THE BRIDGE

Reinforcing the ground beneath our feet

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SPRING 2025

CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY *of* WASHINGTON

Partner with CEE

Discover five meaningful ways to engage with students, research and innovation.

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MESSAGE FROM THE CHAIR

Welcome to the spring 2025 edition of *The Bridge*. As I write this, we are navigating a time of significant uncertainty — both within the university and across the broader funding landscape that supports our work. Like many institutions, the University of Washington is facing budget constraints at the state and federal levels. In response, university leadership has enacted hiring freezes, reduced travel and limited events. Among the unfortunate outcomes of these cuts was the cancellation of Engineering Discovery Days, a long-standing tradition that introduces thousands of Washington students to the world of engineering.

These challenges are real and deeply felt across our community. But they have also reinforced the importance of connection to each other, to our students and to the external partners who help extend the reach and relevance of our work. Strengthening those relationships has been a growing focus for the department. We're also proud to share that CEE was recently ranked No. 10 out of 152 civil engineering graduate programs in *U.S. News & World Report*'s 2026 rankings — a recognition that reflects the excellence of our faculty, students and community. Our environmental engineering program remains ranked No. 18 out of 103, based on the 2025 rankings, which were not updated this year.

This edition features a story on how organizations can partner with CEE to drive innovation and opportunity. From industry-funded research to student club sponsorships, we're proud of the many ways we engage with the world beyond campus. These collaborations shape the education our students receive and the research we conduct.

You'll also find highlights of faculty research addressing timely engineering challenges — from Professor Mike Gomez's work using bacteria to strengthen soil and reduce earthquake risk, to Professor Dawn Lehman's structural testing in support of a national building safety investigation, to pilot projects from the Winkler Lab that are helping local wastewater treatment plants remove nitrogen without building new infrastructure.

The work featured in this edition of *The Bridge*, and the partnerships that support it, reflect how we're meeting today's challenges with purpose, collaboration and care.

As always, thank you for being part of our community.

Bart Nijssen
Chair & Professor

Department honors

Ph.D. candidate Travis Fried and **postdoctoral researcher Sarah Dennis-Bauer** were both named 2024 Outstanding Students of the Year by the U.S. Department of Transportation's University Transportation Centers program. The national award honors students for their academic excellence, leadership and research contributions to the transportation field. Fried studies equity in urban freight planning, while Dennis-Bauer focuses on air pollution and public health impacts of freight transportation.

Ph.D. student Jake Davis won second place for Best Student Oral Presentation at the American Meteorological Society's Symposium on the Coastal Environment. His research uses machine learning and undersea fiber optic cables to better measure ocean waves in the Arctic.

DEPARTMENT NEWS

Faculty promotions

Mike Gomez was promoted to associate professor with tenure. Gomez's research focuses on sustainable ground improvement through biogeotechnical techniques with applications ranging from earthquake mitigation to groundwater remediation. Earlier this year, Gomez received the 2025 Arthur Casagrande Professional Development Award from the American Society of Civil Engineers, which honors outstanding young professionals in geotechnical engineering. Gomez was recognized for advancing biogeotechnics through improved treatment methods and a deeper understanding of the processes that drive them.

David Shean was promoted to associate professor with tenure. A leader in cryosphere research, Shean develops and applies remote sensing technologies to study glaciers, snowpack and ice sheets. His work integrates satellite imagery, drones and cloud computing to better understand water resources, sea-level rise and natural hazards. He also plays a key role in several NASA-supported research projects that make open-source data tools more accessible for Earth science applications.

Mari Winkler was promoted to John R. Kiely Endowed Professor in recognition of her work in microbial ecology and wastewater treatment. Since joining CEE in 2015, she has advanced sustainable nitrogen and phosphorus removal processes and resource recovery technologies. Her research explores the use of microbial communities to improve the efficiency and environmental impact of wastewater systems. Winkler is also involved in global collaborations and serves in leadership roles with international water organizations. Her interdisciplinary background spans chemistry, microbiology and environmental engineering, and she has received numerous international awards for her contributions to the field.

Catherine Petroff delivers keynote at 2025 Graduation Celebration

At this year's departmental Graduation Celebration, students, faculty and families gathered to honor the Class of 2025 and hear from keynote speaker Catherine Petroff, a longtime CEE affiliate faculty member and expert in coastal engineering and natural hazards. The celebration, held on June 7 at Alaska Airlines Arena, recognized nearly 250 civil and environmental engineering undergraduates and graduates.

Petroff served as a faculty member in the department from 1993 to 2001, specializing in environmental fluid mechanics. Since 2003, she has continued her involvement with the department as an affiliate faculty member, teaching professional courses in hydraulics and hydrology.

She currently leads the Engineering Division of the U.S. Army Corps of Engineers, Seattle District, where she oversees a team of more than 160 engineers, scientists and technical staff. Her team works on an array of complex infrastructure challenges, including dam safety, flood mitigation and the design of coastal systems.

