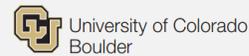


FRIEDMAN FAMILY VISITING PROFESIONALS PROGRAM



Visit to University of Colorado, Boulder: March 30, 2016

This report summarizes the visit of **David Friedman** Emeritus CEO & Chair of the Board, Senior Principal, Forell/Elsesser Engineers, which took place at the University of Colorado, Boulder on March 30, 2016.

ITINERARY OR AGENDA

WEDNESDAY, MARCH 30	ACTIVITY:
8:30 AM	Bagel breakfast with students and faculty
10:00 AM	Tours of structural laboratory facilities
11:00 AM	Break
11:45 AM	Lunch with EERI student members
1:00 PM	Midday seminar: <i>UC Berkeley's California Memorial Stadium</i>
2:15 PM	Tour of geotechnical laboratory facilities
3:00 PM	Meeting with Abbie Liel, CU Boulder EERI student chapter faculty adviser
3:30 PM	Presentation by CU Boulder undergraduate Seismic Design Team
5:00 PM	Student poster session featuring research by graduate students and activities of other engineering undergraduate student groups
6:00 PM	Evening seminar, <i>The Practice of Structural Engineering Today</i>
7:45 PM	Dinner at Pizzeria Locale with EERI student chapter officers

STUDENT CHAPTER VISIT PLANNING COMMITTEE

LEAD ORGANIZER(S):

- Kristen Hess, President, krhe1387@colorado.edu
- Rebecca Scheetz, Event Committee Chair, rebecca.scheetz@colorado.edu
- Sarah Welsh-Huggins, Past President, Event Committee Co-Chair sarah.welshhuggins@colorado.edu
- Robert Chase, Vice-President, robert.chase@colorado.edu
- Sally Gerster, Treasurer, sally.gerster@colorado.edu
- Abbie Liel, Faculty Advisor, abbie.liel@colorado.edu

VISITING PROFESSIONAL LECTURE OVERVIEW

We held two seminars by Mr. Friedman, one mid-day to allow for more faculty members to attend and an early evening lecture to attract students after the academic day had ended. The mid-day seminar had approximately 20-30 attendants, while the evening lecture had nearly 50 people in attendance, predominately students from the department of Civil, Environmental Architectural Engineering. Our Student Chapter President began each seminar with a brief biography of Mr. Friedman, as well as an overview of our Student Chapter activities for those in attendance not familiar with EERI. Mr. Friedman connected well with the students and made an effort to be available throughout his visit. His presentations were well attended by both students and faculty. We found his experience designing earthquake resistant facilities enabled him to present knowledgably on broad structural engineering concepts as well as specific project details. Below we have provided three photos from Mr. Friedman's presentations.



Figure 1. David Friedman speaking at the University of Colorado-Boulder Mid-Day Seminar



Figure 2. David Friedman speaking at the University of Colorado-Boulder Evening Seminar



Figure 3. Audience at the University of Colorado-Boulder Evening Seminar

Mid-Day Lecture Abstract

UC Berkeley's California Memorial Stadium, constructed in 1923 and designed by the renowned architect John Galen Howard, sits directly over the northern segment of the active Hayward Fault. Situated at the opening of Strawberry Canyon, with the eastern half of the stadium literally carved into the hillside, the non-ductile concrete frame western stadium bowl will be seismically retrofitted and modernized with new seating bowl framing, a new press box, and with the preservation and restoration of the historic perimeter concrete wall.

One of the unique features of the retrofit design is the approach to the sections of the stadium positioned over the north-to-south running, right-lateral Hayward Fault. The planned retrofit design creates separate "fault rupture zone blocks", gapped and separated by joints from the adjacent sections of the stadium. The FRB's will be reinforced with stiffening concrete shear walls bearing on a mat slab foundation, all bearing on layers of sand and high-density plastic to reduce friction and thus facilitate the independent sliding, twisting, and tilting that may result from the predicted 6 feet of horizontal fault rupture displacement and 2 feet of vertical fault rupture displacement.

The other unique feature is the 375 foot long steel press box structure which hovers above the west seating bowl on four core walls and four center columns. These core walls are vertically post-tensioned and designed to

rock independently from the surrounding concrete bowl framing except where connected by 16 fluid viscous dampers inserted to control the rocking motion and dissipate earthquake energy.

The construction duration of the CMS retrofit was a very accelerated 20 months with 100% of the materials delivered through the single tunnel through the northern Memorial Arch. The project was on time and on budget for the September 1st, 2012 home opener.

