utah ENGINEERING

$5.3 MILLION

in lab upgrades

DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING THE UNIVERSITY OF UTAH

FALL 2023

$5.3 MILLION TRANSFORMATION

Dr. Michael Barber, Civil & Environmental Engineering Department Chair, speaking at the rededication.

On August 8, 2023, The University of Utah's John and Marcia Price College of Engineering dedicated its renovated Civil & Environmental Engineering undergraduate teaching laboratories to Alan W. Layton, an honorary alumnus, founding member of the College's Engineering National Advisory Council, and long-time benefactor of the U.

The new Layton Building's state-of-the-art facilities will support students from multiple departments and disciplines, but focuses on technologies related to civic infrastructure and advanced construction materials.

The building was originally built in the 1930s by the U.S. Department of Mines and Reclamation. Its rededication as the Layton Building comes after a $5.3m renovation project, featuring seismic, sustainability, and accessibility upgrades, as well as a suite of new educational and research labs.

The building's new Maker Space will serve as an on-ramp into the Civil & Environmental Engineering disciplines, allowing freshmen to quickly start making — and breaking — their own designs. Its Hydraulics Laboratory is a critical addition for juniors in the department, who will use it to study water and wastewater infrastructure, as well as environmental, geotechnical, and materials engineering. Its Cyber Infrastructure Lab will fuse traditional construction techniques with big-data-informed approaches to sustainability through the integration of sensor and networking technology.

At the Layton Building's dedication ceremony on August 8, 2023, University of Utah President Taylor Randall addressed a group of distinguished alumni and remarked on the value of investing in such spaces.

> "OUR STUDENTS NEED TO BE IN LABS, TO BE AROUND PEOPLE, TO GET TACTILE WITH THEIR EDUCATION," SAID RANDALL. "BUILDING COMMUNITY, BUILDING COLLEAGUES, BUILDING RESILIENCE IN OUR SOCIETY – THAT WILL HAPPEN HERE. WHAT MAKES A CAMPUS ELECTRIC IS PLACES WHERE PEOPLE CAN COME TOGETHER AND MAKE LONG-TERM MEMORIES."

That focus is in line with the building's namesake. A child of the Great Depression Alan W. Layton entered the University of Utah in 1937 and began studying Civil Engineering as a sophomore. Before Layton could graduate, however, he was called to active duty in World War II. While serving as a Field Artillery Captain, Layton was seriously wounded by a landmine in the Battle of the Bulge; he remained hospitalized for more than a year before receiving the Purple Heart and a medical discharge.

After returning to Utah, Alan worked as a Construction Engineer with the U.S. Bureau of Reclamation between 1948 and 1952. In 1953, he founded Layton Construction Company, focusing on commercial and industrial projects including the Jordan River Temple, Cougar Stadium, Primary Children's Medical Center, the Moran Eye Center, and the Salt Lake Airport's parking structure and Delta Terminal Expansion.

Though Layton never graduated from the U, he remained deeply involved in the development of new programs and facilities on campus, especially related to the Department of Civil & Environmental Engineering. He served on several planning committees and was awarded an honorary Master's Degree from the College and a Lifetime Achievement award from the University.

"Quality, integrity and commitment to excellence were Alan's values," said Richard Brown, H. E. Thomas Presidential Endowed Dean of the Price College of Engineering. "The facilities and equipment that are in the building now named after him will make a big difference in our students' educations."

Civil & Environmental Engineering Chair Michael Barber emphasized the timeliness of the project, as well as the opportunities it will provide to faculty and students in his department.

Layton Engineering Building Rededicated

"There's a record interest in the discipline given the infrastructure challenges we're facing," said Barber. "The importance of the renovation of this building cannot be overemphasized. A building that was effectively storage space is now the pride of our department in terms of showing students the opportunities that lie in Civil Engineering."

The Layton Building's named facilities and spaces include: "Alta's Landing" stairwell, funded by the family of Alta Shigeta, (BSCE '69); the Barlow Hydraulics Lab, funded by J&S Mechanical Contractors; the Clyde Companies Construction Materials Lab; the Layton Construction Maker Space; the Cyber Infrastructure Lab, funded by the families of Grant E. Marsh (BSCE '61) and Ralph J. Marsh (BSCE '62); the North Ridge Construction Saws/Sifting Lab; and the Jack B. Parson Ready Mix Concrete Research Lab and the Asphalt Materials Lab, both funded by Stalker Parson Materials & Construction Company.

