

# Expanding Access- Grant Programs for Seismic Retrofits

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Chief Mitigation Officer

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**CEA**

**CEA is a not-for-profit residential earthquake insurer.**



## **CALIFORNIA: MANDATORY OFFER LAW**

**Earthquake coverage is excluded from homeowner's insurance policy.**

However, insurance companies are required to offer a separate earthquake insurance policy at time of homeowner policy sale.



## WHEN M6.7 NORTHRIDGE EARTHQUAKE STRUCK IN 1994:

- One of the costliest natural disasters in U.S. history.
- Caused \$20 billion in residential damage.
- Destroyed or severely damaged thousands of single-family homes.
- Left about 22,000 people homeless.
- Most insurance companies stopped writing Homeowners insurance; prompted creation of CEA.

# Publicly Managed • Privately Financed

A not-for-profit provider of residential earthquake insurance

## Governing Board:

Governor  
Insurance Commissioner  
State Treasurer



Governor  
Gavin Newsom



Insurance Commissioner  
Ricardo Lara



State Treasurer  
Fiona Ma

## Non Voting:

Assembly Speaker  
Senate Rules Chair



Assembly Speaker  
Anthony Rendon



Senate Rules Chair  
Toni Atkins

## Privately Financed:

1,132,605 Policyholders

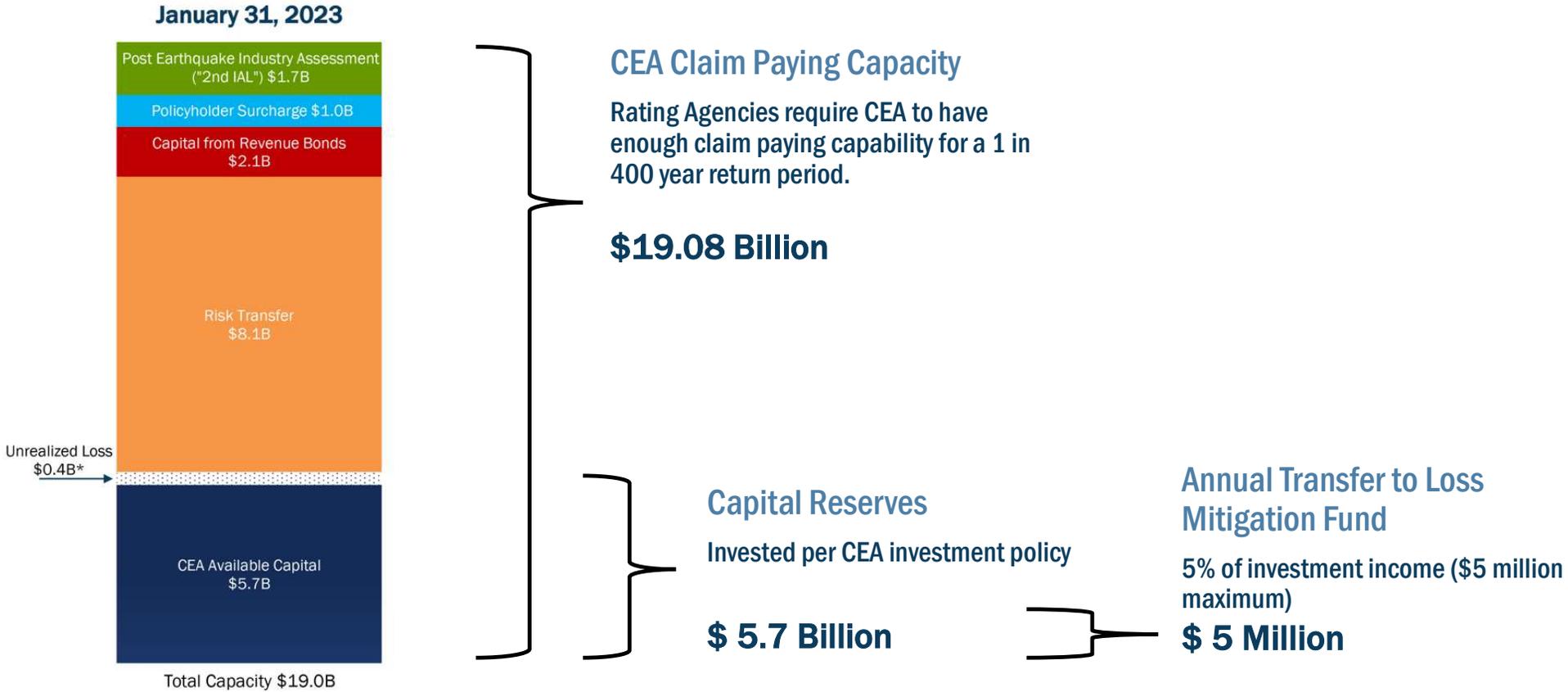
## Mission:

Educate  
Mitigate  
Insure

# CEA Participating Insurers

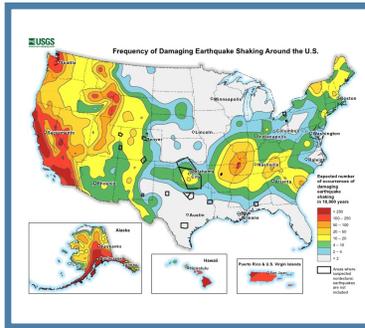


# CEA Participating Insurers



# Things to Know About Earthquake Risk

**RISK = HAZARD + VULNERABILITY + EXPOSURE**



# HAZARD

Earthquake hazard includes surface faulting, ground shaking, landslide, liquefaction, tectonic deformation, tsunamis, and seiches.



# **SEISMIC VULNERABILITY**

**Older homes have known vulnerabilities  
to earthquake damage.**

# Seismic Vulnerability

Four Typical Seismic Vulnerabilities identified in ATC 110 (FEMA P-1100)



Crawlspace Wall



Living-space-over garage  
“LSOG”



Hillside House



Chimney

# Seismic Vulnerability

## Crawlspace Wall Vulnerability



Berkeley, California

# Earthquake Brace + Bolt Retrofit - EBB

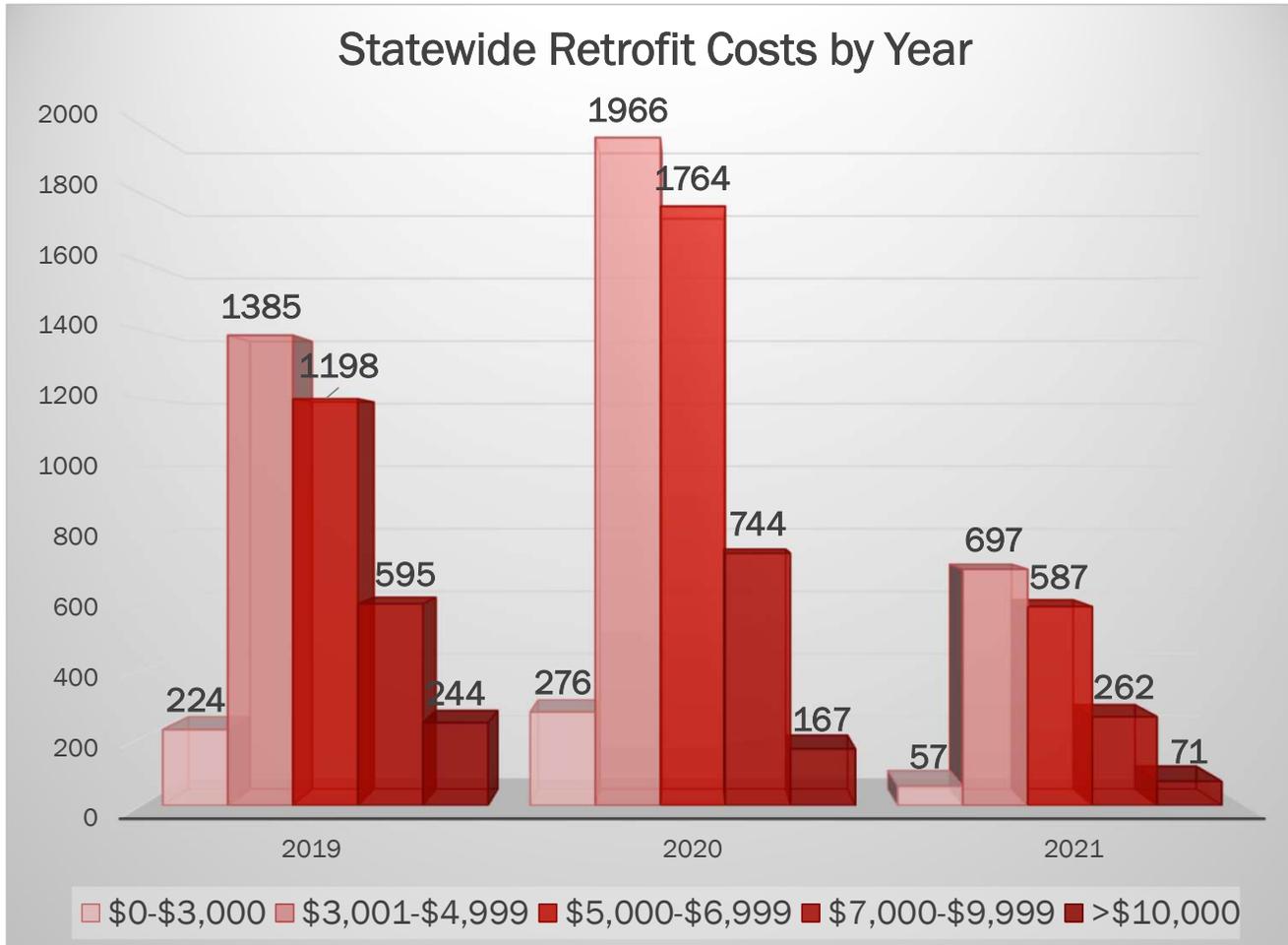
California Residential Mitigation Program Retrofit Grants - Earthquake Brace + Bolt



