

# 2020 VIA REPORT

NUMBER 34



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



# DEPARTMENT HEAD'S MESSAGE

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My first few months as the Charles E. Via, Jr. Department of Civil and Environmental Engineering Department Head involved challenges and activities that often defied the imagination. We spent the summer months planning and preparing for a fall semester where uncertainty was ever present and our usual focus was repositioned on safety and evolving instructional needs. Our faculty and staff rose to the challenge and exhibited leadership in the reopening of our research labs, buildings, and classrooms. Although the usual rhythms and sights of campus life were different from the usual, I was lifted by the return of our students to Blacksburg wearing face coverings and exhibiting an exceptional commitment to public safety. It was great to feel the energy, excitement, and eagerness of our students to further their education at one of the top departments in the country. I am proud of the accomplishments of our students and faculty during the pandemic and I am excited about our future successes.

In response to the Covid-19 pandemic, many of our civil and environmental engineering faculty initiated research projects in an effort to support the local community and to affect humanity on a global scale. I hope you take the opportunity to read about some of those projects in this report.

That exceptional group of faculty are what make our department strong and this semester we added three faculty members to our team. Dr. Siddharth Saxena, Dr. Landon Marston, and Dr. Sherif Abdelaziz. You can read more about them on page 10.

Our students are also continuing to do great things. Many of these accomplishments are from our Via Scholars. I encourage you to look through their profiles starting on page 22 to learn more about each of them.

The annual Via Banquet, normally held in December, will be postponed this year as the university continues to find the safest way to hold large gatherings. We are looking forward to celebrating these outstanding Via scholars in the spring semester.

Engineers are at the forefront of making positive and impactful changes in our society. We are excited to be part of that change and to be training future engineers to go out and improve the world we live



in. I'm looking forward to another exciting year and, once again, thank you for your generous support. The innovative work we do would not be possible without the support of our more than 11,000 living alumni.

Please visit [cee.vt.edu](http://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,

A handwritten signature in dark ink that reads "Mark A. Widdowson". The signature is written in a cursive, flowing style.

Mark Widdowson  
Department Head



# TABLE OF CONTENTS

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<b>DEPARTMENT HEAD'S MESSAGE</b> .....	3
<b>STUDENT NEWS</b>	
Undergraduate Scholarships .....	6
Graduate Scholarships .....	7
Ph.D. degrees awarded .....	8
<b>FACULTY</b>	
CEE Faculty by Program Area .....	9
New Faculty .....	10
<b>PROGRAM AREAS</b>	
Vecellio Construction Engineering and Management Program .....	11
Environmental and Water Resources Engineering Program .....	13
Geotechnical Engineering Program .....	16
Structural Engineering and Materials Program .....	18
Transportation Infrastructures and Systems Engineering Program .....	20
<b>RESEARCH NEWS</b>	
Do HVAC systems increase the spread of COVID-19? Farrokh Jazizadeh Karimi seeks to find out .....	12
Amy Pruden and Peter Vikesland begin testing campus wastewater for COVID-19 .....	14
Alba Yerro Colom is seeking to understand soil behavior to ensure the safety of communities .....	17
Matt Hebdon works to evaluate and preserve bridge members .....	19
Kathleen Hancock analyzes alcohol and reckless driving related crashes .....	21
<b>VIA SCHOLARS</b> .....	22
DEPARTMENT HEAD .....	Mark Widdowson
EDITOR AND DESIGNER .....	Courtney Sakry
COVER PHOTO: Amy Pruden and Peter Vikesland taking sewage samples. Photo taken by Dawn Jeffries.	

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# UNDERGRADUATE SCHOLARSHIPS

## CE Alumni Board Scholarship

Phillip Crispell  
Summer Notte  
Eric Radecki  
Analee Szuszman  
Ana Wilson

## Kenneth R. Ayers '80 Memorial Scholarship

Ryan Elmiger  
Michael Harper

## Kelso S. Baker Scholarship

Cameron Easter  
Justice Forster  
Layne Smith

## Michael Baker Corporation Engineering Scholarship

Sophia Schenk

## Balzer & Associates Scholarship in Land Development

Robert Baumann  
Rachel Stewart

## James L. Bland Civil Engineering Scholarship

Robert Baumann

## Jerry and Sally Brammer Scholarship

Leigh Kadlec

## Charles and Patricia Brown Scholarship

Simer Choudhary

## Everett Carter Memorial Scholarship

Andrew Williams

## William A. Caruthers, Jr. Scholarship

**Joseph Giusti**  
**Bradley Gritz**

## Joseph W. and Jane M. Christenbury Memorial Scholarship

Andrew Brown

## Civil Engineering Class of '58 Scholarship

Albert Cooper  
Cory Demers  
Jack Vance

## Warren F. Cline Scholarship

Paige Braude

## Stanley and Francis Cohen Scholarship

**Henry Brown**  
Charles Hampton  
**Davin Stephens**

## Dewberry Scholarship

Michael Audet  
Charlyn Castillo

## Walter and Mary Ruth Duncan Scholarship

Michael Audet  
Charlyn Castillo  
Nathaniel Clark  
Noah Clark  
Jose Mejia Hernandez  
Evan Isham  
David Jones  
Jenna Woyner  
Marcelo Zuleta Sarmiento

## Vernon and Rebecca Duncan Scholarship

Ethan Obenrader

## Doug and Laurie Fahl Family CEE Excellence Scholarship

Conor Doane

## J. Stuart Franklin, Jr. Civil Engineering Scholarship

Jack Buchanan  
Adolfo Melgar-Toralla  
Sammeth Montgomery  
Victor O'Toole  
Delaney Snead  
Wesley Yeung

## Chesley A. Godfrey Scholarship

Sabrina Mesawich

## Lois Cox and Edna Goodwin Scholarship

Paul Weiss

## Ralph P. Hines '59 Scholarship

Rebekah Laferney

## Charles S. Hughes, III '58 Scholarship

Lillie Saba  
Justin Shelton

## Williams A. Joyner Scholarship

Justin Wingenfield

## Dennis & Sherry Kamber Scholarship

Kerry Desmond

## Hersie B. & Ethel G. McCauley Scholarship

**Jody Shuler**  
Amanuel Tamrat

## Andrew E. "Tripp" McDavid Memorial Scholarship

Henry Hutcheson

## Kenton E. Meland Scholarship

Madolyn Ivy

## Herb and Marsha Morgan Scholarship

Diana Fernandez  
Haley Grubbs

## Newport News Shipbuilding Scholarship

Sabrina Mesawich

## John E. Pruitt, Jr. Scholarship

Kyrsten Dallanegra  
Jacob Mills

## Richard Quarterman '04 Memorial Scholarship

Valeria Lebron Berrios

## Ralph M. Snyder '52 Engineering Scholarship for Virginia Students

Johnathan Arner

## Stantec Award for Excellence in Engineering

Drew Ayers

## George A. Stewart Scholarship

Megan Beever  
Anna Bohlmann  
**Jack Glock**  
Katrina Schmid  
Virgil Thornton  
Juan Venegas  
Jessica Viehman  
Ian Wilson

## Lewis John Turner & William Scott Dewhirst Scholarship

Joshua Garrett  
Daniel McKillop

## Vecellio Scholarship

Kyrsten Dallanegra  
Sean Foley  
Connor Sandway  
Tammy Trinh

## Virginia Concrete Scholarship

Kristen Ellis  
Metkel Samuel

## Donald and Mary Wiebke Scholarship

Carlos Amaral

## Harry S. & Patsy B. Williams Scholarship

Madeline Deck

## Williams Industries Scholarship

Abdelfattah Abdelkariem

## Verne C. & Jewel N. Williamson Scholarship

Samuel Kraus

## Comer V. Yeatts '36 Scholarship

Joshua Pettiford

# GRADUATE SCHOLARSHIPS AND FELLOWSHIPS

American Institute of Steel Construction  
(AISC) Education Foundation Scholarship  
Natasha Vipond

American Association of University Women  
(AAUW) Selected Professions Fellowship  
Amanda Darling

Ann N. and Thomas N. Hunnicutt, III  
Fellowship  
Adam Blazejowski

AWWA Arcadis Scholarship  
Meredith Martinez

Bill and Shireen Kirk Asphalt Scholarship  
Tanner Keen

Bryan Bluhm Memorial Scholarship  
Ann Tkacik

Clifford W. Randall Graduate Fellowship  
Charbel Harb  
Jin Pan

Davenport Leadership Scholarship  
James Boykin  
Wendell Grinton

Dwight D. Eisenhower Transportation  
Fellowship Program  
Emily Jannace

Edna Bailey Sussman Fellowship  
James Hurley  
Sungwoo Kim  
W. Seth Lotts  
Hao Luo  
Jin Pan  
Jiefu Wang

Edward L. Beale Civil Engineering Fellowship  
Mihir Rimjha

Fulbright Scholarship  
Julio Cesar Copana Paucara  
Marie Carmen Landivar Guartatanga  
Martin Scavone

