# CEE @ Nebraska

Department of Civil and Environmental Engineering

University of Nebraska–Lincoln

*Summer/Fall 2022*


*The roadside barrier developed by University of Nebraska–Lincoln*

# CONTENTS



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## *Special Thanks*

University Communications
Karl Vogel
Craig Chandler
JS Engebretson

In the 2021-2022 academic year, the Department of Civil and Environmental Engineering (CEE) has welcomed two new faculty with expertise in transportation engineering and engineering education. We also embarked on significant curriculum change, including revisions to our civil engineering curriculum and creation of a new environmental engineering bachelor's degree. We are excited to welcome our first cohort of first-year environmental engineering students this fall. This edition of CEE@Nebraska also includes a number of stories describing the cutting-edge research performed by Nebraska faculty, as well as innovative courses taught by CEE faculty, such as the course taught by Dr. Jiong Hu on distressed infrastructure highlighted in this magazine. We are also pleased to highlight our graduate student teaching fellows, undergraduate students and alumni. Finally, I want to thank all of our alumni and other supporters who give their time and talents to the department. We are pleased to recognize the recipients of our CEE departmental scholarships and we appreciate the generous support of the donors that make these scholarships possible.

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## *Jason Hawkins, Ph.D.*

ASSISTANT PROFESSOR
Transportation Systems Engineering

Jason Hawkins received his Ph.D. from the University of Toronto in civil engineering. He has a B.Sc. and M.Sc. in civil engineering from the University of Calgary, both focused on energy policy. He completed postdoctoral research at the University of Texas at Austin. His research focuses on transportation demand and integrated infrastructure systems analysis.

# MEET OUR NEW FACULTY

## *Logan Perry, Ph.D.*

ASSISTANT PROFESSOR
Engineering Education

Logan Perry holds a Ph.D. in Engineering Education from Virginia Tech, and a B.S. and M.S. in Civil Engineering from North Carolina State University and Virginia Tech, respectively. Logan's interests sit at the intersection of civil engineering and education with three primary research strands:

1) the transition between engineering school and work;

2) the transfer of learning between contexts; and

3) the use of virtual and mixed reality in engineering education.

# Environmental Engineering Undergraduate Degree Program to Begin in Fall 2022

Expansion of our world population and our national and state economies, along with increased public concern for environmental quality, have created a burgeoning need for more environmental engineers.

To meet those workforce demands in Nebraska, across the U.S. and around the world, the University of Nebraska-Lincoln College of Engineering and the Department of Civil and Environmental Engineering are introducing a new Environmental Engineering undergraduate degree program.

“The department is excited about this new major. The B.S. (Bachelor of Science) in Environmental Engineering will attract new students to the College of Engineering who are interested in environmentally focused engineering careers and who may previously have left the state for other universities who offer this major,” said Shannon Bartelt-Hunt, chair of Civil and Environmental Engineering.

“Environmental engineering programs typically attract more women to engineering, and we are excited about the impact this degree program will have on our department’s gender diversity.”

The Environmental Engineering major, beginning in Fall 2022, will feature a strong foundation in the physical, chemical and biological sciences, mathematics, and engineering fundamentals. Upper-division courses will address engineering applications for the prevention and control of air, water, and land pollution, with required courses that include organic chemistry, biology, geology, statistics, hydrology, solid waste management, air pollution, water treatment, and sustainable design.

The department also offers a Master of Science in Environmental Engineering and an undergraduate minor in Environmental Engineering.

Bruce Dvorak, professor of Civil and Environmental Engineering and an authority on environmental fields such as adsorption processes, pollution prevention and environmental sustainability for industry, said regional employers have in recent years struggled to find enough applicants trained in environmental engineering and prepared to pass licensure exams.

Nebraska environmental engineering graduates will enter a field that the U.S. Department of Labor predicted would be among the fastest-growing in this decade and will be ready to address pressing environmental issues. Those include rebuilding the water and wastewater infrastructure, addressing storm water management challenges, assisting industry in reducing their environmental footprint, and helping communities become more sustainable.

“This is an exciting time in environmental engineering, as the profession evolves to help address critical global challenges, such as the need for clean water and sanitation, sustainable cities, responsible consumption and production, and climate action,” said Dvorak. “The students in Nebraska’s first Environmental Engineering cohort will be prepared to be on the leading edge of the generation that must address these issues.”

John E. Olsson Family Foundation Scholarship for Civil Engineering
Keifer Smith

Dr. Dewey Andersen Memorial Scholarship Fund
Khalilullah Sultani
Arafat Alam

Swaim Family Student Support Fund
Sadie Khalil
Nicole Fiebiger
Hunter Gray

John E. Olsson Civil Engineering Scholarship Subfund
Jack Hinsberger

American Society of Civil Engineers Nebraska Section Scholarship/Fellowship Fund
Braden Labenz

Robert A. and Becky Reisdorff Student Support Fund
Chuyang Liu
Sussan Moussavi
Ronald Alvarado
Qusai Alomari
Khalid Alkady
Ryan Haggerty

Thomas T. Ogee, Sr. Memorial Scholarship Fund
Cordell Mika

Byron Low Civil Engineering Scholarship Fund
Jordan Jurgens
Kaden Perala

John W. Hossack Engineering Fund
Bowen Yang

Albert Schultz Civil Engineering Scholarship Subfund
Dylan Downes

Nebraska Section ASCE Student Support Fund for Transportation Engineers
Ryan Weyers

Russell Stimson Harris & Lina Fricke Harris Civil Engineering Scholarship Fund
Charlie Fankhauser
Alison Fricke

# 2022- 2023 Academic Year

Carl & Margaret Bodensteiner Scholarship Fund
Grace Pelan

John and Minnie Becker Memorial Scholarship Fund
Cate Huse

McLaughlin Scholarship
Carter Ross

Miller and Associates Consulting Engineers Scholarship Fund
Ryan Otte

Rebensdorf Family Foundation Scholarship
Max Lofgren
Ben Goeman
Caidell Davis
Nolan Kasuske
Sidney Matthias

Alfred Benesch & Company Civil Engineering Student Support Fund
Monica Fujan

Myron M. Blume Civil Engineering Scholarship Fund
Kanak Kanti Kar

G. C. “Jerry” and Florence M. Strobel Fund
Mary Connot
Hayden Wulf

Sorkin Scholarship Fund
Nicholas Moresette
Grace Chandler
Sinan Rasiya Koya
Seyed Mohammadreza Farooghi Mehr
Taylor Drahota

UNL Civil Engineering Scholarship Fund
Sudan Pokharel
Shivendra Srivastava
Gerrit Foellmer

Beavers Civil Engineering Subfund
Jacob Garder

Sanford W. Saunders Memorial Subfund
Sandy Ho

AWARDS

# Research team's paper earns PCI Journal's George D. Nasser Award

A team of researchers from Civil and Environmental Engineering, comprised of faculty and former graduate students, was chosen to receive the PCI Journal's George D. Nasser Award for their paper, "Flexural Design of Precast, Prestressed Ultra-High-Performance Concrete Members."

The team members are:

Chungwook Sim, assistant professor of civil and environmental engineering.

Maher Tadros, distinguished emeritus professor of civil and environmental engineering and the founding principal of e.Construct USA LLC.

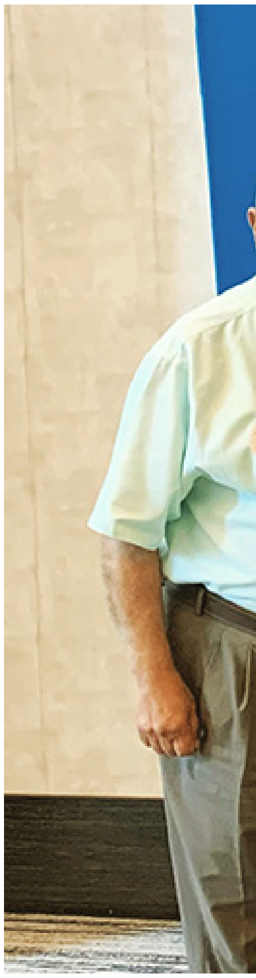
David Gee, a structural engineer with e.Construct specializing in UHPC and bridge design and a former graduate research assistant.

Micheal Assad, a structural engineer at Kiewit, specializing in UHPC and bridge engineering and is a former graduate research assistant and graduate teaching assistant.

The authors proposed flexural design guidelines for precast, prestressed concrete members made with concrete mixtures developed by precasters to meet the minimum specific qualifying characteristics for PCI ultra-high-performance concrete (PCI-UHPC). The paper examines numerous aspects of UHPC design and evaluation and includes a fully worked-out example of a 250-foot span decked I-beam of optimized shape.

The award was presented at the 2021 PCI Committee Days in Rosemont, Illinois, on Sept. 22.

The Nasser Award was established in 2004 by the Precast/Prestressed Concrete Institute (PCI) to honor Nasser's more than 30 years of leadership as editor-in-chief of the PCI Journal. It is given to a young author or authors for the best design, research or state-of-the-art paper on precast concrete appearing in PCI Journal during a single year. Sim's paper was published in the November-December 2020 issue of PCI Journal.



Art

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research, education
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tion system.


icle by: Karl Vogel

## Khattak named director of Mid-America Transportation Center at UNL

Aemal Khattak, professor of civil and environmental engineering and a national leader in highway and rail crossing safety, has been chosen as director of the Mid-America Transportation Center (MATC).

