Planning for Seattle's Mandatory Retrofitting Policy: A Retrofitting Plan for the Northern Pacific Hotel

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Abstract

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Seattle has been developing a mandatory retrofitting policy that would require all unreinforced masonry buildings to be retrofitted. While this policy will improve the life safety of these buildings, there has been concern around the cost of retrofitting and displacement of low income and minority groups if this policy is passed. This thesis provides the Northern Pacific Hotel with a retrofitting plan the focuses on retrofitting methods and financial options. The goal is that this thesis could serve as a template for other like buildings if this policy is passed.

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Introduction

Seattle has experienced three major earthquakes over the past 80 years. While there are many life safety concerns that are caused by earthquakes, the Seattle area experiences greater damages from unreinforced masonry (URM) buildings. URM buildings are buildings constructed of masonry such as stone or brick, with a light timber frame. The floors and roofs of these structures are not attached to the exterior walls in a manner that would resist seismic forces. Initially, URM buildings were a preferable building type due to the fire resiliency, however after Seattle began to experience major earthquakes, it became apparent that they would experience damages. During an earthquake the masonry walls in a URM buildings perform poorly and often lead to damages that could range from cracking in the walls to buildings collapse (*Rutherford 1990, 15*). This is mainly due to masonry's poor ductility as well as the fact that this type of construction does not anchor the floor and ceiling properly to the walls. After various earthquakes that happened in the early 20th century, major west coast cities began to pass buildings codes that would require seismic reinforcement on all new construction. California passed these codes as early as 1933, however Seattle did not prohibit the construction of this unreinforced construction until 1977 (*Bagley 2002, 4*).

Due to the life safety concerns that URM buildings pose, Seattle has attempted to pass a similar retrofitting policy two times in the past. However, each time the policy was voted down due to the large costs of retrofitting. In 2013, Seattle began to develop another retrofitting policy with the goals of improving life safety, preserving historic fabric, as well as preventing widespread building damages. A URM technical committee was created to research the different effects this policy may have and provide a list of recommendations the City should follow when developing the policy. While many are in favor of this policy, there have been concerns

surrounding the economic hardship this will place on URM building owners, and the displacement that may happen due to rising rents to cover retrofitting costs. Concerns of equity surrounding this policy has also been discussed since many of these URM buildings house low income minority groups. If passed, many are concerned that affordable housing and character defining buildings may be torn down if no financial aids are created to help cover retrofitting costs. There is also concern surrounding the process to retrofitting URM buildings and what type of information and resources will be available to URM building owner to help guide the retrofitting process.

For my thesis I wanted to work with a URM building owner that housed low income minority groups and may struggle to find money and resources to retrofit their building. To begin my research, I focused my literature review into five different topics, the first being benefits to retrofitting. In this section of my literature review much of the information came from preservation professionals and the National Parks Service. Through this literature I was able to see cost benefit analysis to retrofitting buildings, as well as benefits to preserving historic structures. The next section, balancing seismic retrofits and historic character also came from preservation professionals as well as some studies on municipalities that had passed similar retrofitting policies. In this section of literature, I learned what historic fabric should be preserved as well as retrofitting methods that do not alter historic fabric.

Most of the literature on Seattle context came from the City of Seattle as well as historians and different neighborhoods organizations and nonprofit groups. From this literature I learned more about Seattle's history, the URM policy, as well as the Chinatown International District. Through engineer journals and books, I was able to gather information on the process to retrofit URM buildings. This section of the literature helped me to learn the process to

developing a retrofitting plan as well as how to choose the correct retrofitting methods. The last section, financial options came from economists as well as the City of Seattle. From this literature, I was able to learn about various local, state, and federal funding options that could be used when funding a seismic retrofit.

After researching information on URM buildings for my literature review I wanted to further study URM buildings by looking at four recently retrofitting URM's in Seattle to find lessons learned and best practices that could be applied to my thesis. While each building would be a retrofitted historic URM building, each precedent study would have a different focus. The Cadillac Hotel was chosen to lean about the benefits to retrofitting before an earthquake. The Kong Yick building was chosen to show community and social value in buildings. King Street Station was chosen to focus on funding options as well as retrofitting methods. Finally, the Morrison Hotel was chosen to show the barriers to retrofitting URM buildings. After completing the literature review and precedent studies I then conducted nine interviews to gather more information that would be useful for my thesis. Four of those interviews were with a stakeholder in each precedent study. Two of the interviews were with the building manager and owner of the NP Hotel. One interview was with a cost estimating professional who works with seismic retrofits. One interview was with a professional who worked with financial options for the King Street Station. The final interview was with a City of Seattle employee who is working on the mandatory retrofitting policy.

To find a URM building to work with, I contact the Seattle Chinatown Preservation and Development Authority (SCIDpda). After touring the neighborhood, I decided to work with the Northern Pacific (NP) Hotel. The NP Hotel houses low and very low-income residents, many of which don't speak English as a first language. While the building owner is aware of the damages

that may happen to the building during an earthquake, they are currently unable to raise enough money to fund a retrofit. After discussing the URM policy with the building manager and owner I knew what type of information I wanted to gather into a retrofitting plan. For my thesis I wanted to provide the building owner with a detailed history of the building that included social as well as construction history. Next, I wanted to develop a retrofitting resource that included information on developing a retrofitting plan and team, retrofitting methods that should be used, as well as financial options that could be used.

While the goal of this thesis was to provide a single building owner with a retrofitting plan, it can serve as a guide for similar mid-rise historic apartment buildings in the Seattle area. Through the work that was done for this thesis, it will provide insight on retrofitting methods and finical options that the City should consider when developing a retrofitting policy. In addition, this thesis will provide insight on the barriers that affordable historic URM buildings may face if this retrofitting policy is passed, and spur on future research into retrofitting this building type.

Literature Review

Introduction

To begin my thesis, I knew I had to create an in-depth literature review on topics that would be relevant and aid me in my project. However, the literature available on URM buildings was large and covered many topics so I narrowed my literature search down to five topics I thought would better guide my thesis. These topics included, the financial aspects of retrofitting URM buildings, retaining historic character while carrying out retrofit projects, Seattle context, the process and specific challenges or retrofitting buildings, and the benefits of retrofitting URM buildings. The goal of my literature review was to use as many primary sources as possible. I wanted to pull literature from studies that included architecture, engineering, preservation, social value, urban planning, hazard mitigation, and code compliance. After I created a base of literature in primary sources, I also want to look at journal articles and newspaper articles to get a sense of how the general community viewed retrofitting URM building, as well as the value they placed on certain buildings in their community.

The goal of researching the financial aspects of retrofitting was to help me understand how much a retrofit would costs, where these costs come from, who generally pays for them, as well as sources of money that were available to building owners to help offset the large costs. In this topic of research, I found papers from FEMA, the National Parks Service, and engineering journals that discussed how much different retrofit methods would costs and where the costs come from. One of the engineering journals also had conducted a cost benefit analysis of retrofitting a URM building. The next topic in my literature review was retaining historic character while retrofitting buildings. The information I wanted to pull from these various sources was breaking down how each retrofit method effected the interior or exterior of the

building. The National Parks Service had released numerous documents including a preservation brief on this topic. There was also a conference workbook from 1991 that included a variety of information on how different cities were retrofitting their historic buildings.

The third topic for my literature review was the process of retrofitting historic buildings. From this literature I wanted to know all the ways that a building could be retrofitted, whether it be in a large one-time retrofit, or done overtime in piece meal. The sources of literature from this topic came from multiple engineering societies, journals, and institutes. The fourth part of thesis literature review, Seattle context, used literature from historians and other city documents. Lastly in my literature review, I wanted to focus on the benefits of retrofitting historic URM buildings. Through the knowledge gaining in this literature I would be able to show all the benefits to retrofitting a building, as opposed to the possible damages that would happen in the event of an earthquake. To arrange this literature, I wanted to show all the damages that could happen to a building if an earthquake were to happen and what the costs and repercussions could be if the building wasn't retrofitted. Then, I would discuss how retrofitted buildings could perform better in the event of an earthquake and the benefits to retrofitting before an earthquake. The literature for this section can from a variety of conferences regarding retrofitting historic buildings, FEMA, as well as some engineering journals and studies.

Financial Aspect of Retrofitting URM Buildings

Determining how much money a seismic retrofit will cost is one of the most common questions that building owners have. While there are many factors that can affect this, such as cost of materials, construction, and labor, there are some tools and resources to help get a general estimate. The Federal Emergency Management Agency (FEMA) has published multiple journal articles and resources on the costs of retrofitting. They have an online tool that can help

individuals calculate what it would cost to seismically retrofit their building. The system is based on over 2,000 past retrofitting projects, and the estimation is made using a statistical regression model (*FEMA 2019, cost calculator*). The user enters in information such as building use, square footage, location, and others and the calculator gives a range of what the retrofit could cost. In 1994 FEMA published a resource, FEMA 156, in which they worked with the Hartman consulting group to break down the typical costs of retrofitting buildings. They had previously published a similar article, however there were many critiques of their research models and other factors, so they had published this resource to address those concerns. With this tool, individuals can base their cost estimation on performance objectives, regional seismicity levels, cost of labor and materials, building type, future values, and additional building characteristics (*FEMA 156 1994, 28*).

