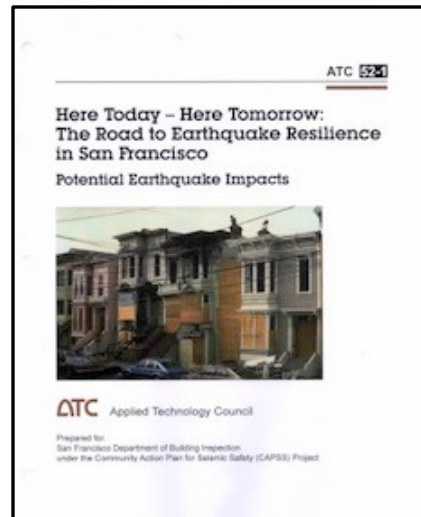


# **The Community Action Plan for Seismic Safety (CAPSS)**

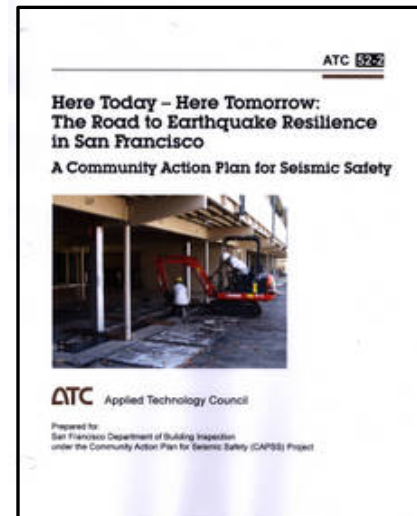
## Loss Estimates and Policy Recommendations