Khattak, who became associate director of MATC in July 2019, was named interim director of both MATC and the Nebraska Transportation Center (NTC) this past July. He will continue to serve as NTC's interim director.

An active member of the Transportation Research Board, Khattak is the inaugural editorial board member of the Transportation Research Records, Journal of the Transportation Research Board and chaired the board's Standing Committee on Highway/Rail Grade Crossings. His research is on transportation safety, transportation planning and intelligent transportation systems. Khattak's research projects, both national and international, have received more than $6 million in funding. He is a recipient of the College of Engineering faculty service award and the university-wide distinguished teaching award.

College of Engineering in 2000 as assistant professor of civil engineering. He received his Ph.D. from the
te University and Master of Science degree from Pennsylvania State University, both in civil engineering.

ted in 2016 as the U.S. Department of Transportation's Region VIII University Transportation Center. The
braska, Iowa, Kansas and Missouri.

eading faculty members from multiple academic departments of the consortium universities, state trans-
, members of the commercial freight industry, and other partner organizations to successfully meet the
n, and technology transfer objectives associated with the center's theme. The theme is improving transpor-
ninimizing risk associated with increasing multi-modal freight movements on the U.S. surface transporta-

# Grad student and MwRSF researcher Ruskamp awarded USDOT Eisenhower Fellowship

Riley Ruskamp, a master's degree student in civil and environmental engineering and a graduate research assistant at the Midwest Roadside Safety Facility (MwRSF), has received a Dwight D. Eisenhower Transportation Fellowship from the U.S. Department of Transportation.

The Dwight D. Eisenhower Transportation Fellowship Program (DDETFP) provided Ruskamp with a $10,000 award that helps fund his research. The program requires recipients to attend the Transportation Research Board (TRB) annual meeting in Washington, D.C., where the recipients showcase their research.

Ruskamp has been working with Mojdeh Pajouh, research assistant professor at MwRSF, and has been part of research projects that include portable concrete barriers, breakaway luminaire supports, and impact attenuation systems. These projects are funded by the National Cooperative Highway Research Program and various state departments of transportation.

"I am honored to receive this award as it serves as a recognition of the importance and impact of the research that I have been a part of, gives me an opportunity to showcase the knowledge and skills that I have developed throughout my academic career, and opens the door to several career opportunities I otherwise may not have come across," Ruskamp said.

The DDETFP provides fellowships to students pursuing degrees in transportation-related disciplines. This program advances the transportation workforce by helping attract the nation's brightest minds to the field of transportation, encouraging future transportation professionals to seek advanced degrees, and helping retain top talent in the U.S. transportation industry.

From its initial support of graduate research fellowships in 1983 to the current program's inception in the Intermodal Surface Transportation Efficiency Act of 1991, the DDETFP has awarded over $50 million to graduate students in the transportation industry. From this investment, fellows have pushed for innovative change in multimodal areas from highway infrastructure to aviation to maritime, making the industry more effective and efficient. Fellows pursue careers in academia, private industry, and public service, serving as leaders across the nation.

# Five from Nebraska Engineering among 11 honored by state for hand sanitizer production effort

Five members of the College of Engineering community are among the 11 people from the University of Nebraska-Lincoln appointed as admirals in the Great Navy of the State of Nebraska – the state's highest honor - for their roles in a collaboration to produce hand sanitizer during the early stages of the COVID-19 pandemic. Receiving the honors from the College of Engineering were:

Leonard Akert, prototype design specialist and lab manager, Chemical and Biomolecular Engineering
Hunter Flodman, associate professor of practice, Chemical and Biomolecular Engineering
Peter Hilsabeck, lab manager, Civil and Environmental Engineering
Terry Howell Jr., research professor, Biological Systems Engineering; and executive director, Food Processing Center
Heather Newell, doctoral student, Chemical and Biomolecular Engineering

The other University honorees included:
Taylor Bond, assistant director environmental programs/hazardous building materials, Environmental Health & Safety
Sarah Herzinger, research technologist, Food Processing Center
April Johnson, senior, Food Science and Technology
Russell Parde, pilot plant manager, Food Processing Center
Julie Reiling, senior consultant, Food Processing Center
Lewis Sieber, fire shop/surplus property manager, Nebraska Forest Service


*Five members of the College of Engineering community - including (from left) Peter Hilsabeck, Hunter Flodman and Heather Newell - were among the 11 from the University of Nebraska-Lincoln who were honored by the state on Aug. 30 for their roles in a collaboration that produced hand sanitizer for the state. Not pictured are Leonard Akert and Terry Howell Jr.*

The production effort, a unique partnership between the University, the Nebraska Ethanol Board and ethanol producers across the state, led to the production of more than 200,000 gallons of hand sanitizer.

The honorary appointments were signed by Gov. Pete Ricketts and presented Aug. 30 by Jim Macy, director of the Nebraska Department of Environment and Energy.

During the ceremony, Macy noted that the hand sanitizer produced at the University's Food Processing Center and provided to the State of Nebraska was important in allowing many school districts and dental practices to remain open, especially in more rural areas of the state.

# Researchers Awarded $5M

*Article by: University Communications and Marketing*

University of Nebraska-Lincoln and University of Nebraska at Omaha researchers have been awarded $5 million by the Department of Defense Army Corps of Engineers for research to extend the lifespan of bridges through new monitoring technology.
Daniel Linzell, professor of civil and environmental engineering and associate dean for graduate and international programs at UNL, and Robin Gandhi, professor of information science and technology and director of the School of Interdisciplinary Informatics at UNO, will conduct the research project, "Multilevel Analytics and Data Sharing for Operations Planning."

Using rural Nebraska bridges as full-scale "testbeds," Gandhi, Linzell and other Nebraska U researchers, in collaboration with the Kinnami Software Corp., will conduct research and development relating to data collection at the edge using internet of things including sensors, unmanned aerial vehicles and more; secure data processing and management from the edge to the cloud; visualizations and analytics of data using machine learning; socio-technical impacts such as fairness of data, algorithms, and analysis; and decision support systems.

U.S. Sen. Deb Fischer, ranking member of the Senate Commerce Surface Transportation Subcommittee and a high-ranking member of the Senate Armed Services Committee, was instrumental in advancing the project, which was included in the Senate Defense Appropriations Bill approved in December 2020.

"New monitoring technology has the potential to increase the safety of our nation's bridges and make infrastructure repairs less costly," she said. "Through this important research, Nebraska will lead the way in the development of these sensors to help address transportation challenges in the future."

Interest is on the rise nationally for using electronic information systems to provide data on a bridge's structural performance between regular in-person inspections. New systems would allow officials to more closely monitor the health and safety of bridges at a time when a recent analysis of U.S. Department of Transportation data shows more than one-third of U.S. bridges are in disrepair. While these systems would provide early detection of potential safety hazards, they could be vulnerable to cybersecurity threats.

The research project will allow for predictions of remaining bridge life and guidance for maintenance using secure communications and protected data systems. It also will provide mission-critical data for use by the Department of Defense as well as public and private stakeholders to better prioritize budgets, protect bridges, and, most importantly, ensure the safety of those who travel on them.

"With the ability to electronically monitor the structural safety and stability of our infrastructure comes the responsibility to protect it from cyber security risks," Gandhi said. "This research aims to add to a growing body of knowledge in both of these areas."

Linzell added that while bridges in the U.S. have admirably served the traveling public for decades, they are at a point where advanced age, increased demand, extreme weather, and finite resources necessitate modifications to how their health is assessed and how bridge systems are managed.

"Our team's findings will augment current processes and allow for optimal allocation of labor and financial resources while, most importantly, maintaining safety," he said. "New technologies will be robust enough to support management of other large, infrastructure systems and could provide unique economic development opportunities in Nebraska."

Gandhi credited a large network of people and institutions who contributed to making this research effort possible, which includes Kinnami Software, which will be developing its resilient data platform, AmiShare, to protect and manage the sensitive data related to this project.

