SPUR: The Resilient City

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What is SPUR

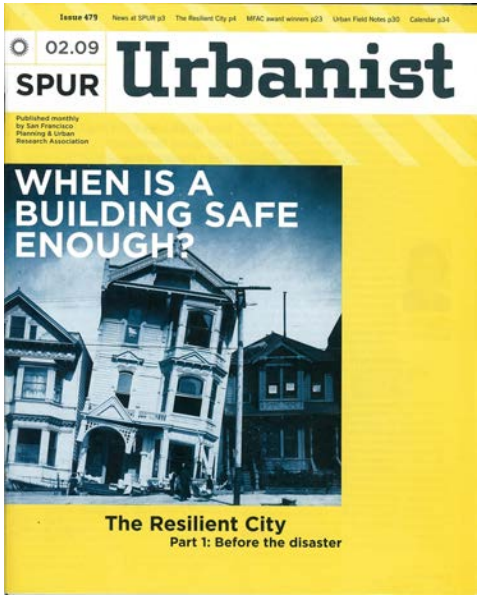
- A member-supported nonprofit organization – begun 1910
- SPUR brings people together from across the political spectrum to develop solutions to our most pressing urban policy problem
  - Eight program areas: Community Planning, Disaster Planning, Economic Development, Good Government, Housing, Regional Planning, Sustainable Development and Transportation

The Resilient City: a three phase approach

Before the Disaster

Disaster Response

After the Disaster



Resilient City: Before the Disaster

- 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
- ***rebuild*** in ways that mitigate the effects of future earthquakes

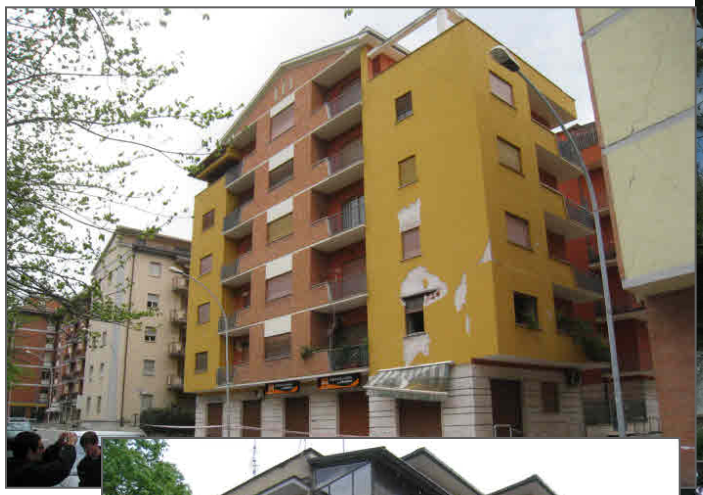
Performance Goals for the "Expected" Earthquake

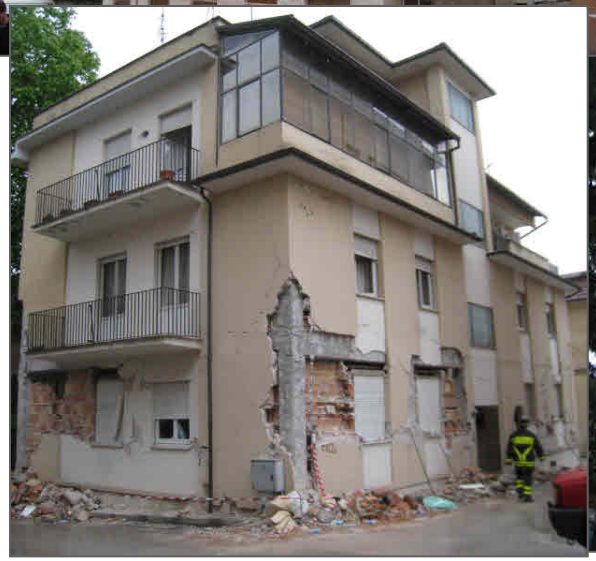
Phase	Time Frame	Condition of the built environment
I	1 to 7 days	Initial response and staging for reconstruction
II	7 to 60 days	Housing restored – ongoing social needs met
III	2 to 36 months	Long term reconstruction

Transparent Performance Measures for Buildings

Category	Performance Standard
Category A	***Safe and operational:*** Essential facilities such as hospitals and emergency operations centers
Category B	***Safe and usable during repair:*** "shelter-in-place" residential buildings and buildings needed for emergency operations
Category C	***Safe and usable after repair:*** current minimum design standard for new, non-essential buildings
Category D	***Safe but not repairable:*** below standard for new, non-essential buildings. Often used as a performance goal for existing buildings undergoing voluntary rehabilitation
Category E	***Unsafe – partial or complete collapse:*** damage that will lead to casualties in the event of the "expected" earthquake - the killer buildings

What is safe?
What is useable?