Laura Samant  
CAPSS Co-Project Manager

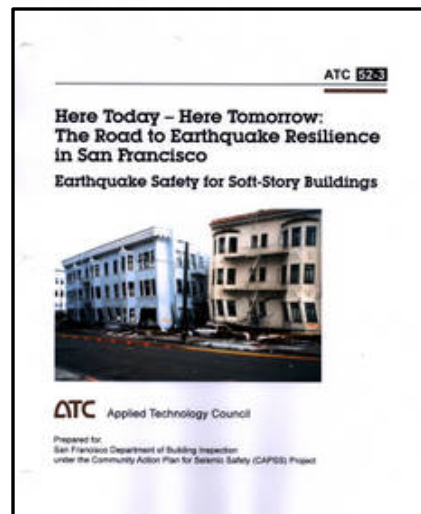
# CAPSS Reports



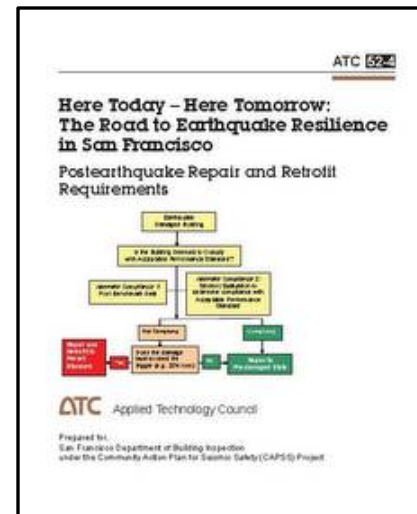
## Loss Estimates



## Action Plan



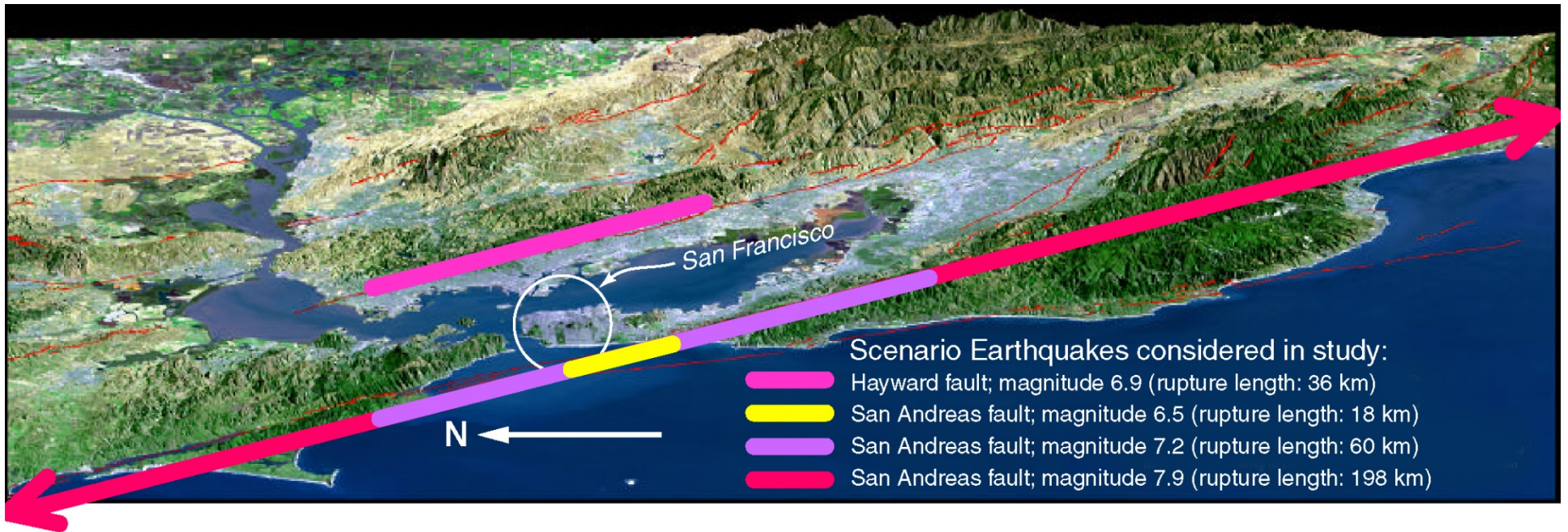
## Soft- Story Buildings



## Post-Earthquake Repair/Retrofit

# CAPSS Loss Estimates

# CAPSS Estimated Losses for Four Possible Earthquakes



San Andreas M6.5

Hayward M6.9

San Andreas M7.2

San Andreas M7.9





# Damage to Buildings

Overview of CAPSS Loss Estimates

Photo: NISEE

# Post-Earthquake Functionality of Buildings after M7.2

Building performance	Number of buildings	
Usable, no or light damage	63,000	Safe to occupy
Usable, some damage	73,000	Occupancy depends on City, owners
Repairable, cannot be occupied	23,000	
Not repairable	3,600	Cannot be occupied until repaired or replaced
<b>TOTAL</b>	<b>160,000</b>	

# Post-earthquake Fire

# Estimated Fire Damage for M7.2

Type of Impact	Average of 1,000 trials
Number of ignitions requiring professional response	73
Size of burned area not previously damaged	8.7 million sq. ft.