Gates Foundation Scholarship  
James Boykin

GEM Associate Fellowship  
Michael Bell  
James Boykin  
Wendell Grinton  
Dwayne Jefferson  
Daniel Keku  
David Kormos  
Kathryn Lopez  
Haniyyah Majeed  
Albin Rosado

G.V. Loganathan Memorial Fellowship  
Andrew Frazier  
Gambhir Lamsal

ICTAS Doctoral Fellowship  
Rebecca Kriss  
Krista Liguori

John and Natalie Hawkins Memorial  
Fellowship  
Shijun Wei

Matthew G. Gwaltney Memorial Fellowship  
B. Keith Gottberg

Multicultural Academic Opportunities  
Program (MAOP)  
Maria Amaya  
Wendell Grinton  
Joseph James  
Katherine Santizo  
Kenneth Velez-Rodriguez

Myers-Lawson School of Construction  
Doctoral Fellowship  
Emma Coleman

NASEM Ford Fellowship  
Kathryn Lopez

National Research Traineeship, Disaster  
Resilience and Risk Management  
Wendell Grinton  
Steven Hoagland

National Science Foundation Graduate  
Research Fellowship  
Brooke Baugher  
Abraham Cullom  
Ayella Maile-Moskowitz  
Haniyyah Majeed  
Erin Mulligan

New Horizon Graduate Scholar  
Maria Amaya  
Patricia Asiatico  
Michael Bell  
James Boykin  
Daniela Charles  
Emma Coleman  
Cara Dietrich  
Wendell Grinton  
Luis Hernandez  
Joseph James  
Emily Jannace  
Joel Javier  
Dwayne Jefferson  
Marcella Kaplan  
Daniel Keku  
David Kormos  
Michael Lee  
Krista Liguori  
Kathryn Lopez  
Haniyyah Majeed  
Tolu Odimayomi  
Ryan Osborn  
Julie Paprocki  
Jeannie Purchase  
Albin Rosado  
Katherine Santizo  
Kenneth Velez-Rodriguez  
Paige West  
Kaleigh Yost  
Abril Yu-Shan Chevez

Pratt Graduate Fellowship  
Michael Bell  
James Boykin  
Mostafa Ebrahimi-Meimand  
Yueyan Gu  
Anh Chi Nguyen

Raymond G. and Madelyn A. Curry  
Graduate Fellowship  
Daniel Szalecki  
Santiago Bertero

SMART Scholarship  
B. Keith Gottberg

Terracon Fellowship  
M. Clay Thomas

Torgersen Research Excellence Award  
Sogand Hasanzadeh

Thomas J. Grizzard, Jr. Graduate  
Scholarship  
Shantanu Bhide

Trent R. Dames and William W. Moore  
Fellowship  
Luis Eduardo Zambrano-Cruzatty

Vecellio Fellowship  
Manik Ahmed  
Esteban Amezcua Radillo  
Joseph James  
Dwayne Jefferson

Virginia Sea Grant Graduate Research  
Fellowship  
Michael Lee

Virginia Space Grant Consortium Graduate  
Fellowship  
Deborah McGlynn  
Kaleigh Yost

Virginia Water Works Association Dr.  
Robert C. Hoehn Graduate Scholarship  
Graduate Fellowship  
Shantanu Bhide

Virginia Water Environment Association  
Sonny Roden Memorial Graduate  
Scholarship  
Shantanu Bhide

Virginia Water Resources Research Center  
Competitive Grant  
Kathryn Lopez

Walts Fellowship  
Mehrnoosh Farhadi

Wells & Wells Graduate Scholarship  
Abdihakim Omar

# PH.D. DEGREES

The following doctoral degrees were awarded to CEE students between Summer II 2019 and Summer I 2020:

Name: [Takwa Alhadid](#)

Dissertation Title: Modeling Transit Vehicle Travel Time Components for Use in Transit Applications  
Advisor: **Hesham Rakha**

Name: [Stephanie Atallah](#)

Dissertation Title: The Impact of Airport Size on Service Continuity and Operational Performance  
Advisor: **Susan Hotle**

Name: [Conrad Brendel](#)

Dissertation Title: Analysis, Modeling, and Forecasting Of Urban Flooding  
Advisor: **Randy Dymond**

Name: [Karim Fadhoulou](#)

Dissertation Title: Modeling Human And Machine-In-The-Loop In Car-Following Theory  
Advisor: **Hesham Rakha**

Name: [Diana Marcela Franco Duran](#)

Dissertation Title: An Enhanced RCS Heuristic and an Enhanced RCPM Algorithm to Perform Delay Analysis in Schedules without Phantom Float  
Advisor: **Jesus de la Garza**

Name: [Zhanyu Huang](#)

Dissertation Title: Lateral Spreading Design of Column-Supported Embankments  
Advisor: **George Filz and Katerina Ziotopoulou**

Name: [Arman Izadi](#)

Dissertation Title: Modeling, Simulation and Optimization of Advanced Air Traffic Procedures to Improve Oceanic Flights  
Advisor: **Antonio Trani**

Name: [Akshay Jian](#)

Dissertation Title: Feasibility of using Waste Heat as a Power Source to Operate Microbial Electrolysis Cells Towards Resource Recovery  
Advisor: **Zhen He**

Name: [Wooyoung Jung](#)

Dissertation Title: Decentralized HVAC Operations: Novel Sensing Technologies and Control for Human-Aware HVAC Operations  
Advisor: **Farrokh Jazizadeh Karimi**

Name: [Kyungwon Kang](#)

Dissertation Title: Enhancing Freeway Merge Section Operations via Vehicle Connectivity  
Advisor: **Hesham Rakha**

Name: [Stephanie Klaus](#)

Dissertation Title: Intensification of Biological Nutrient Removal Processes  
Advisor: **Amy Pruden-Bagchi**

Name: [Kaisen Lin](#)

Dissertation Title: Viability of Viruses in Suspended Aerosols and Stationary Droplets as a Function of Relative Humidity and Media Composition  
Advisor: **Linsey Marr**

Name: [Chang Liu](#)

Dissertation Title: Controlled Evaluation of Silver Nanoparticle Dissolution: Surface Coating, Size and Temperature Effects  
Advisor: **Peter Vikesland**

Name: [Xingjian Liu](#)

Dissertation Title: Membrane Electrochemical Treatment of Landfill Leachate: Processes, Performance and Challenges  
Advisor: **Zhen He**

Name: [Carlos Mantilla Pena](#)

Dissertation Title: Evaluation of In-Service Residential Water Meters: Analysis of Registration Error and Metering Infrastructure Upgrades  
Advisor: **Mark Widdowson and Gregory Boardman**

Name: [Rebekah Martin](#)

Dissertation Title: Impact of Premise Plumbing Conditions, Materials, Corrosion Control, Temperature and Water Heater Design on the Growth of Opportunistic Pathogens in Drinking Water  
Advisor: **Marc Edwards**

Name: [Ross McCarthy](#)

Dissertation Title: Investigation of Network Level Skid Resistance  
Advisor: **Gerardo Flintsch**

Name: [Sogand Mohammadhasanzadeh](#)

Dissertation Title: Worker's Behavioral Adaptation to Safety Interventions and Technologies: Empirical Evidence and Theoretical Considerations Through the Case of Simulated Residential Roofing Task  
Advisor: **Jesus de la Garza**

Name: [Ryland Musick](#)

Dissertation Title: Network Roadway Surface Friction and Its Usage to Improve Safety and Project Performance along West Virginia Highways  
Advisor: **Gerardo Flintsch**

Name: [Armin Rahimi Golkhandan](#)

Dissertation Title: Characterization and Assessment of Transportation Diversity: Impacts on Mobility and Resilience Planning in Urban Communities  
Advisor: **Michael Garvin**

Name: [Shiqiang Zou](#)

Dissertation Title: Assessment of Fracture and Rutting Resistance of Asphalt Overlays Through Heavy Vehicle Simulator and Laboratory Testing: Synthetic Fiber and Rubber Modified SMA Mixes  
Advisor: **Gerardo Flintsch**

Name: [Freddie Salado Martinez](#)

Dissertation Title: Assessment of Fracture and Rutting Resistance of Asphalt Overlays Through Heavy Vehicle Simulator and Laboratory Testing: Synthetic Fiber and Rubber Modified SMA Mixes  
Advisor: **Gerardo Flintsch**

Name: [Japsimran Singh](#)

Dissertation Title: An Investigation of Anchor Nut Loosening and Review of Tightening Procedures for Anchor Rods in Highway Ancillary Structures  
Advisor: **Matthew Hebdon**

Name: [Yewei Sun](#)

Dissertation Title: Advanced Biofilm and Aerobic Granulation Technologies for Water and Wastewater Treatment  
Advisor: **Zhiwu Wang**

Name: [Kristin Ulmer](#)

