UNREINFORCED MASONRY BUILDINGS AND THE CITY OF PORTLAND: UPDATE

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Many of the historic buildings in Portland are defined by their brick exteriors. Neighborhoods, such as the Pearl District, encourage new developments to maintain a similar look and feel to these historic buildings. While the intent to keep these historic buildings intact have merit, the city has acknowledged that due to the construction methods of the time of building, which are categorized as unreinforced masonry buildings (URMs), therein lies a major public safety issue if there were to be a large earthquake. A quick Google image search of "Christchurch Earthquake", from the 6.3 magnitude earthquake in Christchurch, New Zealand that killed 185 (Heritage, 2012), shows just how devastating one of these earthquakes could be, and how these buildings perform in a seismic event.

Approximately nine percent of the building stock in Portland falls under the categorization of an URM building and Portland sits atop the Cascadia subduction zone, thus there is a sense of urgency to retrofit our existing building stock to protect public and businesses. I will discuss why URMs pose a hazard, a very brief history of the city's URM efforts and then detail what Resolution Number 37364, which was adopted by City Council, means to the public, buildings owners and our community. This issue has many different stakeholders with conflicting motivations and does not lend itself to a one size fits all solution.

Figure 1: - The Maddox Building, Pearl District (Loopnet, 2018)

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UNREINFORCED MASONRY BUILDINGS

An unreinforced masonry building is "a building with one or more walls that are made of adobe, clay, brick or blocks, with no steel reinforcement inside" (URM Building Policy Committee , 2017). Before 1945, most of the brick buildings were built in a way that roof and floors were built to be resting on the brick exterior, which are load bearing, but were not mechanically fastened to the exterior (Schofield, 2017). Under normal circumstances this does not present a hazard. In the event of an earthquake however, as the lateral movement from the ground travels up the exterior walls, the walls, floors and roofing that were not connected to the exterior start to separate, see Figure 2.

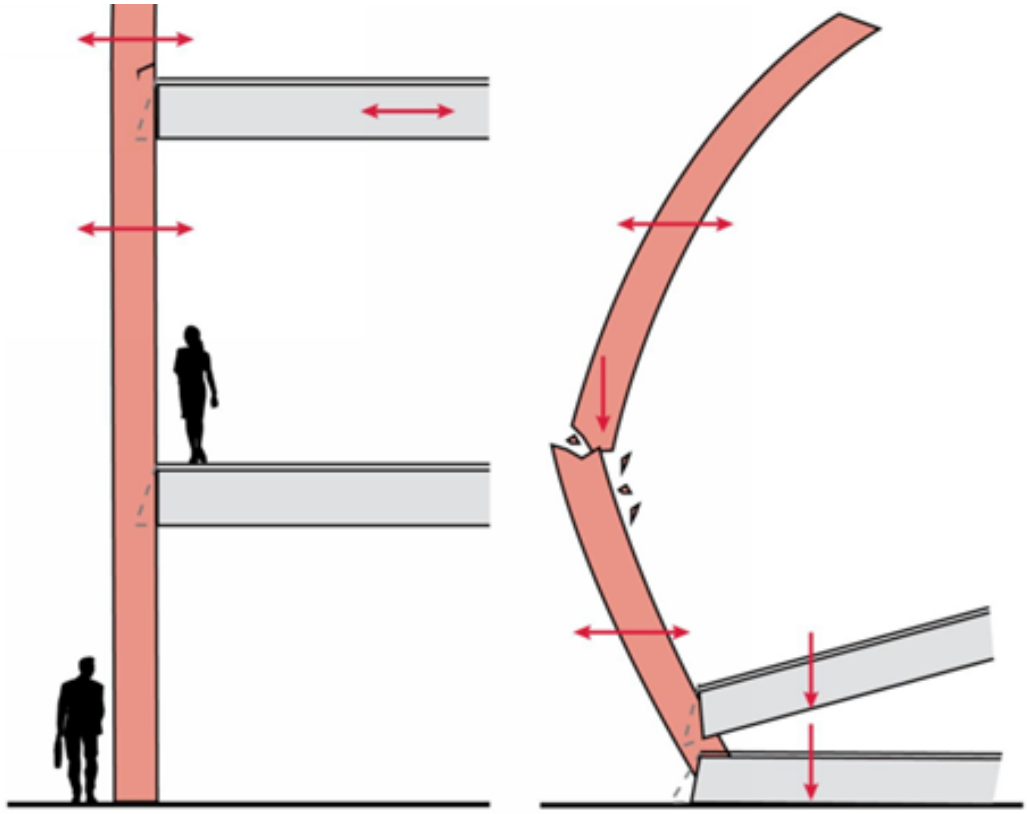
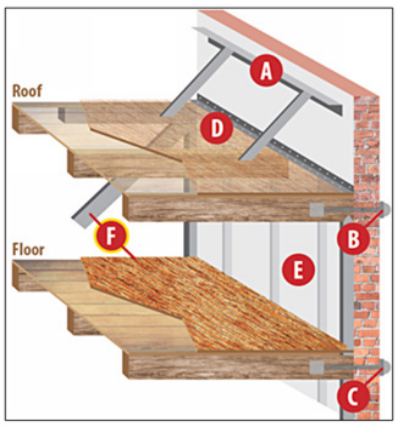


