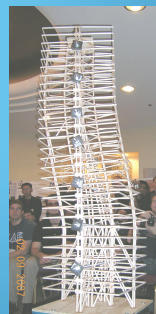
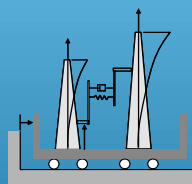
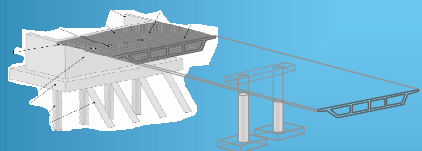
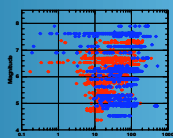
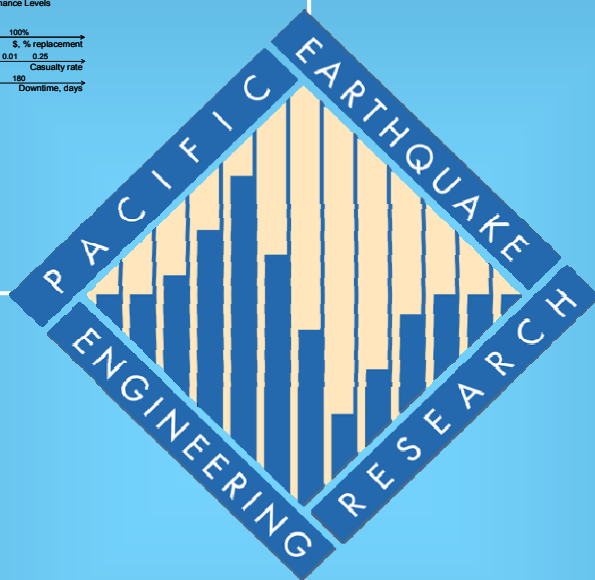
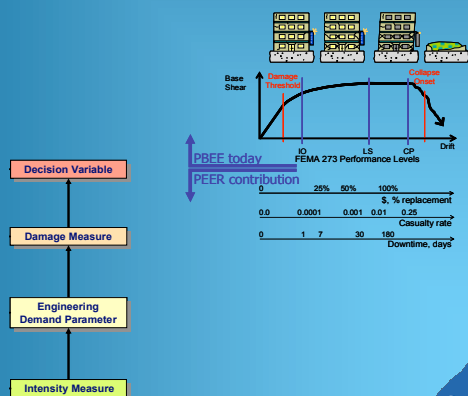


PEER Summative Meeting

13 June 2007
San Francisco, CA

Pacific Earthquake Engineering Research Center



*Celebrating a Decade of Innovations and Impacts in
Performance-Based Earthquake Engineering*

UC Berkeley, CalTech, Stanford, UC Davis, UC Irvine, UCLA, UC San Diego, USC, UWashington



Thanks to all who helped make PEER a Success!

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175 Faculty/Industry Researchers

270 Students

National Science Foundation

Lynn Preston
Vilas Mujumdar
Mary Poats
Joy Pauschke
Aspasia Zerva
& Many experts who reviewed PEER's performance during NSF site visits over a decade

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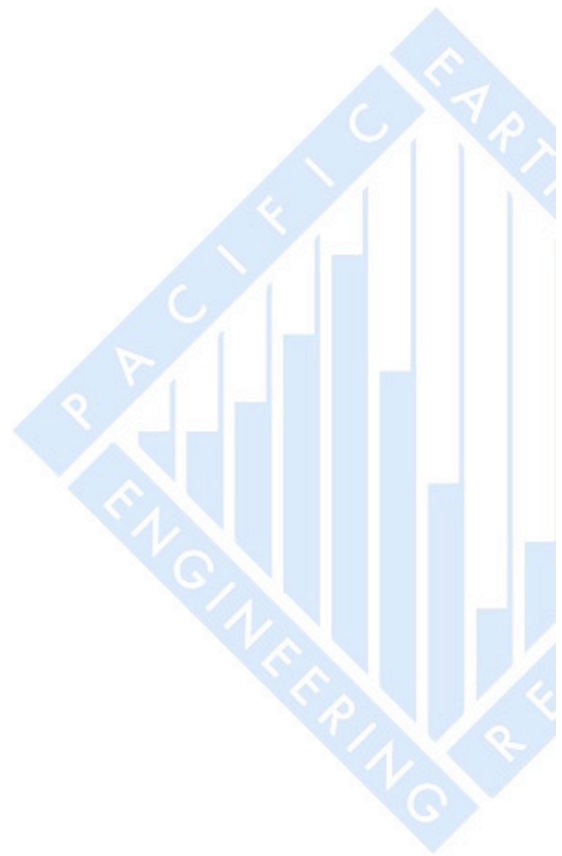
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Thanks to Sponsors

