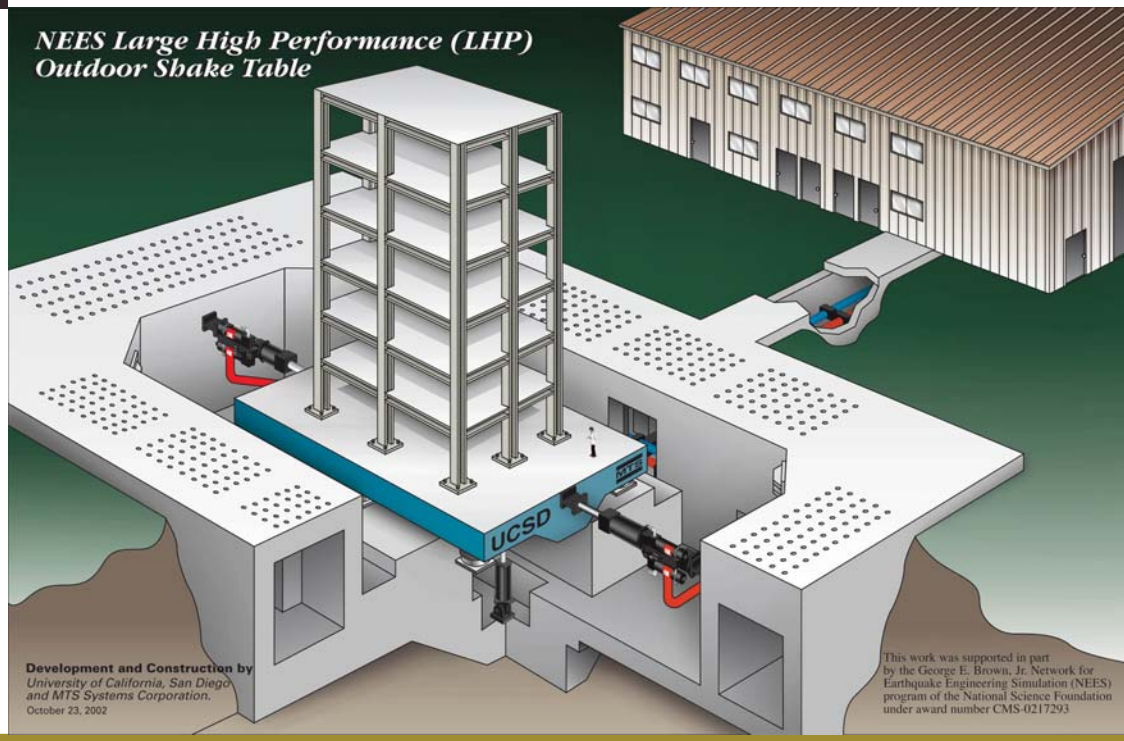
When it comes to earthquake safety,

No one wants to take chances

UCSD is the proven innovation leader in practical and cost-effective construction systems for seismic safety.

Be part of what's next. UCSD has completed the world's first outdoor shake table. It is the only facility capable of verifying seismic safety of full-scale structural systems.



Englekirk Structural Engineering Center Board of Advisors

Be part of what's next. The Jacobs School of Engineering's Board of Advisors for the Englekirk Structural Engineering Research Center is comprised of members of the construction and structural engineering industries. The board provides both financial support and professional expertise to advance the research program. Members include:

American Segmental Bridge Institute
Anderson Drilling
Baumann Engineering
Burkett & Wong Engineers
Carpenters/Contractors Cooperation Committee
Charles Pankow Builders, Ltd.
Clark Pacific
Douglas E. Barnhart, Inc.
Dywidag Systems International USA, Inc. (DSI)
Englekirk & Sabol Consulting Structural Engineers, Inc.
Englekirk Systems Development, Inc.
EsGil Corporation
GEOCON
Gordon Forward
Highrise Concrete Systems, Inc.
HILTI
Hope Engineering, Inc.
John A. Martin & Associates, Inc.
Josephson Werdowatz & Associates, Inc.
JVI, Inc.
KPFF Consulting Engineers
Matt Construction Corporation
Morley Builders
Nabih Youssef & Associates
Oak Creek Energy Systems
Occidental Petroleum Corporation
Pacific Southwest Structures, Inc.
PCL Construction Services, Inc.
Portland Cement Association
Precast/Prestressed Concrete Manufacturers Association of California (PCMAC)
Saiful/Bouquet Consulting Structural Engineers, Inc.
Schuff Steel - Pacific, Inc.
SEAOSC (Structural Engineering Association of Southern California)
Simon Wong Engineering
Simpson Manufacturing Co., Inc.
Smith-Emery Company
Stedman & Dyson Structural Engineers
The Eli & Edythe L. Broad Foundation
UC San Diego, Design and Construction
Verco Manufacturing Co.
Weidlinger Associates, Inc.

