CALBO Annual Business Meeting

The Building Official and the CEA

Janiele Maffei, S.E.
Chief Mitigation Officer

CEA Established Following Northridge Earthquake


Los Angeles Times

33 Die, Many Hurt in 6.6 Quake

L.A. Area Freeways Buckle, Buildings Topple

Sylmar Jolted by Ghosts of Horror Past

Thrust Faults Pose Brutal Danger to Basin

Commuters Will Face Nightmare for Months

Questions on Reinforcing of Freeways Raised

To Our Readers

January 17, 1994

2

Northridge Earthquake

- $20 Billion residential damage
- Insurance companies stopped writing homeowners

3

1996: CEA Created

Publically Managed

Governing Board

- **Governor**
- **Insurance Commissioner**
- **State Treasurer**
- Assembly Speaker
- Senate Rules Chair

Privately Financed

Participating Insurers

CEA Policyholders

2017: 900,000 +

Public Mission

Not-for-Profit

STRATEGIC PLAN

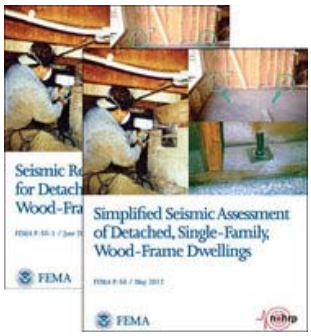
- **Educate**
- **Mitigate**
- **Insure**

4

2017 Participating Insurers

CEA Mitigation Activities

- Research
  - Post-EQ inspections
  - Building performance
- Guideline (Code) Development
  - More plan sets
- Seismic Assessment Tools
  - QuakeGrade ™
- Incentive Programs
  - EBB



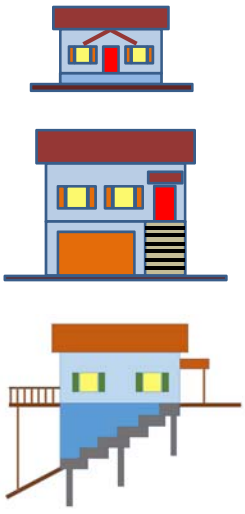
Future Retrofit Standards

- ATC 110 Pre-standard
- Jointly managed by FEMA and the CEA
- Intended to be a model code
- 2018 completion

7

Future Retrofit Standards

- ATC 110 scope:
  - Cripple walls up to 7'
  - Living space over garage (soft-story)
  - Hillside homes
  - Masonry chimneys



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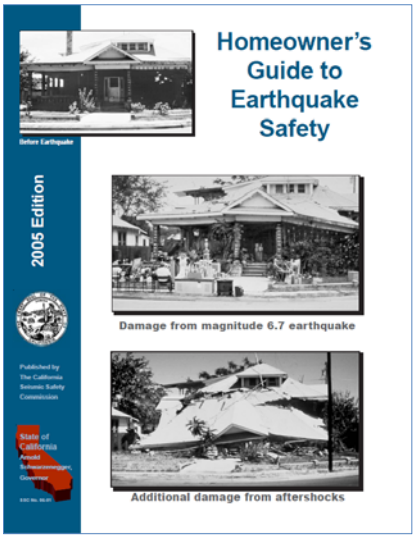
Required at Point-of-Sale in California

Homeowner's Guide to Earthquake Safety:

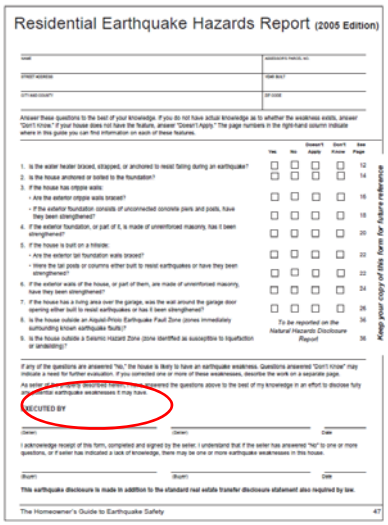
- Guide to assist homeowners in filling out the Residential Earthquake Hazards Report



Residential Earthquake Hazards Report

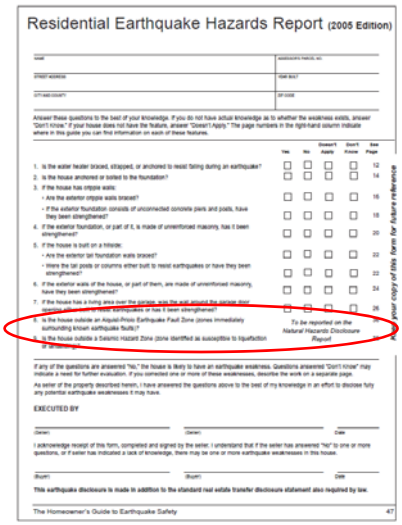
Residential Earthquake Hazards Report:

- Sellers must hand buyers a completed disclosure report.
- Report is signed by seller and buyer.


Residential Earthquake Hazards Report (2005 Edition)

Residential Earthquake Hazards Report

- Is the house outside an "Alquist-Priolo Earthquake Fault Zone" (a zone immediately surrounding a known earthquake fault)?
- Is the house outside a Seismic Hazard Zone (zone identified as susceptible to liquefaction or landslide)?



