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PORTLAND'S UNREINFORCED MASONRY APARTMENT BUILDINGS: A THREATENED SPECIES?

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Now that Western Oregon and Washington have been identified as being subject to massive if infrequent "subduction zone" earthquakes and that the vulnerability of unreinforced masonry (URM) buildings to damage or collapse in a major earthquake has been documented, the owners of URM apartment buildings can expect to face gentle but inevitable pressure from casualty insurers, mortgage lenders and the local government to seismically reinforce their buildings. The challenge facing such owners is that the (1) cost of a standard seismic retrofit of an URM building will in many cases approach 20 percent of the value of that building, but (2) the retrofit adds little to the cash flow of the building aside from marginally lowering earthquake insurance premiums and mortgage interest rates. Given the large number of and historic/ architectural importance of URM apartments to Portland, URM building owners, architectural preservationists, structural engineers, mortgage lenders and insurers, and city and state officials need to work collaboratively to reduce impediments to and increase incentives for seismically upgrading URM apartments.

By 1991, geologists led by Brian Atwater of the U.S. Geological Service had established that Western Oregon and Washington are subject to periodic but infrequent (every 300-600 years) Cascadia Subduction Zone ("CSZ") earthquakes of enormous destructiveness, approximately Magnitude ("M") 8.7 to 9.2. The most recent CSZ quake occurred 310 years ago in January, 1700. Geologists now estimate that there is at least a 10 percent probability of another CSZ, M 9 quake affecting Western Oregon in the next 50 years.

Some casualty insurers and commercial real estate lenders are becoming hesitant to insure or loan on URM buildings

In 2001, the City of Portland published a database identifying URM buildings in Portland. Of those, by this author's count, about 200 are apartment buildings, totaling over 5,200 units and conservatively worth over $350 million. At least 70 of these URM apartments are of National Register historic quality. Another 100 historic apartment buildings, more or less, listed on the database of the State Historic Preservation Office (SHPO) are of similar masonry construction, although not strictly URM's.

A URM building is vulnerable to damage or collapse in a major earthquake because such buildings generally: (1) are rigid, lacking flexibility, (2) are not securely connected together, such that their foundations, exterior walls, floor and roof diaphragms are prone to separation and (3) lack lateral strength sufficient, given the relatively heavy weight of masonry, to withstand large and sustained horizontal forces (shaking). This damage or collapse, in turn, will result in the injury or death of many occupants, the loss of a substantial percentage of Portland's urban (in-close) rental housing, and the loss of much of Portland historic fabric.

Some casualty insurers and commercial real estate lenders are becoming hesitant to insure or loan on URM buildings in locales like Portland which have been identified as having a high earthquake risk.

Portland's URM apartment buildings are too important to "write off." Similar buildings in Los Angeles and San Francisco have been seismically retrofitted, albeit at substantial cost, to anticipate and ameliorate the effects of a major earthquake.

There are tax incentives to the renovation of historic buildings including a 10-year (or with extension 20-year) Oregon historic property tax assessment freeze, a 20 percent federal historic rehabilitation tax credit for substantial renovation, and Oregon and federal charitable deductions for building faade (conservation easement) donations. Additional incentives, especially for URM apartment buildings that are not of National Register historic quality, are advisable. Minimal "life-safety" seismic upgrades to URM's may need eventually to be made mandatory.