Advisory Board Benefits Include:

- Voice in Direction of research initiatives
- Informational meetings between company and technical staff and faculty
- Formal Company recognition at site
- Valuable networking opportunities

UCSD Powell Laboratories the proven innovation leader for earthquake engineering

Flexible Frames Make High-Rise Precast Concrete Buildings a Reality in Earthquake Prone California

In 1999, the Powell Labs subjected a five-story building to a series of pseudodynamic earthquake simulations. It was the largest model ever tested and served to validate five new framing systems with pre-compressed connections. The frames allow precast concrete structures to sway with an earthquake and then self-center. This innovation paved the way for the construction of high-rise office buildings, hospitals and apartment towers using cost-effective precast concrete never before possible in highly volatile seismic zones in California. The Powell Labs test was the culmination of a 10-year research collaboration supported by the Precast/Prestressed Concrete Institute and the Precast/Prestressed Concrete Manufacturers Association of California.

The 39-story Paramount apartment building gracing San Francisco's skyline incorporates a new framing system tested at the Powell Labs.

Explosive soil tests shed new light on liquefaction

UCSD researchers are conducting realistic field tests to study what happens to buildings, bridges, and piers when earthquakes cause the soil beneath them to gyrate and turn to slush. This poorly understood phenomenon called liquefaction occurs in areas where the ground is saturated, such as near oceans and rivers. In research funded by six states and private industry, UCSD researchers ignited explosives buried around deep pile foundations on San Francisco's Treasure Island to better gauge the effects of liquefaction and test various mitigation techniques.

The 1967 earthquake in Caracas, Venezuela killed 240 and caused $50 million in property damage. Here, a building tips over due to soil liquefaction and resulting foundation failure.

UCSD Powell Laboratories the proven innovation leader for earthquake engineering

Coronado Bridge, one of three major toll bridges in California that may be seismically retrofit with huge bearings and dampers.

First-Ever Tests Verify Novel Strategy to Protect Long-Span Bridges from Collapse in Earthquakes

In its earthquake retrofit strategy for the state's longest-span bridges, the California Department of Transportation is evaluating the use of huge isolation bearings and dampers, which are being placed between the bridge superstructure and supporting piers. These devices will absorb the shock of the earthquake and allow large displacements, preventing bridge collapse. Through its Seismic Response Modification Device (SRMD) Test Facility, the Powell Labs is analyzing bearings that are up to 12 feet in diameter and which have never been built, tested or used before. The SRMD is powered by computer-controlled hydraulic actuators that can apply up to 12 million pounds of force during earthquake simulations.

Composite Overlays Harden Buildings Against Terrorist Bomb Blasts

In a series of field tests, Powell Labs researchers have shown that UCSD-designed composite overlays for seismic retrofit can also protect critical structures from bomb blasts. The overlays are comprised of carbon threads woven into a thin material that is applied like wallpaper to walls, floors or columns of a structure to help absorb horizontal forces. In full-scale tests on a four-story building, first floor columns in the building were destroyed by a blast from C-4 explosives. But when the columns were rebuilt and retrofitted with carbon overlays, the same bomb caused little structural damage.

Workers retrofit Verizon Southern California central office, one of some 2,000 buildings that have been protected with UCSD's carbon overlays.