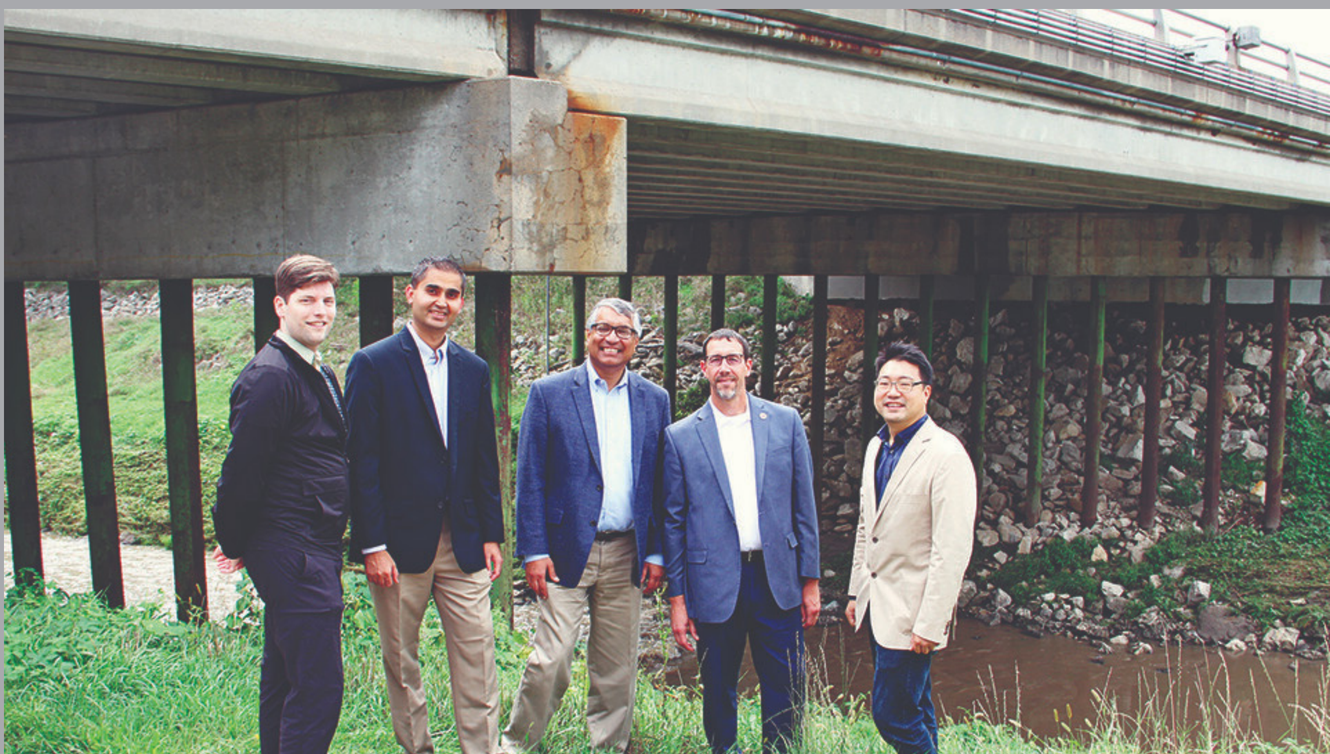
"This project would not have happened without the vision and support of several individuals and organizations," Gandhi said, pointing back to the 2015 decision by the deans of the UNO College of Information

# Bridge Safety Grant

Science and Technology and the UNL College of Engineering to identify infrastructure safety as a priority area.

Additional faculty involved in the project are Deepak Khazanchi and Brian Ricks from UNO and Chungwook Sim of UNL , with collective expertise in the socio-technical impact of continuous infrastructure monitoring; machine learning, visualization and simulation; and infrastructure health monitoring with next-generation sensing.

Linzell and Gandhi previously were part of a team that received a $1 million National Science Foundation grant to establish a Big Data Spoke headquartered at UNO, focused on producing a smart big data pipeline for rural bridge health management.



*PROJECT RESEARCHERS, STANDING IN FRONT OF A BRIDGE IN THE STUDY, ARE (FROM LEFT) BRIAN RICKS, ROBIN GANDHI, DEEPAK KHAZANCHI, DANIEL LINZELL AND CHUNGWOOK SIM.*

# Zhu, Alsaleem developing dual-sensing, health-monitoring system for spent nuclear fuel

Article written by: Karl Vogel

Nuclear energy is a key component of a clean, green future, producing more than half of America's zero-emissions electricity.

But with the U.S. generating about 2,000 metric tons of spent fuel waste each year and that waste stored at more than 70 sites in 34 states, research is needed to ensure safe transportation, storage and disposal.

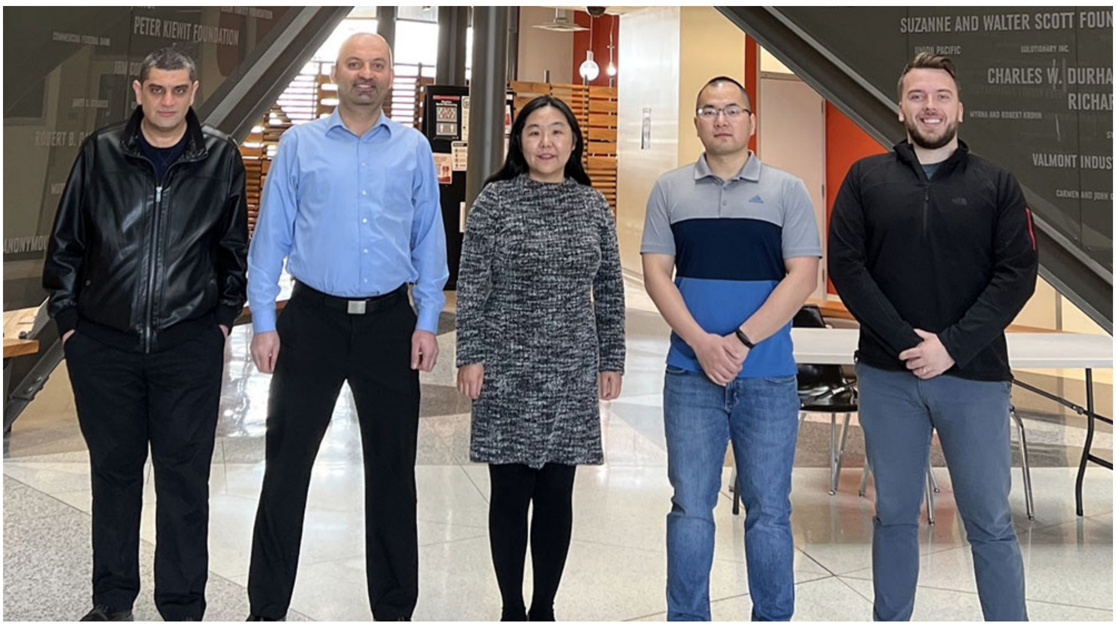
Nebraska Engineering researchers Jinying Zhu and Fadi Alsaleem have received a three-year, $800,000 award from the U.S. Department of Energy (DOE) to develop a dual-sensing, health-monitoring system for a spent nuclear fuel canister.

Both researchers are relying on past research projects to inform their approaches to this work. Zhu led a previous DOE project that developed monitoring system to detect cracks in concrete structures, and Alsaleem has vast experience with micro-electromechanical systems (MEMS), which involve fabrication of tiny sensors on the microscale and nanoscale.

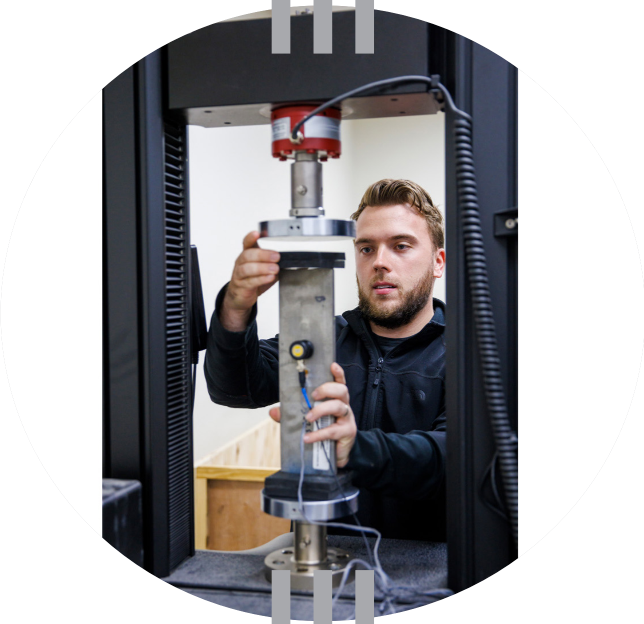
Zhu, associate professor of civil and environmental engineering, said this DOE project will collect data in a similar way to processes used in smart homes.

"Those smart home systems have sensors to monitor temperature and humidity, analyze the collected information, and then determine if the house is in normal operating condition," Zhu said. "If problems are detected, such as a fire, it sets off the smoke alarm."

Most dry storage cask systems in the United States are welded (or bolted) metal canisters inside vented concrete (or steel) overpacks. The meter-thick concrete overpack provides radiation shielding to workers and the public. The steel canister is filled with inert gas (helium or nitrogen), and helium is typically used for its high thermal conductivity. Monitoring the condition of the casks, including internal pressure, temperature, and leak detection are the most critical and challenging tasks. Conventional pressure and temperature sensing methods cannot be used due to radiation hazard and leak tightness restrictions.




The team working on this DOE project includes: Sulaiman Mohaidat, Ph.D. student in the Durham School, Fadi Alsaleem, assistant professor in The Durham School, Jinying Zhu, associate professor of civil and environmental engineering, Bibo Zhong, Ph.D. student in civil and environmental engineering, and Clayton Malone, Ph.D. student in



This new external dual-sensing system will monitor the canister's wall temperature and internal pressure using ultrasonic waves and sensors specifically designed for this purpose. It would then send alerts – or even "alarms" – when it detects significant changes in temperature or pressure or detects a possible leakage of helium gas. The external sensing system allows replacement or maintenance of these sensors for long-term monitoring.

Zhu is leading the ultrasonic research. She will use the sensitivity of ultrasonic waves to temperature and stress changes to continuously monitor the wall temperature and the internal pressure of the canister. Zhu and her graduate students have built the theoretical framework for thermally induced nonlinearity of ultrasonic waves with the support of previous DOE project.

"This new DOE award provides a great opportunity to implement and validate the innovative nonlinear ultrasonic sensing approach," Zhu said.

Alsaleem, assistant professor in the Durham School of Architectural Engineering and Construction, is proposing a miniature sensor using the micro-electromechanical systems (MEMS) technology to detect helium leakage. This work includes a partner at the University of Dallas to fabricate the tiny sensors.

