Columbia City Stakeholders' Perception of the Proposed Citywide URM Retrofit Mandate

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Abstract

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The City of Seattle faces the threat of a major earthquake in the near future. Unreinforced masonry buildings, or URMS, are visually appealing, represent the City's rich history, and often provide low cost commercial spaces in some of Seattle's most dynamic neighborhoods, such as Pioneer Square, Chinatown International District, and Columbia City. While pre-1940s brick buildings are intrinsically tied to each area's sense of place, culture, and history, they also act as a public safety hazard in the event of an earthquake. The purpose of this study is to examine how Columbia City and Hillman City building owners perceive the proposed retrofit mandate and proposed financing options presented by the URM Committee in the 2017 document, *Recommendations from the Unreinforced Masonry Committee to the City of Seattle.* The research shows that the City of Seattle proposed retrofit is cost-prohibitive to building owners in the Columbia City and Hillman City commercial cores. The proposed mandate may cause increased gentrification and displacement of small property and business owners. Public and private sectors will have to work together to find creative financing solutions to resolve the issue.

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Executive Summary

Columbia City Stakeholders' Perception of the Proposed Citywide URM Retrofit Mandate

The City of Seattle has over 1,154 Unreinforced Masonry buildings. Without proper retrofitting, URMs pose the greatest risk of collapse and damage compared to other types of buildings in the event of an earthquake. After the 2001 Nisqually earthquake, the Seattle City Council in conjunction with the Seattle Department of Planning and Development formed a committee that recognized that mitigation policy was necessary to protect residents from the damage caused by URM collapse. The Committee looked to replicate URM legislation enacted by California in the 1990s. Committee members found that mandates have the greatest level of compliance, while incentives to retrofit are largely ineffective.

Columbia City as a Study Area

Most URMs are concentrated in older neighborhoods such as Pioneer Square, Ballard, Chinatown International District, and Columbia City. Populations in Columbia City have a higher percentage of people of color and have a lower median income than the City of Seattle as a whole and are more vulnerable to displacement and the negative effects of gentrification. The Columbia City neighborhood is a demographically diverse neighborhood just south of Downtown Seattle. Over the last 15 years, Columbia City has experienced significant growth and economic revitalization due to the development of the Link Light Rail, increased economic investment, and population growth. While Columbia City only has 2% of the total commercial URM buildings in Seattle, the area has many of the same social characteristics as historic neighborhoods with a high frequency of URMs. Themes such as gentrification, displacement, and financial-burden, as presented in this small-scale study, can certainly apply to a larger citywide context.

Research Objectives

The purpose of this study is to examine how Columbia City and Hillman City building owners perceive the proposed retrofit mandate presented by the URM Committee in the 2017 document, *Recommendations from the Unreinforced Masonry Committee to the City of Seattle.* The study may aid the Department of Building and Inspections and the Office of Emergency Management to produce more targeted materials to stakeholders in burgeoning growth areas such as Columbia City, Chinatown International District, and South Seattle. Research presented here may catalyze the City of Seattle and citywide building owners to work together to negotiate robust financing options that prove efficient, equitable, and may ultimately save lives.

Methods

I chose to use qualitative methods because my research objective pertains to the perception of the proposed mandate, a future action. The exploratory nature of my research lends itself to a qualitative approach that includes precedent case studies, site visits, map analysis, and interviews.

Precedent Studies

A lack of mitigation policy in Christchurch, New Zealand illustrates an example of what Seattle could look like if policy makers do not implement a URM policy. Other policy studies include State of California precedents; some of the first and most successful URM mitigation policies in the United States. Specifically, the Oakland case study illustrates the most comprehensive interpretation of the URM ordinance. The Los Angeles case illustrates the earliest interpretation of the URM ordinance, resulting in massive demolition. The San Francisco case shows the emerging concerns over gentrification and displacement, which resulted in the Bolts Plus Standard. Finally, emerging policies in Portland, Oregon could influence future City of Seattle policies.

Findings

Overall, interviewees felt that an unfunded mandate would cause immediate financial problems for building owners and small businesses alike. Interviewees felt that the retrofit mandate would affect the Columbia City commercial core differently than the Hillman City commercial core, causing increased displacement of minority-owned businesses. Furthermore, many expressed that they expected Columbia City to continue to gentrify, causing increased displacement among longtime commercial tenants. While interviewees stated that the URM mandate would contribute to continued social displacement in the neighborhood, it would not affect major change. Interviewees attributed increased gentrification and displacement to an increase in population and recent economic growth in the Puget Sound region. However, building owners also expressed frustration with the City of Seattle. Many perceived that the City of Seattle had increased taxes and fees for businesses and property owners in order to further social justice issues. Building owners believe that increasing costs for small-scale property and business owners will result in a net loss of small businesses in the Columbia City neighborhood. Financially, building owners expressed that grants, property tax abatement, long-term low-interest loans, and waived permitting fees are their preferred funding options.

Recommendations

A public-private collaborative approach would be the most appropriate way to identify funding alternatives. The City should improve incentives, decrease or eliminate permitting fees, increase education, target mitigation to the most vulnerable areas, and partner with CDFIs to manage a pool of lending capital.

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1.0 Background

1.1 Introduction

Seismic experts warn that an earthquake will rattle the City of Seattle in the next 50 years. The Puget Sound region is prone to three types of earthquakes that could cause minor infrastructure damage to complete regional devastation depending on the fault line and magnitude of the quake. Policy makers face a unique challenge when planning for earthquake mitigation because experts cannot precisely predict seismic events. Another challenge is that planning for earthquakes is economically inefficient. The upfront cost of earthquake mitigation is extremely high, yet the economic payoff is often under-realized or unrealized for generations.

The 2001 Nisqually earthquake damaged many buildings. However, the majority of these buildings were brick structures built before 1940. These buildings are known as unreinforced masonry, or URMs, due to design that lacks structural steel. After the Nisqually Earthquake, City of Seattle policy makers decided that it was time to address the URM problem.

The City of Seattle has over 1,154 unreinforced masonry (URM) buildings (Seattle 2017, 5). Without proper retrofitting, URMs pose the greatest risk of collapse and damage compared to other building types in the event of an earthquake. After the 2001 Nisqually Earthquake, the Seattle City Council, in conjunction with the Seattle Department of Planning and Development, formed the URM Policy Committee. The goal of the URM Committee was to begin formulating a mitigation policy that would protect

residents from damage caused by URM collapse. As a first step, the Committee looked to replicate URM legislation enacted by California in the 1990s. Subsequently, Committee members found that mandates have the greatest level of compliance, while incentives to retrofit are largely ineffective. Committee members also found an unfortunate externality resulting from the implementation of California policy. Due to the high costs associated with retrofits, building owners often preferred to demolish structures rather than perform retrofits. Therefore, in an effort to conserve Seattle's historic architecture, the URM Committee recommends that the City of Seattle offer incentives to discourage URM demolition.

Most URMs are concentrated in older neighborhoods such as Pioneer Square, Ballard, Chinatown International District, and Columbia City. Populations in Columbia City and Chinatown International District have a higher percentage of people of color and have a lower median income than the City of Seattle as a whole and are therefore more vulnerable to displacement and the negative effects of gentrification.

The Columbia City commercial core boasts many independent boutiques and restaurants. The historic architecture and walkable commercial corridor captures a bustling small-town appeal. Further south, Hillman City, often categorized as a ` |subsection of Columbia City, asserts a character of its own. The sleepy strip of Korean and Eritrean storefronts verges against new cafes and breweries. The neighborhoods of Columbia City and Hillman City have proved resilient through economic downturns, the socio-economic impacts of redlining, and the recent influx of the tech population. Today, due to Seattle's rapid population and economic growth, the neighborhoods are stronger than ever; however, they continue to exist in a delicate ecosystem. Community leaders

cite the increase in cost-of-living, rising rents, and rising property and business taxes as potential threats that could out-price independent commercial property owners and businesses. These threats could lead to an influx of chain stores, displace people of color, and result in a loss of community assets. 24[1] URM buildings anchor the commercial cores of Columbia City and Hillman City. Not only does the URM building stock contribute to the historic nature of the area, but many local residents can afford to own and operate businesses within the older structures.

In the summer of 2017, the Unreinforced Masonry Policy Committee produced a set of recommendations to the City of Seattle. The document, *Recommendations for the Unreinforced Masonry Policy Committee to the City of Seattle* proposes a mandate that will require URM building owners to seismically strengthen their buildings. While some incentives and financing options are proposed, the burden of the financial obligation will fall on the building owner.

The Columbia City case study aims to gather and synthesize public opinion about the perceived impacts of the URM retrofit mandate in the Columbia City and Hillman City neighborhoods and examine multiple funding options that could allow building owners to retain their properties.

A literature review examines socio-political issues related to a potential URM mandate such as gentrification and displacement, as well as the implications of historic preservation. Further literature examines international incentives and funding options.

Findings include precedent case studies, observational analysis, and interviews. Policy examples and precedent studies show past, present, and future policy options in

[1] This estimate includes only buildings that include commercial structures. Schools, places of worship, and residential

Christchurch, California, and Portland. Observational analysis qualitatively assesses the neighborhood's character using maps, charts, and photographs to contextualize the study area. Interviews reveal stakeholder perception of the proposed mandate. Interview subjects included the leaders of community non-profits, leaders in the non-traditional lending community, and Columbia City building owners.

Recommended URM mitigation techniques include, low-cost alternatives that improve seismic compliance within the constraints of the status quo until future state funding options are secured, subsidizing or eliminating permit fees and providing technical assistance such as engineering and architectural assessments. Other efforts should garner widespread political support of the ordinance from a public safety standpoint. Increasing the political economy of hazard mitigation prior to a disaster could potentially save lives. The City of Seattle should consider increasing URM education and creating a public-private collaborative program to ensure widespread public support. The City of Seattle should also apply social pressure to building owners to encourage private action, such as requiring non-compliant owners to post safety notices on their buildings. Finally, the mandate should target high-risk areas that have a higher density of URM buildings and areas that are prone to liquefaction. The current policy targets specific types of buildings such as schools and hospitals but does not recognize high risk geographic locations. The goal of this research is to promote an open and cooperative relationship between building owners and the City of Seattle to create a robust, mutually-agreed upon set of solutions to mitigate this serious public safety problem.

1.2 Seismic Threat and Unreinforced Masonry Hazard

The Seattle area is likely to experience a seismic event in the next 50 years. However, the magnitude and type of earthquake is unknown. The Puget Sound region is prone to three types of earthquakes: intraplate (deep), subduction zone (megathrust), and crustal (shallow). The most common type of earthquake is the intraplate, which occurs in the oceanic crust and produces only minimal shaking. Intraplate earthquakes occur in the Puget Sound region approximately every 30-50 years. The 2001 Nisqually quake was an intraplate earthquake with a 6.8 moment magnitude; however, due to the fact that it occurred 32 miles below the ground surface, damage was minimal. Subduction zone earthquakes can produce the largest magnitude seismic events in the world and occur approximately every 500 years. While such an earthquake could be devastating to the entire north-south region from Canada to northern California, the greatest threat to Seattle lies in the Seattle Fault. The Seattle Fault runs east to west across the city and would produce a crustal quake with an upper moment magnitude of 7.5. Due to its shallow nature, a crustal quake produces intense shaking that can induce soil liquefaction in areas with loose or filled soils such as the Duwamish Valley, Interbay, and parts of Rainier Valley. Large magnitude Seattle Fault quakes occur approximately every 1000-5000 years, with the last 7.5 moment magnitude seismic event and tsunami occurring in 900 C.E. (Seattle Office of Emergency Management 2013).

While modern structures can sustain low to medium level magnitude earthquakes, older URM structures are prone to failure. URM collapse can impose bodily harm or death for those occupying the buildings, road blockage, prolonged recovery time, housing displacement, and billions of dollars in repair efforts. However, retrofitting cost is

extremely high – it is often more cost efficient to tear down the URM than to incur retrofitting costs. While the benefit of retrofitting may not outweigh the cost under normal circumstances, in the event of an earthquake, costs to building owners could include loss of the structure, loss of building usage, and fatalities (City of Seattle, 2017).

URMs are buildings that were typically constructed before 1940, consist of brick or other masonry, and do not contain structural steel (City of Seattle, 2017). During ground shaking, a typical one-story URM building will suffer diagonal 'stair-step' cracking in load bearing walls, which can result in building collapse. Even in minor earthquakes, URM structures can prove deadly when parapets and chimneys collapse. One square foot of brick weighs over 120 pounds, and a single falling brick, weighing between 6-12 pounds, can be lethal to those fleeing a building. Most URM structures are single storied, and while multi-story URM buildings are uncommon, they pose the highest risk as load bearing walls do not have a grid of steel reinforcing bars within them, and timber columns and beams bear insufficient load during ground shaking (FEMA 2009).

The risk of URM failure is a significant issue in the City of Seattle. There are over 1,154 URMs in the Seattle metropolitan area, which cover 26.2 million square feet. 450 of these buildings have an occupant load of 100 people or more, and 25,000 people inhabit or use URM buildings daily. As of 2017, approximately 700, or 60%, of URM buildings had no known retrofits. 30% of URM buildings have commercial use, 16% have residential use, and 13% have a mixed use (Devine et al 2017). Figure 1 shows the frequency of URM buildings in the City of Seattle along with public safety buildings within a one (primary risk area) to six (secondary risk area) block radius.

In the 2001 Nisqually Earthquake, URMs suffered substantially more structural damage than modern structures including parapet, chimney, and cornice collapse. After an earthquake, city officials mark buildings that are unsafe to enter with a red placard. After Nisqually, 20 of the 31 marked buildings were URM structures, which contributed to $8 million dollars in property damages. Figure 2 shows an example of URM collapse in the Pioneer Square neighborhood after the 2001 Nisqually Earthquake.

Coincidentally, areas with a high frequency of URMs are not only prone to high liquefaction rates, but these areas are also expected to receive a higher magnitude of shaking during a Seattle Fault Earthquake (City of Seattle, 2007). To mitigate the risk of fatalities and building failure, municipalities can demolish structures, change building usage, or retrofit seismically unsound structures. While protecting against fatalities in the

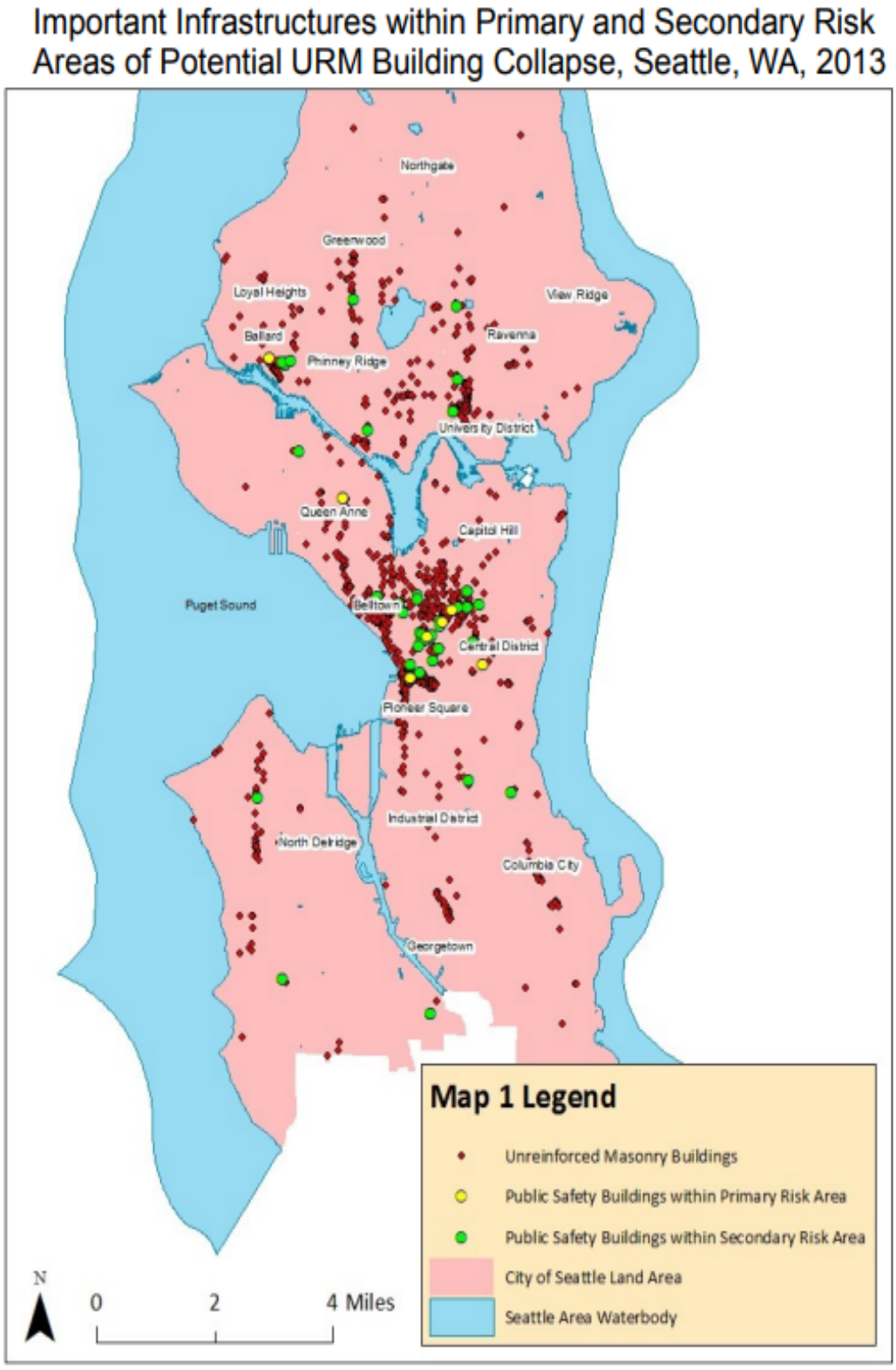

Figure 1: Frequency of URM buildings along with public safety buildings (created by Author 2015)

event of an earthquake is the City's priority, protecting historically significant buildings should continue. As URM structures reflect a bygone building era, many of the structures represent the City of Seattle's historic past. To preserve the architectural character and cultural significance of such buildings to a community, FEMA suggests that seismic retrofits should be employed to protect not only the inhabitants but the building structure as well (FEMA 2009).

Figure 2: URM Collapse caused by Nisqually Earthquake (Seattle Post-Intelligencer 2001)

1.3 Seismic Retrofit Standards and Cost

In 2012, the Unreinforced Masonry Building Technical Committee and the Structural Engineers Association of Washington Existing Buildings Committee (SEAW) issued their final report on retrofit standards in the City of Seattle. They recommended the Modified Bolts Plus Standard. The newly developed Modified Bolt's Plus Standard is specific to the City of Seattle but is based on the California Bolt's Plus Standard. The City of San Francisco developed the Bolts Plus Standard in 1992 as a low-cost option to the existing State of California retrofit standards. The Bolts Plus standard has lower

safety standards than the State of California-adopted code, as to preserve low cost housing and insure that loss of life is unlikely to occur (FEMA 1998, 22).

John Siu, Principal Engineer in the Seattle Department of Construction and Inspection, defines the proposed Modified Bolt's Plus program as a very minimum standard intended to save lives and reduce building collapse in a large seismic event such as a Seattle Fault or Cascadia Subduction Zone earthquake. In a small seismic event, such as an intracrust (deep) earthquake, the Modified Bolts Plus Standard has the potential to partially or completely preserve the URM structure (Devine et. al 2017).

The Modified Bolts Plus standard requires URM buildings to meet current code for new construction regarding wall anchors but allows more latitude regarding other structural vulnerabilities. While the Modified Bolt Plus Standard does not meet new construction standards, nor does it ensure complete safety of the building, the Modified Bolts Plus Standard is the most cost-efficient method to ensure that a building will not collapse in the case of an earthquake (Ibid). The requirements recommended by the Technical Committee include parapet bracing, structural connection between floors and ceilings with walls, interconnected framing (out of plane wall bracing), and strengthening of weak interior and exterior walls (steel beams, plywood sheathing on diaphragm walls. In some cases the mortar between bricks should be replaced (URM Technical Committee 2012). As of 2017, the Seattle Office of Emergency Management and the Department of Construction and Inspections estimate the average cost of retrofit per building using the Modified Bolts Plus standard is $45 per square foot (Devine et. al 2017).

However, the Modified Bolts Plus Standard is considered insufficient for irregular buildings and those with high occupancies such as schools or theaters; retrofits for these

structures are decided on a case-by-case basis. Buildings that do not qualify for Modified Bolts Plus are forced into a higher national retrofit standard developed by the American Society of Civil Engineers. This costly retrofit is known as ASCE 41 (Devine et. al 2017).

1.4 City of Seattle URM Policy Background

In 1965, the City of Seattle experienced the 6.7 moment magnitude intraplate Puget Sound Earthquake. The seismic event was very similar to the 2001 Nisqually earthquake (United States Geological Survey, online, 2018). Three people were killed by falling debris from unreinforced masonry structures. URM buildings in Pioneer Square shed bricks, littering the sidewalks (Lange, 1986). In 1974, the Seattle City Council adopted an ordinance to retrofit buildings in the Pioneer Square neighborhood. Building owners vehemently opposed the retrofit based on its high costs, and after four years, the Seattle City Council rescinded the ordinance, citing that costs were too burdensome for building owners (Devine et. al 2017). Seattle City Council did not broach the subject of implementing retrofit legislation for decades until Seattle experienced its next seismic event in 2001. After the 2001 Nisqually Earthquake, the City of Seattle again began to explore URM mitigation efforts in earnest. After examining the successes and weaknesses of California's URM policy, the City of Seattle took steps to form its own URM policy. Seattle began with an inventory of existing URMs, which led to map analyses, and then final risk assessments. Sixteen years later, after a string of policy recommendations, the result is the City of Seattle's 2017 proposed retrofit mandate (City of Seattle, 2017).

Based on the California model, the City of Seattle began to take steps to identify and assess URM structures, and to develop strategies to implement URM policy. In 2007, The City of Seattle Department of Planning and Development enlisted the Reid Middleton consulting firm to identify URM buildings, provide a map analysis linking areas with high concentrations of URMs to geographic areas prone to high intensity shaking in a seismic event, and produce estimated cost and casualty estimates. (Seattle 2007). Based on recommendations from this seminal document, the Department of Construction and Inspections formed the URM Technical Committee, who proposed an initial technical standard in 2010, entitled the *URM Technical Committee Report*. The report provides a detailed explanation of what types of buildings are considered URMs, and measures the sufficiency of the Bolts Plus Policy as first implemented in San Francisco (URM Technical Committee 2010).

In 2012, the Department of Planning and Development created a task force composed of building owners, preservationists, specialists in hazard mitigation, real estate developers, seismologists, and housing experts. The task force was known as the URM Committee. Former City Council member, Richard Conlin spearheaded the creation of a task force in the hopes of eventually implementing seismic retrofit policy (Seattle 2017, 2). The URM Committee produced many documents including a comprehensive *List of Potential URMs* and supporting maps of URMs and soil characteristics. Further, in multiple documents, the Committee began to broach the subjects of incentives, enforcement, risk categories, and public opinion. The Committee's findings among the eight documents are summarized in *URM Survey Report* (2012) and

recommendations were compiled in a 2013 document, *Draft Recommendations from the URM Policy Committee*.

In 2014, the Department of Building and Inspections hired the consulting firm, CollinsWoerman to draft a cost-benefit analysis of the proposed retrofit ordinance. The evolution of data gathering expanded in 2015, when the Department of Planning and Inspections hired structural engineer Nancy Devine to create a comprehensive inventory of URM structures (Devine et. al 2017). In 2016, Devine's department created the *Confirmed URM List*, a document that provides richer data denoting the location of URMs and provides additional map analysis that matches building location with three different levels of risk (critical, high, and medium) (Alesiani et al 2016). The City produced another updated inventory in 2017.

Finally, in August of 2017, the URM Committee presented its official policy recommendations to the City of Seattle, *Recommendations from the Unreinforced Masonry Committee to the City of Seattle*. The final recommendations call for a URM retrofit mandate, which includes a compliance timeline, special exemptions, and multiple proposed funding options. The proposed policy draws from California precedents, engineering recommendations, risk assessment, and the URM Policy Committee's 2012 recommendations and the CollinsWoerman's cost benefit analysis (City of Seattle 2017). Figure 3 illustrates the timeline of Seattle policies from 1974 to 2017.

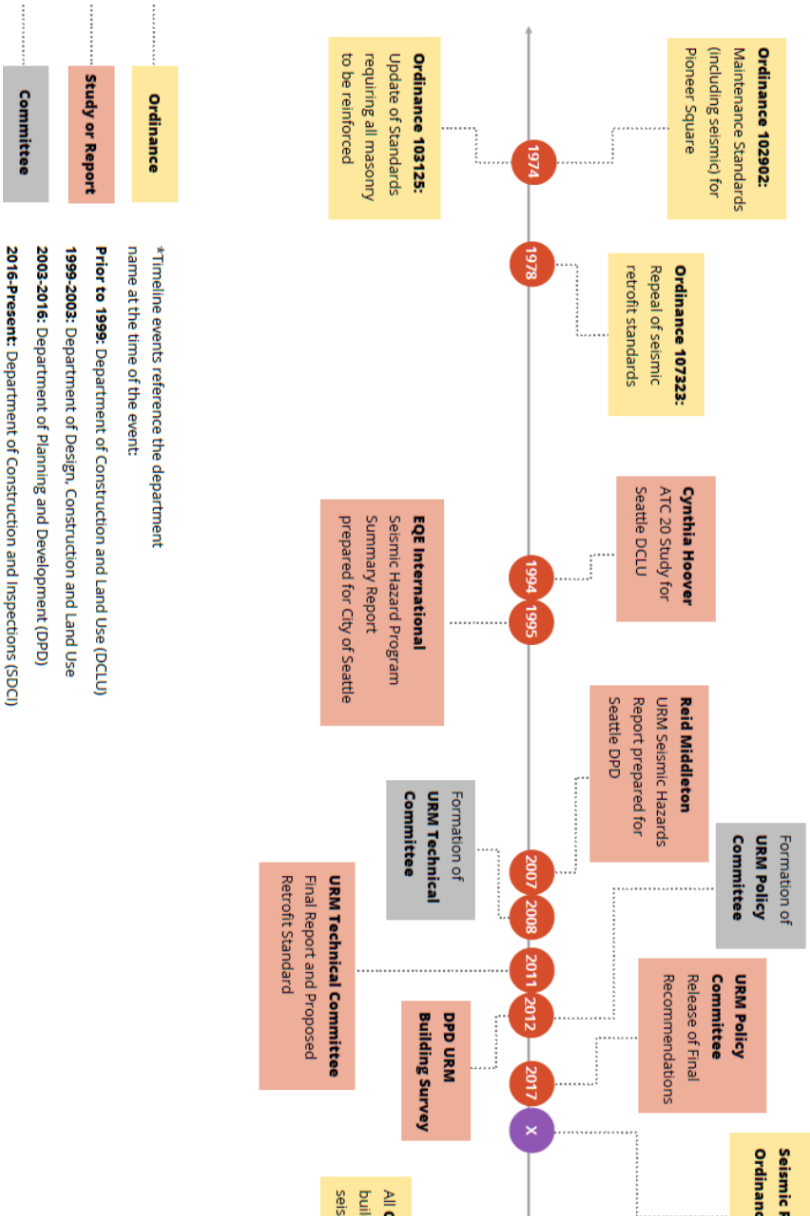

Figure 3: Timeline of City of Seattle URM policy 1974-2017 (Seattle Office of Emergency Management 2017)

City of Seattle Current Policy

City of Seattle policy has gained significant momentum since 2012. At this point in time, the City of Seattle has created almost identical benchmarks as outlined by previous State of California precedent laws. The Department of Building and Inspections in conjunction with the Office of Emergency Management has created a comprehensive inventory of URM structures, an assessment of vulnerabilities, cost assessment, list of retrofit standards, implementation strategy, and compliance timeline.

Currently, building owners must adhere to the current Seattle Building Code, which only requires owners of URM buildings to strengthen or abate unreinforced parapets. Building owners are only required to retrofit parapets when they apply for a building or change of use permit (City of Seattle 2017, 2).

