM group. Dr. Leon was named as the Secretary of the National Institute of Building Science's Building Seismic Safety Council (NIBS/BSSC). The BSSC develops seismic provisions that are incorporated into ASCE 7 and other building standards. Dr. Leon continues his work on composite structures, looking at steel-concrete interaction in composite beams and joints, and enjoying teaching on forensic engineering and construction materials.

Ioannis Koutromanos has continued working on a research project supported by NIST, aimed to provide an understanding of the performance of old reinforced concrete wall structures against earthquake loading, and develop strengthening techniques for such structures. The specific research involves a synergy of computational simulation and experimental testing at the Thomas M. Murray Structures and Materials Laboratory. He has also been working on describing - through computational simulation - the procedure of chloride ingress and subsequent mechanical deterioration of prestressed bridge girders due to corrosion. To enable the reliable simulation of multiple physical processes which constitute the focus of his research, he has completed the creation of a new finite element simulation code called FE-MultiPhys, which is currently being disseminated to researchers and practicing engineers.



Samuel Sherry load testing a carbon fiber-reinforced polymer bridge repair for the Virginia Department of Transportation



Graduate Student Amin Moghadam seeks holistic designs for instrumented bridges

"For a researcher, the best moments are when a significant success occurs in their studies," said Ph.D. student in civil and environmental engineering, Amin Moghadam. "One of those successes for me was when I finished instrumenting two bridges, the Smart Road bridge and the Varina-Enon bridge, with state-of-the-art sensors and data acquisition systems."

Moghadam, along with Virginia Tech Assistant Professor Rodrigo Sarlo and Mohammad AlHamaydeh, from the American University of Sharjah, is designing an integrated structural health monitoring (SHM) system with an intelligent transportation system, called nothing-on-road (NOR) bridge-weigh-in-motion (BWIM), for both structural integrity and traffic monitoring applications.

"We use the bridge strains under traffic loads to localize and weigh vehicles as they pass," explained Sarlo. "This can lead to cheaper and more practical alternatives to traffic weight stations and on-road weigh-in-motion sensors, which can also be used to monitor bridge structural health."

The overall goal is a more holistic design to instrumented bridges. The NOR-BWIM approach uses the instrumented bridge as a platform to find the velocity, number of axis, axle spacings, axle and gross weights, and the position of the trucks while nothing is installed on the road surface. "This system avoids many issues associated with other traditional systems such as lane closures and traffic disruption," Moghadam said. "In addition, leveraging a single network of sensors for two tasks can significantly reduce overall costs and result in a more holistic design to instrumented bridges.

This study uses the two bridges to find whether NOR-BWIM systems would still work effectively on long-span concrete-box-girder bridges. The team is partnering with faculty in the structural engineering and materials program to apply the traffic information to the estimation of a bridge's effective prestress, which decreases with age and can lead to excessive cracking.

When searching for a career path, Moghadam was drawn to civil engineering because he realized that "civil engineering is not only traditional aspects, but the CEE community is going toward smart cities and smart structures for infrastructure to be managed in a more efficient way," he said. "That makes me even more excited to be working in this field as a researcher."

Written by Courtney Sakry

SUSTAINABLE LAND DEVELOPMENT

The Department debuted a new graduate program in Sustainable Land Development this year. There is no comparable engineering program in the country that uniquely prepares students for careers in land development. This program will help meet the need for more highly skilled land development engineers with broad knowledge in areas of water resources, transportation, urban planning, zoning law, land use, finance, real estate, and construction.

The program allows students to customize their learning experience by taking courses from multiple departments and even from other universities. The flexibility of courses creates a truly one-of-a-kind graduate experience. Our new program builds on the Department's successful undergraduate program in Land Development and our Department's industry supported Land Development Design Initiative (LDDI). Just like students in our undergraduate Land Development program, our graduate student courses heavily involve practitioners as mentors.

Our first endeavor as a new program was collaborating with LDDI to host a graduate seminar series. Each Friday during the Fall semester, our graduate students and our LDDI industry members joined together to learn about broad topics associated with sustainable design and land development. We covered topics like how to measure urban tree canopy, the benefit of conservation easements, and land development challenges for megawatt solar energy farms. Undergraduate students and students from other departments began joining the seminar because of our engaging speakers and topics that spanned complex issues associated with sustainability.