Figure 2: URMs Performance in an Earthquake (Schofield, 2017)

To retrofit the URM buildings to become resilient to earthquakes, the floors and roof need to be tied into the exterior. Additional vertical supports and cross bracing also help transfer the loads to let the building withstand earthquakes. Figure 3 illustrates what these retrofit upgrades look like.



Life Safety Upgrade to a URM Building

a. Brace parapets

b. Attach wall to roof

c. Attach wall to floor

d. In plane shear attachments and roof sheathing, ties and cross ties

e. Out of plane wall bracing

f. Other upgrades as needed, including vertical bracing and floor sheathing

Figure 3: URM Building Seismic Upgrades

BRIEF HISTORY

The city of Portland first introduced URM retrofit requirements in 1995 and was later updated in 2004 (City of Portland, 2014). Under Title 24.85 the structural and life safety requirements for existing URM buildings changing occupancy or having alterations performed were set out. This only affected buildings that had building permits applied for. Therefore, the URM buildings grandfathered in, and that were not performing permittable work in their buildings, did not have to perform any seismic upgrades. Building owners were not incentivized to volunteer to do these upgrades, so the burden of costs and disruption to their tenants outweighed the life safety benefits for the majority of building owners. Since 1995, only about 15 percent of the building stock had been upgraded.

City council recognized that the threat of a sizable earthquake and the impacts of it on our city would be too great to stand by and allow building owners use their discretion to upgrade their URM buildings. In 2014, City Council directed the staff to research other cities' programs and report back by the summer of 2016 with code change recommendations and incentives to align the upgrades with the Oregon Resiliency Plan. Three advisory committees were formed to lead the efforts, they were as follows; a Retrofit Standards Committee, an Incentive Committee and a Policy Committee. All of these efforts culminated in December of 2017 when the Policy Committee came out with their "Unreinforced Masonry Building Policy Committee Report" which laid out the groundwork for how a mandatory program would look.

POLICY COMMITTEE REPORT RECOMMENDATIONS AND RESOLUTIONS

The Unreinforced Masonry (URM) Building Policy Committee Report had a few recommendations, and were adopted by City Council per Resolution Number 37364 on June 13, 2018. The committee had a year to create code language and requirements for the URM program. The recommendations that were accepted are below.

The first recommendation was a mandatory URM building retrofit policy, that required upgrades based off of classification, uses and services of each building (URM Building Policy Committee , 2017). Figure 4 below summarizes the building classes, the proposed standard, and the number of buildings that fall into each category.

Proposed Standard	Building Class	Approx. # of Buildings
Immediate Occupancy	1: Critical Buildings + essential facilities	6
Damage Control	2: Schools, community centers, high occupancy structures	94 44 schools, 37 churches, 13 other
Collapse Risk Reduction	3: All URM buildings not in 1,2, or 4	1,332 Plus 37 churches and other buildings owned by non-profits (but not schools) may choose this standard.
Parapet bracing only	4: 1 and 2-story buildings with 0-10 occupants.	201

Figure 4: Building Class and Standards Summary (URM Building Policy Committee , 2017)

Associated with each building class are timelines to complete partial and full retrofits. The timeline for each building class are below:

- Class 1: 10 years to complete all steps.
- Class 2: 10 years to tie-in parapets (which typically require a new roof as well) and 20

POLICY COMMITTEE REPORT RECOMMENDATIONS AND RESOLUTIONS

years for the full retrofit

- Class 3: 20 years for parapet bracing but no timeline for wall to floor attachments
- Class 4: 20 years for parapet bracing

Class 3 buildings are most prevalent URMs in Portland and will have the most impact on the most amount of building owners. A cost estimate was provided, see Figure 5, to perform a benefit cost analysis.