Special Thanks



A Message from the PEER Director



The Pacific Earthquake Engineering Research Center, a National Science Foundation (NSF) Engineering Research Center, funded jointly by the NSF, the State of California, the University of California, and numerous industry and government partners, was created in 1997 to harness the facilities and multi-disciplinary talents of students, faculty, and government and industry partners to advance the state of knowledge and practice in performance-based earthquake engineering.

The PEER Summative Meeting and this report specially commemorate and celebrate a decade of achievements. The program recounts the formation of PEER, its development over the past decade, its major accomplishments and impacts, and future plans. The program covers research, education, and technology transfer successes, and involves several of PEER's key contributors.

When PEER started its program in 1997, performance-based earthquake engineering was in its first generation, often relying on prescriptive approaches that provided a nominal measure of expected performance. PEER has developed a more rigorous performance-based approach, with performance measured in systems-level metrics that matter to stakeholders. PEER also created simulation technologies, models and criteria to enable practical implementation of performance-based engineering approaches. Today, the impacts of PEER's research, education, and technology transfer programs can be found throughout the building, transportation, and utilities industries.

PEER is proud to have contributed to the state, the nation, and industry. PEER will continue to do so with the support of the State of California, the University of California, and industries and government agencies interested in advancing earthquake engineering, many of whom are supporting PEER's programs today and tomorrow.

I thank the NSF, the State of California, the University of California, and numerous students, faculty, staff, and business and industry supporters for investing in the Center and its mission to advance earthquake engineering. Together we have positively effected seismic safety and set forth a model approach that will accelerate seismic safety developments in the future.

Jack Moehle

Jack Moehle
Director, PEER

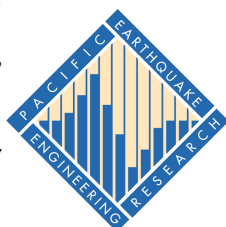
The Pacific Earthquake Engineering Research Center

Celebrates its 10th Year as a

NSF ERC

Presenting keynote speakers and panelists from academia, government, and industry

*13 June 2007
Giannini Auditorium
San Francisco, CA*



8–9:00	Registration
8:30-9	Light breakfast
9:00	<p>Welcome and Opening remarks</p> <p>Jack Moehle, Director, PEER</p> <p>Robert Price, Associate Vice Chancellor for Research, UC Berkeley</p> <p>Vilas Mujumdar, Program Director, EERC, National Science Foundation</p>
9:15	The Story of PEER - Jack Moehle
10:00	Break
10:30	Research Program Impacts - Greg Deierlein, Stanford University
11:00	Educating a New Generation of Engineers - Scott Ashford, Oregon State U.
11:30	<p>Current and Past Student Panel Discussion</p> <p>Christine Goulet, UCLA</p> <p>Ben Langhorst, UC Irvine</p> <p>Wassim Ghannoum, UC Berkeley</p> <p>Curt Haselton, CSU at Chico</p> <p>Dawn Cheng, UC Davis</p> <p>Ken Elwood, U. British Columbia</p>
Noon	Lunch – Belvedere Room, 52 nd floor