Our graduate students also benefited from a recent partnership between LDDI and the Institute for Sustainable Infrastructure. All of our graduate students were able to become Envision Sustainability Professionals (ENV SPs). The Institute, and an LDDI member, Paul Johnson of Charles P. Johnson & Associates, donated trainings for our students to earn their ENV SP certification.

We look forward to our program in Sustainable Land Development growing. The Department, in collaboration with the Real Estate program, plans to hire an additional faculty member with expertise in both land development and real estate. We are also taking steps to market our program to students from undergraduate engineering programs throughout the state.



Sustainable Land Development graduate students

Increasing the number of graduate students will also help strengthen our undergraduate Land Development program. For example, current graduate students, Morgan and Akul, provide a helping hand to students as graduate teaching assistants. As former undergraduate students in our program, they are familiar with the content and can empathize with where students often struggle throughout the semester. Morgan was attracted to our graduate program because of its interdisciplinary nature and the ability to take courses outside of civil engineering, including options in planning, urban affairs, and policy. Akul was also excited by the graduate program's interdisciplinary format, and wanted to learn and integrate new skills beyond those confined to traditional academic silos.

Morgan's graduate research is exploring housing policies and their role in land development. Akul's research is case based. He is building educational modules to teach students about complex projects that involve adaptive reuse, urban sprawl retrofitting, and brownfield redevelopment. His cases will be integrated into our undergraduate courses.

For employers, the ability for students to spend an extra year to two years studying topics like housing policy and principles for sustainable development means students like Morgan and Akul are ready to create and add new value from day one. They have a deeper set of skills and knowledge that comes with a graduate degree. Morgan and Akul, as well as the other students in our program, practice and refine their ability to communicate both written (in a thesis) and through public speaking (oral defense of their research) during their Master's degree, which will prepare them for working closely with clients and across disciplinary boundaries in their career.

A goal for this upcoming year is to increase the number of fellowships the program is able to provide to exceptional students who are interested in pursuing careers in sustainable land development. This year all of our graduate students were provided an assistantship or fellowship. As the program grows in student enrollment, we want to also grow the number of fellowships to support our outstanding students who will soon influence design and development of our towns and cities throughout their careers.

TRANSPORTATION INFRASTRUCTURE AND SYSTEMS

Monty Abbas received the XCaliber Award for contributions to technology-enriched active learning. He was elected as the Chair of the National Association of Sudanese-American Professors in America. His Ph.D. Student, Awad Abdelhalim, was selected as the graduate student of the year. Abbas currently serves on three Transportation Research Board (TRB) committees at the national level and serves on the University Promotion and Tenure Committee and Faculty Senate.

Alexander Brand and students continued materials-related research, with projects from the Center for Tire Research, the Ford University Research Program, and the National Institute of Standards and Technology. Co-authored with his students Morgan Jenkins and Trevor Painter, Brand received two Best Paper awards at the International Conference on Civil, Structural & Transportation Engineering.

Gerardo Flintsch was appointed as Chair of the World Road Association (PIARC) Technical Committee on Asset Management. Flintsch secured more than three million dollars in research funding, continued to lead the national pooled fund on Pavement Structural Evaluation with Traffic Speed Deflection Devices (TSDDs) and initiated the third phase of the Pavement Surface Properties Consortium - Managing the Pavement Properties for Improved Safety. He also completed two National Cooperative highway research projects to develop guidance to predict and mitigate dynamic hydroplaning on roadways and AASHTO protocols for network-level macrotexture measurement and started a FHWA-funded project to develop crash modification Factors/Function for Friction improvement treatments.

Kathleen Hancock and the team from the Center for Geospatial Information Technology are working with VDOT to improve availability of crash data and information to safety stakeholders in Virginia to reduce fatalities and injuries due to crashes. In addition to on-going work to accurately locate crashes and provide reports and analytics, they are developing on-line tools to provide more timely and customizable information. Hancock became a lifetime member of ASCE and was moderator for the Transportation Research Board Workshop on Innovations in Freight Data.

Kevin Heaslip has continued in his role as a CACI Faculty Fellow and was renewed as Commonwealth Cyber Initiative Fellow. His current research projects are sponsored by the United States Department of Energy and the Commonwealth Cyber Initiative, the Ford Motor Company, and the National Science Foundation. Marcella Kaplan and Ian McManus were instrumental to the awarding of the Institute of Transportation Engineers Southern District Student Leadership Conference to be held in Blacksburg in 2022.