In October 2017, Nancy Devine, Barb Graff, John Siu and Nathan Torgelson presented the *Recommendations from the Unreinforced Masonry Committee to the City of Seattle* on behalf of their departments, the Department of Building and Inspection and the Office of Emergency Management to the Seattle City Council. The City Council is expected to use the recommendations to implement retrofit policy in the near future. The primary goal of the document is "to improve life safety by reducing the risk of injury from collapse of URMs in the event of an earthquake," (City of Seattle 2017, 5). The secondary goals are to prevent the collapse of historic and culturally important buildings, improve City resiliency post-disaster, and minimize demolition. Major objectives to achieve these goals include programming that is easy to implement, economically efficient, and publicly supported (6).

The primary Committee recommendation is that the proposed retrofit ordinance be mandatory for all URM structures, except for single-family homes and duplex units with less than three residential units. The Committee recommends that compliance times depend on a building's vulnerability, which the Committee had defined in previous documents. Three vulnerability levels exist for URM structures - Critical Risk, High Risk, and Medium Risk. There is a total of 77 Critical Risk structures, which are primarily schools and critical facilities such as hospitals (all Seattle Fire and Emergency Management facilities have been previously retrofitted). High Risk Structures include URM buildings that are greater than three stories and are located in poor soil areas prone to liquefaction and landslides or located on steep slopes. 170 buildings are characterized as High Risk. Medium Risk Buildings include the remaining 902 URM structures. The compliance timeline, including notification, assessment, permit application, permit approval, and retrofit completion varies on the Risk category. Critical Risk buildings will be required to have all retrofits complete within seven years of the ordinance adoption, High Risk buildings will have 10 years, and Medium Risk buildings will have 13 years (Devine et al 2017).

Enforcement of the proposed policy include penalties for infractions on each level of compliance. In initial risk assessment phase, The City of Seattle will fine non-compliant building owners $500 per quarter, block permits, and assess building through a third party. Building owners who fail to submit a permit application will be fined $1,000 per financial quarter. Those who fail to complete a retrofit will incur a civil penalty of $45,000 per quarter, the City will inform tenants, place a lien on the property, publicly

post flyers of non-compliance, and in worse case scenarios, the City will demolish the property (City of Seattle 2017, 12–13).

Implications of the URM Policy Committee's recommendations are far reaching. The cost of the program is staggering, at an estimated $1 billion dollars, most of which will be passed onto building owners. The Committee presented current incentives and funding options that building owners could utilize to offset costs. Incentives include opportunities to change zoning, rebate programs, subsidized permitting fees, and waived parking requirements. Current financing options include, obtaining a low-interest long-term loan, tax abatement, 10% federal rehabilitation tax credit, Revolving Loan Funds (RLFs), establishing Local Improvement Districts (LIDs), architectural and engineering assessment grants, and transfer of development rights (TDRs) (14-16). There are also multitude social implications. In the document, the URM Policy Committee states, "this policy could be especially onerous for small businesses or small property owners…the policy may result in a significant number of buildings transferring into the hands of developers, possibly leading to an increased rate of demolition and decrease in local ownership of buildings" (16). Similarly, during the City Council briefing, Barb Graff, director of the Seattle Office of Emergency management stated, "this policy will have a disproportionate impact on communities of color and low-income [people]." However, she also stated that due to the concentration of URM structures in low-income neighborhoods with high percentages of people of color, an earthquake would also disproportionately impact communities of color and low-income residents. The Office of Emergency Management has made initial attempts to create a more equitable program by creating the Columbia City Pilot Program as well as forming partnerships with

community organizations in the Chinatown International District, such as SCIDpda and Craft 3 (Devine et al, 2017).

The future of the retrofit mandate will depend on financing options. In the October Council Briefing, Barb Graff indicated that the URM Committee in conjunction with the Washington State Office of the Insurance Commissioner, mortgage companies, and traditional and non-traditional banks are trying to "knit together a tapestry of funding options" (Devine 2017). Unlike California, the State of Washington does not have seismic legislation relating to the built environment. Oakland, Los Angeles and San Francisco used state legislature tax-exempt financing to help fund local retrofit mandates. At this point in time, the Seattle Office of Emergency Management believes that a state solution would be the best opportunity for funding. According to the Washington State Department of Archeology and Historic Preservation there are approximately 5,000 URM structures statewide (Devine et al 2017). In early 2018, the Washington State Capitol Budget allocated funds ($175,000) to create a statewide URM inventory. With a due date of May 11, 2018, the State of Washington department of Commerce issued a request for proposals (RFPs) for contractors to conduct a URM inventory in Washington State between June and October 2018 (State of Washington Department of Commerce 2018).

In late March 2018, Governor Jay Inslee's office hosted a Governor's Session as part of the Results Washington Initiative to present the results of the Resilient Washington subcabinet findings. Along with Laurel Nelson, deputy director of the Seattle Office of Emergency Management, state leaders discussed future state action regarding resiliency issues. Governor Inslee describes the inventory as the first step to future action; "we are a long way from solving the problem, this will allow us to wrap our arms

around [the issue].” He subsequently stated that a final report will be issued in December 2018 (Inslee et al, *Governor’s Session*, March 28, 2018). Laurel Nelson further stated that neither the City of Seattle nor the State of Washington will issue an unfunded mandate. However, she reiterated that finding funding has been extremely difficult; “we are working really, really hard to come up with financial incentives” (Inslee et al, *Governor’s Session*, March 28, 2018).

The URM Committee’s document, *Recommendations from the Unreinforced Masonry Committee to the City of Seattle,* applies analysis of decade’s worth of URM policies in California and New Zealand to set forth a human safety policy. The primary recommendation of the document is to mandate building owners to retrofit their properties. The mandatory retrofit recommendation and supporting policies build upon the strengths of previous precedent studies. The timeline for compliance, penalties, and current funding options reflect successful implementation strategies from California. Weaknesses of the policy include possible economic and social externalities due to its extremely high cost. The URM Committee affirms that the retrofit policy may increase gentrification and displacement, especially in historically marginalized areas. The URM Committee recognizes that many building owners may choose to demolish their structures rather than retrofit. Building owners are likely to resist the retrofit policy until flexible financing options are readily available. The State of Washington may emerge as a future financer of tax-free bonds and other assistance. However, a state-funded option may not be available for many years.

1.5 Columbia City as a Study Area

The Columbia City neighborhood is a demographically diverse neighborhood just south of Downtown Seattle. While Columbia City only has 2% of the total commercial URM buildings in Seattle, the area has many of the same social characteristics as historic neighborhoods with a high frequency of URMs such as Pioneer Square and Chinatown International District. Thus, themes such as gentrification, displacement, and financial-burden as presented in this small-scale study can certainly apply to a larger citywide context. Over the last 15 years, the neighborhood has experienced significant growth and economic revitalization due to the development of the Link Light Rail, increased economic investment, and population growth associated with the rising cost of living in other parts of the city. The neighborhood serves as an accurate illustration of future growth trends in South Seattle. Figure 4 shows the frequency of URMs in the Columbia City study area.

Columbia City was incorporated in 1893 and annexed as part of the City of Seattle in 1907. The heavily forested area quickly developed as a rail hub, shipping lumber to downtown Seattle to support the regional building boom. Columbia City grew rapidly in early 20th century, and most buildings along Rainier Avenue South were built prior to 1926. After the Great Seattle Fire in 1889, architects were wary of building with wood. Therefore, despite being a logging hub, most buildings were built of brick or masonry. The buildings typically had stores on the ground floor and meeting halls or dance halls upstairs. Eventually, the lumber industry depleted the surrounding forestland, and in 1936, the railway on Rainier Avenue South was removed. Early immigrants were Italians, and the Rainier Valley was commonly known as *garlic gulch*.

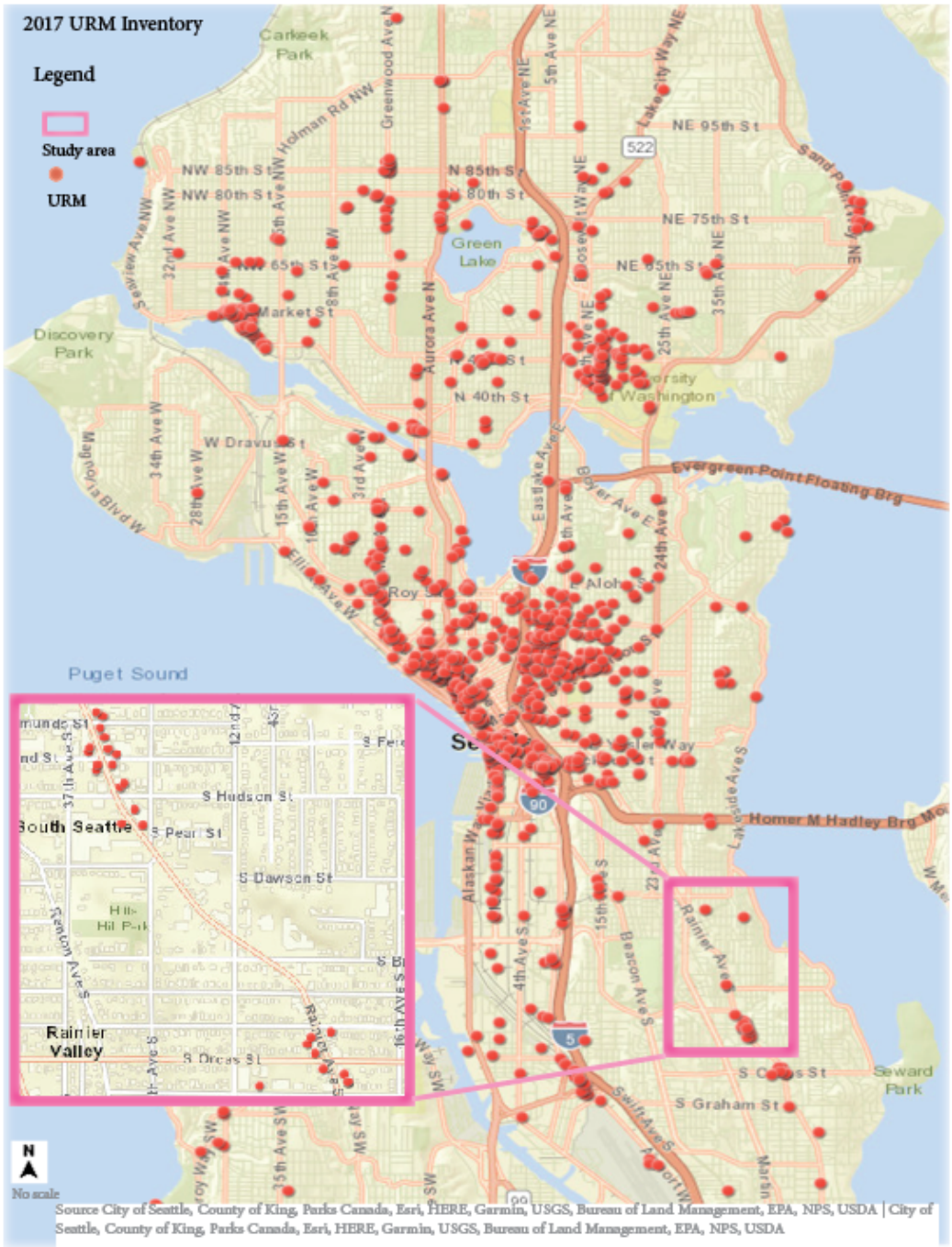

Figure 4: URM Frequency in Columbia City (Seattle Office of Emergency Management 2017)

The area was affordable and remained ethnically white, although a 1936 redlining map categorized the Rainier Valley as "definitely declining" (Seattle Department of Neighborhoods 2018). In 1968 redlining laws were reversed, spurring white flight out of the neighborhood. The 1970s and 80s saw a steady influx of African Americans and Asians into the area. The effects of redlining had gutted the area economically, and many stores along Rainier Avenue South were left vacant. In 1978, the area became a designated historic district, and in the 1990s, renewed investment flowed into the neighborhood. However, with renewed investment, the cost of living skyrocketed. Over the past decade many longtime Columbia City residents chose to move farther south (Ibid).

According to the 2010 Census, the median income of Columbia City is $61,000, lower than the King County average of $76,600. Approximately 38% of the population is white, 25% are African American, 25% are Asian, 6% are Hispanic or Latino, 5% are two or more races, and 1% are Pacific Islander. Additionally, 40% of residents speak a language other than English at home (King County Assessor's Office 2018). The Seattle Comprehensive Plan's Growth and Equity Analysis shows that the neighborhood has a high displacement risk index as shown in Figure 5 (Seattle Office of Planning & Community Development 2016 18).

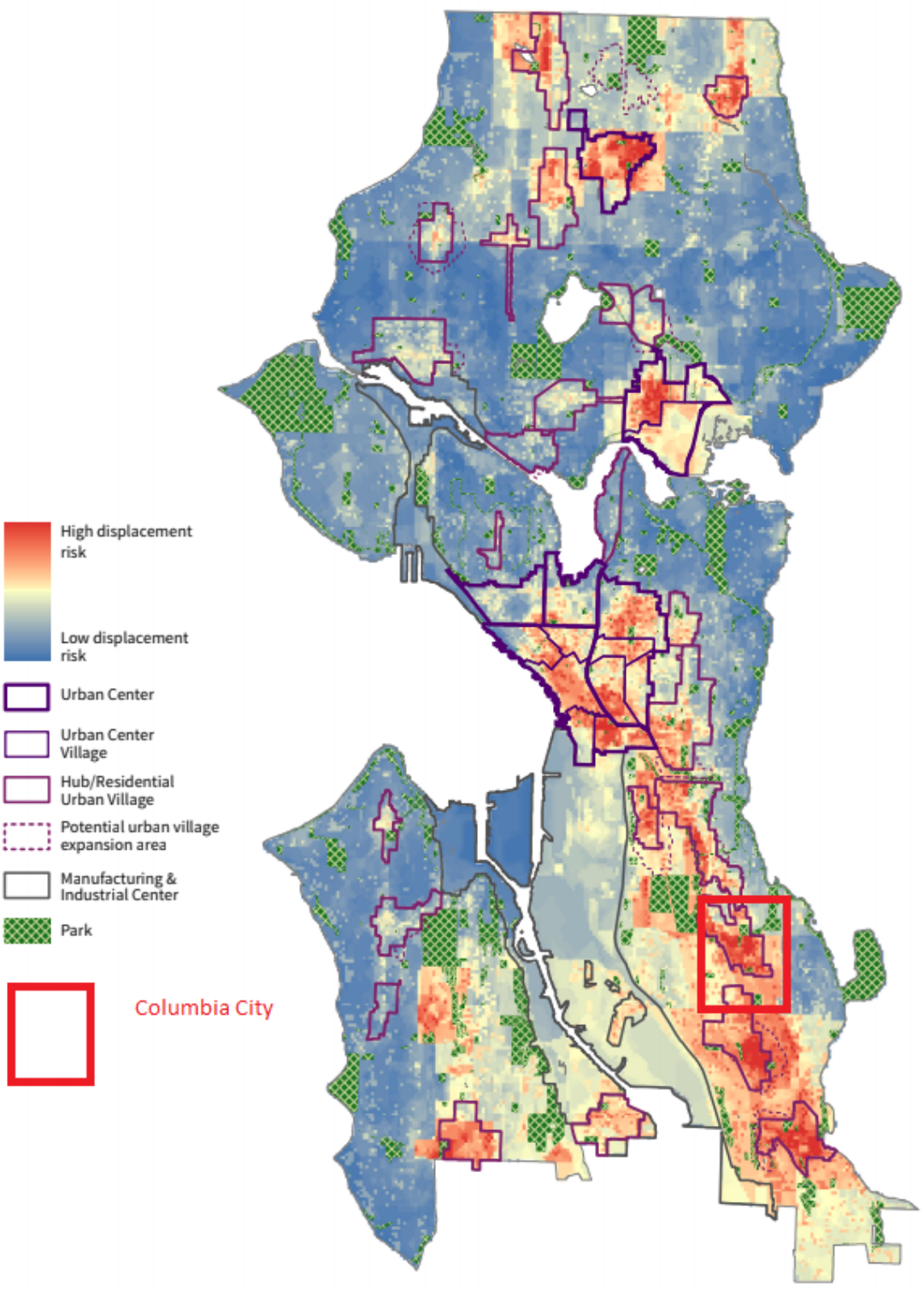

Figure 5: Displacement Risk (Seattle Office of Planning & Community Development 2016)

The Columbia City commercial core from Alaska Avenue South to 39th Avenue South is one of eight Seattle Landmark Districts and part of the State and National Registers of Historic Places. The designation requires that the Seattle Landmarks Preservation Board approve any alteration, demolition, construction, reconstruction, restoration, and painting of the exterior of buildings. The Landmarks Preservation Board must also approve any seismic retrofits. Figure 6 shows the boundaries of the Landmark District. Note that it does not contain the Hillman City subarea.

Additionally, there are few incentives to retrofit in Landmark Districts as building owners are not eligible for some citywide incentives, such as revolving loan funds (RLFs) or Local Improvement District (LID) designations. Also, due to the historic character of the structures along Rainier Avenue South, building owners cannot redevelop their buildings nor can they can they participate in the transfer of development rights (TDR) program. These restrictive covenants cause building owners to pay more for retrofits than in other parts of the city (Interview with Rebecca Frestedt, by author 2018).

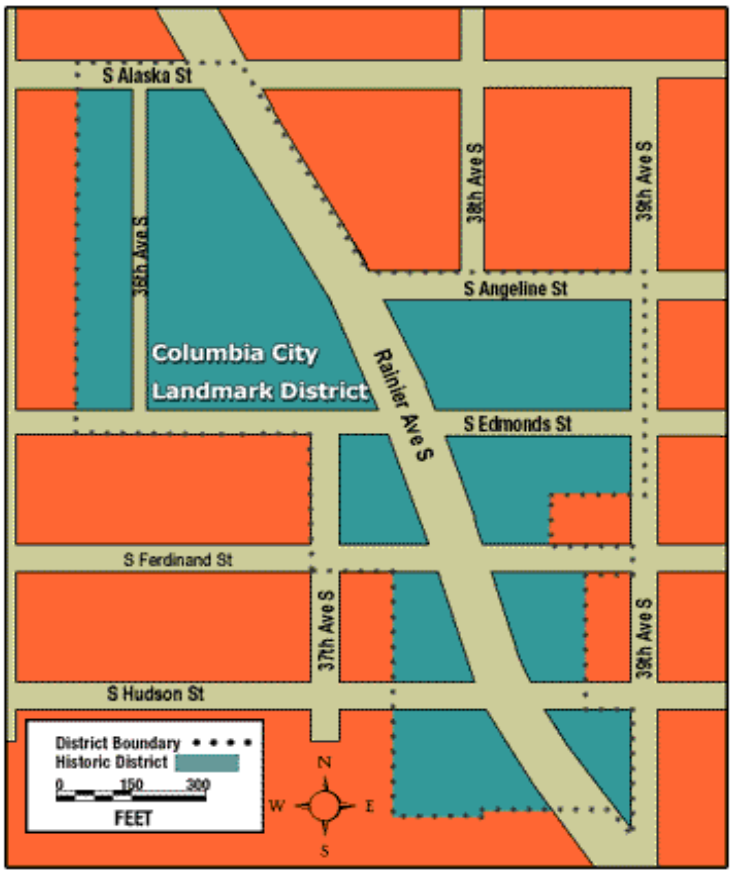

Figure 6: Columbia City Landmark District

The Hillman City subarea is not part of the landmark district despite having buildings of the same age. To curb gentrification, the non-profit South East Effective Development (SEED) and the community of Hillman City recently requested that the City of Seattle establish the neighborhood as an Arts and Culture District. Matthew Richter of the Office of Arts and Culture expects that the Arts and Culture District will come into effect in 2019. The Arts and Culture designation will provide the area with municipal funds to promote and preserve cultural institutions in the Hillman City commercial core. SEED hopes to direct the increased funding to revitalize the S-curve on Rainier Avenue South that connects the Columbia City and Hillman City commercial cores. The Arts and Culture District will allow stakeholders to preserve the minority and ethnic legacy of the area, strengthen Hillman City's place identity, and support artistic vitality. Unlike a Historic Landmark District, however, an Arts and Culture District does not regulate the built form. Therefore, the designation will not protect historic buildings from demolition (Interview with Matthew Richter by Author 2018). Figure 7 shows the division of the commercial cores and the S-curve that connects them.

Hillman City is beginning to feel the economic pressures presented by Seattle's rapid growth. The two commercial cores of Columbia City have had divergent paths, and a retrofit mandate could potentially mean that the trend continues. Hillman City building owners, not tied to the regulations of a designated Landmark District, may find that demolition is their best option. The destruction of cultural assets could create social displacement and further alienate residents who feel their way of life is no longer possible in a growing Seattle.

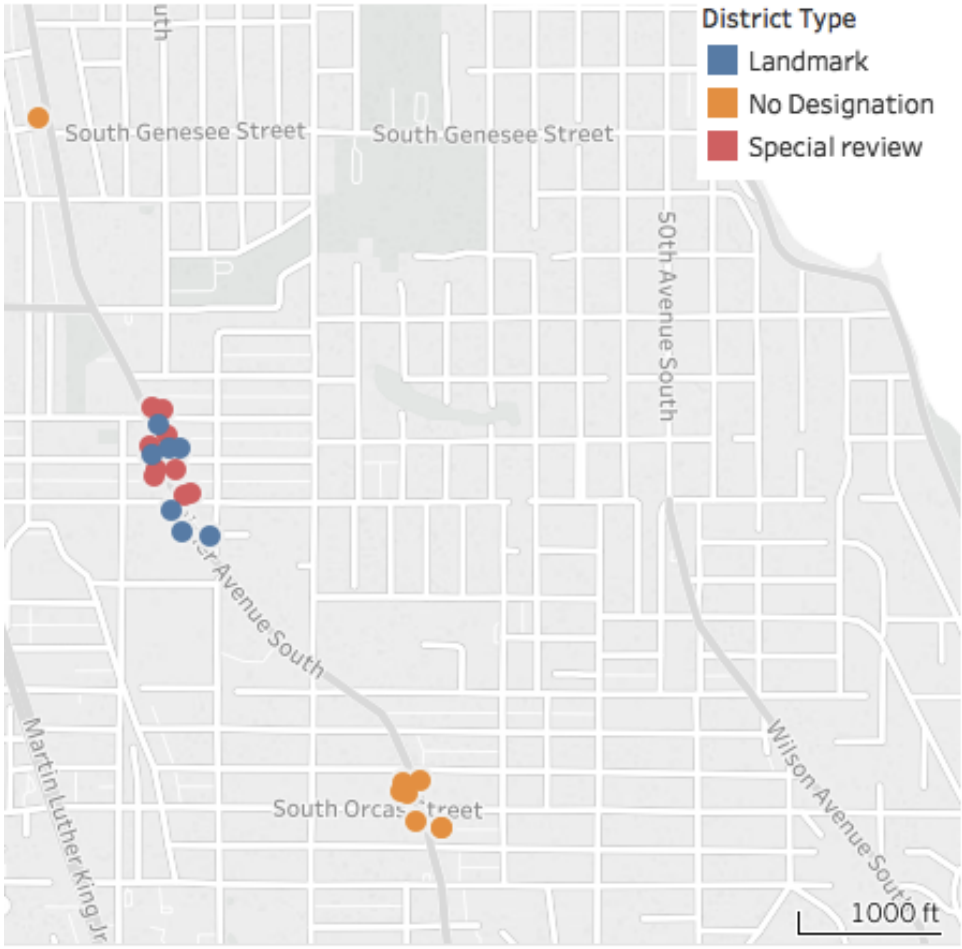

Figure 7: District Types dividing the commercial cores (created by Author 2018)

In 2014, the City of Seattle Department of Planning and Development conducted a URM pilot outreach program in the Columbia City neighborhood. The program's aim was to gauge public knowledge of the URM threat. Program staff held informational meetings and distributed surveys to measure residents' knowledge of the URM threat in their neighborhood. The pilot program had two main goals: raise awareness of the URM problem and encourage public support of a mitigation plan. The pilot program was primarily aimed at residents and workers in the Columbia City commercial core (Seattle Department of Planning and Development 2014). That previous fieldwork paves the way

for this study, which focuses on the perception of Columbia City building owners regarding the proposed mandate.

1.6 Research Objectives

The purpose of this study is to examine how Columbia City and Hillman City building owners perceive the proposed retrofit mandate and proposed financing options presented by the URM Committee in the 2017 document, *Recommendations from the Unreinforced Masonry Committee to the City of Seattle.* The case study may exemplify how building owners throughout the Seattle area view the proposed mandate. The study may also aid the Department of Building and Inspections and the Office of Emergency Management to produce more targeted materials to stakeholders in burgeoning growth areas similar to Columbia City.

There are 27 URM buildings in Columbia City and Hillman City, 24 of which comprise the commercial core (Wing 2017). The URM buildings are integrally tied to the area's sense of place, culture, and history. As a result of the proposed mandate, building owners would incur high retrofit costs. Building owners might respond in several ways – they may be more inclined to sell their property to investors who expect a high rate of return in a short period, which may result in an influx of national and international investors who may not care to maintain the neighborhood's cultural identity. Similarly, building owners may raise commercial rent to offset retrofitting costs. The result may be that many local businesses are unable to pay the increased rent. Subsequently, chain businesses may overwhelm the area, driving up commercial rent in neighboring non-URM buildings. Worse still, higher rent could cause many businesses to vacate and

remain vacant, destroying the cultural identity of the area and the vibrancy of the commercial core.

In addition to identifying how Columbia City and Hillman City building owners perceive the potential impact of a citywide URM mandate. This research aims to identify which existing financing options building owners think are most beneficial to maintain ownership of their private property.

The hypothesis of this research is that the retrofit proposed by the City of Seattle will be cost-prohibitive to building owners in the Columbia City and Hillman City neighborhoods. As a result of high retrofitting costs, building owners will either sell their buildings to development firms, or offset costs onto commercial tenants. In either scenario, tenants will most likely pay a substantial amount more in rent. As a result, tenants unable or unwilling to pay higher rents will relocate or vacate. The impact of this exodus may draw money from the Columbia City and Hillman City neighborhoods as business owners relocate. Finally, as local businesses vacate, national chain businesses or high-priced boutiques may strive to support a wealthier demographic. The final result will be that long-time residents, many of whom are people of color, low-income, and historically underserved may lose a sense of cultural identity connected to the commercial core. Figure 8 is an infographic of how a mandate could result in cultural displacement.

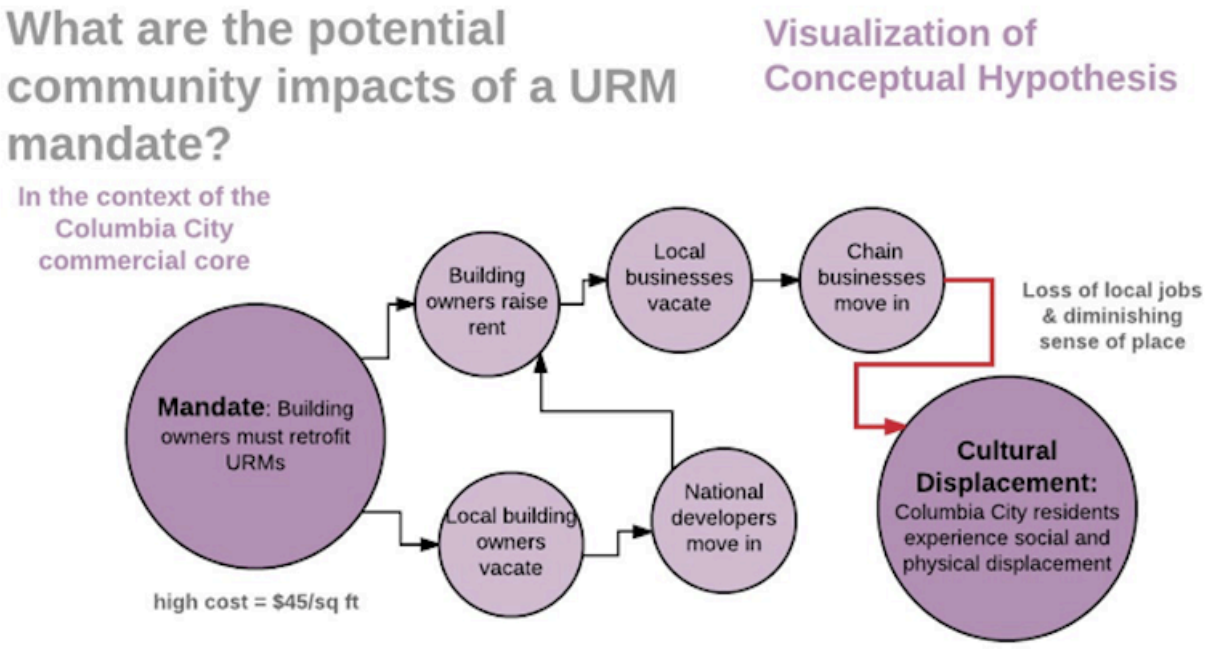

Figure 8: Potential URM Mandate Community Impacts

2.0 Literature Review

Literature on the topic of unreinforced masonry (URM) policy is not extensive. Most literature on the topic relates to identifying and locating URM buildings as well as measuring each URM's level of threat of collapse in the event of an earthquake. All of the literature indicates that URM buildings pose substantial and costly risks, such as bodily harm and even death. Similarly, the body of information shows that URMs have the potential to greatly slow a locality's infrastructure recovery efforts after an earthquake. The first part of the literature review outlines the emergence of hazard mitigation as a policy tool in the United States. The second section of the literature review examines the societal impacts of a URM retrofit in terms of gentrification and displacement, as well as historic preservation and place identity. The final section delves into financing as a hazard mitigation tool with specific examples from cost-benefit analyses from Seattle and Portland.