Below, left: The Barlow Hydraulics lab
Below, right: Dr. Barber and Dave Layton, son of Alan W. Layton, at the rededication

ADVANCING NUCLEAR FORENSICS

+$1.3 Million in Nuclear Forensics Research Awarded to Dr. McDonald by U.S. Department of Homeland Security

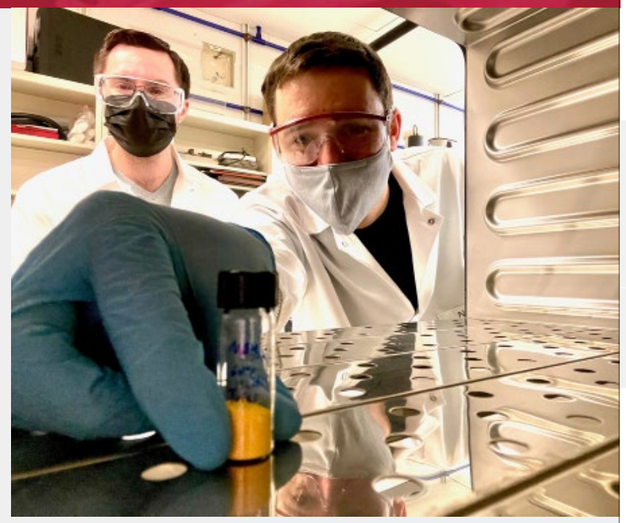
Dr. Luther McDonald's research has received the 2023 Countering Weapons of Mass Destruction: Nuclear Forensics Research Award (NFRA), with a budget of $1,395,000 to support 36-months of laboratory experiments and student development.

For decades, the nuclear forensic community has wanted to use oxygen stable isotope ratios (180/160) to determine the origin of materials, but the process was unclear. Since 2017, Luther's research team has collaborated with experts in stable isotope geochemistry at Lawrence Livermore National Laboratory (LLNL) through the Seaborg Graduate Student Fellowship Programs. Nuclear engineering students at the U would make samples in Luther's laboratory, then use the unique facilities at LLNL to characterize the oxygen isotope ratio. Recently, the team discovered that certain uranium processing conditions yield distinct oxygen isotope ratios on the final product. With funding from the U.S. Department of Homeland Security, the U team will use this recent discovery to create standardized U-oxide samples in controlled environments. They will then work with LLNL to use three techniques: bulk fluorination, laser fluorination, and thermogravimetric analysis with isotope ratio infrared spectroscopy (TGA-IRIS) to analyze the oxygen composition of the samples.

THIS COLLABORATION COMBINES THE UNIVERSITY OF UTAH'S RADIOCHEMISTRY AND NUCLEAR MATERIAL SYNTHESIS EXPERTISE WITH LLNL'S STABLE ISOTOPE GEOCHEMISTRY SKILLS. COMPLETING THIS RESEARCH WILL HELP LINK PRODUCTION HISTORY WITH THE PRODUCTION LOCATION IN A NUCLEAR FORENSICS' INVESTIGATION.

A significant aspect of this work is student development and training. The complex experiments will require students to develop advanced laboratory skills and the students will have ample opportunities for success through internships at LLNL and access to unique facilities at the U including the Utah Nanofab. Success from the student's research will result in numerous peer-reviewed publications and conference proceedings.

The overall success of this research will have a significant impact on advancing the nuclear forensics community and developing a pipeline of future nuclear forensics experts.



Above: A sample of uranium oxide is being removed from an environmental storage container. The light color indicates it's likely a uranium ore concentrate (UOC) or a lightly calcined uranium oxide such as UO3. These uranium oxides are made under controlled atmospheres by PhD students working with Dr. McDonald. For the NFRA, small aliquots of these samples will be shipped to LLNL for detailed analysis of the oxygen isotope ratios.

Right: Dr. Ting Xiao, Research Asst. Professor
Right, below: Dr. Brian McPherson, Professor

SHAPING A SAFER ENVIRONMENT

Over $10 Million from Department of Energy to Support Reducing CO_2 Emissions in Uinta Basin

Dr. Ting Xiao and Dr. Brian McPherson are currently engaged in a comprehensive project focused on carbon capture, utilization, and storage (CCUS) hubs. Their work is part of the CarbonSAFE II: Storage Complex Feasibility initiative, which aims to determine the viability of commercial CO2 storage in Utah's Uinta Basin.