Dissertation Title: Development of an Energy-based Liquefaction Evaluation Procedure  
Advisor: **Adrian Rodriguez-Marek and Russell Green**

Name: [Sneha Upadhyaya](#)

Dissertation Title: Development of an Improved and Internally-Consistent Framework for Evaluating Liquefaction Damage Potential  
Advisor: **Adrian Rodriguez-Marek and Russell Green**

Name: [Ramola Vaidya](#)

Dissertation Title: Removal of Total Organic Carbon and Emerging Contaminants in an Advanced Water Treatment process using Ozone-BAC-GAC  
Advisor: **Amy Pruden-Bagchi**

Name: [Dian Zhang](#)

Dissertation Title: Effect of Process Intensification Techniques on Biosolids Management  
Advisor: **Zhiwu Wang**



# FACULTY

## VECELLIO CONSTRUCTION ENGINEERING AND MANAGEMENT

**Michael J. Garvin**, Professor and Program Coordinator  
**Farrokh Jazizadeh Karimi**, Assistant Professor  
**Frederick Paige**, Assistant Professor  
**Tripp Shealy**, Assistant Professor  
**Sunil K. Sinha**, Professor

## ENVIRONMENTAL & WATER RESOURCES ENGINEERING

**Andrea M. Dietrich**, Professor  
**Marc A. Edwards**, University Distinguished Professor  
**Hosein Foroutan**, Assistant Professor  
**Daniel L. Gallagher**, Professor  
**Adil N. Godrej**, Research Associate Professor (OWML)  
**Stan Grant**, Professor (OWML)  
**Zhen (Jason) He**, Professor  
**Erich T. Hester**, Associate Professor  
**Jennifer L. Irish**, Professor  
**Gabriel Isaacman-VanWertz**, Assistant Professor  
**William R. Knocke**, Professor  
**John C. Little**, Charles E. Via, Jr. Professor  
**Linsey C. Marr**, Charles P. Lunsford Professor  
**Landon Marston**, Assistant Professor  
**Amy J. Pruden**, W. Thomas Rice Professor  
**Megan Rippy**, Assistant Professor (OWML)  
**Robert Paolo Scardina**, Assistant Professor of Practice  
**Siddharth Saksena**, Research Assistant Professor  
**Kyle Strom**, Associate Professor  
**Peter J. Vikesland**, Nick Prillaman Professor / Program Coordinator  
**Zhiwu (Drew) Wang**, Assistant Professor (OWML)  
**Claire White**, Assistant Professor of Practice  
**Mark A. Widdowson**, Interim Department Head and Professor  
**Kevin Young**, Assistant Professor of Practice

## GEOTECHNICAL ENGINEERING

**Thomas L. Brandon**, Professor  
**Sherif L. Abdelaziz**, Associate Professor  
**Joseph E. Dove**, Associate Professor of Practice  
**Russell A. Green**, Professor  
**Adrian Rodriguez-Marek**, Professor  
**Nina Stark**, Associate Professor and Anthony and Catherine Moraco Faculty Fellow and Program Coordinator  
**Alba Yerro Colom**, Assistant Professor

## STRUCTURAL ENGINEERING AND MATERIALS

**Scott W. Case**, Reynolds Metals Professor  
**Finley A. Charney**, Professor

**Matthew R. Eatherton**, Associate Professor and Raymond G. and Madelyn Ann Curry Faculty Fellow in Structural Engineering

**Matthew H. Hebdon**, Assistant Professor  
**Eric Jacques**, Assistant Professor  
**Ioannis Koutromanos**, Associate Professor  
**Robert T. Leon**, David H. Burrows Professor/Program Coordinator  
**Carin L. Roberts-Wollmann**, Professor  
**Rodrigo Sarlo**, Assistant Professor  
**Maryam Shakiba**, Assistant Professor

## TRANSPORTATION INFRASTRUCTURE AND SYSTEMS ENGINEERING

**Montasir Abbas**, Professor  
**Alexander S. Brand**, Assistant Professor  
**Gerardo W. Flintsch**, Professor  
**Kathleen L. Hancock**, Associate Professor  
**Kevin P. Heaslip**, Professor and CACI Faculty Fellow/ Program Coordinator  
**Susan Hotle**, Assistant Professor  
**Bryan J. Katz**, Associate Professor of Practice  
**Hesham A. Rakha**, Samuel Reynolds Pritchard Professor of Engineering  
**Antonio A. Trani**, Professor  
**Linbing Wang**, Professor

## EMERITUS FACULTY

**Gregory D. Boardman**, EWR  
**Thomas E. Cousins**, SEM  
**William E. Cox**, EWR  
**Donald R. Drew**, TISE  
**J. Michael Duncan**, GEOT  
**George M. Filz**, GEOT  
**W. Samuel Easterling**, SEM  
**Antoine G. Hobeika**, TISE  
**Robert C. Hoehn**, EWR  
**Siegfried M. Holzer**, SEM  
**J. Martin Hughes**, EWR  
**David F. Kibler**, EWR  
**James K. Mitchell**, GEOT  
**Thomas M. Murray**, SEM  
**John T. Novak**, EWR  
**Raymond H. Plaut**, SEM  
**Clifford W. Randall**, EWR  
**Kamal B. Rojiani**, SEM  
**Dusan Teodorovic**, TISE  
**Michael C. Vorster**, CEM  
**Richard E. Weyers**, SEM

# MEET THE NEW FACULTY



## **Sherif L. Abdelaziz / GEOTECHNICAL ENGINEERING**

Sherif L. Abdelaziz joined as an Associate Professor. He earned his Ph.D. and M.S. degrees from Virginia Tech and a B.S. from Cairo University in Egypt. He joins our department after five years as an Assistant Professor at The State University of New York at Stony Brook. He also served as a Geotechnical Engineer at CH2M Hill in Herndon, Virginia. His research interests include thermal and energy geotechnics, energy foundations, soil improvement, multiscale soil behavior from microstructure to large-scale, coupled phenomena in earth materials, and resilient infrastructure. Currently, he teaches Earth Pressures and Foundation Structures and Foundation Engineering. In 2018, he won the Young Investigator Program award from the U.S. Department of Defense.



## **Landon Marston / ENVIRONMENTAL AND WATER RESOURCES**

Landon Marston joined as an Assistant Professor. He comes to Virginia Tech from his position as an Assistant Professor at Kansas State University. Prior to that, he was a Hydrologic and Hydraulic Engineer for the U.S. Army Corps of Engineers. He earned a B.S. in civil engineering and an MBA from the University of Kentucky. He also earned an M.Eng. in civil engineering from Texas A&M University and a Ph.D. in civil and environmental engineering from University of Illinois at Urbana-Champaign. His research aims to provide new understanding and solutions for sustainable water resources management through data analytics, modeling, and analysis of integrated socio-hydrologic systems. His work draws on approaches and concepts from engineering, hydrology, environmental science, and economics.



## **Siddharth Saksena / ENVIRONMENTAL AND WATER RESOURCES**

Siddharth Saksena joined as a Research Assistant Professor. He graduated from the Lyles School of Civil Engineering at Purdue University with his doctoral degree in 2019. He also earned a master's degree from Purdue in 2014 and a B.Tech from the Indian Institute of Technology in Roorkee, India in 2012. While at Purdue, he was a Marc and Carol Gill Endowed Fellow, a Dorothy Faye Dunn Fellow, and received the Nellie Munson Teaching Assistant Award. His research interests include working to develop tools for building flood resilient communities in response to land use and climate change involving watershed-scale flood modeling and forecasting using an integrated hydro-systems analysis. He has eight publications and has taught a wide variety of courses in hydrology and water resources.

## CONSTRUCTION ENGINEERING AND MANAGEMENT



*Mike Garvin, Ross Myers, Mike Vorster, and Brian Kleiner paused for a photo while attending the Vecellio Lecture in the fall of 2019.*

The Vecellio Construction Engineering and Management Program (VCEMP) persevered through change in 2020 and sustained over 50 graduate students in the program for the academic year. A highlight for the faculty was a visit to the Vecellio Group to engage with members of the Vecellio family who endowed the program in 2001. Since the family endowed the program, over 80 undergraduate students and over 20 graduate students have received more than \$600,000 in scholarship funding.

The COVID-19 pandemic forced the postponement of the 20th Vecellio Distinguished Lecture. Once conditions permit, this signature event for the program will be rescheduled. Still, four 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 Kyrsten Dallanegra, Sean Foley, Connor Sandway and Tammy Trinh while Fellows are Manik Ahmed, Joseph James, Dwayne Jefferson and Esteban Radillo Amezcua.

Faculty from the program remain active in research, teaching, and outreach. Michael J. Garvin completed a research project for the Federal Highway Administration (FHWA) that developed a decision support tool that will aid public agencies in their selection of alternative project delivery methods. He is now supporting FHWA initiatives to deploy and improve the tool. Mike continued his efforts to establish the Center for Infrastructure Delivery Excellence by

formalizing a partnership with the Barchan Foundation. In addition, he coordinated and presented the proposal for VT to co-host the 2022 Construction Research Congress with ASCE's Construction Institute. He published a book chapter on financially distressed PPP projects, a book review, four journal papers and three conference papers.

