

# **Creating Disaster-Resilient Communities**

**SPUR Disaster Planning Program's Resilient City  
Initiative**

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SAN FRANCISCO  
PLANNING + URBAN RESEARCH  
ASSOCIATION



## The Resilient City:

*Defining what San Francisco needs from its  
seismic mitigation policies for three phases*

**Before the Disaster, Response, Recovery**

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

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# Goal: Resilient Communities

A Resilient Community can take “the Punch” of an event and through preparedness and the impromptu response of those affected, recover quickly.

Goal is to save the people, their neighborhoods, their cultural heritage and their local economy.

# Resilient Communities

## Requires a Holistic Approach before and after the event

- Human Resilience is the engine
- Physical Infrastructure Resilience is the foundation
- Recovery governance sets the pace and direction
- Financial Resources are the fuel

*Requires public education, interim governance including financial planning and mitigation of the physical infrastructure*

# Public Education

## Human Resilience:

Knowing what may happen, how to respond, and deciding to “tip-in” and contribute to the recovery.

Damage must be expected and recovery possible.

- Understand the earthquake potential
- Understand what will happen to their homes, neighborhoods, jobs, and businesses
- Have plans for immediate response and for long term recovery
- Able to willing to “shelter-in-place”

# Recovery Governance

- Attend to the social needs, drive economic restoration
- Provide vision and leadership for rebuilding for the entire community
- Restore public facilities and services
- Provide resources and information
- Hurry! Time is of the essence
- Balance the pressure to rebuild quickly with the opportunity to rebuild deliberately and better

# Mitigation

- Transparent Hazard Definitions
- Transparent Performance Measures for Buildings and Lifelines
- Performance Goals that support response and recovery

# Performance Goals for the “Expected” Earthquake

Phase	Time Frame	Condition of the built environment
I	1 to 7 days	Initial response and staging for reconstruction
II	7 to 60 days	Workforce housing restored – ongoing social needs met
III	2 to 36 months	Long term reconstruction

# Mitigation

## Transparent Hazard Definitions

Category	Hazard Level
Expected	Reasonably expected to occur once during the useful life of a structure or system  <i>Use for planning, retrofit and repair</i>
Extreme	Largest expected to occur on a nearby fault  <i>Use for emergency response planning and major infrastructure design</i>

# What is Safe?

# What is Useable?



Observed Damage  
L'Aquila, Italy  
May 2009

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# Mitigation

## Transparent Performance Measures for Buildings

Category	Performance Standard
Category A	<b><i>Safe and operational:</i></b> Essential facilities such as hospitals and emergency operations centers
Category B	<b><i>Safe and usable during repair:</i></b> “shelter-in-place” residential buildings and buildings needed for emergency operations
Category C	<b><i>Safe and usable after repair:</i></b> Facilities needed to restore the economy
Category D	<b><i>Safe but not repairable:</i></b> Minimum needed to save lives
Category E	<b><i>Unsafe – partial or complete collapse:</i></b> damage that will lead to casualties

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# Mitigation

## Transparent Performance Measures for Lifelines

*Transportation, Power, Water, Sewer, Communication*

Category	Performance Standard
Category I	Resume 100% service within days
Category II	Resume 90% service within weeks 100% within months
Category III	Resume 90% service within weeks 100% within years

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# Target States of Recovery for Buildings & Infrastructure

Phase	Time Frame	Focus of Attention
I	Weeks	Initial response and staging for reconstruction

*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 & CHAN ARCHITECTS  
MARCH 04, 2008

San Francisco General Hospital

*Building Category A: “Safe and Operational”*

*Life Line Category I: “Resume essential service in days”*

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# Target States of Recovery for Buildings & Infrastructure

Phase	Time Frame	Focus of Attention
II	Months	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 weeks”*

# Target States of Recovery for Buildings & Infrastructure

Phase	Time Frame	Focus of Attention
III	years	Long term reconstruction

*Industrial Buildings*

*Commercial buildings*

*Historic buildings*



*Building Category C: “Safe and usable after repair”*

*No fences required*

*Life Line Category III: “Resume 100% commercial service within years” with priority given to key industries*

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# Policies for Achieving Resilience

## New Buildings

- Recommendation 1 (Long Term)
  - Establish seismic performance targets for new buildings that allow the City to recover quickly.
- Recommendation 2 (Near Term)
  - Make improvements to the San Francisco Building Code to provide cost-effective improvements in seismic performance.