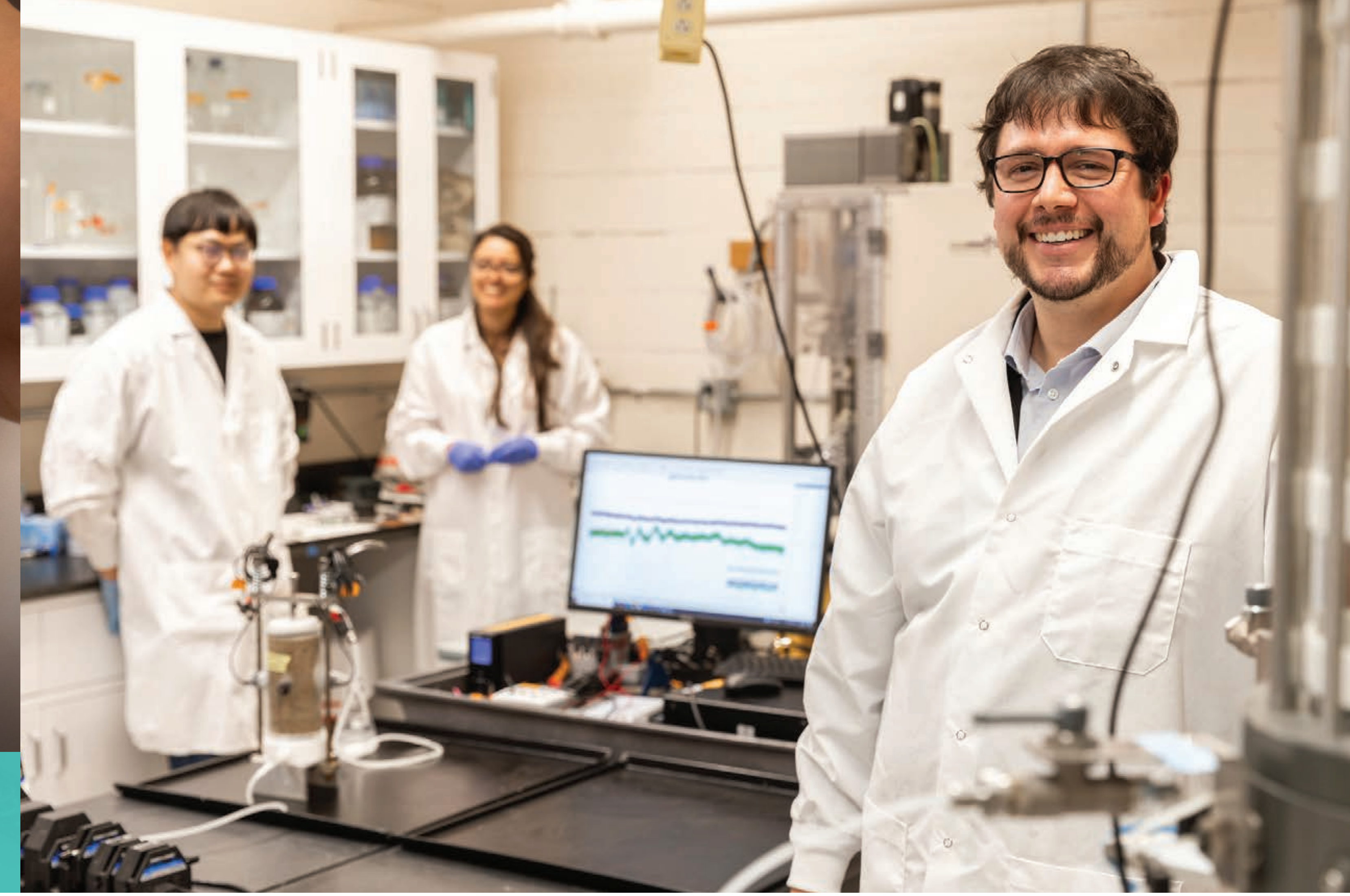
In her address, Petroff spoke about the importance of adaptability and lifelong learning in shaping a fulfilling engineering career. She encouraged graduates to stay curious, collaborate across disciplines and use their skills to pursue work that benefits both science and society.

FEATURE STORY

By Julia Davis

Reinforcing

THE GROUND BENEATH OUR FEET



CEE's Mike Gomez and his team are using bacteria as a more sustainable method of strengthening soils and preventing liquefaction in earthquake zones.

Photos by Mark Stone / University of Washington

When a powerful earthquake strikes, the damage is often visible — collapsed buildings, cracked roads and broken infrastructure. But sometimes, the most dangerous effects happen below the surface. In earthquake-prone regions around the world, a phenomenon called soil liquefaction has caused massive destruction, from Japan to New Zealand to the United States. This occurs when intense shaking turns loose, water-saturated sand into something that behaves like quicksand, causing the ground to lose strength and structures to sink, tilt or collapse.

Liquefaction typically occurs in sandy soils near bodies of water, where the spaces between grains are filled with water. When an earthquake hits, the sand particles try to pack more tightly together, but the water gets trapped, preventing them from rearranging. As pressure from the water builds, it forces the grains apart, and what was once solid ground suddenly acts like a liquid, unable to support what's above it.

To prevent this, engineers have traditionally strengthened soil using cement-based grouts or mechanical methods like compaction and vibration. These approaches are effective but come at a cost: they're expensive, disruptive, equipment-heavy and contribute significantly to greenhouse gas emissions.