It's a step in a new direction from current protocols for monitoring spent-fuel disposal sites.

"Our sensors will look at the changes in the property of the air outside the cask. At certain levels, that's when it sends out notifications or sounds the alarm."

That alert system is a key component of the DOE's request, but both Zhu and Alsaleem said it is critical to ensure the alarms are sounded only when there is a problem.

"Everybody talks about clean energy, zero-carbon, but we have to educate the public about nuclear energy because it's going to be a big part of the earth's future," Alsaleem said. "Storage of nuclear waste or spent fuel is a key component, and we'll be training the next generation of researchers who will be at the forefront of solving these issues."

Ph.D. students Clayton Malone, Bibo Zhong, and Sulaiman Mohaidat are working on this research project. Malone also worked on Zhu's previous DOE project while pursuing a master's degree from the UNL College of Engineering. Zhong recently accepted a position as a postdoctoral researcher at DOE's Idaho National Laboratory.

# Rare, successful crash test showcases strength of MwRSF-developed roadside

Midwest Roadside Safety Facility researchers conducted a rare-but-successful crash test Dec. 8 to assess a newly designed and significantly shorter concrete barrier's performance when it is contacted at 50 mph by an 80,000-pound tractor-tanker truck.

It was the first test in more than 30 years of a Manual for Assessing Safety Hardware (MASH) Test Level 6 truck (one pulling a tanker and not a box trailer), and its primary purpose was to evaluate a

62-inch tall concrete barrier that would be significantly cheaper to manufacture and install on roadways.

The tractor-trailer hit the barrier at a “worst-case scenario” angle of 15 degrees, the tanker rolled slightly over the top of the barrier and slid for about a second before the truck was uprighted and rolled on to its side. It was a result that pleased the research team.

“Overall it’s an excellent containment and the barrier worked is designed to pass the criteria,” said Cody Stolle, research assistant professor at MwRSF and in mechanical and materials engineering.


The roadside barrier developed by University of Nebraska–Lincoln researchers holds firm as a fully-loaded tractor-tanker vehicle slams into it during a Dec. 8 test.

Photos by: Craig Chandler

# Huskers Researchers Work To Improve Landfill Gas Emissions, Community Perceptions

Area landfills conjure up so many negative feelings for a lot of people — the odor, the litter — it's no wonder so many communities are struggling to find new locations for them. Working to create a better environment and improve community perceptions, University of Nebraska-Lincoln researchers are investigating ways to remediate gas emission pollution from landfills by using an innovative ground covering system and analyzing its community impact.

A university collaboration led by Jongwan Eun, assistant professor of civil and environmental engineering, and Yunwoo Nam, associate professor of community and regional planning, started three years ago with a grant from the Nebraska Environmental Trust. The team's goal was to test a new landfill ground covering system made from a co-extruded geomembrane with an ethylene vinyl-alcohol layer sandwiched between two inner, low-density polyethylene layers. This new system has been tested against traditional covering systems consisting of low-density polyethylene and no covering at all in recent field tests.

Reducing gas emissions is particularly important for the environment because landfill gases are not only the third largest source of greenhouse gases in the United States, but they include hazardous, noxious gases that often upset landfill neighbors, resulting in strained relationships with the community, regulatory actions and, in some cases, costly litigation for communities. Poor community perceptions of landfills also negatively impact the selection of future waste management sites as residents embrace NIMBY (Not In My Backyard). This research is of particular interest not only to environmentalists, but planners, legislators and community administrators as they manage current and future sites.

Mitigating gas emissions was a major component of the research project, in addition to gathering, analyzing and evaluating data regarding the new system's potential impact to any given community using gas dispersion modeling. Using geographic information system and engineering data, the team identified and evaluated the boundaries of simulation results to ascertain how far the gases would have an impact in any given community. Knowing how far the gas travels with this new covering system is important data to consider for any city administrator or stakeholder interested in implementing the new technology.

Although the testing for the new cover is ongoing, preliminary results are promising. The new system has proven to reduce gas emissions by 20 times the normal amount and increase gas collection by three times in laboratory and field tests in Butler, Nebraska.

As part of the field test, the team assessed the new landfill cover's impact on the Butler community. Using GIS and data collected through the state of Nebraska's Enterprise Content Management system, the team was able to measure the area impacted by gas emissions by analyzing the addresses of resident complaints. GIS mapping of complaints verified the accuracy of the gas

dispersion modeling.

Cost effectiveness of the new technology was also analyzed by the team.

"Although initially more expensive to install than the traditional approach, based on our simulation for the sixth and seventh year, there is a turning point where you will see a return on investment," Nam said.

In addition to faculty, Master of Community and Regional Planning student Sunah Moon and civil engineering doctoral student Yuan Feng have assisted with research and data collection.

"As a Ph.D. student, I loved working on this project and plan to continue my research work in the future," Feng said. "This project, as the world's first, on-site application of EVOH geomembrane, has built a strong foundation for my career. I hope to continue to engage in research that focuses on reducing landfill gas emissions after graduation and contribute my efforts to the protection of the environment."

Based on the team's research, this new approach to landfill coverings has promising results. With less gas emissions, higher gas collection and greater return on investment, the method may soon gain traction in communities looking to upgrade their systems.

"For my perspective, my long-term goal for this research project, I wanted to provide information that others can use for a good alternative to control and manage the greenhouse gases from landfills, which will be a huge benefit for the environment," Eun said.

For Nam and his many research interests in the planning sector, one of the main goals is creating healthier communities. This is certain to be an increasing struggle for community planners and city administrators as the Nebraska population grows, because increased population means increased waste.

"If you change the perception of waste facilities, then residents will not be so opposed to having them built in their neighborhoods," Nam said. "This is a great example of NIMBY and how it negatively impacts planning and a community's overall health. But hopefully, the work we do here today will make a positive difference."

Article written by: Kerry McCullough-Vondrak
Photo Credit: Dr. Jongwan Eun

# COVID-68512: Samplin
# code scale may hel

## What?

Since the emergence of the COVID-19 pandemic, researchers and health officials have investigated the possibility of identifying coronavirus hotspots — including those with asymptomatic carriers — by examining wastewater samples for traces of the SARS-CoV-2 virus.

To date, that wastewater monitoring has occurred mostly on the scale of either an entire city or an individual building. But the former is too broad to provide much context on specific hotspots, and the latter too narrow to inform public health decisions.

# ng wastewater at ZIP p isolate hotspots

## So What?


To address those limitations, Nebraska's Xu Li, Megan Kelley and colleagues at Lincoln Transportation and Utilities explored the feasibility of tracking coronavirus trends and identifying hotspots at the scale of ZIP codes. From July through September 2020, the team took weekly wastewater samples from five manholes and two wastewater treatment plants that collectively covered about one-third of ZIP codes and more than half the population of Lincoln.

After comparing the concentrations of SARS-CoV-2 from those wastewater samples against weekly reports of COVID-19 cases, the team found suggestive overlaps between the two. During each of the two COVID-19 surges that occurred over the 12-week span, the researchers saw marked rises in SARS-CoV-2 concentrations. Those concentrations appeared to increase in a relatively concentrated area — a single ZIP code — during the first, smaller COVID-19 surge but encompassed a broader swath of Lincoln during the second, more pronounced surge.

## Now What?

The findings indicate that monitoring wastewater at the ZIP code scale could reveal COVID-19 hotspots with greater spatial precision, potentially ahead of corresponding rises in reported COVID-19 cases, the researchers said.

If so, optimizing the sampling of wastewater might inform faster, more prepared, better-tailored responses to emerging COVID-19 outbreaks. Given the established links between geography and socioeconomic status, ZIP code-level monitoring might especially benefit marginalized communities struck hardest by the pandemic, the team said.

# Huskers help power Mayan temple preservation

Husker researchers Heather Richards-Rissetto, Richard L. Wood and Christine E. Wittich spent much of June deep underground, up to 30 meters below, taking lidar scans of Temple 16 at Copán, a UNESCO World Heritage site that was once a Mayan metropolis located in western Honduras.

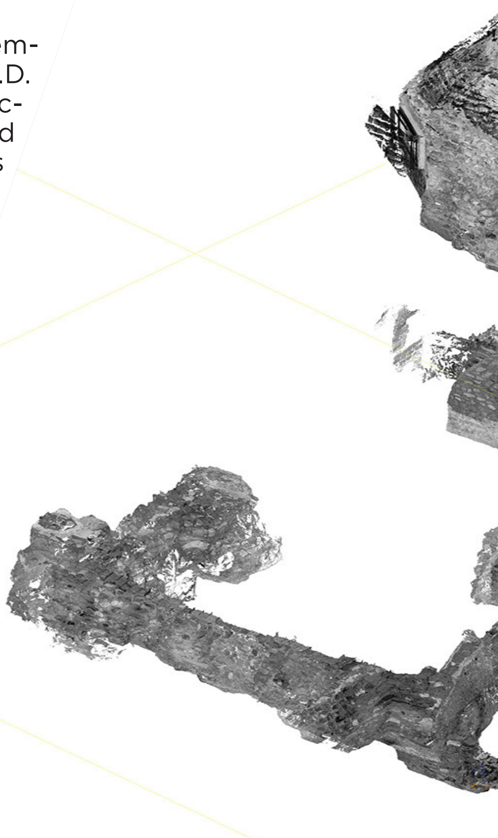
At the University of Nebraska–Lincoln, they have turned the data gathered into 3D geometry of the temple, including its excavation tunnels, the construction that's taken place over the span of centuries — and the damage.

