

THE BRIDGE

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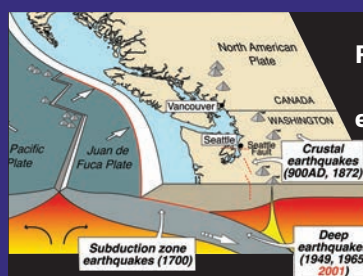
Safeguarding a staple food

CEE graduate student conducts research in Cambodian rice fields to help protect the nation's food security.

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SPRING 2019

CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY of WASHINGTON



Faculty find:
Stronger earthquake-resistant buildings needed.

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MESSAGE FROM THE CHAIR

Perhaps fittingly for spring time, the past quarter has provided an opportunity to reflect on the growth of the department in numerous areas, evaluate our educational objectives and identify strategic areas for cultivation.

One area that continues to grow in both interdisciplinary scope and impact is our faculty and student research. This issue of *The Bridge* features research that involves faculty and students from across campus who are collectively working to preserve and protect the food system in Cambodia, which is threatened by hydropower development along the Mekong River. Closer to home, CEE researchers continue to innovate; in this issue you can learn about the development of a new houseplant that can clean your home's air, as well as other research breakthroughs by our faculty and students.

Another area that continues to grow and change is our undergraduate curriculum. The department is currently preparing for an ABET review next autumn quarter. ABET accreditation substantiates the high quality of our BSCE and new BSEnvE degree programs and is highly valued by our graduates as it facilitates professional licensure. A core part of the ABET review process is a self-study to review our educational objectives and efforts to continuously improve our programs to better achieve the objectives. One critical component of our degree programs is the senior-year capstone design project; new this year, CEE is offering its first industry sponsored capstone design experience (see below with details on how to get involved).

At the graduate level, we are continually working to ensure our curricula meet the needs of professional master's students and supports the research activities of our graduate students. An updated graduate curriculum for our transportation engineering students aims to provide the knowledge and skills students need to design transportation systems of the future. The curriculum now looks ahead to the year 2040, and includes topics such as



Laura Lowes, Chair & William M. and Marilyn M. Conner Professor

electric and connected vehicles, as well as smart infrastructure that supports autonomous vehicles.

For many students, the learning they do in the classroom is just a part of their educational experience. Students learn countless skills through extra-curricular activities. These activities include the long-standing ASCE-sponsored Concrete Canoe and Steel Bridge team competitions as well as the UW chapter of Engineers Without Borders. Recently, I've been impressed with the variety and number of additional competitions and activities in which CEE students participate, including UW Solar and Washington Hyperloop and even the business school's annual Health Innovation Challenge.

Our alumni play an important part in the growth of the department. In coming months, we will be reaching out to our dedicated alumni via a short survey to ask for input on our degree programs and how our curriculum has prepared you for professional success.

Laura Lowes

Chair & William M. and Marilyn M. Conner Professor

Innovation Center. Students were supervised by CEE postdoctoral research associate Andisheh Rajbari and CEE assistant professor Don MacKenzie.

To provide additional hands-on learning opportunities, the department hopes to expand the number of industry sponsored capstone design projects. If your company has a suitable design project, please contact Jill Dalinkus (jmd4@uw.edu). Learn more: www.engr.washington.edu/industry/capstone.

INAUGURAL Industry Sponsored Capstone

This year, CEE offered its first industry sponsored capstone design experience. An interdisciplinary team of six students from CEE, Human Centered Design & Engineering, Computer Science, and Communications developed a mobile-based incident notification and navigation system to increase awareness about major traffic incidents that affect the region's transportation network and provide real-time data to strategically suggest alternate routes and modes of transport. The project was possible thanks to funding and mentorship from King County Metro, Sound Transit, WSDOT and Challenge Seattle, and support from the UW Mobility

FACULTY NEWS

PROFESSOR David Stahl RETIRES

For the majority of his career, Civil & Environmental Engineering professor David Stahl has researched something so small it can't be seen by the unaided eye. His accomplishments, on the other hand, are quite visible.

After 19 years of teaching and research at UW, Stahl is retiring at the end of June. Over the years, his research has led to advancements in the field of microbial ecology. His groundbreaking discovery of a marine microbe sheds light on one of the most abundant microbes in the ocean that plays an important role in the global nitrogen cycle.

"I've had a lifetime interest in biological systems," Stahl said. "I explored natural systems as a kid and there was always a creek or swamp or critters that were attractive nuisances."

Originally from the Seattle area, Stahl earned his bachelor's degree at the UW before heading east to earn his Ph.D. in microbiology at the University of Illinois, Urbana, where he accepted his first faculty position. Prior to returning to the west coast to join UW, he also worked at Northwestern University.

Over the years, Stahl's research has focused on studying the relationships among microorganisms that reside in all natural and built environments. His most significant discovery occurred in 2005, when researchers in his lab were the first to isolate ammonia-oxidizing archaea microorganisms from a water sample taken from a fish tank at the Seattle Aquarium.

For more than a century, it was unknown which marine microbes were responsible for converting the nitrogen in ammonia to forms used by algae that form the base of the marine food web. Although present in air, water and soil, only about 1% of microbial species on Earth have been identified. In honor of his discovery, a plaque was installed at the Seattle Aquarium in December 2018.