## Earthquake Brace + Bolt Program:

- Retrofits crawlspace with plywood bracing and new bolting
- Provides up to \$3,000 grant
- Currently requires owner-occupied
- In select ZIP Codes with high seismic hazard
- Has collected important data:
  - Retrofit averages \$5,200 in CA
  - More expensive in Northern CA
  - Number of retrofitted houses in a City

# Earthquake Brace + Bolt Retrofit - EBB



- **Current Avg Cost: \$6,177**
- **Median Cost: \$5,102**
  
- **8% of Retrofits less than \$3,001**
- **48% of Retrofits less than \$5,000**
- **77% of Retrofits less than \$7,000**
- **93% of Retrofits less than \$10,000**

# Equity Based Analysis of Cripple Wall Retrofits in LA City

Presentation to the CRMP Board, February 14, 2023

“Despite generally occupying older buildings, the neighborhoods with the highest representation of Black, Hispanic and low-income households have retrofit rates that are lower than the rest of LA City.

Disparities in the retrofit rate based on race and ethnicity, income and education significantly reduced from 2013-onwards (after the EBB program was introduced) relative to pre-2013. Despite generally occupying older buildings, the neighborhoods with the highest representation of Black, Hispanic and low-income households have retrofit rates that are lower than the rest of LA City.

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**Henry V. Burton, Ph.D. S.E.**  
**Associate Professor and Presidential Endowed Chair in**  
**Structural Engineering**  
**University of California, Los Angeles**

# 2021/2022 EBB Program includes supplementary grants specifically aimed at underserved neighborhoods.

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The supplementary grant:

- Will provide, in most cases, **100% OF THE FUNDS** needed
- Was marketed widely and offered in all EBB ZIP Codes