EARTHQUAKE RISK IN WESTERN OREGON AND THE VULNERABILITY OF URM BUILDINGS

The vulnerability of Western Oregon (as well as coastal British Columbia and Western Washington) to a large subduction zone earthquake along the Cascadia Subduction Zone ("CSZ"), the intersection of the subducting Juan de Fuca (Tectonic) Plate and the overriding North American (Tectonic) Plate, has been known for almost 20 years (Atwater, Musumi-Rokkaku, Satake, Tsuji, Ueda, and Yamaguchi, 2005). An earthquake in 1700 relieved hundreds of years of tectonic plate pressure and resultant uplifting of the coastal areas of Oregon and Washington with one massive fault line correction which resulted in a several meter drop of coastal areas and incidentally created a "ghost forest" of dead red cedar trees in a tidal salt marsh near Grays Harbor, Washington. This forest was a key clue to the discovery of the CSZ. The exact date (January 26) and intensity (M 8.7 to 9.2) of the 1700 earthquake were established based on an analysis of Japanese archives from that year recording the effects of an "orphan" tsunami that struck Japan on the next day, apparently without any local Japanese earthquake having occurred (Atwater, Musumi-Rokkaku, Satake, Tsuji, Ueda, and Yamaguchi, 2005; Tobias, 2010). Atwater, Musumi-Rokkaku, Satake, Tsuji, Ueda, and Yamaguchi (2005) cite buried soil evidence in Washington of ". . . five great earthquakes of the past 3000 years . . . [and] seven earthquakes from the past 3,500 years."

Analysis of coastal sediment cores has disclosed a 10,000 year history of large (1.5 to 2.0 meter) periodic drops of coastal land in Oregon and Washington, evidence of other CSZ quakes. Investigation of undersea landslides by a team of researchers headed by Oregon State University Professor Chris Goldfinger has indicated 19 distinct, approximate M 9 CSZ earthquake events in the last 10,000 years (Rojas-Burke, 2010). These events involved a rupture along the entire 600 mile long Cascadia fault. Previously 13 such events had been identified as having occurred since the eruption of Mt. Mazama 7,700 years ago with an average repeat time of 600 years (Goldfinger, Nelson, and Johnson, 2003). Some geologists, including Goldfinger, have theorized that the larger M 9 Cascadia quakes come in clusters separated by 1000-year periods of inactivity (Rojas-Burke, 2010).

FEMA concludes that URM buildings bear a disproportionate share the damage suffered in quakes

A large subduction zone earthquake not only has an extremely high magnitude and a long duration, but also has long-period waves which particularly affect tall buildings (Cascadia Region Earthquake Workgroup, 2005). A M-9 quake radiates twice the energy of a 90-mph hurricane if it blew for a month (Atwater, Musumi-Rokkaku, Satake, Tsuji, Ueda, and Yamaguchi, 2005). The shock waves emanating from an earthquake will typically be amplified with respect to a particular building if the soil under a building is soft, especially if the soil is either saturated with water and could liquefy or if the soil is artificial fill (Cascadia Region Earthquake Workgroup, 2005).

In a M-9 CSZ quake occurring close to Portland, many or even most (whether URM or not) buildings in Portland will be at risk of substantial damage or collapse, but the amount of damage to a particular building will depend upon factors including: the intensity and duration of the quake's shaking, the depth and horizontal distance of the quake's epicenter from the building, the site's soil conditions, including the amount of water in the soil, the slope of adjacent hillsides, the building's type of construction and state of repair, and the proximity of other earthquake-vulnerable buildings which might collapse on the subject building.

The Federal Emergency Management Agency ("FEMA"), in surveying eight major United States earthquakes in the period from the 1886 Charleston, S.C. quake (M 7.7) to the 2003 San Simeon, CA quake (M 6.5), concluded that URM buildings bore a disproportionate share the damage suffered in such quakes. Taking the eight quakes together, 4,457 URM buildings were involved of which 5 of 6 (or about 83 percent) were damaged enough for brickwork to fall and one fifth (or about 20 percent) were damaged to the point of partial or complete collapse (Reitherman and Perry, 2009).

The vulnerability of URM buildings to earthquake damage arises from the following:

1. The inadequacy of an URM building's exterior and/or load bearing walls to resist horizontal ("shear") forces and the walls' lack of flexibility ("ductility"), such that in a large

quake the floors move laterally and disintegrate in a manner akin to how the layers of a wedding cake might be affected if violently shaken,

2. The heavy weight of the building and its floors creating enormous momentum once in motion,

3. The lack of structural connections variously between (a) exterior walls and floors diaphragms, (b) exterior walls and roof diaphragms and (c) exterior walls and the foundation,

4. The weakness and consequent susceptibility of the roof and floor diaphragms to deflection in an earthquake, resulting in inadequate lateral support for the walls,