This novel project's mission is the continued conservation of Rosalila, a temple that was originally preserved by ancient Mayan, going back to 600 A.D. Now more than 1,400 years old, the three-story, early classic period structure still features its elaborate stucco panels and original paint. It stored numerous artifacts and is engraved inside and out with iconography. This is the first time lidar has been used to scan an underground structure in a tropical climate.

"Rosalila is very unique, because it wasn't destroyed when another building was built on top of it," Richards-Rissetto, anthropologist and associate professor in the School of Global Integrative Studies, said. "What the Maya did at Copán was they actually encased it very carefully in stucco to preserve it for the future. We don't fully understand why this was done, and it's something very unusual — we don't typically see that in the Maya region.
"We know it was a sacred place, and that rituals took place there, but we are still trying to understand why this building was preserved."

Rosalila was discovered by Honduran archaeologist Ricardo Agurcia-Fasquelle through excavation about 30 years ago. Since then, time and the elements of weather and the environment, including hurricane flooding in 2020, have continued to erode and damage the temple.

Through contacts made during her ongoing research in Copán, Richards-Rissetto was approached to digitally doc-



ument Rosalila and its home, Temple 16, to find structural damage and help manage it. Richards-Rissetto has used various technologies, including 3D scanning and virtual reality, to digitally preserve and share ancient Maya cities, but this project was a heavier lift. She reached out to Wood, associate professor of civil and environmental engineering, who had experience with lidar and 3D renderings of underground historical sites, most recently Robber's Cave in Lincoln.

"The key aspect of lidar is the accuracy and location of these tunnels," Wood said. "With this technology, it enables you to get precise positioning (at the centimeter level), which is a challenge when trying to confirm the tunnels' orientations and locations underneath the temple.

"When you're in the site, far underground, you can lose your orientation or position, but by looking at it in the digital sense, in 3D, you get that precise positioning and location. This is a key for the advanced modeling and analysis task."

Digitally scanning Temple 16 is the largest project Wood has ever taken on. This project has incorporated more than 1,000 lidar scans, as well as an exterior unmanned aerial system (or drone) survey. The project, as led by Wood, is supported by the Asociación Copán, a nonprofit organization dedicated to the research and conservation of Honduras. The team had to spend hours underground each day to take the scans and dealt with 90-degree heat compounded by 90% humidity in the tunnels, and in some places, low oxygen. Aside from the researchers, the field team included Elisandro Garza, a visiting scholar at Nebraska and current doctoral candidate at the City College of New York, and others who were in

*(cont'd.)*

A RECONSTRUCTION OF THE TUNNELS IN TEMPLE 16 TAKES SHAPE FROM THE DATA GATHERED FROM THE LIDAR SCANS.

*HEATHER RICHARDS-RISETTO SCALES A LADDER TO GO DEEPER INTO TUNNEL 16.*

charge of running electrical lines down for lighting and to power the scanners.

Wittich, assistant professor of civil and environmental engineering, used her expertise in the tunnels, and now through study of the 3D renderings, to assess and predict structural damage.

"What we're working on is trying to understand how the structure is currently behaving, how it came to be in its current situation and how it will perform in the future," Wittich said. "We're looking at not just the shape and the geometry, but also asking questions about the specific materials, how those materials are distributed and interacting with one another, and what are the primary contributors to current damage.

"From an engineering perspective, we're harnessing the lidar and materials data to generate computational (finite element) models looking for the primary contributing factors to the structural damage to make recommendations and suggestions, and work with conservationists to preserve this really unique structure."

One dedicated master's student in civil and environmental engineering, Luis Tuarez, is also working on the project objectives as related to the structural modeling.

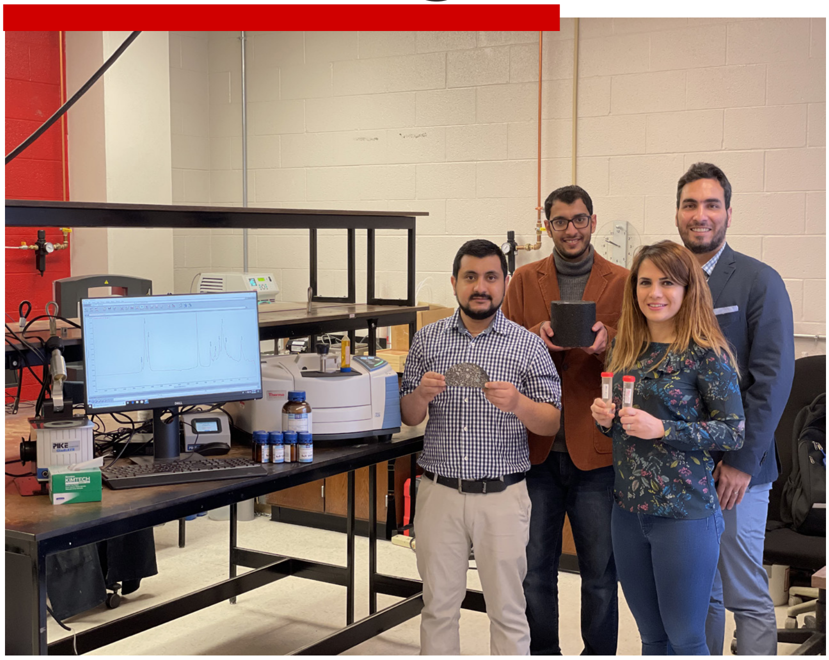
Aside from preserving the ancient temple, Richards-Rissetto hopes the project will eventually be a way for all people to digitally connect with Copán and its ancient structures.

"I think one of the next goals is to bring this into virtual reality," Richards-Rissetto said. "That pipeline is still being developed, but this is a step in that direction.

"This is also providing new avenues for research, which is really exciting. Hopefully, this leads to new insights and new methods for studying ancient architecture revealed through tunneling, not just in the Maya region, but in other areas of the world."

Ricardo Agurcia-Fasquelle (front), director of the Rescuing Rosalila Project at Copan, is pictured with (from left, in back) Christine Wittich, Richard Wood and Heather Richards-Risetto.

# Making the Blacktop... GREEN.



The Nebraska Soybean Board (NSB) is funding research for using soybean oil as a sustainable recycling agent in asphalt pavements.

Thanks to researchers and engineers at the University of Nebraska–Lincoln (UNL), a possible new use for soybean oil is on the way. The aim of this research study is to evaluate the effect of soybean oil—a locally available, affordable and environmentally friendly recycling agent—on the performance of asphalt pavements containing recycled materials.

Asphalt recycling is the process in which reclaimed asphalt pavement (RAP) materials are combined with new materials and a recycling agent, to produce hot mix asphalt (HMA) mixtures. Both batch and drum-type hot mix plants are used to produce a recycled mix. The RAP material can be obtained by milling or ripping and crushing operation. The mix placement and compaction equipment and procedures are the same as for regular HMA.

Recycling is one of the several alternatives available for rehabilitation of pavements. Other methods include overlay and complete removal and replacement.

Recycling is increasingly being used because of the following advantages:

· reduced cost of construction

· conservation of aggregate and binders

· preservation of existing pavement geometrics

· preservation of environment

· conservation of energy

The project, now in its second year, is focusing on the long-term performance, moisture resistance and thermal behavior of asphalt binders modified with the soybean oil.

"As a farmer, these kinds of projects and initiatives are really important," said Nathan Dorn, farmer and chairman of the NSB research committee. "We are finding ways to increase demand for our soybean oil, while supporting a method that decreases our environmental impact and benefits taxpayers and those that utilize and drive on asphalt pavements."

The outcomes of this research will ultimately work to provide a new use for soybean oil and create an expanded soybean oil market. For example, the Nebraska Department of Transportation (NDOT) is planning to use high percentages of RAP (up to 65%) with these new technologies (i.e., recycling agents). The preliminary test results show that 6% of vegetable-based recycling agent based on the total weight of asphalt binder must be added to asphalt pavements containing 65% RAP.

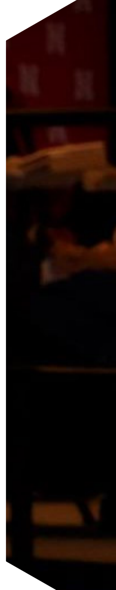
Nebraska produces two million tons of asphalt mixtures every year containing 5.5% asphalt binder, which means 6,600 tons of soybean oil will be consumed annually just for NDOT projects alone—probably about twice that for all asphalt paving in Nebraska. The possible use of soybean oil will provide a safer, trustworthy and more comfortable means of transportation while bringing significant cost savings, providing longer-lasting and more sustainable asphalt pavements.

*Article Cortesy of: Nebraska Soybean Board*

*Photo Caption: Dr. Hamzeh Haghshenas (far right) and the team of Nebraska researchers and engineers working on the asphalt project.*

# GRADUATE STUDENT TEACHING FELLOWS PROGRAM FOR CEE GRADUATE STUDENTS

Original Article by: Karl Vogel (2018). Edited/Updated by: Tareq Daher.



Over the last 3 years, thirty four graduate students from the College of Engineering have participated in the Graduate Student Training Fellows Program (GSTF), which aims to prepare those students to become successful teachers when they become faculty at any university. This year, the 2021 – 2022 cohort has 8 graduate students participating.