Residential Earthquake Hazards Report (2005 Edition)

Answer these questions to the best of your knowledge. If you do not have actual knowledge as to whether the weakness exists, answer "Don't Know." If your house does not have the feature, answer "Doesn't Apply." The page numbers in the right-hand column indicate where in this guide you can find information on each of these features.

	Yes	No	Doesn't Apply	Don't Know	See Page
1. Is the water heater braced, strapped, or anchored to resist falling during an earthquake?	☐	☐	☐	☐	12
2. Is the house anchored or bolted to the foundation?	☐	☐	☐	☐	14
3. If the house has cripple walls:					
- Are the exterior cripple walls braced?	☐	☐	☐	☐	16
- If the exterior foundation consists of unconnected concrete piers and posts, have they been strengthened?	☐	☐	☐	☐	18
4. If the exterior foundation, or part of it, is made of unreinforced masonry, has it been strengthened?	☐	☐	☐	☐	20
5. If the house is built on a hillside:					
- Are the exterior tall foundation walls braced?	☐	☐	☐	☐	22
- Were the tall posts or columns either built to resist earthquakes or have they been strengthened?	☐	☐	☐	☐	22
6. If the exterior walls of the house, or part of them, are made of unreinforced masonry, have they been strengthened?	☐	☐	☐	☐	24
7. If the house has a living area over the garage, was the wall around the garage door opening also strengthened?	☐	☐	☐	☐	26
8. Is the house outside an Alquist-Priolo Earthquake Fault Zone (zones immediately surrounding known earthquake faults)?	To be reported on the Natural Hazards Disclosure Report				
9. Is the house outside a Seismic Hazard Zone (zone identified as susceptible to liquefaction or landslide)?					

Keep your copy of this form for future reference.

If any of the questions are answered "no," the house is likely to have an earthquake weakness. Questions answered "Don't Know" may indicate a need for further evaluation. If you corrected one or more of these weaknesses, describe the work on a separate page.

As seller of the property described herein, I have answered the questions above to the best of my knowledge in an effort to disclose fully any potential earthquake weaknesses it may have.

EXECUTED BY

(Owner) (Owner) Date

I acknowledge receipt of this form, completed and signed by the seller. I understand that if the seller has answered "no" to one or more questions, or if seller has indicated a lack of knowledge, there may be one or more earthquake weaknesses in this house.

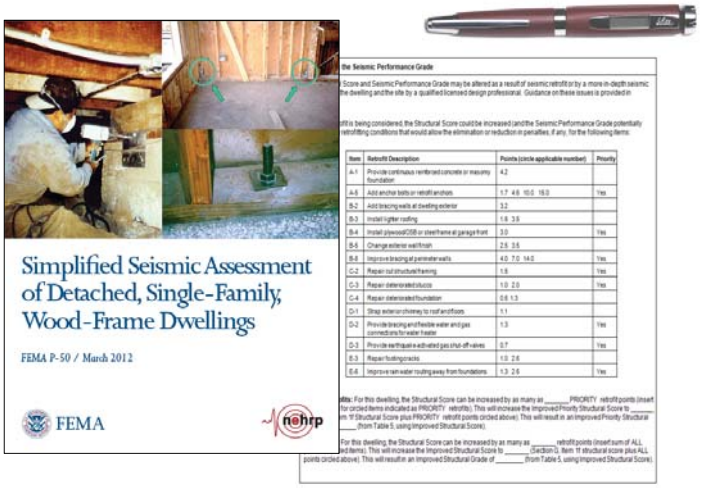
(Buyer) (Buyer) Date

This earthquake disclosure is made in addition to the standard real estate transfer disclosure statement also required by law.

The Homeowner's Guide to Earthquake Safety 47

Existing Tool for Seismic Assessment

- FEMA P-50 Simplified Assessment



Simplified Seismic Assessment of Detached, Single-Family, Wood-Frame Dwellings

FEMA P-50 / March 2012

FEMA

nehrp

the Seismic Performance Grade

Score and Seismic Performance Grade may be altered as a result of seismic retrofit or by a more in-depth seismic the dwelling and the site by a qualified licensed design professional. Guidance on these issues is provided in

ofit is being considered, the Structural Score could be increased (and the Seismic Performance Grade potentially retrofitting conditions that would allow the elimination or reduction in penalties, if any, for the following items:

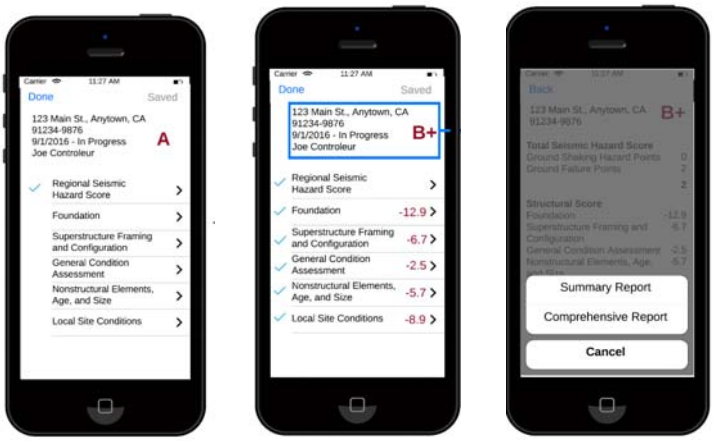
Item	Retrofit Description	Points (circle applicable number)	Priority
A-1	Provide continuous reinforced concrete or masonry foundation	4.2	
A-6	Add anchor bolts or retrofit anchors	1.7 4.6 10.6 16.0	Yes
B-2	Add bracing walls at dwelling exterior	3.2	
B-3	Install lighter roofing	1.6 3.6	
B-4	Install plywood/OSB or steel frame at garage front	3.0	Yes
B-5	Change exterior wall finish	2.5 5.6	
B-8	Improve bracing at perimeter walls	4.0 7.0 14.0	Yes
C-2	Repair rot structural framing	1.5	Yes
C-3	Repair deteriorated stucco	1.0 2.0	Yes
C-4	Repair deteriorated foundation	0.6 1.3	
D-1	Strap exterior chimney to roof and floors	1.1	
D-2	Provide bracing and flexible water and gas connections for water heater	1.3	Yes
D-3	Provide earthquake-activated gas shut-off valves	0.7	Yes
E-3	Repair footing cracks	1.3 2.6	
E-4	Improve rain water routing away from foundations	1.3 2.6	Yes

Note: For this dwelling, the Structural Score can be increased by as many as _____ PRIORITY retrofit points (insert for circled items indicated as PRIORITY retrofits). This will increase the Improved Priority Structural Score to _____ m. If Structural Score plus PRIORITY retrofit points circled above). This will result in an improved Priority Structural _____ (from Table 5, using Improved Structural Score).

For this dwelling, the Structural Score can be increased by as many as _____ retrofit points (insert sum of ALL ed items). This will increase the Improved Structural Score to _____ (Section I). Item 1f structural score plus ALL points circled above). This will result in an improved Structural Grade of _____ (from Table 5, using Improved Structural Score).

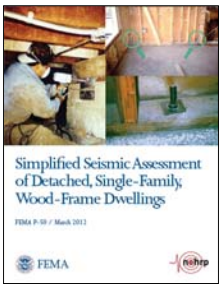
QuakeGrade™

- …and now there is QuakeGrade ™



QuakeGrade™ / CREIA Training

- California Real Estate Inspectors Association
  - Soon to have a seismic assessment certification
- In association with FEMA and ATC



Napa Earthquake Survey

Key Findings:

1. 25% of homeowners did not know if their home had been retrofitted
2. Homeowners who had retrofitted their houses were not clear on what that retrofit was intended to accomplish
3. The template for post-earthquake surveys should address the need for un-biased participants.

EARTHQUAKE BRACE+BOLT

Funds To Strengthen Your Foundation®

CEA California Earthquake Authority — The Strength To Rebuild

CA.GOV Cal OES Governor's Office of Emergency Services

EBB Overview

- Jointly managed by CEA and Cal OES
- Created to offer retrofit incentives
- EBB first to promote code-compliant retrofit
- More than 1 Million cripple wall homes

CEA California Earthquake Authority – The Strength to Rebuild + CA.GOV Cal OES Governor's Office of Emergency Services = Earthquake Brace+Bolt – Funds To Strengthen Your Foundation

EBB Overview

- 2017 Marks Year Four
- Up to $3,000
- In Accordance with:
  - Appendix Chapter A3 or
  - Plan Set A

- Grown Every Year to More Cities and Zips
- Received $3 Million from the State of California

EarthquakeBraceBolt.com

EBB Overview

- City Selection Process
  - High hazard + high density of older homes
  - Bay Area and Los Angeles Area
    - 2013/14 Pilot: 4 Zip Codes in 2 Cities
    - 2015: 28 ZIP Codes in 6 Cities
    - 2016: 100+ ZIP Codes in 18 Cities
    - 2017: 140+ ZIP Codes in 33 Cities

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The Process

- Outreach and 30 Day Registration
- Random selection
- 8 Weeks: contractor and permit
- 6 Months: complete work

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The EBB Process

- Pre-Retrofit Documentation
  - Permit language reference in scope of work
  - Before photos
- Retrofit
- Post-Retrofit Documentation
  - After photos
  - Signed building permit
  - Contractor invoice / receipts
  - Payment Authorization From
  - IRS W-9 Form