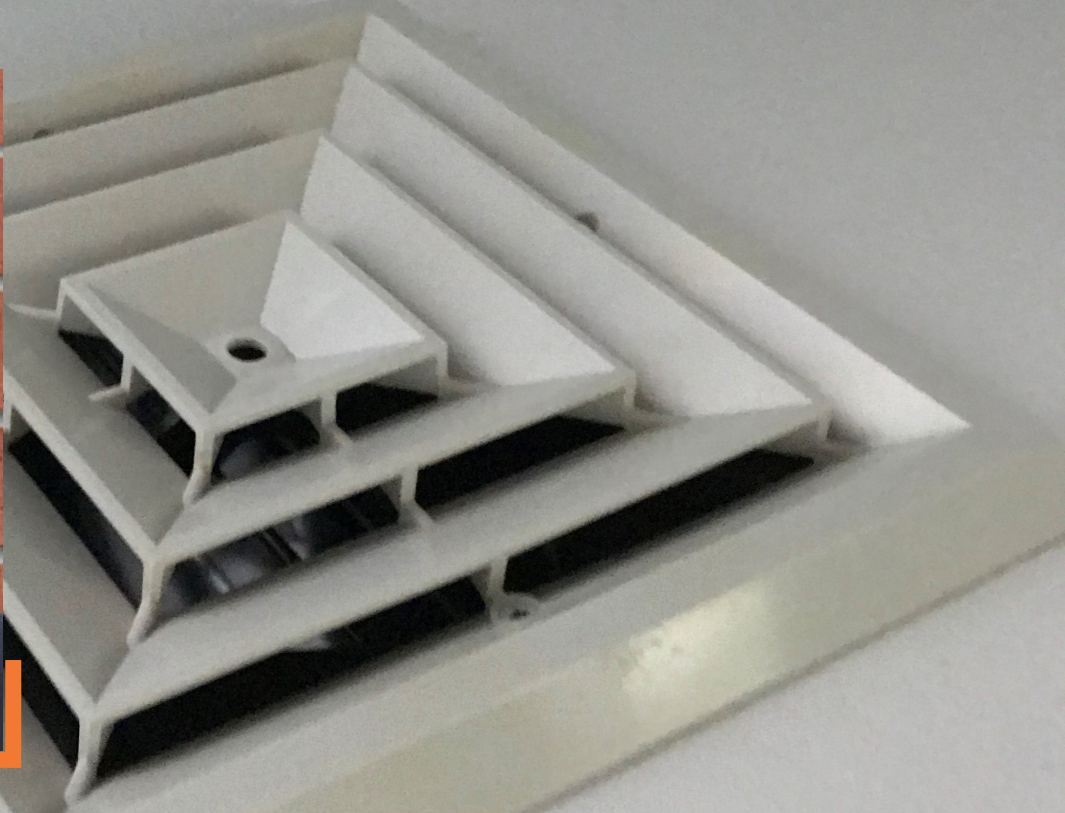
Farrokh Jazizadeh continued his research on two NSF grants that focus on enabling intelligent physical and virtual environments that support human interactions with the built environments for energy efficiency enhancement and learning new skills. He has further secured funding from the Department of 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. He has received a VT COVID19 Rapid Grant to investigate how smart building systems could be leveraged to assess and mitigate viral exposures in indoor environments to enable safe operations of buildings.

Frederick Paige completed a VT Engage Faculty Fellowship and has continued working with community partners to develop solutions for reducing energy consumption in affordable housing. The STILE Research team has been monitoring

energy consumption behaviors and providing energy education interventions. The team has been augmenting technology solutions with social interventions that improve the efficiency of housing which is an inseparable socio-technical system. In collaboration with VCEMP graduate student Brooke Baugher, Dr. Paige supported the execution of another service-learning trip to Rilima, Rwanda. Through a partnership with Fondazione Marcegaglia Onlus (FMO), students successfully built a water pumping system.

Tripp Shealy began a new NSF funded research project studying systems thinking in engineering students. The project will use concept maps to prime students to think about the complex and dynamic relationships in engineering problems. Dr. Shealy's research team will use a novel neuro-imaging tool to measure students' brain activation during engineering problem solving. Dr. Shealy used the same neuro-imaging tool to complete a project for the VDOT about driver response to dynamic message sign safety campaign messages. Messages like "May the 4th be with you, text I will not" are increasingly used to catch drivers' attention. These messages attempt to provoke an emotional response among drivers. The results of the study indicate messages about distracted driving, messages with humor, and messages that use word play elicit higher levels of cognitive activation in the brain, which is a proxy for increased attention.

Sunil Sinha is working on a Water Research Foundation (WRF) Project titled "Case Study Compilation on Applying Risk Management Principles and Innovative Technologies to Effectively Manage Deteriorating Water Infrastructure." He is working closely with more than 700 water utilities across the country for water pipeline performance analysis and artificial intelligence applications. Sunil received an NSF Engineering Research Center (ERC) planning grant for development of a national strategy for Smart One Water (SOW) and hosted five workshops this year.



## Do HVAC systems increase the spread of COVID-19? Farrokh Jazizadeh Karimi seeks to find out.

The COVID-19 pandemic has demonstrated that physical distancing is a critical step to reduce the probability of airborne exposures and physical transmissions. The experience of the COVID-19 pandemic shows that with emergence of highly contagious novel viruses, the medical remedies for their containment, such as vaccine development, require time intensive processes.

However, the trade-off between reducing exposure and resuming economic activities is of critical importance in the resilience of a society to pandemics with such a high impact. Therefore, it is important to understand how economic activities can be resumed while reducing the risk of exposure. An important factor in this direction is to understand the role of buildings and building systems in affecting the risk of exposure.

There have been questions on how building systems (specifically HVAC

systems) can potentially increase the risk of exposure. As occupants interact with the indoor environment, they can pose exposure risk through human-human or human-surface interactions in addition to airborne exposure. Depending on the occupancy density and their level of activities, the risk of contamination and exposure can vary. Recent studies have reported that certain ranges of indoor conditions, provided by building systems, can mitigate COVID-19 exposures.

“Reaching an in-depth understanding of exposure risk due to indoor dynamics is a critical step,” said Farrokh Jazizadeh “This research will help us gain a better understanding on how building systems operations and human indoor dynamics can affect the spread of airborne particles.” Eventually, this can be used to create exposure maps and models which can influence how smart building systems are equipped and used in buildings. Both facility

operators and occupants can use this information to create the safest environment for human interaction indoors.

“We want to create a foundation to provide information for actuation of building systems to reduce occupants’ exposure to different surface and aerosol contaminants within indoor environments,” Jazizadeh said. The research group is working in collaboration with researchers at the University of Virginia to provide an investigation on how indoor dynamics affect the risk of exposure and how building systems can work to reduce that risk.

Prior to this study, Jazizadeh focused his research on leveraging the dynamics of the built environment and human-building interactions toward improved and flexible performance at difference scales. While, he has not previously studied viral exposure, this research of exposure assessment and mitigation broadly fits into his research expertise.

## ENVIRONMENTAL AND WATER RESOURCES

The Environmental and Water Resources (EWR) Program continues to be considered one of the most highly respected graduate programs in environmental and water resources engineering in the United States. The interdisciplinary work conducted by EWR faculty, students, and staff is highly impactful and widely used by the global community.

This year was a year of transition for EWR. Landon Marston has joined us as a new Assistant Professor. Landon, whose research specializes in examining the drivers of water scarcity and degradation across multiple scales, had previously been on the faculty at Kansas State University after completing his Ph.D. at the University of Illinois Urbana-Champaign. The year 2020 also saw the departures of Randy Dymond, who retired, and Jason He, who transitioned to new position at his alma mater Washington University in St. Louis.

EWR faculty have responded broadly in response to the COVID-19 pandemic. With her interdisciplinary background in air pollution and airborne infectious diseases, Linsey Marr has been

a reassuring voice for many. She has given hundreds of interviews over the past months to inform the many different discussions about this disease. Her efforts, and those of colleagues both in the US and elsewhere, have clearly indicated the role of airborne exposures in the spread of

in-person and hands-on educational experiences in the era of social distancing.

EWR faculty received a number of awards in recognition of their work this past year. Landon Marston was recently named a New Innovator in Food and Agricultural Research by the Foundation

for Food and Agriculture Research (FFAR). This award provides funding for early career scientists to conduct “audacious” research in the area of food and agriculture research. From the Virginia Tech College of Engineering, Gabriel Issacman-Van Wertz received one of the 2020 VT COE Outstanding New Professor Awards and Paolo Scardina was recognized with the 2020 Certificate of Teaching Excellence. And, Clair White was recognized with the Blackwood

Award for Exemplary Faculty Service from the Virginia Tech Program in Real Estate. Within CEE itself, in recognition of his longstanding educational efforts, Bill Knocke was recognized with the G.V. Loganathan award. Former EWR staff member Barbara Angellotti received the Virginia Tech Staff Career Achievement Award.