In addition to the demands of the degree program, the students are taking a three-credit course that teaches the fundamentals of being a teacher – designing and planning a course, learning how to assess and observe teaching techniques, and developing a teaching philosophy.

The GSTF helps students progress toward earning a graduate student fellow and gaining certification that can be added to their individual curriculum vitae. In addition to the College of Engineering Teaching Fellow certificate, graduate student teaching fellows earn a national Associate CIRTL certificate through UNL's graduate studies office.

As with other engineering graduate students, each of the students in the current cohort also have responsibilities that include academics, research and teaching.

Tareq Daher, director of the Center for Engineering Education Excellence, said the College of Engineering recognized that it was providing students with support that enabled growth in the first two areas, but not the latter.

This course, Daher said, is the first step in addressing that need.

"The most important piece is all of these students want to be or are looking forward to the future in academic jobs," Daher said. "When Dean Lance Perez came on board as interim dean, we began looking at what we can do to further support our students.

"This course, which came from those discussions, will make the students better able to support their faculty mentors and advisers – whether it's through teaching or co-teaching, or the grading they are doing or when they leave UNL – and when they graduate it will make them better faculty, too."

One of the major components of the course is having the students learn to develop courses that they would like to teach. Through what Daher calls a "backward design process," the students begin by deciding what are the outcomes they wish to achieve and then plan a path to meeting those goals.

"It's just like if they had graduated from here, went to a university and had to teach a course in their area of expertise," Daher said. "They have to write learning goals, think about assessments, think about activities and what would happen in the classroom, and plan for that.

"They also have to work on teaching philosophy that they would have to write on, expand and reflect on what types of teachers they want to be. That helps define for them how they will structure their course."

For many of the students, Daher said, this is the first time they have had to dive deep into the teaching aspect of their journey to a career in academics, and the class has been a success.

"This is an area they don't have great expertise in. You have these brilliant doctoral students in their engineering fields but no exposure to teaching and learning, there hasn't been much formal training," Daher said. "It's a whole new world for them. It's exploratory on their end and on my end. They've been doing great."

Students in the cohort participate in a 3-credit evidence based STEM teaching Methods course, write a Teaching Philosophy, learn the process for validated teaching observation and then observe engineering faculty teach, reflect on their learning, and attend teaching focused workshops.

*"The most important piece is all of these students want to be or are looking forward to the future in academic jobs."*

*-Tareq Daher*

# Inside and Beyond the Classroom:

## *Real-World Problems,*
## *Real-World Solutions*

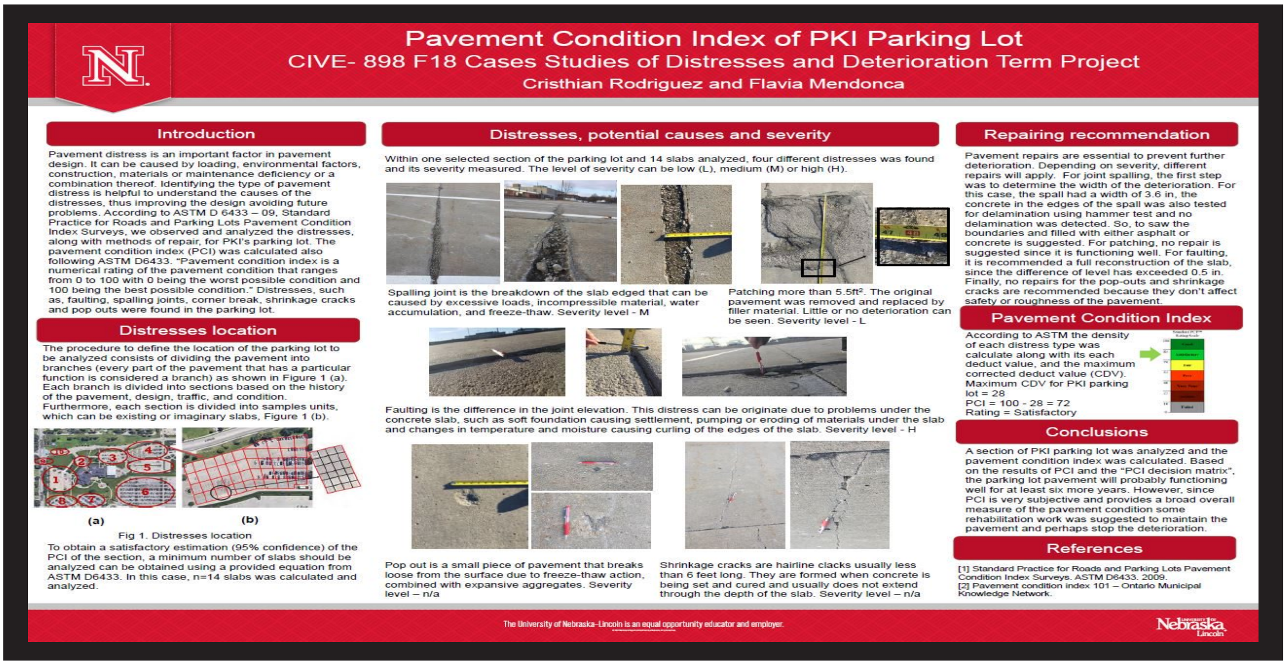
***Article by: Jiong Hu and Christine Wittich***

CEE faculty member, like Associate Professor Jiong Hu, are passionate about bringing the real world into the classroom – problems and all. This is the primary motivation for Professor Hu's novel course entitled "Infrastructural Material Distresses: Mechanism, Diagnosis, and Repair". This course focuses on the real-world problems of infrastructure, which may have deficiencies resulting from design, unsuitable materials, workmanship, aggressive environment, excessive loading, accidents, or many others. Since real-world problems related to infrastructure do not typically follow textbook examples, Professor Hu teaches this class through case studies and student-led projects throughout the Omaha and Lincoln area.

Within the first three weeks of the semester, Professor Hu has students conduct a "field hunting" assignment. Their task is to find real-world infrastructural material problems within the area and present the problems to the entire class. Professor Hu says "They do this before they know much about distresses. The purpose is to find real issues and to help students understand that this topic is very real, not just in the textbook or in theory." Students often find issues that relate to their jobs, internships, or are located close to home. These identified issues form the basis of their final course project, in which teams of students attempt to propose measures to solve the problems they've identified.

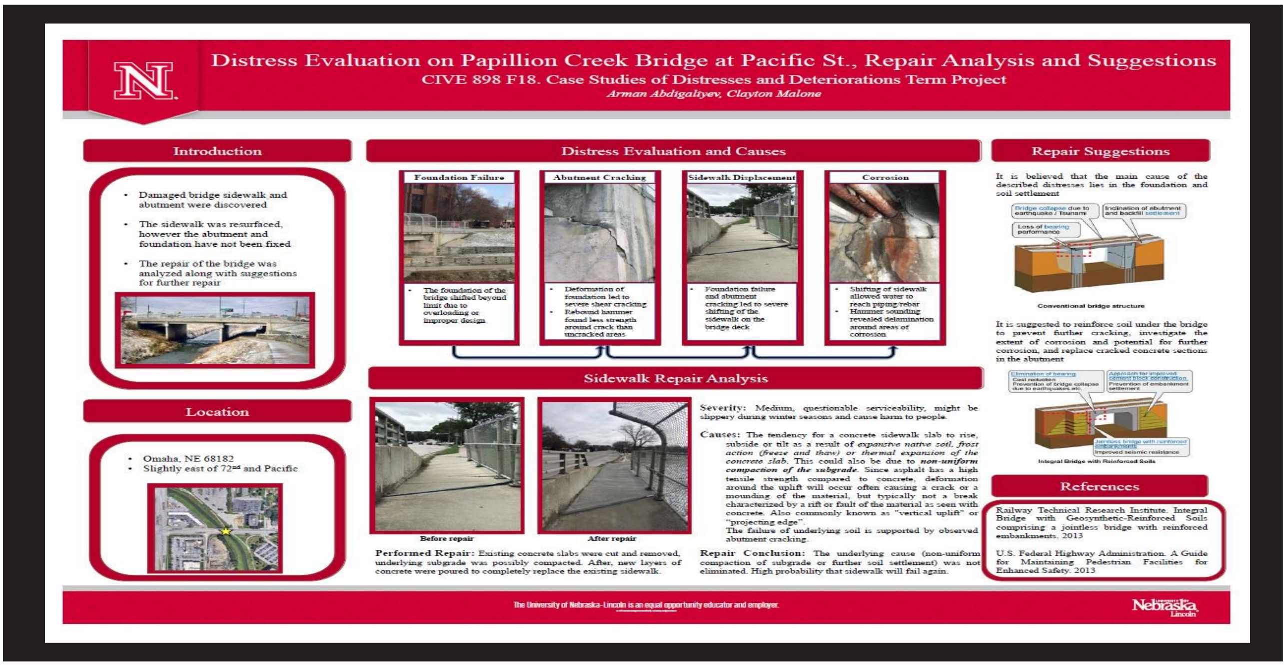

After the students present the results of their field hunting, they can begin to solve these issues alongside their classroom learning throughout the rest of the semester. Through lectures, case studies, lab visits, and demonstrations, students gain technical knowledge associated with the root causes of infrastructural material deterioration, analyzing the extent and impact of deterioration, and selecting appropriate repair and protection materials, measures, and procedures. Armed with this knowledge, student teams come up with their own strategies to address the problems that they've identified. Student teams typically devise a plan and then go out to the site, bring lab tools, and take measurements to help guide their plan of action. Professor Hu says "It is important that students do this on their own and not simply implement what the instructor tells them. This makes students uncomfortable, but in a good way and in a very realistic way."