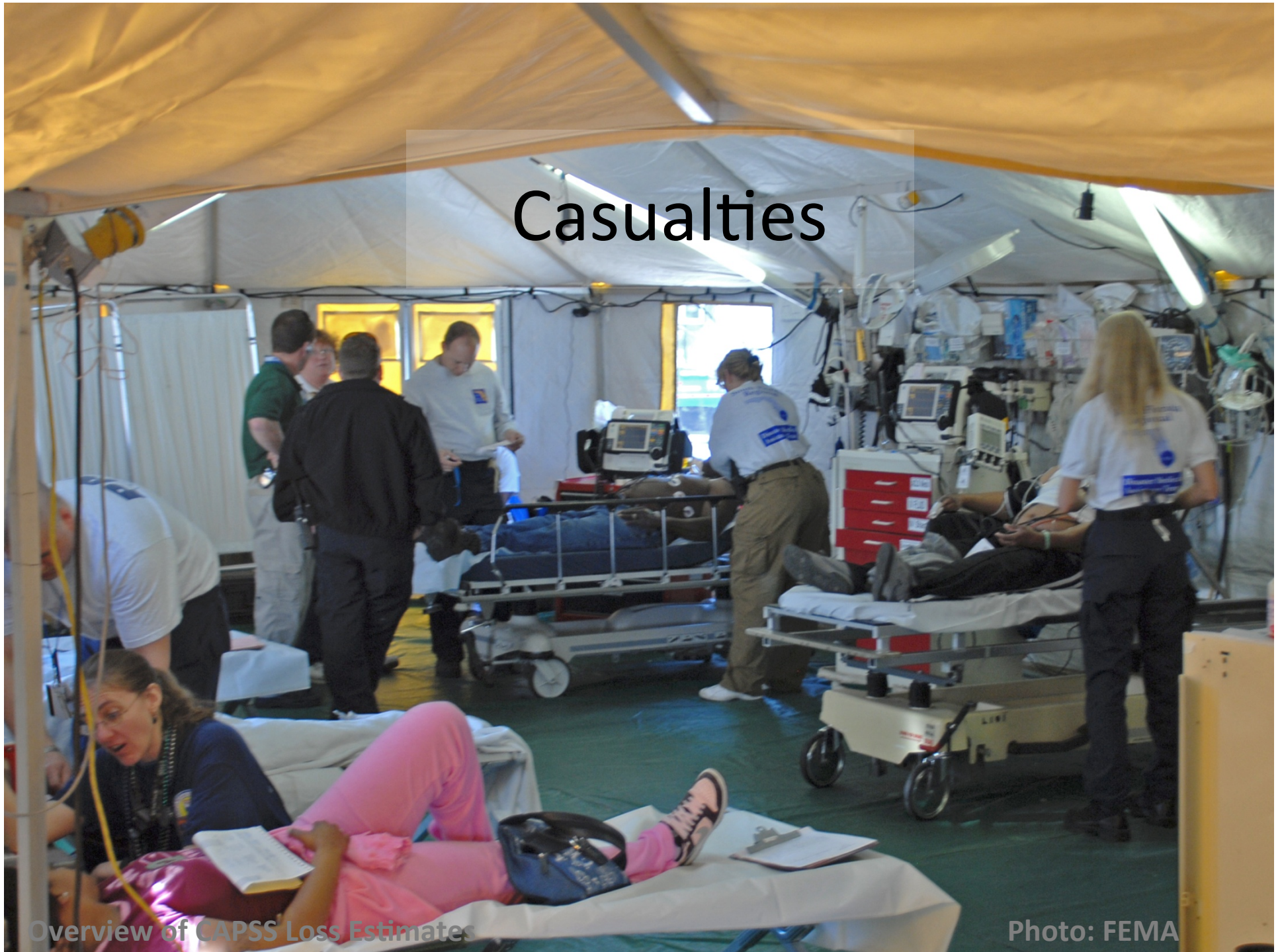
19



4,900



# Casualties



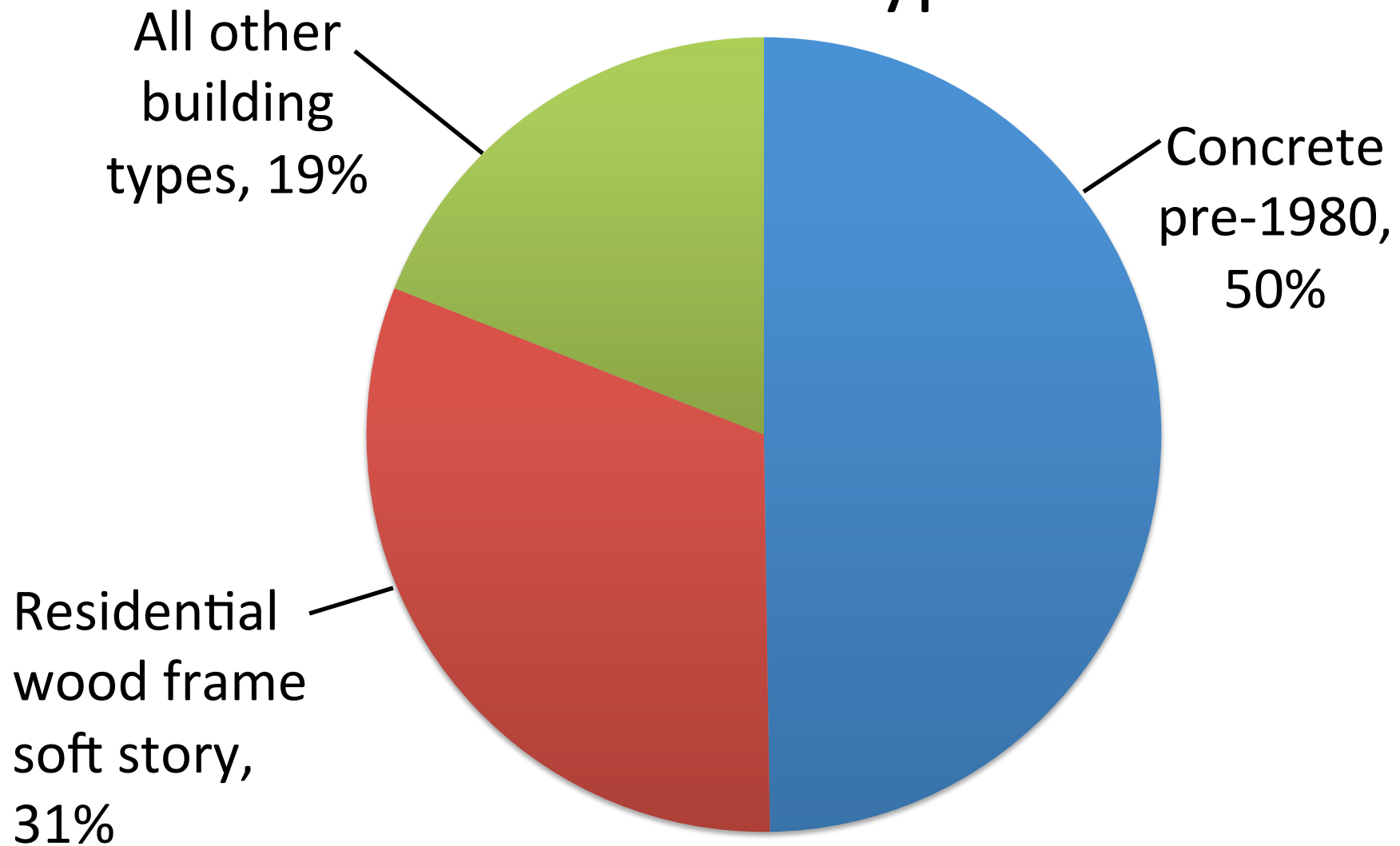
Overview of CAPSS Loss Estimates

Photo: FEMA

# Casualties in M7.2 scenario

Degree of casualty	Estimated range of casualties
1. Injuries needing first aid	3,200 to 5,600
2. Injuries needing hospitalization	760 to 1,300
3. Life threatening injuries	90 to 150
4. Death	170 to 300