Publishing an impressive amount of papers over the years, Stahl has received many thousands of citations. He coauthors a major textbook in microbiology, *Brock Biology of Microorganisms*. Originally published in 1970, the textbook is now in its 16th edition. Stahl was also the cofounding editor of a new journal, *Environmental Microbiology*.



CEE professor David Stahl stands in front of the tank where a water sample was taken in 2005, which led to the discovery of a marine microbe.

In addition to being elected a member of the National Academy of Engineering in 2012, Stahl is a member of the Washington State Academy of Sciences and is a fellow of the American Academy of Microbiology. He also has a dual appointment with the Environmental Molecular Sciences Laboratory, PNNL, and is an adjunct professor in the UW Department of Microbiology.

"I have lots of nice memories of working with people on various projects over the years. Science is very international, so I've developed connections with wonderful colleagues," Stahl said.

Although he will continue working on a few research projects, Stahl plans to spend his retirement doing more hands-on work with wood and metal, as well as spend time hiking in the Pacific Northwest. He and his wife, Lin, also will enjoy time with their three children who reside in either Washington or California, and three grandchildren.

AWARDS & ACCOLADES

Faculty awards

AMY KIM

Husky Green Award

For her efforts to create healthy building interiors and optimize workspaces, assistant professor Amy Kim was honored with a 2019 Husky Green Award. Through teaching and research, Kim has been a strong advocate for sustainability both on and off campus. She has worked with the UW Tower to implement LED lighting fixtures and task lights in building retrofits. Last year, Kim was also involved in gaining Fitwel Certification, one of the leading certifiers of healthy buildings, for the first government building in Puget Sound: Bellevue City Hall. Kim has also developed two courses to provide students with opportunities to get involved in sustainability projects.



RICHARD WIEBE

AFOSR Award

In support of his research to improve the structural performance of aerostructures, assistant professor Richard Wiebe is the recipient of a 2019 Air Force Office of Scientific Research (AFOSR) Young Investigator Program Award. Wiebe is researching the fundamental characterization of nonlinear structural dynamics of aerostructures, and the development of experimentally validated simulation tools to predict and improve the performance of aircraft structures. The work is motivated by the need for accurate and efficient prediction capabilities for the complex response of structures under extreme loading at high speeds.



Student awards

SARA LUCERO

ASCE's New Faces of Civil Engineering

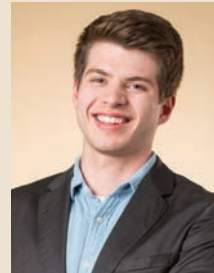
When visiting her grandparents' home in the Philippines as a child, CEE senior Sara Lucero was acutely aware of how water can impact infrastructure, especially during typhoon season. Family portraits on the walls had water lines across people's faces, from frequent flooding. With the goal of one day designing more resilient infrastructure for people affected by tropical storms, Lucero was selected as one of the American Society of Civil Engineers' (ASCE) 2019 New Faces of Civil Engineering. Every year, ASCE recognizes 10 students who represent the future of the profession. The only student in Washington state selected for the honor, Lucero is vice-president of the student chapter of ASCE and also works as a research assistant in CEE's Watershed Dynamics Research Group.



ALEX RATCLIFF

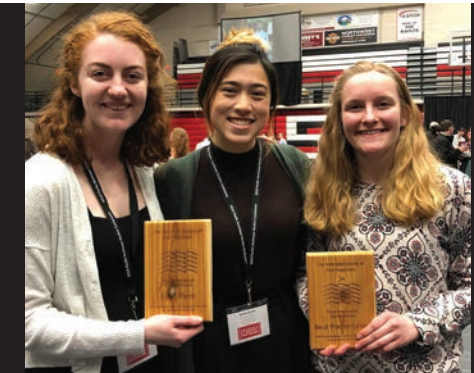
Husky 100 and Dean's Medal

If there's one thing that can be said about CEE senior Alex Ratcliff, it's that he hasn't gone unnoticed. A Husky 100 recipient, Ratcliff was also honored with one of two College of Engineering Dean's Medals for Academic Excellence. Every year, 100 undergraduate and graduate students are recognized as Husky 100 recipients for "making the most of their time at UW." Through his involvement in UW Solar, a student-run organization, Ratcliff helped bring solar power to three residence halls on campus. The Dean's Medal for Academic Excellence recognizes his outstanding academic achievement, research activities and involvement in campus activities. Ratcliff is part of the first cohort of students to graduate with a Bachelor of Science in Environmental Engineering degree.



TEAM TRIUMPHS

Several CEE student teams competed at the 2019 Pacific Northwest ASCE and AISC Student Conference hosted by St. Martin's University in Lacey, Wash., April 12-13. See a full list of student awards online at ce.washington.edu/news/bridge/Spring-2019.



CONCRETE CANOE TEAM takes first place

The UW Concrete Canoe Team sailed into first place at this year's regional competition, advancing to the national competition for the seventh year in a row. Competing against 14 teams, the UW team placed first in both design paper and final product, and third in both oral presentation and race points. Up next, the team will compete at the ASCE National Concrete Canoe Competition in Melbourne, Fla., hosted by Florida Institute of Technology in June 2019.