Susan Hotle and Osama Alsalous were recipients of the 2021 Transportation Research Board's Fred Burggraf award. Hotle acquired a grant through the FAA's NEXTOR II center to analyze operational performance research on the U.S. air transportation system. This grant continues her research in flight delay propagation and airport surface performance.

Bryan Katz continues to serve as an Associate Professor of Practice. He also serves as the President of a consulting firm, toXcel, where he brings practical experience into the classroom. In 2021, he was promoted to the rank of Fellow with the Institute of Transportation Engineers (ITE), an organization where he continues to be actively involved. He also received the G.V. Loganathan Faculty Achievement Award.

Hesham Rakha continued their work on various projects funded by the US Department of Energy, the NSF, the Federal Highway Administration, various automotive manufacturers, and Qualcomm. Rakha led a team that received First Place at the IEEE ITSC 2020 UAS4T Competition. In addition, Rakha was awarded the IEEE ITS Outstanding Research Award by the IEEE Intelligent Transportation Systems Society. He serves as an Editor for Sensors (the Intelligent Sensors Section), a Senior Editor for the IEEE Transactions of Intelligent Transportation Systems, an Academic Editor for the Journal of Advanced Transportation, an Associate Editor and the Journal of Intelligent Transportation Systems: Technology, Planning and Operations and the SAE International Journal of Sustainable Transportation, Energy, Environment, & Policy.

Nick Hinze, Afshin Olamai, and Antonio Trani released a new version of the Landing Event Database (version 1.3.5) and the runway exit design model for the FAA (called REDIM 3.09). The FAA uses the landing event database in runway safety studies to reduce in-trail separations between aircraft in the future. The new landing events database includes detailed trajectories of 36 million landings recorded at the top 43 airports in the U.S. in the last six years. Trani provided a virtual seminar on the runway exit model and a landing database to more than 100 FAA and airport designers.

Nick Hinze, Armin Zolfaghari, and Antonio Trani completed a project to improve the airspace separation logic capabilities of the Global Oceanic Model (GO Model). The GO Model is used by FAA to estimate benefits of advanced oceanic airspace procedures. The recent upgrades include programming into the GO Model, the same conflict detection and resolution logic used by Air Traffic Control systems.

Linbing Wang is elected as a Fellow of ASCE. He continues working as a Co-PI on the NSF Harnessing Data Revolution multiple university grant on MemoNet by developing innovative machine-learning approaches for understanding neural nets. As the director of the Center for Smart and Green Civil Systems, Dr. Wang, Dr. Abbas and Dr. Wollmann acquired multiple grants from the Regional UTC covering a wide range of research on materials recycling and integrated sensing for traffic and infrastructure health. Wang taught a new graduate course on material genome based asphalt mix design. He also served on the CoE Research Task Force on behalf of EFO to identify research thrusts; he was appointed as an associate editor of the 'Construction Materials' section of Frontiers in Built Environment IJPRT, and the International Journal of Pavement Research and Technology.



Tripp Shealy and Bryan Katz analyze driver response to dynaimc message sign safety campaign messages

Messages like "May the 4th be with you, text I will not" are increasingly used to catch drivers' attention. The development and use of non-traditional safety messages is distinctly different than messages previously displayed on highway signs. These message attempt to provoke an emotional response and may reference themes like popular culture, sports, or use rhymes to increase their effectiveness. Unfortunately, there is little empirical evidence measuring how effective these messages are at changing driver behavior. The goal of this study was to understand what types of non-traditional safety messages are being displayed across the country, measure their effectiveness, and identify any potential negative impacts of these non-traditional messages on drivers. Non-traditional safety messages were collected from across the country and categorized by their intended behavior, intended emotional response, and message theme (e.g., sports, rhymes, pop-culture). To measure the effectiveness of these non-traditional safety messages, 300 people read 80 messages. Messages were grouped by their behavior, emotion, and theme. Participants were asked about their perception of these messages to change driver behavior, to identify the intent of the message, and to recall messages. Participants' neuro-cognitive response when reading the messages was also observed. A neuroimaging instrument called functional near-infrared spectroscopy was used to quantify the differences in how non-traditional messages elicit cognitive attention among drivers. The results indicate people perceive all types of non-traditional safety messages as effective. Messages about distracted driving and driving without a seat belt, messages meant to provoke a negative emotion, and messages using statistics are perceived to most likely change driver behavior. Gender, age, and driving behavior have a small effect on perception. Femalesare significantly more likely to believe non-traditional safety messages are effective compared to males. Drivers over the age of 65 compared drivers below the age of 65 are significantly more likely to believe non-traditional safety messages are effective. Low-risk and high-risk drivers compared to medium risk drivers are significantly more likely to believe non-traditional safety messages are effective.