At the conclusion of the course, student teams prepare a final report and present their real-world issues and their real-world plan of action in a poster. Since the focus of this course is outside the classroom, Professor Hu invites members of local industry as well as other faculty members to pro-




vide input and evaluate the student projects. The decision to use a poster presentation is to "allow evaluators to ask lots of questions and have deeper discussions without the typical time limitations of formal oral presentations," says Professor Hu. Another great outcome of this approach is that the final report and final poster can actually be shared with the site owners to help with potential implementation.

When Professor Hu looks back on this class, it is new and different every time since the problems addressed are brought directly by the students. As an instructor, Professor Hu wants the students to develop deeper problem-solving skills through this hands-on and real-world approach. "Problem-solving is what I care most about in my teaching. This class is very open-ended and can implement this in ways other classes cannot. Oftentimes, there are no correct answers and students need to refine their engineering judgment, which I hope better prepares students to solve real-life problems."



# Where are they

## *CHADDWICK ZIEMANN*

My name is Chaddwick Ziemann. I'm a senior civil engineering student at the University of Nebraska – Lincoln with an emphasis in transportation engineering. If you looked up the definition of a non-traditional student, you'd most likely see my picture. I graduated in 2007 with an Associate's of Applied Science degree in Computer Aided Drafting and Design from Southeast Community College. A short time after that, I started a full-time position as a Highway Design Technician for the Nebraska Department of Transportation (NDOT). In 2012, I was hired as a Highway Designer in the Roadway Design Division at NDOT and I am still in that position today. The summer of 2016 came and completely changed my life. Not only was my son about to turn one, but I also decided to return to school.

As a Highway Designer, I get the pleasure of seeing a highway project go from planning, to design, then through construction and completion. My main job duty is to see the project through the design phase and to create a plan set for construction. Every day, I get to interact with individuals who specialize in each area that civil engineering has to offer. For transportation engineering, I use traffic counts along with state and federal standards to make sure the highway is being designed for public safety. I estimate wetland impacts, design erosion control, and I may have to remove contaminants from the water that runs off the highway before it is released back into nearby streams. This covers environmental engineering. I've used gabion piles to stabilize a foreslope, that's geotechnical engineering. Over the years, I've done a lot of drainage analysis for culvert replacements, this is a part of what water resource engineering goes over. Lastly, structural engineering is a big part of highway design. Almost every highway has some sort of bridge or bridge sized box culvert that needs built or replaced. Each instance would need a structural analysis done.

Working at NDOT has not only allowed me to create relationships and work with a wide variety of wonderful people, but it has also given me a sense of pride in my work. On the other hand, I also appreciate the courses I am taking at the CEE department at the University of Nebraska – Lincoln, which significantly strengthened my skills and better prepared me as a licensed civil engineer. I pride myself in knowing that what I am doing will make an immediate impact on my community by giving them a safe and smooth highway to travel on.

now?

## *ARMAN MOUSSAVI*

My name is Arman Moussavi, and I am a senior Civil Engineering student at the University of Nebraska Lincoln. Through various research and internship opportunities, I have refined my interests in Civil Engineering for my future.

As a freshman, I reached out to Dr. Christine Wittich, a professor of Structural Engineering in the Civil Engineering department, as I knew I had a passion for research. The project we worked on is titled "Analysis of Local News Articles in Digital (Virtual) Reconnaissance of Buildings and Other Structures after Natural Hazards." The purpose of this research was to investigate and document structural damage resulting from natural disasters in the United States using multiple databases to detail and document the impacts of such disasters. With Dr. Wittich's mentorship and excellent guidance, I grew tremendously as a writer, student, and researcher. I submitted a research paper that was accepted for publication at the ASCE Forensics Congress.

As my first research project concluded, I began a new research project under the direction of Dr. Congrui Jin, the instructor of my Materials of Construction course. This research is focused on examining and applying biological structures to inspire a new generation of structural designs for roadside safety hardware, such as longitudinal barriers and crash cushions. I analyzed elements such as physical structure, strength, durability, and impact absorption of various materials. I am currently working on a review article and intend to submit it for publication in early 2022.

Academic research is not the only route I have taken to further explore the field of Civil Engineering. Starting in the summer of 2021, I began an internship with Olsson as a Road/Bridge team member. I have learned very valuable skills throughout this internship, such as working with the Civil-3D program, using engineering judgment, and designing roadways. I also shadowed the geotechnical team at Olsson because of my interest in Materials and Geotechnical Engineering.

My future goal is to earn a PhD in engineering so that one day I can teach and mentor others to perform innovative and cutting-edge research in my field of study at a major university.

# How did they get

DANIEL ROBERTSON


My name is Daniel Robertson. I grew up in Lincoln, where I spent a plethora of Saturdays in Memorial Stadium cheering for the Huskers. We still had winning seasons at that time.

Currently, I am pursuing a M.S. degree in Geotechnical Engineering at the University of Nebraska-Lincoln. It is a research-based degree option under the direction of Dr. Jongwan Eun and Dr. Seunghee Kim. My topic incorporates an analysis of geosynthetic-reinforced subgrade underneath asphalt roadways.

As of September 2020, I took an internship with Terracon Consultants in Omaha, Nebraska, where I worked in the soil laboratory for over a year. I performed a myriad of tests, including standard compactions, Atterberg limits, sieve analyses, and relative densities. This was an important internship because it familiarized me with the different procedures and processes for proper soil evaluation.

More recently, I was moved into a new role as a field technician. My responsibilities now encompass concrete testing, steel rebar inspection, and soil compaction assessment. I spend my days outdoors, which is a good fit for myself. Construction is something truly interesting and it is where I want to hold my career.

Since I am still in school though, I still take classes, one of which is Machine Learning in Civil Engineering with Dr. Congrui Jin. In this class we use R to compile data and anticipate theorized results with the information on hand. For my project, I used my collected data from our Terracon to predict concrete strength results based on the collected data of slump, air content, and temperature of a concrete mix. I have also taken geotechnical classes with my advisors, such as Soil Mechanics and Foundation Engineering. These classes show a more in-depth look into soil properties, behaviors, and theories used in application. I've even gotten to teach the Intro to Geotech lab, which I thoroughly enjoyed.

I am grateful for the opportunity to both conduct research at the university and work for a firm as well as establish the connection between the two realms. I know it will only make me a better geotechnical engineer when the time comes.

here?

## *JACOB CONWAY*

My name is Jacob Conway. When entering college, I chose to study Civil Engineering due to the wide range that is in the field. Throughout my studies at UNL, I have taken particular interest in structural, material, and transportation engineering. Fortunately enough, I was introduced to the Midwest Roadside Safety Facility near the end of my sophomore year through peers of mine. It was explained to me that the research conducted at the facility dealt with all three of the subdisciplines I was most interested in, so naturally I applied for their open undergraduate research position.

I ended up starting my position in the MwRSF office in Whittier the beginning of my junior year. Almost immediately I was trained in report writing, test documentation, and video analysis, which were all crucial to how research was conducted at the facility. This was an exciting aspect for me as I got to learn how the research was being conducted from experienced technicians and engineers. Working at the facility was a welcomed contrast in learning from my coursework during the first 'Covid year'.

For most of my first semester I worked on video analysis, however I did end up working over winter break. During the two-month extended break, I was presented the opportunity to get trained in operating machinery for metal tensile as well as concrete compression testing. Although I didn't get the opportunity to conduct tests in the lab for any projects, the training was still a great experience as it furthered my knowledge of material and structural engineering through hands-on learning. Additionally, I learned about some topics from classes that I had yet to take, such as Materials of Construction, which gave me a head start when I actually took the class.

Overall, working at the Midwest Roadside Safety Facility was a great experience and I feel that I learned a lot from the engineers and technicians there.