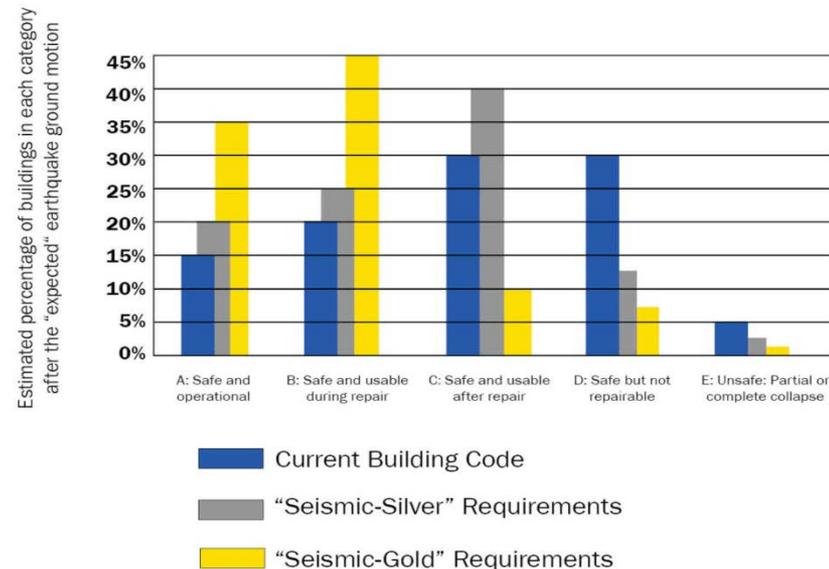


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# Policies for Achieving Resilience

## New Buildings (*cont'd*)

- Recommendation 3 (Near Term)
  - Declare the expected seismic performance that will be achieved by the current Building Code.
  - Develop optional code provisions for Seismic Silver and Gold to quantify improved seismic performance.



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# Policies for Achieving Resilience

## New Buildings *(cont'd)*

- Recommendation 4 (Near Term)
  - Develop strong incentives related to taxes, fees, zoning, or planning that encourage building to higher seismic standards.



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# Policies for Achieving Resilience

## Existing Buildings

- Recommendation 1
  - Mandated retrofit of soft-story, woodframe, multifamily housing. (CAPSS)
- Recommendation 2
  - Mandated retrofit or redundancy for designated shelters.



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# Policies for Achieving Resilience

## Existing Buildings (cont'd)

- Recommendation 3
  - A mitigation program for essential city services.
- Recommendation 4
  - A mitigation program for critical non-ductile concrete buildings.



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# Policies for Achieving Resilience

## Existing Buildings (*cont'd*)

- Recommendation 5
  - Mandated and triggered retrofit of gas lines and gas-fired equipment.
- Recommendation 6
  - Assessment of the unreinforced masonry program.



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# Policies for Achieving Resilience

## Lifelines

1. Establish a “Lifelines Council” to provide a mechanism for comprehensive planning.
2. Conduct a seismic performance audit of lifelines in San Francisco and establish priorities for lifeline mitigation.



# Policies for Achieving Resilience

## Lifelines (*cont'd*)

3. Require improvements to City-owned and regulated systems and develop a funding program.
4. Require the design and implementation of improvements to the gas distribution system.



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# Policies for Achieving Resilience

