University of California at San Diego Large High-Performance Outdoor Shake Table

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Large High Performance Shake Table OVERVIEW

- Designed to permit accurate simulation of severe earthquake ground motions.
- Lack of height limitation allows testing of full- or very large-scale structural specimens.
- 30 major tests were performed in 12 years of operation:
  - Reinforced concrete buildings and bridge column
  - Precast concrete parking structure
  - Unreinforced and reinforced masonry building structures
  - Metal building structures
  - Woodframe dwellings and buildings
  - Wind turbine
  - Soil retaining walls / Laminar soil-boxes

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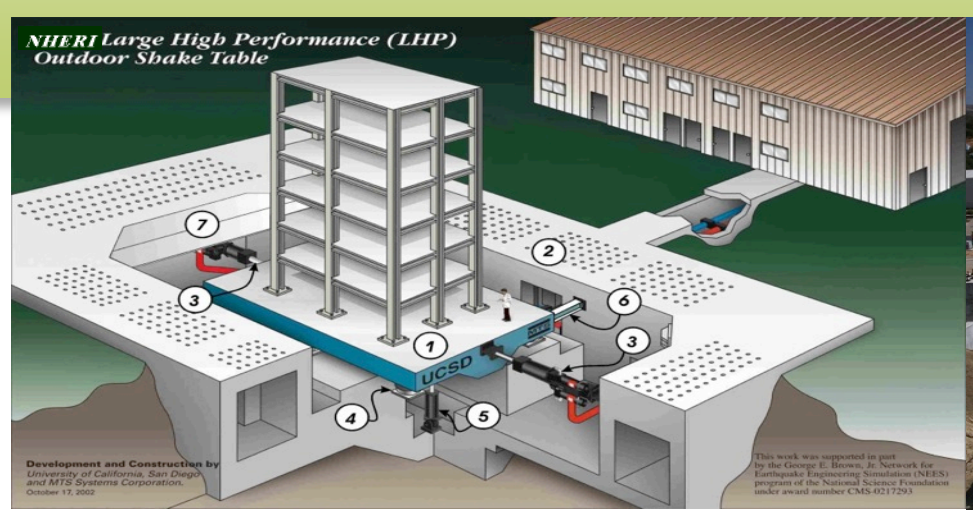
LHPOST - Characteristics



Performance Characteristics in Current 1-DOF Configuration	
Designed as a 6-DOF shake table, but built as a 1-DOF system to accommodate funding available	
Stroke	±0.75m
Platen Size	40 ft × 25 ft (12.2 m × 7.6 m)
Peak Velocity	**1.8 m/sec**
Peak Acceleration	4.7g (bare table condition); 1.2g (4.0MN/400 tons rigid payload)
Frequency Bandwidth	0-33 Hz
Horizontal Actuators Force Capacity	**6.8 MN (680 tonf)**
Vertical Payload Capacity	**20 MN (2,000 tonf)**
Overturning Moment Capacity	50 MN-m (5,000 tonf-m)

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Recent site additions:
Staging Area

- Improves transition time for projects.
- Facilitates materials handling.
- Allows multiple projects to be worked on simultaneously.

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Tall-Wood Project

Summer of 2017

Overview:

- 2 Story, Rocking Wall system using CLT (cross laminated timber).
- On-site assembly of deck and beam members.
- Machine shop fabrication of post-to-beam connections.

Contributing Institutions:

- Colorado School of Mines
- Oregon State University
- Colorado State University
- University of Washington
- Washington State University
- Lehigh University
- University of Cal San Diego

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Lessons Learned:
Planning and Coordination for Machined fixtures

Critical path and time restraints for project

- Steel Corbel connection fabrication
- 20 fixtures with ~ 40 holes / fixture
- Need them in 1 week, turnaround time was close to 3 weeks.
- Everyone focused on schedule and missed the details.

Problems

- 5/16” hole called out for 5/16” hardware.
- On-site fabrication to open holes and resume construction.
- Lost time

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Lessons Learned: Solutions

Starting from the bottom up

- Management was overwhelmed with production, volume, and pace.
- Best ideas come from those who do. Listen to them. This was something installers would have caught.

Implementations

- Technicians given chance to review drawings with engineers and researchers
- Machine shop fabrication
- Rebar details
- Instrumentation plans

Inclusion

- On large projects there are engineers, researchers, technicians, students, etc. Teamwork is important for project success and everyone has a voice.

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Thank you!

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