



# NEHRP ACEHR Vision for the Future

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Chairman and CEO  
Degenkolb Engineers

# Advisory Committee on Earthquake Hazards Reduction

- Create during the 2004 NEHRP Reauthorization
- Statutory Requirements – PL 108-360
  - Assessment – Shall Assess
    - Trends and developments
    - Effectiveness of the program
    - Need to revise the program
    - Management, Coordination, Implementation and Activities of the Program
  - Report
    - At least once every 2 years



# Advisory Committee on Earthquake Hazards Reduction

## Advisory Committee Members

Chris Poland, Chair	Degenkolb Engineers
Walter Arabasz	University of Utah
James Beavers	University of Tennessee
Jonathan Bray	University of California, Berkeley
Richard Eisner	Fritz Institute
Ronald Hamburger	Simpson Gumpertz & Heger, Inc.
James Harris	J. R. Harris and Company
Howard Kunreuther	University of Pennsylvania
Michael Lindell	Texas A&M University
Thomas O'Rourke	Cornell University
Paul Somerville	URS Corporation
Anne vonWeller	Chief Building Official, Murray City, Utah
Yumei Wang	Oregon Department of Geology and Mineral Industries
Sharon Wood	University of Texas at Austin
Brent Woodworth	Global Crisis Services, Inc.
Mark Zoback	Stanford University (SESAC ex-officio liaison)

# 2008 ACEHR Report

## Effectiveness of the National Earthquake Hazards Reduction Program

- Executive Summary
  - Introduction
  - Program Effectiveness and Needs
  - Management, Coordination, and Implementation of NEHRP
- Appendix – Trends and Developments in Science and Engineering

# 2008 Report Findings

- Deep concern about the withering of appropriated funds
- Overall success is dependent on legislative and administrative support for increased funding
- NEHRP has achieved significant improvements
- NIST as the newly designated lead agency for NEHRP, has formed a NEHRP office with a highly regarded NEHRP director
- NEHRP must become a well recognized national priority

# Key Recommendations

- FEMA
  1. Revitalize state earthquake programs
  2. Fund FEMA at the authorized level
  3. Develop and maintain guideline documents
- NIST
  1. Secure the funding to effectively carry out its role
  2. NIST must plan for the development of multidisciplinary expertise within its own staff and foster relationships with other public agencies

# Key Recommendations *(cont'd)*

- NSF
  1. Enhance its support for multidisciplinary research
  2. Enhance its support for curiosity-driven basic research
  3. Address critical research needs for the civil infrastructure
- USGS
  1. Fully fund ANSS
  2. Proceed with multi hazard demonstration projects
  3. Extend National Seismic Hazard Mapping project

# Key Recommendations *(cont'd)*

- Management, Coordination, and Implementation
  1. USGS delegate post-earthquake investigation leadership to NIST

# Trends and Developments in Lifelines Earthquake Engineering

## Topics

- Social Sciences
- Earth Sciences
- Geotechnical Engineering
- Structural Earthquake Engineering
- Lifelines Earthquake Engineering
- Disaster Response

# Trends and Developments in Lifelines Earthquake Engineering

- Recognizes six principal systems:  
electric power, gas and liquid fuels,  
telecommunications, transportation,  
waste disposal, and water supply
- Significant Advances
  - Development of high performance computational models
  - Major assessments of system-wide earthquake performance have been undertaken
  - There is a growing body of research and applications associated with the economic and social consequences
  - Since Hurricane Katrina there has been a notable shift in emphasis from protecting critical infrastructure to ensuring communities are resilient

# Trends and Developments in Lifelines Earthquake Engineering *(cont'd)*

- Issues and Challenges
  - FEMA funding for the American Lifelines Alliance was removed after FY 06
  - National workshops needed on the development of a coordinated approach to lifeline earthquake risk reductions
  - NEHRP related activities should support efforts to recognize and reduce the vulnerabilities arising from interdependencies
  - Support could be sought for critical lifelines from the DHS, the Department of Energy, the Department of Transportation and the Department of Defense
  - Lifeline research could contribute to multi hazard improvements in the Nation's critical infrastructure