## Lifelines (*cont'd*)

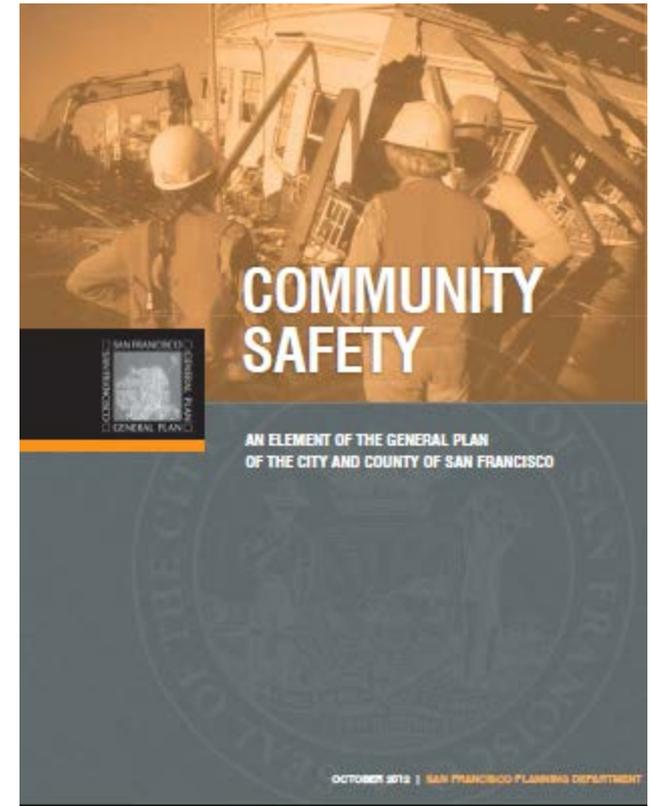
5. Establish partnerships with regional, state and private sector entities to address multi-jurisdictional and regional systems.
6. Establish a program for communications and outreach to regional, state, federal and private sector entities to drive change.



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# Resilient San Francisco

- > Defined in the Community Safety Element of the General Plan
- > Includes 4 Objectives and 83 Policies
  - Mitigation
  - Emergency Preparedness
  - Response
  - Recovery and Reconstruction
- > One of the Rockefeller 100 Resilient Cities



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# 106 Years in the Making

- Initiated by the 1906 Earthquake and Fire
- Stimulated by the 1989 Loma Prieta Earthquake
- Triggered by the 100<sup>th</sup> Anniversary of 1906
- Defined by the 2009 SPUR Resilient City Initiative and the 2011 Community Action plan for Seismic Safety
  - City's 10 Year Capital Plan
  - Earthquake Safety Improvement Program (ESIP) for privately owned buildings
  - San Francisco Lifelines Council

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

TARGET STATES OF RECOVERY FOR SAN FRANCISCO'S BUILDINGS AND INFRASTRUCTURE									
INFRASTRUCTURE CLUSTER FACILITIES	Event occurs	Phase 1 Hours			Phase 2 Days		Phase 3 Months		
		4	24	72	30	60	4	36	36+
<b>CRITICAL RESPONSE FACILITIES AND SUPPORT SYSTEMS</b>									
Hospitals								X	
Police and fire stations			X						
Emergency Operations Center	X								
Related utilities						X			
Roads and ports for emergency				X					
CalTrain for emergency traffic				X	X				
Airport for emergency traffic				X					
<b>EMERGENCY HOUSING AND SUPPORT SYSTEMS</b>									
95% residence shelter-in-place								X	
Emergency responder housing				X					
Public shelters							X		
90% related utilities								X	
90% roads, port facilities and public transit							X		
90% Muni and BART capacity						X			

## Phase I

### TARGET STATES OF RECOVERY

Performance measure	Description of usability after expected event
	<b>BUILDINGS</b> <b>LIFELINES</b>
	<b>Category A:</b> Safe and operational
	<b>Category B:</b> 100% restored Safe and usable in 4 hours during repairs
	<b>Category C:</b> 100% restored Safe and usable in 4 months after moderate repairs
	<b>Category D:</b> 100% restored Safe and usable in 3 years after major repairs
	Expected current status

Note: Categories A–D are defined on page 10.

# San Francisco's 10 year Capital Plan

- > Initiated in 2006
- > A sustainable plan. focused on long term safety, accessibility, and modernization of publically owned buildings and systems
- > Includes sustainability and resilience goals
- > Addressing sea level rise
- > Prioritization based on maximizing multiple benefits