WATER TREATMENT TEAM wins regional competition

The UW Water Treatment Team made a big splash at the regional environmental competition, taking first place for designing a water treatment system that can be used in emergency situations. Based on an emergency scenario in which an earthquake triggered the eruption of Mount St. Helens and damaged nearby wastewater treatment plants, teams from 12 universities around the region competed to develop a filter that is capable of treating water from a stormwater retention pond.

STEEL BRIDGE TEAM demonstrates engineering integrity

If there was an award for engineering integrity, the UW Steel Bridge Team would have taken first place. On the morning of the regional Student Steel Bridge Competition, the UW team discovered that their bridge had a broken weld. Knowing they would be disqualified from placing in the event, the team self-reported the weld crack. The team still assembled their bridge along with 12 other teams and tested the strength of their structure. If allowed to compete, their score would have placed them second overall.

Alumni awards



ANA BARROS

National Academy of Engineering

Ana Barros (Ph.D. '93) spends much of her time working to predict extreme events. But there is one that she didn't foresee coming—being elected to the National Academy of Engineering (NAE).

"It was a big big surprise for me, and I feel humbled and deeply honored by this recognition," said Barros, who is the Edmund T. Pratt Jr. School Professor of Civil and Environmental Engineering at Duke University.

Advised by professor emeritus Dennis Lettenmaier during her graduate studies at UW, Barros was one of 86 new members elected to the NAE. One of the highest engineering honors, new members are elected for distinguishing themselves in their field and advancing projects that use engineering and technology to enhance quality of life.

The honor recognizes her work to predict precipitation dynamics and flood hazards in regions with complex, mountainous terrain. To better understand how large weather phenomena

develop, Barros and her research group spent several years installing ground-based sensors in a mountainous area of North Carolina. The sensors, used together with computer simulations and models, have led to improved weather forecasting methods. In 2014, Barros used the sensor system to help calibrate a new NASA weather satellite.



SAFEGUARDING A STAPLE FOOD

Graduate student works to protect Cambodia's food security



FEATURE STORY

When civil and environmental engineering graduate student Yasmine Farhat says she's going out into the field to conduct research, she means it. Rice fields, to be exact.

Based in Phnom Penh, Cambodia, where she lived for four months, Farhat frequently traveled several hours' north of the capital city in a four-wheel drive vehicle to collect soil and rice samples in two rice-producing powerhouses along the Tonle Sap Lake, a tributary of the Mekong River.

"What is often not fully appreciated in the United States is how important rice is in Cambodia," Farhat says. "Most Cambodians eat rice three times per day."

Together with assistant professor Rebecca Neumann, Farhat is working to understand how Cambodia's most important crop will be impacted by the introduction of hydropower dams along the Mekong River. The project is part of a larger interdisciplinary research effort focused on preserving the food system in the country, as Cambodians get up to 70 percent of their daily calorie intake from rice.

One of the most water-intensive crops to grow, rice requires not just a lot of water, but a lot of water at just the right time. With dams threatening to disrupt the current water cycle and monsoon floods that fuel rice production, the researchers anticipate changes to the nutrient content and seasonal yield of rice.

"Our hypothesis is that the flooding allows fresh soil from elsewhere to come and settle onto the rice fields and that brings in a bunch of nutrients and minerals that the plants need. So they do really well the next season," Neumann says.

To uncover the severity of the impact, and mitigate the effects, Farhat is measuring harmful contaminants such as arsenic as well as beneficial nutrients like zinc. By pinpointing the factors that fuel rice growth and nutrient content, the researchers can make recommendations for the optimal operation of dams, such as water releases that optimize for high rice yield for rice varieties that are high in minerals and low in contaminants.

"Once we figure out what key variables are important, we can assess whether those will be impacted by the flood duration and timing and make predictions into the future," Farhat says.

In Kampong Thom Province, one of two areas where Farhat conducts research, each visit starts by meeting with farmers at the Farmer Water User Community Office. Sitting down at a large table with the farmers, Farhat answers questions and shares updates about the research.

Photo opposite page top: In a rice-producing powerhouse in Cambodia, graduate student Yasmine Farhat meets with farmers.

Photo bottom: With help from Cambodian master's student Muth E-Nieng, graduate student Yasmine Farhat collects soil samples in a rice field.

"They get really involved, a lot of times they hop into the field with us and want to help and be part of the excitement," Farhat says. "The farmers have a lot more knowledge of rice production than we do. Their value is significant."

Although more than 130 new hydropower dams are on the horizon, the farmers are not yet visibly, or vocally, concerned. They are more interested in how the research can inform the general day-to-day aspects of growing rice.

"I want to know about the fertility of the soil, if it's good or bad and how to fix it," says farmer Lam Heang, who has been growing rice for more than 10 years.

Collaborating with local researchers is also an important aspect of the project. For the past year, the researchers have worked closely with the Royal University of Agriculture in Phnom Penh, where master's student Muth E-Nieng helps analyze soil and rice samples.

Still in data-gathering mode, Farhat plans to bring her initial findings to the table, quite literally, in the near future, to share with the farmers at Kampong Thom Province.

"It's all about the connection between food, water and energy," Farhat says. "We are trying to understand this interplay, how the changes in water and changes in energy produced by water will impact food security in Cambodia."