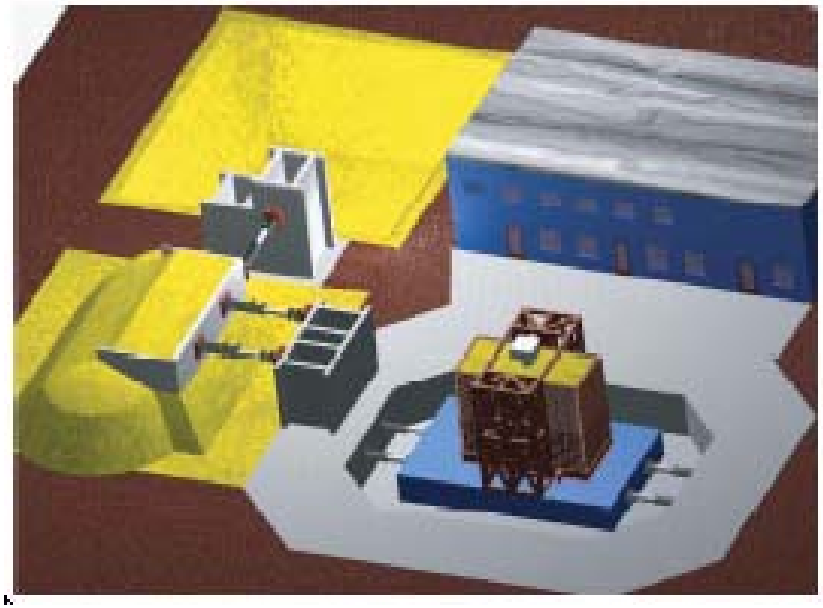
UCSD Powell Laboratories the proven innovation leader for earthquake engineering

Woodframe Research Leads to Safer Homes

Seismic research at the Powell Labs has had important implications for the State of California in which 99 percent of its single-family residences are woodframe designs. In 2001, as a key collaborator in the Consortium of Universities for Research in Earthquake Engineering (CUREE), UCSD performed the first-ever test on a fully-furnished woodframe house. Images from cameras and data from over 300 sensors gathered valuable information on existing construction techniques used throughout the State, verifying designs which had previously been untested, and opening the doors to new, safer innovations. Results indicated that non-structural elements like stucco and gypsum wallboard, when properly integrated, can add to a building's structural performance and minimize property loss. Half or more of the $40 billion in property damage from the 1994 Northridge earthquake was due to damage to wood buildings and totaled approximately $15 billion in insured loss.

Flexible Steel Buildings to Avoid Earthquake Damage

After the Northridge earthquake in 1994, it appeared that steel-framed structures had escaped unharmed. However, upon careful inspection it was discovered that the joints connecting the beams to the columns had lost structural integrity. Answering the call, engineers at the Powell Labs have tested and verified a new, safer and more efficient way of constructing steel framed structures. By applying post-tensioning, a technique commonly used in the construction of concrete buildings and bridges, they have create a new class of weld-free steel-framed structures. The initial dynamic test conducted in 2001 on a large-scale assembly indicated that the post-tensioned steel frames can absorb strong earthquake motions with little or no damage. A follow-up test is planned for late 2002.