Mike Gomez, a CEE associate professor, is exploring an alternative: biocementation, a process that uses bacteria to naturally bind soil particles together, strengthening the ground from within.

A more sustainable way to strengthen soil

Biocementation is inspired by nature. Just as corals and shellfish use calcium carbonate in their protective shells, this process uses bacteria already present within soils to begin forming similar minerals underground. Instead of injecting cement-based materials, engineers introduce a water-based solution containing nutrients, urea and calcium salts into the ground. The solution enables the growth of bacteria, which act like microscopic builders, producing an enzyme that breaks down urea and releases carbonate ions. These ions react with calcium in the solution to form calcium carbonate — the same mineral found in limestone. As this mineral grows, it "cements" sand particles together, transforming loose sand into a rock-like material that can better resist liquefaction.

"We're taking something that looks like loose sand and, in a matter of days, turning it into something that behaves more like soft rock," Gomez explains. "Although such changes can occur naturally over geologic time, we're doing it with a process that is dramatically accelerated by microorganisms."

Because the biocementation process relies solely on liquid injections, it requires no excavation or heavy construction equipment, making it ideal for urban environments where reinforcing the ground under existing buildings, roads and bridges can be difficult and more disruptive with traditional methods. Unlike thicker cement and chemical grouts, which require high pressure to inject, biocementation treatments flow easily through the soil, allowing them to reach deep underground with minimal disturbance.

"With this method, we're injecting a fluid that has essentially the same viscosity as water, so it has the potential to be transported over larger distances under existing infrastructure with minimal disruption," Gomez says.

Beyond its practical advantages, biocementation can offer significant environmental benefits. Portland cement, the key ingredient in most soil stabilization methods, is a major contributor to global CO_2 emissions, accounting for nearly 8% of total emissions worldwide. Conventional soil stabilization methods are used in over 40,000 projects annually in the U.S. alone, costing more than $6 billion per year. These methods are effective but come at a steep environmental price, contributing to greenhouse gas emissions and changes in soil ecology, and have even resulted in groundwater contamination in some instances. Biocementation offers a way to realize comparable engineering benefits with lower environmental impacts.

While engineers once thought they needed to create hard, sandstone-like material to reduce liquefaction, Gomez's research shows even minimal cementation, less than one percent by mass, can improve soil strength.

"We're realizing that even a small amount of cementation can lead to significant improvement," Gomez says.

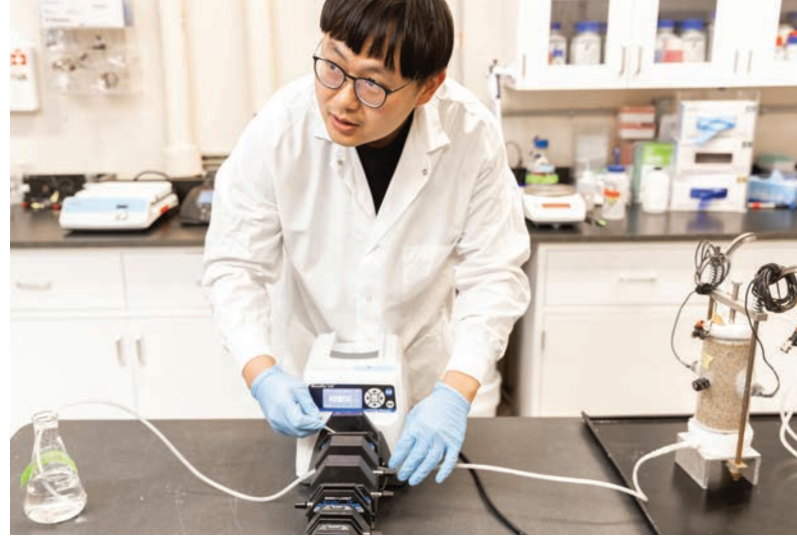
(continued on next page)

Above: Assistant Professor Mike Gomez (right) with graduate students Chungen Tai (left) and Bruna Gabrielly Ribeiro (center) in the Biogeotechnics Lab at the University of Washington.

Cover: Road damage caused by liquefaction during the 2011 Christchurch, New Zealand earthquake.

"We are not as used to using biological processes in geotechnical engineering. And that's part of the challenge — not just proving that it works, but helping people understand how it works, where it makes sense to use it, and identifying its limitations like we would any other ground improvement technology."

- MIKE GOMEZ, *CEE Associate Professor*



Graduate student Chungen Tai prepares the experimental setup by connecting a beaker containing the nutrient-rich injection solution to a soil column. This setup allows the solution to flow into the soil, initiating the biocementation process.

This means fewer materials, lower energy use and a smaller carbon footprint compared to conventional soil improvement methods.

Gomez's team is also exploring biocementation methods inspired by natural materials found in shells and insect skeletons that provide both strength and flexibility. By incorporating more flexible components, his team hopes to create a version of biocementation that is not only strong but also better able to withstand extreme loading events.

"Ultimately, these efforts could help us develop new materials that are more durable and can provide new functionalities for different engineering challenges," Gomez says.

Bridging the gap between innovation and trust

Like any new technology, biocementation faces skepticism. Civil engineering has relied on cement-based methods for decades, not because they're perfect, but because they're familiar.