THE BIG PICTURE

To discover how changes to the Mekong River will impact the future of fish and rice in Cambodia, UW CEE researchers are working in collaboration with the College of the Environment, School of Public Health, and Arizona State University. Supported by an NSF grant, the researchers are collectively working to provide recommendations for sustainable hydropower development and management in Cambodia that balances renewable energy with food security. Read the immersive story about the project: <https://environment.uw.edu/mekong>.

CAREER CONNECTIONS:

13th annual CEE Career Fair

Dream jobs are closer to becoming a reality for many CEE students thanks to the 13th annual CEE Career Fair, which once again connected students with employers.

On the search for internships and upcoming job openings, more than 400 students attended the career fair on January 17, held in the HUB. Students handed out resumes and talked with representatives from 79 participating companies, five more than last year. Several employers traveled from outside the Seattle area to attend.

Founded in 2007, the career fair connects students with employers who are seeking internships and full-time positions. Industry focuses range from general civil engineering to specialty areas such as construction, transportation, geotechnical, structural, water resources/hydrology/fluid mechanics and environmental engineering. This year, construction saw the biggest sector of employers in attendance.

Leading up to the career fair, students were invited to attend a Career Fair Prep Night, where they received resume tips and interview practice.

“Many employers mentioned how well prepared our students were, and those who have attended year-after-year told me they’ve really seen improvement in the quality of the engagement of the students with employers,” said lead undergraduate adviser Mariko Navin.

PERFECT ATTENDANCE

The following companies have attended the majority of CEE career fairs since 2007:

- | | |
|---------------------------------|---------------------------------------|
| BergerABAM | KPFF Consulting Engineers |
| Gray & Osborne, Inc. | Magnusson Klemencic Associates |
| Hart Crowser, Inc. | Perteet, Inc. |
| Kiewit | Reid Middleton, Inc. |

STELLAR SUPPORT:

The following companies have attended at least half of all CEE career fairs since 2007:

- | | | | |
|--|---|---|--|
| DCI Engineers | Harriott Valentine Engineers, Inc. | Murray, Smith & Associates, Inc. | US Army Corps of Engineers Seattle District |
| Degenkolb Engineers | HDR Engineering, Inc. | PACE Engineers, Inc. | US Forest Service |
| Fehr & Peers Transportation Consultants | HNTB Corporation | Parsons Brinckerhoff | US NAVY |
| Golder Associates Inc. | KBA, Inc. | Puget Sound Energy | Washington State DOT |
| Harder Mechanical Contractors, Inc. | Manson Construction Co. | Tacoma Water | WSP Parsons Brinckerhoff |
| | Morrison Hershfield Corporation | Transpo Group | |



Watch the 2019
EVANS LECTURE

Managing the state’s transportation network requires a detailed roadmap. Offering insight into Washington State Department of Transportation’s role as steward of the state’s \$200 billion investment in transportation is secretary of transportation Roger Millar. During the 2019 Evans Endowed Lecture on May 9, Millar discussed both opportunities and challenges the transportation industry is facing, from congestion to alternative energy to new and emerging technologies. Enjoy the lecture video “Transportation Matters: Moving Washington Forward” at ce.uw.edu/news/video.



ADVISER
MARIKO NAVIN
transitions careers

For three decades, undergraduate adviser Mariko Navin has guided students toward achieving their career-oriented goals. And now, she’s heading off to pursue one of her own.

“I’m continuing the part of my work that I love the most – coaching, mentoring and creating opportunities for people to achieve what they want,” Navin said.

Taking an “early retirement” from the university will allow Navin to focus on growing her business, Questte, which has been a side hobby for several years, working with adults who are going through life transitions.

During her 30-year career in higher education, Navin has spent all but seven years at the University of Washington. In addition to Civil & Environmental Engineering, she also worked in the Department of Economics and Information School.

When she joined the CEE department 13 years ago, Navin was the only undergraduate adviser. As the department has grown, she has strived to enhance the student experience and “facilitate a culture of caring.” In addition to instigating a Welcome Day orientation event, she also grew the department’s graduation celebration from a simple affair to a large celebration in the HUB Ballroom, which is enjoyed by hundreds of students and their families.