FEMA 156 also explained four factors that would influence the cost of the project. The first was seismicity which is based on a National Earthquake Hazards Reduction Program (NEHRP) map that divides areas into regions based on their earthquake activity. If an area was more prone to earthquakes, then the costs associated with the retrofit increase. The next factor is performance objectives which were grouped into life safety, damage control, and immediate occupancy (*FEMA 156 1994, 43*). Depending on the performance objective, the level of seismic performance that the retrofit would achieve would differ. For example, if the objective of the retrofit was life safety, the retrofit would cost the most money, followed by damage control, and finally immediate occupancy. The third factor is structural systems which categorizes buildings by which materials they are made out of. Typically building materials that are denser and heavier such as brick and stone will be more expensive to retrofit than materials such as wood. The fourth cost factor is occupancy class, which separate buildings by intended use, i.e.

commercial/office, mall, industrial, etc. Industrial buildings will generally have a lower retrofitting costs than buildings such as offices and apartments because of the seismic performance they will have to be retrofitted to (*FEMA 156 1994, 65*).

There are many direct and indirect costs must be funded in a URM retrofit. Some of the direct costs include the cost of construction materials and labor as well as professional and permit fees. There are also often architectural design and engineer design costs as well as material testing. If tenants need to vacate the building during the retrofit, there are direct costs associated with their relocation. Some direct costs also include damage repairs to non-structural elements, hazardous material removal, disabled access improvements, as well as non-structural rehabilitation work (*Reitherman 2009, 22*). There are also many indirect costs that occur during a seismic retrofit. Some of these include increased rents, change in property value, reduction in affordable housing, loss of revenue from commercial and office spaces during construction, social impacts such as displacement, as well as unforeseeable costs associated with construction delays. Other studies have found additional costs associated with retrofitting work. For example, there are system improvement costs that are associated with retrofits such as improvements to mechanical and electrical work. It is possible that during a renovation of a historic building the fire department would require the individual to update fire protection or other life safety aspects of the building that previously had not been up to code (*Reitherman 2009, 39*). In previous retrofits that has included adding modern sprinkler systems, addition fire exits, alarm systems, as well as improving the fire rating on the interior walls.

There have also been several engineers and economist that have tried to detail where the costs come from in a seismic retrofit. One cost prediction model used multilinear regression with 14 independent variables to develop models to predict the net retrofitting construction costs. It is

important to note that seven of the independent variables that this team studied had not be included in previous cost estimation studies. The buildings that were used in this study included 158 unreinforced school buildings in Iran. Using a backwards elimination regression technique, the team was able to identify variables that would be statistically significant to the construction costs. The most statistically significant variables were found to be total floor area, number of stories, structural type, soil type, weight, and irregularities in the building plan, the most significant variable being floor area and number of stories (*Jafarzadeh 2014, 134*). Surprisingly building age and previous attempts to meet building code were found to be insignificant variables in this study.

A report put together by SCIDpda in 2016 focused on how the upcoming mandatory retrofitting policy in Seattle would affect URM buildings in the CHID and Pioneer Square. A large section of this document concentrated on financial options to help cover the retrofit costs ranging from local community-based funds to federal money. They also distinguished if funds could only be used for a specific type of building, i.e. education or affordable housing. The team at SCIDpda generated five financial tools that could be viably created to help meet the needs of URM building owners. The first was funding for a study and pilot project on financial tools to cover costs of URM buildings. The second option included focusing on the Community Reinvestment Act, which requires banks to make loans in the communities they are located in (*SCIDpda 2016, 3*). This funding also predominantly benefits low to medium income groups. The third funding option would develop a state property tax exemption for URM retrofits. This would create a significant financial incentive for property owners to retrofit if it were to be adopted at the state level. The fourth option would utilize a Community Development Block Grant-Disaster Relief fund from HUD. This would be a viable option due to the fact that

retrofitting URM buildings increases the life safety of the buildings (*SCIDpda 2016, 18*). If used, the funds could be distributed to all URM property owners. The final funding option that SCIDpda put forward was an interest rate buy-down. This would allow public funds to buy down interest rates which would create a sum of money that could create cheaper loans for private borrowers.

There are various loans options that SCIDpda proposed such as private loans, loans from the Washington Housing Trust Fund or the Washington Community Reinvestment Association (*SCIDpda 2016, 12*). However, it should be noted that loans should be taken with caution being as that they can have high interest rates which can make paying them off difficult and increase the costs of the retrofit. There are also various local grants that could be used such as community grants from 4Culture to HOME funds. However, local grants are often highly competitive and not a guaranteed source of funding, so it has been advised that they are not used as a main source of funding for retrofitting projects. Some other common sources of funding include tax credits that are associate with historic properties. If a building is designated as historic or part of a historic district, rehabilitation work can earn a 20% tax credit if the rehabilitation work follows the Secretary of the Interiors *Standards for Rehabilitation*.

There are also some financing methods that have been discussed for URM buildings, however the state or local codes would have to change making them an unreliable source of funding to count on. One of the methods include transfer of development rights in which a building can sell unused Floor to Area Ration (FAR) to developing properties for money. Some have suggested using Tax Increment Financing (TIF) which is a public financing method that is used for community improvement or redevelopment projects through using money from property tax revenue. The last method would be to create a local improvement district in areas with high

concentrations of URM buildings (*SCIDpda 2016, 21*). Through this financial tool, property owners would pay a tax that would go directly to funding seismic retrofits.

The National Parks Service, (NPS) also put together a list of potential financing methods for the rehabilitation of historic properties. After a natural disaster such as an earthquake, FEMA and the Small Business Administration offer some funds for rebuilding damaged structures. State and the federal government may also receive additional funds following a natural disaster however, these sources of funding are not guaranteed (*Cox 2001, 47*). In addition, these emergency funds are provided as a reactive measure instead of preventative. Building owners should finance a retrofitting project much like any other renovation project, taking out bank loans if necessary. If the building is on the National Register of Historic places and the retrofit will cost more than $5,000, tax credits can be received at the end of the project to help with overall costs (*Cox 2001, 29*). Bonds are then issued as an incentive to help cover costs of URM retrofits. Some other cities have used redevelopment funds to also cover the retrofit costs. The NPS claims that creating financing options for URM projects are best done at the community level since available resources are different in each area.

Retaining Historic Character while Seismically Upgrading

While the primary goal of the mandatory retrofitting policy is improving life safety, retaining historic character is another important factor in this policy. Since this thesis will be focusing on the retrofit of historic URM buildings, it was important to find information on how to retrofit buildings while preserving historic fabric. This National Parks Service advocates for making sure historic preservation is a main concern when retrofitting URM buildings. The released a resource, *Preservation Brief 41,* which explains that retrofitting the buildings as a preventative measure is one of the most effective ways to preserve historic character. If this

preventative measure is not taken, damages caused by an earthquake can be so serve that the building will have to be completely demolished (*Agular 2003, 23*). However, if a retrofit is done quickly, it can ruin much of the historic features of the building because the structural enforcements will be placed where it is most convenient, which often covers up walls and changes the facades. There are three preservation principals the National Parks Service advocates for. The first is that the historic materials should be protected to the greatest measure possible, and materials should not be replaced if feasible. The second principle is that the new seismic structure should respect the historic character by being designed in a compatible style (*Agular 2003, 26*). The third principle is that the retrofits should be created to be removable in the event that less intrusive technology is invented. To make sure that historic character is retained building owners who are planning a retrofit should study the Secretary of the Interiors *Standards for the Treatment of Historic Properties*.

There are multiple factors that affect why historic URM buildings are damaged during an earthquake. The first is the depth and strength of the earthquake, the second is the duration of the earthquake, the third is the location of the buildings in relation to the origin of the earthquake, the fourth is the soil condition, the fifth is the building materials and construction, and the final factor is the existing building condition (*Reitherman 2009, 56*). While the first four factors are out of human control, the final two can be mitigated through retrofits and building maintenance. Once a building owner has made the decision to retrofit and has assembled an educated team to carry out the retrofit, background information should be gathered. This includes looking over historic documentation on the building including national register nominations, original architectural drawings, maps, and other pertinent data that can be compiled. After the history of the building is studied, the important character defining feature of the building should be

determine so that care is taken not to alter them during the retrofitting process. Then, a structural engineer should be brought in to assess the structural integrity of the building to see to what extend the building needs to be retrofitted, while adhering to local and state building codes. Then a retrofit plan should be drafted which can include multiple phases and methods to complete the project (*Look 1997, 43*). Protecting property values and historic character is also an important factor in retrofitting historic buildings. Since URM building were often made out of durable materials they have been around for many decades and have become important to the communities they serve. Damages that occur to these buildings during an earthquake could cause damages the important historical character that cannot be replaced. It is vital that people are mindful when retrofitting historic URM buildings because the retrofit can often change the appearance of the building if not completed carefully (*Look 1997, 76*).

While retaining historic character is important in a seismic retrofit, it can often make the process more difficult and expensive to building owners. To help remove barriers associated with retaining historic character and seismically upgrading buildings, the California Historical Building Code allows for some leeway when making seismic retrofits. Based on section 33420.1 if a rehabilitation project is begun to make seismic retrofits of the building, the building may "take those action which the state determines necessary to meeting the Uniform Building Code" (*Alesch 1980, 17*). This relates to any buildings that is deemed historic under state of local jurisdiction. This code also states that the requirement for buildings to meet the retrofit standards for the Uniform Building Code outweighs the requirements set place by preservation ordinances. Thus, if seismic retrofits need to be made to a designated historic structure historic character can be altered in order to make the buildings safe.

Often times, building owners of historic URM buildings are hesitant to seismically upgrade their building because they are worried of damaging the historic fabric and integrity of the building. However, it is important that they retrofit the structure due to the potential loss of historic fabric from damages in an earthquake. Basic hazard prevention knowledge that can be obtained from the Red Cross can be extremely beneficial to reduce the risks associate with earthquakes and URM buildings (*Augustus 1997, 39*). Furthermore, the historic materials that are often damaged in earthquakes are impossible to replace. To properly retrofit buildings while retaining historic character an engineer and architect that have experience working on these types of projects are necessary.