*Connor Brown and Ayella Maile-Moskowitz are sampling sewage on campus. You can read more about the sampling on page 14.*

COVID-19 and have illustrated the utility of masks in reducing these exposures. On a more local level, Amy Pruden and Peter Vikesland, have led efforts to detect signals of COVID-19 in sewage samples collected across the Blacksburg campus, while Paolo Scardina made numerous upgrades to the Fluid Mechanics and Water Resources laboratories to make them useable for

**Linsey Marr has been featured on several national news outlets for her expertise in airborne transmission of viruses in relation to the spread of Covid-19. The New York Times, Washington Post, NPR, The Wall Street Journal, and many others have interviewed Marr for her input about mask effectiveness, social distancing, and air filtration and ventilation.**





## Peter Vikesland and Amy Pruden begin testing campus wastewater for COVID-19

A team of Virginia Tech civil and environmental engineering researchers will begin testing wastewater at 15 campus sites for the presence of the novel coronavirus (SARS-CoV-2), enabling the university to more rapidly identify and respond to positive tests.

The advance will allow the university to monitor clusters of campus buildings on a daily basis, testing for the presence of the virus in fecal matter. If the testing shows positive results, the university can then conduct targeted testing among individuals in those buildings to zero in on possible infections. The idea is to more proactively identify virus clusters, even when individuals may be asymptomatic.

“The general idea is that people who are sick with COVID-19 excrete the virus or viral RNA in their feces, and it ends up in sewers,” said Peter Vikesland, professor of civil and environmental engineering. “That signal can be detected for a period of time after people are sick, and you can potentially detect it before you start to see clinical cases.”

The team – led by Vikesland, civil and environmental engineering professor Amy Pruden, and Ph.D. candidate Ayella Maile-Moskowitz – has been conducting sampling at five campus sites to test the process, but is just beginning to test samples. Now, the office of Virginia Tech’s vice president for research and innovation and the Department of Civil and Environmental Engineering have invested \$200,000 to expand the project to 15 sites on the Blacksburg campus. Most, but not all, of the sampling sites focus on clusters of residence halls.

“As we saw researchers around the world testing their wastewater for COVID we thought it would be interesting to see if we could too, since we already examine wastewater for pathogens and viruses in our lab,” Maile-Moskowitz said. “As it became clear that the pandemic was not going anywhere, we saw it as an opportunity to help the university in determining where outbreaks might be occurring around campus, especially as an early warning system.”

“We are in the process of

expanding monitoring and getting a baseline,” said Pruden. “We’re planning to sample from the sewage of the dorm on campus where students who tested positive are being isolated. That will be a good positive control to compare to, and then we’ll go from there.”

Each site can be monitored daily, with the samples then sent to the Molecular Diagnostics Laboratory at the Fralin Biomedical Research Institute at VTC, which is processing clinical swabs for COVID-19 testing for the Roanoke and New River valleys.

“The whole idea is conceptually very simple,” said Carla Finkielstein, director of the lab and associate professor in the Department of Biological Sciences. “If you really think, what we want here is to somehow use a broad way to test a community and find out if there’s any potential COVID outbreak coming. The idea is to identify the virus before spreading. One of the most difficult things is identifying those cases that are pre-symptomatic and asymptomatic. By doing this kind of sewage epidemiology, you’re getting a snapshot of what is going on in the

population that doesn't show any symptoms of the disease. You can detect the virus before anybody has any symptoms."

The samples are processed within a day after they're received at the lab, and Finkelstein said the additional samples will not significantly add to the lab's workload. In fact, they likely will help Virginia Tech to proactively target its testing toward potential outbreaks: If positive results show up for a cluster of residence halls, Virginia Tech will work with the Virginia Department of Health to do more testing within those halls, as well as to conduct contact-tracing.

This methodology grew out of a previous project targeted at tracking antibiotic resistance by monitoring sewage. With the pandemic and

approvals to develop the process for COVID-19, researchers are learning more and may be able to adapt the system to monitor for other viruses and markers in the future.

"We want to build a platform not just for the pandemic, but flexible for future pandemics and global health threats," said Pruden.

Ron Fricker, senior associate dean in the Virginia Tech College of Science, is co-leading a multidisciplinary infectious disease modeling group that is helping the university better understand and plan for the effects of the pandemic. He hailed the wastewater monitoring project as a "true game-changer in Virginia Tech's ability to do COVID-19 surveillance.

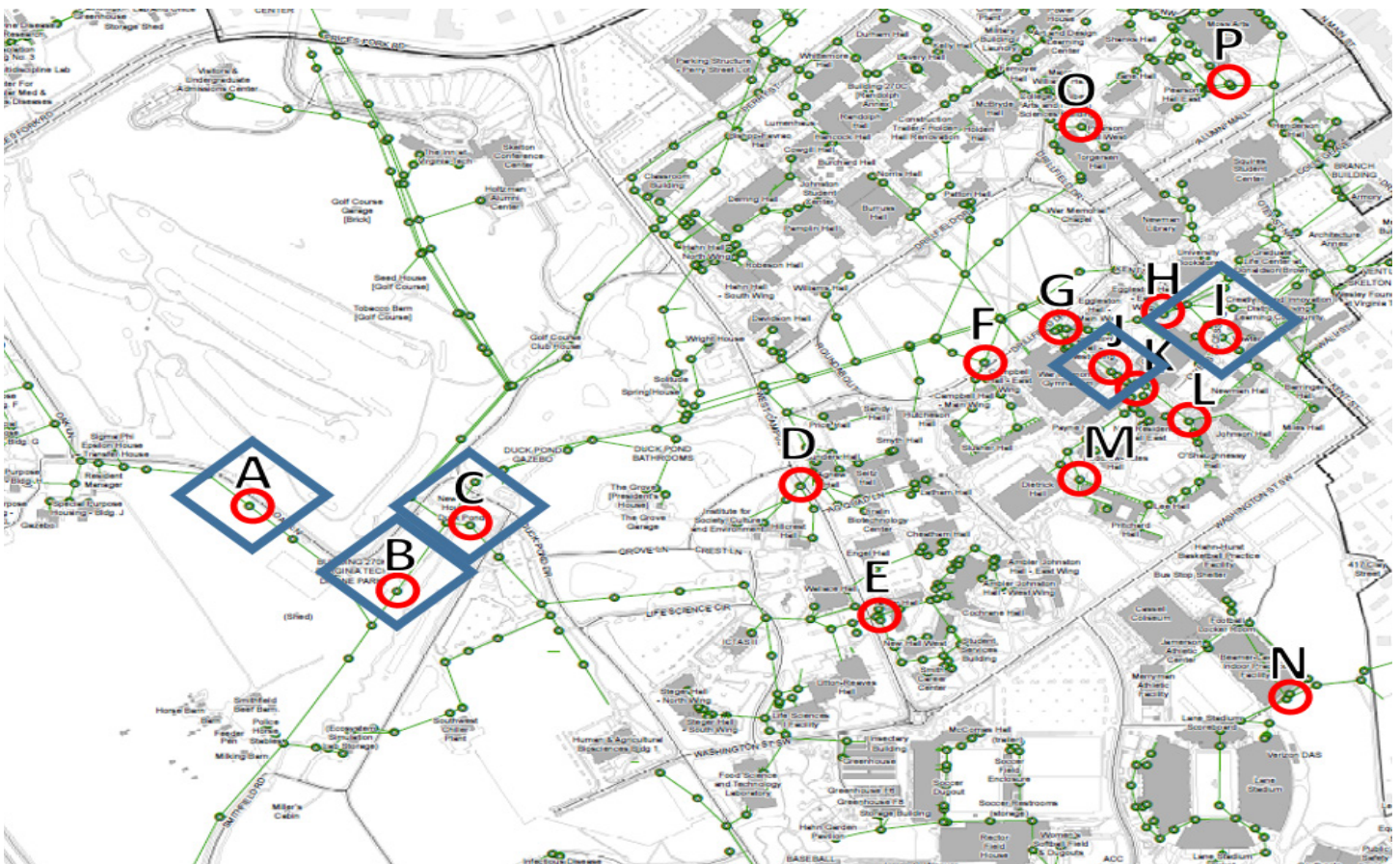
"This effort is an example of

Virginia Tech at its best," Fricker said. "It's a cross-campus collaboration between faculty and students in the College of Engineering, the College of Science, the College of Veterinary Medicine, Fralin Biomedical Research Institute, the Division of Campus Planning, Infrastructure, and Facilities, and Virginia Tech Emergency Management, who have all come together to develop and deploy a new technology to help solve a critical real-world problem."

Read more about Virginia Tech's response to COVID-19 at the university's Ready site at [ready.vt.edu](https://ready.vt.edu).