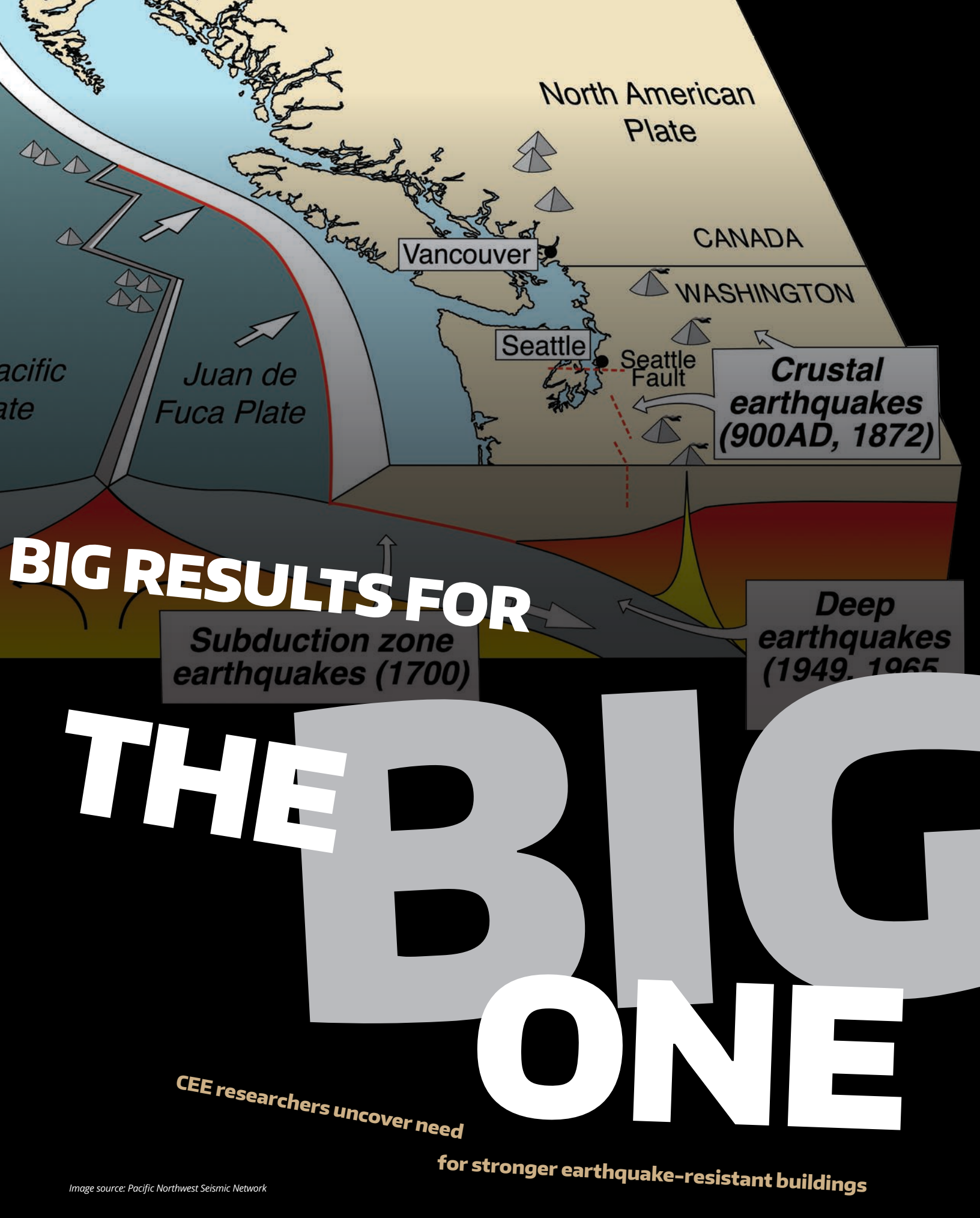
“When I go the extra mile, it can make a difference in students’ lives,” Navin said. “I hope I have had a positive impact on those I’ve had the opportunity to serve and meet along the way.”

Accommodating the expanding interests of students was also a priority for Navin, who was instrumental in helping to launch the new Bachelor of Science in Environmental Engineering degree program in fall 2017. From reviewing course offerings to recruiting students, Navin was a strong advocate throughout the lengthy process.

Realizing the importance of connecting students with industry representatives, Navin also founded the CEE Career Fair. Now in its 13th year, the annual event attracts more than 70 companies and up to 400 students.

“I will miss the students; I appreciate their hard work and the process of discovery,” Navin said. “And I will miss the passions and dedications of the faculty, as well as colleagues who make everything happen.”

In recognition of her efforts, Navin was honored last year with a UW College of Engineering Professional Staff Award. And although she will miss helping undergraduate students navigate the path of career discernment, Navin looks forward to applying her skills to a slightly different audience. And knowing her, they’ll be well served.



BIG RESULTS FOR

THE BIG ONE

CEE researchers uncover need

for stronger earthquake-resistant buildings

Image source: Pacific Northwest Seismic Network

FEATURE STORY

Most people know that the Pacific Northwest is overdue for a catastrophic earthquake. But they may not know that a group of UW researchers, including CEE faculty, is actively working to reduce the consequences.

For the past four years, an interdisciplinary team of researchers involved in the M9 Project, funded by the National Science Foundation, have worked to identify how a Cascadia Subduction Zone earthquake will play out in the region. Researchers from across campus, as well as the private and public sectors, presented their findings at a stakeholders workshop in May 2019.

Prior to the M9 Project, there was little understanding of what type of damage an earthquake along the Cascadia Subduction Zone may cause. Predictions were not only limited in scope, but were based on data from earthquakes in California and Japan. To remedy this, researchers from U.S. Geological Survey and UW conducted 50 different earthquake simulations to more precisely characterize the ground motions expected during a magnitude 9.0 earthquake in the region.

“We are taking the simulation information and filling a knowledge gap,” said co-investigator and CEE professor Jeffrey Berman.

Needed: Stronger buildings

How buildings in Seattle perform during an earthquake is largely influenced by the intensity of ground-motion shaking, which the simulations revealed is twice as strong as expected. This is largely attributed to the effects of the Seattle Basin, as the deep sediment-filled basin upon which much of the city sits amplifies the seismic waves.

“Usually accelerations are going down as the period elongates, but inside the basin the number is actually going up,” Berman said.