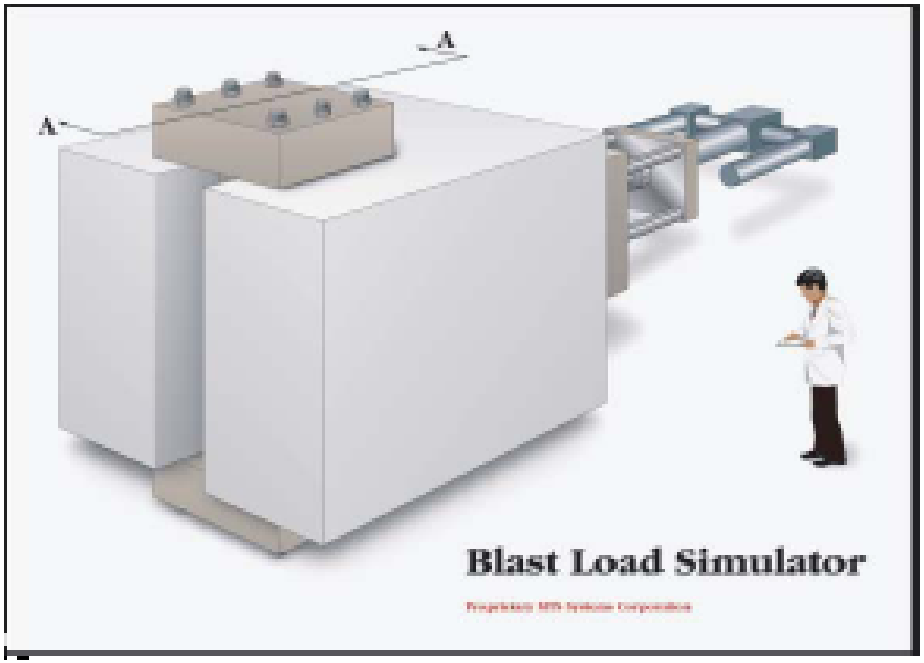


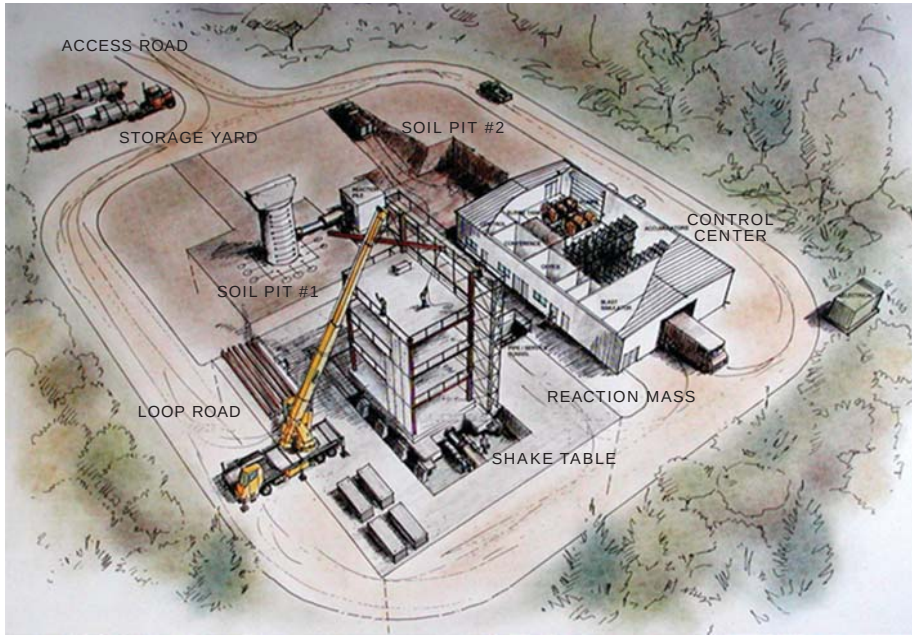
Soil Foundation-Structure Interaction Facility (SFSI)

Funding Agency: California Department of Transportation
With its two refillable soil pits, laminar soil shear box, and two reaction walls, this is the nation's largest facility for testing soil-structure reactions to earthquakes and other natural disasters such as hurricanes. The reaction walls allow for full-scale testing of systems such as a bridge abutments and pile foundations. Researchers will be able to tailor soil properties to simulate conditions in specific geographic locations, and to analyze soil-related phenomena caused by earthquakes such as liquefaction and lateral spreading. The SFSI is located adjacent to the UCSD-NEES outdoor shake table, which allows for full-scale testing of foundations and structures.

Blast Simulator

Funding Agency: Technical Support Working Group (TSWG)
Description: The non-explosive blast simulator is used to perform controlled blast load simulations on critical structural elements such as columns, walls, and floors. The simulator will be used to characterize blast effects on structural systems and to develop hardening technologies to protect structures from terrorist bomb attacks.



