

# FRIEDMAN FAMILY VISITING PROFESSIONALS PROGRAM



## Visit to Utah State University: March 21, 2024

This report summarizes the visit of **Dr. Faiz I. Makdisi** from Gannett Fleming that took place at Utah State University on March 21, 2024.

### ITINERARY OR AGENDA

The table below outlines the itinerary of Dr. Makdisi's visit:

Event	Start Time	End Time	Event Duration	Location
Breakfast	9: 00 AM	10:00 AM	60 minutes	Hotel
Meet USU EERI chapter president Nishkarsha Dawadi	10:00 AM	10:30 AM	30 minutes	Hotel
Utah Water Research Lab (UWRL) Tour	10:30 AM	11:15 AM	45 minutes	UWRL
USU SMASH Lab Tour with Dr. Brady Cox (Geotech faculty)	11:15 AM	12:00 PM	45 minutes	SMASH LAB
Travel back to ENGR building / Break period	12:00 PM	12:30 PM	30 minutes	ENLAB BUILDING
Meeting over lunch with graduate students.	12:30 PM	1:30 PM	60 minutes	ENLAB 211C CEE Conference Room
Meet with Dr. John Rice (Geotech faculty)	1:30 PM	2:00 PM	30 minutes	ENLAB 272
Meet with Dr. James Bay / Dr Loren Anderson (Geotech faculty)	2:00 PM	2:30 PM	30 minutes	ENLAB 266
Meet with Dr. Marv Halling (Structure faculty, Department Head)	2:30 PM	3:00 PM	30 minutes	ENLAB 264
Meet with Dr. Srishti Banerji (Structure faculty)	3:00 PM	3:30 PM	30 minutes	ENLAB 274
Meet with Dr. Brady Cox (Geotech faculty)	3:30 PM	4:00 PM	30 minutes	ENLAB 268
Break period / Presentation Preparation	4:00 PM	4:30 PM	30 minutes	ENGR 106 or ENGR 108
CEE Seminar Presentation	4:30 PM	5:30 PM	60 minutes	ENGR 106 or ENGR 108
Dinner	6:30 PM	7:30 PM	60 minutes	Elements Restaurant

## STUDENT CHAPTER VISIT PLANNING COMMITTEE

### LEAD ORGANIZER(S):

- Nishkarsha Dawadi, President, [nishkarsha.dawadi@usu.edu](mailto:nishkarsha.dawadi@usu.edu)
- Aser Abbas, Member, Ex-President, [aser.abbas@usu.edu](mailto:aser.abbas@usu.edu)
- Tyler Jackson, Undergraduate Liaison, [tyler.jackson@usu.edu](mailto:tyler.jackson@usu.edu)
- Pranish Dahal, Secretary, [pranish.dahal@usu.edu](mailto:pranish.dahal@usu.edu)
- Deepika Ghorasaini, Event Coordinator, [deepika.ghorasaini@usu.edu](mailto:deepika.ghorasaini@usu.edu)
- Kyle Cannon, Treasurer, [kyle.cannon@usu.edu](mailto:kyle.cannon@usu.edu)
- Dr. Mohsen Zaker Esteghamati, USU EERI Chapter Faculty Advisor, Professor, Department of Civil and Environmental Engineering, [mohsen.zaker@usu.edu](mailto:mohsen.zaker@usu.edu)
- Dr. Brady Cox, Professor, Department of Civil and Environmental Engineering, [brady.cox@usu.edu](mailto:brady.cox@usu.edu)

## VISITING PROFESSIONAL LECTURE OVERVIEW

Dr. Makdisi's lecture was titled "The Oroville Dam Spillways Emergency Recovery Project" in which he talked about the lessons learned from the viewpoint of a member of an independent Consultant Review Board.

The lecture detailed the February 2017 slab failure incident at Oroville Dam's control spillway chute, which caused significant damage to the spillway channel and its foundation, leading to the use of the emergency spillway. Concerns about the emergency spillway monoliths' foundations prompted the evacuation of nearly 200,000 downstream residents. The presentation covered hypothesized failure mechanisms and the Independent Forensic Team's findings on contributing factors. It also described the immediate recovery response, including an expedited design schedule, the appointment of an independent review board, regulatory interactions, and contractor selection. The reconstruction of both the control spillway chute and emergency spillway over two construction seasons, along with lessons learned, was also presented.