To evaluate how tall buildings in Seattle may respond to the predicted shaking, the researchers conducted additional simulations using the new ground motion data. With shaking expected to last as long as 115 seconds, and reverberations accelerating throughout the Seattle Basin, the simulations revealed that the collapse risk of modern concrete shear wall buildings exceeds the current building code target of 10 percent probability of collapse. The risk is greatest for buildings built after 2012 that are under 180 feet tall.

WHAT IS THE CASCADIA SUBDUCTION ZONE?

Located off the Washington and Oregon coasts, the Cascadia Subduction Zone is a fault that runs 1,000 km from Vancouver Island, B.C., in the north to Cape Mendocino, Calif. in the south. The fault separates the North America and Juan de Fuca plates, one of which is slowly moving beneath the other. Capable of reaching 9.0 magnitude, the Cascadia Subduction Zone last ruptured in AD 1700. These types of earthquakes occur roughly every 500 years.

“Today we design for collapse prevention, but nothing in the building code considers ground motion or basin amplification,” Berman said. “The M9 simulations are more damaging than what the building code allows for today.”

While the next iteration of National Seismic Hazard Maps will include basin effect, changes to local building codes are yet to be determined; the next updates will be in 2022.

“When it comes time to adopt the next building code, I am hopeful that the City of Seattle and City of Bellevue will take into account the M9 research results and make an informed decision,” said postdoctoral researcher Nasser Marafi, who worked on the M9 Project for his Ph.D. research.

Less landslide risk

In addition to damaging buildings, earthquakes can also trigger landslides. With shaking from a Cascadia Subduction Zone earthquake anticipated to set off landslides throughout the region, CEE researchers assessed the severity of landslides in the region, uncovering some good news.

“While expected to be numerous, landslides in the Seattle metropolitan region will be less severe than what we expected at the outset of the project,” CEE professor Joe Wartman said.

Compared to other locations in the Pacific Northwest, there will be modest levels of ground shaking in Seattle from a landslide perspective, as Seattle is relatively far away from the zone of energy release, Wartman said. To assess risk, the researchers developed a regional-scale landslide model to predict the location and severity of landslides in the region.

“What we found under the M9 scenario, depending on a wet or dry scenario, was something on the order of 35 to 225 football field areas of landsliding,” Wartman said.

From a landslide perspective, a smaller earthquake along the Seattle Fault, which is south of downtown, is more concerning than a M9 offshore earthquake along the Cascadia Subduction Zone, Wartman said.

CEE FACULTY INVOLVED

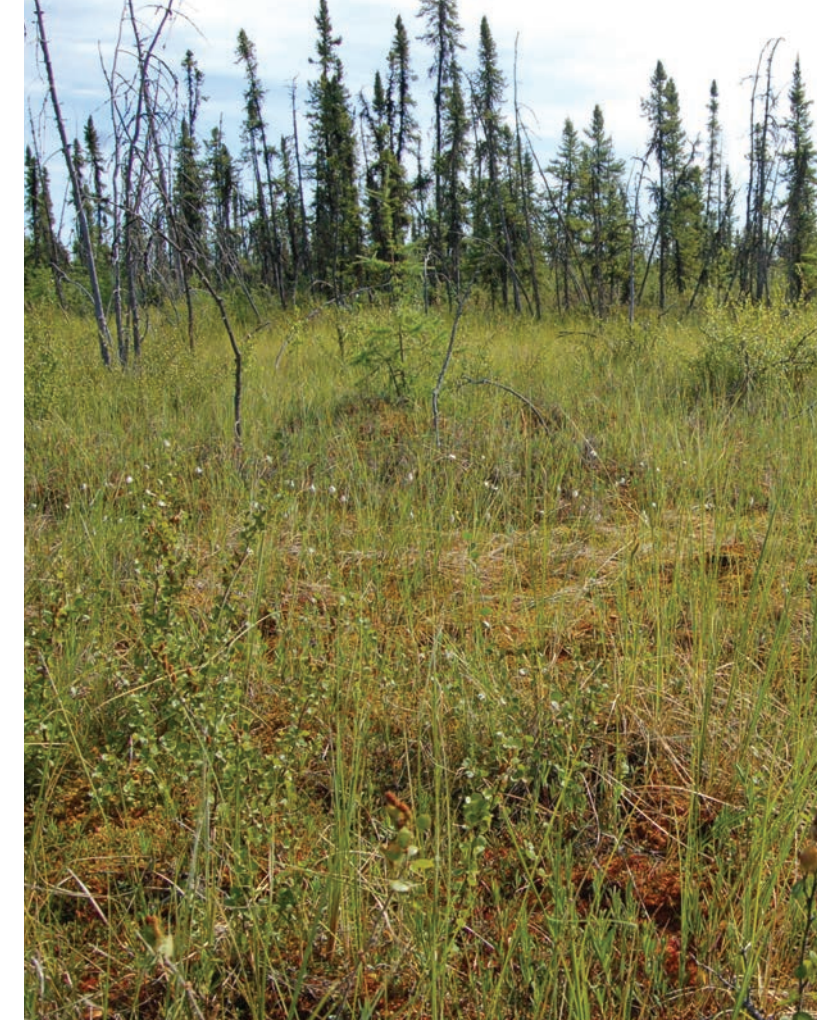
Conducted in collaboration with researchers across the public and private sectors, the M9 Project drew on the expertise of several CEE faculty:

- Jeffrey Berman, Co-PI
- Marc Eberhard
- Steve Kramer
- Mike Motley
- Joe Wartman