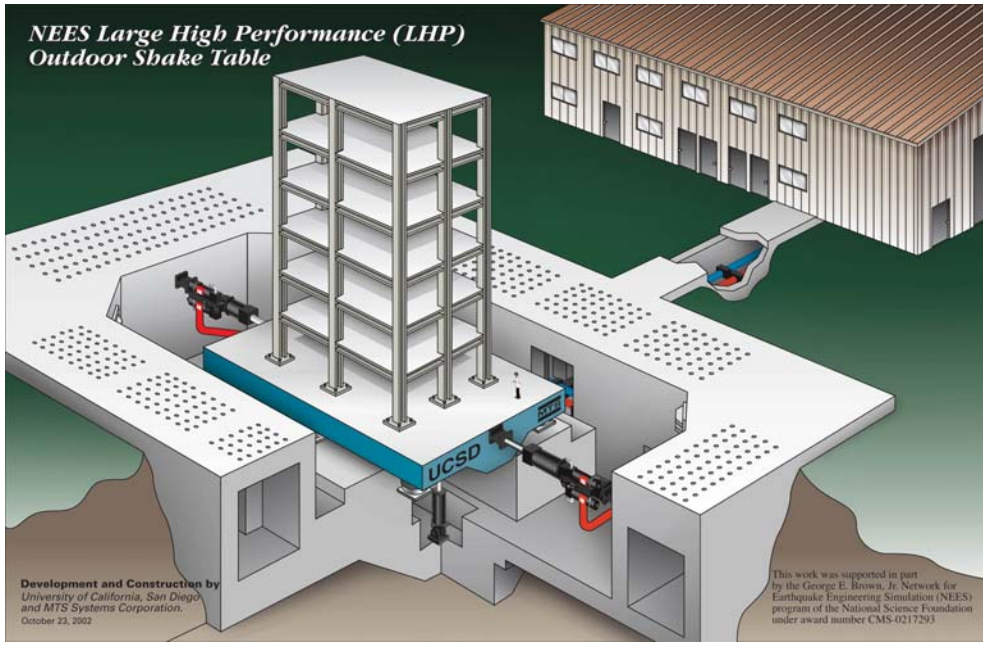


UCSD-NEES Outdoor Shake Table

Overview

With its one-of-a-kind facilities, the Englekirk Structural Engineering Center will enable structural tests that have never been possible before. The Center is equipped with the world's first outdoor shake table adjacent to the country's largest soil-structure interation facility, allowing researchers to perform dynamic eathquake safety tests on full-scale structural systems. The non-explosive blast simulator will be used to study the effects of bomb blasts and test new technologies to harden buildings against terrorist bomb attacks. construction of the Center is scheduled for completion by April 2005.

Funding Agency: National Science Foundation (NSF)
Description: At 25 ft. by 40 ft., the world's first outdoor shake table is also the largest shake table in the United States - able to handle structures weighing up to 2,200 tons and as tall as 100 feet. With its powerful hydraulic actuators capable of shaking at speeds up to 6 ft. per second, the shake table will be able to produce accurate near-fault ground motions, creating realistic simulations of the most devastating earthquakes ever recorded. The shake table is part of the Network for Earthquake Engineering Simulation (NEES) initiative which includes research facilities at more than 15 U.S. universities, providing an unprecedented, networked infrastructure for earthquake engineering research and education.



Invest in the Future

At a cost of $10.9 million, the construction of the Englekirk Structural Engineering Center has been supported by the National Science Foundation's National Earthquake Engineering Simulation (NEES) program as well as campus and state funds. Sponsorship from industry continues to leverage the federal government's investment in this one-of-a-kind facility and will be used to :

- fund start-up costs and site improvement
- support equipment upgrades that will extend the capabilities of the facility
- voice in direction of research activities

Funding

Federal (NSF & NEES):	$2.5 M
UCSD :	$2.5 M
Caltrans:	$0.5 M

Be Part of What's Next. . . .

We invite you to
become a member of the
Board of Advisors
for the

ENGLEKIRK STRUCTURAL ENGINEERING CENTER

Powell Structural Research Laboratories
Department of Structural Engineering • Jacobs School *of* Engineering
University of California, San Diego
Contact Kelly Briggs • kbriggs@ucsd.edu, 858.534.2329

PLEDGE LETTER

Dean Frieder Seible
Jacobs School of Engineering
University of California, San Diego
9500 Gilman Drive (0403)
La Jolla, CA 92093-0403

Dear Dean Seible,

We wish to provide support for the Englekirk Structural Engineering Center at the Jacobs School of Engineering, University of California, San Diego (UCSD). Therefore, we hereby agree to contribute a minimum of $25,000.00 to the U.C. San Diego Foundation to establish a current use fund to be used for the construction, equipment, and operation of an extension of the world-renowned Powell Structures Laboratories. This support is needed for full implementation of the best possible research and educational programs.

We pledge to the U.C. San Diego Foundation as follows:

Amount of Pledge: $_____

Down Payment: $_____

Balance: $_____

We prefer to pay the balance annually over a period of:

☐ 1 year ☐ 2 years ☐ 3 years ☐ Other:_____

Our pledge payments will be in the form of cash or marketable securities. It is understood that we may accelerate pledge payments, and that the U.C. San Diego Foundation will deduct the University's one-time 4% administrative fee from each gift as it is received.

In recognition of this contribution, we have been offered a seat on the Englekirk Structural Engineering Center Board of Advisors.

_____ _____

Donor Date