5. The prevalence of parapets, cornices, chimneys, and stone ornamentation prone to breaking off and falling in a quake, and

6. The fact that URM buildings were typically designed totally without reference to seismic forces (Reitherman and Perry, 2009).[1]

Figure 6.1 Example of parapet failure (l) and parapet bracing (r)

The earthquake performance of URM buildings gives rise to various types of loss and damages:

1. Injury to Persons. Bricks are heavy and when they fall can injure or kill people. Parapet walls, chimneys and cornices are all vulnerable to falling off and hitting people. URM buildings can partially or entirely collapse in a major earthquake, trapping, injuring and even killing occupants.

2. Damage to Property. Because URM buildings typically lack any integrating reinforcement or any tying together of structural elements, a major earthquake can potentially

[1]See also, Look, Wong, and Augustus (1997).

cause their partial or total collapse. As a result, a URM building may be costly to restore after earthquake damage occurs such that demolition often is the only feasible alternative. For instance, the 1989 Loma Prieta earthquake (M 7.1) near Santa Cruz, California damaged the Pacific Avenue Historic District with the result that 52 percent of the URM brick buildings were quickly demolished and another 16 percent were "red tagged" (closed to use by the City inspectors because unsafe to enter).[2]

3. Loss of Use. Even modest earthquake damage to an URM building can require closure until repairs are made. Typically post-quake repairs will need to be coupled with seismic upgrades, such that closure may be for many months (Reitherman and Perry, 2009).

THE RESPONSE OF INSURERS AND LENDERS TO WESTERN OREGON'S EARTHQUAKE RISK

> Financial institutions offering apartment loans in Portland now are becoming somewhat cautious about loaning on URM apartments

In the mid-1990's, soon after the discovery of a history of CSZ quakes in the Northwest became public and well before any increased lender concern about the earthquake risk in Western Oregon, some of casualty insurance companies changed their ratings of Western Oregon and Washington with respect to earthquake casualty risk and took steps to limit their exposure to this risk. This retrenchment began in part as a reaction to the enormous losses suffered by the insurance industry in the January 1994 Northridge Quake in Los Angeles. In the immediate aftermath of the Northridge Quake, the insurers estimated $3 billion in insurance claims, but ultimately paid out more than $15 billion, on losses of nearly $18 billion (Treaster, 1999; Missouri Earthquake Insurance Task Force, 2008). In response, 90 percent of the preexisting insurers writing earthquake insurance in California withdrew from that market. To insure this risk, the California Legislature created the California Earthquake Authority, a state backed and managed but privately funded organization (pool) which provides basic or "bare bones" earthquake coverage in California (Missouri Earthquake Insurance Task Force, 2008).

In the Northwest, by contrast, most casualty insurers offering residential and/or commercial earthquake coverage have not withdrawn from the market. However, most have lessened their risk by: (1) raising their policy deductibles to 10 percent or even 20 percent of the amount of the *coverage*, not a percentage of the amount of *loss* (Oregon Department of Consumer and Business Services, 2010), by (2) covering primarily direct physical loss to property and by not covering landslides, erosion, tsunami or volcanic eruption, even if part of an earthquake event (Oregon Department of Consumer and Business Services, 2009), and (3) excluding from coverage items such as personal property, ancillary improvements and rental income replacement. In 2006, Allstate announced it was dropping earthquake coverage for most of its customers nationwide (Associated Press, 2006; Meyer, 2006). Several

[2]Reitherman and Perry (2009), citing Architectural Resources Group (1990).

other carriers including Mutual of Enumclaw and Rocky Mountain Fire have also withdrawn from the Oregon earthquake market.[3]

Commercial earthquake insurance is still available for URM buildings in Oregon through various carriers, in particular Lloyds of London, but coverage is expensive and is typically written through the "surplus lines market" as opposed to the more regulated "admitted market."[4]

Commercial real estate lenders active in the Portland, Western Oregon and Southwest Washington mortgage market are becoming more conservative in making loans collateralized by URM buildings. Fannie Mae, Freddie Mac and HUD/FHA have since 2008 provided over 80 percent of all multifamily lending by dollar volume in the U.S. (Cassidy, 2010). However, the most accessible multifamily loan program from Fannie, Freddie and HUD, namely the popular Fannie Mae DUS (Delegated Underwriting and Servicing) loan program does not loan on URM buildings unless already seismically upgraded.