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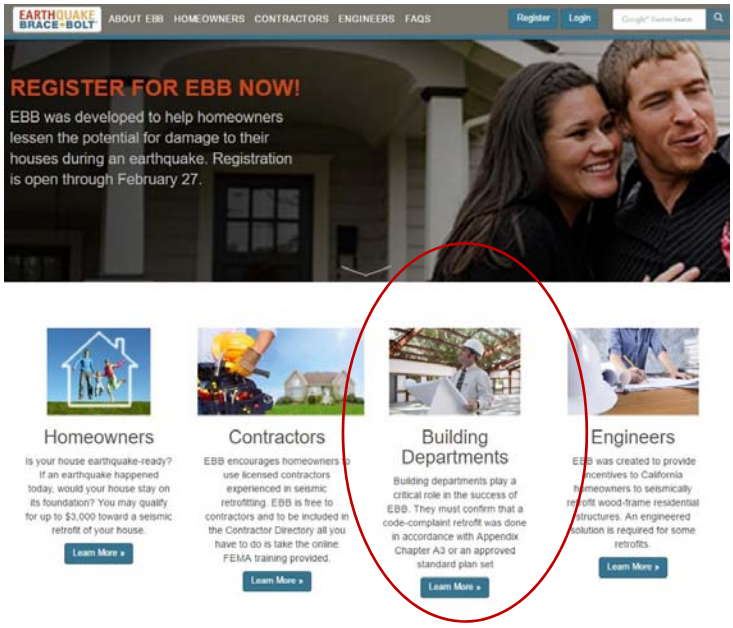

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Building Departments

Earthquake Brace + Bolt program is designed to encourage homeowners to complete a code-compliant seismic retrofit of their older house.

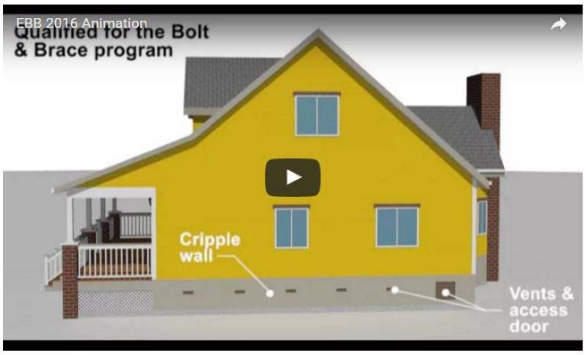
Houses included in the program are those that conform to the latest California Existing Building Code, Appendix Chapter A3. Chapter A3 provides detailed descriptions of the building elements that need to exist and the prescriptive plans on completing a retrofit.

Homeowners participating in the program are advised they will need to obtain a building permit signed by a building official who has inspected and confirmed the retrofit was done in accordance with Chapter A3. **Building officials are requested to ensure the permit's Scope of Work denotes the work will be performed "in accordance with Appendix Chapter A3 or an approved standard plan set."**

Additional Resources:

- FEMA Education Course on Appendix Chapter A3
- City Los Angeles Department of Building and Safety Standard Plan Number 1
- Standard Plan A developed by the Association of Bay Area Governments
- About Standard Plan Set A: Association of Bay Area Governments, Earthquake and Hazards Program

ANIMATION VIDEO: CODE-COMPLIANT CHAPTER A3 RETROFIT.