"In almost every area of civil engineering, our profession has remained heavily reliant on Portland cement," Gomez says. "We know cement, we trust cement, and there's no one questioning whether or not it works."

Biocementation introduces something new: using bacteria to trigger natural mineral formation underground.

"We are not as used to using biological processes in geotechnical engineering," Gomez says. "And that's part of the challenge — not just proving that it works, but helping people understand how it works, where it makes sense to use it, and identifying its limitations like we would any other ground improvement technology."

While many are intrigued by the technology, he notes that engineers are hesitant to adopt new methods until they can trust that they are as successful, reliable and safe as traditional methods.

That proof starts in the UW's Biogeotechnics Lab, where the team studies how biological processes like biocementation, can change the way soil behaves. One technique involves sending non-destructive shear waves through treated soil to measure how these processes affect a soil's stiffness — the faster the waves travel, the stiffer the soil is, which correlates to the amount of cementation generated.

They also simulate earthquake loadings by repeatedly cycling the treated soil samples under controlled conditions to see how they behave prior to and after the occurrence of soil liquefaction.

"In some of our tests, untreated loose sands can see liquefaction within just a few loading cycles," Gomez explains. "But when we add even a small amount of cementation, the same soil can withstand tens or even hundreds of cycles before liquefaction occurs."

Looking ahead

So far, much of what's been learned about biocementation comes from lab tests. The next step is testing in the field, but that depends on opportunity.

"The geotechnical engineering community has already completed many large-scale tests and field trials using this technology, but they've been for things like sealing rock fractures or stabilizing soil erosion," Gomez says. "So far, none have been for the deeper geotechnical challenge of liquefaction mitigation."

Field trials present unique challenges. Unlike the uniform soil conditions in a lab, real sites have varied soil types, groundwater flow and less predictable environmental conditions. Engineers will need to figure out how to distribute nutrients evenly through different materials, control reaction speeds and ensure that cementation remains effective and stable long after treatments have been completed.

Another challenge is adoption. Despite its potential, biocementation is still relatively new, and industrial use of the technology has been limited.

"There is a real opportunity to deploy this technology for problems with few existing solutions," Gomez says. "A successful field trial for liquefaction mitigation could pave the way for wider adaptation, and our research team is committed to realizing real-world impacts."

CEE partners with NIST on national building safety investigation

By Julia Davis

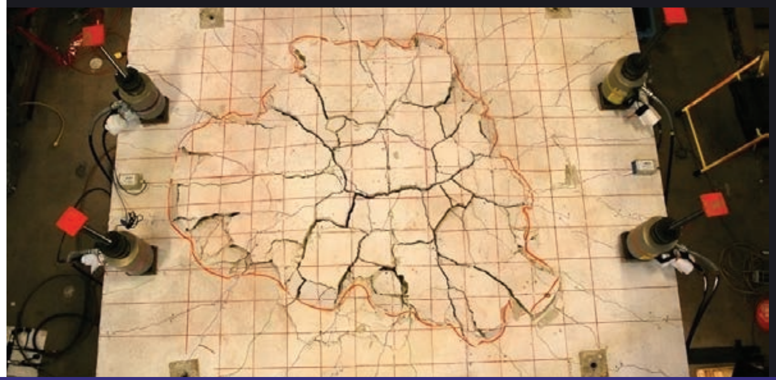
Through a contract awarded by the National Institute of Standards and Technology (NIST), CEE researchers are contributing to the National Construction Safety Team (NCST) investigation into the 2021 partial collapse of the Champlain Towers South condominium in Surfside, Florida. As part of this effort, the University of Washington partnered with the University of Minnesota (UMN) to conduct 13 full-scale structural tests using concrete materials from South Florida, where the original building was constructed.

Led by CEE Professor Dawn Lehman and Assistant Professor Travis Thonstad, with support from structural engineering students, the UW team tested eight full-scale slab-column connections and three full-scale columns in the department's Large-Scale Structural Engineering Testing Laboratory. These connections, where a vertical column supports a horizontal floor slab, are key to how a building transfers weight to its foundation.

"We have the capacity in our lab in terms of space and equipment to test these full-scale specimens," says Lehman. "That was pivotal in being able to support this work."

The testing investigates structural issues observed in the original building, with a focus on corrosion. To simulate the building's aging, the UW team worked with NIST to implement an accelerated corrosion protocol that mimics the deterioration the slab experienced over 40 years. In addition, the tests at the UW and the UMN included long-term loading to simulate column damage that would have occurred over time due to the heavy loading of the building.

Top view of a slab after a punching shear test, showing cracks radiating outward from the center, where the column supported the slab from below. Photo courtesy of NIST.



CEE's 2.4 million pound Universal Testing Machine in the Large-Scale Structural Engineering Testing Lab was used to test columns during the investigation.

The project began in May 2023, after NIST selected the UW's proposal to evaluate how these types of structural connections perform under different conditions. Testing began in February 2024 and was completed in June 2025.

The slabs were cast using a concrete mix sourced from Florida materials to match the original building conditions.

Each slab measured over 10 feet by 10 feet and weighed more than 11,000 pounds. During testing, hydraulic jacks applied increasing loads to simulate real-world forces.