Messages about general safe driving and general aggressive driving are significantly misunderstood compared to messages about distracted driving, impaired driving, and wearing a seat belt. Messages about distracted driving and impaired driving are the most recallable. Messages about distracted driving, messages with humor, and messages that use word play and rhyme elicit significantly higher levels of cognitive activation in the brain. An increase in cognitive activation is a proxy for increased attention. The highest level of cognitive activation when reading messages occurred in the region of the brain associated with emotional control and word processing. The younger the driver, the greater the increase in message engagement in this region of the brain.

These results provide evidence that drivers find non-traditional safety messages as effective, and specific messages are more effective than others. Messages about distracted driving, messages that include humor, and messages that use word play and rhymes rank high among multiple measures of effectiveness.

Written by Tripp Shealy

MEET THE VIA SCHOLARS

The Via Scholarships are made possible through the generosity of the late Mrs. Marion Bradley Via of Roanoke, Virginia, and her family. In 1987, Mrs. Via contributed $5 million each to the Departments of Electrical and Computer Engineering and Civil and Environmental Engineering. Virginia Tech's Board of Visitors subsequently named the ECE department in honor of Mrs. Via's deceased father, Harry Lynde Bradley, and the CEE department in honor of her late husband, Charles E. Via, Jr. Mrs. Via died in 1993.

Both departments use a portion of the endowment to award scholarships to qualifying students. These scholarships are among the most competitive in the country. Since the Via endowment was created in 1987, the department has received more than $20 million in support.

We are proud to acknowledge that this is the 34th year of the Via endowment and the Via Report. We want to take this opportunity to recognize the current Via scholars as well as alumni that have come through the program for the last 33 years and continue to fulfill the mission set by the Via family.

UNDERGRADUATE

Valeria Lebron



Hometown: Richmond, Virginia
Career Goals: As a civil engineer pursuing education, I want to actively work to improve the lives of community members and lead them to impact their own communities. My ultimate aspiration is to teach in some capacity - whether it is at the university level or high school level.

Tyler Misencik



Hometown: Woodbridge, Virginia
Career Goals: My career goals are to work as a transportation engineer and improve transportation infrastructure to prioritize the safety and mobility of pedestrians, bicyclists and public transit.

Emily Philpott



Hometown: Yorktown, Virginia
Career Goals: My desire to pursue civil engineering stems from my passion for helping others. While I am still deciding my area of focus as well as opportunities within industry, research, and academia, I plan to further my education, become a licensed PE and apply my knowledge to create sustainable energy solutions for future generations.

MASTERS

Megan Beever



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Stratham, New Hampshire
Location of Undergraduate Studies: Virginia Tech
Career Goals: I hope to explore research opportunities in coastal resilience by working for the federal government or a university. After gaining work experience I plan to pursue a Ph.D. in civil engineering with a coastal engineering focus.

Michael Bell



CONSTRUCTION ENGINEERING AND MANAGEMENT

Hometown: Severn , Maryland
Location of Undergraduate Studies: North Carolina A&T State University
Career Goals: My goal is to use my degree to positively impact the communities I work in by building sustainable infrastructure that helps to improve the quality of life around it.

Jonathan Blalack



STRUCTURAL ENGINEERING AND MATERIALS

Hometown: Charles Town, West Virginia
Location of Undergraduate Studies: West Virginia University Institute of Technology
Career Goals: After completion of my master's degree from Virginia Tech I plan on joining the industry as I work toward earning my PE license. I would eventually like to land in a structural design position focusing on either steel or concrete structures.

Carly Federman



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Bethesda, Maryland
Location of Undergraduate Studies: Virginia Tech
Career Goals: After completing my Master's degree, my goal is to work for a consulting firm in the water resources field. I eventually want ot obtain my PE license.