A DISPROPORTIONATE BURDEN FROM AIR POLLUTION

Poor air quality is the largest environmental health risk in the United States, leading to more than 100,000 deaths each year from heart attacks, strokes, lung cancer and other diseases. But not everyone is equally exposed to poor air quality, nor are all people equally responsible for generating it. Black and Hispanic Americans bear a disproportionate burden from air pollution generated mainly by non-Hispanic white Americans, according to new research from a team including CEE research scientist Christopher Tessum and professor Julian Marshall. The team compared what people spend their money on, from buying groceries to getting clothes dry cleaned, to the pollution these activities generate. They then overlaid the results on a map of where people live, finding that on average, non-Hispanic white Americans spend more money on pollution-intensive goods and services, which means they generate more pollution than other groups.



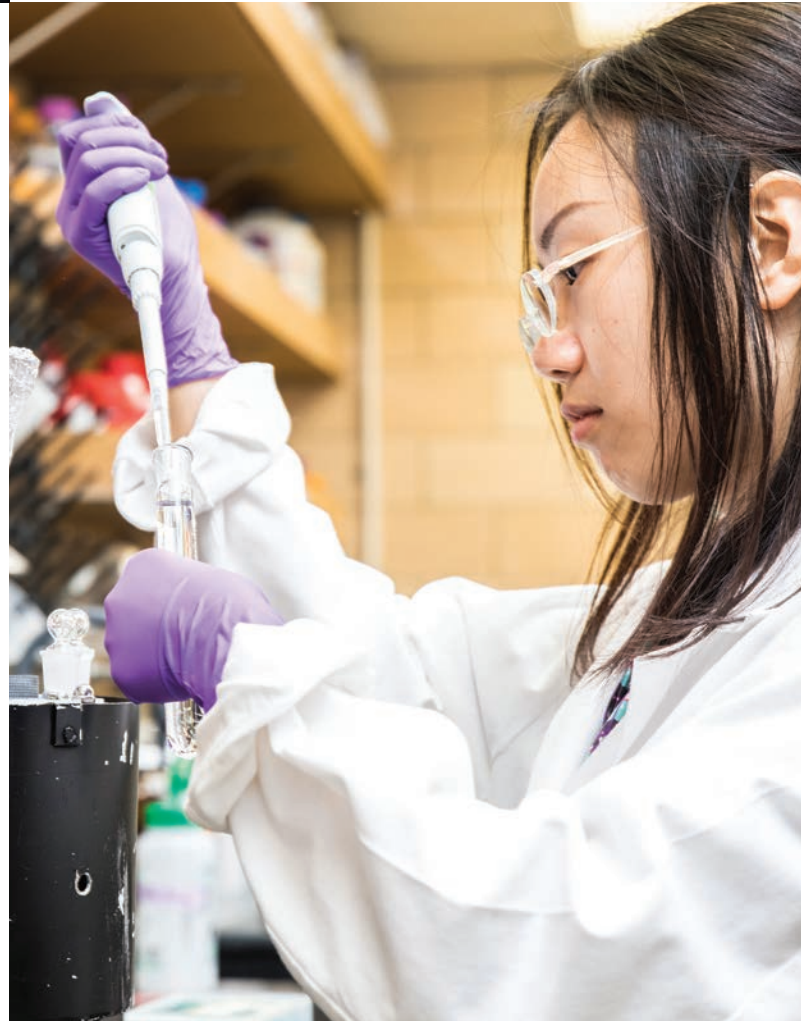
EARLY SPRING RAIN BOOSTS METHANE FROM THAWING PERMAFROST

Arctic permafrost is thawing as the Earth warms due to climate change. Scientists predict that this thawing soil will release increasing amounts of methane, a potent greenhouse gas that is known to trap more heat in our planet's atmosphere. Now, a team of researchers including CEE faculty Rebecca Neumann and Jessica Lundquist has found a new source of increased methane emissions from a thawing permafrost bog in Alaska: Early spring rainfall warms up the bog and promotes the growth of plants and methane-producing microbes. The team showed that early precipitation in 2016 warmed the bog about three weeks earlier than usual, increasing the bog's methane emissions by 30 percent compared to previous years. The researchers studied a thawing permafrost bog located about 20 miles from Fairbanks, Alaska from 2014 through 2016.



INVESTIGATING ANTIBIOTIC RESISTANT BACTERIA AND THEIR GENES

A team of researchers including associate professor Michael Dodd is investigating how well current methods of disinfecting water and wastewater affect antibiotic resistance genes in bacterial DNA, which can potentially spread undesirable traits into bacterial communities. By predicting the effectiveness of various disinfectant methods, the researchers hope to better counteract antibiotic resistance genes that pose a concern. While disinfecting methods work well to deter bacterial growth, the researchers had varied success in either degrading or deactivating a representative antibiotic resistance gene. Three disinfection methods showed greater than 90% degradation or deactivation of the gene and two disinfectant methods showed barely any damage to the gene. The researchers are now working to develop a model for proper treatment of antibiotic resistance genes.