2017 EBB Outreach Material

EarthquakeBraceBolt.com

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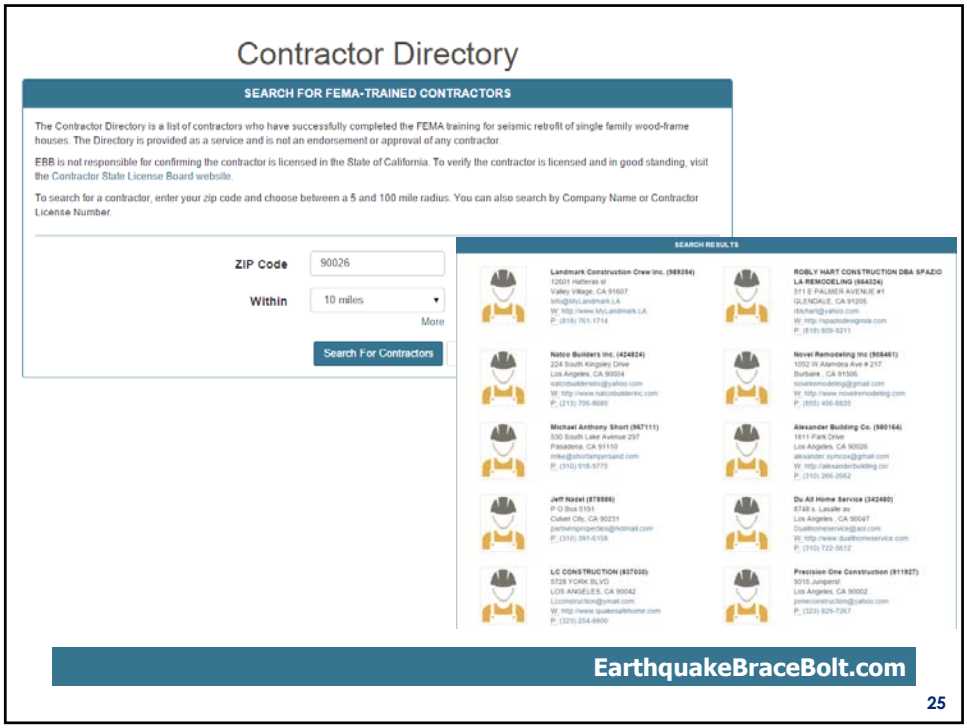
Contractor Directory
SEARCH FOR FEMA-TRAINED CONTRACTORS
The Contractor Directory is a list of contractors who have successfully completed the FEMA training for seismic retrofit of single family wood-frame houses. The Directory is provided as a service and is not an endorsement or approval of any contractor.
EBB is not responsible for confirming the contractor is licensed in the State of California. To verify the contractor is licensed and in good standing, visit the Contractor State License Board website.
To search for a contractor, enter your zip code and choose between a 5 and 100 mile radius. You can also search by Company Name or Contractor License Number.
ZIP Code
90026
Within
10 miles
More
Search For Contractors
SEARCH RESULTS
EarthquakeBraceBolt.com
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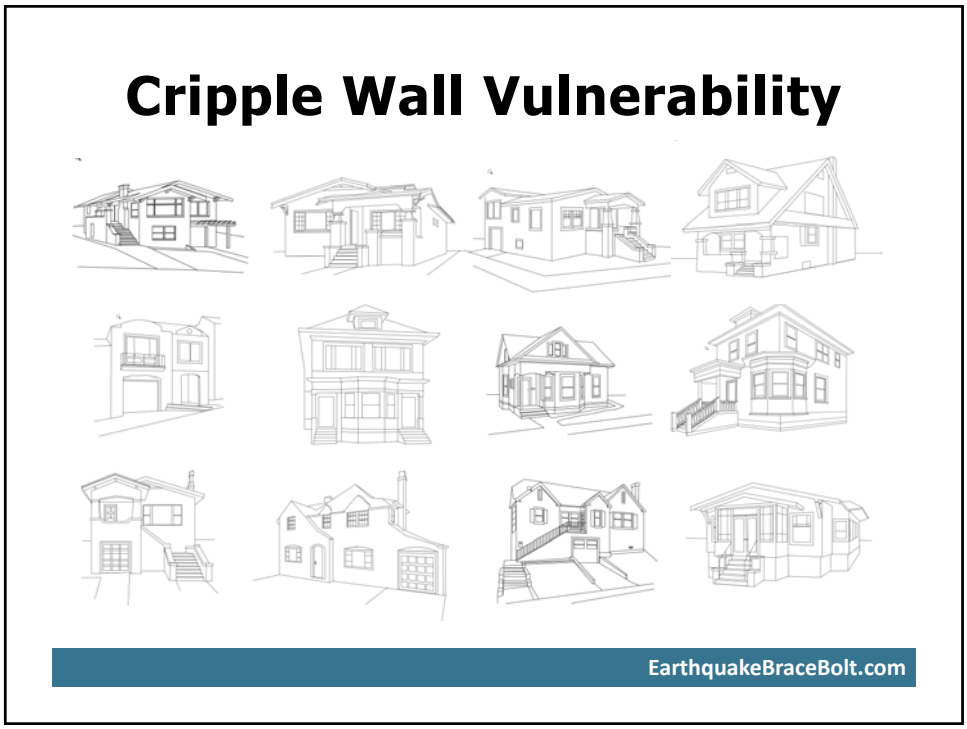
Cripple Wall Vulnerability
EarthquakeBraceBolt.com

EarthquakeBraceBolt.com

Common Seismic Vulnerability: Cripple Wall

- In adequate sill plate anchorage to foundation
- Unbraced cripple walls (short, stud walls around crawlspace)

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1906 San Francisco EQ

Photo: Getty Images

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1989 Loma Prieta EQ

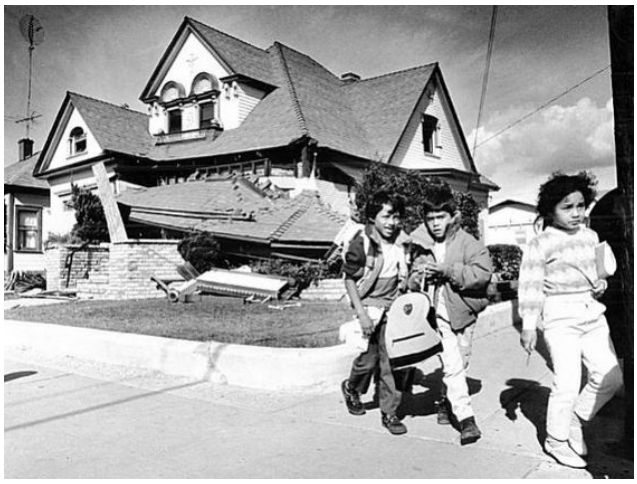

Photo: SF Chronicle

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1994 Northridge EQ

Photo: FEMA

EarthquakeBraceBolt.com

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1994 Northridge EQ

Photo: FEMA

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2014 Napa EQ

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33

2014 Napa EQ

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34

2014 Napa EQ

Long Recovery Process

Photo: SF Chronicle

2014 Napa EQ

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2014 Napa EQ

Disproportionately affects economically challenged

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Seismic Retrofit Works

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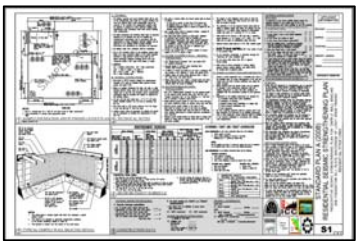
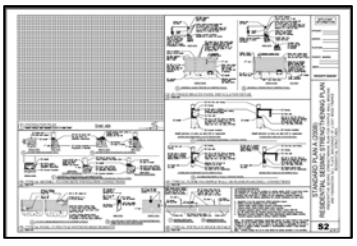
Code-Compliant Retrofit