MASTERS

Lydia Fielding



STRUCTURAL ENGINEERING AND MATERIALS

Hometown: Warrington, Pennsylvania
Location of Undergraduate Studies: Virginia Tech
Career Goals: After earning my Master's degree, I plan to gain experience in the design industry for a few years. My goal is to return to academia to obtain a Ph.D. and work in the engineering education program.

Rachel Finkelstein



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Raleigh, North Carolina
Location of Undergraduate Studies: North Carolina State University
Career Goals: My goal is to work on potable water infrastructure and contamination challenges as they relate to sustainable development around the world.

Jack Glock



GEOTECHNICAL ENGINEERING

Hometown: Fallston, Maryland
Location of Undergraduate Studies: Virginia Tech
Career Goals: After completion of my Master's degree, my goal is to work in the geotechnical industry and obtain my P.E. license.

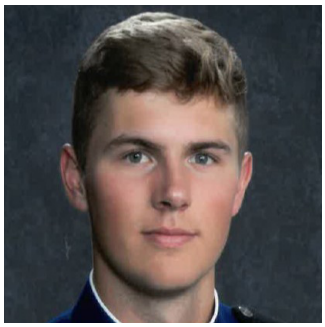
Hunter Hutton



STRUCTURAL ENGINEERING AND MATERIALS

Hometown: Marianna, Florida
Location of Undergraduate Studies: The Citadel, The Military College of South Carolina
Career Goals: After earning my Master's Degree my goal is to work for a Structural Engineering firm that specializes in complex bridge or building design while also pursuing my Professional Engineering License. I also hope to become an adjunct professor later in life.

Colin Jonasen



GEOTECHNICAL ENGINEERING

Hometown: California, Maryland
Location of Undergraduate Studies: United States Air Force Academy
Career Goals: I am in the Air Force and hope to use my civil engineering education as a pilot to bridge the gap between engineers and pilots concerning airfield operations.

Tanner Keen



CONSTRUCTION ENGINEERING AND MANAGEMENT

Hometown: Riner, Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: I hope to earn my PE license and oversee construction of large highway and bridge projects.

Frank Mazzola



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Sterling, Virginia and Aiken, South Carolina
Location of Undergraduate Studies: Virginia Tech
Career Goals: To work in the drinking water industry and help provide clean drinking water to communities in a safe and equitable manner.

Laurie Metzler



STRUCTURAL ENGINEERING AND MECHANICS

Hometown: Horsham, Pennsylvania
Location of Undergraduate Studies: University of Delaware
Career Goals: I hope to work at a structural design firm in the Philadelphia area.

MASTERS

Alexandra Miller



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Smithsburg, Maryland
Location of Undergraduate Studies: University of Maryland, College Park
Career Goals: After getting my master's degree I hope to work for a company as a water resources engineer, focusing on pollutant remediation in our waterways as well as watershed and stream restoration while working towards obtaining my P.E. licenses.

Benjamin Roston



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Newport News, Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: I hope to explore opportunities in flood hazard management to improve the safety, welfare, and wellbeing of communities impacted by hazardous floodplains and coastal zones. I look forward to exploring new perspectives on the relationships between water and society throughout the M.S. program and my future career.

Katherine Scott



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Wall, New Jersey
Location of Undergraduate Studies: Rutgers University
Career Goals: I hope to find a career applying research in water reuse to solve large-scale problems such as groundwater depletion.

Elizabeth Smith



GEOTECHNICAL ENGINEERING

Hometown: Auburn, Alabama
Location of Undergraduate Studies: Virginia Tech
Career Goals: I plan on finishing my master's degree and working in the geotechnical field to obtain my PE license and apply my knowledge to sustainability and resiliency issues in the geotechnical field both in the United States and abroad.

MASTERS

Natasha Vipond



STRUCTURAL ENGINEERING AND MATERIALS

Hometown: Ankeny, Iowa
Location of Undergraduate Studies: Lafayette College
Career Goals: After earning my master's degree, I hope to work at a firm specializing in structural design. My goal is to become a licensed professional engineer and to lead challenging and innovative projects.

Benajmin Winter



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Chesapeake, Virginia
Location of Undergraduate Studies: Virginia Military Institute
Career Goals: I hope to eventually obtain my P.E. licensure and work for a public entity where I can help develop sustainable water infrastructure for our communities and environment.