# ACEHR Dec 08 Meeting Roundtable Discussion on Lifelines Research and Implementation

## Additional Issues and Challenges

- Lifelines are both publicly and privately owned
- Not subject to the ongoing development of mandatory building codes
- Considerable progress has been made in the development of voluntary design standards
- Lifeline owners and operators choose whether to implement these standards
- Members questioned whether existing standards are adequate
- Suggested that some form of independent external review may be needed

# ACEC -CA 2007 Performance Measures

An attempt to judge consistency

Service									
Immediate		Fully usable following EQ (Green Tag)							
Limited		Use impaired, use restored within 1 month							
Restricted		Limited access, use restored within months (Yellow Tag)							
Closed		No access, repairs unlikely, rebuilt within 2 to 4 years							
Damage									
Minimal		Essentially elastic Performance - cosmetic repairs only							
Repairable		Damage repaired within 1 year while open							
Significant		Damage repaired within 1 year while closed							
Complete		Reconstruction/replacement required							

# Draft Performance Matrix

Category	Standard	Latest	EQ	Function	Safety
Buildings	ASCE	2006	475-2500	Defined	
Electric	ASCE				
Water	AWWA	1997			
Waste	AWWA	1997			
Gas	TCLEE	1984			
Telecom	Bell Core	1980			
Oil	TCLEE	1984			
Roads	CALTRANS	2003	92-1500	Defined	Defined
Rail (H)	AREMA	1970	50-500	Defined	Defined
Rail (L)	BART	2000	475-2500	Defined	Defined
Ports	ASCE	1997	36-475	Defined	Defined

# Roundtable Discussion on Lifelines Research and Implementation (*cont'd*)

## Additional Issues and Challenges (*Cont'd*)

- Lifelines rehabilitation using stimulus money is an area of exceptional opportunity for adding resilience.
  - A small group of experts should be assembled to develop recommendations on lifeline related work
  - A separate committee should be established to identify best practices for use
  - Valuable to have a lifeline Czar as close as possible to the president



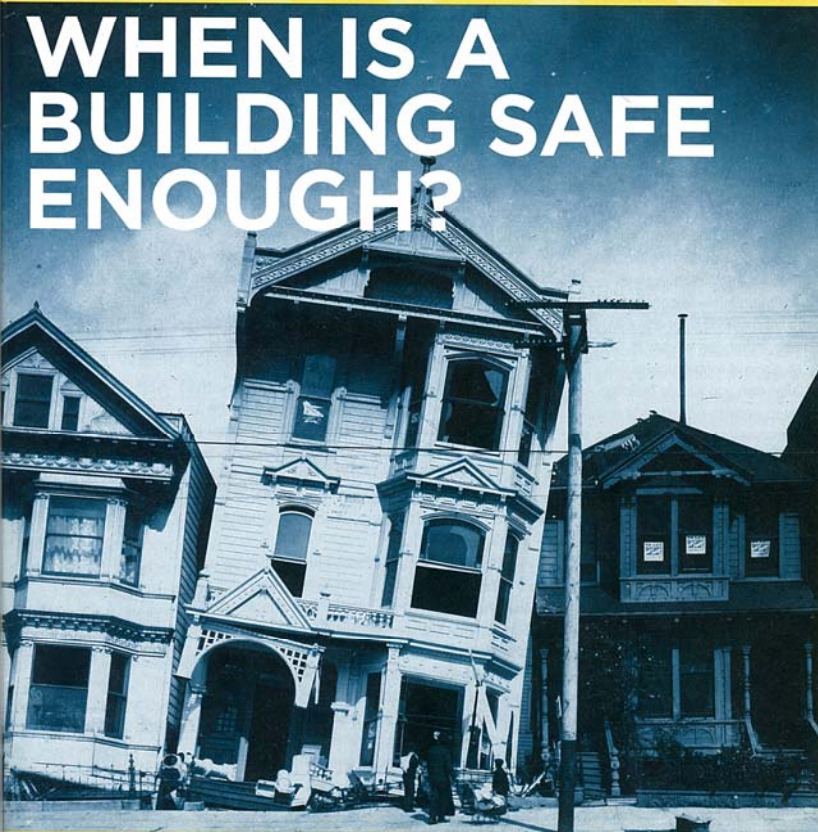
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SPUR

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## WHEN IS A BUILDING SAFE ENOUGH?