1:15	<p>PEER Research Program Achievements</p> <p>Risk Decision Making for Buildings – From Owners to Society – Mary Comerio, UC Berkeley</p> <p>Framework for Performance-Based Earthquake Engineering – Helmut Krawinkler, Stanford University</p> <p>Characterization of Ground Motion Hazard – Yousef Bozorgnia, PEER</p> <p>Simulation & Information Technologies – Gregory Fenves, UC Berkeley</p> <p>Assessment & Design Implications of Large Ground Deformations – Ross Boulanger, UC Davis</p> <p>PBEE Assessment & Design of Bridges – Stephen Mahin, UC Berkeley</p> <p>Implementation, Adoption & Stakeholder Perspectives – Peter May, U. Washington</p>
3:15	Break
3:45	<p>PBEE Practice and Needs – A panel discussion with key industry partners</p> <p><i>Panel moderator:</i></p> <p>James Malley, Degenkolb Engineers</p> <p><i>Panelists:</i></p> <p>Earthquake Ground Motion – Paul Somerville, URS</p> <p>Tall Building Design – Joe Maffei, R&C</p> <p>PBEE Performance Modeling – Ron Hamburger, SGH</p> <p>Lifelines Earthquake Engineering – Lloyd Cluff, PG&E</p> <p>Bridge Engineering – Tom Shantz, Caltrans</p>
4:30	PEER Graduation – Jack Moehle, PEER
5:00	Adjourn to Social Hour with posters – Wine Room, 52 nd floor
6:30	Dinner – Bay Room, 52 nd floor

The Pacific Earthquake Engineering Research Center

Core Universities

UC Berkeley (lead)
Caltech
Stanford
UC Davis
UC Irvine
UCLA
UCSD
USD
U Washington

Education Affiliates

Cal Poly, SLO
CSU, Los Angeles
CSU, Northridge
Oregon State U.
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URS
WJE

The Pacific Earthquake Engineering Research Center (PEER) was established as a consortium of nine West Coast Universities in 1996 and gained status as a National Science Foundation Engineering Research Center in 1997. In addition to its nine Core Universities, PEER currently involves six Education Affiliates and numerous Business and Industry Partners. PEER operates a range of programs with principal funding from the US National Science Foundation, the State of California, and other government and industry partners.

PEER has a mission to develop and disseminate performance-based earthquake engineering technology for design and evaluation of buildings, lifelines, and infrastructure to meet the diverse seismic performance objectives of individual stakeholders and society. PEER achieves its mission through research, education, and technology transfer programs aimed at cost-effective reduction of earthquake losses, with emphasis in the following areas:

Definition of seismic hazard for engineering design applications;

Engineering tools for the seismic assessment and design of constructed facilities, with emphasis on geotechnical structures, buildings, bridges, and lifelines;

Design criteria to ensure safe and efficient performance of constructed facilities;

Methodologies including engineering and public policy instruments for mitigating seismic hazards in existing buildings;

Performance-based approaches for design and evaluation of constructed facilities to provide appropriate levels of safety for occupants, and protection of economic and functional objectives for essential facilities and operations.

PEER has entered its tenth year as a NSF Engineering Research Center and, as planned at the outset, is graduating from NSF funding at the end of September 2007. PEER will continue as an active earthquake engineering research center with a wide spectrum of technical activities, supported by federal, state and regional agencies together with industry partners.

Vision for Performance-Based Earthquake Engineering

The PEER mission is to develop and disseminate procedures and supporting tools and data for performance-based earthquake engineering (PBEE). The approach is aimed at improving decision-making about seismic risk by making the choice of performance goals and the tradeoffs that they entail apparent to facility owners and society at large.

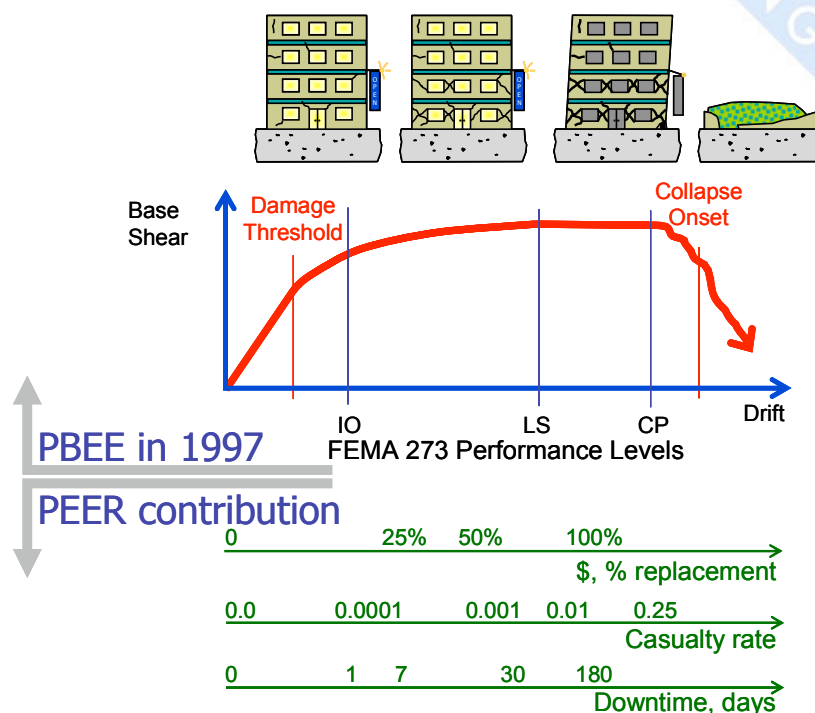
There are three levels of decision-making that are served by enhanced technologies for performance-based earthquake engineering:

One level is that of owners or investors in individual facilities (e.g., a building, a bridge) who face decisions about risk management as influenced by the seismic integrity of a facility.

A second level is that of owners, investors, or managers of a portfolio of buildings or facilities – a university or corporate campus, a highway transportation department, or a lifeline organization – for which decisions concern not only individual structures but also priorities among elements of that portfolio.

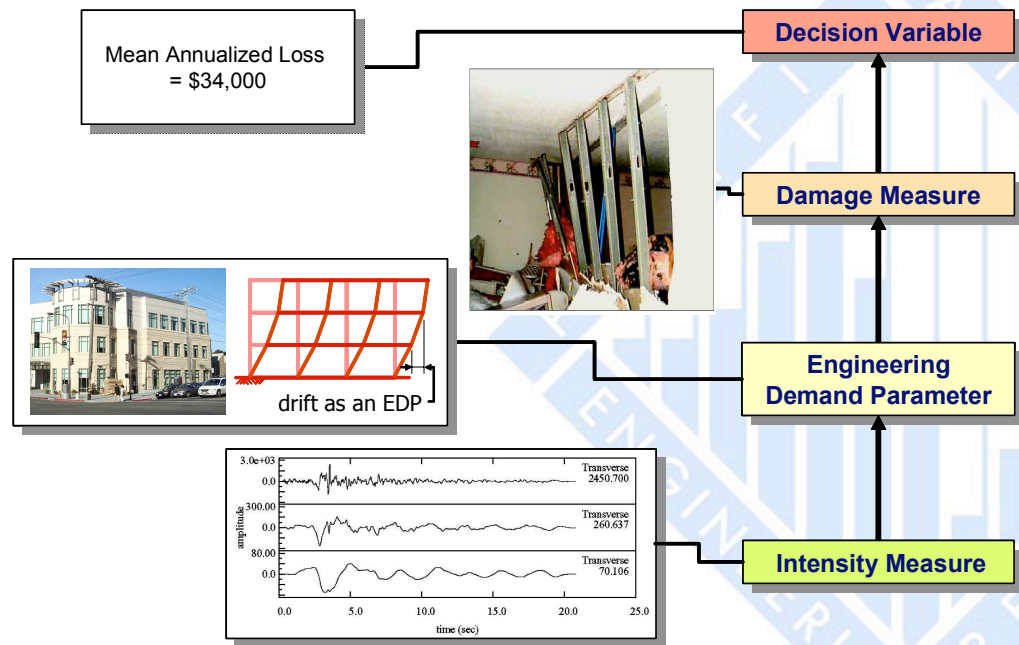
A third level of decision-making is concerned with societal impacts and regulatory choices relating to minimum performance standards for public and private facilities, including regulated objectives for seismic performance and prescriptive or performance-based procedures for achieving them.

The clients for PBEE technologies are members of the engineering profession, entities with responsibility or interests in facility performance, and society at large. Performance-based earthquake engineering is bringing about a change in the profession that alters both the role of earthquake engineers (broadening their involvement as consultants for management of earthquake risks) and the demands placed on the profession (changing the methods of risk evaluation, design, and engineering). PEER has worked hand-in-hand with business and industry partners to understand how advances in PBEE affect engineering practice and the construction regulatory environment, and to identify ways to lessen barriers to adoption and implementation of PBEE.