In December 2006, Fannie Mae, in its DUS Program [Underwriting] Guide, imposed the following requirements on potential borrowers relative to seismic risk:

1. Provide 100 percent full replacement cost earthquake insurance (maximum 10 percent deductible) as mitigation of the earthquake risk,

2. Commission a Level I, Seismic Risk Assessment (PML Study)[5] for all loans over $20 million and for all loans on properties located in seismically active areas (Seismic Zones 3 and 4), in particular (a) for even reinforced masonry if constructed prior to 1994, (b) for any building with a weak (soft) story at the first level above grade, such as glass storefronts. (Additional risks are identified for properties in Seismic Zone 4.)

3. Achieve a PML of 20 or less, in other words, "The acceptable level of seismic risk is represented by a . . . PML at a 10 percent/50 year exceedance probability which does not exceed 20 percent."

Given the fact that an un-retrofitted URM might have a PML in the mid to high 30s,[6] URM buildings are not acceptable for financing under the DUS program, at least in Seismic Zones 3 or 4 (Fannie Mae, 2006). Moreover, Fannie Mae representatives have indicated that although the DUS program will accept seismic upgrading of URM apartments to satisfy the 20 PML, it will do so only if the work is completed prior to loan funding.

Other financial institutions offering apartment loans (principally banks) in Portland now are becoming somewhat cautious about loaning on URM apartments. They typically require earthquake insurance. Some have underwriting guidelines which limit the loan to value ratio (LTV) and increase the debt service coverage (DSC) ratios on URM building loans. Conversations with several lenders suggest that although the interest rates and maturities offered URM owners are still competitive, principal amortizations may be faster and therefore less favorable (25 year versus 30 year), and personal guarantees of the principals of the borrower(s) will be standard.

[3] Author's telephone conversation with CeCe Newell of the Oregon Insurance Division, May 27, 2010.
[4] Author's telephone conversation with CeCe Newell of the Oregon Insurance Division, May 27, 2010.
[5] A term used in the insurance industry and commercial real estate. It is generally defined as the anticipated value of the largest loss that could result from the destruction and loss of use of the property. With regard to seismic risk, PMLs are typically performed according to the scope of work published by ASTM International (2007).
[6] Author's conversations with Wade Younie, Structural Engineer, DCI Engineers (Winter, 2009–2010).

Figure 6.2 Trinity Place Apartments, Portland, Ore.

PORTLAND'S UNREINFORCED MASONRY APARTMENT BUILDINGS

The typical URM apartment building in Portland was built between 1902 and 1935. In the 1930s, as building codes began to address seismic risk, reinforced masonry techniques including concrete and reinforcing iron/steel ("rebar") came into greater use. Still, small URM apartments apparently were built in Portland into the 1950s.

As mentioned above, the City of Portland, using work/study students, conducted a rough count of all URM buildings (not just apartments) in Portland and created an Unreinforced Masonry Database ("URM Database").[7] The URM Database discloses, by this author's analysis, that there are approximately 200 URM apartment buildings (including both rental apartments and apartments converted to residential condominiums) constituting over 3.8 million square feet and 5,200 apartment units in the City of Portland. By way of comparison, the Metro Multifamily Housing Association's Spring, 2010 rent survey encompassed only 9631 rental apartment units within the City of Portland and 32,202 units in the entire Portland/Vancouver metro area (McConachie, 2010). Hence URM apartment buildings constitute a significant percentage of Portland's rental housing stock. Since, the median year of construction of the URM apartments in URM Database is 1912, URM apartments, espe-

[7] Hagerty (2001).

cially "close in," represent a key component of the city's historic fabric, making an aesthetic and architectural contribution to the city.