"We performed slab-column punching shear tests," explains Ph.D. student Addie Lederman, who led the testing. "In these tests, the slab is supported by the column below it. As the load increases, the slab bends downward and eventually fails by punching shear, meaning that it cracks in a radiating pattern around the column and then drops suddenly, while the column itself stays in place."

The UW's work, alongside the testing at the UMN, supports NIST's broader investigation and efforts to improve building safety nationwide.

"NIST is using data from these tests to refine the structural engineering models of the building," explains Jack Moehle, Research Civil Engineer at NIST and co-leader of the structural engineering team. "With these models, we can identify the most likely causes of the partial collapse and be better prepared to prevent similar failures in the future."

Winkler Lab pilots pave the way for cleaner water without building new tanks

By Julia Davis

Most wastewater treatment plants were designed to remove carbon — organic waste that bacteria can easily break down — but not nitrogen, which is harder to eliminate. Nitrogen, found in human waste, can trigger harmful algal blooms when released into waterways. Removing it requires specialized, slow-growing bacteria that often get flushed out of conventional systems. Retrofitting plants to retain these microbes usually means building costly new tanks.

To address this challenge, the Winkler Lab has piloted new biofilm technologies that help nitrogen-removing bacteria stay in the system.

"The goal is to retrofit existing plants for nitrogen removal, without needing to expand," says Mari Winkler, John R. Kiely Endowed Professor.

Winkler's team recently piloted projects regionally in Everett, Edmonds and Seattle's West Point Treatment Plant. Each project tested a different method to boost nitrogen removal within the plant's existing footprint.

In Everett, research scientist Bruce Godfrey tested hydrogel beads filled with a type of bacteria called anammox. These bacteria remove nitrogen without needing oxygen, eliminating the need for aeration — the energy-intensive process of bubbling air into treatment tanks to feed bacteria.

"Traditional methods rely on air compressors to keep bacteria alive," Godfrey says. "With anammox, you skip that step entirely, which cuts energy use by more than half."

In Edmonds and West Point, the lab tested biodegradable carriers made from kenaf, a fibrous plant. These small carriers float throughout the tank, providing a surface where bacteria can attach and form sticky biofilms, helping them stay in the system long enough to remove nitrogen.

Bao Nguyen Quoc (CEE Ph.D. '22), who led the Edmonds pilot, describes the kenaf as "an affordable housing program" for slow-growing, nitrogen-removing bacteria. "It gives them a place to cling to, so they don't get washed out."

At Seattle's West Point Treatment Plant, CEE Ph.D. candidate Brian Roman is leading a project that simulates conditions at King County's South Plant. Like Edmonds, it's testing how kenaf can boost nitrogen removal without requiring additional tanks — an increasingly important goal as growing urban density limits opportunities to expand treatment facilities.

"With more people, there's more wastewater, but no room to grow the treatment plants," says Roman. "This technology helps us treat more water in the same space and add nitrogen treatment, which most plants weren't originally designed to handle."

These projects point to a future where existing treatment plants can meet stricter environmental regulations without costly new construction.

"We're finding ways to treat more water, remove nitrogen and minimize energy use — all without needing to build new infrastructure," Winkler says.

The West Point Treatment Plant, pictured here, is the site of the Winkler Lab's ongoing pilot project to improve nitrogen removal without building additional tanks. Photo courtesy of King County.

Tracking recovery after the Los Angeles wildfires

By Julia Davis

When massive wildfires tore through the Los Angeles area earlier this year, they left behind more than charred homes and scorched hillsides. They also raised pressing questions about public health, environmental safety and how communities recover after such devastation. To help answer those questions, the UW's RAPID Facility quickly mobilized.

"The Los Angeles fires are among the most significant U.S. disasters of the past decade," says Joe Wartman, director of the RAPID Facility and CEE professor. "We immediately recognized this as an important event and began making plans for a field deployment."

Over the course of four visits to the region, RAPID collected high-resolution imagery, 3D lidar scans, and environmental data, including air and water quality measurements. Much of this was captured using RAPID's new hyperspectral imaging system, which can detect post-fire toxins, such as ash and contaminated soil, not visible to the naked eye.

Wartman notes that the team's initial observations revealed more than structural damage. "After our first visit, we realized that beyond damage to the built and natural environment, there were significant health impacts," he says.

A key focus has been gathering baseline data — detailed documentation of conditions in the immediate aftermath of the fire. This time-sensitive information allows researchers to track how the environment and communities change over the coming months and years.

"Baseline data serves as the critical starting point for any long-term longitudinal studies," Wartman explains. "Without it, we don't know what the on-ground conditions were immediately after the fire, making it difficult to assess changes during the recovery period, which will inevitably span many years."

Background: An aerial view shows clusters of homes that survived while neighboring structures were destroyed by the fire. Top left: RAPID researchers wear protective equipment while collecting data in areas with lingering toxins from debris. Photos courtesy of RAPID.

The wildfire's impact on densely populated neighborhoods also brought unique challenges. Because of concerns about lingering toxins in debris, RAPID implemented specialized health and safety protocols for team members during fieldwork.

One unexpected observation stood out: clusters of surviving homes surrounded by destruction. Researchers hope the data will help uncover why some structures remained intact, whether due to construction materials, vegetation or local terrain.