There are general steps that building owners must follow when planning for a rehabilitation of their building. First, local regulation should be checked such as building codes and historic regulations. Second, a qualified professional should be hired who has experience working with historic URM buildings. If a building owner doesn't know where to find an engineer to work on the building, they can contact the American Society of Civil Engineers and the American Institute of Architects to begin their research (*Augustus 1997, 16*). Third, the scope of work should be clearly defined. The Secretary of the Interior *Standards for Rehabilitation* should be followed as closely as possible during the retrofit. Alternative solutions should be discussed in case any problems arise during the construction process. A close dialogue between the building owner and architect/engineer should be kept so that there are no miscommunications during the process. The fourth step is to estimate the cost of the retrofit. This can be done by asking the contractor you have hired to help with the retrofit. The fifth step is to hire all necessary people for the project include construction crew if not part of the architectural and engineering team.

There are also special steps that should be considered when rehabilitating historic URM buildings. The first aspect is to reinforce hazardous architectural elements that are above head height. An anchor should be placed that attached the element to the wall without affecting the aesthetics of the element if possible (*American Society of Civil Engineers 2003, 47*). The next method is to the anchor masonry walls. This is done by anchoring masonry walls to the floors and roofs. The anchors that are on the exterior of the wall can come in different shapes and designs that can be carefully selected to match the historic quality of the building. Recently, there has also been some alternative anchors that do not fully penetrate the exterior of the building. While this is a more expensive technology, it completely preserves the exterior façade of the building. Another method is to reinforce slender masonry walls. These slender walls often experience damages at the top of the building where the walls support the attic (*American Society of Civil Engineers 2003, 57*). To mitigate this the slender walls can be anchored to the roof. If the structure is fairly unstable, additional wood or steel buttresses can be added to the exterior of the building. This should be done with reservation however, since it greatly impacts the exterior facade of the building. Another technique to reinforcing slender walls is by thickening them through added a reinforced concrete wall on one side (*American Society of Civil Engineers 2014, 23*). This greatly impacts the historic fabric of the building and should be considered only as a last resort if structural integrity is extremely weak.

Another retrofitting method that can be useful to URM buildings is to reduce the horizontal displacements that occur during seismic events. This can be done by removing interior partitions; however, this should only be done if the walls are not critical to the historic character of the building (*American Society of Civil Engineers 2014, 88*). If the partition contributes to the historic character, then they can be reinforced with plywood and well as tied to the building

frame. Steel frames placed on the interior of walls will also reduce horizontal displacement, however this greatly impacts the aesthetics of the building. The final method for retrofitting is by vertically coring with grouted reinforcement. This is done by boring long vertical holes into the masonry walls and inserting steel reinforcing bars into the holes and then filling the hole with grout (*American Society of Civil Engineers 2003, 103*). This is one of the costliest methods to retrofitting URM buildings, but it does not alter the interior or exterior of the building.

Seattle Context

In 1851 European settlers arrived the area now known as Alki Beach, however by 1853 many of the settlers moved across the sound to Pioneer Square as they thought it would serve as a better port area (*Bagley 2002, 33*). The main economic driver of the new town was Henry Yesler's Mill due to the abundance of the lumber in the area. While lumber provided economic growth in the area through trade, it also served as a popular building material for all of the downtown structures. By the late 1880's the population of Seattle was growing by almost 1,000 residents a month (*Bagley 2002, 41*). On June 6, 1889 there was a great fire that destroyed 116 acres that started in the center of the downtown area of Seattle. After the fire, there were several municipal codes that were passed to help prevent another large fire. Some of these included widening the street, regrading some areas, creating a professional fire and water department, as well as requiring all new construction to be made of masonry. Due to the lack of knowledge of the seismic activity in the area, there were no building requirements for seismically reinforcing the new construction.

In 2001, a 6.8 magnitude earthquake went through Seattle and caused severe damages to many of the historic URM buildings located in downtown Seattle, as well as the Alaskan Way Viaduct. The damages in Seattle and Olympia together cost nearly $2 million to repair. (*Farley*

2003, 1). There were also hundreds of people that needed medical attention from injuries directly related to URM buildings. Public awareness of the hazards of that URM buildings can cause during seismic events became a more popular discussion after this earthquake, and in 2013 the City of Seattle began creating a URM retrofitting policy that would require all buildings, new construction and existing, to be fully retrofitted. The City of Seattle has stated three goals of this retrofitting policy. The primary goal is improving the public safety for the tenants of these buildings, as well as the communities that use them. The second goal is preserving and protecting historic URM buildings since they are often considered "character buildings" within the city, and they can help to create neighborhood identity (*City of Seattle, SDCI 2013, 5*). The final goal of this retrofitting policy is to prevent widespread buildings damages after an earthquake that could lead to vacancy or demolition. The city stated that all three of these goals will not only help to increase Seattle's resiliency during a natural disaster, but also shorten the recovery time after one.

After the retrofitting policy is adopted by city council and approved by the mayor, the city promises to create a process so that all building owners would have to retrofit their buildings. Currently, building owners only have to retrofit URM buildings if they have applied for a building permit that would be considered a large remodel or renovation. The city has stated that most of the time these retrofits do not bring the URM structures fully up to code because they focus on parapet bracing or other small strengthening techniques. The City of Seattle foresees the policy having incentives for buildings owners to help cover the costs of retrofitting, however having these incentives lined up is not a requirement to get the policy to pass. The City also wants to use this policy to encourage buildings owners to exceed the minimum code

requirements for seismic retrofitting so that building damages and personal injuries would be at a minimum after an earthquake (*City of Seattle, SDCI 2013, 11*).

There have been previous efforts to pass a retrofitting policy that included Seattle City Council passing an ordinance that all URM buildings had to meet. However, these ordinances were quickly voted down because of the large costs of retrofitting URM buildings and there was a lack of funding options. In 2008 a URM technical committee recommended using a modification of the bolts-plus method to attach floors and ceilings to the walls as a city-wide retrofitting standard. This method included that the parapets be braced, floors and roofs be connected to the walls, framing be interconnected, and weak interior and exterior walls be strengthened. However, this would cost buildings owners $5-$40 per square foot and city council was unable to approve this policy. (*City of Seattle, SDCI 2013, 5*).

The city hired outside firms and professionals to create a URM policy committee that conducted outreach, created a cost benefit analysis for retrofitting, explored financial and funding options, as well as created a list of recommendations the City of Seattle should follow when implementing this retrofitting policy. This URM Policy Committee was brought together through the organization of the Seattle Department of Construction and Inspections. It included URM building owners, geologists, structural engineers, architects, housing and real estate professionals, and well as preservationists. This committee was created for the purpose of developing recommendations that would contribute to an effective retrofitting policy. After the committee did their preliminary recommendations and research, they requested various studies and research be conducted by the city to greater understand the effects of this policy. One was that a cost benefit analysis be conducted so that the costs of retrofitting URM buildings could be

understood in greater detail. Another request by the policy committee was that a more complete list of URM buildings be identified and presented to better create recommendations.

In 2017 the URM policy committee provided the city with its recommendations which are detailed in the following paragraphs. The recommendations begin by explaining why this policy is necessary due to the frequency of earthquakes in the area and public safety concerns. The Seattle area is the only major metropolitan area to have underwent three different earthquakes that caused severe damages to URM buildings in the past 80 years. Many experts in the field believe that the Pacific Northwest will see another large earthquake in the next 30 years, making it critical that this policy is passed and enforced before the next earthquake (*City of Seattle, SDCI 2013, 34*). On top of the goals that the city had stated as the objective of the mandatory retrofitting policy, the policy committee recommended additional goals that included creating an easy program for all buildings owners to understand, reducing the retrofitting costs, encouraging early participation, and building a broad support system for the enforcement of this mandatory policy. All in all, the URM committee agreed that this retrofitting policy be mandatory in order to improve the life safety of Seattle and its residents. The committee also suggested that all buildings that had unreinforced aspects in it be subject to this retrofitting policy.

During the planning phase of this policy, a list of URM buildings were identified and there were over 1,100 confirmed URM structures within the city limits. From these buildings they defined three levels of vulnerability that URM buildings can be categorized under. The most critical level included school and other facilities such as hospitals and utility facilities. The highly vulnerable buildings were URM structures that were greater than 3 stories on infill soil that had over one hundred tenants (*City of Seattle, SDCI 2013, 26*). The rest of the URM

buildings were defined as medium vulnerability. The URM committee also recommended steps to accomplish these retrofits for each building owner. The first step is notification by the City to all of the URM buildings owners with details on the mandatory retrofitting policy, what needs to be done, the policy's goals, as well as resources to funding and retrofitting methods. The next step includes each owner conducting a seismic assessment of their building to confirm if the structure truly is a URM building, to ensure that the building needs to be retrofitted and to what extent. The next step would be for the building owner to apply for a construction permit and wait for its approval. The final step would be the completion of the retrofit work by the building owner.

The recommendations then detail the timeline for which this should be carried out which includes the first year dedicated to notifying and educating URM building owners. Then allowing 3-6 years for building assessment and permit approval and an additional 4-7 years for retrofitting completion. In all, from notification to retrofitting completion, critical URMs are allowed seven years, highly vulnerable allowed ten, and medium allowed thirteen. The policy committee then recommends various resources that building owners can find funding to cover retrofitting costs. These include federal grants, GO bonds, tax cuts, local improvement districts, transfer of development rights, revolving loans, and more (*City of Seattle, SDCI 2013, 33*). The policy committee also detailed how each source of funding could be used and how it could be applied for. In all, the recommendations that the URM policy committee put forth were based from research and knowledge from professionals in various fields and are meant to help guide the City of Seattle with their mandatory retrofitting policy.

