

LARGE DISPLACEMENT SOIL-STRUCTURE INTERACTION FACILITY FOR LIFELINE SYSTEMS

Presented by
H.E. STEWART
T. D. O'ROURKE
Cornell University



CORNELL
UNIVERSITY

CORNELL NEES

 **College of Engineering**

The George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES)

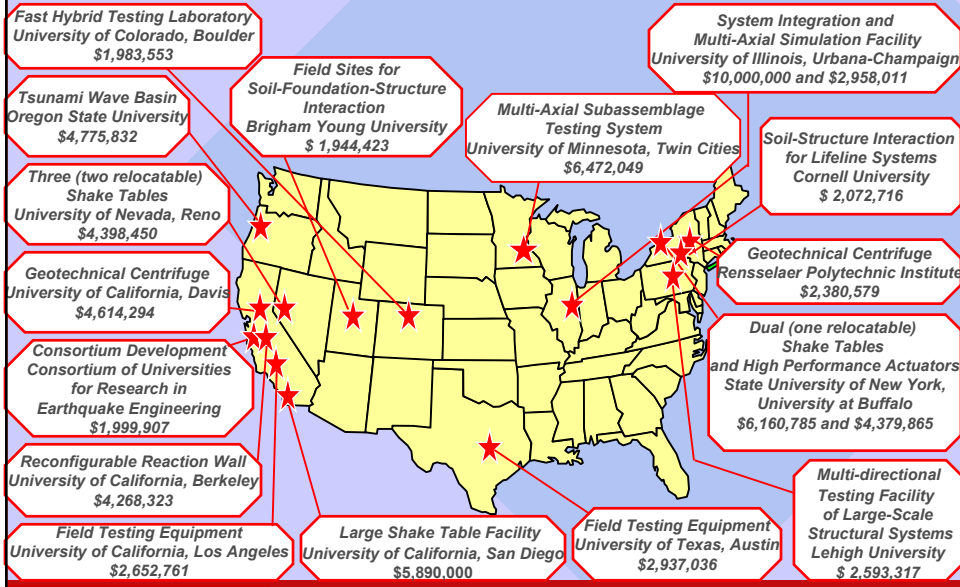
- Integrated experimentation, computation, and model-based simulation for improving the seismic design and performance of our Nation's civil and mechanical infrastructure.
- 15 equipment sites nationally.
- On line Sept. 2004, operational through 2014.
- High-speed Internet 2 connectivity through NEESgrid and common support software
- Coordinated use through the NEES Consortium, Inc.

CORNELL
UNIVERSITY

CORNELL NEES

 **College of Engineering**

NEES SITES



CORNELL
UNIVERSITY

CORNELL NEES

College of Engineering

VISION

Cornell/RPI Large Displacement Facility will be a unique, world-class resource for research, education, & outreach focused on underground lifeline response to large ground deformation & the seismic performance of highly ductile above-ground structures using advanced materials & construction.

LIFELINE SYSTEMS

- Electric Power
- Gas and Liquid Fuels
- Telecommunications
- Transportation
- Wastewater Facilities
- Water Supply

LARGE SCALE SOIL- LIFELINE INTERACTION

- Largest Lab Experiment of Ground Rupture Effects on Lifelines Ever Performed, Sponsored by **Tokyo Gas**

Special Trench and Backfill at Fault Crossing

Pipe Trench Cross-section

PGD Effect on Buried Pipelines

Buried Pipeline

Permanent Ground Deformation (PGD)

Elbow

PGD Effect on Buried Pipelines with Elbows

CORNELL UNIVERSITY **CORNELL NEES** College of Engineering

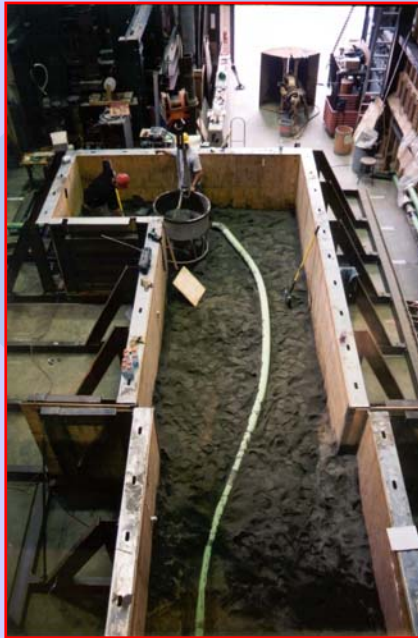
CORNELL UNIVERSITY **CORNELL NEES** College of Engineering



CORNELL
UNIVERSITY

CORNELL NEES

 College of Engineering



CORNELL
UNIVERSITY

CORNELL NEES

 College of Engineering

Impact on Diverse Population of Students

- **Bring CS and Physics students into earthquake engineering (College support & GE Foundation program)**
- **Multidisciplinary group for IT, data base management, Internet connectivity**
- **K-12 outreach through Sciencenter**
 - **Pilot project with Ithaca Sciencenter**
 - **National network of science museums**

Winter Lab Renovations

- **Detailed architectural plans from HUNT**
- **Updated materials fabrication and curing areas**
- **Instructional area / Electronic classroom**
- **High bay renovations**
- **Material storage and handling**

VISION-MISSION-FUTURE

- **World-Class Research Facility**
- **Vigorous Education & Outreach**
- **Underground Lifelines**
- **Highly Ductile Aboveground Structures**
- **Advanced Materials and Construction**
- **Continuing Industry Support**

CORNELL
UNIVERSITY

CORNELL NEES

 **College of Engineering**