Written by Mason Adams

Photo by Ayella Maile-Moskowitz



*A team of Virginia Tech civil and environmental engineering researchers is testing wastewater at several spots on campus to rapidly identify and respond to positive COVID-19 cases.*

## GEOTECHNICAL ENGINEERING

The Geotechnical Engineering Program had another successful year in its research, teaching, and service missions, despite the unique 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.

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 the 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 received funding from the Geological Survey of Israel to collaborate on the development of updated seismic hazard maps for the country. He is also leading 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.

Tom Brandon; along with alumni Dan VandenBerge, Bernardo

Castellanos, Rick Valentine, and John Rice; are putting the finishing touches on the NAVFAC manual 7.01 (Soil Mechanics). This is the first time that this legacy document has been overhauled in the past 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 has been awarded a new grant to investigate the impacts of coastal erosion on infrastructure in Arctic coastal communities within the NSF Navigating the Arctic framework. She also participated with a team of seven students in the multi-agency and multi-investigator During Nearshore Event Experiment (Dunex) pilot.

Joe Dove continued to be heavily involved in a myriad of 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 in geotechnical engineering. He also continues to serve as the Chair of the Curriculum Committee.

Contributions of the Geotechnical Faculty have been acknowledged

through awards, various keynote lectures, and invited lectures. Amongst others, Alba Yerro Colom was invited as keynote lecturer for the European Conference on Unsaturated Soils; Nina Stark was invited as keynote lecturer for the CONCREEP 11+ conference; Tom Brandon received the ASCE Thomas A. Middlebrooks Award. Luis Zambrano-Cruzatty, a Ph.D. student working with Alba Yerro Colom, received the ASCE Trent R. Dames and William W. Moore fellowship.

Our graduate students enhanced their professional development by attending the annual GeoCongress in Minneapolis. 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](http://cee.vt.edu/duncan-endowment). Please send your email address to Rachel Atwell ([raesquivel@vt.edu](mailto: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 profound impacts on professional practice and on our program. This year the CGPR annual meeting was held virtually due to COVID-19.



*Geotechnical Engineering faculty gathered for a group photo in Patton Hall.*





*Oblique aerial photograph of the 2014 landslide in northwest Washington, commonly named the "Oso Landslide" or the "SR530 Landslide," as named by Snohomish County and Washington State. Credit: Mark Reid, USGS*

## Alba Yerro Colom is seeking to understand soil behavior to ensure the safety of communities around the globe

"All civil infrastructure rests on, with, or in the ground," said Assistant Professor Alba Yerro Colom. "Therefore, understanding soil behavior is essential to ensure the stability of all construction and the safety of our communities"

As global climate patterns are expected to change, soil conditions and hazards associated with those conditions will also change. Traditional methods to study soil mechanics and soil-structure problems strictly focus on the evaluation of failure and are unable to predict post-failure results. However, Colom states that understanding the whole deformation process is crucial to predict failure consequences, to improve risk assessment, and to reduce and mitigate damage in our communities. This is what led her to create an advanced framework that is capable to further investigate the consequences of soil behavior after failure through the numerical simulation of geotechnical problems that involve large deformations of the soil and interactions with water through landslides, dam failures, and

internal erosion. Modeling these problems can present challenges that commercial software is unable to handle. Colom is developing a material point method (MPM), which is an advanced computational tool that can be applied to problems in a variety of geotechnical hazards, including landslides, soil-water-structure interaction, soil characterization, and soil reinforcement problems. Furthermore, the model can potentially be applied outside of geotechnical problems to help solve challenges in energy and transportation.

Colom is a founding member and software developer of Anura3D MPM Research Community. The community began in 2014 as a collaboration between nine universities and research institutes in Europe and the United States. The strategic aim is to consolidate the group as a world leader in the future generation of computational tools for large deformations, dynamics, and coupled

analysis of a variety of geomechanics related problems.

Colom was born in Suria, a small town near Barcelona, Spain that has one of the largest potash underground mines (900-m deep) in Europe. Despite the efforts in keeping mines safe, underground collapses are relatively frequent and accidents happen often. After her grandfather lost his life in the mine, she was inspired to pursue a career in geotechnical engineering. "My goal is to continue to improve the predictive methods that inform decision-makers about risk of geotechnical hazards," she said. "This will further optimize the design of structures and protective barriers."

Eventually, the developed numerical tool will be shared with researchers and practitioners at no cost through an open-source platform to inform, advance, and transform the way stability analyses are currently approached.

## STRUCTURAL ENGINEERING AND MATERIALS

The SEM graduate program continues to thrive with over 70 graduate students. Virginia Tech was selected to host the 2021 American Institute of Steel Construction (AISC) Student Steel Bridge Competition (SSBC) National Finals. Alumni and friends of CEE are encouraged to volunteer and/or sponsor this opportunity to showcase Virginia Tech Civil Engineering on a national level (email: [ssbc2020@vt.edu](mailto:ssbc2020@vt.edu).) Other highlights for the program this year are:

Dr. Roberto Leon co-edited and published, through the American Institute of Steel Construction, the proceedings of the 8th International Conference on Composite Construction in Steel and Concrete. Dr. Leon was named to the Committee on Specification for the American Institute of Steel Construction; the committee is charged with updating steel buildings design provisions. Dr. Leon developed a course on CE Failures that parallels the graduate class he teaches on forensic engineering.

The Shock Tube Research Facility, led by Dr. Eric Jacques, is now fully operational. The equipment fosters collaborative high strain rate blast research in a unique on-campus laboratory tightly integrated with Virginia Tech's expertise in manufacturing, engineering, and materials. The hands-on environment strategically expands VT's talent pipeline for high-demand careers in defense-related engineering. Leveraging the shock tube facility, Dr. Jacques and his group developed blast self-centering reinforced concrete members using hybrid arrangements of GFRP and steel rebar for enhanced blast resilience.

Dr. Scott Case worked with other COE faculty on a recently-awarded \$3.8M composites manufacturing education project. The effort combines instruction, project design teams, and industrial courses. Dr. Case 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.

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, use of photogrammetric methods to assess corrosion damage of prestressed beams, and long term behavior of post-tensioned segmental concrete bridges. Dr. Roberts-Wollmann was appointed for another code cycle of ACI 318, and will serve as chair of subcommittee 318-P - Precast/prestressed concrete. She was appointed to two new code committees ACI 319 - Precast/Prestressed Concrete Building Code and ACI 320 - Post-Tensioned Concrete Building Code. These committees write the task of writing new specifications, separate from ACI 318, for prestressed and post-tensioned concrete.

Dr. Maryam Shakiba received Air-Force Office of Scientific Research Young Investigator Program (YIP) award. Dr. Shakiba worked on large scale simulations of transverse plies in fiber-reinforced composites were conducted, which shed light on the delamination and failure in such composites.

Dr. Finley Charney did field testing of several metal buildings on campus and in South Carolina to determine the frequency of vibration for use in validating an approximate formula proposed for use in building codes. Dr. Charney published "Seismic Loads - A guide to the Seismic

Load Provisions of ASCE 7-16" with coauthors Justin Marshall and Thomas Heasuler.

Dr. Matt Hebdon received the CEE Alumni Teaching Excellence Award. Dr. Hebdon tested full-scale deteriorated steel bridge members, repaired steel bridge members using CFRP, steel sheet piling, and inspection of bridges using AI and drones.

Dr. Rodrigo Sarlo added a course on Experimental Methods and Signal Processing dealing with structural health monitoring, infrastructure instrumentation and data processing which includes numerous exercises with deployable sensors and large datasets. Dr. Sarlo published an open-source modal analysis MATLAB library. Dr. Sarlo won two seed grants on vibration based gait diagnosis for smart hospitals and on cybersecurity of structural health monitoring systems.

Dr. Matthew Eatherton's research group focuses on developing new structural systems with enhanced performance during extreme natural hazards and improving resilience and sustainability of structural systems. Dr. Eatherton's group is working on a multi-university project on seismic behavior of steel deck diaphragms, an NSF CAREER project on structural fuses, a collaborative project on optimizing resilience and sustainability of building systems, a project working on computational simulation of steel fracture in structures, and a project developing new bolted end plate moment connections for metal buildings.

Dr. Yannis Koutromanos is working on the seismic evaluation of existing reinforced concrete wall buildings using computational simulation. This research, aims to enhance the resilience and safety of built communities. Dr. Koutromanos completed a multi-year project, supported by the NSF and focused on experimental and analytical characterization of rupture in structural steel under strong earthquakes.