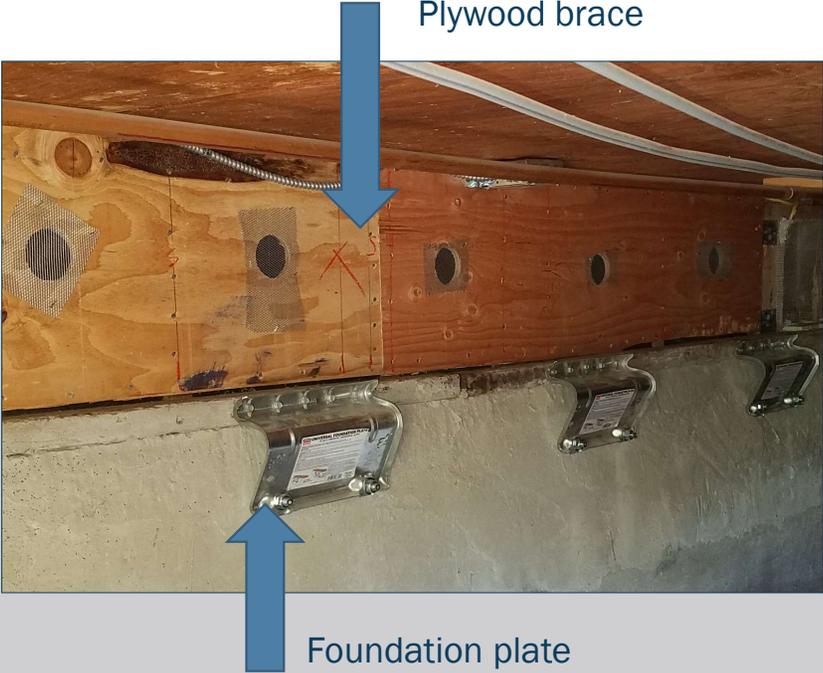


# Earthquake Brace + Bolt

Short Cripple Wall Requires Framing Clips, Foundation Plates, and Plywood



Crawlspace Before Retrofit



Crawlspace After Retrofit

# Seismic Vulnerability

ATC 110 / FEMA P-1100



## Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings

Volume 1 - Prestandard  
FEMA P-1100 / Month 2018



Weight Category	Seismicity	Total Area in Square Feet	Cripple Wall Height						Foundation Sill Anchors						Floor to Cripple Wall or Floor to Foundation Sill	INSTRUCTIONS	PROJECT ADDRESS	PROPERTY ADDRESS	CITY	STATE	ZIP	DATE
			1'-0" to 2'-3" w/o tie-downs	2'-3" to 4'-0" w/o tie-downs	4'-0" to 4'-6" w/ tie-downs	4'-6" to 6'-0" w/ tie-downs	6'-0" to 7'-0" w/ tie-downs	Panel Edge Noting	Type "A"	Type "B"	Type "C"	12"x12" Sill Bolt	Type "D"	Type "E"								
Light Construction	I	up to 800	5.3	5.3	8.0	5.3	9.3	5.3	9.3	6.7	4*	4	7	7	7	5	11	10	14	1. Locate the section that matches your home's construction. Use the foundation on Sheet S3 to determine "Weight Category". 2. Find the home's Total Floor Area in the schedule. This number should be at least as large as the number listed below. Do not use a smaller number, even if it is closer. a. Approximate 1st floor area over crawlspace. (Do not include areas built over/above crawlspaces.) 3. Check the box that matches your home's construction type, number of stories, and total floor area. You will use information in this row of the schedule to determine the length of wood structural panels, noting requirements, quantities of hardware, etc. 4. Measure the maximum height of the cripple wall along each wall line of the house. 5. Determine the length of wood structural panel bracing required. The columns contain the length of required bracing, depending on the height of the cripple wall. The length of bracing is given for cripple wall heights of zero to 1', 1' to 2', 2' to 4', 4' to 6', and 6' to 7'. Furthermore, choices are given for bracing without tie-downs and with tie-downs. If the cripple wall height changes along the length of the wall, use the tallest height to determine the required bracing length. Follow the row across from the 1st floor area that you checked for your home on Sheet 2, but the bracing length for the cripple wall height on each side of the house. Review General Notes, Sheet S3, Section 4 for restrictions on non-rectangular "T" or "L" shaped dwellings. Check boxes where Special Provisions apply. 6. Determine the number of Foundation Sill Anchors required. The columns show the number of anchors required, depending on whether you use Types A through C, or 12"x12" or SIF anchors bolts. (a = diameter of the bolt). See Sheet S3. 