**The Resilient City**  
Part 1: Before the disaster

## The Resilient City

*Defining what San Francisco  
needs from its seismic  
mitigation policies*

[www.spur.org](http://www.spur.org)

# The Resilient City Initiative

A Three Phased Initiative to achieve Resilience

1. Before the Disaster – Seismic Mitigation Task Force - Chris Poland, Chair
2. Disaster Response - Emergency Preparedness Task Force – Dick Morton, Chair
3. After the Disaster – Rebuilding Task Force – Jacinta McCann, Chair

# Hazard Mitigation Task Force

- Overarching Framework – *setting goals*
  - Chris Poland - lead Author
- New Buildings – *building right*
  - Joe Maffei - lead Author
- Existing Buildings – *rehabilitate only as needed*
  - David Bonowitz - lead Author
- Lifelines – *to support recovery*
  - Chris Barkley – lead Author



# Approach:

- Define concept of **resilience** in the context of disaster planning and recovery
- Establish **performance goals** for the “expected” earthquake that supports the definition of resilience
- Define transparent **performance measures** that help reach the performance goals
- Recommended **next steps** for San Francisco’s new buildings, existing buildings and lifelines

# What is Seismic Resilience?

Seismic resilience is the ability of the city to:

- ***contain the effects*** of earthquakes
- ***carry out recovery*** activities in ways that minimize social disruption



# Transparent Hazard Definitions for San Francisco

Category	Hazard Level	
Routine	Likely to occur routinely in San Francisco	(M = 5.0)
Expected	Reasonably expected to occur once during the useful life of a structure or system	(M= 7.2)
Extreme	Reasonably be expected to occur on a nearby fault	(M=7.9)

# Target States of Recovery for San Francisco's Building & Infrastructure

Phase	Time Frame	Focus of Attention
I	1 to 7 days reconstruction	Initial response and staging for

*EOC's,  
City Buildings,  
Hospitals,  
Police and Fire Stations,  
Shelters*



VIEW FROM POTRERO AVENUE  
SAN FRANCISCO GENERAL HOSPITAL AND TRAUMA CENTER  
CITY AND COUNTY OF SAN FRANCISCO

FONG & UGAN ARCHITECTS  
MAR 04, 2008

San Francisco General Hospital

*Building Category A: "Safe and Operational"*

*Life Line Category I: "Resume essential service in 4 hours"*

# Target States of Recovery for San Francisco's Building & Infrastructure

Phase	Time Frame	Focus of Attention
II	7 to 30 days	Workforce housing restored – ongoing social needs met

*Residential structures,  
Schools,  
Community retail centers,  
Doctors offices*



*Building Category B: "Safe and usable while being repaired"*

*Life Line Category II: "Resume 100% workforce service within 4 months"*

# Target States of Recovery for San Francisco's Building & Infrastructure

Phase	Time Frame	Focus of Attention
III	2to 36 months	Long term reconstruction

*Industrial Buildings*

*Commercial buildings*

*Historic buildings*



*Building Category C: "Safe and usable after repair"*

*Life Line Category III: "Resume 100% commercial service within 36 months"*

# Policies for Achieving Resilience

Establish a “Lifelines Council” to provide a mechanism for comprehensive planning.

Conduct a seismic performance audit, establish priorities, mitigate to achieve resiliency and partner nationwide.



# TCLEE Opportunities

- Advocate for Lifeline Research Funding within NEHRP
- Develop and adopt Resiliency Goals for all Lifeline Systems
- Create a Lifelines Council to advocate for implementation
- Upgrade design guidelines into ASCE Standards
- Advocate standards in individual projects