The effort is supported by a multi-institutional research team led by UCLA, with collaborators from Oregon State University, the University at Buffalo and the Public Health Extreme Events Reconnaissance organization. The team includes experts across engineering, environmental science and public health, all working together to better understand the impacts of wildfires and inform future disaster resilience strategies.

"Fire is quickly becoming the most costly environmental hazard in the U.S. and globally," says Wartman. "Unless we understand the factors that led to the initiation and spread of this fire, we can't develop mitigation approaches to help minimize such events in the future."

One day in CEE

CEE undergrad Izzy Lavoie shares a behind-the-scenes look at her day through an Instagram takeover.

University of Washington Civil and Environmental Engineering

"This pic is from last summer, when I interned for the Federal Highway Administration. I was placed with Western Federal Lands and lived in Salem, Oregon, for 10 weeks while working on a bridge reconstruction project in Falls City."

Izzy Lavoie

YEAR: Sophomore
MAJOR: Civil Engineering
MINOR: Music
HOMETOWN: Houston, TX
FAVORITE CLASS SO FAR: CEE 220 - Introduction to Mechanics of Materials
EXTRACURRICULARS: Husky Club Crawlers, Concrete Canoe, UW Chi Omega

When sophomore Izzy Lavoie took over the CEE Instagram for a day, she gave followers a candid look at what it's like to be a student in the department. From labs and lectures to club meetings and even virtual golf, Izzy's schedule reflects the range of opportunities you'll find in the department and at the UW as a whole.

Originally from Houston, Texas, Izzy knew she wanted to pursue something in STEM, but wasn't sure what that would look like until college.

"I want to work for the public good and build something that's going to outlive me," she says.

Civil engineering stood out as a way to combine her interest in problem-solving with projects that have a lasting community impact.

Through photos, stories and quick tips, Izzy documented a full day in her life — sharing routines, favorite campus spots and a glimpse into the CEE community.

- 8:00 a.m. Start the day
- 9:00 a.m. Quick workout at the IMA
- 10:00 a.m. Breakfast
- 10:30 a.m. CEE 220 Lab
- 12:00 p.m. Lunch at Microsoft Cafe
- 12:30 p.m. ME 230 Recitation
- 2:30 p.m. Concrete Canoe Aesthetics Meeting
- 4:00 p.m. Virtual golf w/ friends
- 5:00 p.m. Dinner
- 6:00 p.m. Campus Philharmonia Rehearsal
- 8:00 p.m. Studying at Odegaard
- 11:00 p.m. Ending the day at McDonald's with a sweet treat

"On this day, we were learning about torsion – how things shear based on weight distribution or torque. Basically, at what point will something break?"

"Microsoft Cafe is right next to More Hall, which makes it the go-to coffee spot for everyone in CEE."

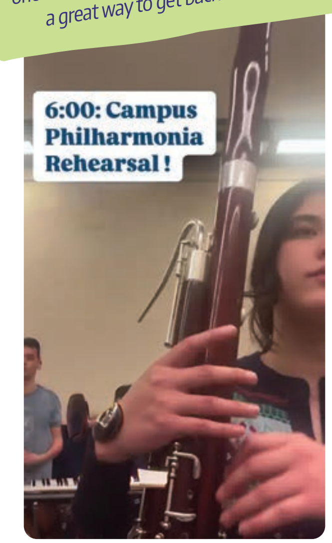
"In Concrete Canoe, I'm on the aesthetics team, so we work on the product display, which is the thing that the judges look at that shows the process of how we got to our final canoe."

"My biggest study tip would be find good people to study with. If you dread studying, you're not going to enjoy your college experience. You're going to want to find people who are on the same path and have that same passion, who you're going to enjoy spending your time with."

Want to see more student stories? Follow us on Instagram: @uw_cee

"Dynamics is about things that move. So we are analyzing: if we put pressure at a certain angle on an object, how will that object move? What angle will it move at? How much will it accelerate?"

"I've been playing the bassoon in Campus Philharmonia since I got to UW! It's a one-credit, once-a-week class for non-music majors, and it is such a great way to get back into your instrument."



"This summer, I'll be working for Performance Contracting Incorporated (PCI), a specialty contracting firm I met at a CEE Career Fair. The people from PCI that I talked to at the Career Fair seemed like the kind of people I wanted to work with, and that sold me."

Concrete Canoe team paddles to victory at regionals and advances to nationals

Each year, civil engineering students across the country put their skills to the test by designing, building and racing a canoe made entirely of concrete. Known as the Concrete Canoe Competition, hosted by the American Society of Civil Engineers (ASCE), this unique challenge combines structural engineering, materials science and teamwork.

At this spring's Pacific Northwest ASCE Student Symposium, the UW Concrete Canoe Team took home first place overall, winning every race and earning top scores for their project proposal and prototype. Their victory secured a spot at the national championship in San Luis Obispo, California, where they will compete in late June.

This year's canoe, Anni, celebrates the 50th anniversary of the UW's first Concrete Canoe team, founded in 1975. With a bold 1970s-inspired design, the canoe features colorful fiberglass inlays of flowers, a peace sign and a boombox, blending engineering precision with playful nods to the past.