2.1 Hazard Mitigation in the United States

Consensus exists regarding the danger of URMs and the current lack of URM policy in many municipalities. In regard to disaster policies in general, the Federal Emergency Management Agency (FEMA) takes center stage. In recent years, FEMA has shifted disaster policy away from recovery efforts alone, and now stresses the importance of mitigation (FEMA 2005). FEMA began to assess the potential dangers posed by URM structures and municipal mitigation strategies beginning in the mid-1990s, after the State

of California enacted the 1986 URM Law. The bulk of FEMA's literature regarding the implications and impacts of the 1986 California URM Law appears in 1998. Two seminal documents are *Planning for Seismic Rehabilitation: Societal Issues* and *Handbook for the Seismic Evaluation of Buildings* (FEMA 1998). In 2006, FEMA produced an overview of seismic rehabilitation in the United States, *Techniques for the Seismic Rehabilitation of Existing Buildings,* which applies lessons-learned in California on a federal scale (FEMA 2006). Further applying mitigation techniques to URM structures as a nationwide approach, in 2009, FEMA produced the most cited URM document in the body of City of Seattle mitigation literature, *Unreinforced Masonry Buildings and Earthquakes: Developing Successful Risk Reduction Programs* (FEMA, 2009). Finally, in 2015, FEMA produced the technical document, *Rapid Visual Screening of Buildings for Potential Seismic Hazards: A Handbook*, which focuses policy on technical standards and specific retrofit techniques (FEMA 2015).

In response to FEMA's realignment of goals to strengthen mitigation efforts rather than recovery efforts, Ward Lyles et al. (2014) discuss the success and weaknesses of local hazard mitigation plans in a number of states including Washington. Lyles assessed six hazard mitigation plans that were enacted in response to FEMA's mandate requiring US states to develop a hazard mitigation plan. The authors state that the quality of plans is low-to-moderate overall because national review criteria and procedures for approving local plans do not incentivize high quality plans. The authors purport that cooperation among local government entities, state, and national entities is tenuous and there is a lack of shared goals (resulting from cost) on mitigation issues. Lower levels of government have less incentive to prepare mitigation strategies as disasters are

infrequent. The authors show that Washington State's hazard mitigation strengths lie in high public participation and high levels of documentation. Similarly, Lyles concluded that the State of Washington and a medium to strong commitment to local planning. However, Washington and other states continue to struggle with mitigation efforts because national incentives for high quality mitigation plans remains weak (Lyles, Berke, and Smith 2014).

Regarding earthquake mitigation specifically, Mary Comerio, a member the Earthquake Engineering Research Institute (EERI), in conjunction with University of California, Berkeley, produced the earliest documents regarding URM hazards, assessment of ordinances, and financial implications of California policies. Beginning in 1998, she describes that as cities grow in population, disasters will continue to have greater impacts (Comerio 1998). She indicates that there is an increased need for hazard mitigation efforts, and she recommends a national policy. In 2004, she states that national mitigation efforts continue to be insufficient. She states that existing mitigation policies are not effective because local governments do not pair incentives with regulations and tax credits. Furthermore, governments do not link mitigation measures with loan rates. She believes that risk reduction policy is necessary because a housing and recovery crisis may occur after an earthquake. The document outlines her belief that private owners need to pay their fair share, although local governments should complement private funding with a robust package of incentives. Finally, Comerio asserts that local governments need to find policies that successfully link financial incentives to market forces (Comerio 2004).

Multiple authors discuss the ways in which hazard mitigation in the United States is insufficient; however, few discuss the psychological implications of hazard mitigation. Richard Stuart Olson et al. discuss hazard mitigation as an issue of political economy, specifically as something that is generally unpopular, unsubstantiated, and underfunded until a major disaster hits. The political unpopularity of disaster mitigation stems from the unpredictability of natural catastrophes. Mitigation planning will remain unpopular and underfunded in specific municipalities until a natural disaster unexpectedly wreaks havoc (Richard Stuart Olson, Robert Olson 1998).

2.2 Societal Impacts of URM mandate

According to the literature a relationship exists between a URM mandate and issues of gentrification and displacement. A relationship also exists between a URM mandate and issues of preservation and place identity.

2.2.1 Gentrification and Displacement

While the Landmark District designation triggered gentrification in the Columbia City commercial core, the seismic retrofit mandate could contribute to rising inequities in the Hillman City neighborhood. First, gentrification and displacement often arise when neighborhoods invest in infrastructure improvements. Second, the high cost of retrofits could spur gentrification and related displacement as building owners choose to offset costs on commercial tenants, who, as a result, move to more affordable areas.
Zukin's 1987 work attempts to define gentrification. She concludes that the term loosely encompasses private market investment capital into downtown areas. The results of

private investment in downtown neighborhoods results in an influx of corporate investment, architectural restoration of deteriorating buildings, clustering of cultural amenities, and historic preservation. More abstractly, she defines gentrification as a geographic reshuffling of populations, an economic restructuring, a radical break with suburbia, and a contributing factor to homelessness and displacement (Zukin 1987).

Legates and Hartman provide one of the earliest frameworks connecting displacement and gentrification. They define gentrification-caused displacement as the involuntary dislocation of households to clustering neighborhoods as an influx of affluent households compete for desirable older housing stock within the city core. They define two players in gentrification-caused displacement: the inmovers and the outmovers. Inmovers constitute primarily young professionals in managerial capacities, who are majority white, from the middle and upper classes, and comprised of single individuals or couples. Outmovers are more heterogeneous, but most were blue-collar, people of color from the low to middle classes, comprised of primarily of elderly adults and children. Legates and Hartman concluded that gentrification and displacement produces racial and class conflict, and does not promote integration (Legates and Hartman 1982). In a more recent study, "Community Development: Can Communities Effectively Fight Displacement Caused by Gentrification?," Delilah Lawrence connects the concepts of displacement and gentrification. She asserts that new development displaces long-time low-income residents. She outlines strategies to fight development-led gentrification such as increased collaboration among private developers, business investors, city officials, and residents. She suggests several policy solutions to help people remain in their

neighborhoods such as improved land use policies, rent control, low income housing tax credits, and community land trusts (Lawrence 2002).

2.2.2 Historic preservation and place identity

Experts argue that preservation is tied intrinsically to cultural identity and sense of place. The psychology of sense of place and placemaking are relatively recent topics. Psychiatrist Mindy Fullilove's seminal work, "Psychiatric Implications of Displacement: Contributions from the Psychology of Place," defines the term and its social implications. She asserts that humans are linked to their environment through three key processes: attachment, familiarity, and identity. She concludes that displacement caused by any number of factors can cause serious mental anguish (Fullilove and Thompson 1996). Similarly, Twigger-Ross applies a psychological examination of place identity and ways in which 'attached' residents view their neighborhoods in light of social and economic changes (Twigger-Ross and Uzzell 1996). Environmental social scientist, Devine-Wright defines sense of place, or 'place identity,' as the ways in which the physical environment contributes to an individual's sense of self-identity. He asserts that humans are resistant to local change because they psychologically link familiar places with a sense of emotional attachment. When changes occur to their physical environment, attachments are disrupted and threaten place-related identity processes (Devine-Wright 2009).

In 2005, FEMA coupled historic preservation and hazard mitigation as a resilience method. Authors assert that place-identity is comforting post-disaster. Cultural assets can help reinforce connections between neighbors and between individuals and their communities as a whole. Historic properties and cultural resources are an important catalyst to economic development that increase property values and attract business.

FEMA concluded that integrating historic preservation and hazard mitigation ensures a community's resilience before and after a disaster, and warrants future growth (FEMA 2005). In all, humans are resistant to infrastructure change and often cling to historic preservation as a solution.

Chalana and Wiser outline the historic perspective of the URM planning process specific to Seattle with a preservationist's perspective. They use the term 'cultural geographers' to identify those who wish to preserve built heritage to maintain a sense of place and cultural vitality in a neighborhood (Chalana and Wiser 2013). Goodwin et al expand on this point within the context of New Zealand. The authors emphasize the importance of heritage structures to residents' sense of place (Goodwin, Tonks, and Ingham 2009). Finally, Langenbach also recognizes the significance of historic structures as symbols of cultural identity. He suggests that solutions to modern engineering retrofits may ensure that cultural significance of important buildings is not compromised. He draws from various indigenous building techniques to highlight effective retrofit techniques that are not fully accepted) by modern engineers (Langenbach 1989).

The most common argument against historic preservation of URM structures is that it may compromise safety standards. The literature suggests that although human safety overrides preservation or aesthetic concerns, there is a mismatch of goals and outcomes between preservationists, planners, and engineers. For example, Chalana and Wiser call for preservation and safety concerns to become more integrated. He states that hazard mitigationists and preservationists have different goals regarding URMs - mitigators strive to reduce physical harm to people whereas preservationists focus on preventing physical harm to the structure (Chalana and Wiser 2013). Goodwin et al

suggests that engineering goals and preservation goals need to be reconciled. Goodwin et al believes that some retrofitting measures are more damaging than no retrofitting at all as it harms cultural heritage more so than the safety measures that it aims to support. In this case, the author would like to merge the goals of efficient engineering with historic preservation (Goodwin, Tonks, and Ingham 2009). Similarly, Minner examines the endemic conflicts between planning and preservation. Minner concludes that both planners and preservationists need to engage in deeper collaboration and interdisciplinary exchange -improving placemaking and place-based knowledge. Minner suggest that policy makers need to improve participatory methods of surveying and mapping historical assets. Also, Minner asserts that 'smart growth' is under-examined. He believes that equity planning would transform the field and the relationship between planners and preservationists (Minner 2017)**.** Again, Reiss suggests there is a fundamental mismatch between planning and preservation goals. Reiss purports that historic preservation conflicts with policy on public safety issues. For example, California's URM Law threatened historic structures (Reiss 1994). Finally, Zukin suggests that historic preservation is merely a symptom of gentrification; an exercise in the 'spirit of authenticity' carried out by the urban elite (Zukin 1987)**.**

2.3 Incentives and Financing

Financing options are perhaps the most powerful tool to prevent gentrification and displacement. Lack of financing options is also the largest impediment to a citywide URM mandate. Building owners are more likely to maintain ownership and reduce costs

to their tenants if they have a rich mix of market and government solutions to finance the required retrofits.

Most of the current literature on retrofit financing has an international author base, with most literature related to Istanbul, Turkey and Christchurch, New Zealand. Egbelakin et al presented their most current research at the 5th Building 2015 Resilience Conference. They assert that financial organizations have a designated place in mitigation effort. They believe that financial organizations can aid earthquake mitigation efforts by providing long-term, low interest loans and adopting risk-based approaches for insurance premiums. Insurance and financial lenders should encourage transparency by creating a unified risk information system, and they should disclose seismic risks to buyers during market transactions. Overall, Egbelakin et al believe that property investors, insurers, and financial institutions exacerbate issues regarding URM retrofits as they contribute to a public unwillingness to mitigate (Temitope Egbelakin, Suzanne Wilkinson 2015).

Comerio (2000), however, argues that municipalities have a lack of financing options for mitigation and disaster recovery. She recognizes that mitigation requirements without incentives are nearly impossible to implement. She points to the fact that private earthquake insurance is not readily available, government agencies are underfunded, and building owners have few incentives. She recommends tapping into the secondary real estate marketplace to promote greater shared risk between the lender and the insurer. She suggests that quasi-governmental agencies such as the Federal Housing Administration (FHA), the Federal National Mortgage Association, and the Federal Home Loan Mortgage Corporation should require building owners to meet safety inspections and retrofit standards in order to qualify for a federally-backed mortgage. She suggests that

FEMA should promote mitigation policies that help private insurers return to the marketplace by promoting programs that integrate safety assessments and real estate transactions (Comerio 2000).

Howard Kunreuther furthers the conversation regarding hazard insurance. He coins the term 'National Disaster Syndrome' as encompassing several inefficiencies. First, people are naturally averse to hyperbolic discounting of hazard events. In other words, property owners are unlikely to invest a large sum of money to retrofit now, when the benefits are very delayed or never realized (as is often the case in hazard mitigation). These individuals perceive the likelihood of a disaster as sufficiently low enough that they do not voluntarily mitigate their properties. Finally, the term includes the perception that in the event of a major catastrophic event, the federal government will always provide disaster relief. Kunreuther shows that mitigation reduces post-disaster recovery efforts in four case studies in Florida, New York, South Carolina, and Texas. He urges a new approach to hazard mitigation from the insurance standpoint. First, insurers should supply risk-based premiums that provide discounts to property owners who invest in loss reduction strategies. Second, state insurance commissioners should not interfere in rates, allowing rates in risk areas to remain artificially low. Third, he recommends that the state and federal governments should supply insurance vouchers, similar to the food stamp program, to building owners who cannot afford hazard insurance. Finally, he recommends that the market include long-term insurance options that are tied to the property specifically rather than the property owner (Kunreuther 2008).

Smolka et al identify the stakeholders in hazard mitigation as property owners, the financial sector, and public authorities. The authors present international precedents such

as the New Zealand Earthquake Commission's provision of basic earthquake insurance to property owners, with additional coverage offered through the private market, state-supported insurance pools in Switzerland, France, and Spain, and linked code enforcement and government insurance protection in Turkey. Smolka et al recommend that mortgage banks require disaster insurance as a precondition to loans. The authors recommend that insurers charge adequate rates, apply appropriate underwriting guidelines, limit liability, and establish adequate reserves. Finally, they suggest that public authorities grant tax exemptions for catastrophic reserves to ensure that private insurers have adequate income from which to draw (Smolka et al. 2004).

Reiss, however, suggests several alternative policy incentives to lessen a URM building owner's financial burden. He believes that expanding the scope of the definition of 'historic' in order to include more structures eligible for government assistance, as well as requiring architectural design review for mitigation plans, and providing a range of economic incentives will lessen the financial burden on individuals and spread costs more evenly into the public realm (Reiss 1994).

In practice, American financial practices and financing mechanisms of earthquake retrofits are poorly documented, and few studies examine financing application. Beyond Comerio's analysis of California retrofit laws and their immediate effects (Comerio 1992, 2000), financing documents for the State of California are buried in policy appendices and simply enumerate the various policies for each municipality. A cursory list of state and local funding options and their implementation first appear in *California Emergency Services: A Handbook for Local Governments* in 1992. Most financing options are incentive based with most support coming from the State of California (State of

California Emergency Services 1992). Researchers can find a later list of various updated financing options in a table located in the *Earthquake Engineering Research Institute's Special Report: Incentives and Impediments to Improving Seismic Performance of Buildings* in 1998. The document lists 25 California municipalities along with the number of URM structures and preferred methods of financing. Financing options range from state bonds, community development block grants, matching loan programs, waived fees, and zoning incentives (Earthquake Engineering Research Institute 1998).

Fortunately, as the City of Seattle began to initiate proposals to solve the URM problem, they succinctly organized the many disjointed California documents into a single document that examines how 12 municipalities implemented of the State of California's URM Law (including Oakland, Los Angeles, and San Francisco). The authors examine three types of implementation, and conclude that a mandatory retrofit is most effective, a voluntary retrofit has unpredictable levels of compliance, and notification only is least effective (City of Seattle Department of Planning and Development 2007). Today, robust information from the state of California is available regarding soft-story retrofits. However, as many localities have not yet instituted the programs, analysis of funding methods is undeveloped.

Portland and Seattle are the most recent west coast cities to develop retrofit planning strategies. The two cost-benefit analyses have been requisite planning documents for the success of the two programs. According to Goettel and Associates Inc. (2016), the benefits of a seismic retrofit ordinance in Portland, Oregon would exceed the cost for a typical URM structure. Results are strengthened by a qualitative benefit cost discussion. Analysts calculated the benefit cost ratio by dividing present value of benefits

by the retrofit costs, which range from $20 to $111 per square foot depending on the building. Authors note that benefit cost ratio varies broadly depending on building type. Analysts find that low cost retrofits produce lower performance levels and high cost retrofits produce high performance levels. Low cost retrofits have higher benefit cost ratios. However, analysts state that low-level retrofits cannot sustain high levels of shaking, and in the case of a Cascadia Subduction earthquake, low cost retrofits may perform quite poorly. The report does not account for financial implications to building owners nor undesired impacts such as increased rates of demolition. Similarly, the report recognizes that retrofit costs will most likely fall upon building owners, with residual costs falling on tax payers and tenants (Goettel 2016).

In 2014, however, Gibson Economics and CollinsWoerman presented an entirely different scenario for the City of Seattle. The findings of Gibson Economics and CollinsWoerman claim that the cost of a seismic retrofit would exceed the benefit significantly. In response to their findings, Goettel (prior to his Portland analysis) sent a memorandum to the Seattle Department of Planning and Development stating that the benefit cost ratio Gibson Economics et al calculated was "*extraordinarily* low and well below the range of results. Simply put the stated BCR [Benefit Cost Ratio] appears to be *substantially* low," and criticized Gibson Economics' use of data (Seattle Department of Planning and Development 2015,17). As a result of the criticisms, Gibson Economics used a more accurate probability modeling scenario and amended their recommendations. However, despite a higher value for avoided loss, the new ratio did not improve significantly enough to change their original findings. Gibson Economics continued to base their findings on the low probability, or 4.1% per year, of an earthquake, and the

100% cost building owners would pay up front. As a result, the authors of the analysis purported that a retrofit mandate may result in widespread demolition of URM structures. In fact, they claimed property owners would demolish more buildings than an earthquake would actually harm. Gibson Economics did not recommend a retrofit mandate but rather a suite of incentives such as transfer of development rights, historic tax credits, city sanctioned property tax abatements, and increased FAR allowances in exchange for a property owner's building retrofits. Overall, Gibson Economics recommended that the City of Seattle provide better support for building owners who were seeking incentives. (CollinsWoerman 2014).

The widely differing results of the Seattle and Portland cost benefit analyses is troubling. Authors conducted the cost-benefit analyses only two years apart; the building stock is similar in age, type and quantity; and the neighboring geographic areas are prone to similar seismic threats. The staggering differences in analysis results illuminate the limitations of applying cost benefit analysis to human safety issues. The authors of both reports display a remarkable difference in the qualitative data used, type of analysis, and assumptions. The question remains, can analysts really quantify the cost of a human life along with numerically measurable data such as retrofit costs and seismic intensity? Moreover, should this type of analysis inform policy decisions?

2.4 Gaps in the Literature

According to the literature, mitigation is the most effective method of disaster management, high costs and infrastructure improvement lead to increased gentrification and displacement within cities, historic preservation is both a boon and a curse to the

URM building stock, and a mandated retrofit would be prohibitively expensive and wholly economically inefficient without incentives and government support. While literature regarding hazard mitigation and historic preservation is robust, literature on place identity and displacement is only adequate. However, literature connecting the impacts of mandates on increased levels of displacement is lacking. Similarly, literature regarding the financial impacts of retrofitting beyond hazard insurance is incomplete, and the cost-benefit analyses are inconsistent.

Public Policy documents regarding the URM problem in the United States are scattered and disorganized. Pre-internet public documents for the State of California are difficult to locate and often poorly coordinated. Interested researchers are forced to cobble together disparate data that is devoid of analysis. The City of Seattle attempted to synthesize the uncoordinated array of 1990s policy documents, tables, and charts into a succinct summary of laws in 2007.

Few analyses of the 1986 URM Law exist beyond Mary Comerio's evaluations in San Francisco and Los Angeles. Little to no analysis exists regarding the mandate's impact on commercial property; rather, authors focus on residential URM stock. Similarly, no studies are available that examine hazard mitigation and its impacts on a neighborhood level.

Finally, American analysis of mitigation financing is wholly undeveloped. Financing strategies for the United States almost solely depend on private insurance, and authors do not identify a robust mix of financing and mitigation options. Authors from New Zealand, Turkey, Japan, and the Netherlands examine creative financing and government-supported programs related to hazard mitigation strategies. However,

international funding opportunities are hard to apply to the United States because authorizing authorities and legal precedents differ dramatically.

3.0 Methods

I chose to use qualitative methods because my research objective pertains to the perception of the proposed mandate, a future action. The exploratory nature of my research lends itself to a qualitative approach that includes interviews, site visits, and map analysis.

After completing my initial literature review, I found that City of Seattle policymakers have only recently delved into the URM problem. As a result, limited data exists. Further, the existing data is sparse outside existing California policy precedents and the latest City of Seattle URM inventory list. I chose Columbia City because the City of Seattle had recently conducted a pilot program in the area regarding public awareness of the threat posed by URM structures (City of Seattle 2014). Stakeholders were likely to have awareness of the potential threats due to previous outreach. The City of Seattle will likely continue to use Columbia City as a pilot program due to its race and social justice indicators.

3.1 Qualitative Methods and Data Used

I used precedent case studies, observation, map analysis, and interviews to gain a multifaceted and robust data set. See Figure 9:

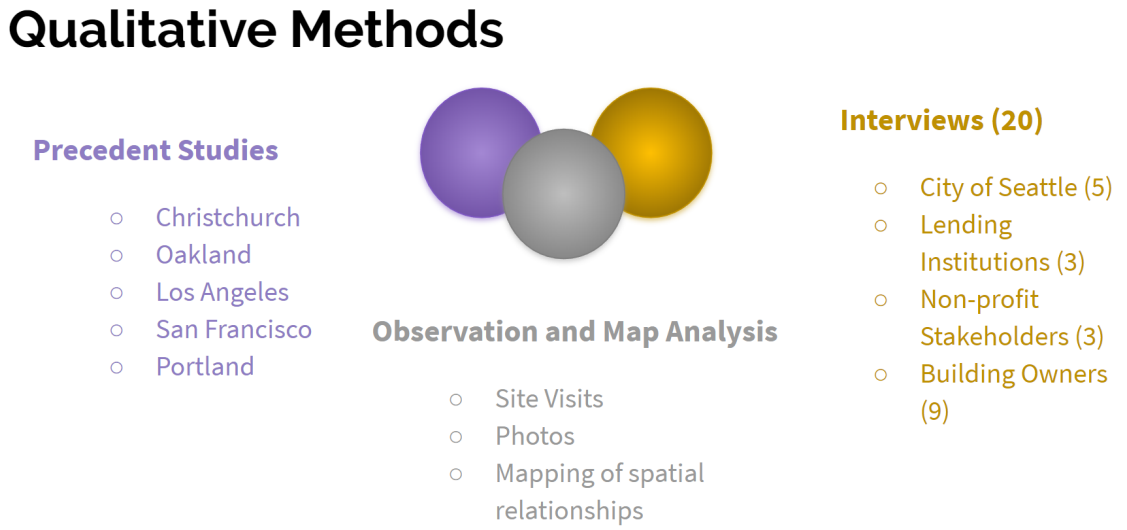

Figure 9: Data used

Precedent Case Studies

After conducting an initial literature review, I found that there is an overall dearth of information regarding URM policy and its financial implications. To gain a robust understanding of the implications of URM retrofit laws, I examined the history of URM mitigation policies and their impacts using five place-based precedent studies. I chose to examine City of Christchurch, New Zealand, as well as three precedent cities in California, and Portland, Oregon. I chose three municipalities in California that each illustrate a different aspect of URM policy: lessons that the City of Seattle should keep in mind when formulating its future policies. No URM mitigation literature exists on a

neighborhood level. Therefore, only a general comparison can exist connecting Columbia City to the municipal-scale precedent studies. However, in each case study, I focus on issues that are endemic to the Columbia City neighborhood, such gentrification and displacement.

First, I chose to examine Christchurch, New Zealand because seismic experts identified it as a municipality most similar to Seattle. Not only do the two cities share similar geographic size and populations, but prior to the Canterbury Sequence, they shared a similar impending seismic threat. Further, both cities had a similar frequency of URMs concentrated near the city core.

I chose to study three California municipalities that successfully implemented the 1986 URM law with varied results. I chose to study Oakland because it has the most comprehensive URM retrofit policy that proved successful due to its growing private sector. I examined the City of Los Angeles because it had one of the first URM retrofit policies that resulted in massive demolition. I also chose to study San Francisco because city engineers introduced the lower cost Bolt's Plus plan, and also because its complex one-size-fit-all financing method proved wholly unsuccessful.

Finally, I studied Portland, Oregon because the cities of Portland and Seattle also share a similar seismic threat, and they also have a similar number of URMs centered near the city core. However, recent state funding of seismic retrofits indicates that Portland may implement a URM strategy sooner than the City of Seattle.

Observation and Map Analysis

I conducted multiple site visits of Columbia City and Hillman City over two months in order to take photos and gather field notes about the commercial core. In the

Seattle Department of Planning and Development Pilot Study, authors refer to such observational studies as "ground truthing" (Seattle Department of Planning and Development, 2014). I attempted to discern the commercial core's general 'sense of place.' I took extensive notes on land usage to catalogue the number of confirmed URMs in the commercial core. I denoted the type of business, the frequency of patronage, and general upkeep of the building. Additionally, I attempted to understand how specific URM buildings add to the neighborhood's fabric – is the building an important community asset? And would its destruction or preservation considerably alter the character of the neighborhood? Photos and field notes inform my observational findings and provide the reader with visual significance of the area's place identity.

Spatial figures include, orientation maps (location of URMs within Seattle, in Columbia City, in the Columbia City commercial core). Another maps shows a spatial link between low-income areas and high concentration of URMs. I created maps and charts to show interview-sourced spatial relationships, including zoning, types of businesses, and financing preferred. Charts and figures supplement research and should not be considered as stand-alone analysis.

I used the City of Seattle ArcGIS dataset to generate the addresses of all 26 Columbia City URM structures. I then traveled to each address, assessed the appearance and use of the building, identified the number of stories and use, and I listed each business within the structure. Field Notes 1 is located in Appendix 1 and shows my process. I was able to eliminate two structures that did not match my criteria –one was a library and the other was a school. My research and analysis only pertain to the 24 structures that meet my criteria.

Next, I mapped the data using the City of Seattle ArcGIS 2013 dataset to compare the frequency of URMs and each area's Equity and Social Justice (ESJ) score. King County combines three demographic scores to find an area's ESJ score. Demographic scores include frequency of people of color, median household income, and level of English proficiency. The combined score ranges from 3-15: a score of three represents census areas that have a low percentage of people of color, high median income, and high levels of English proficiency (King County 2014).

After I conducted interviews, I used field notes and interview data to create another Excel chart that indicated zoning, number of businesses, frequency of building type, whether the building contained residential uses, square footage of the building, the average cost to retrofit, the owner's preferred financing method for future retrofits, and whether each owner had earthquake insurance. The Interview Results Excel Sheet is located in Appendix 2. I obtained the zoning data from the most recent ArcGIS dataset. Number and type of businesses is based on observation. I denoted four types of businesses – non-profits, local independent stores (stores that have two or fewer locations), local chains (chain businesses located only in the Puget Sound region such as Pagliacci Pizza and Molly Moon's Homemade Ice Cream and have three or more locations), and national chains (large-scale businesses that exist nationwide such as Starbucks Coffee or State Farm Insurance). I obtained residential use data and financing preferred from interviews. I obtained each building's square footage from King County Parcel Data, and I obtained data for average retrofit costs based on recent City of Seattle estimates that show the average cost of a retrofit is $45 per square foot. I then multiplied each buildings square footage by 45 to find the average cost to retrofit each building.

Using Interview Results Excel Spreadsheet (Appendix 2), I generated maps and charts in Tableau. I present these map and charts to enrich research findings and interview findings throughout the report.