# Deaths attributable to various structural types



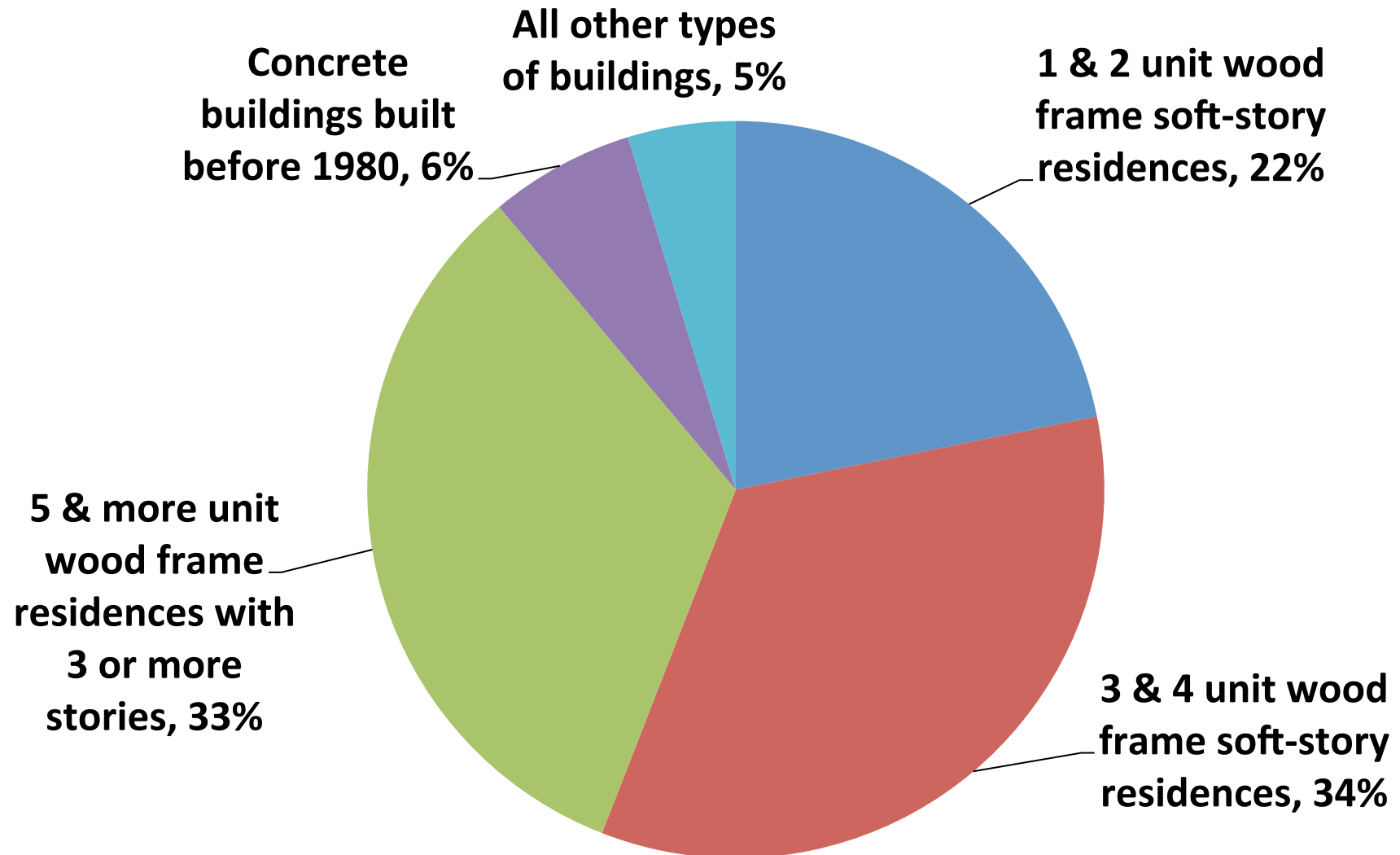
# Housing Impacts

# Damage to Residences after M7.2 (in housing units)

Usable, light damage	Usable, moderate damage	Repairable, cannot be occupied	Not repairable, cannot be occupied
120,000	130,000	74,000	11,000

85,000 units unusable

# Unusable Units by Structure Type





# Recovery Time for Housing

Loma Prieta: Mean time to reoccupancy in San Francisco

Type of structure	Buildings needing repair	Buildings needing demolition
Single family homes	3 months	28 months
Multifamily residences	9 months	74 months

**Faster than other communities**

**Slower than other communities**

Larger earthquake means slower recovery.



# Economic Losses

Overview of CAPSS Loss Estimates

Photo: NISEE

# Total Economic Losses for Privately Owned Buildings, M7.2

Type of Loss	\$ Billions
Damage to buildings from shaking	\$30
Damage to buildings from fire	\$4.3
Additional direct economic losses	\$10
<b>Total Direct Losses</b>	<b>\$44</b>

Indirect losses would be on par with or greater than a recession

# Impacts on Buildings with Special Uses



Overview of CAPSS Loss Estimates



We know very little about the vulnerability of the following privately owned buildings:

- Private schools
- Daycare centers/preschools
- Assisted care facilities
- Pharmacies/medical clinics
- Buildings used for assembly
- Historic buildings

# CAPSS Policy Recommendations



# 3 step strategy to reduce risk to privately-owned buildings

Step 1: Encourage retrofits



Step 2: Require evaluations



Step 3: Require retrofits

# 17 Policy Recommendations

1) Require evaluation of all wood frame buildings with three or more stories and five or more units, and retrofits of those vulnerable to earthquake damage.

2) Inform the public of risk and ways to reduce risk.

3) Adopt updated code standards.

4) Require all buildings be evaluated for seismic risk.

5) Require retrofits of vulnerable buildings.

6) Assist community service groups to reach earthquake resilience.

# 5. Require retrofit of vulnerable buildings

Building Categories	2010-2015	2015-2020	2020-2025	2025-2030	2030-2035	2035-2040
Wood frame residential buildings with three or more stories and five or more units**						
Concrete tilt-up buildings						
Residential buildings with three and four units						
Private K-12 schools and private universities						
Assisted living facilities						
Concrete residential buildings built before 1980						
Other types of residential buildings with more than five units						
Hotels and motels serving tourists						
Critical retail stores and suppliers						
Single family homes and two unit residences						
Concrete non-residential buildings built before 1980						
Houses of worship						
Preschools and daycare centers						
Buildings used by large audiences						
Historic buildings						
Large buildings with welded steel moment frames built before 1994						
Early retrofitted buildings						
All other building types						

## Color key

Step 1: Facilitate a market in which earthquake performance is valued	
Step 2a: Nudge market by requiring evaluation upon sale	
Step 2b: Nudge market by requiring evaluation by a deadline	
Step 3: Implementation period to require retrofit by a deadline	

# 17 Policy Recommendations

7) Establish clear responsibility within City for preparing for and reducing risk from earthquakes.

8) Adopt improved post-earthquake repair standards.

9) Offer incentives for retrofit of buildings.

10) Require automatic gas shutoff valves on select buildings.

11) Track evaluations and retrofits in a database system.

12) Provide technical assistance for building retrofits.

13) Enact a façade ordinance.

# 17 Policy Recommendations

- 14) Promote development and implementation of effective ideas on earthquake risk reduction.
- 15) Evaluate measures to reduce post-earthquake fires.
- 16) Address the hazards from damage to furnishings, appliances, equipments and non-structural building elements.
- 17) Periodically assess progress and implementation of these recommendations.

Thank you!

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

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