The 230-pound vessel is the result of hundreds of hours of research, design and construction, with carefully engineered concrete mixes and reinforcements that balance strength and buoyancy.

"Our canoe is a testament to the dedication, skill and teamwork of our team," the group shared on social media. "Anni embodies 50 years of innovation, perseverance and passion for Concrete Canoe."

See more photos and learn how to support the team's trip to nationals: ce.uw.edu/canoe2025

Above left: The Concrete Canoe Team poses with this year's competition canoe, Anni, on the shores of Portage Bay in Seattle. Above right: Concrete Canoe team members raise their paddles in celebration after winning the Pacific Northwest ASCE Student Symposium. Photos courtesy of Mackenzie-Helnwein Photography.

Into the snowpack

By Julia Davis

There's no better way to understand snow science than to dig right into it.

In February, students in CEE's Snow Hydrology course left the classroom behind for a day of fieldwork at Snoqualmie Pass, about 50 miles east of Seattle. Led by graduate student Eli Schwat, who teaches the course under Professor Jessica Lundquist, the trip brought students face-to-face with the field techniques behind the data they spent the quarter analyzing.

Armed with shovels, thermometers and snow sampling tools, students dug snow pits and collected detailed measurements. They recorded temperature profiles, used density cutters to examine snowpack structure and studied crystals through magnifying lenses, replicating methods researchers use to track water content and snowpack stability.

Students also heard from John Stimberis, a UW alum and avalanche forecaster for the Washington State Department of Transportation. Stimberis, who manages avalanche risk and road closures on the pass, shared how snow measurements inform public safety decisions.

"It's awesome to hear John talk about the usefulness of these kinds of measurements," Schwat says. "His team is out there digging these pits to improve safety for people crossing over Snoqualmie Pass. It makes the class feel less theoretical."

Snow hydrology students at Snoqualmie Pass.
Photos by Jorge Azpeitia / University of Washington

Seniors rally around facilities improvements in class gift campaign

This spring, the College of Engineering launched its first Senior Class Gift Campaign, and CEE students chose to support a cause close to home.

Graduating seniors in each engineering department were invited to vote for a departmental fund they wanted to spotlight as part of the college-wide campaign, which runs from May 26 to June 14. In CEE, the Class of 2025 chose the CEE Facilities Improvement Fund, which supports efforts to modernize student spaces and create a more welcoming environment in More Hall.

From new gathering areas and updated teaching labs to a reimagined lobby and entrance, the fund aims to make a lasting impact on the student experience, something this year's graduating class wanted to pay forward.

"As much as I love More Hall, that building needs some love," says senior Fischer Brunzell. "It would be really cool if CEE could have a building that shows other students what we're all about. I'd love to see upgrades to study spaces so that More Hall becomes a place where people want to study and foster the department community."

HELP SHAPE THE FUTURE OF CEE

Join the Class of 2025 in transforming CEE's spaces for the next generation of students: **ce.uw.edu/giving**

Remembering Professor Emeritus Stuart Strand

Known for his pioneering work at the intersection of microbiology and environmental engineering, Professor Emeritus Stuart Strand dedicated his career to developing sustainable solutions for some of the planet's most persistent pollutants. He passed away in February 2025.

Strand joined CEE in 2003, following more than two decades as a researcher and faculty member in the UW School of Environmental and Forest Sciences. His work focused on using plants and microbes to remove contaminants from soil, water and air, from chlorinated hydrocarbons to military explosives and greenhouse gases. Among his most notable projects was a field study demonstrating how genetically engineered switchgrass could break down toxic explosives in contaminated soils, offering a low-cost, sustainable path to remediation.

He was also widely recognized for his indoor air research, including the development of genetically modified houseplants that can remove hazardous pollutants such as chloroform and benzene, a practical example of what he called the "green liver" concept.

Strand's academic path began with a B.S. in Aeronautical Engineering and an M.S. in Environmental Engineering from The Ohio State University, followed by a Ph.D. in Environmental Engineering from Pennsylvania State University. He joined the University of Washington in 1982.

Outside the lab, he was known for his love of cycling and could often be spotted riding his recumbent bike along the Burke-Gilman Trail.

His contributions to environmental engineering and his inquisitive spirit will be fondly remembered by his colleagues and students alike.

STRONGER TOGETHER

Five concrete ways to partner with CEE to advance engineering research and education

"These relationships give us a better understanding of what skills our students need in industry and where employers see gaps — and what we as a department can do to address that."

- SHARON DANA, *CEE's Director of Corporate and Foundation Relations*

As civil and environmental challenges grow more complex — from aging infrastructure and climate change to increasing demands on transportation and water systems — the need for engineers who can meet these challenges head-on has never been greater. Partnerships between academia and external entities play an important role in shaping how future engineers are educated and how research is applied.

With civil and environmental engineering at the forefront of many of today's most pressing issues, CEE is looking outward, inviting new partners to help drive innovation and shape the future of engineering. Since adopting a new strategic plan in 2023, expanding relationships with industry, nonprofit and government partners has become a growing priority for the department.

These collaborations prepare the next generation of engineers, spark discovery and bring valuable insights and resources to the department. They also create opportunities for ongoing dialogue between CEE and the organizations that rely on its graduates.