Evening Lecture Abstract

The practicing structural engineer today must not only have a broad understanding of not just structural engineering, but must be knowledgeable about architecture, M/E/P systems, construction delivery methodologies, and the construction process. All projects come with their own litany of challenges and constraints, and the structural engineer is one of the key players in achieving the optimal solution. The project's budget, the selected performance and design criteria, the architectural form, and the operating systems all affect the selection of the appropriate structural materials and lateral force resisting system. Then the analysis must get translated into a design, and the design must clearly and carefully be delineated into construction documents including plans, details, sections and technical specifications, with appropriate attention to sequencing, phasing and constructability. This all gives rise to the notion of today's structural engineer as a "Master Builder," one who can articulate their way through a complex labyrinth of form finding, criteria setting, risk evaluation, design and documentation, and construction (and hopefully not litigation). Some current projects that highlight these issues include:

San Francisco City Hall

Forell/Elsesser served as Prime Engineer for the complete repair and base isolation seismic upgrade of the 550,000 sq.ft., 4-story City Hall which contains both Superior and Municipal Courts for the City and County of San Francisco. This "essential facility" is a classic steel framed structure with a 310-foot high dome clad with perimeter granite walls and with hollow clay tile interior walls. Base isolation was selected because it is cost-effective, allowed for minimum disruption to the ornate historic building, and provided maximum protection. The structural solution consisted of 530 isolators, concrete shear walls, steel collectors, reinforcement of rotunda tower walls and installation of steel braces and shortcrete walls were used at various levels of the dome.

UCSF Parnassus Ray & Dagmar Dolby Regeneration Medicine Building

The construction of this 80,000 SF stem cell research building utilized the design/build delivery system. The program included wet laboratories, laboratory support, offices, an auditorium, and "green roofs." This unique building, designed by the renowned and international architect, Rafael Viñoly, is situated on a steeply sloped site and terraces vertically through a series of steps along the building length. The structure is steel framed with special friction pendulum isolators that protect the structure and the sensitive equipment and research it houses from the effects of a major seismic event.

UC Berkeley California Memorial Stadium

This historic concrete football stadium was originally built in 1923 and was designed by John Galen Howard. The project included seismic strengthening and modernization of this non-ductile concrete frame structure with a seating capacity of 72,000-seats. The west bowl retrofit saved the perimeter historic wall of the stadium; provided a new seating bowl, press box, and 200,000 SF of game-day and programmatic improvements. The unusual aspect of the project was created by the challenged posed by the Stadium sitting atop the northern segment of the Hayward Fault, which runs approximately from end zone to end zone. The retrofit of the fault rupture segments includes "blocks," separated from the adjacent building portions, and free to move independently

when the fault ruptures and displaces. The West Bowl was an interesting challenge as well, and utilized vertically-post-tensioned rocking concrete walls and passive viscous dampers.

Professional Bio

David Friedman is the Senior Principal, and immediate past President, CEO and Emeritus board chair, at Forell/Elsesser where he has worked for more than 35 years. David's strength is a holistic approach to a project's planning, design and construction, and the collaborative integration of creative structural solutions with architects, engineers, and builders. With a specialty in designated historic structures, David has creatively solved numerous engineering challenges. Principle examples of his solutions include the base isolation retrofits for both the San Francisco City Hall and Asian Art Museum, the adaptive reuse and retrofit for the San Francisco Conservatory of Music, and the seismic safety corrections and remodel of UC Berkeley's California Memorial Stadium.

SUPPLEMENTAL ACTIVITIES

Laboratory Tours

Our tours the CU Boulder structural engineering and geotechnical engineering laboratories, which gave our graduate student members a chance to explain their work on projects like a full-scale bridge pier dynamic loading and soil-structure interaction centrifuge tests. The tours also highlighted the large number of earthquake engineering research projects ongoing in our university's Department of Civil, Architectural, and Environmental Engineering.

Student Poster Session

Prior to his visit, Mr. Friedman noted his interest in meeting with as many students as possible. We organized an afternoon student poster session before his evening lecture to give more students the chance to meet with our guest one-on-one, and for Mr. Friedman to learn about many of the exciting student (undergraduate and graduate) research studies ongoing at CU Boulder. The poster session also encouraged relationship-building between our EERI student chapter and other student engineering organizations in our department, including the student chapter of ASCE and Bridges2Prosperity.

Seismic Design Team Presentation

Since the visit took place before the 2016 Seismic Design Team competition, our undergraduate team used this opportunity to discuss their design strategy and expected performance results to Mr. Friedman. Our design team was extremely appreciate of the feedback they received from our guest as they finished their preparations for the national competition. In addition, this presentation gave our students a chance to develop a personal relationship with Mr. Friedman, an incredible opportunity for these budding earthquake engineers. Two of our graduating seniors were even able to follow-up their connection with Mr. Friedman with a lunch meeting in San Francisco the day before the Seismic Design Competition began. The two students later talked about that lunch as a highlight of that week and were grateful to have first forged their relationship with a practicing structural engineer as prominent and compassionate as Mr. Freidman during his visit to our campus.

Lunch with Student Chapter Members

During the middle of the day, Mr. Friedman had lunch with graduate and undergraduate student members of EERI. Two undergraduate student from architectural and geotechnical engineering and one graduate structural engineering student joined Mr. Friedman for lunch. Mr. Friedman spoke of his own career experience and gave advice about the upcoming seismic design competition at the EERI annual meeting.