Interviews

I conducted interviews with stakeholders in Columbia City to gain public perspective of the emerging policy. Initially, I hoped that interview subjects would include building owners, business owners, residents, and community leaders. However, as I began my public outreach efforts, building owners were the most eager to speak with me regarding of the prohibitively high costs of building retrofits. In turn, I also expanded my interviews to include the City of Seattle Office of Emergency Management and multiple alternative banking institutions and community development financial institutions (CDFIs), as well as non-profit leaders in Columbia City and Hillman City.

In total, I conducted 20 interviews dispersed across sectors as shown in the table below:

	City of Seattle	**Lending Institutions**	**Non-profit Stakeholders**	**Building Owners**
Number of subjects	5	3	3	9

Initially, I reached out via email to representatives of the Office of Emergency management, whose names and contact info are public record. My first interviews were with Nancy Devine, Barb Graff, and Erika Lund of the Office of Emergency Management. They briefed me on the background and future steps of the policy initiative and provided me with the latest ArcGIS URM data. I interviewed preservationist Rebecca Frestedt, Columbia City Landmark District Coordinator by phone regarding the

background and technicalities of the Columbia City Landmark District. I also interviewed Matthew Richter, Cultural Space Liaison of the Office and Arts and Culture by email. My discussion with Richter informed my knowledge of the proposed Arts and Culture District in Hillman City. All City of Seattle interviews informed my background research of the URM issue and aided my understanding of the Columbia City neighborhood. Since City of Seattle interviews informed my background research, they are not included as part of my findings.

Next, I contacted community-banking organizations. Community banking institutions are non-profit lenders who strive to provide creative and non-traditional loans to community members who are un-bankable, or ineligible for traditional loans from conventional banks. The mission-driven lenders competitively operate alongside commercial banks in terms of loan capacity, amortization schedules, and interest rates. However, their missions often constrain their lending services to certain types of organizations and businesses or to specific geographic locations. Non-traditional lenders take a holistic approach to equity and lending services – their goal is often to help people with poor or no credit secure a serviceable loan in order to become bankable in the future. I conducted interviews with Todd Tarbert of Semble by phone, Sue Taoka of Craft3 in person, and Wayne Lau of the Rainier Valley Community Development Fund (RVCDF) by phone. Interview data informed my understanding of the overall scope of the problem and influenced my recommendations. The questions are below:

Lending Institutions

Do you know about the City of Seattle's proposed URM retrofit mandate?

If yes, in your opinion, what financial impact will the mandate have on small business owners in the Columbia City commercial core and Hillman City?

In your opinion, what financial impact will the mandate have on commercial building owners in the Columbia City and Hillman City commercial core?

How many businesses in the Columbia City commercial core and Hillman City use your financial and lending services?

If the City enacts the mandate, will you provide services related to seismic retrofitting (loans, consulting, something else)?

Next, I interviewed three community non-profit stakeholders – anonymous Stakeholder A of the Hillman City Collaboratory, Melissa Lafayette of National Development Council, and Lance Matteson of South East Effective Development (SEED). Again, I researched each organization and contacted each stakeholder b email. I conducted all interviews in person. Non-profit interview data shaped my understanding of the Columbia City and Hillman City community demographics, history, and challenges in the future. Non-profit stakeholders also shaped my understanding of financing and economic impacts in the specific neighborhoods. I address the results of the interviews in the Findings Section.

Finally, I interviewed building owners in the Columbia City and Hillman City commercial cores. First, I used GIS data to generate a spreadsheet of my study area, then I travelled to the Columbia City and walked to each address. I took a photo of the building and denoted the business name and address of each commercial tenant. Each building on the inventory contained two to four commercial tenants.

I used King County Parcel Viewer to identify the name and mailing address of each building owner. Using a modified Dillman Method, I mailed a total of 84 letters to each tenant and building owner to request an interview. See Appendix 3 for letter. After two weeks, I sent a follow-up email to each business using data retrieved from commercial websites. I received a total of 16 interview requests. Of the 16, I was only

able to interview nine building owners. Only three business owners contacted me, and none were able to find time to meet in person, by phone or email. In all, I conducted five face-to-face interviews and four interviews via phone. I did not conduct any of my primary interviews by email. I recorded each interview and transcribed the results at a later date.

Most interviews lasted 30 minutes, with two lasting an hour and one over two-and-a-half-hours. All nine building owner interviews are anonymous. The questions pertained to general knowledge of a building's history and retrofit status, perceived social implications of the proposed retrofit mandate, and their preferred incentives and funding options. The questions are below:

Building Owners

1) Do you know that your building is part of the City of Seattle's URM database?

2) What actions, if any, have you taken to retrofit your property?

3) What motivated you to retrofit your property?

4) If you have not taken action to retrofit, why not?

5) According to the URM benefit/ cost analysis conducted by Gibson Economics and CollinsWoerman in 2014, retrofits could cost $20-$50 per sq ft. Do you know how much it will cost to retrofit your building?

6) What concerns do you have regarding retrofitting other than the cost of the retrofit itself? (e.g., displacement of tenants, loss of business during repair, loss of community character/ historical value, gentrification)?

7) If the City of Seattle requires you to retrofit your building, with all retrofits completed by 2031 (this date reflects if the mandate went into effect today and your building is on the medium risk indicator 13 years compliance time), what will be your next steps? Explain in detail.

8) How would you finance a retrofit at this point in time?

9) Will you offset retrofit costs on your commercial renters? How do you think they will respond?

10) What types of City incentives would encourage you to retrofit (financial or otherwise)? Be specific. Types of incentives in Proposal include- opportunity to change zoning, rebate program, subsidized permitting fees, waive parking requirements

11) Have you used any non-traditional lenders, such as a community development financial institution (CDFIs)?

12) What financing options would be most effective to help you maintain ownership of your property if retrofitting would be cost-prohibitive? (Current recommendations include, ability to obtain a low-interest long term loan from a community banking institution, tax abatement, 10%

federal rehabilitation tax credit, RLFs, Local Improvement Districts (LIDs), architectural/engineering funding, transfer of development rights (TDRs)

13) Would demolition be a viable or attractive alternative for you?

14) Do you think the mandatory retrofit will impact Columbia City? Do you believe the area will change economically? Culturally?

15) If the city requires building owners to retrofit, what do you think Columbia City will look like in 15 years? What types of businesses do you think will anchor the commercial core?

16) What do you believe is the best solution to the URM problem in Columbia City?

17) Anything you would like to add?

A description of financing options referenced in interview is listed in Appendix 4

3.2 Data Analysis

First, I organized and sorted the data for analysis by transcribing interviews and field notes. I catalogued photos and produced a literature map and literature review to identify literary themes. I also collected and researched precedent studies and organized spatial data. I used expert interview data to inform the background of current policies and financial practices. Expert interviews include City of Seattle interviews, alternative lender interviews, and non-profit interviews.

Next, I conducted interviews with building owners. Due to the larger sample size of building owners compared to expert interviews, I coded building owner interview data and pulled out common themes. I used the comment-coding method used by City of Seattle to organize open-ended public comments. I used 17 Excel spreadsheets to perform inductive coding to extract themes from the raw qualitative data. Examples include, 'existing policies may potentially displace residents', and 'threats of gentrification may cause concerns among Columbia City residents'. Finally, I analyzed how the themes connect to induce a general theory and interpreted and arranged the coded data into an analysis. An example of a general theory and analysis would be *Columbia City*

stakeholders perceive a proposed mandate threatening to the current small business population.

3.2.1 Decision Criteria

Validity is an important concern even qualitatively. In order to maintain an accurate study, I chose to employ multiple data sources. For example, building owner interviews did not function as my only interview data source as building owners were often emotional and prone to personal bias that may not reflect the opinion of the population at large. I used expert interviews to offset building owner interview data and to provide context. I also chose to conduct case studies and spatial analysis to supplement interview data. I understand that themes are only valid if several sources reflect the theme. Thus, I attempt to show that themes are reflected through multiple datasets.

3.2.2 Data Limitations

The interview data that I obtained is primarily from building owners. Only three business owners responded to mailers and follow-up emails. The three business owners that did respond later cancelled meetings or stopped replying to emails. Similarly, I only conducted two interviews in the Hillman City neighborhood. As a result, I was unable to gain the perspective of ethnic and minority building and small business owners. Finally, I had a difficult time synthesizing non-profit stakeholder and lending institution interviews. Formal interviews quickly devolved into informal conversations that covered a variety of topics relating to the organization's mission. As each organization has disparate goals, topics ranged from financial expertise to the socio-political impacts of gentrification and displacement within southeast Seattle as a whole.

4.0 Findings

Three types of qualitative findings are presented in this report: precedent case studies, observational and spatial data analysis, and interviews. The case studies provide varied contextual evidence of successful URM ordinance implementation on a municipal scale. The precedents also demonstrate positive and negative externalities of each city's strategy, which may shape how policymakers in the City of Seattle address the URM issue. Next, observation and spatial data analysis strive to capture Columbia City's place identity in the context of a citywide URM ordinance. Finally, interviews reveal the perception of the proposed mandate from multiple perspectives in Columbia City.

4.1 Precedent Case Studies

The following case studies provide lessons for the City of Seattle as policy makers attempt to implement of a retrofit ordinance. I examine five cases that illustrate different aspects of hazard mitigation efforts and expose different strengths and weaknesses in each. The first case study illustrates that a lack of mitigation policy in Christchurch, New Zealand contributed to loss of life and a near total loss of URM infrastructure. Christchurch acts as an example of what Seattle could look like if policy makers do not implement a more rigorous URM policy. The State of California precedents show both positive impacts of state support as well as negative externalities of over-zealous implementation. Specifically, the Oakland case study illustrates the most comprehensive interpretation of the State's URM ordinance. The Los Angeles case study illustrates the earliest interpretation of the California URM ordinance, resulting in

massive demolition. Additionally, the San Francisco case examines gentrification and displacement concerns, which resulted in the creation of the Bolts Plus Standard to improve affordability. The Final case study examines emerging policies in Portland, Oregon that could influence future City of Seattle policies.

4.1.1 Christchurch, New Zealand

The parallels between the City of Seattle and the City of Christchurch are eerily similar. Not only does Christchurch have a similar seismic threat risk as Seattle, but it had similar building stock as well. Both cities are prone to high moment magnitude crustal earthquakes from faults that lie within the city limits. Historically similar to the City of Seattle, Christchurch was established by European settlers between 1880 and 1935. The settlers constructed the downtown core with brick and other masonry after a fire destroyed much of the earlier wooden building stock. These similarities correspond to the rapid development of unreinforced brick structures in the Pioneer Square neighborhood after the Great Seattle Fire of 1889 wiped out much of the wooden building stock.

Between 2010 and 2012, Christchurch, New Zealand experienced the Canterbury Sequence, a multitude of earthquakes that resulted in two serious seismic events. At the time of the Canterbury Sequence, Christchurch's central business district contained 340 URM structures (Moon et al. 2014, 265).

New Zealand had a lax national retrofit policy prior to the devastating seismic events. According to the Building Act of 2004, New Zealand Parliament gave territories the authority to take either an 'active' or 'passive' approach to seismic strengthening. Territories that took an 'active' approach inventoried seismically vulnerable structures,

set performance guidelines and set 30-year compliance timelines. Territories that took a 'passive' approach relied on the Building Act of 1991, which required a retrofit to earthquake-prone buildings only when the building owner submitted a change of use permit. Christchurch had taken a 'passive' approach to URM retrofits at the time of the Canterbury Sequence (Canterbury Earthquakes Royal Commission 2012, 4:31–32). Due to the fact that Christchurch had a relatively lax seismic strengthening program, only 94 buildings in the central business district had been retrofitted prior to 2010.

The two largest seismic events were the September 2010 moment magnitude 7.0 Darfield Earthquake and the February 2011 moment magnitude 6.8 earthquake. Because of the time of day and the fault location, the second earthquake killed 185 people. URM collapse directly caused 39 of the fatalities (Johnson and Mahin 2016, 17); 36 of those fatalities took place within the central business district (Canterbury Earthquake Royal Commission 2012, 4:27). Prior to the Darfield Earthquake, the region of Christchurch contained 958 URM structures, most of which were row structures. The URMs ranged in height between one and three stories, with the majority having two stories, and 67% housed commercial businesses (Ingham and Griffith 2011, 211). After the 2011 seismic event, which occurred at a much closer proximity to the city limits than the 2010 Darfield Earthquake, 73% of URM building were red tagged and later demolished (Moon et al. 2014, 256). A staggering 90% of all un-retrofitted URMs were demolished, and sadly, due to fear and rising costs and insurance premiums, 80% of reinforced buildings that engineers labeled as in good or undamaged condition were also demolished in the months after the earthquake. In all, approximately 250 buildings were demolished within the central business district alone (Moon et al. 2014, 272). The most common failures

included chimney collapse, out of plane wall failure (70% of URM structures), parapet collapse (66% of URMs with parapets), corner failure (66%), and gable collapse (63% of URMs with gables) (256). Fatalities were due to bricks falling into the streets; 35 of the 39 fatalities occurred outside of a URM structure as structural elements crushed sidewalk pedestrians, drivers, and those fleeing the crumbling buildings. Only four deaths occurred inside a URM structure (260).

In the months after the devastating series of earthquakes, the New Zealand national government directed multiple agencies to analyze policy failures and recommend future seismic action. The Canterbury Earthquake Royal Commission produced several volumes and 1,000s of pages of recommendations. Regarding unreinforced masonry structures, the Commission states,

> *We consider that there is a demonstrated need in the interests of public safety for the hazardous elements of unreinforced masonry (URM) buildings to be strengthened throughout New Zealand. We consider that falling hazards such as chimneys, parapets and ornaments should be secured or removed. In addition, we consider that the external walls of all URM buildings should be supported by retrofit, even in areas of low seismicity. We also consider that the design actions for the elements and connections to be strengthened should be based on the provisions in NZS 1170.5:2004* (C. E. R. Commission 2012, 4:11).

Specifically, the Commission recommended that the Ministry of Business, Innovation, and Employment enact a national retrofit policy that included minimum statutory retrofit requirements for all territories, stricter retrofit standards for territories in seismic zones, (11), an accurate grading system that comprehensively described seismic performance, and a shorter compliance timeline (territories would have two years to assess and evaluate URMs, and five years to ensure that all retrofits were complete) (195). In 2014, the Parliament updated the national 2004 Building Act to allow territorial authorities to identify and mitigate URM buildings. Authorities could "(a) put up a hoarding or fence to prevent people from approaching the building nearer than is safe, (b)

attach in a prominent place on, or adjacent to, the building a notice that warns people not to approach the building, issue a notice that complies with section 125(1) requiring work to be carried out on the building to (i) reduce or remove the danger; or (ii)prevent the building from remaining insanitary" (Parliament of New Zealand 2015, 30-31).

The Canterbury Sequence, specifically the 2011 crustal earthquake that devastated the central business district of Christchurch in 2011, illustrates several things. First, experts and lay people alike witnessed the vulnerability of URM buildings in the event of an earthquake. Second, hazard mitigation has the most political economy in the time immediately after a catastrophic event. While engineers and policy makers knew the danger posed by URM structures in the event of an earthquake, most New Zealand municipalities were hesitant to mandate a costly retrofit. It was only after the disastrous earthquake that public opinion swayed national authorities to implement a national unreinforced masonry retrofit law. Overall, the result of the lack of stringent policy resulted in 39 lives lost, a decimation of the city's historic building stock, and an influx of public safety measures that overruled historic preservation code and private property rights.

4.1.2 California Precedents

The following State of California case studies illustrate the transformative impacts of state funding. Due to statewide URM legislation, hundreds of URM buildings were abated, saving many lives and preserving many historic structures over the past 30 years. Unfortunately, many buildings were also demolished, and many neighborhoods underwent gentrification resulting in displacement as a result of URM ordinances. City of

Seattle should view the California case studies as both precedents and warnings. The cities of Oakland, Los Angeles, and San Francisco show the many positive aspects of seismic policy, but they also show that when policy is not implemented strategically it can result in demolition and social displacement. Seattle should pay special attention to the variety of funding options employed by California municipalities, some of which proved unsuccessful.

The 1971 moment magnitude 6.4 San Fernando Earthquake with an epicenter near the City of Los Angeles brought hazard mitigation to the forefront of California lawmaker's minds. The earthquake served as a catalyst, spurring policy action on local, state and federal levels. The 1989 Loma Prieta Earthquake solidified state and local action. Notably, as a result of legislative policies, all State of California planning departments were required to include seismic safety elements in local land use documents (Olshansky 2001, 173). The 1989 Loma Prieta Earthquake had a moment magnitude of 6.9 and caused severe damage in the San Francisco and Monterey Bay regions. The earthquake proved especially harmful to coastal California URM stock. Santa Cruz, Oakland, and San Francisco experienced the majority of URM damage (see Chart below). The URM stock in Santa Cruz experienced a 78% rate of severe damage and two fatalities as a result of URM collapse. The damage in Santa Cruz was so stark the National Register of Historic Places removed the historic Pacific Avenue Downtown District from the National Register of Historic Places as 52% of URM buildings along Pacific Avenue were so damaged they were immediately demolished and 16% were considered unsafe to enter, and were later demolished (FEMA 2009, 4). Oakland

experienced a 20% URM damage rate, and San Francisco experienced a 13% URM damage rate (Mahin 1991, 1590).

URM DAMAGE	**Santa Cruz**	**Oakland**	**San Francisco**
Approximate Number of URM Structures (1989)	46	2000	2000
Number of URM structures damaged or destroyed	36	400	252
Percentage of URM Structures severely damaged or destroyed	78%	20%	13%

The most common structural damage as a result of the Loma Prieta earthquake to URM structures was parapet collapse. The most harmful damage resulted when masonry walls were not tied to floor diaphragms with structural steel anchors. As a result, walls failed out of plain and collapsed into streets and onto the roofs of neighboring structures (Mahin 1991, 1591). The 1989 earthquake hastened many proposed URM policies into State Law, and in 1990 municipalities along the San Andreas Fault had instituted policies that attempted to deal with the statewide URM problem.

California State law acts as a precedent for URM policy on the West coast. Between 1992 and 2007, the State of California produced extensive policy and literature regarding URM risks. California State Law requires that jurisdictions have legal statutes that protect citizens against the potential damage or loss of life that URM collapse can cause in the event of an earthquake (City of Seattle Department of Planning and Development, 2007).

Prior to the Loma Prieta earthquake, in 1986 the State of California mandated cities and counties in Seismic Hazard Zone 4 to address URM vulnerabilities. Seismic Hazard Zone 4 represents an area that spans along the San Andreas Fault Line from Eureka to San Diego and includes 365 local governments. As of 2006, the California

State Seismic Commission have inventoried 25,900 URM buildings (McGavin et al. 2006, 2). The 1986 law required municipalities to identify and inventory structurally deficient buildings and to create policies to mitigate structural hazards. Acceptable policies outlined by the state law included retrofit mandates, change in occupancy levels, demolition, and provision of financing options such as low-cost loans or tax incentives. The URM law strongly recommended that municipalities issue mandates but allowed the provision of incentive packages as the cost to retrofit is extremely high. In 1986, URM mitigation was estimated at $4 billion dollars. (California State Law 1993, 2).

Policy Timeline

In 1986, California State Legislature enacted Senate Bill 547, more commonly known as the Unreinforced Masonry Building Law, which required local governments to identify URM structures and to create and implement mitigation strategies (Seismic Safety Commission 2000). Law makers created the URM Law as a reaction to the 1971 San Fernando Earthquake (Comerio 1992, 79).

In 1992, the State of California created an inventory of various financing options employed in municipalities that have mandatory retrofit standards including deferred and no interest loans, long term financing, fee waivers, rebates, and zoning incentives (California Emergency Services 1992).

In 1993, the State of California inventoried URM structures statewide, provided a timeline for local policy compliance, a standard for retrofits, and introduced penalties and enforcement strategies for 5 California jurisdictions - San Francisco, Berkeley, Oakland, Los Angeles, San Diego (State of California 1993).

In 1996, the State outlined the level of compliance in the above municipalities and highlighted the latitude that the state law allows regarding the interpretation of the law including four types of implementation. The four types of policy implementation are mandatory retrofit, voluntary retrofit with incentives such as, waived permit fees, bonds that provide low interest loans and grants, implementation of the Mills Act (a reduction of property taxes on historic buildings), voluntary retrofit with notification only (no incentives), and demolition (City of Seattle Department of Planning and Development, 2007).

In 2000 the California Seismic Safety Commission (CSSC) issued a progress report to the state legislature on the status of the 1986 Unreinforced Masonry Building Law. In 2000, a total of 17,100 URM buildings were inventoried by the State of California. The Commission identified that only half of the URM building stock had been reinforced. 129 municipalities had mandatory programs, 39 had voluntary programs, 46 had notification-only programs, and 36 municipalities had another program (Seismic Safety Commission 2000, 6-8). The State of California found that municipalities that had mandatory retrofit policies had the highest level of compliance. Municipalities with voluntary retrofit policies with incentives such as no permit fees, reduction in property taxes, and low-interest loans had unpredictable levels of compliance, and municipalities that had voluntary retrofit policies with no incentives and notification only practices were extremely ineffective (City of Seattle Department of Planning and Development, 2007). Most jurisdictions rely on demolition only as a last resort, and more URM buildings have been retrofitted rather than destroyed as a safety measure. The demolition rates were highest among municipalities that mandated retrofits. A survey revealed that 17% of

URM buildings were demolished in localities that had retrofit mandate and only 5% were demolished in municipalities that had voluntary retrofit programs. While these results are not surprising, they do indicate that a mandate could potentially increase the demolition of URM structures. (Seismic Safety Commission 2000,7).

In 2003, two women were killed inside their workplace (an un-retrofitted URM) during the San Simeon Earthquake. The building owners argued that although they had been notified by the City of Paso Robles, they were not required to retrofit until 2018. The court found that "a city ordinance requiring hazardous buildings to be retrofitted by a certain date does not insulate owners of URM buildings from negligence causing death or injuries prior to the compliance date." The case, *Myrick v. Mastagni*, settled in 2010 awarded $2 million to the plaintiffs and created legal precedent that building owners could be held responsible for injury or loss of life due to URM collapse (Baldridge and Kat 2012, 485).

In 2004, the State of California required that owners of URM structures place 8" by 10" placards on their buildings that state, "Earthquake Warning. This is an unreinforced masonry building. You may not be safe inside or near unreinforced masonry buildings during an earthquake." Building owners who do not comply with the law are subject to fines and civil action. Also, in 2004 the state of California instituted a law that would require URM buildings to undergo seismic strengthening before a municipality would issue a building permit or change of use permit to a known URM (McGavin et al. 2006, 8).

In 2006, the California Seismic Safety Commission issued another progress report to the state legislature. Most significantly, the inventory of URM structures increased to

25,945, indicating that the state had not inventoried all URM buildings as of 2000. Since 1986, 70% of inventoried URMs have either been retrofitted or demolished (9). In the 2006 report, the Commission reports that of the 283[2] municipalities required by state law to implement URM mitigation programs, 260 have URM programs, six do not have complete inventories, and 17 have no URM mitigation programs. Progress from the 2000 Report includes an increase in municipalities with mandatory retrofit programs from 129 to 134. Demolition remains highest at 17% in municipalities with mandatory retrofits and has jumped to 8% (from 5% in 2000) in municipalities with voluntary retrofit programs. The 2006 rate of statewide demolition of URM structures since 1986 remained at 15%. (McGavin et al. 2006, 6–7). Compliance continues to remain highest in municipalities that mandate retrofits at 87%, and only 409 URM buildings statewide have not undergone treatment - strengthening or demolition (9).

In 2016, the CSSC again evaluated the 1986 URM Law under the lens of the moment magnitude 6.0 South Napa Earthquake that occurred in August 2014. The Commission in conjunction with FEMA found that the City of Napa's retrofit program successfully reduced building damage. The evaluation found that 20 of the 28 URM buildings had been previously retrofitted. Of the retrofitted buildings 16, or 80%, sustained minor damages, and four or 20% had moderate to severe damage. Of the eight un-retrofitted buildings, five or 70% were so severely damaged that authorities barred civilians from entering the structures (Johnson and Mahin 2016, 16–17).

Financing remains to be the biggest barrier to strengthening the State of California building stock. As of 2016, the California Seismic Safety Commission recognized that

[2] 365 municipalities are within the Seismic Zone 4, however, 82 do not have URM structures.

implementation continues to lag in some municipalities. The Commission recommended that the State better incentivize retrofits with creative funding programs and stricter penalties for building owners who do not post URM safety placards on their URM properties. The Commission also recommended that the state reduce regulatory barriers that may act as disincentives for many building owners who find retrofitting economically burdensome. Low interest loans continue as the most effective incentive for retrofit (Johnson and Mahin 2016, 41–44).

Currently, as of January 1, 2017, the State of California implemented the California Capital Access Program administered by California Pollution Control Financing Authority (CPCFA) in conjunction with the State Treasurer. The program provides incentives for private retrofit financing for small businesses as well as residential and commercial property owners in areas designated as seismically vulnerable. The state-funded loan loss reserve fund provides partial risk coverage to lenders who provide a long-term low interest loans to interested parties. Eligible financial institutions include federal and state-chartered banks, credit unions, and Community Development Financial Institutions (CDFIs). The program works as lenders and borrowers deposit between 2% and 3.5% of the total loan amount into the lender's Seismic Safety loan loss reserve account, and then California Pollution Control Financing Authority contributes up to four times the amount of the lender's fee to the Seismic Safety loss reserve account depending on the length of coverage of the loan. Loans can be up to $250,000 over a period of 10 years, and CPCFA can contribute an additional amount up to twice the lender's fee for buildings located in economically distressed areas.

The loan loss fund is currently recruiting additional lenders, and its successful implementation is yet to be determined (Pollution Control Financing Authority 2017). Measuring and evaluating the success of this program will help determine if more building owners strengthen their buildings as a result of its implementation, and whether the program mitigates the prohibitive costs of retrofitting.

California has successfully implemented a URM policy that mitigates the risk of URM building collapse. However, the policy has not been wholly successful; after 32 years, several hundred buildings statewide have not undergone treatment. Because of the overall success of the 1986 URM Law, the State of California has now expanded its seismic retrofitting standards to soft story (multi-story wood buildings that lack interior retaining walls), tilt-ups (inexpensive concrete 'big box' structures in which walls are constructed horizontally offsite), and older concrete buildings.

The following precedent studies illustrate the impacts of the 1986 URM Law as well as current seismic policies in the State of California. Oakland, Los Angeles, and San Francisco have state-mandated mitigation programs. Each municipality differs and often overlaps in their URM problem scope, rate of compliance, minimum standards, financial tools, penalties, and future next steps. The chart below outlines the major differences and similarities of each municipality.

	Oakland	Los Angeles	San Francisco
Number of URMs	2,000 (1989) 1,582 (2006)	8,956 (1981) 7,214 (2006)	2,000 (1989) 1,985 (2006)
Rate of Compliance (%)	89% (2006)	Over 90%	92.5 (2008)
Rate of Demolition (%)	7% (2006)	19% (2006)	8% (2006)
Minimum Standards	Bolts Plus	State Standard	Bolts Plus
Compliance Timeline	1-7 years depending on environmental factors (soil type, building use, occupancy levels)	270 days – three years	4- 13 years
Financing Tools	Private investment, CFD (unsuccessful), Statewide California Capital Access Program	Private investment, redevelopment districts, special assessment districts (unsuccessful), (CDBG), tax exempt bonds, Proposition 77 (State grants)	$350 million bond for deferred interest or low interest, long term loan for property owners
Penalties for Non-compliance	$1000 for missed deadline on a permit or analysis report, $2000/ month for missed upgrade deadline (max $10,000 per building), property lien, public nuisance declaration, injunctive relief, withhold future permits, revoke Certificate of Origin	Misdemeanor, forced vacation and demolitions after a period of 90 days noncompliance.	$500 fine/ day or 6 months in jail/day City officials have the authority to vacate, barricade, and demolish non-compliant buildings, and recover abatement costs if timelines are not met.

Oakland: A comprehensive URM interpretation

The situation in Oakland pre-Loma Prieta mirrors the current URM condition in Seattle. In 1989, Oakland had approximately 2,000 URM structures (Mahin 1991, 1590). Although the California legislature had established a seismic agenda a decade prior and instituted the 1986 URM ordinance that required Oakland to inventory and establish seismic strengthening laws and strategies, local government agencies viewed the URM law as an overreaching and undue formality. Property owners viewed the state mandate as needless and inefficient, (Richard Olson and Robert Olson 1998, 153). Similarly,

preservationists feared that scope and standards of the ordinance would encourage building owners to abandon historic and functional structures that the City of Oakland would then demolish (159).