Seattle's Chinatown International District (CHID) has served as a home to the regions Asian community since they first settled here in the 1860's. The neighborhood was originally in

an area of tide flats but was filled in with earth in 1910 during a city regrade project (*Kreisman 1986, 22*). At first, the CHID was filled with young men who worked in casinos, hotels, restaurants, shops, canneries, lumber mills, fisheries and laundries. Many of these young men had to live in poverty and poor housing conditions due to severe discrimination that would happen outside of the neighborhood. Once these men would amass enough wealth, they would pay for the rest of their family to come live in the CHID as well. Some of the wealthier Chinese business men built boarding houses for these immigrants and had commercial uses and stores on the bottom floors (*Kreisman 1986, 23*). At first, the main corridor of the CHID was along 2nd Ave and South Washington Street (currently in the Pioneer Square neighborhood). However, street extensions forced the neighborhood to move south east to is present day location. As the CHID grew, the hub of commerce and community gathering was along King Street.

The community was displaced during the Jackson Regrade and many of the Chinese immigrants moved closer to King Street and began to rebuild their community there. The Chinese population grew steadily until the Chinese Exclusion Act in 1882 which restricted immigration. During this time, Japanese immigrants began to increase in population and settled in the area. As the Japanese population grew, they created their own center of commerce and gathering called NihoMachi or Japantown which was along Main Street (*Kreisman 1986, 24*). The next Asian immigrant population to settle in the area were the Filipinos. Many young men from this group worked in canneries, cafes, pool halls, or other small business. African American also moved into the area and opened diners, groceries, taverns, night clubs, and other shops. In addition, Jackson Street became a prominent jazz scene in Seattle that prospered for decades (*Kreisman 1986, 29*). According to the City of Seattle, the CHID was the only area in the United States were Chinese, Japanese, Filipinos, African Americas, and Vietnamese lived in the same

neighborhood. During World War II the CHID saw a decline in commerce and population as many of its residents were forced into internment camps. In the mid 1900's the CHID was dramatically changed with the construction of Interstate 5 and the Kingdome. After these two projects were complete, over half of the areas housing had shut down and multiple businesses relocated. The younger Asian American population in the area created activist groups to help bring low income housing, bilingual social services, and public legislature to preserve and protect the historic building fabric.

In 1973 the City of Seattle created the International Special Review District in an attempt to preserve and perpetuate the cultural, economic, historical qualities of the CHID. The Special Review District also seeks to preserve and promote the Asian heritage in the neighborhood. As a result of their efforts, many Asian American professionals work and live in the same buildings that their family had decades prior. The Special Review District has allocated funds to refurbish buildings, create new senior housing, as well as provide community-based service centers (*Seattle Department of Neighborhoods 2016, 3*). There have been many revitalization projects that have been done as a result of this funding, such as Hing Hay Park and the Kobe Terrace. The neighborhood has also expanded east of Interstate 5 to the area known as Little Saigon. Continuing Asian immigration into the area has helped to preserve the culture of the CHID. Some of the most notable recent changes to the neighborhood include the construction of two sports stadiums to the west of the CHID, new larger office buildings near Union Station, as well as other large mixed-use housing developments such as the Uwajimaya. With the new development, the CHID still remains one of Seattle's few ethnic neighborhoods.

The work for this thesis involved two prominent organizations in the CHID. The first is the Seattle Chinatown Preservation Development Authority (SCIDpda) which was formed in

1975 as a community development organization based in the CHID. SCIDpda seeks to preserve and invest in the CHID in four distinct areas. This include affordable housing, commercial property management, real estate development, and culturally relevant senior services. Since the organization's inception, they have helped the CHID to increase the neighborhood sustainability with development and preservation programs (*SCIDpda 2016, 2*). They also encourage the residents within the neighborhood to be a part of the development and design process. This helps SCIDpda to focus on neighborhood priorities and character within their work. The second company that I collaborated with for this work was the Interim CDA. This organization is a nonprofit affordable housing and community development group that serves the CHID. Interim CDA seeks to advance social justice for low income residents within the CHID that are of Asian or Pacific Island Heritage. Through their work, Interim CDA provides housing and development services for low income and mixed-use projects (*InterimCDA 2017, 1*). By advocating for low income and elderly residents this organization is able to promote the interests of these groups in large projects within this neighborhood and outlying areas.

This mandatory retrofitting policy and the effect it may have on the CHID has raised some equity concerns from different stakeholders in the neighborhood. Many of the buildings within the district are URM and few have been retrofitted according to MaryKate who is SCIDpda preservation planner. Currently, the CHID residents are 82.5% people of color, compared to Seattle which is 30.5% making it one of the most diverse neighborhoods in Seattle (*Statistical Atlas 2019*). The median household income in the CHID is $35,000 a year which is one of the lowest income brackets for the City of Seattle with Yesler Terrace, Holly Park, and Little Saigon being less. The neighborhood also has one of the highest levels of population without a high school degree at 26.3% of the population (*Statistical Atlas 2019*). The average age

bracket in this neighborhood is 40 to 50 years old. The most common language spoken in the CHID is Mandarin and Tagalog, and many of the businesses in the CHID are small Asian family owned restaurants and grocery stores.

Concern for the life safety of URM buildings in the CHID dates back to a newspaper from a *Northwest Asian* Weekly article from October of 1989. The article was written by Tom Hsieh, a CHID citizen, who created a resolution for the City of Seattle to closely inspect the seismic performance of the buildings in the CHID. This article was a response to the URM work that was happening in San Francisco. The article stated that evaluation of these URM buildings in the neighborhood by a structural engineer was crucial and that visual assessments by city surveyors would not suffice. Hsieh, who was also an architect in the Seattle area had been advocating for a speedy and efficient survey of these buildings due to the damages they posed if another earthquake were to happen. He voiced his frustrations with the slow progress that has been made by the City of Seattle stating that racial discrimination may be a factor with the city not valuing the opinions of Asian Americans.

In 2016 Stacy Nguyen wrote a three-part series for the *Northwest Asian Weekly* detailing the issues that arise with the upcoming mandatory retrofitting policy. The article begins by stating the long history these building within the CHID have. The West Kong Yick building was used by popular business on the bottom floor and had one level of residential floors that were inhabited. Due to the need to retrofit the URM building the owner was unable to lease the other residential floors. The building still belongs to family that originally owned it in 1910 and they are very worried about what the retrofitting policy would do. After an interview with SCIDpda, Stacy claimed that more than 10% of URM in the city of Seattle are located within the CHID and 4,000 affordable units are within these URM buildings (*Nguyen 2016, 2*). One of the building

owners in the CHID stated that If the policy went through, he would have to raise rents to cover the retrofitting costs.

URM Background and Retrofitting Process

Before understanding the process of retrofitting a URM building, it can be helpful to know why these buildings fail in earthquakes. While masonry materials are strong under compression, they are often fragile under sheer or "flexing" forces (*Architectural Resources Group 1990, 40*). The mortar that holds masonry materials together is also brittle and can crack easily under sheer forces. Typically, in one or two story URM buildings, the wall is a foot thick and the bricks are laid in the "American bond" pattern in which the bricks are parallel to the wall. There is often a hollow cavity between the inner and outer layers of the all to protect from rainfall. When masonry buildings are reinforced, a reinforcement bar is placed through the inner and outer layers of the masonry walls with grout poured in as well (*Architectural Resources Group 1990, 40).* This reinforcement helps to resist the sheer earthquake forces that occur. In addition, the reinforcement also keeps the wall intact even if cracking occurs.

In earthquakes, URM buildings are often the most vulnerable. During a small earthquake, while a seismically stable buildings may only get cracks in the walls, a URM buildings would experience much more severe damage such as parapets dropping to the ground. It is typical in URM structures to have wooden floors and roofs, which perform well in seismic events. However, the connection between the masonry walls and the wooden floors and roofs is often weak. The pieces are attached by placing the floors in a small notch created in the walls without any steel bracing. Because of this, the floors and roofs can easily pull away from the walls in an earthquake causing serve damage, such as collapse of masonry walls or roof and upper floors (*Architectural Resources Group 1990, 45*).

Based on interviews conducted for this thesis and newspaper articles, many building owners and tenants are aware of the upcoming retrofitting policy, however there is confusion over the process that should be followed when planning a retrofit and determining what needs to be done. There have been many publications by preservationists, engineers, and policy makers on how create a design plan for a seismic retrofit. One of the first steps in a retrofitting plan is determining if a building could withstand a seismic even, and if not what the damages would be. The American Society of Civil Engineers (ASCE) has done multiple studies on what factors effect a building during an earthquake. While the effects on a building focused mainly on ground shaking, there was also brief mention of other seismic effects such as ground liquefaction, slope failure, and fault rupture. The ASCE used this study to create a list of standards that could be used to replace various FEMA documents such as FEMA 310, 356, and 2000c. These standards included using modern technological advancements, incorporating design professionals and lessons learned from recent earthquakes, being adaptable form building codes, and using evaluation techniques that would work for a variety of building performance standards.

Many have noted that there is a difference between the seismic evaluation of existing buildings and older historic existing buildings. While the evaluation techniques would be similar, there are special considerations that historic buildings must consider such as older materials, building systems, and other details that might affect seismic performance. If historic buildings material is an important character defining feature, there may be regulations that make it much more difficult and expensive to evaluate the seismic performance of historic buildings. Therefore, historic buildings be evaluated on a case by case basis instead of by general building type (*American Society of Civil Engineers 2014, 89*). The ACSE also recommends that the respective states Historic Preservation Officer be brought into the evaluation process. Another

item to consider is the level of performance historic buildings should be seismically upgraded too. Various jurisdiction requires historic buildings to be retrofitted to standard building code. Other jurisdictions require the historic buildings be retrofitted to higher standards due to the value these buildings possess to the local community. However, at times historic buildings are allowed to perform less that current building code in order to preserve and protect historic fabric from demolition (*American Society of Civil Engineers 2014, 91*).