*In early March of 2020, a VTCEE team competed in the EERI Seismic Design competition. Their building survived the ground motions and aftershock, placing them 12th overall in the national competition, including 1st in the Architecture category.*



## Matthew Hebdon works to evaluate and preserve bridge members

Millions of cars drive over bridges each day, meaning the safety and operation is important to measure. Usually this has been done from proof loading tests with test trucks to measure deflections or strains under known loading conditions. Hebdon is evaluating the bearing capacity of deteriorated bridge girders that have corrosion section loss. His goal is to provide bridge rating engineers with a better understanding of the relationship between section loss and remaining capacity. These deteriorated girders also need to be repaired and he is doing that through Carbon Fiber Reinforced Polymers (CFRP). “We first tested individual bridge members in the lab. Then we are identifying and repairing bridge members in different parts of the state,” he said. “We are testing the bridges before and after the repair to evaluate the increase in capacity

as a result of the repair.” He is also working to evaluate and repair deteriorated pre-stressed concrete girders by testing large retired bridge members to quantify the capacity in a deteriorate condition and then repair them using CFRP or external post-tensioning.

Technology is playing an increasingly important role in bridge member creation and repairs as well. Hebdon is using additive friction stir welding for low-carbon steels to create steel through 3D printing methods. This process has many potential benefits over other 3D printing methods because it uses lower temperatures, lower residual stress, and high deposition rates.

While it is necessary, it can be costly and, at times, dangerous for workers to evaluate and repair

bridges. Through the development of artificial intelligence (A.I.) models, Hebdon, along with faculty from Aerospace and Ocean Engineering, Industrial Systems Engineering, and Electrical and Computer Engineering, is using inspection of bridges with unmanned aerial vehicles (UAV). The algorithms are being developed to identify critical regions and damage prone details on a bridge. He does this by incorporating the UAVs in close proximity to structures to relay critical inspection data with high levels of detail to monitor and evaluate deterioration in difficult-to-access areas. “The overall goal is to find methods to improve the capacity and life-span of bridge structures,” he concluded.

## TRANSPORTATION INFRASTRUCTURE AND SYSTEMS

This year was an active one for the Transportation Infrastructure and Systems Engineering (TISE) group.

In 2019, Gerardo Flintsch and his group at the Center for Sustainable Transportation Infrastructure secured more than 2.2 million dollars in research funding, published 23 peer-reviewed manuscripts, and initiated a collaboration with the US Army Corps of Engineers Engineer Research and Development Center (ERDC). Dr. Flintsch and colleagues from the Mechanical Engineering were awarded the best 2019 paper in the SAE International Journal of Passenger Cars - Mechanical Systems and received the Arch T. Colwell Merit Award. Dr. Flintsch co-chaired the organization of two international events, the Pavement Evaluation 2019 conference and the International Symposium on Pavement, Roadway, and Bridge Life Cycle Assessment 2020.

Hesham Rakha and researchers in the Center for Sustainable Mobility (CSM) continued their work on various projects funded by the US Department of Energy, the National Science Foundation, the Federal Highway Administration, and various automotive manufacturers. Dr. Rakha was named an IEEE Fellow for contributions to optimization, modeling and assessment of transportation. Dr. Osman (a Research Associate in CSM) and Dr. Rakha were awarded the User Information Systems (AND20) 2019 Best Paper Award at the Transportation Research Board Annual Meeting.

Alex Brand was the invited keynote speaker at the International Seminar for Upcycling of Construction and Demolition Wastes. Antonio Trani, Arman Izadi, Nick Hinze, and Amy Seo completed a two-year project to evaluate the use of advanced convective weather information in the flight deck for oceanic flights. The study was

commissioned by the Federal Aviation Administration (FAA) and estimated annual fuel savings to oceanic flights of 15.3 million dollars and up to 7 million dollars in injury costs avoided due to improved pilot awareness to avoid bad weather. The FAA and industry team that collaborated in the project received the FAA 2019 Safety Award. Sayantan Tarafdar and Mihir Rimjha's (graduate students working with Susan Hotle and Antonio Trani) received the best student paper award at the 2019 Integrated Communications Navigation and Surveillance (ICNS) Conference. Nick Hinze, Navid Mirmohammadsadeghi and Antonio Trani released the latest version of a runway exit design model for the FAA (called REDIM 3). An earlier version of the model has been used in hundreds of airports studies to locate optimal runway exits worldwide. Dr. Trani introduced the new version of the model and a landing database developed for FAA to industry and FAA in June and July 2020.

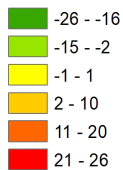
Linbing Wang was promoted to Fellow of the Engineering Mechanics Institute of ASCE in recognition of his overall achievements in research, education and service. As a Co-PI of a \$2.0 million NSF Harnessing Data Revolution multiple university grant on MemoNet, he has been conducting research on developing innovative machine-learning approaches for understanding neural nets. Under his leadership, he and his colleagues including Dr. Monty Abbas, Dr. Carin Roberts-Wollmann, Dr. Matthew Hebdon and Dr. Rodrigo Sario have acquired multiple grants from the Regional UTC. During his faculty leave at University of Science and Technology Beijing (USTB), Dr. Wang and Lindy Cranwell have jointly developed a global education course on Comparative US-China Civil Engineering. In this class, Dr. Wang leveraged the resources at USTB by inviting practicing engineers in major bridge, tunnel,

highway, sports stadium design and construction companies to talk about real project design and construction in China. Dr. Wang also led the renewal of the MOU for research, education collaborations between Virginia Tech and USTB. He, Dr. Roberto Leon and Ms. Lindy Cranwell also visited USTB to discuss future collaborations; and Tongji University to kick off the Virginia Tech-Tongji University dual MS degree program.

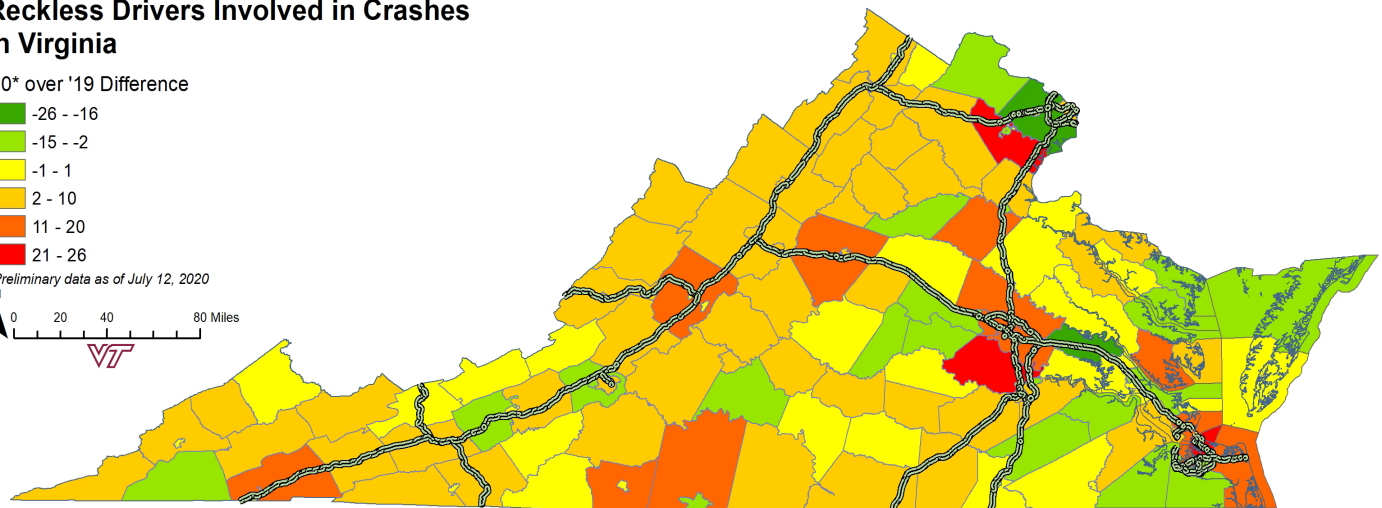
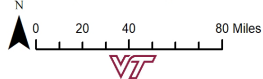
Kevin Heaslip was promoted to full professor this year. Also, he was appointed as one of the two CACI Faculty Fellows in the College of Engineering. The CACI Faculty Fellows are in recognition of work in the field of cybersecurity. Dr. Heaslip has been working to promote the importance of cybersecurity in the operations of cyber physical systems, especially for critical infrastructure. In April, Dr. Heaslip was named a Commonwealth Cyber Initiative Fellow. The Commonwealth Cyber Initiatives seeks to elevate the state-wide ecosystem of innovation and excellence in cyberphysical systems with an emphasis on trust and security and to further secure Virginia's role as a global leader in secure cyberphysical systems. Dr. Heaslip was an invited keynote speaker for General Electric Global Research Edge and Controls Symposium in September.

## Reckless Drivers Involved in Crashes in Virginia

'20\* over '19 Difference



\* Preliminary data as of July 12, 2020



*Reckless driving, defined as 20mph or greater over the speed limit or traveling 80 mph or higher, is shown in this choropleth map by jurisdiction in the Commonwealth of Virginia.*

## Kitty Hancock analyzes reckless driving related crashes as a result of the stay-at-home directive in Virginia

Governor Northam issued a Declaration of Emergency on March 12, 2020, followed by a stay-at-home order effective March 30, 2020 for the Commonwealth of Virginia. As a result, Virginia saw a substantial reduction in traffic, which also reduced the number of vehicle crashes.