- Provides homeowners and contractors with guidance
- Promotes a complete retrofit





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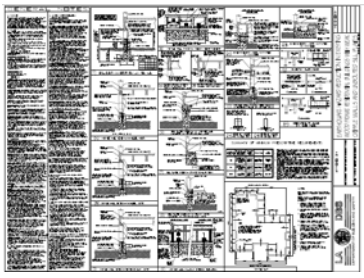
Code Requirements = EBB Requirements

- Code = CBC Appendix Chapter A3
- Engineered retrofit allowed by A3 for
  - Cripple walls > 4'-0" tall
  - Walls with many/large openings
- Construction Documents = Plan Set A, LA Standard Plan Set or Custom Plans



EARTHQUAKE BRACE+BOLT
Funds To Strengthen Your Foundation

Chapter A3

The State of California has adopted, effective January 1, 2011, California Existing Building Code (CEBC) Appendix Chapter A3: *Prescriptive Provisions for Seismic Strengthening of Cripple Walls and Sill Plate Anchorage of Light, Wood-Frame Residential Buildings*

Chapter A3 Prescriptive House

EarthquakeBraceBolt.com

Chapter A3 Engineered House

EarthquakeBraceBolt.com

A3 Retrofit Requirements

	Chapter A3
Maximum Stories	Three
Anchor Bolts	1/2” or 5/8” Diam.
Foundation Anchors	Proprietary or Fabricated
Cripple Wall Sheathing	Plywood or OSB
Framing Clips	Proprietary or Fabricated
New Continuous Concrete Footing	Yes

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A3 - Plan Set Comparison

	Chapter A3	Plan Set A	LA Standard Plan
Maximum Stories	Three	Two	Three
Anchor Bolts	1/2” or 5/8” Diam.	1/2” or 5/8” Diam.	1/2” or 5/8” Diam.
Foundation Anchors	Proprietary or Fabricated	Proprietary or Fabricated	Proprietary or Fabricated
Cripple Wall Sheathing	Plywood or OSB	Plywood	Plywood or OSB
Framing Clips	Proprietary or Fabricated	Proprietary or Fabricated	Proprietary or Fabricated
New Continuous Concrete Footing	Yes	No	Yes

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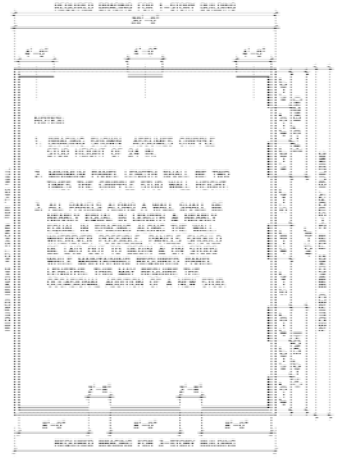
Retrofit Plan Required



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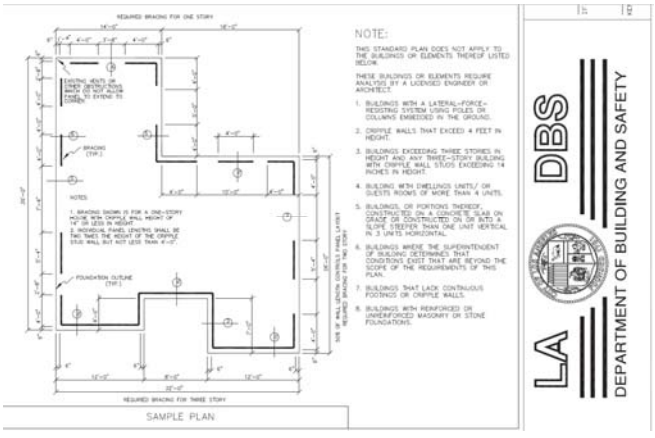
LABD Sample Plan



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LA Standard Plan

NUMBER OF STORIES[1] ABOVE CRIPPLE WALL	STRUCTURAL WOOD PANEL CRIPPLE WALL BRACING REQUIREMENTS[2]	SILL PLATE ANCHOR SIZE AND SPACING[3,4,5]	FRAMING ANCHOR	JOIST BLOCKING[7]
ONE[1]	EACH END AND NOT LESS THAN 50% OF THE WALL LENGTH	1/2 INCH AT 6 FEET ON CENTER MAX	32 INCHES ON CENTER MAXIMUM	ALTERNATE JOISTS
TWO[1]	EACH END AND NOT LESS THAN 70% OF THE WALL LENGTH	1/2 INCH AT 4 FEET ON CENTER MAX[6]	24 INCHES ON CENTER MAXIMUM	ALTERNATE JOISTS AND EVERY JOIST ABOVE WALL BRACING
THREE[1]	100% OF THE WALL LENGTH	5/8 INCH AT 4 FEET ON CENTER MAX[6]	16 INCHES ON CENTER MAXIMUM	ALL JOISTS