DOCTORAL

Maria Amaya



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Columbus, Ohio
Location of Undergraduate Studies: The Ohio State University
Career Goals: Become a PE and apply my knowledge in an international setting as part of my professional practice in water resources and environmental engineering.

Brooke Baugher



CONSTRUCTION ENGINEERING AND MANAGEMENT

Hometown: Charlottesville, Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: Once I finish my Ph.D., I want to work on international development projects and teach engineering students about international engineering practices. My goal is to help create a more effective system within engineering which benefits student learning and impacts communities around the world.

DOCTORAL

Matthew Blair



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Clear Spring, Maryland
Location of Undergraduate Studies: Mississippi State University
Career Goals: After graduation, I would like to continue my work with water reuse systems and ultimately work in both industry and academic settings.

Nick Brilli



GEOTECHNICAL ENGINEERING

Hometown: New Orleans, Louisiana
Location of Undergraduate Studies: Virginia Tech
Career Goals: Obtain an M.S. and Ph.D. in civil engineering and eventually make a career doing research in coastal engineering.

Abraham Cullom



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Leawood, Kansas
Location of Undergraduate Studies: University of Pittsburgh
Career Goals: I want to pursue an academic career through teaching and researching environmental microbiology.

Amanda Darling



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Aurora, Illinois
Location of Undergraduate Studies: University of Illinois at Urbana-Champaign
Career Goals: After earning my degree, I hope to pursue research opportunities applying technologies for sustainable development of water infrastructure, including systems for wastewater treatment and water supply.

DOCTORAL

Megan Harris



ENVIRONMENTAL AND WATER RESOURCES

Hometown: San Antonio, Texas
Location of Undergraduate Studies: The University of Texas at Austin
Career Goals: I want to work internationally and locally for city governments on water resources models and eventually return to academia.

Steven Hoagland



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Lexington, Kentucky
Location of Undergraduate Studies: University of Kentucky
Career Goals: I would like to perform research and help educate young engineers as a university faculty member.

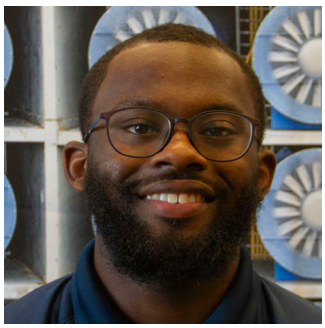
James Hurley



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Durango, Colorado
Location of Undergraduate Studies: University of Colorado at Boulder
Career Goals: Research scientist or engineer focusing on air pollution and air quality

Joseph James



CONSTRUCTION ENGINEERING AND MANAGEMENT

Hometown: Columbia, South Carolina
Location of Undergraduate Studies: Clemson University
Career Goals: After graduate school, I would like to stay in academia, become a professor, continue researching my field of interest, or travel the world to help people visualize their data.

DOCTORAL

Rebecca Kriss



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Landenburg, Pennsylvania
Location of Undergraduate Studies: Johns Hopkins University
Career Goals: After earning my doctorate degree, I would like to pursue a career in research, potentially in academia or the public sector.

Krista Liguori



ENVIRONMENTAL AND WATER RESOURCES

Hometown: King of Prussia, Pennsylvania
Location of Undergraduate Studies: Penn State University
Career Goals: I hope to become a professor to continue working with motivated students and formulating original research with global impact.

Alexandra Longest



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Oakland, Maryland
Location of Undergraduate Studies: Bucknell University
Career Goals: After earning my doctorate, I would like to work at a national laboratory to continue to pursue research into issues concerning public health and the air.

Kathryn Lopez



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Miami, Florida
Location of Undergraduate Studies: Florida State University
Career Goals: I plan to become a professor to continue conducting research on aquatic contaminants and shape the learning experiences of young engineers. I also aim to become involved in environmental policy.

DOCTORAL

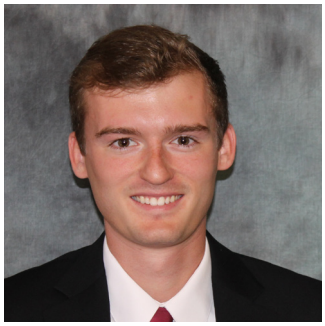
W. Seth Lotts



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Richmond, Virginia
Location of Undergraduate Studies: US Military Academy at West Point
Career Goals: My goal is to be a university professor and make a significant contribution in the field of environmental engineering.