Before an existing building evaluation is performed there are certain requirements that must be met. The professional team who will be evaluating the building should thoroughly understand the seismic evaluations process. The evaluation process includes three parts, the screening phase, the evaluation phase, and the detailed evaluation phase. The screening phase is made of three checklists that were created to allow a quick evaluation of buildings. The evaluation phase is when buildings that require the most rehabilitation to meet the current building code are identified (*Reitherman 2009, 34*). Depending on the structural strength determined by the evaluation in this phase, a building can with move onto the detailed evaluation or have a detailed seismic study completed before moving to the next phase. The detailed evaluation phase is when aspects of the buildings that will need retrofitting are studied in depth (*Reitherman 2009, 13*). The goal of these three phases if to determine which elements of the building must be retrofitting to save on retrofitting costs.

After the three phases are completed a final report is compiled. The final report must include the scope and intent of the seismic evaluation which summarizes the finding and methods that were used. The site and building data should include a building description, structural and nonstructural system descriptions, soil type, building type, and the seismic strength and performance level of the building before retrofitting (*Reitherman 2009, 20*). A list of

assumption in regard to the building materials and soil conditions should also be included. The final report should also include the findings from all three phases of the evaluation as well as recommendations as to which retrofitting methods should be taken to bring the building up to the appropriate code. An appendix with photos, building documents, calculations, test results, and references should also be included. The standards that were developed by the ASCE were also created to be applicable to all building types, regardless of a building's historical importance. However, the ASCE notes that preservation regulations may limit some retrofitting methods in order to preserve historic fabric. Some techniques that may not be used in historic buildings include the condition and material testing, architectural damage during evaluation and retrofitting, removal of architectural elements to improve building structure, as well as retrofitting methods that alter the appearance of the building (*Reitherman 2009, 45*). The ASCE concludes that working with historic buildings might increase costs due to these limitations.

After completing the building evaluation, the first step in completing the seismic retrofit is creating the initial considerations. These conditions highlight the structural deficiencies and show what aspects of the building must be retrofitted. Some additional pieces of information that should be included in these considerations are the building characteristics, seismic hazards that are common to the location (site liquefaction, slope failure, etc.), building use and occupancy levels, historic status, economic information, societal issues surrounding the building, and local building code requirements (*American Society of Civil Engineers 2014, 78*). These conditions should also generally state where costs will be coming from in the process in a funding plan. These usually include construction costs associated with the retrofit, life safety upgrades, hazardous material removal, ADA requirements, aesthetic building features that are added during

the retrofit, and federal tax incentives if working with a historically designated building (*American Society of Civil Engineers 2014, 105*).

The next step in the seismic retrofitting process is to determine the level of performance that the building will be retrofitted to. This often will change depending on if the retrofit is voluntary or mandated by the local jurisdiction or another entity. For voluntary retrofits the ASCE provides a list of performance levels that a building can be retrofitted to. A code official should be brought into the retrofitting team to be sure that the changes to the building do not violate any other city codes. For mandatory retrofits, the performance level will be chosen by city officials, and a code official should be brought in to be sure those requirements are being met. Since mandatory retrofits are not yet common across the US, it has been recommended that jurisdictions and their code officials be flexible to meet the needs of these retrofitting buildings so that an efficient and streamlined code process can be determined (*American Society of Civil Engineers 2014, 76*).

There are four procedures that may be used to determine how the building will react in an earthquake prior to the retrofit. They include the Linear Dynamic Procedure, Linear Static Procedure, Nonlinear Static Procedure, and the Nonlinear Dynamic Procedure. The two linear procedure provide a conservative model of a building's response in an earthquake. However, the effect of an earthquake on a building is not normally linear and thus the two nonlinear procedures should be used when possible (*Somers 1996, 196*). Since the nonlinear procedures provide more accurate results, costs can be saved during the retrofitting process. However, the nonlinear methods require more time and professional expertise so they might not be practical for every retrofitting project. Next step in the retrofitting process is to look at the individual retrofitting measures and determine which methods need to be used to bring to building to the

desired performance objective (*Somers 1996, 200*). The retrofitting measure include local modification of components, removal, reduction of existing irregularities, structural stiffening or strengthening, mass reduction, seismic isolation, energy dissipation, or additional measure that are outline by local jurisdictions (*Somers 1996, 201*).

Local modification of components is ideally used in buildings that as a whole, have adequate strength and stiffness, however other elements may be lacking. This can include improving connectivity, strength, and/or capacity of these specific elements. This is also one of the more cost-effective methods to retrofitting being as only a few elements need to be retrofitted. Removal or reduction of existing irregularities is an ideal retrofitting method for buildings in which the structural irregularities are the source of the instability (*Somers 1996, 205*). These irregularities are often found in discontinuity if the building structure such as lack of sheer walls between floors. Often time removing these irregularities, or at times, demolition parts of the building will strengthen the structure. However, if dealing with a historical building, this may not be a suitable method to use since it would destroy historic fabric. Structural stiffening is an appropriate retrofitting method in buildings in which a lack of ductility results in deformations under stress (*Somers 1996, 211*). This retrofitting method would add braced frames or shear walls to improve the structural stiffness. Structural strengthening is a method appropriate for buildings that have shown a low level of structural strength. By adding shear walls, brace frames, or moment resistant frames will improve the buildings strength to the force of ground shaking during an earthquake (*Somers 1996, 215*).

Mass reduction would be an ideal retrofitting method for buildings in which parts of the building, often the walls, have excessive mass that reduce the ductility and strength of these buildings. Removing some of the mass from these elements will conversely reduce the force that

is exerted on the structure during an earthquake, which will improve its seismic performance. The reduction of mass is often done through the removal of upper stories, interior partition walls, or the removal of heavy storage loads (*Holmes 1995, 44*). Seismic isolation is a retrofitting method that is applicable for buildings in which there is structural weaknesses in the building, however the design team wishes to protect important contents and nonstructural elements from changes due to the retrofitting process. In this method, bearings are inserted between the main building structure and its foundation. When seismic activity happens, most of the forces are drawn to these bearings instead of the weaker building structure (*Holmes 1995, 48*). Since these bearing have little aesthetic impact on the structure, this is an ideal method for historic buildings since it protects the historic character. However, it is important to note that this method works best in stiff building with a large mass, as oppose to light flexible buildings. The final retrofitting method is energy dissipation which is apt for buildings that have low level of flexibility that lead to damages during an earthquake. This method inserts dissipation devices (fluid damper, yielding plates, friction pads, etc.) to reduce the seismic forces on the building (*Holmes 1995, 62*). At the end of the retrofitting process, the building will be inspected, and construction documents will be reviewed to ensure that the building is meeting the selected performance objective and that the construction and design were followed correctly.

Many cities have attempted to have their URM building stock become retrofitted, ranging for creating ordinances to taking surveys of all of the URM buildings. Overall, successful retrofitting programs all had an inventory of URM buildings, as well as having sustained support and leadership from individuals and organizations. Utah passed a state-wide program that required building owners to have an engineering survey done of their buildings when they applied for a re-roofing permit (*Cox 2001, 13*). This survey would inspect the connection

between the walls and the roof to see if they were properly attached. Being as that roofs generally need replacement every 20 years; Utah was able to seismically retrofit much of the building stock in a relatively short amount of time. In 2008, Utah also mandated that a survey be done to see how many URM buildings were in the state so that they could properly assess the situation (*Cox 2001, 24*).

In 1986, the state of California passed a law in which all local government in a specific seismic zone had to develop a way to properly enforce their current building code to all URM buildings. The local governments were then required to create a risk reduction program and report their work back to the state government (*Association of Bay Area Governments 1997, 27).* The different jurisdictions created a variety of programs ranging from requiring building owners to either retrofit or demolish, to sending a letter to building owners informing them of state law and building codes. The jurisdictions that had more invasive retrofitting programs had greater success at retrofitting their URM building stock (*Association of Bay Area Governments 1997, 29*). Seattle, Washington used two different methods to help reduce risk associated with URM buildings. The first was after the 2001 Nisqually earthquake when many buildings that were more than 100 years old had been deemed uninhabitable due to damages. A local nonprofit named *Historic Seattle* created a program that gave $10,000 in grants to each of these building owners (*FEMA 1994, 56*). These grants were intended to help with the initial engineering report as well as renovation and retrofits that needed to be made in order to avoid demolition. FEMA notes that while this method was reactive instead of preventative, it still achieved the goals of reducing the risk caused by URM buildings. Another successful approach that Seattle took was to pass the Fire Facilities and Emergency Response Levy in 2003. This measure provided funds

for seismic retrofits, historic preservation necessities, as well as making other upgrades that modernized these fire station facilities (*FEMA 1994, 33*).

California has also been a state who has enacted a successful risk reduction program with URM buildings. California uses financial incentives to persuade building owners to retrofit. In Berkeley, the city will refund one-third of the retrofitting taxes from the total retrofit costs. In ten years, over $6 million has been refunded due to this policy (*Association of Bay Area Governments 1997, 33*). Some cities also provide tax breaks or waiving building permit fees to retrofit. Another approach California took to retrofitting URM's was to focus on public school buildings. In 1933 the Field Act was passed which required all public-school buildings to be constructed by the state government. This was useful because no school buildings built after this time were URM. In addition, the state of California also required all school to have a seismic evaluation done of their building by 1970 so that the state would know if retrofits needed to be done (*Association of Bay Area Governments 1997, 34*).