Dinner with Student Leadership

After the Visiting Professional lecture on Wednesday evening, the Student Chapter leadership took Mr. Friedman to dinner at Pizzeria Locale, a local restaurant in the heart of downtown Boulder. The dinner provided a chance for the student leaders to connect with Mr. Friedman on a personal level. The dinner was a highlight for our outgoing Vice-President, Cody Harrington, who is preparing to defend his Ph.D. in Structural Engineering this year and enjoyed the chance to talk with Mr. Friedman about the challenges and realities of a career in Structural Engineering.

RESULTS, FEEDBACK AND LESSONS LEARNED

A challenge of coordinating Mr. Friedman's visit to the University of Colorado Boulder (one perhaps unique to our visit) was organizing the student poster session. It took a team effort to sign up students to present posters of their research and to find a space for the session, as well as poster easels for each student. Important to the success of this event was clear communication and timely coordination with the leadership of other student groups and with our department's administrative staff. A key component of Mr. Friedman's visit was sharing duties between the Student Chapter leaders and laying out clear plans for the responsibilities of each officer before, during, and after the visit. Our President took the lead on all of the scheduling and general communication of the visit, but the seminar catering, dinner reservations, and cross-campus advertising were made possible through delegation of tasks to all of the other executive leaders. The visit also offered a chance for our EERI Student Chapter to shine in the broader campus community, and we received high praise from faculty members for how well-organized and well-attended the seminar was. All of our student members were grateful for EERI's support to have the chance to hear such a key member of the earthquake risk professional community speak and meet with him in-person. We all look forward to the opportunity to host another Friedman Family Visiting Professional next year. Mr. Friedman was an inspiring ambassador for who encouraged engineers to work with project teams to successfully complete challenging projects in high seismic areas. He impressed all who met him with the interest he showed in meeting with students and learning about their personal research and extracurricular engineering activities. Below we present other topics we hope to learn about from future speakers, as well as general goals for our EERI Student Chapter as part of the broader earthquake engineering community:

- Practitioners making innovative contributions to geotechnical engineering, as we have an active Geosciences and Geotechnical Engineering student group on campus
- Women or racial/ethnic minority practitioners in earthquake engineering and risk management
- Interdisciplinary research and practice that demonstrates the importance of collaboration between structural and geotechnical engineers, city planners, policy makers, sociologists, and the public in reducing earthquake risk
- Our university is home to many different research groups and student organizations that would like the opportunity to collaborate further with practitioners, to enhance both academic knowledge and professional practice of earthquake risk management and long-term community development

ACKNOWLEDGEMENTS

The University of Colorado-Boulder EERI Student Chapter gratefully acknowledges the support of the Friedman Family for sponsoring the travel of David Friedman through his own Friedman Family Visiting Professional Program endowment. We also appreciate the support of our university's Student Government Funding Board for providing additional financial assistance of this visit.

LIST OF ATTACHMENTS

Included below are our fliers for the two lecture events.

THE EARTHQUAKE ENGINEERING RESEARCH INSTITUTE STUDENT CHAPTER

UC Berkeley's California Memorial Stadium

2015-2016 EERI Friedman Family Speaker



David Friedman

Join us for an exciting presentation by David Friedman, Senior Principle at Forell/Elsesser. With almost 40 years of industry experience, Mr. Friedman takes a holistic approach to a project's planning, design and construction, and emphasizes the collaborative integration of creative structural solutions with architects, engineers, and builders. In his presentation, Mr. Friedman will speak on his involvement in the seismic safety corrections and remodeling of UC Berkeley's California Memorial Stadium.

Wednesday, March 30

1:00 PM – 2:00 PM

Engineering Center ECCR 151

David Friedman will also be speaking 5:00 PM – 6:00 PM in the DLC

Contact EERI@colorado.edu with any questions



Earthquake Engineering Research Institute

University of Colorado, Boulder



THE EARTHQUAKE ENGINEERING RESEARCH INSTITUTE STUDENT CHAPTER

The Practice of Structural Engineering Today

2015-2016 EERI Friedman Family Speaker



David Friedman

Please join us for an exciting presentation by David Friedman, Senior Principal, and immediate past President, CEO and Board chair, at Forell/Elsesser. With almost 40 years of industry experience, David has worked to develop a holistic approach to project planning, design and construction, and the collaborative integration of creative structural solutions. With a specialty in designated historic structures, David has creatively solved numerous engineering challenges. In his presentation, David will provide insight into the practice of structural engineering today using recent project examples such as the California Memorial Stadium and the newly finished home for the Facebook campus.

Wednesday, March 30

5:00 PM – 6:00 PM: Student Poster Session

6:00 PM – 7:30 PM: Seminar *(Light Refreshments Provided)*

Discovery Learning Center

David Friedman will also be speaking 1:00 PM – 2:00 PM in ECCR 151

Contact EERI@colorado.edu with any questions



Earthquake Engineering Research Institute

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