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Plan Set A

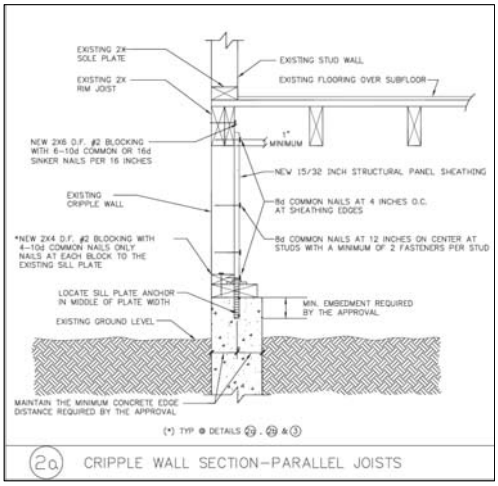
REINFORCEMENT SCHEDULE

	GENERAL INFORMATION		PLYWOOD BRACING	MUDSILL ANCHORAGE			FLOOR TO CRIPPLE WALL / MUDSILL CONNECTION		
CHECK THE BOX WHICH APPLIES TO YOUR HOME	TOTAL FLOOR AREA (SF) (1)	HEAVY OR LIGHT CONSTRUCTION	MINIMUM TOTAL BRACING LENGTH ALONG EACH WALL LINE	MINIMUM SILL ANCHORS ALONG EACH WALL LINE UFP10 (2)	1/2"ø BOLT	5/8"ø BOLT	MIN. NO. OF FLOOR FRAMING CLIPS (FFC)(5) ALONG EACH WALL LINE (4) NO. OF L70	NO. OF H10 (5)(6)	NO. OF L90
1-STORY REQUIREMENTS	800	Heavy	16'-0"	5	8	6	13	10	10
	800	Light	12'-0"	4	6	5	11	8	8
	1000	Heavy	17'-4"	6	9	6	15	12	12
	1000	Light	14'-8"	4	7	5	12	9	9
	1200	Heavy	20'	6	9	7	17	13	13
	1200	Light	14'-8"	5	7	5	13	10	10
	1500	Heavy	22'-8"	7	11	8	19	15	15
	1500	Light	17'-4"	5	8	6	15	11	11
	2000	Heavy	28'	8	13	9	24	18	18
	2000	Light	21'-4"	6	10	7	18	14	14
2-STORY REQUIREMENTS	1500	Heavy	17'-4"	5	8	6	15	11	11
	1500	Light	14'-8"	4	7	5	12	9	9
	1800	Heavy	24'-0"	7	12	8	21	16	16
	1800	Light	18'-8"	6	9	7	16	12	12
	2400	Heavy	29'-4"	9	14	10	25	19	19
	2400	Light	22'-8"	7	11	8	20	15	15
	3000	Heavy	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	3000	Light	26'-8"	8	13	9	23	17	17

FOOTNOTES FROM TABLE

EarthquakeBraceBolt.com

Prescriptive Details



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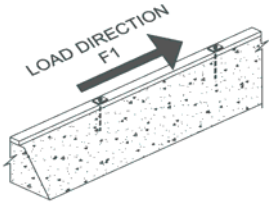
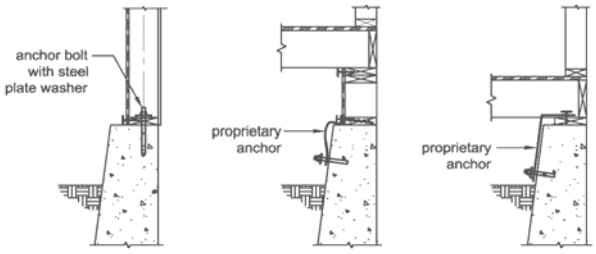
Dwelling Anchorage to Foundation



Concept:

- Install anchor bolts if space permits
- If not, install proprietary or engineered anchors



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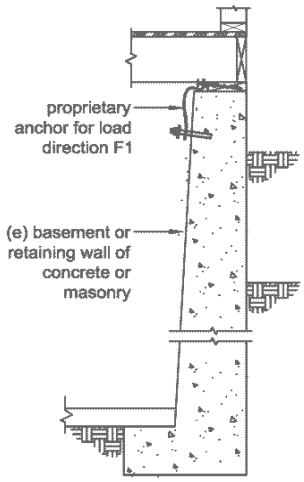
Residential Seismic Rehabilitation - CEBC Chapter A3

Dwelling Anchorage to Foundation



Concept:

- Is also applicable to basement and retaining walls
- Contact building department for additional retaining wall concerns

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New Anchor Bolts

EarthquakeBraceBolt.com

Foundation Plates – Bolt Only

EarthquakeBraceBolt.com

Foundation Plates – Bolt Only

EarthquakeBraceBolt.com

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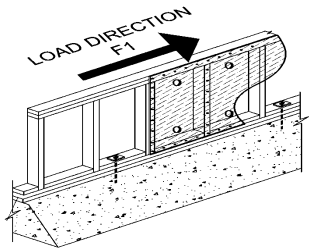
Cripple Wall Bracing