Another important step in the process of developing a retrofitting plan is knowing what building code needs to be met. There can then be different levels of retrofitting that are laid out depending on the initial engineer inspection. Often the most beneficial retrofit when looking at saving costs is bracing parapets. This is done by using diagonal steel struts to attach the parapets to the roofs (*Bhattacharya 2014, 51*). While this method protects parapet from falling during an earthquake, it does not prevent entire building collapse. The next level of retrofitting it to bolt the walls to the roof and floors. This is done by inserting long steel bolts into holes that have been drilled into the walls on the exterior of buildings. They are then attached to a steel angle which is then bolted to a wooden joist. There are large washers that are placed on the exterior of the

buildings to prevent the bolts from pulling through the wall during an earthquake (*Bhattacharya 2014, 55*).

The next level of retrofitting includes having a full engineering exam done to determine further weaknesses in the building. These weaknesses can include adding layers of sheathing to increase horizontal stiffness, adding new columns to hold up floors or roofs, or strengthening masonry walls by adding a layer of concrete or columns attached to the walls (*Bhattacharya 2014, 58*). Additionally, a hole can be drilled down through the top of the wall to the bottom and insert a steel bar to increase the walls stiffness. Seismic isolation devices can also be installed in any one of these techniques to aid in reducing building movement. This is done by installing these devices between the ground and building foundation and the devices thus attempts to reduce the movement that travels up from the ground to the building. While this is the general process to fully retrofit URM buildings, each building is unique and requires the input and expertise of a structural engineer (*Bhattacharya 2014, 60*).

Importance and Benefits of Retrofitting Historic URM Buildings

The City of Seattle hired consultants Gibson Economics and Collins Woerman to do a cost-benefit analysis of the URM policy. The study concluded by stating only a few building owners will be able to easily manage the additional cost of the retrofit, specifically those who can locate a market that will pay more for rent. Overall, the cost of a seismic retrofit would exceed the increase in benefit. This is partly because the economic benefits of the retrofit are only seen if the area experiences an earthquake. The chance that an earthquake would cause significant damage per year is only 4.1%, while this policy would require a 100% investment in the cost of retrofitting (*Gibson Economics 2015, 4*). The authors of this report warn that the results of the costs benefit analysis my spur on demolition of no designated historic URM

buildings. They suggest that instead of a mandatory retrofitting policy, the city create targeted incentives to get building owners to retrofit their buildings.

During the 2001 Nisqually earthquake the research team was able to quantify the cost of damages amongst the buildings in Seattle. URM buildings on average experienced $512 in damages, Bolts-Plus retrofitted buildings experienced $238 in damages and fully reinforced buildings had $52 in damages (*Gibson Economics 2015, 28*). The study also found that if all of the URM buildings in Seattle had been fully retrofitted, the city would have saved $558.5 million in damages. During that same earthquake, URM buildings in Seattle had 940 injuries related to the earthquake damages. Bolts-Plus reinforced buildings had 114 injuries, while fully retrofitted buildings only had 6 injuries (*Gibson Economics 2014, 28*).

There have been some studies done that show how retrofitted URM buildings performed versus non-retrofitted URMs. In 1981 the city of Los Angeles passed an ordinance named Division 88 that required all URM buildings to be seismically strengthened. As a result, most of the URM buildings in the area had to have retrofits done before the Northridge Earthquake of 1994 (*Association of Bay Area Governments 1997, 20*). This code required parapets to be braced, mortar joints to be tested, walls to be strengthened as well as meet certain height and thickness requirements. This ordinance also required that walls were anchored to floors and roof diaphragms. While many other cities around Los Angeles had similar URM ordinances many were not a rigorous as Los Angeles and as a result, were not as extensively retrofitted as those URM buildings that were affected by Division 88. Since the retrofitting of URM buildings in this area was regulated by ordinance, the research team was able to find research through data that was attached to the different ordinances.

After the Northridge Earthquake the City of Los Angeles put together a task force to research the difference between how retrofitted and non-retrofitted buildings performed. Based on the data collected by the task force, a vast majority of retrofitted URM buildings had little to no damage after the earthquake. The data showed that of the 637 URM buildings that had been strengthened 77% of them saw less than 10% damages after the earthquake (*Association of Bay Area Governments 1997, 34*). Of the 208 non-retrofitted URM buildings, only 52% of them saw less than 10% damages. After their research they determined that weak mortar strength, as well as anchorage failure between floors and walls were the most common causes of building damages. It is important to note that some buildings that had been partially retrofitted, but not to the level that Division 88 required, and as a result they experienced damages that were often not as severe as non-retrofitted buildings.

FEMA conducted a study to show the damages that happened to URM buildings after earthquakes. Through this research they claim that if retrofits of URM buildings had occurred prior to these earthquakes, that the damages that would have occurred would have been far less. For this research they surveyed, where the earthquake had happened, what magnitude the earthquake was, and how many URM buildings were damages. A 7.7 earthquake in Charleston, South Carolina in 1886 saw 82% of its brick building stock damaged and 7% had to be demolished. A 6.2 earthquake in Santa Barbara, California saw 40% of their URM stock severely damaged (*Reitherman 2009, 49*). A 6.3 Earthquake in Long Beach, California saw 54% of their URM stock damaged with more than 20% of those buildings having partial or full wall collapse. A 6.2 earthquake in Coalinga, California caused damage to all but one of their URM building stock. A 7.3 earthquake in Bora Peak, Idaho all of their URM stock was damaged. with some falling bricks causing fatalities (*Reitherman 2009, 49*). A 7.1 earthquake in Loma Prieta,

California 16% of their URM stock were so badly damaged that tenants had to vacate. A 6.5 earthquake in San Simeon, California many of the URM buildings were so damaged that they had to be demolished. In addition, there were 9 URM buildings that had been retrofitted that saw no damages due to this earthquake (*Reitherman 2009, 49*).

Cost benefit analysis are also useful tools in determining the benefits of retrofitting URM buildings. A study in Vancouver, British Columbia conducted a cost benefit analysis and the variables that were taken into consideration included building value, pedestrian and occupant exposure, construction costs, retrofit measures, and well as seismic hazard (*Bhattacharya 2014, 53*). The retrofitting measures that were studied ranged from parapet bracings to full seismic retrofits that met local building codes. This is a relevant study because Victoria runs along the same subduction zone that Seattle does, making its seismic activity comparable. At the time of this study, full seismic retrofits were only required if a large building renovation was planned. The study used three different level of retrofits. The lowest method included bracing parapets on building. The next level was partially retrofitted, which included the braced parapets, as well as some anchoring of floors to walls. The highest level of retrofit was a full retrofit that included all floors and roofs to be braced, as well as vertical supports under major structural elements (*Bhattacharya 2014, 59*).

The benefit costs analysis focused on two aspects that could be lost during damages. The first was building owner loses which included repair costs, income losses, and tenant relocation costs (*Bhattacharya 2014, 62*). The other aspect of losses focused on public losses which include occupant and pedestrian casualties cause by URM damages in a seismic event. Retrofits costs were also determined by pulling together the costs for design, permits, taxes, and construction and labor. Due to the fact that there was no system in place to finance the retrofits, the costs were

calculated to be borne by the building owner. Based on the calculations of this study, it was concluded that in general seismic upgrades are not economically justifiable even if they were as small as parapet bracing (*Bhattacharya 2014, 64*).

In addition to life safety benefits there are economic incentives and benefits to the preservation of URM buildings. Historic preservation, or more simply fixing and reusing old buildings, can be the solution to unemployment, inflation, poor housing, dying inner cities, as well as creating alternative to high costs of housing and urban renewal (*Bever 1978, 9*). Many cities and towns, no matter the size, have experienced revitalization through the widespread use of rehabilitation. Historic preservation is often successful because it provides details and character that is unique to modern architecture that create sense of place that local communities enjoy. Historic preservation has also been successful because of economic factors. It often costs less to rehabilitate a building than it does to build a new one. Once on the market, rehabilitated buildings also are put at comparable values when compared to new construction (*Bever 1978, 23*). Rehabilitating buildings also provide jobs to the local community as well as stimulating local businesses and tradesmen.

Preservation and rehabilitation work can also have employment benefits. Working with historic buildings can be as high as 75% labor while new construction is generally 50% (*Bever 1978, 26*). This not only creates more jobs, but they are often source locally which has a direct benefit on the local community. Materials for the rehabilitation can often be sourced locally which can further stimulate the local economy. When these rehabilitation projects focus more in the local economy there are also more local funds and grants that rehabilitation can apply for. Rehabilitation projects also stimulate the private sector. This is partly due to the cost of labor being less than the cost of materials. Rehabilitation projects also save on demolition costs which

can be very high in urban areas (*Bever 1978, 43*). This process is often much faster than new construction, sometime taking half the time. Rehabilitation can also work through the year because as that the building provides shelter from the elements. The New Tax Act also allows costs on rehabilitation to be written off in 5-year increments.

Rehabilitation has also been an effective tool in revitalizing areas. Seattle's Pioneer Square neighborhood increased land values by 114% after the area was rehabilitated. Rehabilitating the Skid Row area also increased the tax base by 1000% (*Bever 1978, 29*). 23% less energy is consumed in rehabilitated buildings than new construction and is often more resource efficient than new construction. In addition, there are often more private and local funds available for historically designated buildings. Some professionals have argued that almost every city has the opportunity to rehabilitate old buildings due to the economic benefits associated with the process (*Bever 1978, 32*). In addition, the social and culture benefits of rehabilitating older buildings cannot be understated either. While historic preservation is not the answer to fix all social and economic challenges many cities face, it has historically demonstrated itself to be beneficial to the local community.