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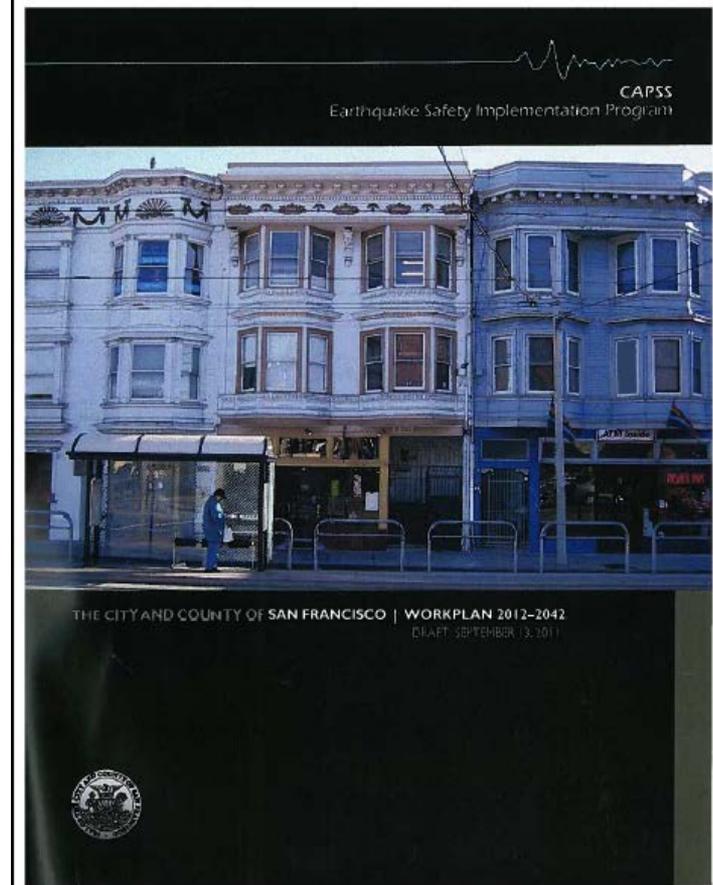
# Earthquake Safety Improvement Program

30 year program to mitigate privately owned buildings and prepare for recovery.

Community developed and supported through CAPSS

A formal program with staff within the City Administrators Office

Provides a three step approach

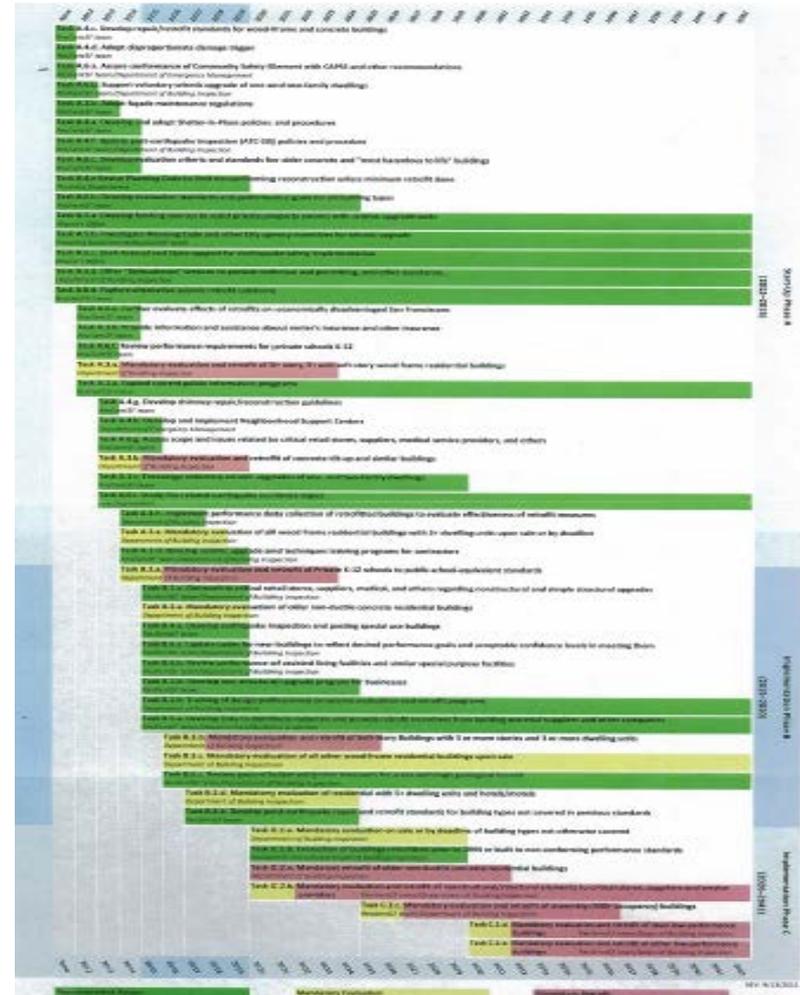


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# ESIP

- Includes 50 tasks and three phases of effort
  - Start Up – High Risk
  - Implementation Critical
  - Implementation All other
  
- Three step approach to resilience.
  - Facilitate the market
  - Nudge the market
  - Retrofit y deadline