Virginia Tech researchers, including Kathleen Hancock, partnered with the Virginia Department of Motor Vehicles (DMV) to understand the reduction and to identify driver and pedestrian behaviors and their consequences as a result of the pandemic. While total crashes have decreased, one of the more concerning aspects during the pandemic is that, although fatal crashes dropped during the stay-at-home order, they now are nearly equal to the same period in 2019. Another disturbing consequence of reduced traffic on the roads is the apparent increase in speeds and reckless

driving of some drivers. One of the goals of this analysis is to evaluate whether and how this translates to increased numbers of speed-related crashes and crash severity.

This analysis fits in with projects that Hancock and her team have already been working on. She works with undergraduate and graduate students in civil engineering and with the Center for Geospatial Information Technologies (CGIT) on campus to geocode and supplement the crash data and to solve problems such as identifying the highest crash intersections and using data mining techniques to extract information from the text that police officers include in their reports about the crashes and why they occur. This information is used for on-demand support when officials ask for more information about a crash and what can be done to avoid a similar circumstance in the future.

The team developed a methodology and tool to locate all reported crashes in Virginia and have been providing standardized crash location for nearly 10 years. They provide a series of reports that DMV distributes to their stakeholders and the legislature identifying types of crashes based on human factors such as alcohol use and speeding. They partner with the Highway Safety Office to provide requested information including summarizing characteristics of drivers and pedestrians involved in crashes. These same methodologies are being applied to the analysis of pandemic-related traffic patterns and crashes.

The team continues to analyze the data to see if trends have changed after the stay-at-home order was lifted and as more commuters return to work.

## 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 33rd 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 32 years and continue to fulfill the mission set by the Via family.

## UNDERGRADUATE

### Sarah Adams



*Hometown:* San Diego, California

*Career Goals:* It is my professional aspiration to one day work with the National Oceanic and Atmospheric Administration in a role that allows me to concentrate my efforts on nature-based infrastructure along coastal and wetland regions.

### Conor Doane

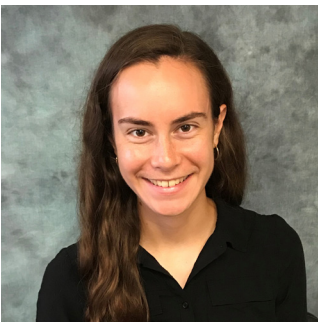


*Hometown:* Portland, Maine

*Career Goals:* I hope to develop technical and scientific expertise on infrastructure and lead a business that provides economically viable and environmentally sustainable engineering technology. I would also like to hold a political leadership position to best represent the values of a population. Ultimately, I want to become a civil and environmental engineering educator to younger generations.

## MASTERS

### Kayla Bauhs



#### ENVIRONMENTAL AND WATER RESOURCES

*Hometown:* Middleton, Wisconsin

*Location of Undergraduate Studies:* University of Wisconsin-Madison

*Career Goals:* After completing my master's degree, I would like to work for a consulting engineering firm with a focus on water and wastewater projects. I also hope to obtain my PE license along the way.

### 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.

## MASTERS

### 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.

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### Abby Burke



#### GEOTECHNICAL ENGINEERING

*Hometown:* Hardinsburg, Kentucky

*Location of Undergraduate Studies:* University of Kentucky

*Career Goals:* After earning my master's degree, I plan to work for a geotechnical consulting firm and obtain my PE license. Eventually, I may return to school for a Ph.D. and pursue a career in academics.

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### Amanda Darling



#### ENVIRONMENTAL AND WATER RESOURCES

*Hometown:* Aurora, Illinois

*Location of Undergraduate Studies:* University of Illinois at Urbana-Champaign

*Career Goals:* After earning my master's degree, I hope to pursue research opportunities applying technologies for sustainable development of water infrastructure, including systems for wastewater treatment and water supply.

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### 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 to obtain my PE license.



MASTERS

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.

Kyle Horsham



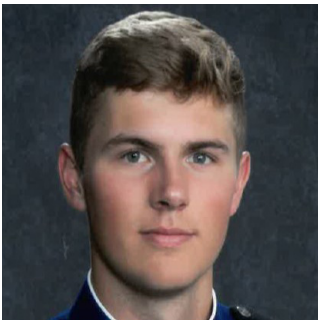
GEOTECHNICAL ENGINEERING

*Hometown:* Fallston, Maryland

*Location of Undergraduate Studies:* University of Delaware

*Career Goals:* To work at a professional engineering firm upon earning my Ph.D. and becoming a licensed professional engineer. I have goals of returning to academia and becoming a professor to aid in the engineering education of future engineers.

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.

## MASTERS

### 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.

---

### Justin Macmanus



#### ENVIRONMENTAL AND WATER RESOURCES

*Hometown:* Harlingen, Texas

*Location of Undergraduate Studies:* Texas A&M University

*Career Goals:* I plan to work at a private consulting firm as a design engineer and project manager on water treatment and wastewater treatment projects. I hope to eventually work my way up to a management position in a large firm or start my own firm.

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### 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.

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### 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

### Ryan Osborn



#### ENVIRONMENTAL AND WATER RESOURCES

*Hometown:* Galesburg, Illinois

*Location of Undergraduate Studies:* University of Illinois at Urbana-Champaign

*Career Goals:* My career goal is to work as a water resources engineer for a company that focuses on stream and watershed restoration.

### Casey Peloquin



#### GEOTECHNICAL ENGINEERING

*Hometown:* Gig Harbor, Washington

*Location of Undergraduate Studies:* United States Air Force Academy

*Career Goals:* My goal is to make the Air Force a career and serve my 20 years. I am currently a 1st Lt. as a civil engineer officer and I love my job.

### 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.

### 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

### 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.

### 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.

### Maria Amaya



## DOCTORAL

#### 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.

Meredith Bullard 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.

Emma Coleman



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.

DOCTORAL

Abraham Cullom



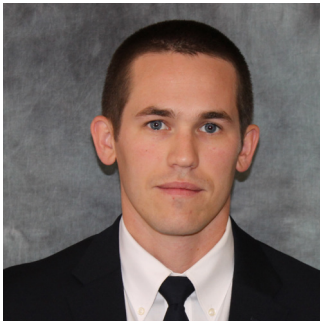
ENVIRONMENTAL AND WATER RESOURCES

*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.

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

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.

DOCTORAL

Michael Lee



ENVIRONMENTAL AND WATER RESOURCES

*Hometown:* Seoul, Republic of Korea

*Location of Undergraduate Studies:* Hanyang University, Seoul, Republic of Korea

*Career Goals:* I would like to be a professional in the field of coastal engineering as a researcher and/or educator.

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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.

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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.

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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.

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.

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, especially 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.



DOCTORAL

Julie Paprocki



**GEOTECHNICAL ENGINEERING**

*Hometown:* Mingo Junction, Ohio

*Location of Undergraduate Studies:* University of Cincinnati

*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.

Emily Parker



**ENVIRONMENTAL AND WATER RESOURCES**

*Hometown:* Stockton, California

*Location of Undergraduate Studies:* University of California, Los Angeles

*Career Goals:* I hope to become an expert in urban water sustainability and help communities achieve more sustainable water practices through science/engineering, policy, and outreach

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.

Tyler Quick



**GEOTECHNICAL ENGINEERING**

*Hometown:* Lexington, Kentucky

*Location of Undergraduate Studies:* Brigham Young University

*Career Goals:* I plan on continuing in academia as a university professor. I would like to continue researching while teaching and mentoring future civil engineers.

DOCTORAL

Samuel Sherry



**STRUCTURAL ENGINEERING AND MATERIALS**

*Hometown:* Allentown, Pennsylvania

*Location of Undergraduate Studies:* University of Oklahoma

*Career Goals:* I would like to pursue a career in academia as a researcher. I hope to apply my knowledge to advance research in the field of structural engineering, as well as instill my passion for learning and knowledge in future engineers.

Ryan Stevens



**STRUCTURAL ENGINEERING AND MATERIALS**

*Hometown:* Signal Mountain, Tennessee

*Location of Undergraduate Studies:* Virginia Tech

*Career Goals:* I would like to work in the structural steel industry, with either a fabricator or contractor. Eventually, I would like to work for an engineering firm designing buildings and other structures.

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.

## DOCTORAL

### 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.

## VIA ALUMNI: WHERE ARE THEY NOW?

To see a list of Via alumni through the years, visit our website at <https://www.cee.vt.edu/via-alumni-where-are-they-now/>.

If you would like to update your information, contact Courtney Sakry at [csakry@vt.edu](mailto:csakry@vt.edu) or call the CEE main office at **540-231-0635**.

**THE CHARLES E. VIA, JR. DEPARTMENT OF  
CIVIL AND ENVIRONMENTAL ENGINEERING**

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