A NEW HOUSEPLANT THAT CAN CLEAN YOUR HOME'S AIR

Some hazardous compounds are too small to be trapped in HEPA air filters, such as chloroform, which is present in small amounts in chlorinated water, or benzene, which is a component of gasoline. Both benzene and chloroform exposure have been linked to cancer. The compounds build up in our homes when we shower or boil water, or store cars or lawn mowers in attached garages. To help counteract these contaminants, a team of researchers led by research professor Stuart Strand has genetically modified a common houseplant, pothos ivy, to remove chloroform and benzene from the air around it. The modified plants express a protein that transforms these compounds into molecules that the plants can then use to support their own growth. The team is currently working to add a protein that can break down another hazardous molecule found in home air: formaldehyde.



“Dale had an amazing, unmatched career—
he was a giant in our university and environmental engineering field,”

DAVID STENSEL CEE PROFESSOR EMERITUS

REMEMBERING DALE CARLSON



Throughout his career, dean and CEE chair emeritus Dale Carlson worked to improve the quality of the environment. For him, this extended past the natural world and into the everyday lives of people.

Known for his encouragement, kindness and optimistic attitude, Carlson passed away at the age of 94 in February 2019. His vision and ability to engage others were key to his outstanding career and leadership at UW and in the environmental engineering profession.

“Dale had an amazing, unmatched career—he was a giant in our university and environmental engineering field,” CEE professor emeritus David Stensel said.

During his career at UW, Carlson accomplished much, including serving as chair of Civil & Environmental Engineering, dean of the College of Engineering and becoming the founding director of the Valle Scholarship and Scandinavian Exchange Program.

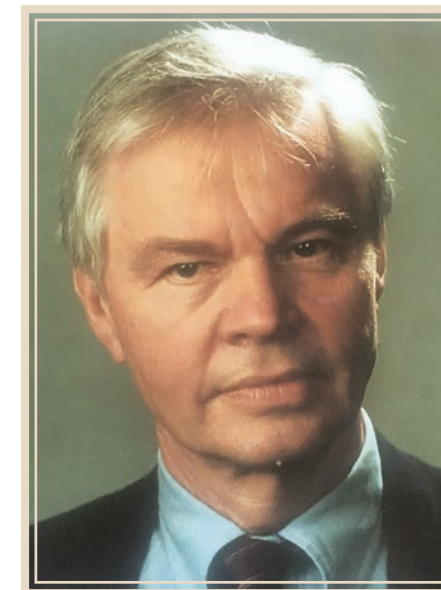
Born in Aberdeen, Wash., Carlson earned his undergraduate and master’s degrees in civil engineering at UW and a Ph.D. in sanitary engineering at University of Wisconsin- Madison.

A talented teacher, and a favorite among students, Carlson helped launch numerous UW graduates into careers, as well as steer them toward academia. A former student who is now an associate dean at Seattle University, professor Jean Jacoby remembers the pivotal role Carlson played in her professional career. While she was a student at UW, Carlson encouraged her to apply for the Valle Scholarship and Scandinavian Exchange Program and many years later he encouraged her again—this time to pursue a career in academia.

“Dale remained a stalwart advocate and mentor to me during my initial years as a new assistant professor,” Jacoby said. “I followed in Dale’s footsteps, eventually becoming chair of Seattle University’s Department of Civil & Environmental Engineering. I know that my success and happiness pleased Dale immensely and I would not have had this opportunity had it not been for his encouragement and belief in me.”

A strong advocate for engineering’s role in improving the quality of the environment, Carlson’s research helped advance the area of wastewater treatment. His focus was on the disinfection of treated wastewater to protect public health and the development of cost-effective wastewater treatment technologies.

“He gained a highly regarded reputation in our field and helped put UW on the map as one of the best environmental engineering programs as far back as the late 1960s,” Stensel said.



Dale Carlson

Following his appointment as dean, Carlson initiated the Valle Scholarship and Scandinavian Exchange Program, which he continued to administer on a part-time basis after his retirement in 1983. The program continues to support the exchange of graduate students between UW and institutes in Nordic countries.

The exchange program and joint research between countries helped pave the way for increased understanding of environmental engineering in Scandinavia, said professor Arild Eikum, who worked closely with Carlson for 58 years as Nordic Adviser to the Valle Office in Seattle.

“During the early 60s environmental engineering was very weak and in some countries non-existent in many of our educational institutions. Dale influenced our thoughts on environmental solutions in Scandinavia. This was a great contribution to the Scandinavian countries,” Eikum said.

After retiring, Carlson joined the faculty of Seattle University and served as chair of the Civil Engineering Department and dean of the School of Science and Engineering.

Married for more than 70 years to Jean, Carlson leaves behind four children, 10 grandchildren and 17 great-grandchildren. Carlson’s daughter, Joan Lee, who was a student in one of her father’s classes, recalls a fellow student commenting on how her father was the kindest professor they’d ever known.

“That helped me begin to see that who he was at home didn’t change when he went to the office, and on later reflection what an impact it must have had on a generation of students to experience extraordinary kindness and competence working in tandem,” Lee said.



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SHARING THE EXCITEMENT OF

engineering

There's one foolproof way to get elementary and middle school students excited about engineering: hands-on activities. During the annual two-day Discovery Days event on April 25-26, students and faculty from all UW engineering departments shared their work with 4th through 8th grade students. CEE students coordinated 17 exhibits with activities such as testing structures on a shake table and learning how to remove microorganisms from water. This year's event brought more than 8,900 elementary and middle school students to campus.