APPROACHES TO MITIGATION OF CRIPPLE WALL FAILURE

PEER Internship Program – Summer 2013

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Introduction

- San Francisco has high earthquake hazard risk. Thus, made efforts to address buildings that are known to fare poorly during earthquakes.
- Weak structures: cripple walls, wood studs that run along the perimeter of a house's crawl space. Failures typically not life threatening but render a house uninhabitable(see figure 1).
- Plan Set A provides standard solutions for retrofit. Criteria to meet Plan Set A: cripple wall must be under 4 feet on at least 40% per side for a single story home
- This project explores approaches to mitigate cripple wall failures in San Francisco.

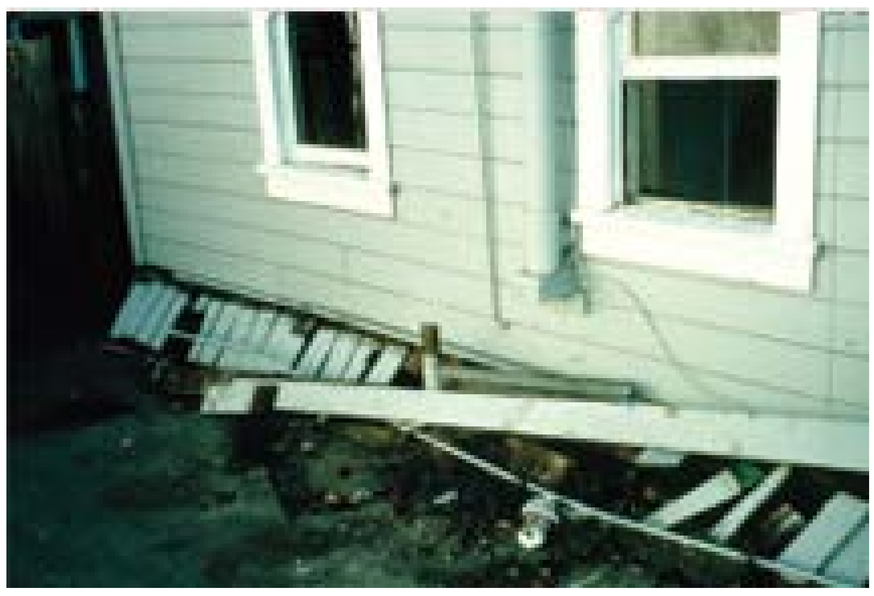

Figure 1. Typical cripple wall failure (SPUR, 2012)

Methods and Materials

- Tasks: Research and brainstorm incentive programs that motivate homeowners to retrofit and locate cripple wall buildings in San Francisco
- Break San Francisco into smaller neighborhoods and investigate each neighborhood separately
- Slope map and Google Earth to extrapolate which neighborhoods have higher cripple wall concentrations
- Drive through neighborhoods to make final inventory of cripple walls in San Francisco

Acknowledgements

This project was made possible by PEER, the NSF, and the city of San Francisco. Many thanks to PEER Outreach Director, Heidi Tremayne, for ongoing support and guidance and Laurence Kornfield for continued mentorship in research and work ethics.

Results

- By extrapolating from Google Earth (See Figure 3) and a slope map of San Francisco, the following estimate of cripple wall concentration in San Francisco was made:

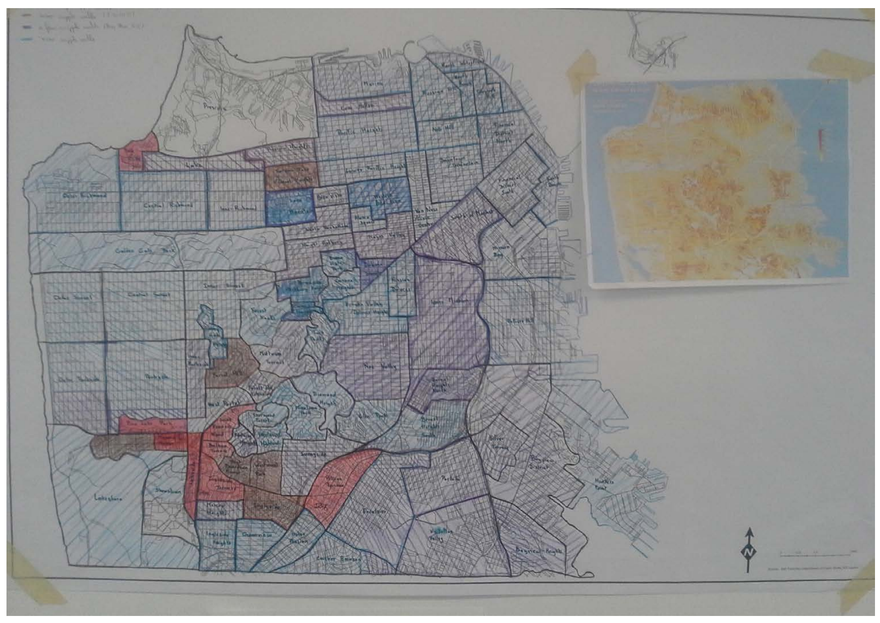

Figure 2. The larger map shows cripple wall estimate. Purple denotes no cripple wall, blue denotes few (<1%) brown denotes some (1-10%), red denotes many (>10%). The smaller map on the right is a slope map used for reference.

- Walking surveys of red areas show that many houses in higher concentration areas (brown and red) dip backwards and have cripple walls >4' on back walls
- Homes that do meet the criteria have very complex structures different from typical cripple wall homes

Figure 3. Front view of a home with cripple wall. Hints include vent and the number of steps (Google)

Conclusions and Further Work

- Homes that meet criteria have complex structures that make using Plan Set A difficult
- Many cripple wall homes with one cripple wall > 4 ft. Need research for prescriptive solutions for those
- Cripple wall retrofit program using Plat Set A not feasible in San Francisco
- Collaborate with ABAG to introduce cripple wall retrofit program to other parts of Bay Area, where more typical cripple wall homes exist

SPUR, (2012). *Safe enough to stay*. Retrieved from website: http://www.spur.org/files/spur-reports/SPUR_Safe_Enough_to_Stay.pdf

The PEER Internship Program is funded from a REU Site Award from the National Science Foundation.
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