Estimated Class 3 Building Retrofit Costs	**Cost Range per Square Foot**		
Cost Component	Min	Max	Median
Existing Ownership Expense			
Re-roofing	$ 31	$ 36	$ 34
Existing Code Requirement			
Parapet Bracing	$ 1	$ 7	$ 2
Roof-to-wall attachment	$ 1	$ 8	$ 2
New Code Requirement			
Sheathing	$ 8	$ 9	$ 9
Floor-to-wall attachment*	$ 3	$ 5	$ 2
Total Estimated Cost Per SF	$ 43	$ 65	$ 48

*Only required on multi-story buildings

Figure 5: Class 3 Retrofit Estimate (URM Building Policy Committee , 2017)

The second recommendation was to support URM building owners financially. The cost burden of the retrofit has prevented many building owners from pursing a voluntary retrofit. The following are the main potential funding sources:

- Seismic C-PACE Program: Authorized under Senate Bill 85, requires investment in retrofit to support the payoff of the loan. Funds are already set aside for this program.
- Property Tax Exemptions: Up to 15 years of tax exemptions, program would need to be created for URM specifically. The program was authorized by the 2017 Oregon Legislature in SB 311, but Multnomah County and Portland Public Schools must agree to forego property tax income.
- State Seismic Tax Credit: Being explored, would provide a 20 percent of seismic expenditure state tax credit exemptions for all private owners of URMs.
- State Historic Tax Credit: Did not pass in 2017 originally, but will be attempted again. Main proponents include the City of Portland and Restore Oregon.
- Revolving Loan Fund: Proposal to be proposed within a year.

POLICY COMMITTEE REPORT RECOMMENDATIONS AND RESOLUTIONS

The third recommendation included different types of special hardships for affordable housing, schools, and religious/non-profit uses. These hardships included extending the timelines and requirements for buildings falling under these categories. This group did include historic structures at one point, but since historic buildings benefit from other incentives already, they would not receive additional hardships.

The fourth recommendation was modifications to the building code. This includes the following:

- Building Owner Notice: URM building owners must be notified of the City's determination that a building is URM and provided access to information regarding the determination. This will include an appeal process and timelines for retrofitting.
- Additional Triggers: reroofing greater than 50 percent of total roof area within a 15-year period will trigger parapet bracing. Alternatively, if over a 5-year period building alterations or repairs are more than the building value, the parapet bracing will be triggered.
- Public Notice: Lease agreements will be the vehicle to notify tenants that the building is a URM and has a potential to collapse in an earthquake. Building owners will also be required to add a placard at the entrance that states "This is an unreinforced masonry building. Unreinforced masonry buildings may be unsafe in the event of a major earthquake. The City's Policy Committee did not favor placarding of a building unless the building was significantly out of compliance.

CONCLUSION

With City Council allowing more relaxed timelines on the retrofit of class 3 and 4 URM buildings, there is some relief to building owners. However, this will just allow building owners to kick the can down the road per se. The group Save Portland Buildings estimated that financial assistance will need to cover at least 80 percent of the total costs of a retrofit for many of the building owners to be able to afford taking on the upgrades (Save Portland Buildings, 2017). Although the June 13 proposal seemed to be a reasonable compromise, the resolution published on June 25 had language that was not discussed in the meeting, which further angered those not in favor of the mandate (Classen, 2018)

The elephant in the room is what happens when a building owner cannot afford the upgrades, even with financial assistance. The rhetoric around town has been that the building owners will just decide to demolish or sell their buildings to developers, who would likely look at the best and highest use at each site, which typically includes demolition, which could eliminate a substantial number of affordable housing units.

SOURCES

City of Portland. (2014). Update of URM Seismic Retrofit Requirements. Portland: City of Portland.

Classen, A. (2018, June). Final resolution contains language not discussed at June 13 City Council session. Retrieved from http://nwexaminer.com/author/nwexaminer.

Heritage, M. F. (2012, April 12). Christchurch earthquake kills 185. Retrieved from New Zealand Government: https://nzhistory.govt.nz/page/christchurch-earthquake-kills-185

Loopnet. (2018, July 29). 1231 NW Hoyt. Retrieved from Loopnet: http://www.loopnet.com/Listing/1231-NW-Hoyt-St-Portland-OR/11826688/

Save Portland Buildings. (2017). Save Portland Buildings Presentation . Portland: Save Portland Buildings.

Schofield, K. (2017, October 9). Understanding The Unreinforced Masonry Problem. Retrieved from SCC Insight: https://sccinsight.com/2017/10/09/understanding-unreinforced-masonry-problem/

URM Building Policy Committee . (2017). Unreinforced Masonry (URM) Building Policy Committee Report. Portland: Portland Bureau of Emergency Management.