The Loma Prieta earthquake was particularly devastating for Oakland, as 42 of the 63 regional fatalities occurred within the city limits when a section of the Nimitz Freeway collapsed, killing evening motorists. Additionally, the earthquake destroyed 400 URM structures, or 20% of the URM stock (Mahin 1991, 1590). The 1989 earthquake induced fundamental change, and the City of Oakland began to earnestly implement a seismic agenda. Between 1989 and 1993, the City passed nine ordinances that would mitigate future seismic risk, including making an inventory of seismically vulnerable buildings and establishing a URM retrofit mandate (Richard Stuart Olson, Robert Olson 1998, 147-151).

The City of Oakland's URM laws are considered some of the most comprehensive in the State of California. As of 2008, Oakland had seismically abated 89% of its URM building stock (State of California 2008, 5). As of 2006, only 112 (7%) of the 1,582 remaining URMs were either destroyed or slated to be demolished (California Seismic Safety Commission, 2006). The City of Oakland requires that retrofits meet a minimum standard of Bolts Plus, and over 200 URM structures meet a higher retrofit standard. The City of Oakland incentivizes upgrades beyond Bolt Plus by increasing zoning to mixed use, allowing building owners to increase commercial and residential occupancy. The compliance timeline for retrofits is between one and seven years and is based on soil type, number of stories, condition of adjacent paths and roadways, and number of occupants (State of California 2008, 5).

Oakland has experienced rapid economic development in the last decade, which has spurred redevelopment of the building stock. The City of Oakland has capitalized on the influx of private development to require seismic retrofits when building owners apply for a loan, change ownership, or apply for change of use permit (City of Seattle 2007). Private interests lowered retrofit cost estimates by 40-50% as contractors from across the state competed for retrofit bids. The city attempted to establish a Community Facilities District (CFD), which would create a financing district that would provide low interest loans. However, the CFD was unsuccessful as it could not get underwriting due to financial risks (State of California 2012). The recently implemented 2017 California Capital Access Program may increase funding for retrofits, but it is too soon to evaluate its impacts.

Finally, penalties for non-compliance are severe. As of 2012, the City of Oakland charges a $1000 fine to a building owner who misses a deadline on a permit or analysis report, a $2000 per month fine if the owner misses an upgrade deadline (up to $10,000 per building). The city can file a lien on the property, declare the site a public nuisance, file an injunctive relief, withhold future permits, and revoke Certificate of Origin (document that shows evidence of renewable energy or waste to generate electricity) (State of California 2012, 2).

Due to the success of the URM retrofit program, the City of Oakland is now addressing other seismically vulnerable structures such as soft-story buildings. At this point in time, they are creating an inventory of soft-structure buildings. The City of Oakland recently passed ordinance 12966 CMS, which requires owners of soft-story structures to provide the city with information regarding their building's ground floor

supports. Grants are available residential property owners. Future next steps will be to establish retrofit policy and implement timelines for compliance (City of Oakland 2017).

Los Angeles: A model for the State of California

The Los Angeles case illustrates that a retrofit mandate can successfully mitigate health and safety issues linked to URM structures. However, as an early implementer of URM policy, Los Angeles policy makers induced several unforeseen negative externalities that Seattle should strive to avoid. The externalities included massive infrastructure demolition and displacement of elderly and minority residents.

Los Angeles was one of the first municipalities to implement seismic retrofit ordinances to identify structures and create strategies and timelines for mandatory strengthening. In fact, the Los Angeles ordinance acted as a model for the 1986 statewide URM Law. Unlike Oakland, Los Angeles had URM strengthening ordinances well before the moment magnitude 6.7 Northridge Earthquake that struck the city in January of 1994. In 1981, the City of Los Angeles implemented the Los Angeles Earthquake Hazards Reduction Ordinance, Division 88 of the building code, requiring buildings to retrofit known URM buildings. At the time, approximately 8,100 URM structures existed (Comerio 1992, 79–81). Most URM structures were concentrated in Hollywood, West and Central LA, and Santa Monica. The building stock ranged from one to five stories. Citizens' reactions to Division 88 were similar to the Oakland experience: emotions ran high, and citizens had a murky concept of the scope or implications. During a public hearing regarding the 1981 ordinance, one citizen stated:

> *Our brilliant City Council is going to tear down 14,000 buildings because there might be an earthquake that might knock these buildings down and the people might get hurt. So, you're going to knock them down first and leave them [the people] homeless instead. That's like cutting off your arm so then you won't ever have to worry about breaking it* (FEMA 1998, 18).

At the time of the 1994 Northridge Earthquake, 90% of URM buildings had been retrofitted – parapets either removed strengthened, walls anchored to floor and roof diaphragms (Somers et al 1996). Because of the retrofit law, no URMs collapsed during the seismic event, although 200 buildings suffered serious damage (Olshansky 2001, 181). According to the 2006 CSSC report, more URMs existed than previously thought, equaling 8,956. Los Angeles building owners had demolished a staggering 1,742 a 19% demolition rate. The higher than average demolition rate (state average is 15%). At the time, the City of Los Angeles did not attempt to preserve any of the URM building stock, because policy makers did not consider the URM buildings as historic. (California Seismic Safety Commission 2006). As of 2012, approximately 6,300 URMs remain and over 90% have been retrofitted (State of California 2012, 2). At the time of the Los Angeles retrofit mandate, the engineers had not developed the Bolts Plus standards. Division 88 established the state-adopted Uniform Code for Building Conservation (UCBC), later revised in 1995. The standard is stricter and more comprehensive than the Bolts Plus Standard (FEMA 1998, 23). After the 1981 ordinance, the City of Los Angeles expected all retrofit work to be completed within 15 years. Timelines were flexible depending on the building's risk based on occupancy, public use, and whether it was a hospital or school. The City of Los Angeles classified building types into four classes. Class IV URM buildings that had the least risk had a period of up to 10 years to complete retrofits (Comerio 1992, 1). As of 2008, the compliance timeline for retrofits was between 270 days and three years. Owners are expected to complete a structural analysis and form a plan to retrofit in 270 days, complete wall anchors in one year, and complete all alterations of demolition within 3 years (California 2008, 8). Penalties for non-

compliance include misdemeanor and eventual vacation and demolition after a period of only 90 days (State of California 2012, 2).

Similar to the Oakland case, private investment played a primary role in financing the URM retrofit ordinance. 1980s Los Angeles was a time of economic expansion and rapidly rising property values (FEMA 1998, 25). The public sector also provided funding for URM retrofits, including the initial inventory of URM structures (State of California 2012). To implement retrofits, the City of Los Angeles provided funding primarily to residential property owners. The city sought to implement Special Assessment Districts for Seismic Rehab, but staggering costs proved insurmountable (87). In 1987, State Proposition 77 passed, providing $150 million in tax-free bonds to finance seismic strengthening of affordable housing. However, as the Los Angeles retrofit ordinance passed in 1981, many property owners did not have access to these funds. According to a 1992 report, public funding accounted for 11% of Los Angeles retrofits. The Los Angeles Housing Division initially provided low-interest financing to all residential URM structures, with no restrictions on income of property owner. Sources of funding included, creation of redevelopment districts to provide shared funds, a Community Development Bloc Grant (CDBG), tax exempt bonds, and other grants (Comerio 1992, 86).

The City of Los Angeles has a lesson for Seattle regarding the implementation of funding strategies. Low-interest city loans were initially available to all property owners, no matter their financial standing. Building owners in economically growing areas owned 15-20% of URM building stock. Costs in these areas could have been offset by rental increases without causing displacement. Yet, property owners in these areas were eligible

to use city funds to gentrify their residential properties despite the fact they were eligible for traditional private financing. (90). Property owners in wealthy areas siphoned public funds that should have initially aided the 30% "un-bankable" URM building owners who could not receive traditional private loans. Such "un-bankable" building owners bought and sold properties without traditional appraisals and financing; 50% of these property owners were Asian or Hispanic, and 80% of these property owners did not carry any commercial loans (93). As a result of a mismatch in timing between local and state ordinances, and misdirection of public funds to economically viable areas, many property owners had either demolished buildings or increased rental costs substantially. Due to the concentration of older buildings in predominantly low-income areas, the retrofit law displaced residents who were primarily elderly and Hispanic (88).

Today, Los Angeles is addressing other seismically vulnerable structures such as pre-1980s soft-first story buildings and pre-1980s non-ductile reinforced concrete buildings. Recently, Los Angeles Mayor, Eric Garcetti appointed Dr. Lucy Jones as his Science Advisor for Seismic Safety and formed a partnership between the city and U.S. Geological Survey. The result of these efforts is the implementation of the Resilience by Design Program, which focuses on three objectives: fortifying buildings, fortifying water systems, and fortifying telecommunication networks (Mayoral Seismic Task Force 2016, 4). The program recommends implementing a seismic safety rating system and inventory for older concrete and soft-story structures. The program also recommends a mandatory retrofit on any building that incurs major damage in a minor seismic event (8).

San Francisco: A technical standard to combat displacement

The San Francisco case illustrates that municipalities can successfully engage in collaboration with private parties to produce mutually agreed upon URM policies. The City of San Francisco created the Bolts Plus Standard as an affordable retrofitting option to compromise with housing advocates. Another lesson from San Francisco is that strict non-compliance penalties result in a high number of retrofits. Unfortunately, the San Francisco case also demonstrates that complex funding options are wholly underutilized by parties that need them the most.

Prior to the 1989 Loma Prieta Earthquake, the only retrofit standard for URM structures in the City of San Francisco was the 1975 Parapet Safety Program (San Francisco Department of Building Inspection 2003, 2). The Loma Prieta Earthquake's epicenter was 60 miles from the City of San Francisco, yet the seismic event caused considerable damage to the city's URM stock. However, the U.S. Geological Survey warns that a much stronger magnitude earthquake could strike the City on one of the dozen fault lines in the Bay Area (Tarakji 1991, 132). The majority of URM structures were built in 1907, a year after the devastating 1906 earthquake. Structures are between one and four stories, and prior to the Loma Prieta Earthquake the most common building usage was commercial located in the Chinatown and Tenderloin neighborhoods (FEMA 1998, 22). In 1992, the Board of Supervisors introduced Ordinance No. 225-92, the URM Ordinance. The ordinance was implemented in 1993. A previous 1985 ordinance required that the City of San Francisco notify building owners of potential hazards and inventory suspected URM structures. Under the ordinance, building owners were required to

seismically strengthen their buildings (San Francisco Department of Building Inspection 2003, 2).

In 2008, 1,850 URM buildings were in complete compliance with the URM Ordinance, a 92.5% rate of compliance (Seattle Department of Planning and Development 2012, 38). According to the CSSC 2006 report, of the original 2,000 structures, approximately 170 structures were demolished at a rate of 8% (California Seismic Safety Commission 2006).

The prohibitive financial cost of URM retrofits spurred community members to question the social viability of the ordinance. Community leaders argued that costs would lead to gentrification-caused displacement. As a compromise, engineers introduced the Bolts Plus Standard to counteract the strong low-income private sector opposition and to preserve low-cost housing. The Bolts Plus Standard were far laxer than the previous state sanctioned Uniform Code for Building Conservation (UCBC) standards. (FEMA 1998, 23). Ordinance 225-92 states, "URMs are vital to San Francisco's economy. They provide low-cost housing, job sites, and irreplaceable historic and architectural resources" (23-24). Bolts Plus prevents 80% of out-plane failure of load bearing walls, and only applies to normally configured buildings. Irregular and critical buildings must continue to use UCBC State codes (23).

The compliance timeline for retrofits depended on risk level of the building. Starting in 1993, the Department of Building Inspection required all building owners to submit an inventory form within one year. High- risk buildings (Level 1) had a two-year compliance timeline after submitting their inventory (San Francisco Department of Building Inspection 2003, 2). Level 1 structures included schools, hospitals, building

with over 300 occupants, and buildings in liquefaction zones URMs that were 3 or more stories Risk Level 2 structures had a 4 year compliance timeline (California 2012), Risk Level 3 Structures had a ten year compliance timeline, and Risk Level 4 structures had a 12 year compliance timeline (San Francisco Department of Building Inspection 2003, 2).

Again, the City of San Francisco can provide the City of Seattle with a valuable lesson regarding complex and one-size-fits-all financing options. As a direct result of the Loma Prieta Earthquake, voters approved a bond measure that provided low-interest loans in 1989 (Seattle Department of Planning and Development 2012, 38). In 1992, voters authorized $350 million in bonds for loans for URM building owners, with $150 specifically for buildings that included affordable housing. Affordable housing property owners were able to apply for deferred interest and principal loans. All loans had an interest rate of 8.5% and were fully amortized over a term of 20 years. In return for a low interest or deferred loan, a property owner would enter a contract with the City that would safeguard low-income housing. While the policy protecting residential tenants was robust, there were no legal requirements that protected commercial tenants (Inspection 2003, 3–4). Confusion abounded the financing policy as the issued bond covered only the cost of the loan; building owners were responsible for the principal cost of retrofits or demolition. The funds were underutilized as many thriving property owners used private financing, the administrative requirements often increased costs, and the complex issues arose from pairing the seismic financing with multiple other low-income regulations required by the City of San Francisco (FEMA 1998, 24).

Penalties for non-compliance occurred when property owners did not meet city timelines. Non-compliance resulted in a $500 fine per day or six months in jail per day

(State of California 2008, 1–2). City officials had the authority to vacate, barricade, and demolish non-compliant buildings, recovering abatement costs from property owners if timelines were not met (State of California 2012, 2).

Similar to other major California municipalities, San Francisco is exploring implementing retrofits beyond the URM standard. In 2013, the City of San Francisco adopted the Mandatory Soft Story Retrofit Program, enforced by the Department of Building Inspection. The City has notified property owners, inventoried seismically vulnerable structures, and created an implementation timeline in accordance with previous URM precedent. According the City and County of San Francisco Hazard Mitigation Plan, the anticipated completion date of the soft-story retrofit is 2042 (City and County of San Francisco 2014, 110).

4.1.3 Emerging Policies in Portland, Oregon

In terms of a comprehensive URM retrofit policy, Portland, Oregon is currently outpacing Seattle because more robust funding options are available, especially from the state level. The emerging Oregon case study demonstrates that state funding is requisite for a successful policy implementation.

Portland contains 1,640 un-retrofitted URM structures, concentrated in the central business district (Portland Bureau of Emergency Management 2017, 9). Portland faces similar earthquake risks to Seattle, a coastal subduction zone mega-quake as well as threats from crustal faults beneath the city. Similar to Seattle, 85% of URM buildings remain un-retrofitted despite general knowledge of earthquake risk. Similarly, building owners only need to retrofit when their building applies for a permit to alter the structure (2-6). The Portland Committee, similar to Seattle, created four risk levels, which the

Portland Committee refers to as Classes 1-4. The Portland Committee indicates adherence to ASCE 41 Standards except a modified standard (similar to Bolts Plus) for Classes 3 and 4 (21).

Recently, the State of Oregon has instituted tax exempt financing methods for URM retrofit policies. During the 2017 legislative session, the State of Oregon adopted Senate Bill 311, permitting local jurisdictions the authority to create a seismic property tax exemption. A property owner in Portland will be exempt from taxes on property retrofits for up to 15 years. Historic property owners may freeze their property taxes for 20 years while they perform retrofits. The State of Oregon Seismic Rehabilitation Grant Program competitively provides funding for schools and emergency service facilities (Portland Bureau of Emergency Management 2017, 21-22). Multnomah County allows retrofits to meet energy standards, lowering costs and providing additional funding by requiring investment to generate savings or revenue to support the pay-off of the loan (Devine et al 2017). Other financing strategies include, urban renewal area funds, floor area ratio (FAR) transfers, state historic tax credits, a proposed state seismic tax credit, revolving loan funds, and a proposed business license tax exemption (Portland Bureau of Emergency Management 2017, 24).

Despite the robust funding package than the City of Seattle and a comprehensive danger assessment, Portland building owners and small business owners are wary of the potential mandate. Council members were expected to vote on the potential ordinance on May 9, 2018. Due to rising public uncertainty regarding the project, the vote was postponed until June 13, 2018. 53 members of the public spoke; only three supported the mandatory retrofit policy. Opposition leaders believe the funding options are insufficient,

burdening small business owners. Property owners stated that they would move or tear down their property (Kenoyer, 2018). The City of Seattle should expect similar reactions, as many believe the city should supply generous funding along with the mandate. If funding options prove insufficient, and the cities of Portland and Seattle decide to support the mandate with inchoate financing, the cities will risk further displacement as rental prices rise and building owners demolish buildings that are too expensive to revive.

4.1.4 Case Study Discussion

The case studies serve as lessons to the City of Seattle in multiple ways. The Christchurch case study shows there is a public unwillingness to address seismic mitigation issues until disaster strikes. However, due to laissez-fair seismic policy, the Canterbury Sequence led to 39 fatalities and destruction of much of the URM building stock. The case demonstrates that public perception of seismic threat is often undeveloped. In the future, policy makers should consider extensive campaigns to educate the public on seismic issues relating to URM structures.

The case studies of Oakland, Los Angeles, and San Francisco illustrate several different outcomes of municipal implementation of the 1986 State of California URM Retrofit Law. The success of the Oakland policy centers on a robust private economy in which property owners willingly retrofitted their buildings as a response to the economic growth of the area. The deadly Loma Prieta Earthquake catalyzed municipal lawmakers to create the most comprehensive retrofit laws in the state. The Los Angeles case acted as an early precedent to inform state law and retrofit policies around the globe. Well before the Northridge Earthquake Los Angeles had retrofitted most of its URM stock, however mitigation often resulted in massive demolition of brick buildings. The San

Francisco case study shows the technical evolution of retrofits. Engineers developed the Bolts Plus Standard as a reaction to the concerns of property owners and policy makers who feared that housing prices would skyrocket if the state retrofit standard were imposed URM building owners. San Francisco demonstrates that high compliance levels are tied to strict penalties. Unfortunately, property owners viewed the one-size-fits-all approach to financing as overly complex, and as a result it was grossly underutilized.

Lessons learned from the California case studies are that catastrophic natural disasters catalyze political support of retrofit policies. Similarly, state-supported funding is requisite to a successful ordinance. Due to the relative success of the URM Law, the State of California is now implementing similar policy to other seismically vulnerable buildings such as soft-story and tilt-up structures. Despite the overall successes of the policy, hundreds of URM buildings remain 30 years after the State of California enacted the ordinance, a troubling effect of local implementation.

One of the most confounding aspects of organizing the California precedents into coherent case studies is the existence of fluctuating numeric data. Data shows rising and falling URM inventories based on varying year-to-year demolition data and previously misidentified buildings. Authors of the policy documents often make no distinction between mitigated and demolished structures, or un-retrofitted and retrofitted URMs.

Finally, the Portland case demonstrates that a retrofit policy in Seattle is possible in the coming years with increased public education. Due to political and social similarities between Portland and Seattle, overall public perception supports a mitigation policy. Unfortunately, the retrofit ordinance is facing private However, again, the success

of the Portland implementation process is the existence of state funding. Seattle should consider that State funding is requisite to successful future financing.

4.2 Spatial Findings

The best way to capture a neighborhood's place identity is through site observation and map analysis. Qualitative findings suggest that Columbia City is a dynamic and ethnically diverse neighborhood. The URM building stock contributes to the neighborhood's character and reflects the area's historic past. The high frequency of URM buildings within the commercial core suggest that the building stock is an integral part of the neighborhood's economy and social structure. Current zoning and building use show that the area is, for the most part, a busy pedestrian center with multiple amenities ranging from ethnic food restaurants, theaters, boutiques, and wellness centers. The high frequency of independent businesses housed within the study area suggest that the URM structures contribute to the local home-grown economy. Finally, observation and spatial data show a sharp divide between the Hillman City and Columbia City in terms of the built form, and economic and social vitality.

4.2.1 Spatial Mapping

The research area is the Columbia City neighborhood. The Columbia City neighborhood is defined by the City of Seattle neighborhood boundaries. The study area is constrained to the location of URM buildings. In all, the study area as defined by these two parameters and runs along Rainier Avenue South, bounded by South Alaska Street and South Mead Street. The research area includes the commercial cores of the Columbia City Landmark District and the Hillman City commercial core, with URM

buildings concentrated between South Angeline Street and 39th Avenue South in the Columbia City Landmark District and between South Findlay Street and South Mead Street in the Hillman City subarea. The area between 39th Avenue South and South Findlay Street does not contain any URM structures and is not included in the study area. See Figure 10 for the highlighted study area.

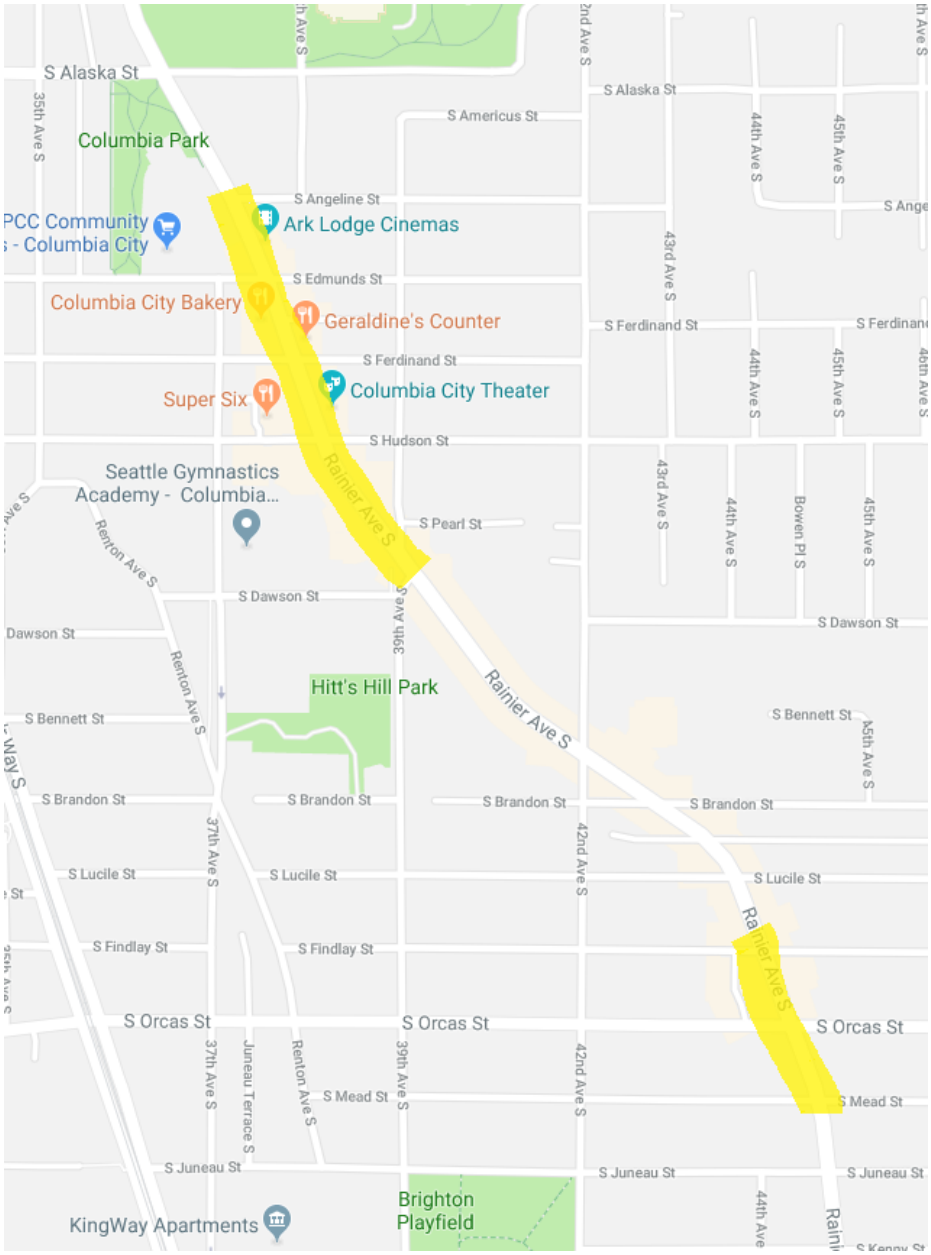

Figure 10: Highlighted Study Area (Google Maps 2018)

The total number of URMs in the study area is 24, excluding a school and a library, neither of which fit my criteria. Only one structure is listed as 'Critical Risk' according to URM classifications because it contains a small school as well as commercial tenants, and only one structure, the Columbia City Theater, is listed as 'High Risk' because its occupancy in one room is over 100 people. The remaining 22 structures are classified as 'Medium Risk.' Medium Risk buildings have the least amount of risk and have longest compliance times – 13 years after the mandate is enacted. See Figure 11 for the spatial distribution of medium, high and critical risk buildings within the study area.

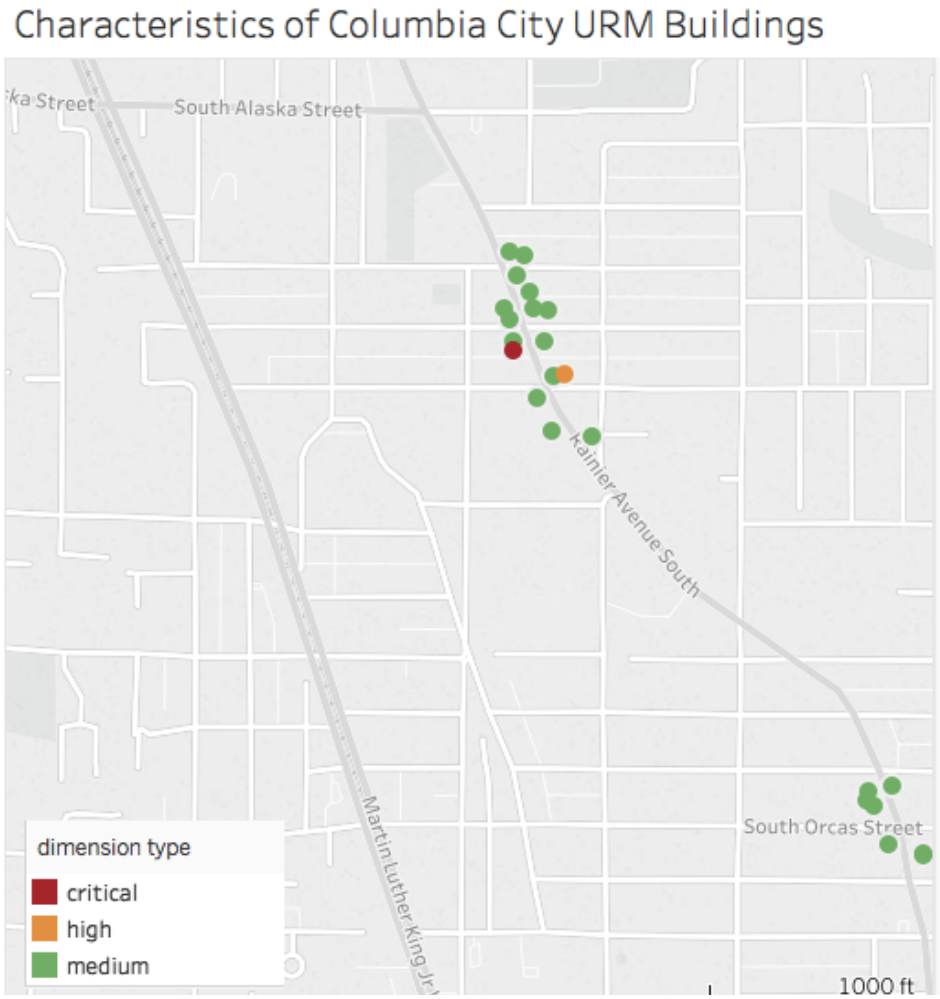

Figure 11: Risk Levels of URM buildings (created by Author 2018)

Buildings in the study area were built between 1901 and 1925; with the majority built between 1920 and 1925. See Figure 12 for distribution of URM building dates.