Conclusion

Based on this literature review, retrofitting URM buildings is an important part of hazard mitigation and planning. However, retrofitting these structures can be costly no matter the extent of the retrofitting project. While there can be federal and local government funds available to finance the project, finding unique methods to fund retrofit project at the community level often are some of the most successful approaches. FEMA has also created multiple tools so that building owners and other individuals can estimate what the costs would be to retrofit their own URM building. Being as that the majority of URM structures have been around for over 50

years, many of them are historic are have important character defining features. Some jurisdictions however value the seismic retrofits over historic fabric and allow leeway on preservation regulations when seismic retrofits are made. Other resources described various retrofitting methods for URM building and how they could be executed while preserving historic character.

The literature on the process and specific challenges of retrofitting URM buildings showed how many cities and states have enforced successful retrofitting policies. This body of literature also described how URM buildings are constructed, how they perform in earthquakes, and how they can be retrofitted to prevent damages. Another focus of this literature review was the benefits of retrofitting URM buildings. Many resources have shown the immense damage that has happened in previous earthquake to URM buildings. Additionally, there have also been studies that compare the performance between retrofitted URM buildings and non-retrofitted URM buildings in past earthquakes.

Methodology

The goal of my thesis was to provide a URM building owner with a retrofitting resource that focused on the financial aspect of retrofitting a building, how to create a plan for retrofitting a building, as well as retrofitting methods that could be used that retain historic character. The financial piece of the resource detailed specific funds that may be available to the building owner if then plan a retrofit, as well as how much the retrofit may cost and where the costs would come from. The next part of my thesis focused on the process to retrofit the building. This included information on how to develop a retrofitting plan and team, as well as how to follow the process of the mandatory retrofitting policy. The third aspect of the retrofitting resource focused on the retrofitting methods that the building owner could use. Since the building I selected was historic and important to the community, it was critical that the historic character defining features were preserved during the retrofit. This part of the plan discussed the different retrofitting methods the building owner would have to use and how they would be executed without altering the historic fabric. During an interview with the building owner of the NP Hotel, they also wanted this resource to include detailed information about the history of the building, as well as what renovation work has been done.

After I had obtained a background of knowledge in the retrofit process of historic URM buildings I began to discuss buildings to look at for my thesis. The goal of this thesis was to provide a URM building owner with a resource guide that they could use if they wanted to retrofit their building. To begin my search for a case study for my thesis, I contact the Seattle Chinatown International District Preservation and Development Authority (SCIDpda). During my initial contact, I explained the goal of my thesis and asked if I could meet up with someone to discuss the possibility of working with a building in the International District. Their preservation

planner, MaryKate reached out to me saying that saying she would be able to meet, and she had a few buildings in mind. Before going into the meeting, I developed some questions and talking points to help explain my background, the goal of my thesis, and what building I was hoping to work with. I also want to be sure to ask for her input as well since she was deeply immersed in the neighborhood and SCIDpda had been working with URM buildings in the past.

Later we met at SCIDpda office to discuss my thesis. One of their interns Naomi Saito, was in attendance as well since she was working on the URM retrofit policy. During our discussion we were able to work through many of the questions and talking points I had outlined, and I was able to gather plenty of valuable information to help guide my thesis. During our meeting MaryKate also took my on a tour of the International District to look at several URM buildings in which SCIDpda knew the building owners and had good relations with them. While we looked at many buildings two of them stood out. One was the Chong Wa Benevolent Association. This building was built in 1929 and is a 2-story masonry structure with a concrete foundation. The exterior of the building was brick with decorative stone, balconies, and cornices. There were also oriental motifs on the exterior of the building. The unique character of the façade of this building make it a critical building in the landmark district. The building is currently used as a school house making it vital that this building get retrofitted. MaryKate also mentioned that she didn't believe any retrofitting work had been done.

As we continued our tour of the International District, we met the Building Manager of the NP Hotel and SCIDpda employee Rachtha Dahn. He took us on a tour of the NP Hotel which is a 6-story mixed use apartment building with masonry and heavy timber construction. The apartments are home to many low-income seniors. The NP Hotel is a contributing building in the Special Review District. Some of the important historic features of this building include the sheet

metal canopy over the entrance, French windows, brick pilasters, and terra cotta capitals. The NP Hotel was also important to the Japanese community in Seattle that came by rail. According the Rachtha, the only retrofitting that has been done has been parapet bracing. After discussing the two options with my thesis advisor and thinking about the benefits to working with each building, I decided to work with the NP Hotel. One of the reasons I choose to work with the NP Hotel was that I had previously met the building manager and had already establish communication. The building was contributing to the historic district had had many interior and exterior features that were character defining. Some retrofit work had already begun so the owner was aware of the work that needed to be done and likely knew of the dangers of not retrofitting the building. After my discussion with the building manager I knew that keeping rents low as to not displace the current residents was a high priority, so I thought this would be a good building to focus on retrofitting methods while keeping costs as low as possible.

Later, I interviewed the building owner of the NP Hotel to gather some background information on the building, as well as ask them if they had any questions of concerns regarding my thesis, and if there was any additional tasks they would like me to accomplish. After gathering all of the information from the building owner I took a long time to study the building and look at the important historic features and opportunities for retrofits. To gather information on the history of the NP Hotel I visited the city archives. There I was able to gather information on the renovation history, as well as the building's social history. To gather information on the process of retrofitting the building I research various journals and briefs by the National Parks Service, engineering journals, and other resources on how to develop a retrofitting plan.

I then visited the Seattle's Department of Construction and Inspection website to learn information on what the process of following the retrofitting policy would likely be as well as the

expected timeline. To gather information on retrofitting methods that could be used for the NP Hotel I consulted journal articles, studies, engineering reports, and preservation guides on the various retrofitting methods that were available. I chose to focus on methods that would not destroy the important historic features of the NP Hotel. Finally, to gather information on financial methods for the retrofitting process I looked at various local, state, and federal funding sources and determine which one would be applicable for the NP Hotel.

I conducted nine different interviews to gather necessary information to develop my thesis. While the detailed notes from those interviews can be found in the appendix of this thesis, I will briefly describe what information was gained. From the interview with the NP Hotel's building manager, Rachtha Dahn, I was able to gain information on how the tenants interact with the building as well as what is important to them. Rachtha also took me on two tours of the NP Hotel where I was able to take photos and see some of the character defining features of the building. From the interview with the building owner of the NP Hotel, Valerie Neng, I was able to gain information on how they are planning for the retrofit, their concerns with the policy, as well as information on the buildings renovation history. Through those two interviews I was able to gather enough background information on the NP Hotel to help guide my research through city archives and online databases for the building.

Next, I wanted to interview important stakeholders from each of the precedent studies that I had chosen. First, I interview Kji Kelly from *Historic Seattle* who was able to speak to the retrofitting work on the Cadillac Hotel. From this interview I learned the challenges that the retrofit went through, and in addition we also talked about the effects that this retrofitting policy may have on historic buildings in Seattle. To gather information on the Kong Yick Building, I interview the main architect on the project, Rick Sundberg. From this interview I was able to

learn information on his design process, how they involved the community and really focused on community-based design for the project. For information on King Street Station I interview the lead architect on the project Chris Frost. Through this interview I was able to gain information on all of the seismic work that went into the design process, how they preserved the historic character, and how they were able to fund the project. Finally, for information on the Morrison Hotel, I interview the Executive Director of the DESC, Daniel Malone. From this interview I was able to gather information about the tenants that live in the building, the barriers that they faced when trying to retrofit the hotel, and how they were able to fund the project.

After I had conducted these interviews, I felt that there were some gaps in my research and literature review that I needed answers to before I began my work for the NP Hotel. First, I felt that I had gain a lot of insight on the building owner perspective of the retrofitting policy, so I wanted to talk to someone from the City of Seattle who helped to develop the policy. I was able to interview Nancy Devine who works for SDCI. From this interview I was able to gain information on how they created the policy, where the policy was at, and how the city was addressing the equity issued surrounding this policy. I then interview Trevina Wang who worked for the City of Seattle during the renovation of King Street Station. From this interview I was able to gain more detailed information on how the project was funded, as well as the effect she thinks the policy will have on historic building stock in Seattle. Finally, to gain better information on what retrofitting project cost, I interviewed Andy Cluness from the ARC Cost Group. From this interview I was able to gain information on how much the project would cost, where the costs come from, and how money could be saved. After conducting all nine of these interviews, I felt better prepared to begin developing the retrofitting resource for the NP Hotel.

Precedent Studies

Introduction

The next part of the thesis design was selecting precedent studies to help me better understand the retrofitting process. I selected four local projects that had been retrofitted. Each of these cases had different focuses that I thought would be useful to help guide the case study building I chose for a retrofit plan. The first precedent study was the Cadillac Hotel located in Pioneer Square. This is a historic building that was un-retrofitted at the time of the Nisqually earthquake. The building was severely damaged after the event and was had to undergo and extensive reconstruction process to make the building inhabitable again. While the building was fully restored and operational, the retrofit process was much larger and more complicated than it would have been if it had been done before and earthquake. By choosing the Cadillac Hotel as a precedent study, I wanted to focus on the benefits to retrofitting a building before an earthquake. The next precedent study I chose was the Kong Yick Building. This building was important to the immigrant community in the International District and went through a full retrofit with the help of an architecture and structural engineering team. The design team for this project focused on community-based design since it was such an important building to the local community. Through studying this building, I wanted to focus on the importance of social value when retrofitting these URM buildings as a way to prevent destruction in an earthquake and make them safe for the communities they live in.

The third precedent study I chose was the Morrison Hotel located in Pioneer Square. This building was important to the history of Seattle being as it housed many of the workers that traveled to Seattle, and it possessed some unique architectural feature. The building is currently inhabited by some commercial uses on the street level, but the majority of the building is owned

and operated by the Downtown Emergency Service Center (DESC) which offers emergency services to the homeless community in Seattle. In this case study, the building owners struggled to find funds to retrofit the building. By studying the Morrison Hotel, I wanted to focus on the barriers to retrofitting. The final precedent study I chose was King Street Station. This building is a prominent feature in Pioneer Square and had some very distinct and grand architectural qualities to it. The retrofit was done by a large team of developers, architects, and other professionals in the field. This retrofit restored the building to its original design while bringing the structure up to current building code. The team was able to source money from different federal and local grants and use advanced technology to insert retrofitting structure into the walls on the building. By focusing on King Street Station, I wanted to learn the different sources of funding a project could apply for as well as the different technologies they used to hide the retrofitting structures.