FEASIBILITY AND COST EFFECTIVENESS OF SEISMIC RETROFITTING OF URMS

Since URM buildings are vulnerable to substantial damage in a major earthquake, one might well wonder whether it is technically possible to seismically retrofit them and, if so, whether such a retrofit is cost effective. The short answer is that a seismic retrofit is feasible, but expensive.

The feasibility of seismically retrofitting a URM building has been established by several studies of the performance of seismically retrofitted URMs in specific earthquakes.

In 1981, the City of Los Angeles adopted an ordinance mandating the seismic upgrading or demolition of approximately 14,000 URM buildings. By the time of the 1994 Northridge Earthquake (M 6.7), most URM buildings in L.A. had been seismically retrofitted, not to the seismic standards for a new building, but with the goal of bringing the URM buildings to a "reasonable level of safety." [Analogous to what the author calls "Basic Life Safety."] For example Reitherman and Perry (2009), citing California Seismic Safety Commission (2004), explain:

> As would be expected, unretrofitted URM buildings performed worse, in general, than both reinforced masonry buildings and retrofitted URM buildings . . . The performance of buildings retrofitted to the ["reasonable . . . safety"] standard . . . was generally in line with that criterion . . . .

In the 2003 San Simeon Earthquake (M 6.5), the seismic retrofitting of URM's was again tested. The nearby town of Paso Robles was severely impacted:

> Of 53 unreinforced masonry buildings in Paso Robles, the nearest affected city, none of the nine [0 of 9] that had been retrofitted experienced major damage. Many of the others were damaged so extensively they were subsequently demolished."

As to cost, in general, it is prohibitively expensive to bring an URM brick apartment building up to the current seismic standards for a newly constructed apartment building. Even a more limited seismic retrofit of an URM apartment costing (say) $20 per square foot would, for a 40,000 gross square foot apartment building, cost $800,000. With 3.8 million square feet of URM apartments, the upgrades for the approximate 200 URM apartment buildings in the City of Portland would cost by very rough estimate in excess of $75 million or over $14,000 a unit. For comparison, the average sale price of an apartment unit in Portland Metro area in the fourth quarter of 2009 was about $87,000 (Barry, 2010).

THE HISTORIC FACTOR IN URM RETROFITTING

The technical feasibility and monetary cost of a seismic upgrade are not the only factors to be considered. There is also the potential aesthetic cost, that is, the adverse impact of an insensitive seismic upgrade on historic and architectural values. Many of Portland's historic apartment buildings are beautiful examples of early 20th Century American interior and exterior apartment architecture designed by some of Oregon's leading early 20th Century architects, such as Ellis Lawrence (Belle Court Apts.), Whitehouse & Fouilhoux (705 Davis Apts./ now Condominium) and William Knighton (Trinity Place Apts.). These architectural

Figure 6.3 Example of a floor joint tie back in Trinity Place Apartments

gems could be aesthetically "ruined" by an insensitive addition of exterior steel reinforcing beams, interior moment frames, gunnite reinforcing walls and the like.

To date, about 48 historic apartment buildings in Portland have been individually listed on the National Register of Historic Places ("National Register"). Approximately another 110 apartment buildings (excluding duplexes and row houses), while not individually listed on the National Register, have been inventoried and listed as primary or secondarily contributing historic properties within designated a National Register historic or conservation districts in Portland ("District Inventory"). Important Historic or Conservation Districts in Portland include the Alphabet Historic District in Northwest, the Ladd District in Southeast and the King's Hill Conservation District in Southwest.

Approximately 69 historic apartment buildings in Portland are identified in the URM Database as URM buildings. As a consequence of a building's identification as an historic landmark, its renovation is regulated by the Portland Landmarks Commission enforcing

City Code.[8] If a building is listed individually on the National Register or if deemed historically compatible in a District Inventory and if the owner has taken the additional step of applying for an historic property tax abatement, then in such case a building's renovation is further subject to regulation by the Oregon State Historic Preservation Office ("SHPO") enforcing the regulations of the National Park Service.