7. Determine the number of Floor to Cripple Wall or Foundation Sill connectors. The columns	1. Anchor bolts and Connectors shown in the Earthquake Retrofit Schedule are specified in this schedule as longer than can be accommodated by a strengthening, without tie-downs, are preferred. (See Supplement 3. Connector Type "T" should be used as an alternative only if joints for 4. Any of the connectors listed within a particular group and as shown in this Plan Set was developed using the lowest listed manufacturer's spacing when an alternate connector is used. Any such substitution 5. Foundation of anchor types A, B, and C should not be used with (1)	1. 12"x12" Sill Bolt 2. 12"x12" Sill Bolt 3. 12"x12" Sill Bolt 4. 12"x12" Sill Bolt 5. 12"x12" Sill Bolt 6. 12"x12" Sill Bolt 7. 12"x12" Sill Bolt 8. 12"x12" Sill Bolt 9. 12"x12" Sill Bolt 10. 12"x12" Sill Bolt 11. 12"x12" Sill Bolt 12. 12"x12" Sill Bolt 13. 12"x12" Sill Bolt 14. 12"x12" Sill Bolt 15. 12"x12" Sill Bolt 16. 12"x12" Sill Bolt 17. 12"x12" Sill Bolt 18. 12"x12" Sill Bolt 19. 12"x12" Sill Bolt 20. 12"x12" Sill Bolt 21. 12"x12" Sill Bolt 22. 12"x12" Sill Bolt 23. 12"x12" Sill Bolt 24. 12"x12" Sill Bolt 25. 12"x12" Sill Bolt 26. 12"x12" Sill Bolt 27. 12"x12" Sill Bolt 28. 12"x12" Sill Bolt 29. 12"x12" Sill Bolt 30. 12"x12" Sill Bolt 31. 12"x12" Sill Bolt 32. 12"x12" Sill Bolt 33. 12"x12" Sill Bolt 34. 12"x12" Sill Bolt 35. 12"x12" Sill Bolt 36. 12"x12" Sill Bolt 37. 12"x12" Sill Bolt 38. 12"x12" Sill Bolt 39. 12"x12" Sill Bolt 40. 12"x12" Sill Bolt
		801 to 1000	6.7	6.7	8.0	6.7	10.7	6.7	10.7	8.0	4*	5	8	8	8	6	13	12	16			
		1001 to 1200	6.7	6.7	9.3	6.7	10.7	8.0	12.0	8.0	4*	6	9	10	10	7	15	14	19			
		1201 to 1500	8.0	8.0	10.7	8.0	13.3	9.3	13.3	9.3	4*	7	11	12	12	8	18	17	22			
Medium Construction	II	up to 800	5.3	5.3	8.0	5.3	9.3	5.3	9.3	6.7	3*	5	8	8	8	6	13	12	16			
		801 to 1000	6.7	6.7	9.3	6.7	10.7	8.0	12.0	8.0	3*	6	9	10	10	7	15	14	19			
		1001 to 1200	6.7	6.7	9.3	6.7	10.7	8.0	12.0	8.0	3*	6	9	10	10	7	15	14	19			
		1201 to 1500	8.0	8.0	10.7	8.0	13.3	9.3	13.3	9.3	3*	7	10	11	11	8	17	17	22			
Heavy Construction	III	up to 800	5.3	5.3	8.0	5.3	9.3	5.3	9.3	6.7	3*	5	8	8	8	6	13	12	16			
		801 to 1000	6.7	6.7	9.3	6.7	10.7	8.0	12.0	8.0	3*	6	9	10	10	7	15	14	19			
		1001 to 1200	6.7	6.7	9.3	6.7	10.7	8.0	12.0	8.0	3*	6	9	10	10	7	15	14	19			
		1201 to 1500	8.0	8.0	10.7	8.0	13.3	9.3	13.3	9.3	3*	7	10	11	11	8	17	17	22			

**1. ANCHOR THROUGH FOUNDATION SILL ONLY**  
Clear applies where (E) foundation sill is same width as the (E) cripple studs.

**2. ANCHOR THROUGH BLOCKING AND FOUNDATION SILL**  
Clear applies where (E) foundation sill is wider than the (E) cripple studs.

**3. NEW BLOCKING INSTALLATION FOR SHEATHING ATTACHMENT**  
Clear applies where (E) foundation sill is wider than the (E) cripple studs.