PBEE Framework

PEER has developed a framework for performance-based earthquake engineering that integrates a series of distinct and logically related parts of the problem. The first part is definition of the seismic hazard, which we have represented by the term *intensity measure*. The second part is determination of *engineering demand parameters* (e.g., deformations, velocities, accelerations) given the seismic input. This leads naturally to definition of *damage measures* such as permanent deformation, toppling of equipment, or cracking or spalling of material in structural components and architectural finishes. Finally, these damage measures lead to quantification of decision variables that relate to casualties, cost, and downtime. The PEER framework mathematically tracks the interrelationships and uncertainties through the performance assessment process.



$$v(DV) = \iiint G\langle DV | DM \rangle | dG\langle DM | EDP \rangle | dG\langle EDP | IM \rangle | d\lambda(IM)$$

Education and Technology Transfer

PEER's programs in research, education, industry partnerships, and outreach have been geared to producing the technology and human resources necessary to transition from current design and assessment methods to performance-based methods. A primary goal has been to produce and test through research the fundamental information and enabling technologies required for performance-based earthquake engineering. The Education Program has promoted earthquake engineering awareness in the general public, and attracted and trained undergraduate and graduate students to conduct research and to implement research findings developed in the PEER program. The Business and Industry Partner Program has involved earthquake professionals, relevant industry, and earthquake information users in PEER activities to ensure the utility of the research and to speed its implementation. The Outreach Program has presented PEER's activities and products to a broad audience including students, researchers, industry, and the general public.

A key objective of the PEER program has been to facilitate the development of practical guidelines and code provisions that formalize performance-based earthquake engineering in practice, replacing some of the first-generation documents on this approach [e.g., FEMA 273, ATC 32, FEMA 354, ASCE/SEI 41]. PEER continues to work closely with other organizations, including the Applied Technology Council and the Federal Emergency Management Agency on the ATC 58 project, *Development of Next-Generation Performance-Based Seismic Design Procedures for New and Existing Buildings*, where PEER's methodology and basic tools are forming the basis for this FEMA-funded project. Additionally, PEER continues to produce models and data that are useful, useable, and used in industry. The process is aided by the involvement of practicing earthquake professionals in our program, who help guide and incorporate our research advances as they occur. As a result, the PEER program is an important contributor to national, state, and local efforts to reduce earthquake risks that threaten the interests of government, industry, and the general public.



For more information....

See the attached mini-posters from the PEER Summative Meeting, which showcase some of the major achievements of PEER.

Read the PEER Summative Meeting Report at http://peer.berkeley.edu/publications/annual_report/ar_y10/FirstChapter_FinalReport2007-6.pdf

Find out more about PEER's many programs and opportunities to participate at <http://peer.berkeley.edu>, especially including

- The PEER Business and Industry Partnership Program at http://peer.berkeley.edu/bip/peer_bip.html
- The Tall Buildings Initiative at http://peer.berkeley.edu/research/tall_building.html
- The NEES Grand Challenge Project on Mitigation of Collapse Risk in Older Concrete Buildings at <http://peer.berkeley.edu/grandchallenge/index.html>
- OpenSees Days to learn about how OpenSees can serve you, coming 27 June 2007 at <http://opensees.berkeley.edu/index.php>
- OpenSees Navigator for an entry-level introduction to OpenSees at <http://peer.berkeley.edu/OpenSeesNavigator/>
- All PEER Reports available online free at http://peer.berkeley.edu/publications/peer_reports.html
- PEER Research Digests at http://peer.berkeley.edu/publications/research_digests.html
- A handbook report on UC Berkeley's seismic retrofit program at http://peer.berkeley.edu/publications/bracing_berkeley.html
- Direct access to PEER's NGA (Next Generation Attenuation) Project data and results at http://peer.berkeley.edu/products/nga_project.html
- Information on currently funded projects at http://peer.berkeley.edu/research/funded_projects_c.html
- PEER Education Program Successes and Opportunities at http://peer.berkeley.edu/education/research_program.html

Come see us at 325 Davis Hall on the Berkeley campus.

Stay involved in the PEER community in the years ahead.

PEER Summative Meeting Thanks

Special thanks to...



Dr. Yousef Bozorgnia
Assoc. Director for Sponsored
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PEER



Prof. Gregory G. Deierlein
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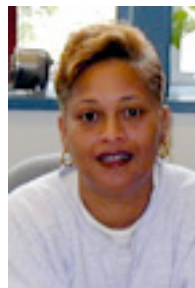
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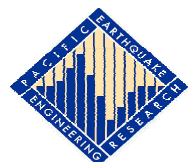


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