Observed Damage
L' Aquila, Italy
May 2009

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 Buildings and Infrastructure

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

EOC's,

City Buildings,

Hospitals,

Police and Fire Stations,

Shelters

San Francisco General Hospital

Building Category A: "Safe and Operational"

Lifeline Category I: "Resume essential service in 4 hours"

Target States of Recovery for Buildings and Infrastructure

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

Residential structures,

Schools,

Community retail centers,

Doctors offices

Building Category B: “Safe and usable while being repaired”

Lifeline Category II: “Resume 100% workforce service within 4 months”

Target States of Recovery for Buildings and Infrastructure

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

Industrial Buildings

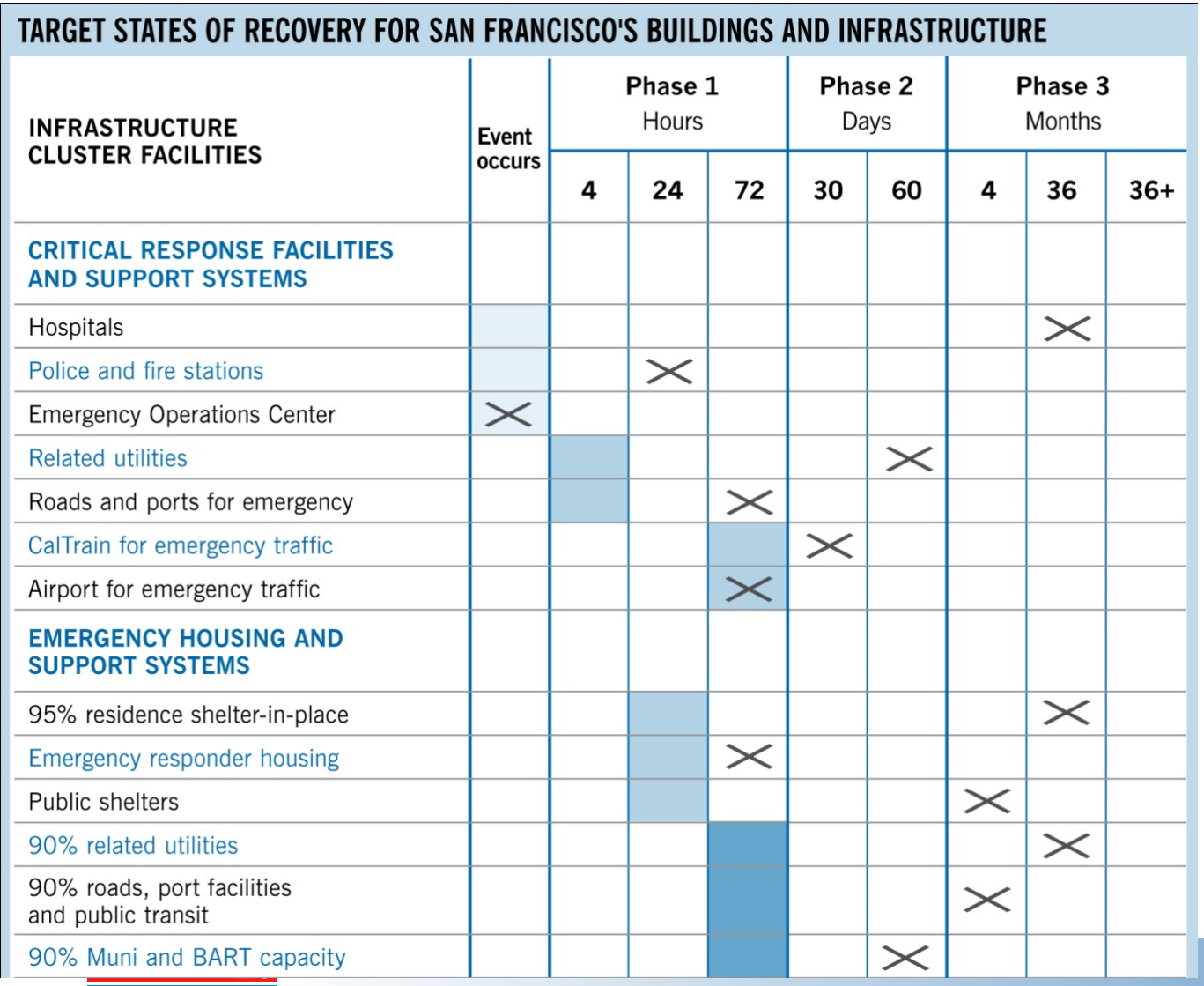
Commercial buildings

Historic buildings

Building Category C: “Safe and usable after repair”

Lifeline Category III: “Resume 100% commercial service within 36 months”

Target States of Recovery for Buildings and 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+
CRITICAL RESPONSE FACILITIES AND SUPPORT SYSTEMS									
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				
Airport for emergency traffic				X					
EMERGENCY HOUSING AND SUPPORT SYSTEMS									
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			

TARGET STATES OF RECOVERY

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

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

Policies for Achieving Resilience: Existing Buildings

Recommendation 1

Mandated retrofit of soft-story, woodframe, multifamily housing.

Recommendation 2

Mandated retrofit or redundancy for designated shelters.

Policies for Achieving Resilience: Existing Buildings