**4. FOUNDATION SILL CONNECTORS**  
Check areas where cripple wall width is too great to allow fitting for new anchor bolts. Maximum cripple wall height 2'-2".

**ABBREVIATIONS**

(E)	Existing
(N)	New
min.	Minimum
max.	Maximum
N/A	Not to Scale
Typ.	Typical

# RETROFITTING WORKS

2014 M 6.0 Napa Earthquake



**Unretrofitted - Red Tagged**

**Retrofitted - Green Tagged**

# RETROFITTING WORKS

2022 and 2023 Ferndale, CA M6.4 and M5.3 Earthquakes



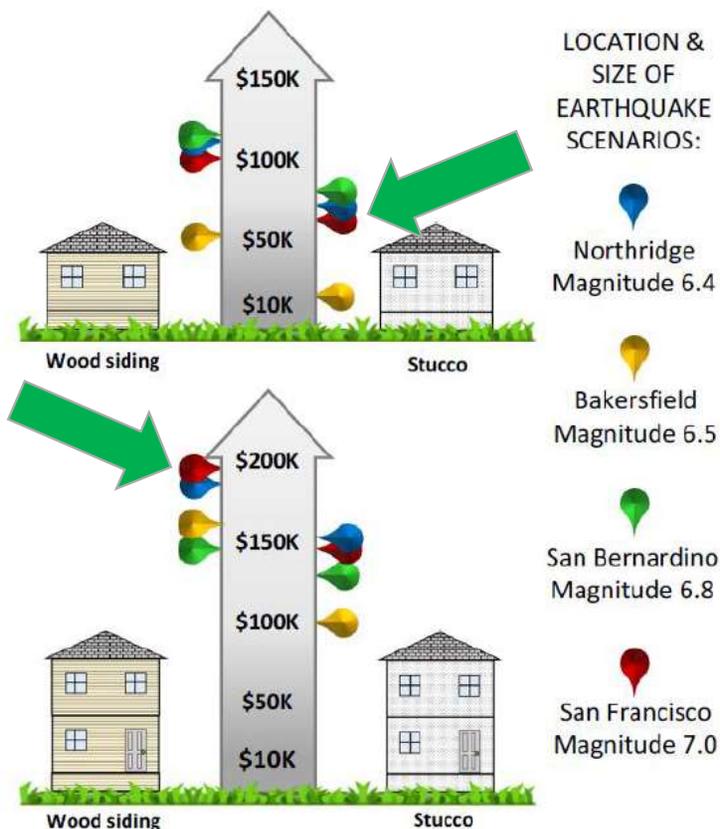
Unretrofitted – Red Tagged

Retrofitted – Green Tagged

# Seismic Vulnerability

Research by Pacific Earthquake Engineering Research Center (PEER)

## How Much Could I Save In "The Big One" If I Retrofit My House\*?

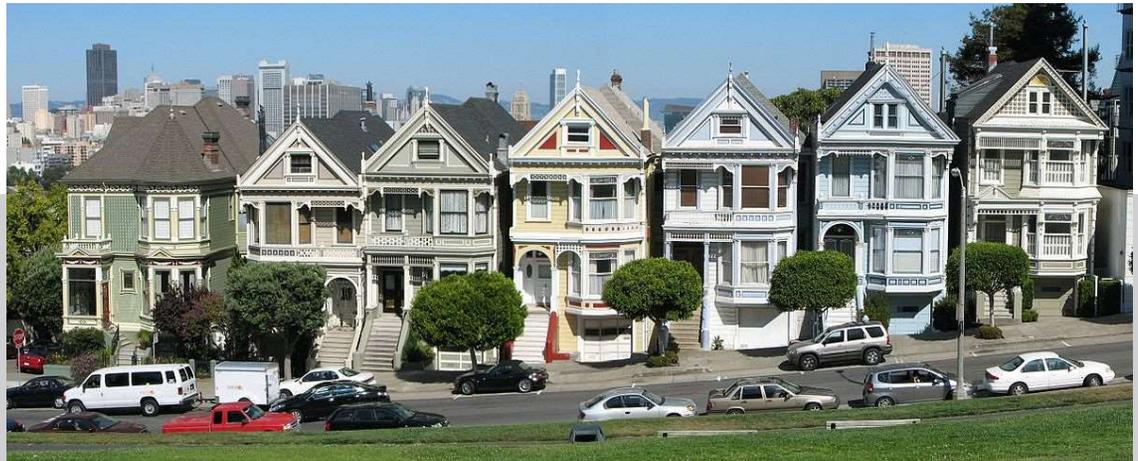


Note: Savings based on:

- 1200 sf one-story house
- 2400 sf two-story house
- \$200/sf replacement cost

# Seismic Vulnerability

## Living-Space-Over-Garage (Soft-Story)



The “Soft-Story” was created when the garage doors were installed in 1920s

# Seismic Vulnerability

## Bay Area Living-Space-Over-Garage (Soft-Story)



Soft-Story damage in Marina District - 1989 Loma Prieta Earthquake

# Seismic Vulnerability

## Living-Space-Over-Garage (Soft-Story)



1971 San Fernando EQ



1989 Loma Prieta EQ



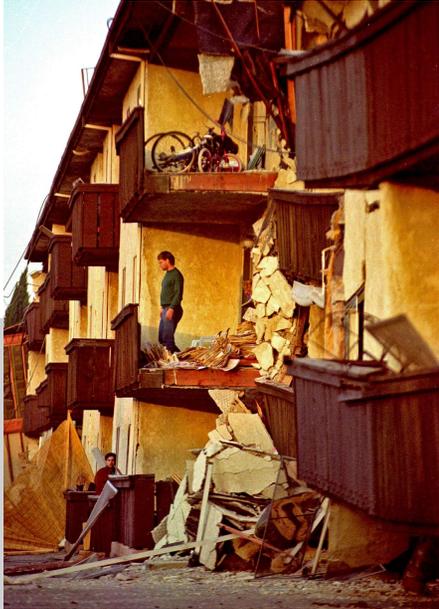
1994 Northridge EQ



2014 Napa EQ

# Seismic Vulnerability

## Multi-Family Soft-Story



Source: LA Times

Northridge Meadows Apartments –  
Northridge M6.7 Earthquake 1994

# Multi-Family Soft-Story Retrofit Grant Program (MFSS)

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## Potential FEMA Grant Funding

- 2021 FEMA BRIC Grants - \$20 million in FEMA review
- 2022 FEMA BRIC Grant application submitted - \$20 million
- 2023 FEMA BRIC Grant application submitted - \$20 million
- SB 189 - \$250 million ( not included in budget)

# EXPOSURE

Using age as a proxy we estimate there are over 1 million houses with the crawlspace vulnerability. We have no inventory for the soft-story single-family house.

These structures are typically privately owned homes. Less than 13% of Californian homes are insured for earthquakes.

# STRENGTHEN YOUR HOUSE

Home > Strengthen Your House

## Get Prepared. Worry Less.

Earthquakes in California are inevitable, but the damage they cause is preventable. While older houses in California are charming, many are also vulnerable to shake damage. Find your house type or hazard below and learn about its vulnerabilities, and what you can do to strengthen your property against earthquake damage. While seismic retrofitting a house does not guarantee against damage, it can help to improve its performance in an earthquake by making it stronger and more resilient. This can help make your house safer for you and your family.



### Raised Foundation

Older houses with steps up to the first floor can shift off their foundations from shaking. They would be strengthened by bolting or bracing and bolting the house to its foundation.

[LEARN MORE](#)



### Living Space Over Garage

Houses with one or more floors of living space over an attached garage are vulnerable to shaking. Retrofitting the garage space can make it more resistant to earthquakes.

[LEARN MORE](#)



### Post & Pier

A house without a continuous perimeter foundation can shift or collapse in an earthquake. Adding a foundation that is braced and bolted will strengthen the house.

[LEARN MORE](#)



### Chimneys & Fireplaces

Older chimneys can crack and fall away from the house during or after an earthquake. And brick, stone, or decorative fireplace components can be a hazard, inside.

[LEARN MORE](#)

Next Steps to Strengthen Your House

StrengthenMyHouse.com