LEVELS OF SEISMIC UPGRADING FOR HISTORIC BUILDINGS

There are various levels of seismic upgrading available to the owner of an historic URM apartment building. The degree of seismic upgrade chosen by the owner is likely to be determined by:

1. The requirements of the local government, e.g. the City of Portland,
2. The requirements of the owner's lender and/or insurer, if any,
3. The owner's financial strength and perception of earthquake risk,
4. The availability of reasonably priced renovation financing and of tax incentives,
5. The importance or uniqueness of the building, and
6. The costs of engineering design, permitting, construction and loss of rental income from the seismic upgrade project.

Preservation

By the author's rough estimate, a "premium" seismic upgrade would cost at least $50 more a square foot (i.e. $2 million or more for a 40,000 square foot building). Such an upgrade would not be appropriate for a typical URM commercial or apartment building. It is normally reserved for important public buildings, hospitals, and irreplaceable historic structures like the 1897 Pioneer Courthouse in Portland. Recently the Courthouse (57,000 square feet) was not only seismically reinforced, but the entire building was seismically isolated from its foundation with "friction pendulum isolators." The construction manager on the project reports that the total cost of the Courthouse's renovation was $20 million, but this included numerous improvements unrelated to seismic issues, e.g. creating an underground parking area, refurbishing all interior areas, and replacing all mechanical systems. This level of upgrade promises to protect the building from a major earthquake almost intact, so it can continue to be open and in operation.

Full or Standard Seismic Retrofit, Zone 3

This level of seismic upgrade is estimated to cost in the range of $20 to $40 per square foot depending on building design and condition (i.e. a minimum of $800,000 for a 40,000 square foot building). Under this approach, an historic building is substantially retrofitted to meet, to the extent possible, the prescribed IBC (building code) provisions for renovation of a

[8] City of Portland, Title 33, Planning and Zoning, 33.445 Historic Resource Protection Overlay Zone and 33.846 Historic Reviews.

building to Seismic Zone 3 standards.[9] Some substantial, but repairable, damage would be expected after a major earthquake. This is the level of upgrade one might use for an historic quality URM apartment building.

Basic Seismic Upgrade

This level of upgrade is estimated to cost from $10 to $15 per square foot depending on building design and condition (i.e. $400,000 to $600,000 for a 40,000 square foot building). Under this approach, the building is selectively upgraded to substantially reduce damage and loss in a moderate earthquake. Inherent deficiencies found in older buildings, such as poor floor to wall framing connections and un-braced masonry walls would be corrected. After a design-level (moderate) earthquake, some structural damage is anticipated, such as masonry cracking, and the building would be temporarily unusable, but it would be repairable; moreover occupants would be able to exit the building in relative safety.

Basic Life Safety

This upgrade is estimated to cost in the $5 to $10 per square foot range depending on building design and condition (i.e. $200,000 to $400,000 for a 40,000 square foot building). This type of project addresses the most serious life-safety concerns by correcting those deficiencies that could lead to serious human injury or total building collapse. Upgrades may include (i) bracing and tying the most vulnerable elements of the building, such as parapets, chimneys, and projecting ornamentation, or (ii) reinforcing routes of exit. It is expected that if an earthquake were to occur, the building would not collapse but would be seriously damaged requiring major repairs (Look, Wong, and Augustus, 1997).

INCREASING INCENTIVES AND REMOVING OBSTACLES TO THE SEISMIC UPGRADING OF URM APARTMENTS

URM building owners, architectural preservationists, architects, structural engineers, mortgage lenders, the City, SHPO, all need to work collaboratively to increase incentives and reduce or impediments to undertaking seismic upgrades of URM apartments. These impediments and possible solutions include:

1. The inability of many building owners to benefit from the 20 percent Federal Historic Tax Rehabilitation Credit because of alternate minimum tax ("AMT") limitations.[10]

   Suggested solution: Short of inducing Congress to change AMT rules, the City, through (say) the Portland Development Commission ("PDC"), might commit to facilitate the "sale" and potentially help "create a market" for the "sale" by the building owners of historic tax credits to local and national corporations able to use them.