# Where are they now?

## *MADDIE GALUSHA*

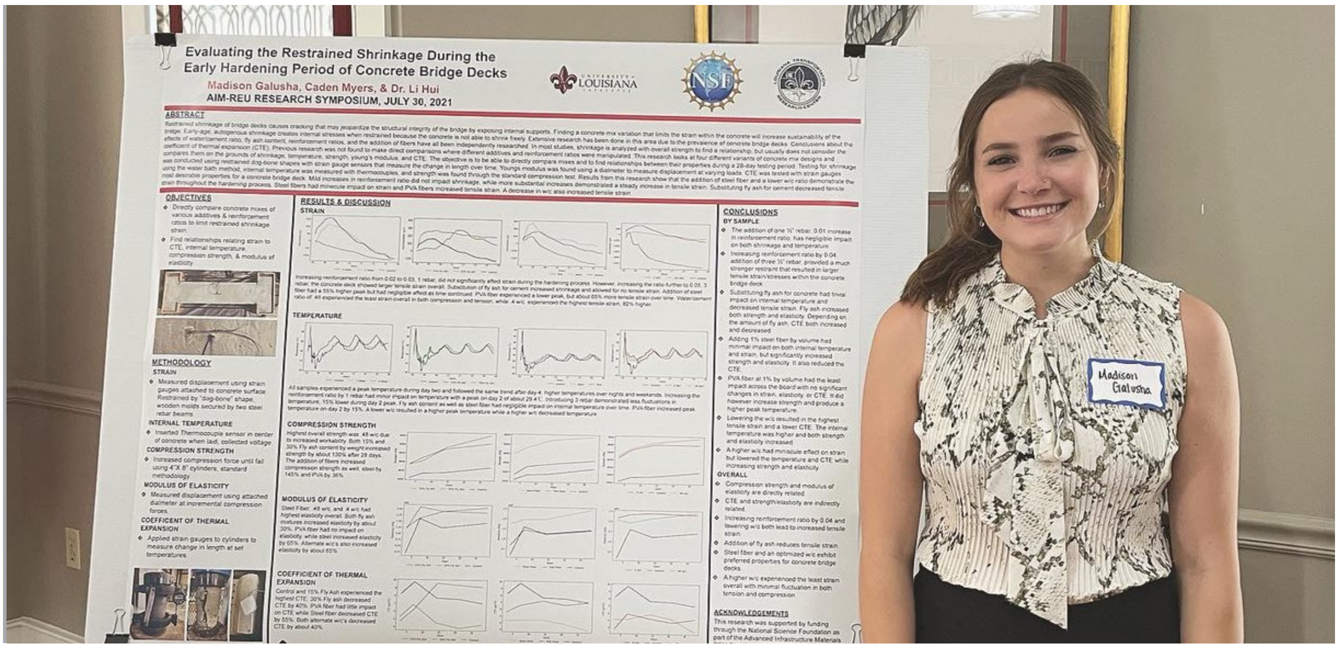
During the summer of 2021, I had the opportunity to participate in a Research Experience for Undergrads (REU) program at the University of Louisiana. I was paired with Dr. Li Hui and assigned a project related to Restrained Shrinkage on Concrete Bridge Decks. I had the freedom to decide the specifics of my project including what parameters I would change and what testing I would do. After extensive literature review, I decided to manipulate additives including steel and polyethylene fiber and fly ash, varying water to cement ratios, and increased rebar restraints. These different mix designs were tested and compared on the basis of compression strength, strain, temperature, and coefficient of thermal expansion.

Once my research plan was set, I had to present my idea, including specific testing methods and intended findings to fellow REU students and faculty. I was able to design, budget, and build all the molds needed to create my miniature bridge decks from plywood and rebar. Once molds were assembled, a control and eight variable batches of concrete were mixed and poured. This involved lots of hands-on work and heavy lifting. Each sample bridge deck was connected to a strain gauge sensor and thermocouple that took readings at specified time intervals. Organizing all this data was the most difficult and time-consuming aspect of my research. Each sample also had corresponding 4x8 cylinders for compression and coefficient of thermal expansion testing on days 3, 7, 14, and 28.

After testing was complete, I was tasked with organizing the data in a way that would be comparable and showed my results in a communicable way at a final poster symposium. I enjoyed being able to convey the work that I had spent so much time becoming an expert on. The sense of pride I felt discussing my findings was so worthwhile.

Besides the actual research, I enjoyed branching out for the summer. I was able to move away on my own, scary as it was, I watched myself grow and learned more soft skills than imaginable. I saw parts of the country that I never had and visited so many new places with my fellow researchers who were from all over. I expanded my network and made life-long friendships. I loved being tossed into the Cajun southern culture, the food, people, and climate are so unique. Living in the south is an adventure that would be rewarding to anyone.

This experience led me to pursue graduate school and a career in academia. This experience was invaluable, and I would recommend an REU program to all.



# Alumni


## *Flavia Mendoca, Ph.D.*

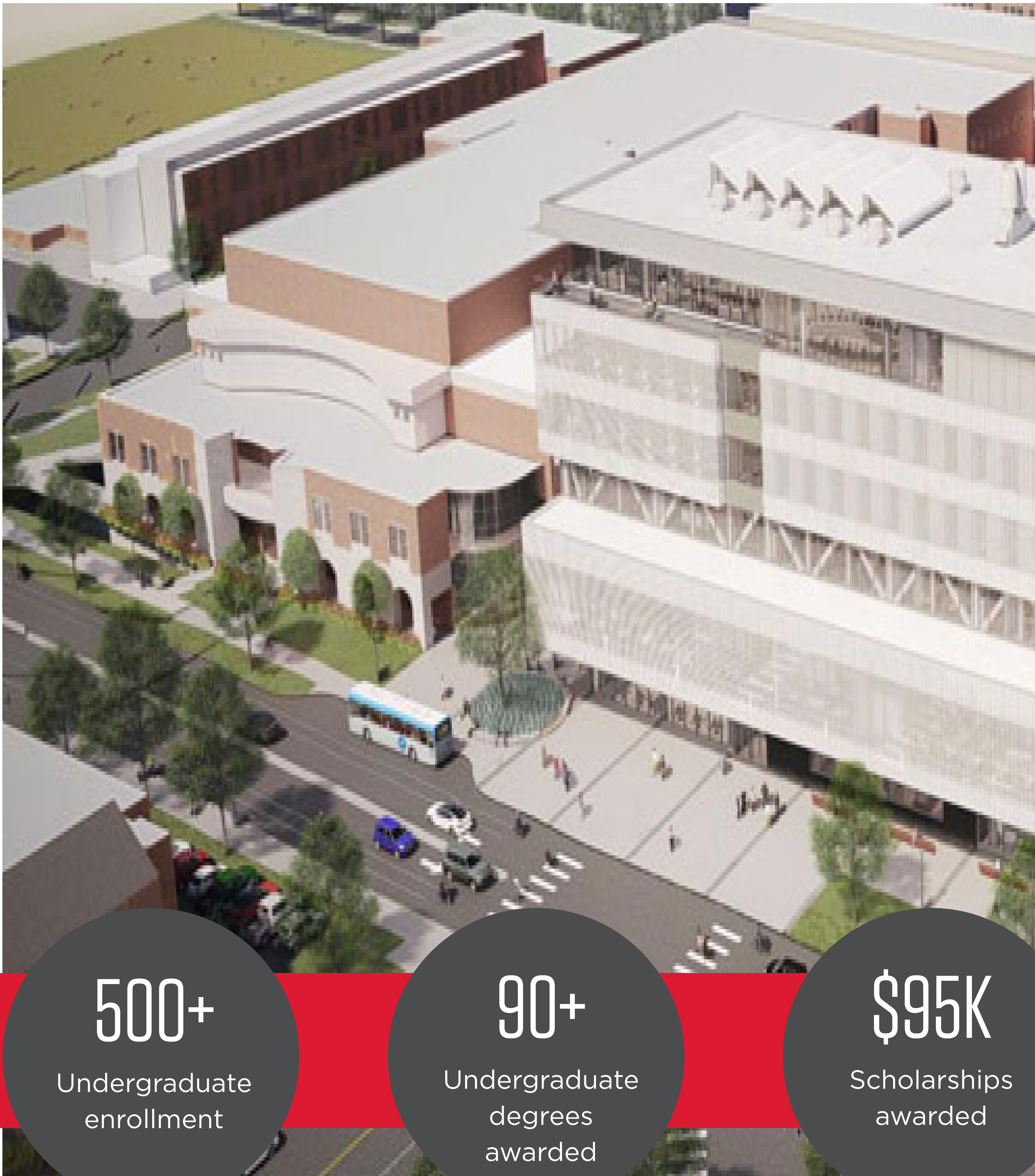
***Assistant Professor***
***Sweet Briar College***

During my childhood, I lived in a developing city in Brazil. Because of the rapid expansion of the city, there were many fascinating ongoing constructions. As a young girl growing up, I always admire the preparation of the terrain, the rising of the buildings, the workers in the field, and, of course, the engineers planning everything. Since then, I was motivated to study civil engineering to better understand that environment I was amazed by and to help develop the society just like they did to my city. I graduated with my bachelor's in civil engineering in Brazil and came to UNL to pursue my master's and Ph.D. When I was in the process of applying for graduate school, the study that was being developed by my advisor at UNL caught my attention and I knew I wanted to study and do research there.

While in UNL I conducted research in materials of construction, more specifically in concrete. Besides developing and evaluating concrete for different pavement and bridge applications, I have also been working on special concrete and advanced testing. My past research includes the successful development of Ultra High-Performance Concrete (UHPC) for highway bridge application in Nebraska, a project funded by the Nebraska Department of Transportation. Also, I developed and evaluated the behavior of Cellular Concrete mixes for different applications associated with a project funded by the University of Nebraska.

While much of my graduate school career has focused on research, I have discovered that I am also enthusiastic and interested in future engineers' education. Therefore, in addition to working on my research, I decided to study more about teaching future engineers. In my third year of graduate school, I was accepted to a fellowship program offered by UNL entitled ECEC's Graduate Student Teaching Fellowship to enhance excellence in STEM undergraduate education. Participating in this program was extremely important, it helped me develop my own teaching techniques and get confidence in teaching. Currently, I am an engineering professor at Sweet Briar College in Virginia and I feel that UNL truly prepared me to be successful in the career path I chose.

# *Civil and Environmental Engineering at Nebraska*



**500+**
Undergraduate enrollment

**90+**
Undergraduate degrees awarded

**$95K**
Scholarships awarded

TOP 10

Field for college graduates

KIEWIT HALL RENDERINGS AS OF SEPTEMBER 2021

University of Nebraska–Lincoln
Department of Civil and Environmental Engineering
P.O. Box 880531, 900 N. 16th Street, Nebraska Hall
W181

engineering.unl.edu