Recommendation 3

A mitigation program for essential city services.

Recommendation 4

A mitigation program for critical non-ductile concrete buildings.

Recommendation 5

Mandated and triggered retrofit of gas lines and gas-fired equipment.

Recommendation 6

Assessment of the unreinforced masonry program.

Policies for Achieving Resilience: New Buildings

Recommendations

1. Establish seismic performance targets (and incentives) for new buildings that allow the city to recover quickly.
2. Make near-term improvements to the San Francisco Building Code to provide cost-effective improvements in seismic performance.
3. Declare the expected performance that will be achieved by the current building code, and develop options for improved seismic performance.
4. Develop strong incentives and a clear communication of seismic performance expectations that encourage building to higher seismic standards.

Policies for Achieving Resilience: Lifelines

Recommendations

1. Establish a “Lifelines Council for comprehensive planning.
2. Conduct a seismic performance audit of lifelines in San Francisco and establish priorities for lifeline mitigation.
3. Require improvements to City-owned and regulated systems.
4. Require the design and implementation of improvements to the gas distribution system that reduce the risk of post-earthquake ignitions.
5. Establish partnerships with regional, state, and private sector entities to address multi-jurisdictional and regional systems.

Phase 3: Components of SPUR's "After the Disaster" Recovery Planning

1. Transportation
2. Governance
3. Planning
4. Housing

NORTHRIDGE 20
SYMPOSIUM

Safe Enough to Stay:

What will it take to enable San Franciscans to shelter-in-place after an earthquake?

How much of our housing stock needs to meet shelter-in-place standards?

Given:

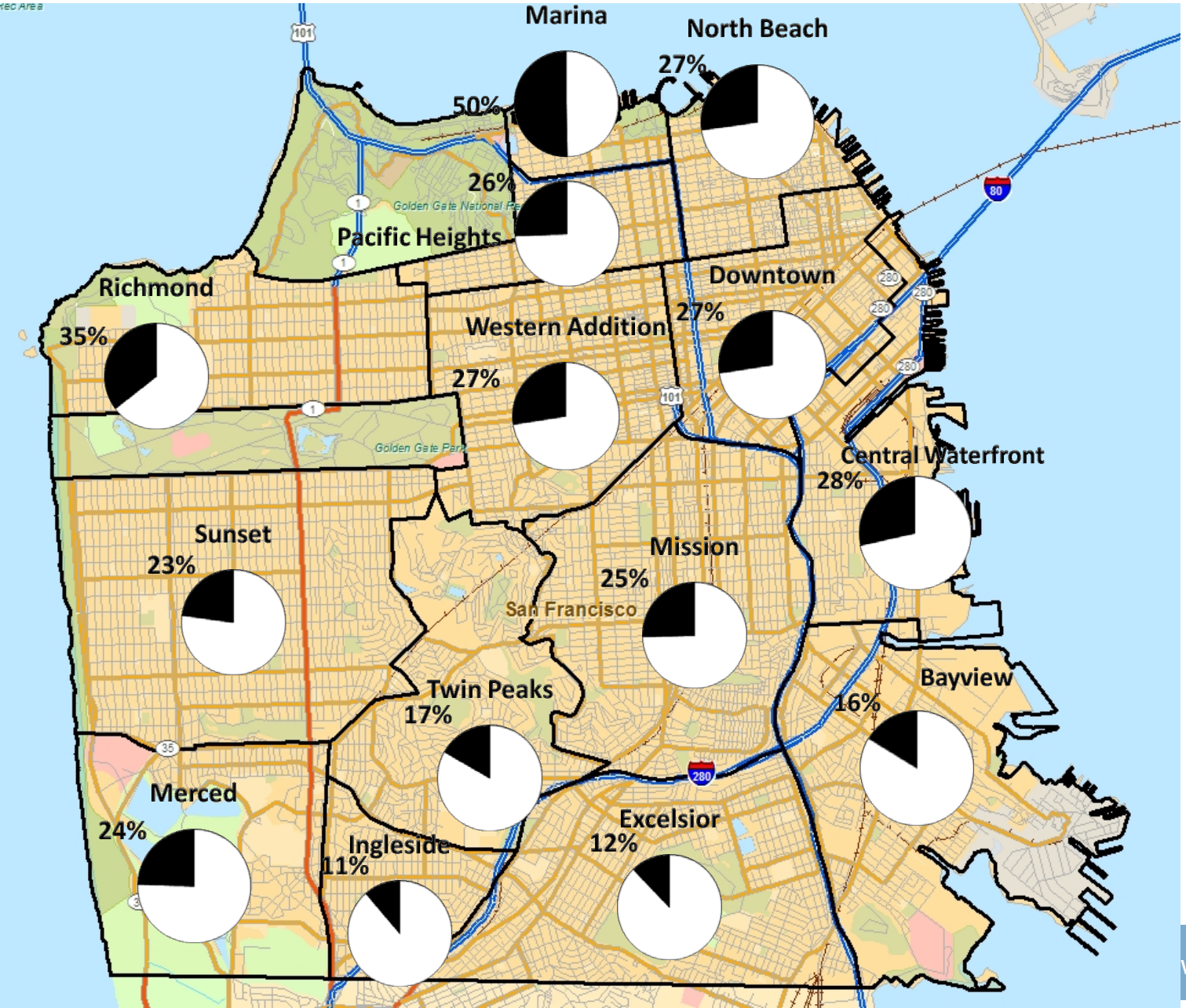
Emergency shelter bed capacity:
60,000 beds

Potential interim housing need**:**
80,000 + households or
25% of San Francisco's population