Concept:

- Install sheathing on inside face of cripple wall to resist load direction F1
- Anchor top plate to floor framing above (load in)



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New Plywood Sheathing

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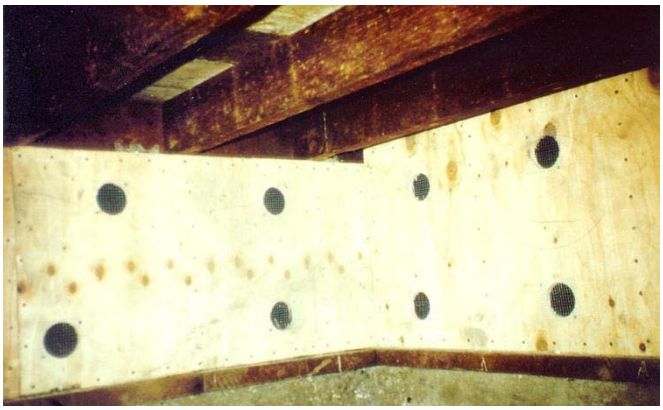
Vent Holes in Each Stud Bay



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Properly Placed Nails

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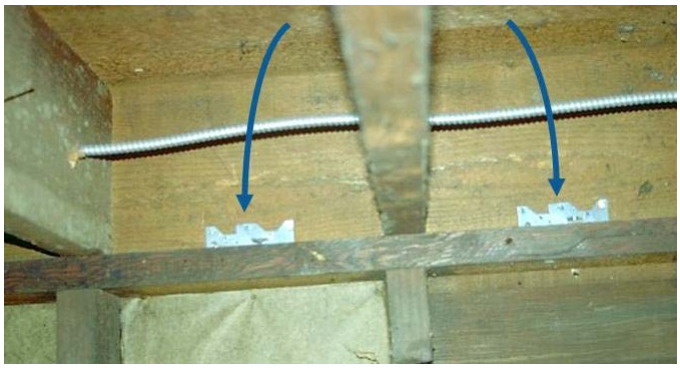
Connect Wall to Floor

Framing Clips



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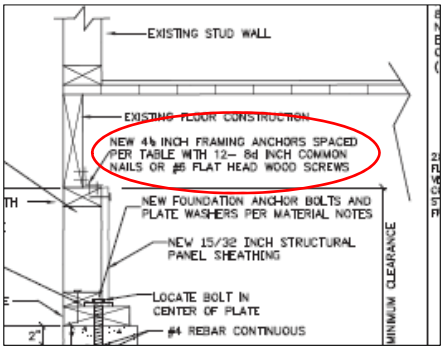
Framing Clip Detail



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Replace Decayed Framing

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Add Replacement Bolts

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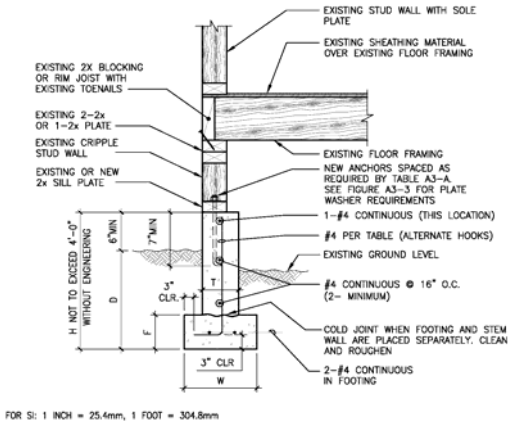
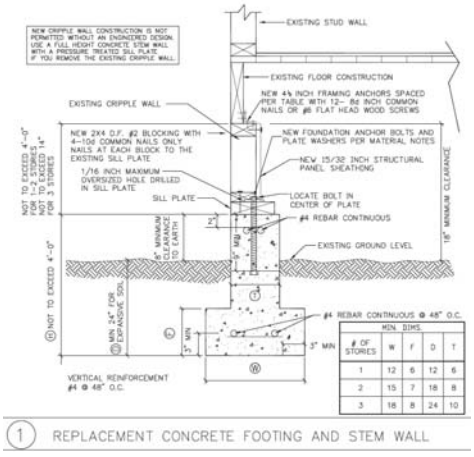
Chapter A3 Allows New Footing



New foundation may be designed per Figure A3-1 or A3-2, or be designed by an architect or engineer

A local building official may require a soils report.

LABD Std. Plan Set Allows New Ftg.



1 REPLACEMENT CONCRETE FOOTING AND STEM WALL

The legacy of the "Voluntary Retrofit"

- Northern California (ABAG 1999) study showed the majority of seismic retrofits done improperly
- Voluntary retrofits often leave out important items

A EFGHIJK NOPQRSTU XYZ

ABCDEFGHIJKLMN WXYZ

ABC IJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLMNOPQRSTUVWXYZ

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Not Seismic Retrofit

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Not Seismic Retrofit

Code Compliant Retrofit

- Does not bring the entire “house” up to code
- Rather, it provides a complete retrofit in accordance with an approved standard

Seismic Retrofit

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Seismic Retrofit

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