"These relationships give us a better understanding of what skills our students need in industry and where employers see gaps — and what we as a department can do to address that," says Sharon Dana, CEE's Director of Corporate and Foundation Relations.

Here are five ways you and your organization can partner with CEE to make a lasting impact:

1. Sponsor a student capstone project

Through the College of Engineering's Industry Capstone Program, CEE students partner with external sponsors to solve real-world engineering problems. Students work as a dedicated project team, bringing fresh insight and technical skills to a challenge identified by the sponsor.

Capstone projects have tackled everything from stormwater infrastructure design to construction logistics to sustainable energy planning. Sponsors benefit from early access to student talent, enhanced brand recognition and the opportunity to shape future engineers' skills.

2. Collaborate with CEE researchers

CEE faculty conduct research in areas like transportation systems, infrastructure resilience, water resources, climate adaptation and environmental sustainability. Your organization can partner on sponsored research projects, contribute through philanthropic gifts, or offer in-kind support such as access to data or equipment.

3. Support student clubs and teams

Engineering clubs and teams like Steel Bridge, Concrete Canoe, Engineers Without Borders and Timber Strong Design Build help students gain teamwork, leadership and project management skills alongside hands-on engineering experience. These groups rely on community support to fund their projects.

Companies can sponsor teams through financial gifts, materials and equipment donations, professional advising and more.

4. Hire interns and recruit talent

Organizations can participate in CEE's annual Career Fair in the fall to connect with students and recent graduates seeking internships and jobs. To recruit talent throughout the year, companies can post positions on the UW's job board, present to classes or clubs, or host site visits to showcase engineering projects in action.

5. Use our facilities and labs

CEE's research facilities are available for use by industry partners and public agencies. These include the X-ray Computed Tomography Lab, which houses the largest CT scanner on campus; the Large-Scale Structural Engineering Testing Lab, featuring the 2.4-million-pound "Big Baldwin" testing machine; and the RAPID facility, which provides equipment for collecting data after natural disasters.

Other resources include the Washington State Transportation Center, which supports applied transportation research and connects partners across sectors. Additional labs offer expertise in air quality, geotechnical testing and water treatment — making CEE a valuable resource for research and innovation.

Partnering in action:
Amazon Science Hub and CEE

A recent collaboration between CEE and Amazon's Middle Mile Products and Technology team shows how industry partnerships can lead to practical, impactful research.

The connection began through the UW + Amazon Science Hub, which invited faculty to submit proposals aligned with Amazon's research priorities. Seeing an opportunity to expand his work in transportation systems, Associate Professor Don MacKenzie proposed a project focused on electric freight trucks. His idea was selected by Amazon's Middle Mile team, which develops and manages the longer-distance routes in the company's delivery network.

MacKenzie's project explores how electric freight trucks and personal vehicles might share fast-charging infrastructure along highway corridors. While both types of vehicles need fast chargers, freight trucks require significantly more power and different hardware, including larger connectors and more space to park and maneuver. Similar to how cars and trucks often use different areas at a gas station, the idea is to keep the charging areas physically separate while sharing the same electrical supply and behind-the-scenes equipment. Charging at different times of day helps prevent overloading the system, allowing a single site to serve more vehicles without doubling the infrastructure. The approach could make electric transportation more practical and affordable, especially for long-haul freight.

The project builds on earlier CEE research supported by WSDOT, in which MacKenzie developed simulation tools to model charging station operations. Those tools are now being adapted to identify the best locations for shared stations based on demand from both passenger vehicles and trucks.

"Fast-charging stations have high fixed costs and low utilization, which makes them expensive to operate," MacKenzie says. "By identifying locations where both types of vehicles can charge without conflict, we're working to make electric transportation more cost-effective for everyone."

The collaboration offers a clear example of how companies can partner with CEE faculty to tackle real-world challenges and how a single proposal can lead to meaningful, applied impact.

CEE Associate Professor Don MacKenzie

THE BRIDGE

SPRING / 2025

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Send address corrections, questions and comments by email to ceenews@uw.edu or to the return address above.

JOIN US THIS FALL: 2025 EDWARD WENK, JR. ENDOWED LECTURE

Mark your calendar for our next endowed lecture featuring Carlos Genatios, an international leader in disaster risk reduction and sustainable development. Genatios has shaped science and technology policy across Latin America and led projects spanning earthquake engineering, climate change adaptation and equitable infrastructure planning. He is currently the Director of Engineering Technology and Design at Miami Dade College.

The lecture will take place on November 20, 2025. Learn more at ce.uw.edu/news/lecture/wenk

ENJOY THE VIDEOS:

2025 Steve and Sylvia Burges Endowed Lecture

CEE Professor Jessica Lundquist presented "Patterns in the Peak: Understanding Mountain Hydrology." Her talk explored how consistent snowmelt patterns can support streamflow forecasting, even in the face of unpredictable weather.

2025 Daniel L. and Irma Evans Endowed Lecture

Kimberly L. Jones, professor in the Department of Civil and Environmental Engineering at Howard University, discussed "Bridging Environmental Research, Policy and Community Engagement for a Sustainable Future." She emphasized the importance of aligning engineering research with policy and community needs to ensure sustainable, equitable access to clean water.

Watch the lectures at **ce.uw.edu/news/video**