Christian Lytle



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Liberty Township, Ohio
Location of Undergraduate Studies: Case Western Reserve University
Career Goals: I plan on conducting research in academia or the private sector after completing my doctorate degree. My end goal is to teach and mentor the next generation of environmental engineers.

Ayella Maile-Moskowitz



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Mount Rainier, Maryland
Location of Undergraduate Studies: University of Maryland, College Park
Career Goals: I plan on continuing my research in academia or in a national laboratory.

Meredith Martinez



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Garner, North Carolina
Location of Undergraduate Studies: North Carolina State University
Career Goals: I want to be a consulting engineer and return to teach at a university. My ultimate goal is to teach, mentor, and inspire young engineers.

DOCTORAL

Erin Milligan



ENVIRONMENTAL AND WATER RESOURCES

Hometown: North Canton, Ohio
Location of Undergraduate Studies: Ohio University
Career Goals: A career in research studying the environmental microbiome and contaminant transport, esepcially in rural communities.

Tolulope Odimayomi



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Westfield, Indiana
Location of Undergraduate Studies: Purdue University
Career Goals: My interest in researching water quality improvement and sustainability in the built environment is geared towards fostering safe and informed communities, both domestically and globally. As a professor, I hope to address modern environmental concerns and equip rising engineering professionals to do the same.

Julie Paprocki



GEOTECHNICAL ENGINEERING

Hometown: Mingo Junction, Ohio
Location of Undergraduate Studies: University of Cinncinati
Career Goals: Work for a geotechnical design company working on large-scale projects and obtain my professional engineering license. Outside of work, volunteer with Engineers Without Borders and serve on international projects.

Kase Poling



CONSTRUCTION ENGINEERING AND MATERIALS

Hometown: Beckley, West Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: I hope to work as a professor, legislator, and Christian apologist.

DOCTORAL

Jeannie Purchase



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Ellenwood, Georgia
Location of Undergraduate Studies: Clemson University
Career Goals: My goal is to continue in the field of academia as a professor of civil engineering with an emphasis of water remediation strategies, citizen science, and communicating science. I hope to inspire the next generation of engineers through teaching, mentorship, and outreach.

Alan Smith



STRUCTURAL ENGINEERING AND MATERIALS

Hometown: Buena Vista, Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: I would like to work in either a research setting or structural forensic analysis.

Emma Todoroff



CONSTRUCTION ENGINEERING AND MANAGEMENT

Hometown: Columbia, South Carolina
Location of Undergraduate Studies: Clemson University
Career Goals: I study the impact of transportation mode on chronic disease. I would like to work for a government or consulting organization that prioritizes public health through the construction of sustainable cities and analysis of public data. For my dissertation, I am researching U.S. cities' transportation network effects on bicycle commuting and connections to cardiovascular disease outcomes.

Joshua Trump



CONSTRUCTION ENGINEERING AND MANAGEMENT

Hometown: Manassas, Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: My interests are split. I'm very interested in continuing research but I'm also considering my future in industry. I'm excited to see where this year takes me as I explore more of my research and experience academia.

DOCTORAL

Kory Wait



ENVIRONMENTAL AND WATER RESOURCES

Hometown: Seymour, Indiana
Location of Undergraduate Studies: Purdue University
Career Goals: Continue my Ph.D. research investigating potential sources of groundwater contamination and specifically focusing on the effects of contamination on drinking water supplies from private wells.

Lucas Walshire



GEOTECHNICAL ENGINEERING

Hometown: Kalona, Iowa
Location of Undergraduate Studies: University of Iowa
Career Goals: Contribute to the US Army Corps of Engineers mission by providing technical support through practical and cost effective means.

Kaleigh Yost



GEOTECHNICAL ENGINEERING

Hometown: Princeton, New Jersey
Location of Undergraduate Studies: University of Notre Dame
Career Goals: I plan on dedicating my career to furthering the understanding of earthquakes and reducing earthquake risk worldwide. I aspire to become a leader in the field of geotechnical earthquake engineering and plan to pursue a career in academia.

Abril Yu-Shan Chevez



STRUCTURAL ENGINEERING AND MATERIALS

Hometown: Lexington, Virginia
Location of Undergraduate Studies: Virginia Tech
Career Goals: I plan on continuing in academia as a professor so I can perform research as well as teach and mentor future engineers.

NOT PICTURED: ZACHARY COLEMAN

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