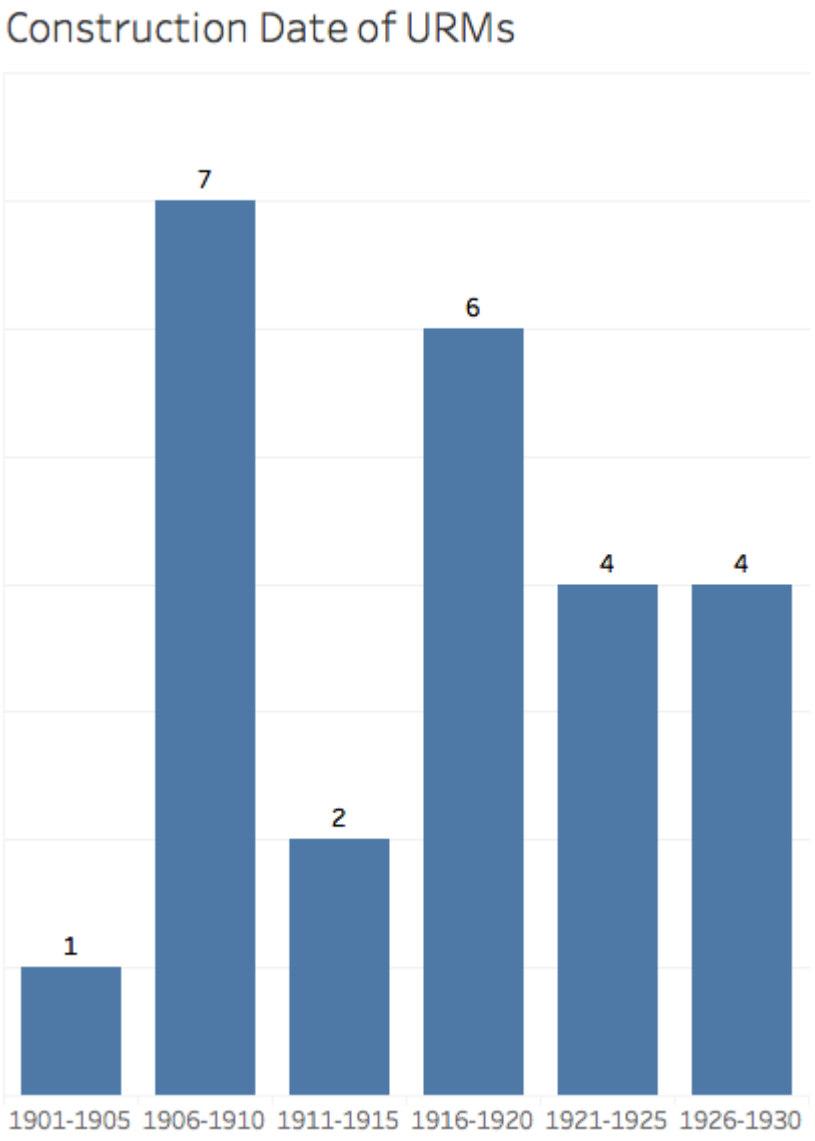

Figure 12: Construction dates of URMs in study area (created by Author 2018)

Buildings range from one to three stories. There are 13 one-story structures, nine two story structures, and two three story structures in the Columbia City and Hillman City commercial cores. 21 of these structures are zoned NC3P-40 (neighborhood

commercial with a pedestrian designated overlay with a 40-foot maximum height). According to the Department of Construction and Inspections NC3 zones typically include supermarkets, restaurants, retail shots and residences that are mixed-use compatible. The P designation encourages a pedestrian-oriented shopping district, and drive-thru businesses are prohibited. One building in the commercial core is zoned NC3-40, because it is adjacent to Rainier Avenue South and is not considered a pedestrian zone. One structure, containing CrossFit RE, is zoned C1-40, auto-oriented commercial, because it is located several blocks north of the commercial core along Rainier Avenue South. Finally, one structure containing several auto repair shops and vacant businesses is zoned C2-65, which typically includes warehouse and manufacturing zones (Seattle Department of Construction and Inspections, 2016). The building is located directly outside of the Landmark District and the one-story structure will be subject to demolition and adaptive reuse as a residential mixed-use building in the coming months, according to one anonymous developer. See Figure 13 for the spatial distribution of zoning types.

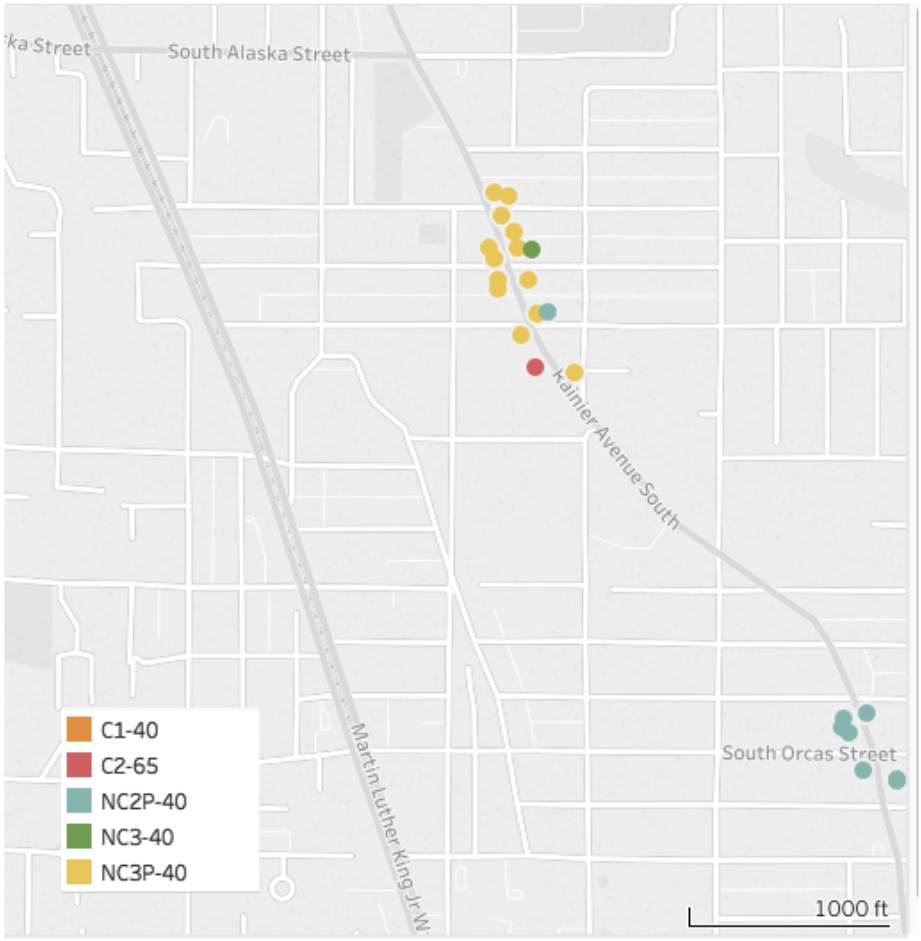

Figure 13: Study area URM zoning (created by Author 2018)

Finally, the 24 URM buildings house a total of 46 businesses: 34 small local businesses, four local chain stores, three national chain stores, and five non-profits. Figure 14 shows the frequency of business types within URM structures.

Columbia City contains only 26 of 1,154 Seattle URM buildings, or 2% of the City's total URM stock. However, due to Columbia City's rich history and diverse demographics, the area may be disproportionately impacted by gentrification and displacement. The following maps created by the Author and sourced from the City of Seattle Office of Emergency Management act to visually aid the underlying analysis.

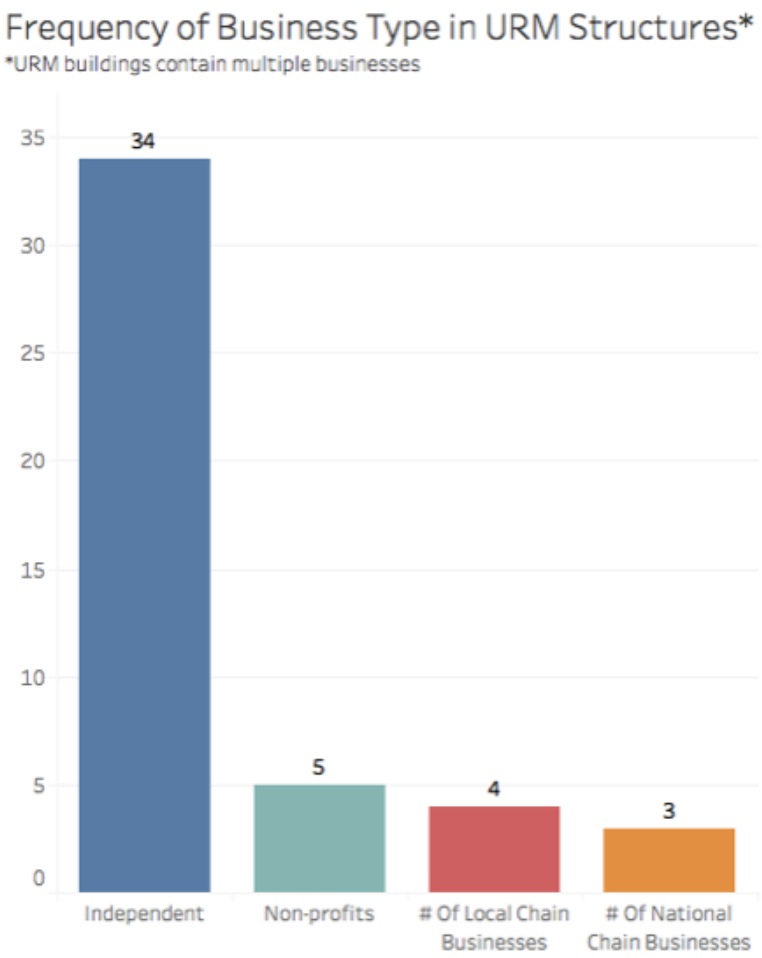

Figure 14: Frequency of Business type within URM study area (created by Author)

Figure 15 illustrates the relationship between the frequency of URM buildings and the Census tract ESJ score. The map shows that Columbia City has an ESJ score of 14 and a medium frequency of URMs. The ESJ scores are based on the Jenk's classification method and divided into quintiles, and the data is represented in a chloropleth map where the light color represents a low ESJ score. Visually, the map suggests that there is a spatial relationship between a medium to high frequency of URM structures and high ESJ scores. Figure 16, a map sourced from Office of Emergency Management and modified to highlight the study area by Author show that the study area is not prone to liquefaction. Additionally, Figure 17 shows that the study area is not prone to landslides in the event of an earthquake.

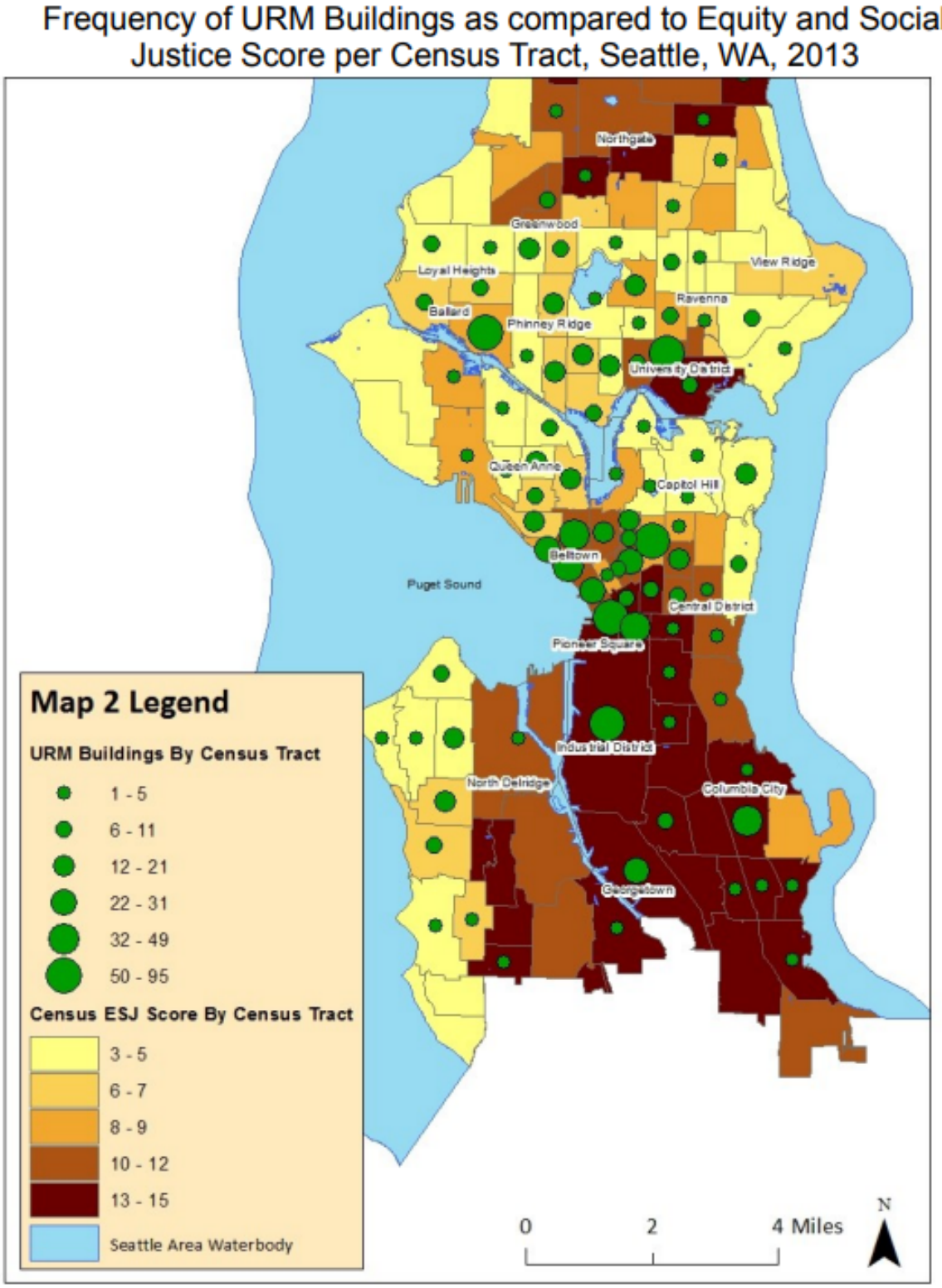

Figure 15: Frequency of URMs and areas with high ESJ scores (by Author 2015)

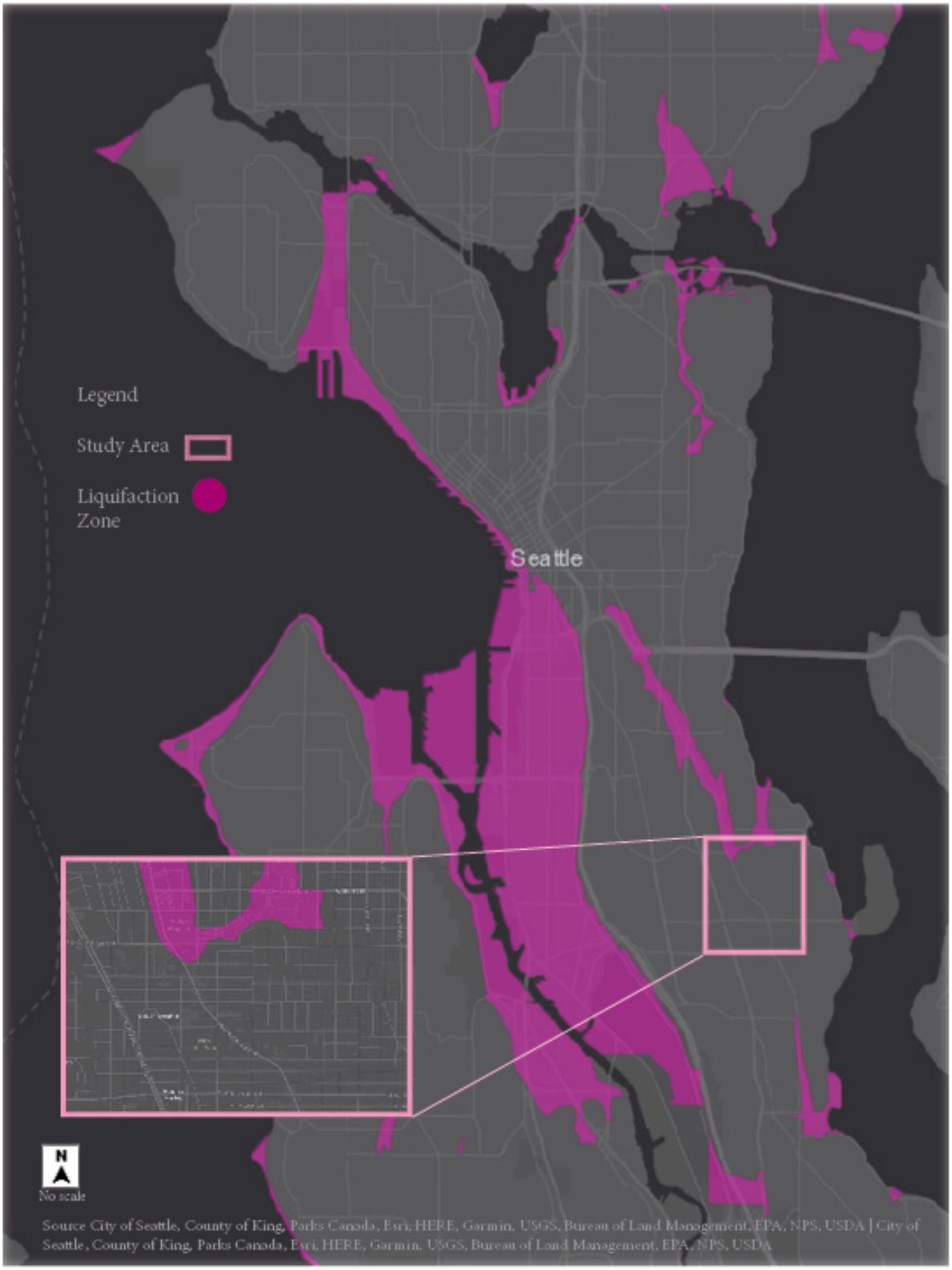

Figure 16: Liquefaction Zones (Seattle Office of Emergency Management 2017)

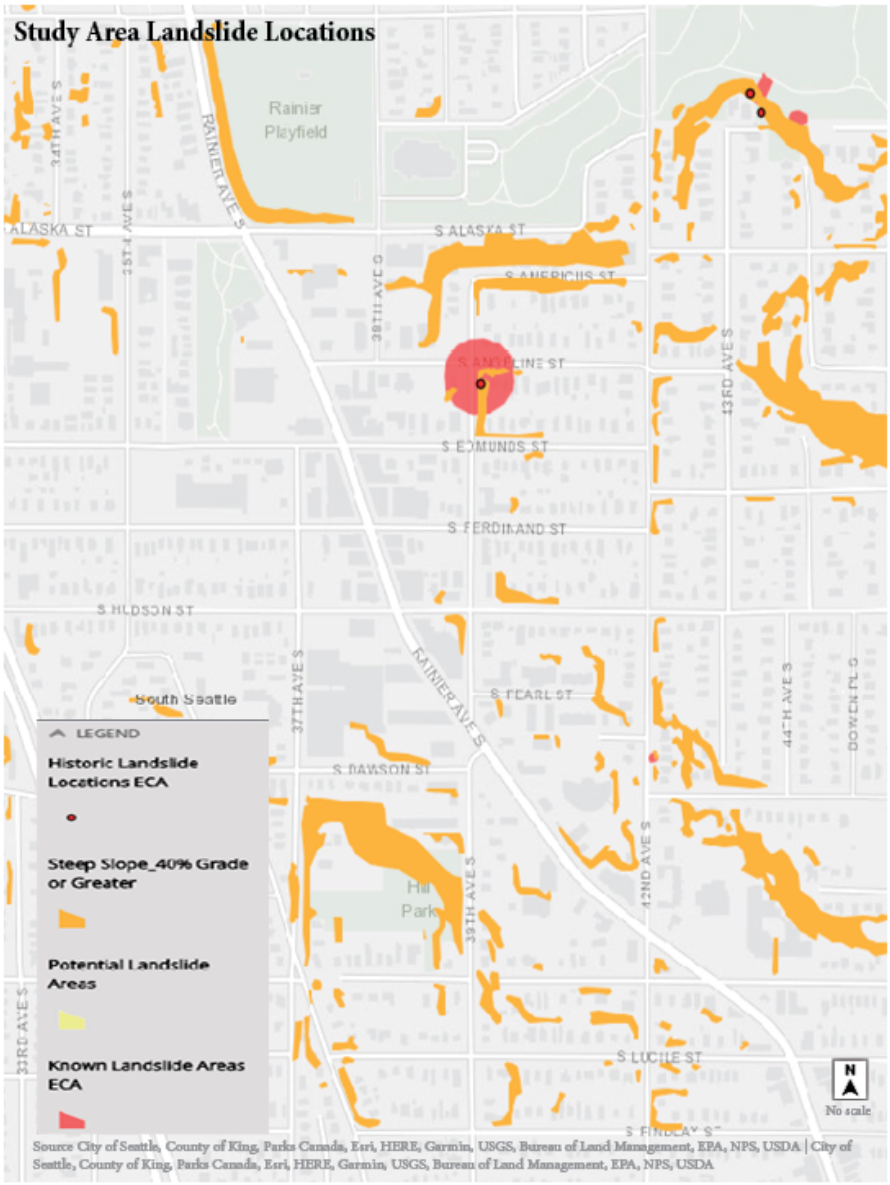

Figure 17: Study area landslide threats (Seattle Office of Emergency Management 2017)

4.2.2 Spatial Observation

I visited the Columbia City commercial core during different times of day for several months. The commercial core is nestled in a five-block area extending along Rainier Avenue South. The appealing commercial core is designated as one of eight citywide landmark districts, and the area is dominated by human scale, attractive older brick buildings. During the times I visited the neighborhood, morning to late afternoon, heavy pedestrian traffic flowed along the main commercial thoroughfare. While parking is available adjacent to Rainier Avenue South in the surrounding residential neighborhood, most shoppers either walk from their residences or drive and park in the residential streets adjacent to the commercial core. The commercial core is located three blocks east of the Link Light Rail, which allows many visitors to frequent the area via public transit.

Businesses are typically dominated by small eateries, coffee shops, bars, and boutique stores. Ethnic food restaurants are the most prevalent type of business, including

Figure 18: Royal Room, Photo by Allen Medley

diverse choices such as Senegalese, Caribbean, Hawaiian, Mexican and Ethiopian cuisines. Historic businesses located in URM buildings include the historic post-WWII African American Jazz Club and event place, the Royal Room and Esquire Club, Figure 18. In Hillman City, the Hillman City Collaboratory anchors the historic architecture of the small neighborhood hub.

The building stock in the Columbia City Landmark District is well preserved and retail businesses cater to professional middle to upper income clientele. Restaurants cater to a diverse set of clienteles, but artisanal fare reigns supreme- Neapolitan pizzerias, boutique bakeries, and sushi restaurants pepper the commercial core. Figure 19 shows an example of a typical boutique store in the neighborhood. National and local chain stores,

Starbucks, Pagliacci Pizza, Molly Moon's, and Eileen Fisher, anchor the four main corners of the commercial core. Buildings are well maintained, and several buildings show seismic bracing including interior steel crossbeams. Figure 20 shows the interior of a high-end retail store with visible seismic reinforcement performed by the building

Figure 19: Typical Business in Columbia City URM, Photo by Allen Medley (2018)

owner. Figure 21 shows an example of the well-maintained historic structures that comprise the Columbia City commercial core. The Hillman City neighborhood is a subarea of Columbia City and is classified as part of the greater Columbia City neighborhood. The Hillman City commercial core is a half-mile south of the designated landmark district. The quiet four block stretch of Rainier

Figure 20: Interior Eileen Fisher with visible reinforcement, photo by Author (2018)

Avenue South is lined with trees and not subject to heavy automobile traffic. The small human-scale commercial core consists of one-story buildings. The area has fewer

Figure 21: A typical Landmark District URM structure, Photo by Allen Medley (2018)

pedestrians frequenting the cluster of small businesses. The majority one-story URM buildings are not as structurally unique nor as well-maintained as the buildings in the Columbia City Landmark District. The exception is the attractive 1907 corner building that houses the Hillman City Collaboratory. Figure 22 shows the historic Hillman City Collaboratory, which anchors the commercial core.

Figure 22: Hillman City Collaboratory

Mom-and-pop ethnic restaurants and cafes are the most frequent type of business mixed with sleepy breweries, bars, and several vacant storefronts. The neighborhood, from an observer's standpoint, lacks the commercial appeal of its northern neighbor. Hillman City is not a designated landmark district, nor is it as economically viable as its northern neighbor. Despite its lack of commercial vitality, stakeholders identified the area as a historically vibrant arts and culture hub that has celebrated its ethnic diversity for generations. Hillman City is also in the most danger of displacement and infrastructure demolition as a result of increased pressure on small- scale property owners and businesses. A URM retrofit mandate could potentially change the face of Hillman City and destroy not only its character but displace many building and business owners who are majority ethnically diverse, immigrants, and people of color. Figure 23 shows a typical Hillman City URM building.

Figure 23: A typical Hillman City URM structure, Photo by Allen Medley (2018)

4.3 Interview Findings

I conducted three types of interviews to inform my findings. Interviews include, community stakeholders, alternative lenders, and private building owners. The focus and majority of my interview data is based on building owners' perception of the proposed retrofit mandate. The three community stakeholder interviews cover a broad base of information regarding the changing profile of the Columbia City community, gentrification concerns, and general neighborhood perceptions of the proposed URM mandate. The three alternative lender interviews cover technical financial aspects of the proposed retrofit as well as the widespread economic consequences of the impact on Columbia City. Finally, the nine building owner interviews provide detailed responses regarding perception of the proposed mandate from each individual's financial and social perspective. In aggregate, the interviews show a poor public perception of the proposed mandate unless additional sources of funding can be secured.

4.3.1 Community Stakeholder Interviews

Lance Matteson of SEED and a representative of the Hillman City Collaboratory (Stakeholder A) delved into the changing character of the Columbia City neighborhood as well as the social implications of the URM mandate and its connection to continued gentrification and displacement. Stakeholder A related that the Collaboratory existed as an informal meeting hub and social club for generations. To this day the Collaboratory hosts myriad events including birthday parties, theater performances, and religious services. Newer transplants, generally young professionals, use portions of the building as co-working office space. Both stakeholders expressed that the building itself has a

precarious future. Many community members expressed fear that the building owner would sell to a developer as she already avoided making tenant improvements. Stakeholder A stated that a potential $100,000 retrofit would incite her to sell. Both the Collaboratory and SEED are housed in the historic corner building. The Collaboratory is the social hub where many community members gathered to chat about the realities of retaining culturally relevant businesses that support a diminishing population.

While both stakeholders expressed that gentrification and displacement are occurring due to the growing residential popularity of the Puget Sound region. Stakeholder A stated that Hillman City community members are especially fearful. Many fear that structural changes to the neighborhood would contribute to social displacement. Stakeholder A states,

> Everybody here talks about here like they are waiting - 'oh they got Columbia City, we're next,' 'First it was the CD and then it was Beacon Hill, then it was Columbia City, and its coming.' The building boom is creeping down this direction. People have a long-term dream of this area becoming a historic district and saving the facade of this building with affordable housing above and a community center below. (Interview with Stakeholder A, by Author 2018).

Stakeholder A expounded on how the neighborhood would change in the next 15 years. She stated that with or without a URM ordinance the neighborhood would change. She believed that small minority-owned businesses anchored the Hillman City commercial core, contributing to the neighborhood's place-identity. Stakeholder A states,

> My hope would be that the diverse restaurants that are here are still here and - that they continue to anchor this place. I think they are a huge part of it. I hope the small businesses would sustain - there is a small coffee shop over here, a furniture shop over there, a physical therapy place. They are trying to get a boxing program over there. I would hope that the community center would stay. I think there is going to be a huge amount of housing going in (Interview with Stakeholder A, by Author 2018).

In order to combat growing displacement concerns, Stakeholder A mentioned that SEED is pushing for an Arts and Culture designation in Columbia City, which would

provide multiple spaces similar to the Collaboratory for neighborhood-use. Matteson clarified that an Arts and Culture district designation would establish the neighborhood as cultural hub for local artists. Stakeholder A added that it would also bring an influx of public money into the neighborhood. Stakeholder A stated, "a lot of people feel that the historic populations have been pushed out- [there are] huge gentrification concerns…people are concerned that the money would not be evenly distributed…there is an idea that these buildings wouldn't be able to be demolished, and also people think that it would protect the area from being flattened by developers" (Interview with Stakeholder A, by Author 2018). However, Matteson pointed out that the Arts and Culture District would have no impact on the built form.