The $ 10 million granted in large part by the Department of Energy, will support an extensive range of activities, including high-resolution societal analysis, geological characterization, technical assessments, economic evaluations, and environmental analyses.

The main goal of CarbonSAFE II is to expedite Deseret Power's evaluation of large-scale CO2 capture capabilities. By pooling additional sources of CO2 storage hub development in the region, the project is a significant step towards cleaner energy production.

BY CAPTURING AND STORING SUBSTANTIAL AMOUNTS OF CO_2 GENERATED BY INDUSTRIAL PROCESSES, ESPECIALLY THOSE LINKED TO FOSSIL FUEL COMBUSTION, THE INITIATIVE ACTIVELY CONTRIBUTES TO SHAPING A SAFER ENVIRONMENT.

The contract is expected to be finalized in October, with a start date of October 1, 2023.

Dr. Xiao's and Dr. McPherson's work, along with the many others involved in the CarbonSAFE II initiative, holds great environmental significance: By directly tackling the urgent problem of carbon emissions by promoting the capture and storage of CO2, it supports the adoption of cleaner energy sources, emphasizes meticulous environmental analysis, and drives community development efforts.

These combined endeavors will work to combat climate change, enhance air and water quality, and stimulate sustainable economic growth. All these facets are crucial for fostering a healthier, more environmentally responsible future.

faculty RESEARCH

$2.9 MILLION

in NSF grants

Department of Civil and Environmental Engineering professors have collectively received over $2.9 billion in National Science Foundation (NSF) grants from academic year 22-23 through summer of 2023.

WE'RE PROUD TO HAVE DEDICATED PROFESSORS IN DIVERSE FIELDS, FROM ENVIRONMENTAL ENGINEERING TO NUCLEAR ENGINEERING, CONTRIBUTING SIGNIFICANTLY TO THE ADVANCEMENT OF MULTIPLE DOMAINS OF ENGINEERING.

WE APPRECIATE THAT OUR PROFESSORS ARE COMMITTED TO FURTHERING RESEARCH AND DEVELOPMENT IN THEIR RESPECTIVE FIELDS.

These remarkable projects reflect the department's commitment to advancing knowledge and addressing pressing societal challenges. With these substantial NSF grants, they are poised to make significant contributions to the engineering landscape.

OVER $2.9 MILLION secured in NSF grants

Jianli Chen (PI) - $584,094

- **Project:** A Convergent Physics-based and Data-driven Computing Platform for Building Modeling
- **NSF Category:** Elements: Special Initiatives, EnvS-Environmental Sustainability, Software Institutes

Dr. Chen works as an interdisciplinary researcher actively collaborating with experts from various fields. He teaches building construction courses within the department.

Ramesh Goel (PI) - $526,083

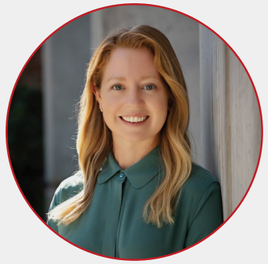
- **Project:** GOALI: Understanding granulation using microbial resource management for the broader application of granular technology
- **NSF Category:** EnvE-Environmental Engineering, Special Initiatives

Dr. Goel teaches Environmental Engineering. His research mission is to accomplish environmental sustainability and integrate it in graduate and undergraduate education.

Cathy Liu (co-PI) - $600,000

- **Project:** Integrating and Learning on Spatial Data via Multi-Agent Simulation
- **NSF Category:** Info Integration & Informatics

Dr. Xiaoyue (Cathy) Liu is passionate about programming, computational analysis, and urban informatics. She encourages all CVEEN students to "Engage in research activities with faculty,



Emily Marron (PI) - $575,000

- **Project:** Overlooked Oxidation of Aqueous Alcohols: Kinetics, Mechanism, and Relevance to Water Reuse
- **NSF Category:** Collaborative Research: Environmental Chemical Science

Through her research, Dr. Marron aims to protect the health of humans and the environment, and to better manage water resources in the face of climate change.

Abbas Rashidi (PI) - $656,166

- **Project:** CyberTraining of Construction (CyCon) Research Workforce Through an Educational and Community Engagement Platform
- **NSF Category:** Collaborative Research: CyberTraining

Recently tenured, Dr. Rashidi is an Associate Professor of Construction Engineering.

THE UNIVERSITY OF UTAH

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