2. The onerous expenditure requirements (i.e. 10 percent of the building's Real Market Value as determined by the county assessor in 5 years) which must be agreed to in a

[9]See Oregon Structural Specialty Code (2007), Section 1613, Earthquake Loads.
[10]See Internal Revenue Code, Section 47 and Regulations 26 CFR 1.48-12.

"preservation plan" and accomplished by the historic building owner to qualify for or extend an Oregon historic property tax assessment freeze for 10 years.[11]

Suggested solution: Modify ORS 358.487(2)(a) so that a phased seismic upgrade of an historic building over as long as a 15 to 20 year period, so long as the expenditures during the each 10-year freeze period total at least 5 percent (as opposed to 10 percent) of the property's initial RMV, is sufficient to qualify the property for a full 20 years (10 initial years and 10-year extension) of assessment freeze.

3. The perception (if not reality) that City Building Inspectors, Portland Landmarks Commission and SHPO approvals of rehabilitation plans for historic buildings are often bureaucratically determined with little reference to practical realities and that costly plan changes are sometimes required. Note that typically, no City Landmarks approval is required if there are no exterior modifications.

   Suggested solution: Encourage the City and SHPO to appoint a joint task force, including representative architects, engineers and building owners, charged with analyzing and expediting the rehabilitation plan approval process and criteria for review of seismic upgrades.

4. The unavailability of most historic tax incentives to the owners of non-historic quality URM apartment buildings in Portland.

   Suggested solution: Lobby Congress to remove the "no-residential" exclusion from the 10 percent rehabilitation credit for seismic upgrade work in Seismic Zones 3 and 4 and lobby the Oregon legislature to pass a property tax assessment freeze to non-historic URM apartments undergoing seismic upgrading.

5. The higher cost, higher deductibles and more limited coverage of earthquake insurance for URM buildings.

   Suggested solution: The Oregon Insurance Commissioner should set up a task force, including representative URM apartment owners and insurance companies, to study the potential need for and steps required to set up a state- organized commercial earthquake insurance program for URM buildings.

6. The expense of building-specific engineering studies of seismic risk ($2,000 to $10,000) and of seismic upgrade designs needed by the owner of a URM building to analyze his/her building's seismic condition and to design seismic upgrades to address deficiencies.

   Suggested solution: A mechanism for pooling technical information on current seismic upgrade technology and design for URM buildings and for subsidizing engineering inspections of URM apartment buildings so as to facilitate the analysis of URM building deficiencies and the design of seismic upgrades.

7. The relative unavailability and, if available, the costliness (high loan fees and interest rates) of renovation (construction) loans for URM apartment buildings.

   Needed: A State or City/ PDC grant and/or low interest subordinated loan program (possibly funded by municipal bonds) affording URM building owners renovation loans sufficient to cover a majority of the cost of at least life safety seismic upgrades.

[11] ORS 358.475-545

8. The difficulty of making extensive seismic upgrades to an apartment building especially to interior spaces without terminating all tenants and the consequent loss of income.

   Suggested solution: The owner should be allowed by the City inspectors and its renovation lender, if any, to undertake the project in discrete stages over several years, For instance, the exterior work (less intrusive) first, interior common area work next, and work that necessitates unit entry on a unit by unit basis, as much as possible on unit turnover (vacancy).

These impediments to seismic upgrades of URM apartment buildings, together with the general lack of knowledge among URM apartment owners of either the earthquake risk or the feasibility of seismic upgrades, compounded by the natural tendency of investment property owners to avoid voluntary capital expenditures that do not improve the "bottom line" cash flow, these factors have resulted in a very slow pace for seismic upgrades of URM apartment buildings in Portland. Given the risk of an M 9 earthquake in the next 50 years, this pace must be accelerated for the owners, the tenants, and the City. As the creation of additional generous governmental incentives to seismic upgrading are unlikely in the current economic climate, some combination of (i) a governmentally mandated timetable for minimum (Basic Life Safety) seismic upgrading timetable (over say 15 to 20 years) for URM apartments and (ii) changes ameliorating the impediments listed as items 1 to 8 above, may be the only feasible approach. ■

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