Both Stakeholders agreed that a retrofit mandate would exacerbate displacement concerns and would primarily impact immigrant and minority-owned businesses. However, they mentioned that Columbia City, having already gentrified, would prove resilient while Hillman City would undergo substantial change to both the built form and the type of businesses in the commercial core. The one exception, according to Matteson, is the Royal Room and Esquire Club which lie on the fringe of the Columbia City Landmark District. He inferred that the historic jazz club could suffer a similar fate to Hillman City if the Seattle City Council approves the retrofit mandate.

Stakeholders expressed concern that an unfunded URM mandate would exacerbate equity issues in the Hillman City commercial core. Stakeholder A expressed that a divide between two types of business owners existed – newer businesses, who could sustain a retrofit cost without a significant rise in income, and older, primarily-minority owned businesses that could not sustain additional costs without a substantial

change in income. Ironically, Matteson pointed out that these businesses are the most welcoming of increased economic vitality, while the newer transplants are fighting to stave off rising costs.

Matteson expressed concern that the City of Seattle continues to offset costs such as the proposed retrofit onto commercial business owners, He states,

> The City has done have done a terrific job of paying attention to residential tenants - to stop displacement. But it has done little beyond lip-service to commercial affordability and the ability of owners and operators of businesses to stay. Immigrant, refuge, minority, and creative- owned businesses are under huge stresses to leave Seattle because of run-ups in rents. In some ways you could say that this [the retrofit mandate] is a subset of those affordability issues.

Matteson also believes that current City of Seattle policies, especially policies that target property owners, are cost-prohibitive and completely unviable to small-scale building owners and developers, who are often important leaders in their communities. He states that restrictive property policies such as the retrofit mandate would pressure African American and Asian community members to sell their property and relocate as their ability to retrofit is constrained. Matteson elaborates,

> People think about building owners as evil capitalists – [there is one building owner] who has been here a very long time. This is her living. - the way she supports her extended family, and it's what keeps this is what keeps her family around the community. So, it's not simple – that nuance is not always seen when the City Council makes these kinds of decisions (Interview with Lance Matteson, by Author 2018).

When I asked Matteson to formulate potential solutions, he stated that if the City of Seattle implemented a retrofit mandate SEED would continue to provide small business technical assistance but did not have capacity for much else. He also stated that a mandate coupled with serious substantive public investment would be a viable solution. He stated that forcing building owners, especially small-scale building owners that exist in Columbia City and Hillman City, to pay for retrofits is not a solution – "we have to

have some restraint built into our visions – we need to be cognizant of how costs filter down to some people" (Interview with Lance Matteson, by Author 2018).

Stakeholder interviews expressed minimal concern regarding the viability of the Columbia City commercial core over the next 15 years; however, they expressed ample concern over the potential loss of historic and cultural place identity of the Hillman City commercial over the next 15 years, with or without the proposed retrofit mandate.

4.3.2 Alternative Lender Interviews

I interviewed three alternative lenders, Todd Tarbert of Semble, Sue Taoka of Craft 3, and Wayne Lau of the Rainier Valley Community Development Fund (RVCDF). Interviews consisted of six questions that addressed the financial impact of the proposed retrofit mandate as specific to Columbia City and Hillman City as well as potential solutions.

Lenders expressed that the unintended consequences of the retrofit mandate would have profound negative externalities. They expressed that retrofit costs are prohibitively high, and commercial property owners in the Rainier Valley simply do not have access to the capital to fund large-scale improvements. Taoka expressed that the crux of the problem is that small scale building owners simply cannot set aside building and facility reserves and would be forced to borrow money. The loans would be used to finance structural improvements, which have very few returns on investment. Therefore, banks would have to offer very low interest loans with long amortization schedules and affordable rates, with no guarantee that funds would capitalize (Interview with Sue Taoka, by Author 2018).

Another issue that lenders addressed is that retrofit improvements do not add value to the building. In other words, the value of a retrofit is contingent on an earthquake, and the value of the building often lies in the land value rather than the building itself**.** Taoka states that the concern is that small scale building owners would lose their properties to developers who can afford the upfront cost of retrofits. The small-scale building owners would have to sell below market rate after the retrofit went into effect, because the building would no longer meet code. In areas located outside historic districts such as Hillman City, buildings will get torn down and people will be gentrified out unless the City of Seattle can implement financing or other policies for vulnerable building owners (Interview with Sue Taoka, by Author 2018).

Financial lenders echoed previous stakeholder sentiment that the Hillman City commercial core had less economic strength than its northern neighbor. Columbia building owners and businesses are eligible for traditional bank loans, unlike the Hillman City owners who are often considered un-bankable by traditional lenders. Building and business owners in the Hillman City commercial core were more likely to enlist the services of CDFI such as the Rainier Valley Community Development Fund. Wayne Lau stated that he had few commercial loans in the Columbia City commercial core, but six current loans in the Hillman City commercial core.

When asked if lenders would provide services related to seismic retrofits, lenders responded that they would attempt to support retrofitting costs, however most lenders had limited capacity either because money is not allocated for infrastructure improvements or property loans are not consistent with their missions. They also expressed that they were wary to provide financial funding until state and city options were more developed. As a

possible solution to the financing problem, lenders suggested that creative solutions will have to be considered, perhaps a collaboration among lending institutions to provide a larger base of capital. Some also questioned whether historic preservation should be a priority especially due to the lack of funds and the huge public safety issue, "I think demolition is a good alternative if the alternative will force a small-scale property owners to sell – we don't fight the decision if a building owner decides to demolish" (Interview with Wayne Lau, by Author 2018).

Lending institutions are wary that the ordinance will not pass until the City has secured public funding options. All lenders expressed willingness to help commercial property owners in their communities but recognized that their lending capacity is constrained either due to lack of capital or mission mismatch. However, lenders articulated that one solution would be to form a cooperation among lender that would allow for a greater pool of capital. Finally, they all agreed that no financing solution was possible without substantial public funding.

4.3.3 Building Owner Interviews

I interviewed nine Columbia City building owners in person and by phone. Only one building owner represented the subarea of Hillman City.

All URM owners knew that their property was listed on the citywide inventory. Three stated that their Columbia City URM buildings were fully retrofitted either by them or a previous owner. Full retrofits included parapet abatement, tying the roof to the walls, and adding reinforcement to the exterior walls. Two owners stated that they had performed some retrofits, such as parapet abatement and attaching the walls to the floor

but had not fully retrofitted their structures. These owners also expressed that they knew they should do more but had not taken further actions due to the prohibitively high costs. The Hillman City building owner stated that she knew she owned several URM buildings, but she was unaware of the requirements to retrofit. Three building owners expressed that they did not believe the retrofits they performed were necessary. Building Owner D describes the process and his concerns whether the retrofit was needed,

> "The earthquake retrofitting required digging down at all of the columns that are in the building and putting steel reinforcement in - concreting that in and going up with a steel member on the side of that and steel tying everything in…They required us to replace the roof - which was in perfect condition- in order to make it part of the structure. The given reason was to protect the businesses inside from loss of income - I don't know. The building is small - exits are close. If an earthquake started, people could get out. It's been through all the other ones. I just don't know" (interview with Building Owner D, by Author 2018).

Other building owners echoed his sentiment that their buildings had sustained multiple earthquakes, "I don't know what kind of earthquake would destroy my buildings – it doesn't make a lot of sense for some buildings (Interview with Building Owner J, by Author 2018). Many stated that the soil type and underlying bedrock of the Columbia City commercial core differed from the surrounding areas, "That seismic risk map that came out - Columbia City has the least risk. There is a unique rock formation under Columbia city - only one of its kind in the City of Seattle – It's pure rock three feet down" (Interview with Building Owner A, by Author 2018).

Almost all of the building owners who performed retrofits acted because they had applied for a major rehabilitation or change of use permit, which in turn triggered a retrofit through city permitting codes. Only one of these building owners received historic rehabilitation tax credits. Another owner retrofitted because he wished to maintain his building in order to charge tenants higher rent in the future, "the rent would

go up if I did the improvements, you know…the cost was justified by the higher rent – people are willing to pay that [high] rent in Columbia City. I also like when buildings look like they are in good condition" (Interview with Building Owner I, by Author 2018).

Owners who did not retrofit claimed that either the retrofit was unnecessary because they owned one-story structures or because it was too expensive – "So I don't necessarily think it's an awful idea, but I can't afford to do it – ever. I would be selling my buildings before I would retrofit" (Interview with Building Owner J, by author 2018). Another owner stated that retrofits would take too long, and it would displace tenants. Another stated that he probably would retrofit if he applied for a change of use permit.

Based on current City of Seattle estimates, the average cost to retrofit buildings is $45 per square foot. Based on this assumption, I calculated the average Columbia City building retrofit as $299,124, ranging between a low estimate of $66,690 and $649,035. However, eight of the structures have existing retrofits that may not need to be financed in the future. Most owners did not know the cost to retrofit their building. A few had retrofitted previous buildings and could estimate the cost for future retrofits. Owner-estimated costs ranged between $150,000 and $300,000 per building. One building owner stated that externalities should be factored into the total construction costs such as a loss of occupancy, impacting a business owner's livelihood, and lease negotiation,

> "How do you account for the lost occupancy? A lot of it is not just the cost of the retrofit. If you have a long-term restaurant tenant, and you have to kick them out for a time that the retrofit is taking place, how do you calculate killing their business - what is that cost? Construction cost is just a piece of the whole thing. For an empty building, it's not a big deal. But for a building with an occupant, it's a whole different question" (Interview with Owner I, by Author 2018).

Similarly, building owners were most concerned that they would have to raise commercial rent. Building owners are concerned that many small businesses could not

absorb the cost of a rent increase and would vacate, especially after many have increased rents as a response to a recent spike in property taxes. He believes that rising costs would lead to small business displacement:

> "Costs get passed through to tenants - property taxes have gone up so much in the last couple of years - especially this year. It would be really detrimental to the homegrown businesses that we prefer here. We are a neighborhood of unique mom-and-pop, one-of-a-kind businesses, and higher rents tend to discourage them - what we get in replacement are the chain stores that can afford the higher rents. That would really change the neighborhood - destroy it, in my point of view " (Interview with Owner B, by Author, April 2018).

Many equate the proposed retrofit mandate with a tax increase, and they perceive that the City of Seattle is overburdening small businesses with taxes and other fees. Owner H echoed a common theme that Seattle is one of the hardest places to business in the US,

> "Commercial rents are at an all-time high, transportation costs are high. We are getting surcharges on deliveries from vendors. We are paying high utility rates. We are paying the highest minimum wage in the country… Businesses are really burdened in this city" (Interview with Owner H, by Author 2018).

Other concerns are that commercial tenants would not be able to operate during retrofits, and complications regarding commercial leases would arise. Other negative externalities include the perception that structural retrofits, primarily steel cross beams, would ruin the appeal of the historic buildings:

> "One of my concerns would be whether it is gonna do anything to negatively impact the historic structure of the building… I've seen a lot of retrofits with cross bracing of steel. If you were gonna put a cross brace there - It would ruin the historic look of the building" (Interview with Owner C by author, April 2018).

Building owners had varied responses to possible next steps if a retrofit mandate went into effect in the next year. I asked building owners what they would do if they had 13 years to retrofit their buildings in accordance with the URM Committees' recommendations. Surprisingly, half of the six respondents stated that the 13-year timeline gave them considerable time to either retrofit or sell their properties. For example, Building Owner I stated, "in that time period, I would potentially have a tenant rolling over, construction costs would be lower…I may not even own it in 13 years. In 13

years we might know more about earthquakes – there might be an earthquake and half these buildings are gone. It's kind of like, yeah, no problem, I'll get this done in 13 years" (Interview with Owner I, by Author 2018)." Two other owners stated that they would probably sell their buildings, but they had plenty of time to think about it. When I asked owners about how they would finance their retrofit at this point in time, the majority stated that their first choice would be to finance in cash, but it would be inconvenient – "it would keep me from doing another project for maybe a year or two" (Interview with Owner A, by Author 2018)." However, second-tier responses included 'I don't know,' 'take out a loan,' and 'investigate public funding options.' Most building owners stated that they were bankable and could take out a traditional loan. Only three respondents had used a CDFI or alternative lender in the past and complained that their rates were not competitive with commercial banks.

Building owners did not find any of the current financial incentives attractive enough to encourage them to retrofit their buildings. Current incentives include, opportunity to change zoning, rebate programs, subsidized permitting fees, and waived parking requirements. The most attractive incentive was subsidized permitting fees. Commonly, building owners stated that they would like the City of Seattle to provide an easy to access list of available engineers, architects, and contractors who specialized in seismic retrofits. Additionally, building owners thought the City of Seattle should subsidize engineering and architectural analysis prior to the retrofit. Finally, many stated that making the permitting process easier and cheaper would incentivize them to take the next step to retrofit their buildings. However, many owners pointed out that most incentives do not apply in a designated landmark district. Additionally, many owners

expressed concern that retrofit would trigger further building renovations to meet energy efficient and green building codes.

When asked which financing option they preferred from a list of possibilities suggested in the 2017 URM Committee Recommendations, building owners overwhelmingly preferred government grants and assistance as well as long-term low-interest loans. Other financing options included tax abatement, revolving loan funds, local improvement districts (LIDs), architectural and engineering funding, and transfer of development rights. Again, waiving or reducing permitting fees was also an attractive option, but owners did not feel that their benefit outweighed the overall cost of the project. Figure 24 shows building owners' preferred financing option along with the estimated cost to retrofit their building. Only current URM owners with non-retrofitted building are included in the graph.

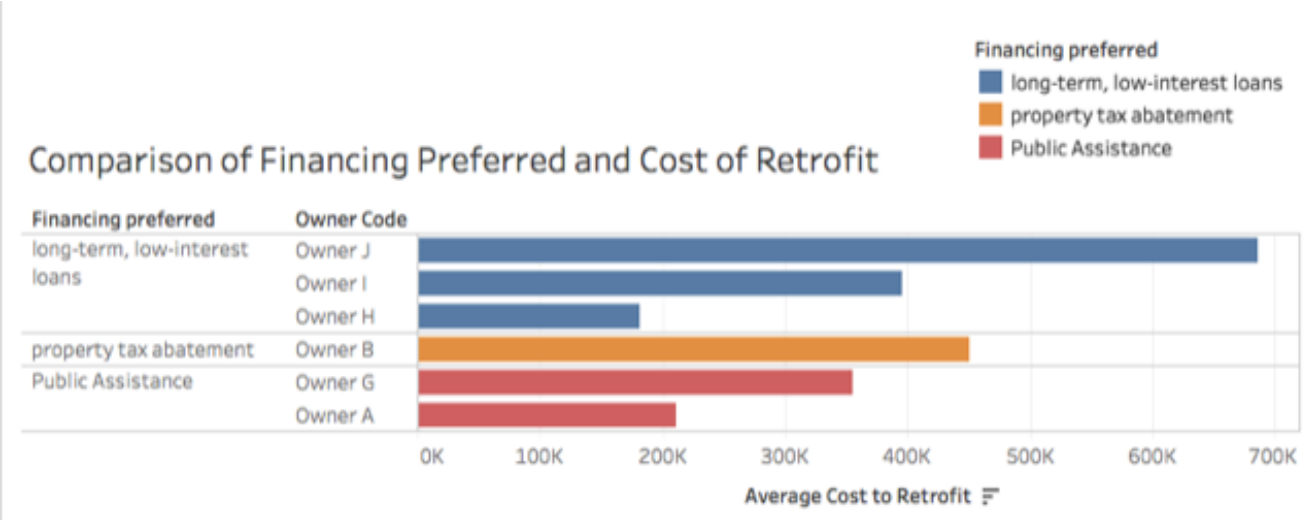

Figure 24: Building owners' preferred financing method as compared to the average cost to retrofit their buildings, graph by Author (2018)

Least popular options included LIDs and transfer of development rights, neither of which are available in a landmark district anyway. Building owners felt that existing LIDs, especially on the waterfront had too many issues, and unfairly forced business owners to comply: "LIDs don't work for everyone, and I think there are some people on the waterfront who are maybe forced to participate –I don't really think that's effective – those scare people" (Interview with Building Owner J, by Author 2018). Building owners either did not know what transfer of development rights were, whether they were applicable in a landmark district, or whether they were a feasible policy alternative: "I have no confidence the City can execute that effectively. The existing programs are opaque, complicated, inefficient, and confusing – and not fully utilized. I do not have confidence that that program would work" (Interview with Owner E, by Author 2018). Some building owners expressed that demolition would be an attractive alternative, but next to impossible in a landmark district – owners voiced that the building owner must have a strong economic hardship coupled with a building so damaged it no longer retained its historical significance.

From a broader perspective, building owners, by in large, do not believe a retrofit mandate would cause further displacement or gentrification within the commercial core. For the most part, building owners surmised that the built-form of Columbia City would not change significantly due to its landmark designation. Many believe that gentrification had already taken place. Based on Seattle's growth trajectory, building owners believe that the continued influx of wealthy populations into the area would affect future changes more so than a retrofit mandate within the next 15 years. For the most part, building owners believe that they could absorb a retrofit cost. On the other hand, building owners

expressed concern about historic minority-owned businesses as well as the Hillman City neighborhood: “Places like the Royal Room and Esquire Club won’t exist,” (Interview with owner A, by Author 2018). Others stated that not only will the built environment of Hillman City change due to a retrofit mandate, but commercial businesses will be forced out due to a sizeable increase in rent; “Hillman City will be affected. That will be harder. People have cheap rent up there. You are basically disenfranchising people who have owned buildings for a long time – people of color” (Interview with Building Owner E, by Author 2018).

Building owners felt that a retrofit mandate would impact the type of businesses in the commercial core, many stating that small businesses would be priced out, “I think it could really impact the types of businesses in the district. Right now, we have a lot of small mom-and-pop, funky businesses, but if you have to significantly raise your rents to justify doing improvements on the building – you could price some businesses out of the market” (Interview with Building Owner C, by Author 2018). Another building owner states, “[the retrofit] will absolutely motivate property owners to seek higher rents – what some people call gentrification” (Interview with owner I, by Author 2018).

When I asked building owners what they believed to be the best solution to the URM problem in Columbia City, the answers were diverse, but four common themes were most popular. Owners suggested that the City of Seattle target retrofits to specific seismically vulnerable areas or areas that had a higher concentration of URM buildings. Building Owner B states,

> “Do a neighborhood specific analysis of the threat and not use a standard citywide approach because the nature of the rock here - the ground- I believe is different than other places like Pioneer Square. You might find that the risk here is much less than in other areas of the city. It would be best to customize the program based on specific geology” (Interview with owner B, by Author 2018).

Building Owner A adds,

> "Target critical buildings, critical areas first area by area. Multistory buildings are a concern – the City should target those first. I totally understand with the two-story buildings. Retrofits should be based on seismic threats" (Interview with Owner A, by author 2018).

Additionally, building owners also suggested the City allow historic districts more flexibility and provide more assistance in the form of loans and grants since building owners do not have the economic options available in non-historic districts, such as demolition of redevelopment.

Two building owners suggested that the status quo was preferential to further regulations because it allowed real estate investors to plan if they wanted to purchase an older brick building, whether they would upgrade the use, and plan when to start and stop commercial leases.

> "I would prefer they keep the current requirements that a retrofit is required with an upgrade, because then you can plan accordingly. When you renovate a building, you put new tenants in and you can decide whether a retrofit works or not - you can budget for that - you have the leeway to make decisions" (Interview with owner E, by Author 2018).

Overall, suggestions for future policy were peppered with emotive statements and opinions regarding the City of Seattle's state of government and policy practices. Commonly, building owners felt victimized. The most frequent theme among building owners was that the City routinely overregulates small business owners and property owners. They believe that Seattle City Council does not prioritize small business success over social policies. However, despite the overall lack of trust in city policy, some building owners believed that a public-private collaborative approach is a necessary next step for a successful retrofit policy- "there has to be some middle ground that we can all reach through City participation" (Interview with owner C, by Author 2018), and another

building owner stated, “business owners should work with government to compromise and collaborate, not to compete” (Interview with owner H, by author 2018).

4.3.4 Interview Findings Discussion

Interviewees thought that an unfunded mandate would cause immediate financial problems for building owners and small businesses alike. Interviewees also thought that the retrofit mandate would affect the Columbia City commercial core differently than the Hillman City commercial core, causing increased displacement of minority-owned businesses in the southern subarea. Similarly, interviewees thought that the built form would remain static in the Columbia City commercial core due to the Landmark District overlay, but they believed the Hillman City commercial core would change dramatically over the next 15 years despite the proposed Arts and Culture overlay zone. Many expressed that they expected Columbia City to continue to gentrify causing increased displacement among many long time commercial tenants. While interviewees stated that the URM mandate would contribute to continued social displacement in the neighborhood, it would not affect major change. Instead, interviewees attributed increased gentrification and displacement to an increase in population and recent economic growth in the Puget Sound region. However, building owners also expressed frustration with the City of Seattle. Many perceived that the City of Seattle had increased taxes and fees for businesses and property owners in order to further social justice issues. Building owners believe that increasing costs for small-scale property and business owners will result in a net loss of small businesses in the Columbia City neighborhood.

Financially, building owners expressed that grants, property tax abatement, long-term low-interest loans, and waived permitting fees are the preferred funding options.

Moving forward, interviewees suggested that a public-private collaborative approach would be the most appropriate way to identify funding alternatives. Interviewees also suggested that the City of Seattle target neighborhoods that have high-risk soil composition and neighborhoods with a high frequency of URMs.

Localized findings suggest that it would be unwise for the Seattle City Council to approve a mandated retrofit ordinance until a more robust mix of funding alternatives can be identified. In this study, Columbia City acts as a microcosm of the City of Seattle. If the sentiment of Columbia City stakeholders reflects that of citywide building owners, any retrofit mandate ordinance will be met with vitriol. Moreover, at this stage, a mandate will be wholly ineffective, potentially abandoned or hindered by the court system. Currently, the State of Washington is moving forward on a statewide inventory of URMs, and if the state legislature determines that the risk is substantial, state funding will be an obvious next step. However, private funding will also be necessary. Retrofits will be expensive, and while building owners do not want to bear the full cost, municipal and state governments cannot afford to provide grants and loan support to thousands of property owners.

The interview findings are not surprising when compared to the precedent case studies. The benefits of disaster mitigation efforts are not fully realized until a catastrophic event occurs. The pay-off of mitigation efforts is only contingent on tragic and unexpected circumstances. The City of Seattle will experience an earthquake, but that earthquake may be tomorrow, or it may occur in 500 years. From an economic perspective, the odds are against the property owner who will pay 100% of the costs upfront with no guarantee on increased returns. In fact, the property owners may not see

any returns at all, if a catastrophic event fails to occur during the lifetime of their property ownership. Property owners remain resistant to pay mitigation costs despite the fact that experts have shown that post-disaster recovery costs are far higher than mitigation costs. In Christchurch, URM laws were lax, and resulted in 39 fatalities. Subsequently, almost the entire URM building stock was destroyed either during the earthquake or demolished in the years after. Similarly, state policy in California was not fully realized until after the Loma Prieta Earthquake killed several dozen and destroyed many URM buildings. Unfortunately, according to precedents, it will be difficult to convince property owners to seismically strengthen their buildings until after a severe disaster occurs in our region. However, the precedent studies also show that state or national legislation increases the success of a municipality's seismic mitigation program and provides a much-needed funding boost.

Columbia City building owners' perception of the mandate is not surprising when compared to previous efforts. Building owners feel that they have to endure prohibitively high costs to satisfy ambiguous and gratuitous results that satisfy the normative public safety visions of the Seattle City Council. Surprisingly, many owners who had retrofitted their buildings demonstrated an overall lack of expertise regarding how their building would perform in an earthquake. Some cited that people in the buildings could just run outside in the event of an earthquake or that since the building had sustained many previous earthquakes it would be impervious to future events. Thus, many building owners feel that they were forced to perform retrofits, often triggered by a change of use permit, but do not understand the risks their buildings pose. Before a retrofit ordinance can gain traction, public opinion must match the goals of the municipal government. At

this point in time, many do not understand the danger of URM structures and view safety measures as unnecessary.

Limitations of the findings are that participation was limited and skewed toward Columbia City Landmark District building owners as I was only able to interview one Hillman City building owner. Findings center on wealthier Columbia City commercial building owners. Columbia City building owners had several properties throughout the city, did not reside in the Columbia City neighborhood, and stated that they would not leave if a retrofit mandate took place. Interviewees expressed that Hillman City property owners would face severe challenges that would include selling properties below cost or leaving behind their multi-generational neighborhood. Future City of Seattle researchers should continue to examine the connection between URM abatement and gentrification in Hillman City and areas farther south.

Finally, City of Seattle interviews and other stakeholder interviews reveal that, adequate funding options simply do not exist. Interviewees often alluded to "financing packages." However, such "robust" or "rich" "tapestries of funding options" do not yet exist. Many City interviewees suggested that no financing mechanism had been proposed because no one had yet found the right mixture of options or the missing financial ingredient. Unfortunately, financing is not an afterthought in political decision-making. It is impossible to parse out financing from the problem itself; lack of financing options *is* the integral problem. It is unlikely that further research will result in a silver bullet financial option or bundle of options. While state funding may provide some relief, the onus of the retrofit problem will continue to be its underlying cost. Instead of attempting

to find a perfect combination of public-private funding options, the City will need to work with the private sector to find an acceptable compromise.

5.0 Recommendations

Currently, building owners feel that they have inadequate financing options to support seismic retrofits. Building owners do not complete minimal retrofit standards such as parapet abatement because the incentives to do so often do not provide more benefit than the added cost. As part of the URM Committee's recommendations, Committee members suggest that retrofits meet a modified Bolt's Plus Standards. Although Modified Bolt's Plus is considered a low-cost retrofitting option, the cost is still a staggering $45 per square foot on average. Building owners do not perceive that the high cost will benefit them in anyway except in the event of an earthquake. Building owners perceive that they must pay 100% of the retrofitting cost upfront while the probability of an earthquake occurring in any given year is only 4%. City of Seattle policy makers, state legislators, and CDFIs agree that an unfunded mandate would be devastating to not only small building owners and businesses, but the historic building stock itself. It is unrealistic to believe that a silver-bullet funding option will materialize. Similarly, state funding may be on the horizon, but such options are not guaranteed, nor will they be available for several years.

The literature indicates that neighborhoods such as Columbia City are prone to issues arising from gentrification and displacement. Similarly, due to the lack of mitigation policy within the US, few financing options exist to aid small-scale building owners and business owners. The precedent studies show that un-bankable populations are the most likely to be displaced after a city enacts an URM mandate. Currently, many Hillman City building owners and business owners rely on CDFIs such as the Rainier

Valley Community Fund. However, such non-traditional funding streams are often mission-driven or lack consistent revenue streams. One option is to consider cooperation among alternative lenders who could pool their resources to supply capital to un-bankable individuals who may lose their properties otherwise. Again, according to lenders, a cooperative program would require public subsidies.

The findings indicate that until more funding options become available, such as state support, the City of Seattle should maintain its status quo. Similarly, the current policy climate does not support a URM retrofit mandate. Stakeholders believe that they are already overburdened by regulations, and many view the retrofit requirements as another tax. Further, there continues to be a lack of knowledge regarding seismic threat in the City of Seattle as well as the performance of URM buildings in the event of an earthquake. However, the City should continue to work toward full retrofits in the near future. If more funding options become available, such efforts will improve public perception and ensure smoother implementation of a retrofit ordinance. The City should work with building owners in a collaborative governance system to create and implement mutually-agreed upon goals. Further, the City should improve incentives, decrease or eliminate permitting fees, increase education, target mitigation to the most vulnerable areas, and partner with CDFIs to manage a pool of lending capital.

Currently, a major renovation, change of use permit, or increase in occupant load triggers an owner to bring their building up to code. Building owners cited this most frequently as the reason they retrofitted their building. In this case, the market determines which buildings are retrofitted. As Seattle continues to grow and historic areas become more gentrified, many URM owners will apply for change of use permits to appeal to the

changing clientele. As areas continue to gain economic viability, historic building owners will continue to convert turn-of-the-century brick buildings into bars, restaurants, and retail stores. The current policy does not disrupt tenants as building owners apply for a change of use permit when they purchase a new building or remodel a vacant structure. Building owners have the choice when purchasing a historic brick building. Such buyers are savvy investors who understand the implication of renovating a URM building. While a retrofit mandate would not bankrupt a savvy real estate investor, it would disproportionately impact small building owners in areas like Hillman City, who often only own one building, have their equity and savings tied into ownership, and have little knowledge of permitting procedures. If the City enacted a retrofit mandate, unsophisticated building owners would be forced to sell their properties at highly discounted rates because the buildings would no longer be up to code. As the city continues to grow rapidly, property owners can sell their buildings at market rate to investors who will invest the capital to renovate and retrofit the buildings.