Recommended Action  
 Mandatory Evaluation  
 Mandatory Retrofit



# Soft Story Legislation

Mandatory retrofit ordinance introduced with 7 year goal

Pre '78, Wood Frame, 3+ stories, 5+ units

Mitigates one of the most significant potential impacts to San Francisco

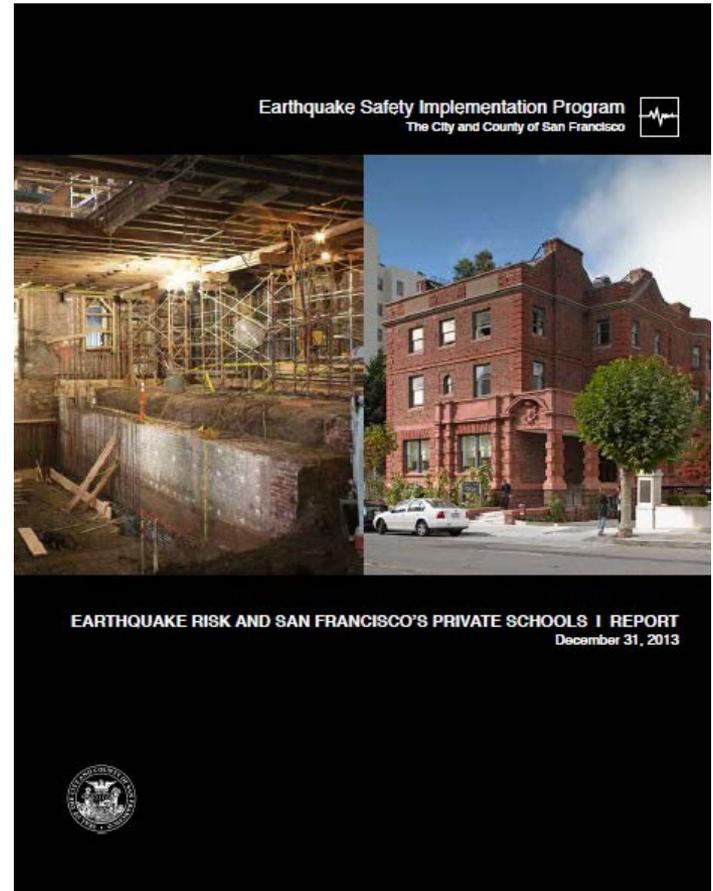
Retrofit goal is shelter-in-place



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# Private Schools

- > California Public Schools are safe
- > Private Schools are not regulated
- > 57% of the Schools in SF housed in potentially dangerous buildings
- > Pending ordinance to require evaluation and reporting
- > Expect that understanding the vulnerability will resolve the risk



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# Façade Ordinance

- > Deteriorating facades are a national problem
- > A falling hazard during earthquakes
- > Create debris, block access and suggest an unsafe environment
- > Intended ordinance will require routine inspection, maintenance and mitigation



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# San Francisco Lifelines Council

- > 11 Primary and 19 Secondary Providers
- > Meet quarterly, share openly, review lessons learned worldwide
- > Began with current vulnerabilities and plans
- > Includes regular review of lessons learned
- > Special Studies in process
  - Routes and access
  - Cell sites
  - Table top exercises
  - Interdependencies

# San Francisco Lifelines Council

## > Expectations

- Improve collaboration
- Understand interdependencies to enhance planning, restoration and reconstruction
- Identify and mitigate choke points
- Share information about recovery plans, projects and priorities
- Establish a coordination process for restoration and recovery including service to temporary and interim housing
- Establish consistent restoration and repair standards.

# Companion Programs

- Neighborhood Empowerment Network
- Neighborhood Emergency Response Teams
- Building Occupancy Resumption Program
- Community Engagement
- Give2SF
- SF Community Agencies Responding to Disasters
- SF Ready
- Vial of Life
- 72 hours.org

# For More Information

- SPUR Resilient Cities Initiative  
[www.spur.org](http://www.spur.org)
- Earthquake Safety Improvement Program  
[www.sfgsa.org/index.aspx?page=6044](http://www.sfgsa.org/index.aspx?page=6044)
- Sf Lifelines Council  
[www.sfgsa.org/index.aspx?page=4964](http://www.sfgsa.org/index.aspx?page=4964)
- Chris D. Poland  
[cpoland@cdpce.com](mailto:cpoland@cdpce.com)