**Figure 1: Dr. Makdisi presenting his lecture about the Oroville Dam Spillways Emergency Recovery Project**

The presentation on the Oroville Dam incident was highly informative and well-delivered. The detailed explanation of the slab failure mechanisms and the findings of the Independent Forensic Team provided valuable insights into the factors that contributed to the failure. The discussion of the immediate recovery response and the expedited design and reconstruction efforts was impressive, showcasing a robust and efficient approach to crisis management. Overall, we learned a great deal from the lessons shared and appreciate the comprehensive overview of this significant event.



**Figure 2: Dr. Makdisi with Prof. Brady Cox and EERI USU Student Chapter Officers**



**Figure 3: Lecture attendees including CEE faculties and students.**

### Lecture Abstract

This lecture provides a description of the incident of slab failure of the control spillway chute at Oroville Dam during a February 2017 spill that resulted in significant damage to the spillway channel, and erosion of its underlying foundation. This prompted the operation of the emergency. The potential for undermining of the foundation of one of the emergency spillway monoliths lead to an evacuation of close to 200,000 residents downstream of the dam.

The presentation describes the postulated mechanisms of failure, a summary of the findings and conclusions of an Independent Forensic Team that identified factors that most likely contributed to the failure. The immediate recovery response program is described that included an expedited design schedule, an appointment of an independent review board, interaction with the regulatory agencies, and selection of a construction contractor. Elements of the design and reconstruction of both the control spillway chute and emergency spillway during two construction seasons are presented together with the lessons learned from this incident.

## Professional Bio

Faiz I. Makdisi is a Senior Consultant with Gannett Fleming, Inc. in Oakland, California. He received his Bachelor of Engineering degree from the American University of Beirut, Lebanon, and his M.Sc. and Ph.D. degrees in Geotechnical Engineering from the University of California at Berkeley. He has over 45 years of specialized experience in geotechnical and earthquake engineering. Dr. Makdisi has been actively involved in studies of the seismic behavior of earth and rock fill dams and embankments. He developed and published (with the late Professor H. Bolton Seed) widely used simplified procedures for estimating the dynamic response and permanent deformations in earth and rock fill dams. Recently, Dr. Makdisi has been involved in the development of seismic design criteria, evaluation of seismic stability, and design of remedial measures for more than 25 embankment dams.

He has authored and co-authored many papers dealing with the seismic stability of dams and with various aspects of earthquake ground motions and seismic design criteria for critical facilities. He is a recipient of the 1977 Norman Medal award of the American Society of Civil Engineers (ASCE) for the paper (co-authored with Seed, Lee, and Idriss) on the analyses of the slides in the San Fernando Dams during the 1971 San Fernando earthquake. As a member of a team of Technical Advisors to the Los Angeles District, Corps of Engineers, on the design and construction of Seven Oaks Dam in California, Dr. Makdisi was a co-recipient of the U.S. Army Corps of Engineers, Chief of Engineers "Design and Environmental Honor Award for 2002." In 2017, Dr. Makdisi was awarded the Danny K. McCook Medal by the Association of State Dam Safety Officials (ASDSO), for his lasting contributions to dam safety. In 2019, Dr. Makdisi was inducted into the Civil and Environmental Engineering Academy of Distinguished Alumni of the University of California, Berkeley.

Dr. Makdisi has taught short courses on the seismic stability of dams at the 2008 Geotechnical Earthquake Engineering and Soil Dynamics Conference in Sacramento, CA, and at the 2013 International Committee on Large Dams Conference in Seattle, WA. He has presented lectures at ASCE seminars and workshops in San Francisco, Los Angeles, and Oakland, California, and Seattle, Washington; as well as lectures at the University of California campuses at Berkeley and Davis, at Stanford University, the University of Illinois at Urbana-Champaign, the University of Puerto Rico at Mayaguez, and at Virginia Tech. He was invited to present a keynote lecture on the seismic stability of embankments and slopes at the session on slope stability at the Geo-Denver 2000 conference of ASCE's Geo-Institute. He also presented a lecture on seismic design criteria for dams at the Federal Energy Regulatory Commission's (FERC) Dam Safety Workshop, held in Portland, Oregon in March of 2001. Dr. Makdisi is a member of the Earthquake Engineering Research Institute (EERI), and the Earthquake Committee of the United States Society on Dams (USSD) and serves on the ASCE 1 Committee involved in updating the "Standard for Geotechnical Analysis, Design, Construction, Inspection and Monitoring of Nuclear Safety-Related Structures."

