

## Undergraduate Research Assistant Profile - Jack Montgomery

During the spring and summer of 2009, Cal Poly undergraduate civil engineering student Jack Montgomery worked as a student researcher on the NSF-sponsored "City Block" project. The work took place at the University of California, Davis at the Center for Geotechnical Modeling's centrifuge facility, which is one of fourteen Equipment Sites in the George E. Brown Jr. Network for Earthquake Engineering Simulation (NEES). Jack moved to Davis for his last term at Cal Poly so that he could assist the project team with this research.

Jack relied on his structural dynamics and earthquake engineering background to help design and test a miniature voice coil mass vibrator, which was used to study the dynamic response of model buildings tested on the centrifuge. An objective of the research project is to examine how adjacent structures interact with one another during earthquakes through the ground supporting their foundations. The effect of this "structure-soil-structure interaction" on buildings in dense urban environments is not well understood. Says Montgomery, "I found the combination of structural and geotechnical engineering to be the most interesting aspect of the project. The structures, the foundations, and the soil must all be analyzed when evaluating how neighboring buildings interact. This required research experts with different backgrounds to work together toward a common goal."

While in Davis, Jack continued working toward his B.S. degree by taking the Cal Poly course *CE 586-Geotechnical Earthquake Engineering*. Each week during the spring term two classes were transmitted live via a web-based video connection so that Jack could complete the course, finish his degree requirements, and work on the research project at the same time. The on-line course was successful thanks to support from the course instructor, Dr. Robb Moss, the Civil and Environmental Engineering Department, and an undergraduate civil engineering student, Kyle Marshall, who worked as a video operator and technician throughout the term. As a result of his efforts, Jack earned one of the top grades in the class. During the class he was able to share his experiences related to this project as well as those related to his part-time work at the U.S. Army Corps of Engineers (USACOE). Jack is now working full-time at the USACOE on several dam and levee projects.



*Jack (left) works with graduate researchers from UC Davis, UCSD, and UC Berkeley.*



*Jack (center) assists in the centrifuge control room during a test.*

Working on the City Block project and experiencing graduate school firsthand had an impression on Jack. "Prior to my involvement, I thought graduate students operated somewhat independently with limited guidance from advisors. But, during this project the advisors were all very hands-on. The graduate students were still responsible for managing day-to-day tasks associated with the research, but the advisors were always there to provide suggestions and advice."

This fall Jack will be entering the civil engineering graduate program at U.C. Davis where he plans to study geotechnical engineering. Jack feels that his experiences with the City Block project have helped to prepare him for success in the future. His advice for other undergraduates? "I think

students should look for opportunities to further their education or experience. I've noticed that good engineers have a lot of experience. In my opinion, the best way to gain this experience is to be open to different opportunities early in a career. I've found that almost everyone is willing to teach you about their work if you are willing to ask."

## Soil-Structure Interaction on the Scale of a City Block

### Seismic Performance Assessment in Dense Urban Environments



This material is based upon work supported by the National Science Foundation (NSF) under Grant No. CMMI-0830331 through the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). The "Seismic Performance Assessment in Dense Urban Environments: Soil-Structure Interaction on the Scale of a City Block" project is a collaborative effort that includes the University of California, Berkeley (lead institution), University of Buffalo-SUNY, University of California, Davis, University of California, San Diego, California Polytechnic State University, San Luis Obispo, and the Consortium of Universities for Research in Earthquake Engineering. This project utilizes the NEES equipment site at the University of California, Davis. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the NSF.