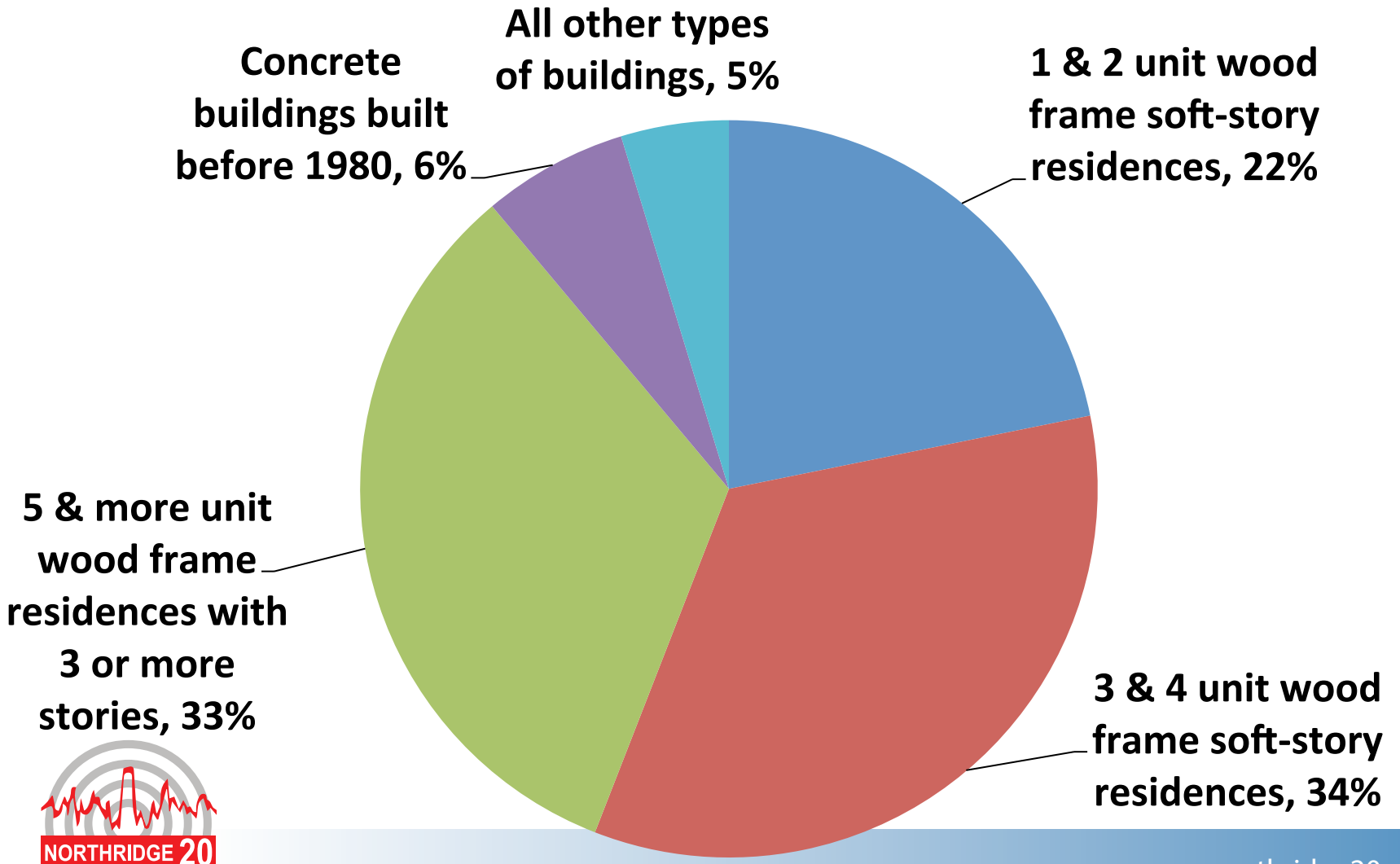
Current Capacity: 75%

% of Housing Units Usable and Unusable by Neighborhood

San Andreas 7.2 Magnitude Earthquake Scenario



Unusable Units by Structure Type

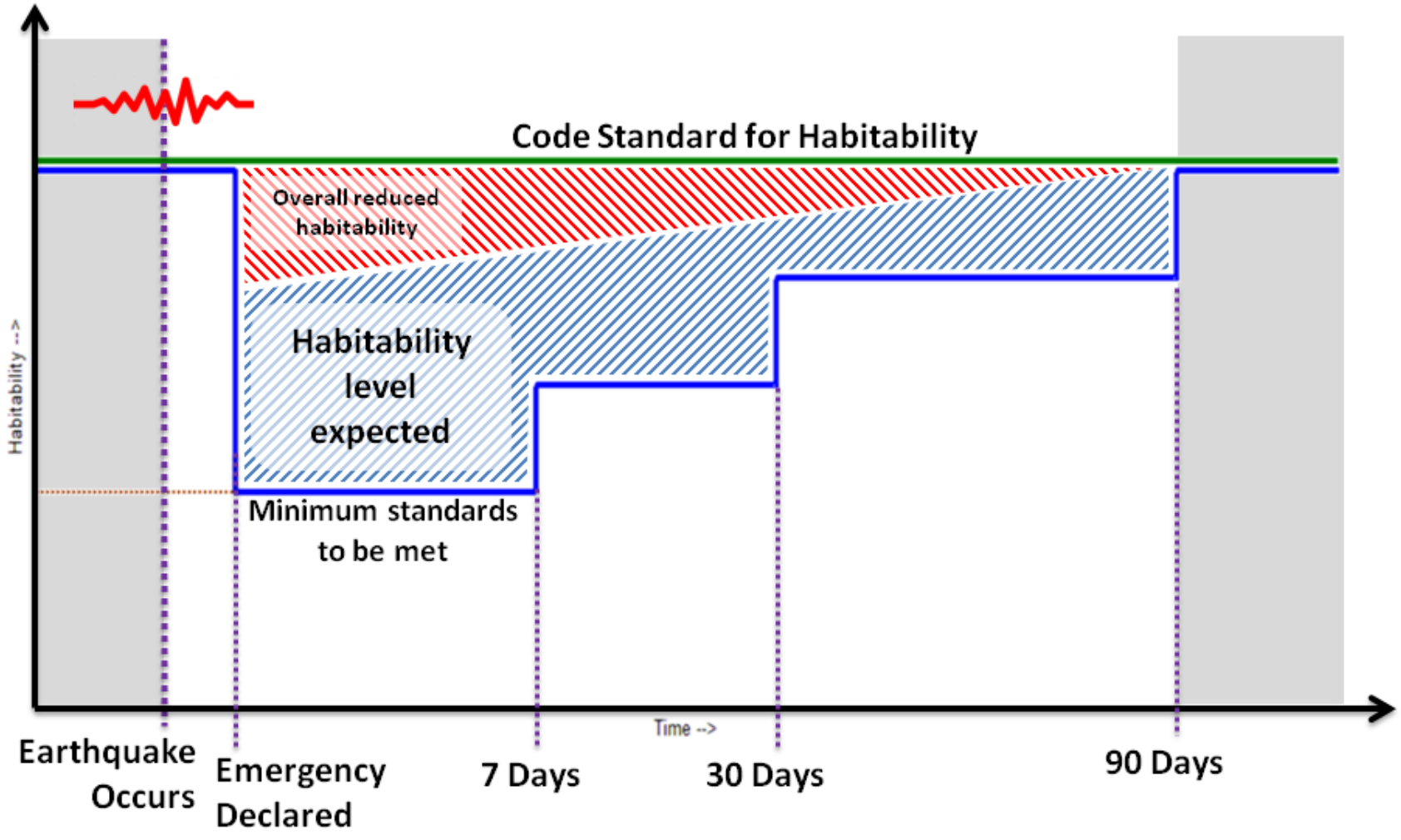


Summary of Recommendations

Shelter in Place

1. Adopt recovery targets for the housing
2. Implement mandatory soft story retrofit program
3. Develop soft-story retrofit program for smaller soft-story buildings
4. Develop retrofit programs for other vulnerable housing types
5. Focus on developing an interim housing strategy for the City
6. Develop engineering criteria for voluntary, mandatory, and triggered seismic work on residential buildings
7. Prepare and adopt regulations for shelter-in-place habitability standards in a declared “housing emergency” and plans for neighborhood support centers

Habitability Standards following Earthquake



Shelter-in-place habitability standards

Immediate post earthquake period	- Must be safe - One usable exit path
One week after the earthquake	- Fire extinguishers - Temporary plastic covering for weather protection - Battery powered smoke detectors
One month after the earthquake	- Electrical, gas, sewer and toilet must be working 30 days following restoration of service.
Three months after the earthquake	- Fire sprinklers must be must be working 90 days following restoration of service - Entrance doors and hardware/locks.
After the housing emergency is over	- All normal habitability requirements will apply at the end of the housing emergency period.

SPUR.org Publications

- Part I: Before the Disaster
  - Defining What San Francisco Needs From Its Seismic Mitigation Policies
  - The Dilemma of Existing Buildings
  - Building It Right the First Time
  - Lifelines
  - Safe Enough to Stay

- Part II: Emergency Response
  - The Culture of Preparedness
  - The Hub Concept

- Part III: After the Disaster
  - Rebuilding Our Transportation Infrastructure
  - On Solid Ground (Land Use Planning)

Implementation in San Francisco

- CAPSS / Mandatory Soft-Story Retrofit Program
- Lifelines Council
- Governance Recommendations
- Land Use Policy Recommendations
- Integration with the City's Recovery Initiative