Dr. Makdisi has served as a member of the Board of Consultants for the Oroville Dam Spillway Restoration Project, and the Director's Safety Review Board for Perris Dam, Castaic and Crafton Hills Dams, B. F. Sisk Dam, and five Delta Dams, for the California Department of Water Resources, Division of Safety of Dams. He also served as a member of the Consultant Review Board for Conconully and El Vado Dams, for the US Bureau of Reclamation, and as an Independent Technical Reviewer of the design of the raise of Folsom Lake's Mormon Island Auxiliary Dam and Dikes 7 and 8, for US Army Corps of Engineers.

## SUPPLEMENTAL ACTIVITIES

### Water Lab tour

The Utah Water Research Laboratory (UWRL) at Utah State University has been a leader in water and environmental research for over 50 years. As one of the first and largest university-based water research facilities in the United States, it is highly respected in its field. The EERI USU chapter was proud to host a tour of UWRL for Dr. Makdisi, led by Dr. Michael Johnson. During the tour, Dr. Johnson presented various ongoing projects, student research works, and state-of-the-art machines to Dr. Makdisi.



**Figure 4: Dr. Michael Johnson (left) hosts a UWRL tour for Dr. Makdisi (right) with Dr. Brady Cox (middle) from the Department of Civil and Environmental Engineering.**



**Figure 5: Dr. Johnson showing one of UWRL's state-of-the-art machines to Dr. Makdisi on the UWRL tour**

#### SMASH lab visit

Utah State University's Systems, Materials, and Structural Health (SMASH) Laboratory, built in 2009, is the main structural testing facility on campus. Dr. Brady Cox conducted the lab visit for Dr. Makdisi, showcasing various features and equipment of the 5,000 ft<sup>2</sup> lab. The facility includes a 60 ft by 24 ft strong floor, an L-shaped strong wall for bi-axial loading, a 1200-kip shear load frame, smaller load frames, and two 20-ton overhead cranes. Dr. Makdisi was also introduced to the lab's equipment, including a 40-channel data acquisition system, an MTS 110-kip servo-hydraulic actuator, four 600-kip rams with 12-inch strokes, necessary hydraulic pumps, a refurbished Tinius Olsen 300-kip universal testing frame, and several displacement sensors for destructive testing projects.



**Figure 6: Dr. Makdisi with EERI USU chapter officers and faculty. In the picture from left to right are: USU EERI Inaugural president Aser Abbas, current president Nishkarsha Dawadi, Dr. Makdisi, Prof. Brady Cox, and USU EERI Student Chapter Undergraduate liaison, Tyler Jackson.**

### Lunch with Graduate Students

Dr. Makdisi had lunch with undergraduate and graduate students from the CEE department, where he shared his invaluable experiences—from his time as a student at UC Berkeley to the challenges he faced during his commendable career and the transition into his professional life.

### Meeting with the Department of Civil and Environmental Engineering Faculties

Faculty members in the CEE department were allocated a 30-minute meeting with Dr. Makdisi, during which they discussed personal and professional experiences and exchanged ideas.

## RESULTS, FEEDBACK, AND LESSONS LEARNED

The program was a resounding success and received positive feedback from both students and faculty. We eagerly anticipate hosting similar events in the future, with a particular emphasis on engaging undergraduate students. Specifically, our student chapter plans to organize:

- A lecture featuring past seismic design-winning teams sharing their experiences.
- A meet and greet event with student chapters from across the United States and globally.

## ACKNOWLEDGMENTS

The Utah State University EERI Student Chapter extends heartfelt thanks to the Friedman Family for sponsoring Dr. Faiz Makdisi's travel expenses through their Friedman Family Visiting Professional Program endowment. We are also deeply grateful to the Earthquake Engineering Research Institute for their support in making this opportunity possible.