Residential Buildings Committee

Cripple Wall Fact Sheet

1. How many Bay Area residents live in single-family houses?
Over 7 million people live in the 10 Bay Area counties. Almost 75% of them, about 5.2 million, live in about 1.8 million one- and two-unit dwellings.

2. How many of those houses have "cripple walls"?
At least 200,000. Almost all Bay Area houses built before 1940 (and many built more recently) have cripple walls. Cripple walls are the short wood stud walls that enclose a crawl space under the first floor. Non-retrofitted or "unbraced" cripple walls are known to be vulnerable to damage and even collapse in earthquakes.

3. How many cripple wall houses have been adequately retrofitted?
According to ABAG, "only 20-40% of the older homes in the Bay Area have been strengthened to resist any earthquake damage, and only 5-15% have been strengthened enough to withstand violent shaking without becoming uninhabitable."

One reason so many retrofits might be inadequate is that almost no jurisdictions have adopted minimum technical standards for voluntary cripple wall retrofits. As long as the structure is not *weakened*, building departments will generally issue a permit for any voluntary work that a homeowner wants to do—such as the installation of nominal bolts or plywood. The problem is that the nominal work, sometimes sold by unscrupulous contractors, might not significantly improve the house's resistance to earthquakes. East Bay and Peninsula building officials are currently developing generic cripple wall retrofit standards by which homeowners can measure the work of their contractors. Such generic plans might also be used as minimum requirements to qualify for incentive or rebate programs.

4. Which jurisdictions have cripple wall retrofit or mitigation programs?
According to ABAG, "31% of local governments offer some type of financial incentive to private owners for retrofit," but only some of those apply to cripple wall retrofits.

Berkeley offers financial incentives, including tax rebates and fee waivers. Training and construction assistance are offered by San Leandro, Albany, and Foster City. Other programs that cover multiple jurisdictions include the California Department of Insurance Loan and Grant Programs.

5. How much does it cost to retrofit a typical cripple wall house?
Generally between $2,000 and $5,000 for a typical Bay Area house. The price depends largely on the size of the house and its existing condition, and sometimes on the ease of access. These costs include the installation of anchor bolts to the foundation, plywood sheathing, and all necessary connection hardware, by a qualified licensed contractor.

6. Are there financial benefits to cripple wall retrofit?
Yes, though they may be difficult to quantify, mostly because the exact nature of damage is impossible to quantify. The cost of worst-case repair, however, far exceeds the cost of retrofit, by a factor of perhaps 10 or more. For most Bay Area houses, even the 15% deductible on typical earthquake insurance policies exceeds the cost of retrofit.

Also, retrofitted houses can qualify for lower earthquake insurance premiums or for extra insurance benefits. Finally, failure to retrofit can lower the sale price of a house because of disclosure rules of the California Department of Real Estate.

Notes and Sources

1. From 2000 Census, about 7,039,000 people live in these 10 counties (about 80% of them in the first five): Santa Clara, Alameda, Contra Costa, San Francisco, San Mateo, Sonoma, Solano, Santa Cruz, Marin, Napa. Note: Association of Bay Area Governments (ABAG) stats do not include Santa Cruz County.

2. According to ABAG (1996), "pre-1940 single-family dwellings account for 8.3% of the total Bay Area housing stock. Their relative numbers are highest in the counties of San Francisco and Alameda where they account for 14.9% and 11.7% of the total housing stock." 8.3% of the 2.6 million housing units in 10 counties is about 215,000; this number is reduced slightly to account for duplexes.

3. ABAG analysis is based on a 1998 report by the American Society of Home Inspectors. See the following two sites: http://www.abag.ca.gov/abag/events/retrofit/ and http://www.abag.ca.gov/bayarea/eqmaps/nightmare/ashi_rpt.pdf.

Regarding inadequate retrofits and minimum technical standards, see Bonowitz, Schock, and http://bayarearetrofit.com/False_Security/false_security.html.

4. The 31% figure comes from a 2002 ABAG press release: http://www.abag.ca.gov/abag/news/arc9-2002.html. Summaries of local incentive and training programs, some of which might be inactive, are available online at http://www.abag.ca.gov/bayarea/eqmaps/nightmare/finance.pdf and http://www.abag.ca.gov/bayarea/eqmaps/awards.html. See also the EERI-NC Best Practices at http://quake06.org/quake06/best_practices/HomeSRIP.html and http://quake06.org/quake06/best_practices/HomeSSIP.html.

5. Price range based on averages from several contractors' websites: http://www.homeinspection.net/foundation (Bay Area), http://www.concretenetwork.com/concrete/seismic_support_of_old_foundations.htm, http://www.foundationbolting.com/construction.htm (Southern California), http://www.seismicsafety.net/earthquake.htm (Southern California). Additionally, this site estimates the cost as 1 to 3% of the value of the house: http://bayarearetrofit.com/Seismic_Retrofit_FAQ%27s/faq_s.html

Noncommercial sources include these references, listed below: CSSC, FEMA, Gallagher, and Grossi. Some of this cost data is 10 to 15 years old.

6. Relative cost of retrofit: see CSSC, page 14 and Table 1. For a more detailed analysis, see Grossi.

The California Earthquake Authority offers a 5% premium discount for retrofitted cripple wall houses. See http://www.earthquakeauthority.com/rates/rates_premiums.html. Other insurers offer additional "upgrade" coverage for retrofitted houses only. See http://www.geovera.com/Comprehensive.pdf and http://www.pacificselectproperty.com/Premier.htm.

For real estate disclosure rules, see http://www.dre.ca.gov/disclosures.htm.

References

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