The number of URM buildings in Seattle is a health and safety issue. Until state funding is secured, the City will need to provide supplementary low-cost incentives to increase private investment. The first option would be to severely restrict occupancy requirements in known URM buildings. This may incite some building owners to retrofit in order to have a more economically viable space. However, it could also mean that buildings remain underused.

Building owners expressed that subsidized or waived permitting fees and grants toward architectural and engineering service are the most attractive incentive programs. Such services often cost $10,000 to $20,000 according to interviewees. If the City could

subsidize this first step, many building owners might agree to perform a seismic assessment of their building. Not only would this increase their knowledge of their building's vulnerability, but they might decide to implement improvements at a later date. Other interviewees also mentioned that the city should provide a comprehensive list of architects, engineers, and contractors that perform retrofits.

Another low-cost option is to follow the example of California and require building owners to post a notice on each entryway that informs potential patrons that they are entering a URM building that could be hazardous in an earthquake. Signage would increase public knowledge of the URM risk. Increased public knowledge of URM risk, as precedent studies show, can leverage increased political support. Notices may incite some building owners to improve their building due to social pressure.

Finally, a retrofit ordinance will need public support to have political viability. At this time, few people know that URM buildings pose a serious safety risk in the event of an earthquake. Building owners themselves demonstrated a lack of knowledge in how their buildings would perform in an earthquake. Some building owners suggested that tenants and customers could easily run outside if there was an earthquake. Ironically, falling bricks from parapet collapse most often kill people who are exiting the structure during an earthquake. Many building owners assumed that since their building had sustained multiple earthquakes that future earthquakes would not pose a threat. Thus, many building owners retrofit simply because the code requires them to when they apply for a change of use. Many building owners do not understand the seismic risk their buildings pose. The City should amplify education efforts to both building owners and the general public. Building owners will be more likely to comply if they understand the

risk, and the general public may direct municipal government to mitigate the public safety hazard.

The City of Seattle's ultimate goal is to fund a URM retrofit. However, public opinion and lack of funding options preclude further action. Many building owner interviewees suggested the City provide more opportunities for collaboration between the City and the private sector. The City should employ a collaborative governance approach to ensure that the City and building owners work together to create a set of mutually agreed upon public safety goals, areas of agreement, and financing alternatives. The current situation is ripe for a collaborative process. It is in the best interest of building owners and the City of Seattle to identify ways to cooperate to solve a potential human safety crisis. The City of Seattle cannot move forward because there is a lack of public buy-in, and building owners refuse to comply unless they receive substantial public assistance. However, using a mediated approach, the City and citywide building owners could identify areas of agreement to move towards a set of workable policy alternatives. I have created a Draft Collaborative Governance Charter that may prove useful if the City of Seattle wants to pursue a collaborative approach with building owners in the future. See Appendix 6 for Collaborative Governance Charter.

Finally, Columbia City building owners feel that their neighborhood should have more flexible retrofitting options due to the landmark overlay district. The highly regulated district restricts incentives that are available to other neighborhoods such as demolition, transfer of development rights, and up-zoning potential. The City of Seattle should revise the current one-size-fits all approach to retrofitting. Instead, the City should provide more flexibility in landmark areas in regard to compliance times. The City should

also provide grants for building owners who can prove economic hardship and demonstrate that they would benefit from incentives outside historic districts.

The URM Committee recommends that critical and high-risk buildings have more stringent retrofit timelines than medium risk buildings. However, the City should also allow latitude depending on neighborhood. The City should target neighborhoods that are most prone to URM collapse such as Pioneer Square and the International District. Compared to areas such as Pioneer Square and Chinatown International District, Columbia area does not have a high density of URM structures nor is the soil prone to liquefaction. Overall, Columbia City does not pose the greatest public safety issue, and the City should target retrofit requirements to neighborhoods that contain the greatest frequency of critical-risk and high-risk buildings first.

6.0 Conclusion

The City of Seattle faces the threat of a major earthquake in the near future. Pre-1940s brick buildings are visually appealing, represent the City's rich history, and often provide low cost commercial spaces in some of Seattle's most dynamic neighborhoods, such as Pioneer Square, Chinatown International District, and Columbia City. Turn-of-the-century URM buildings are intrinsically tied to each area's sense of place, culture, and history. URM buildings also act as a public safety hazard in a seismic event.

The purpose of this study is to examine how Columbia City and Hillman City building owners perceive the proposed retrofit mandate and proposed financing options presented by the URM Committee in the 2017 document, *Recommendations from the Unreinforced Masonry Committee to the City of Seattle.* The hypothesis of the research is that the City of Seattle proposed retrofit is cost-prohibitive to building owners in the Columbia City and Hillman City commercial cores. Subsequently, the proposed mandate may cause increased gentrification and displacement of small property and business owners.

The literature review shows that gentrification and displacement often result when neighborhoods undergo structural improvements, and that while historic preservation can retain an area's place identity, it is often a tool employed by the elite to preserve an exclusive way of life in rapidly changing area. Additionally, preservation goals often contradict public safety issues. The literature shows that financial programs to fund mitigation efforts are undeveloped and international in scope.

Research findings include precedent case studies in Christchurch, California, and Portland, spatial findings that contextualize Columbia City's place identity, and interviews with stakeholders, alternative lenders, and building owners. Findings show that perception of the retrofit mandate is largely negative. Interview subjects agree that without adequate funding, the proposed mandate would be disastrous to small businesses and small-scale building owners especially in areas vulnerable to the negative impacts of gentrification and displacement such as Columbia City. Not only would building owners face financial hardship, they would likely pass costs onto their commercial tenants who in turn would move to more affordable areas. While interviewees do not think that building owners and businesses would move as a result of a retrofit ordinance, the mandate would exacerbate current issues of gentrification and displacement especially in Hillman City. Moreover, many believed that much of the building stock in Hillman City would fall into the hands of developers if long-time small building owners cannot afford to retrofit their buildings. In all, building owners felt that the City of Seattle continued to pass tax increases and fees onto the small public sector in order to fund socially popular, but economically infeasible policies.

Limitations of the study include an overall lack of comprehensive research regarding the State of California 1984 URM retrofit law and municipal byproducts. Also, literature relating to financing of US mitigation policies is entirely undeveloped. Research limitations include a small sample of stakeholders. Also, interview subjects are highly skewed towards building owners, who are not representative of business owners, neighborhood workers, or other community stakeholders. Ironically, interview subjects

were the least likely to experience displacement due to the high costs of the retrofit mandate.

Additional research should include a more robust study of US hazard mitigation financing options, perhaps synthesizing lessons learned from California precedent studies. Within the context of Columbia City, further research should include a wider interview sample that is representative of the entire neighborhood, not just the commercial core between Alaska Ave S and South 39th Street. Finally, research should concentrate on successful citywide collaborative processes that could lead to an agreed-upon solution by all parties.

Without more funding options, Seattle City Council should not approve a mandatory retrofit ordinance. State funding may provide more options, but it is not guaranteed. At this point in time the status quo is the most effective alternative. The City of Seattle should focus on low-cost incentives that improve seismic compliance such as subsidizing or eliminating permit fees and providing technical assistance such as engineering and architectural assessments. The City could further restrict occupancy requirements for un-retrofitted buildings and require owners to post hazard notices that alert the public that the building is a URM structure. The City should increase URM education programs to the general public and building owners to gain increased political support. The City should also create a collaborative program with building owners to define goals, identify solutions and mutually-agreed upon funding solutions. Finally, the City should target the most vulnerable areas, such as areas with poor soil composition and a high frequency of URMs.

The goal of the research presented here is to catalyze the City of Seattle and citywide building owners to work together to negotiate robust financing options that prove efficient, equitable, and may ultimately save lives.

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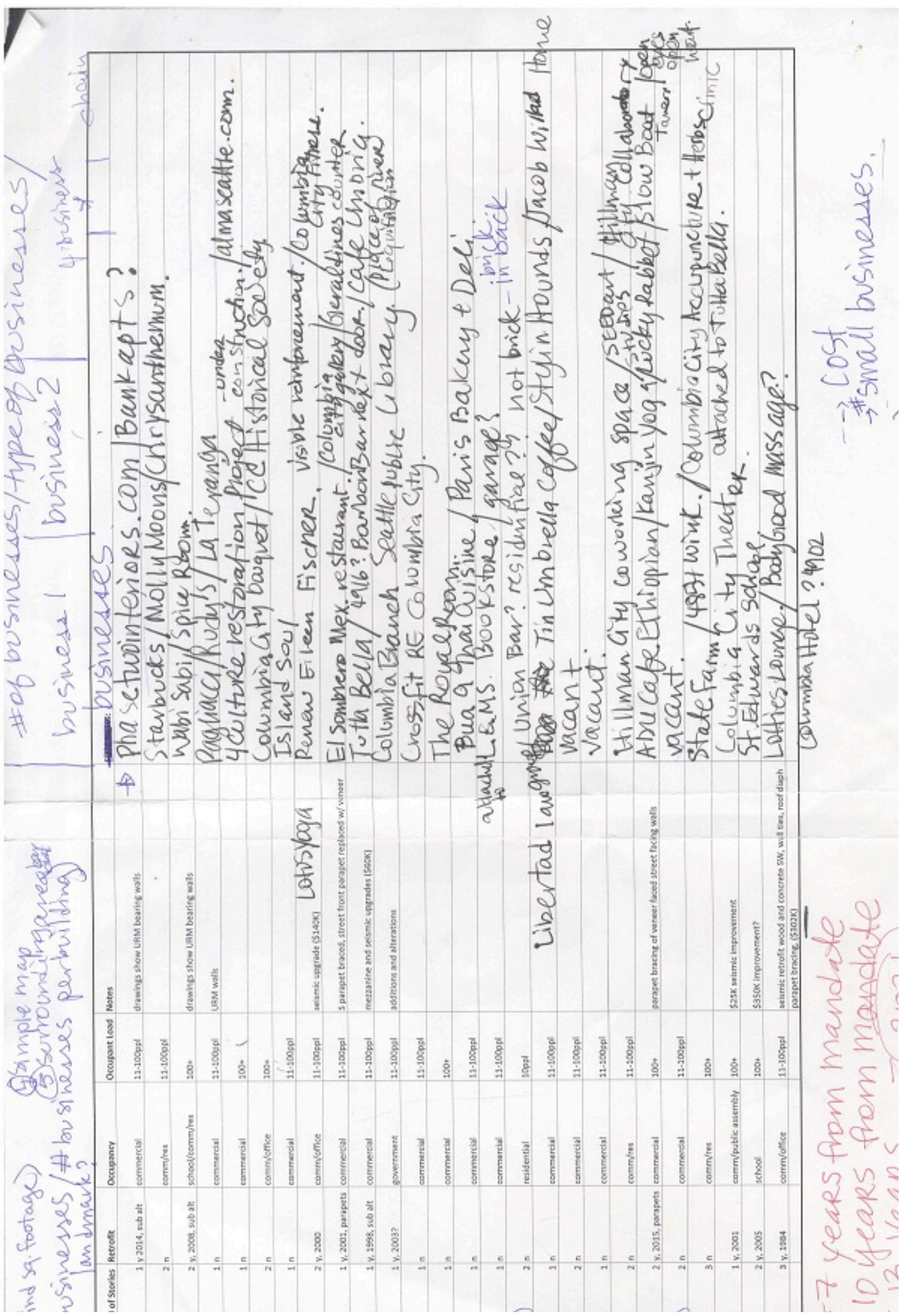
Appendix 1: Field Notes



[illegible]nd sq. footage) / [illegible]usinesses / # businesses per building / landmark?
(4) simple map (5) surrounding area [illegible]
# of businesses / type of businesses /
business 1 | business 2 | 4 business | chain

# of Stories	Retrofit	Occupancy	Occupant Load	Notes	businesses
1	y 2014, sub alt	commercial	11-100ppl	drawings show URM bearing walls	Phasetwointeriors.com / Bank apts?
2	n	comm/res	11-100ppl		Starbucks / Molly Moons / Chrysanthemum.
2	y, 2008, sub alt	school/comm/res	100+	drawings show URM bearing walls	Wabi Sabi / Spice Room.
1	n	commercial	11-100ppl	URM walls	Pagliacci / Rudy's / La Teranga
1	n	commercial	100+		4Culture restoration project - under construction. / almaseattle.com.
2	n	comm/office	100+		Columbia City Bouquet / CC Historical Society
1	n	commercial	11-100ppl		Island Soul
2	y, 2000	comm/office	11-100ppl	seismic upgrade ($140K) Lotus Yoga	Renew Eileen Fischer. Visible reinforcement. / Columbia City Fitness.
1	y, 2001, parapets	commercial	11-100ppl	5 parapet braced, street front parapet replaced w/ veneer	El Sombrero Mex. restaurant. / Columbia City gallery / Geraldines counter
1	y, 1998, sub alt	commercial	11-100ppl	mezzanine and seismic upgrades ($60K)	Tutta Bella / 4916? Bamboo Bar next door. / Cafe Umoja.
1	y, 2003?	government	11-100ppl	additions and alterations	Columbia Branch Seattle Public Library. ([illegible])
1	n	commercial	11-100ppl		Crossfit RE Columbia City.
1	n	commercial	100+		The Royal Room.
1	n	commercial	11-100ppl		Bua 9 Thai Cuisine / Paris Bakery + Deli.
1	n	commercial	11-100ppl		attached to L.E.M.S. Bookstore / garage? brick in back
2	n	residential	10ppl		Union Bar? residential?? not brick
1	n	commercial	11-100ppl		Libertad language [illegible] Tin Umbrella Coffee / Stylin Hounds / Jacob Willard Home
2	n	commercial	11-100ppl		vacant
1	n	commercial	11-100ppl		vacant.
2	n	comm/res	11-100ppl		Hillman City coworking space / SEEDart studios / Hillman City Collaboratory
2	y, 2015, parapets	commercial	100+	parapet bracing of veneer faced street facing walls	Abu Cafe Ethiopian / Kanjin Yoga / Lucky Rabbit / Slow Boat Tavern / open eyes open heart
2	n	commercial	11-100ppl		vacant.
3	n	comm/res	100+		State Farm / 4859 Wink. / Columbia City Acupuncture + Herbs Clinic
1	y, 2001	comm/public assembly	100+	$25K seismic improvement	Columbia City Theater. attached to Tutta Bella.
2	y, 2005	school	100+	$350K improvement?	St. Edwards School.
3	y, 1984	comm/office	11-100ppl	seismic retrofit wood and concrete SW, wall ties, roof diaph parapet bracing. ($302K)	Lotties Lounge / BodyGood Massage?

Columbia Hotel? 4902

7 years from mandate
10 years from mandate
13 years [illegible]

→ cost
→ # small businesses.

Appendix 2: Interview Results Excel Sheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Full Address	Longitude	Latitude	Address	City, State	URM Building	Risk	District	Year Built	Number of Stori	Retrofit	Occupancy	Occupant Load	Zoning	Number of Busi	Contains reside	# of independer	# of local chain
2	3808 S Edmunds	-122.2850324	47.5588376	3808 S Edmunds	Seattle, WA	y	medium	Special review	1925	1	y	commercial	11-100ppl	NC3P-40	1	y	1	0
3	4820 Rainier Ave	-122.2853282	47.5588054	4820 Rainier Ave	Seattle, WA	y	medium	Special review	1920	2	n	comm/res	11-100ppl	NC3P-40	3	y	1	1
4	4909 Rainier Ave	-122.2852731	47.557558	4909 Rainier Ave	Seattle, WA	y	critical	Special review	1906	2	y	school/comm/res	100+	NC3P-40	2	n	2	0
5	4901 Rainier Ave	-122.285257	47.5576859	4901 Rainier Ave	Seattle, WA	y	medium	Special review	1913	1	n	commercial	11-100ppl	NC3P-40	3	n	1	2
6	3806 S Ferdinan	-122.2845856	47.5580949	3806 S Ferdinan	Seattle, WA	y	medium	landmark	1921	1	n	commercial	100+	NC3-40	2	n	1	0
7	4873 Rainier Ave	-122.2853297	47.5579695	4873 Rainier Ave	Seattle, WA	y	medium	landmark	1908	2	n	comm/office	100+	NC3P-40	2	n	1	0
8	4869 Rainier Ave	-122.2854386	47.5581258	4869 Rainier Ave	Seattle, WA	y	medium	Special review	1928	1	n	commercial	11-100ppl	NC3P-40	1	n	1	0
9	4860 Rainier Ave	-122.2849415	47.5583463	4860 Rainier Ave	Seattle, WA	y	medium	Special review	1909	2	y	comm/office	11-100ppl	NC3P-40	3	n	2	0
10	4868 Rainier Ave	-122.2848631	47.5581166	4868 Rainier Ave	Seattle, WA	y	medium	landmark	1908	1	y	commercial	11-100ppl	NC3P-40	3	n	3	0
11	4918 Rainier Ave	-122.2844516	47.5572142	4918 Rainier Ave	Seattle, WA	y	medium	Special review	1920	1	y	commercial	11-100ppl	NC3P-40	2	n	1	1
12	4243 Rainier Ave	-122.2885725	47.5644206	4243 Rainier Ave	Seattle, WA	y	medium	no designation	1926	1	n	commercial	11-100ppl	C1-40	1	n	1	0
13	5000 Rainier Ave	-122.2863893	47.5569293	5000 Rainier Ave	Seattle, WA	y	medium	landmark	1910	1	n	commercial	100+	NC3P-40	1	n	1	0
14	5020 Rainier Ave	-122.2837015	47.5564066	5020 Rainier Ave	Seattle, WA	y	medium	landmark	1926	1	n	commercial	11-100ppl	NC3P-40	2	n	2	0
15	5021 Rainier Ave	-122.286642	47.5564912	5021 Rainier Ave	Seattle, WA	y	medium	landmark	1924	1	n	commercial	11-100ppl	C2-65	1	n	1	0
16	5609 Rainier Ave	-122.2783003	47.5515654	5609 Rainier Ave	Seattle, WA	y	medium	no designation	1920	2	n	residential	10ppl	NC2P-40	2	y	1	0
17	5600 Rainier Ave	-122.28	47.5518122	5600 Rainier Ave	Seattle, WA	y	medium	no designation	1926	1	n	commercial	11-100ppl	NC2P-40	4	n	4	0
18	5710 Rainier Ave	-122.2771539	47.5509376	5710 Rainier Ave	Seattle, WA	y	medium	no designation	1920	2	n	commercial	11-100ppl	NC2P-40	0	n	0	0
19	5716 Rainier Ave	-122.2771683	47.550845	5716 Rainier Ave	Seattle, WA	y	medium	no designation	1919	1	n	commercial	11-100ppl	NC2P-40	0	n	0	0
20	5619 Rainier Ave	-122.2781374	47.5514887	5619 Rainier Ave	Seattle, WA	y	medium	no designation	1907	2	n	comm/res	11-100ppl	NC2P-40	1	y	0	0
21	5701 Rainier Ave	-122.2778628	47.5509867	5701 Rainier Ave	Seattle, WA	y	medium	no designation	1924	2	y	commercial	100+	NC2P-40	5	n	5	0
22	5607 Rainier Ave	-122.2782499	47.5516957	5607 Rainier Ave	Seattle, WA	y	medium	no designation	1915	2	n	commercial	11-100ppl	NC2P-40	0	n	0	0
23	4850 Rainier Ave	-122.285184	47.558567	4850 Rainier Ave	Seattle, WA	y	medium	landmark	1907	3	n	comm/res	100+	NC3P-40	3	n	2	0
24	3804 S Hudson S	-122.2842622	47.5572562	3804 S Hudson S	Seattle, WA	y	high	Special review	1920	1	y	comm/public ass	100+	NC2P-40	1	n	1	0
25	4900 Rainier Ave	-122.2846597	47.5576869	4900 Rainier Ave	Seattle, WA		medium	Special review	1901	3	y	comm/office	11-100ppl	NC3P-40	3	y	2	0
26	3714 S Hudson.	-122.2854177	47.5572346	3714 S Hudson	Seattle, WA	n	none		5							n	34	4
27	4915 Rainier Ave	-122.2850863	47.5573816	4915 Rainier Ave	Seattle, WA	n	none									n		
28	3810 S Ferdinan	-122.2844023	47.5580671	3810 S Ferdinan	Seattle, WA	n	none									n		
29	3820 S Ferdinan	-122.284219	47.5580393	3820 S Ferdinan	Seattle, WA	n	none									n		
30	3824 S Ferdinan	-122.2839071	47.5580412	3824 S Ferdinan	Seattle, WA	n	none									n		
31	3828 S Ferdinan	-122.2837855	47.5580474	3828 S Ferdinan	Seattle, WA	n	none									n		
32	3811 S Ferdinan	-122.2843849	47.5576451	3811 S Ferdinan	Seattle, WA	n	none									n		
33	3813 S Ferdinan	-122.2843238	47.5576643	3813 S Ferdinan	Seattle, WA	n	none									y		
34	3815 S Ferdinan	-122.2842633	47.5576513	3815 S Ferdinan	Seattle, WA	n	none									y		

Appendix 3: Initial Interview Request Letter

UNIVERSITY of WASHINGTON

Survey Request

Hello,

My name is Rose Haas, and I am a graduate student in the Department of Urban Design and Planning at the University of Washington. In the next couple of weeks I will be conducting interviews regarding a proposed City of Seattle policy that may affect you and other businesses in Columbia City.

This is an invitation to participate in a 25-minute interview regarding your opinions of a proposed citywide law that will impact the Columbia City commercial core.

The City of Seattle has proposed an unreinforced masonry (URM) seismic retrofit mandate. The policy will require older brick buildings to undergo structural improvements that may enhance their overall safety in the event of an earthquake. I am interested in discussing how this policy may impact your business.

Participating in this survey will inform my research, and your responses may encourage policy makers to evaluate public opinion.

If you are interested in participating, please contact me at

rosehaas@uw.edu or (404) 993-4650.

Thank you for your time, and I look forward to hearing your feedback.

Rose Haas

If you have any questions about the study or the Department of Urban Design and Planning, you may contact my faculty advisor, Branden Born at bborn@uw.edu or (206) 543-4975

Appendix 4: Description of Financing Options

(City of Seattle, 2017)

The following funding options are available to all types of property owners:

Tax abatement – Tax abatement consists of the reduction or elimination of property taxes for a designated period of time. For the URM policy, URM buildings would be granted short-term property tax abatement and property owners could use those monies to help fund a seismic retrofit. **This change would require a change in State law.**

Revolving loan fund – A revolving loan fund creates a central fund through which multiple loans are made to borrowers. Through regular repayments of the original loan, borrowers replenish the central fund. A URM revolving loan fund could initially be funded through an endowment or through a partnership with lending institutions.

Local improvement districts (LIDs) – By forming a local improvement district, a group of property owners can share in the cost of infrastructure improvements. LIDs could be used to finance retrofits but would need to comply with City regulations for LID formation, assessment and administration.

Transfer of development rights (TDRs) – This strategy allows buildings in designated areas to sell the potentially developable "air space" above the building to purchasers who can use the additional floor area to increase the density of their development in another area of the city. TDRs could help building owners generate funding for URM retrofits while maintaining their building's historic character.

Architectural and engineering services grants and resources– The City would provide funding for building owners to access architectural and engineering services in support of a building's retrofit design.

10% Federal rehabilitation tax credit – This existing federal tax credit allows users to write off 10% of eligible construction costs for retrofits. The tax credit applies to any non-residential building built before
1936 and does not require a formal review process if the rehabilitation is for a non-historic building. The right to the tax credit can also be sold by the owner. A similar 20% tax credit is available to certified historic structures that are either listed or eligible for listing on the National Register of Historic Places or
A contributing building to a National Register historic district. A certified historic structure may also be considered a Seattle landmark building.

Appendix 5: Collaborative Governance Charter

SAMPLE MEMORANDUM
TO: Ruckelshaus Center (or another third-party mediator)
FROM: Office of Emergency Management
DATE: May 22, 2018
SUBJECT: SAMPLE CHARTER
USING COLLABORATIVE GOVERNANCE TO EXPLORE FUNDING OPTIONS TO SUPPORT A CITYWIDE URM RETROFIT
Through years of research and precedent case studies in Oakland, San Francisco, Los Angeles and Christchurch, experts find that seismic retrofitting of unreinforced masonry buildings (URMS) reduces brick building collapse in the event of intense shaking; however, buildings owners often choose not to retrofit because the cost is extremely high and few public financing options are available.
Because of prohibitively high costs and lack of public funds, building owners have resisted retrofitting their buildings and have urged City Council not to pass the retrofit ordinance. A collaborative governance approach could ensure that the city and building owners work together to create a robust set of financing options.

Is a collaborative governance process appropriate?

Using the criteria for a collaborative governance process, the current situation is ripe for a collaborative process. It is in the best interest of building owners and City of Seattle to identify ways in which to work together in order to solve a potential human safety crisis. Despite a lack of financing options, the City of Seattle could potentially pass an underfunded mandate. In order to produce a more successful and economically efficient ordinance, building owners need to take an active role in the evolution of the policy so they do not disproportionally suffer economic hardship.

At the time, no constitutional rights or basic societal values are at stake. The primary parties are identifiable and willing to participate. The primary parties in this situation are building owners, small business owners, as well as the City of Seattle and the State of Washington. Secondary parties are seismologists, geologists, historic preservationists, community members, and banking institutions. There are many areas for agreement and multiple issues for trade-offs including the introduction of state funding, timeline compliance, and penalties. Each party has a legitimate spokesperson, including elected officials, directors of small business associations, and technical professionals. Potential deal breakers include underdeveloped city financing options that put undo economic pressure on the building owner from the perspective of landlords, and non-compliance from the perspective of the City of Seattle. There is a relative balance among parties at this point in time, but if the City Council passes a mandate ordinance, the City and the State will have much more power than the building owners. The pending City Council vote and State legislative action act as external pressures to reach an agreement. Thus, to ensure a publicly supported and successful implementation of a citywide retrofit, it is in the best interest of the parties to form a group that can produce applicable and mutually agreed upon funding options.

Draft Charter for a collaborative working group

I. Mission Statement, Purpose, Goals

It is the mission of The URM Financing Working Group is to options to ensure that the public safety issue does not result in loss of life in the event of an earthquake. The purpose of the Working Group is to resolve issues regarding financing gaps of the proposed URM mandate. The goal of the Working Group is to establish a list of mutually agreed-upon funding options to ensure equitable implementation.

II. Scope of Issues

Issues include should include:

- an evaluation of status quo – how successful are current incentives and financing options
- Identifying and recommending potential incentives and funding options
- Examining if State of Washington funding is appropriate
- Examining potential issues – compliance timelines, penalties for non-compliance

III. Workshop Logistics

Six Working Group meetings will occur over the next six months. After the last meeting, participants will determine if more meetings are needed. The first workshop will result in a list of goals and deliverable for the following five workshops.

IV. Membership

The following stakeholder participants should attend each meeting and meaningfully contribute to each workshop

- City of Seattle representatives (5)
- Building Owner Working group representatives from areas with high concentration of URM buildings (CID, Columbia City, Pioneer Square, Capitol Hill, and Ballard) (5)
- State representatives (3)
- Business owner Working group representatives from areas with a high concentration of URM buildings (CID, Columbia City, Pioneer Square, Capitol Hill, and Ballard) (5)
- Technical Committee Members (engineers) (3)
- Seismologist (1)
- Geologist (1)
- Representative from the City of Seattle Preservation Committee (1)
- Community members from areas with high concentration of URM buildings (CID, Columbia City, Pioneer Square, Capitol Hill, and Ballard) (5)
- Third party facilitator (1)

V. Funding

Funding is not yet solidified. It is our hope that funding will be provided for the Working Groups from a City of Seattle grant with additional funding from the State of Washington (specific departments to be determined)

VI. Meetings

Meetings will be open to the public, and community members will have an opportunity to comment before and after each session for a period of 15 minutes.

VII. Consensus Definition

The group will have reached consensus on an issue when it agrees upon a single alternative and each participant can say:

- I believe that other participants understand my point of view.
- I believe I understand other participants' point of view.
- Whether or not I prefer this alternative, I support it because it was arrived at openly and fairly, based on good information and it is the best decision for us at this time.