The Cadillac Hotel

Figure 1: Cadillac Hotel southern and eastern façade (Source: Rachel Vickers, 2019)

General Building Information

The historic and current name of this building is the Cadillac Hotel. The Cadillac Hotel was built in 1889 by the construction team Heatherington and Clements Co (*Link 2007, 16*). The architects that worked on the recent rehabilitation of the building were SMR Architects. The historic use of the building was a single room occupancy (SRO) hotel with commercial uses on the ground floor. The Cadillac Hotel currently is used for office spaces on the upper floors and commercial spaces on the bottom including a National Parks Service museum. The Cadillac Hotel was retrofitted in 2004 and the building square footage is 22,695. The Cadillac Hotel experience major damages in the 2001 earthquake which spurred on its rehabilitation. The focus

on this building is to show the dangers these building possess if left un-retrofitted and the advantages to planning a retrofit before a seismic event.

Building History

The Cadillac Hotel is located at 319 2nd Ave and was originally designed by the architect James Hetherington and the construction team Clements and Company in 1889, right after the Great Fire. At the time of construction, the Cadillac Hotel was one of the two brick buildings that were located in the area, with most other structures being made of wood, and were used as SRO's for working men (*Link 2007, 18*). The building consisted of a three-story structure with the exterior clad in red brick. Some key architecture elements include the arched window openings and the decorative brickwork. The brick pilasters create vertical bays and the horizontal courses show the floors. This pattern creates a grid design that was common in Victorian buildings. The Cadillac Hotel was also located one block away from train tracks that would have trains from the Northern Pacific Railroad as well as Elliot Bay (*Link 2007, 19*). Historically, the building was used as a single room occupancy (SRO) hotel with commercial space on the bottom floor. Some of the commercial uses included a drugstore, bar, and various restaurants. The single room occupancy hotel housed mainly single men that worked in logging, shipyards, and railways. The façade of the building remined untouched except for a portion of the brick pediment that was on the 2nd Ave facing side of the hotel. In the 1970's, the brick exterior facade was sandblasted when the building was undergoing minor renovations in an attempt to modernize the structure for its tenants (*Historic Seattle 2005, 4*).

The Cadillac Hotel was first owned by the Buttnick Family and Goodman Financial Services. The restoration architect was Stickney Murphy Romine and the structural engineer was Coughlin Porter Lundeen (*Link 2007, 20*). Right before the Nisqually earthquake in 2001 the

Cadillac Hotel was bought by a private company who then wished to tear the building down after the severe damages from the earthquake. According to interview with *Historic Seattle*, the previous owners began to tear the building down before receiving an approved demolition permit, and *Historic Seattle* had to get a cease work application before the entire building was demolished (*Kelly 2019*). Currently, the building is home to the Klondike Gold Rush Museum and various National Parkers Services offices and is owned by *Historic Seattle* who bought the building for $2 in 2002 (*Historic Seattle 2005, 9*). The building is a contributing structure to the Pioneer Square/Skid Row Landmark District and is also listed on the Seattle Inventory of Historic Places. The Cadillac Hotel is significant in Seattle's history not only because it was one of the first buildings erected after the great fire, but it also is an example of a workingman's hotel.

In 2001 the 6.7 magnitude earthquake that went through downtown Seattle and many URM buildings in the area were damaged. 16 of those URM structures in Pioneer Square were damaged so severely that they were red-lined and deemed uninhabitable and hazardous. This included significant damages to the exterior of these buildings with additional damages in the interior spaces. In the case of the Cadillac Hotel, the sidewalk around the building was closed due to public safety concerns with bricks falling off the building (*Historic Seattle 2005, 2*). The Cadillac Hotel was also subject to more severe damages due to its location on fill soil and neglect and abandonment before the earthquake and after the earthquake.

Retrofitting Information

In 2002 the building was purchased by *Historic Seattle* and the rehabilitation of the building began in 2004. The retrofitting team included architects, structural engineers, mechanical engineers, electrical engineers, a general contractor, a project consultant-financing

firm, and construction management firm, community development firms, real estate firms, and a preservation firm. To finance the project, *Historic Seattle* utilized traditional debt services, Historic Tax Credits, and loans for the City of Seattle (*Kelly 2019*). *Historic Seattle* also received donations from The Historic Seattle Preservation Fund, National Parks Service, Impact Capital, 4Culture, Seattle Office of Economic Development, Key Community Development Corporation, Community Development New Markets, and Key Bank National Association. The total cost of the retrofitting project was $10,600,000 (*Historic Seattle 2005, 1*).

The initial condition of the building was very poor due to poor maintenance before the earthquake as well as damages after the Nisqually earthquake. The wood floor in most of the structure was warped and an interior stairwell had been removed. The removal of the stairwell weakened the load capacity of the structure which likely lead to more severe damages during the earthquake (*Kelly 2019*). After the earthquake, a portion of the buildings cornice has fallen and as a result, pigeons were able to nest in the upper floors of the building which led to further degradation of the building. The previous owner of the building had also removed some of the wallboards and plaster and left them strewn about the interior of the building (*Kelly 2019*). According to Kji Kelly of *Historic Seattle*, many thought the damages from the Nisqually earthquake were too severe to be able to save the building. However, after teams of engineers from the firm Rutherford and Chekene surveyed the Cadillac Hotel and provided insight to how the building could be salvaged and rebuilt.

Figure 2: Cadillac Hotel damage from 2001 Nisqually earthquake (Source: Komo4 News, 2003)

The engineering firm who survey the Cadillac Hotel has also developed polices that govern historic URM buildings in California (*Historic Seattle 2005, 7*). *Historic Seattle* was able to provide the funds to cover this initial survey work by the engineering firm. It is important to note that when a historic building has been damaged the survey of the engineer and opinion on whether the building can be saved or not play a crucial role in the preservation of damaged buildings. However, the input from the client and their objectives for the building can often determine the fate of the building more than the engineer's opinion. Therefore, it is often times important to get the opinion for multiple engineers and preservationist to determine whether to demolish of rehabilitate a damaged historic building (*Kelly 2019*).

During the first attempt to retrofit the building, the process to strengthen the building actual weakened the whole structure. For example, some bricks that were too loose to keep on the building had to be removed and some exterior walls of the building became unstable. Upon more extensive brick removal, the design team noticed the mortar that held the brick together had

poor strength and portions of the outer walls had to be removed (*Historic Seattle 2005, 3*). It was here that the initial owner began to demolish the entire building and preservation groups in the area began to worry about the building. While the building owner had applied for a permit for demolition, the Seattle Department of Neighborhoods then denied any demolition of the building stating that all other alternatives should be explored before demolition. However, the original owner was still adamant that life safety, cost, and opening the streets were apt enough reasons to demolish the building (*Kelly 2019*). Then in 2001 Historic Seattle gained ownership of the building and began to retrofitting process.

Figure 3: Eastern Façade of Cadillac Hotel (Source: Rachel Vickers, 2019)

The interior of the building was redesigned while following the Secretary of the Interior *Guidelines for Rehabilitation*. The work that was done in the project included repair of the exterior brick façade, adding steel bracing frames to seismically stabilize the structure, parapet

reconstruction, wall ties, floor and roof sheathing, as well as new interior shear and load bearing walls (*Historic Seattle 2005, 7*). The design also brought the hotel up to current building and life safety code as well as modern energy code requirements. The original trim, windows, and railing on the building were catalogued and refurbished, then replaced on the building. The original stairwell was also reconstructed, and an additional one was added that exists into the alleyway behind the building (*Historic Seattle 2005, 7*). While the original intent was to add insulation to the walls, the design team ended up double glazing the original windows. Some elements that the design team also intended to keep such as the original slabs, were so badly damages that they had to be replaced.

On September 22, 2005 the Cadillac Hotel celebrated its grand reopening. The design team was able to comply with the federal standards for rehabilitation and received the 20% tax credits. The building became occupied once again and the Klondike Gold Rush Museum and other commercial uses on the first floor. The National Parks Service has office space on the top three floors with the National Parks Service Regional Library on the third floor (*Historic Seattle 2005, 9*). While the rehabilitation mitigated most of the structural issues with the building, the tenants are still dealing with some issues such as problems with the HVAC system and the setting on foundation on poor soil.

Conclusions: Benefits to Preemptively Retrofitting

In all, the Cadillac experienced extreme damage during the 2001 Nisqually earthquake. Due to these damages the Cadillac Hotel was almost demolished due to concern with life safety, costs, and pedestrian safety. However, the expertise of preservationist and engineers were able to create a design plan that would save the historic structure. Through applying for various grants, receiving historic tax credits, and multiple donations from private companies *Historic Seattle*

was able to restore the Cadillac Hotel in a way that they claim allowed the chapters of its history to be expresses through the built form. While in the end, the building was saved, Kji Kelly has stated that the retrofitting process was much more drawn out and difficult after the building had been damaged. There were also multiple parts of the building that has to be remove completed resulting in a loss of historic character.

The Kong Yick Building

Figure 4: Kong Yick Building eastern façade (Source: Rachel Vickers, 2019)

General Building Information

The historic name of this building was the Kong Yick Building and today it goes by the same name. There is a prominent museum, the Wing Luke Museum, that resides in a large portion of the Kong Yick building so the name are often used interchangeably. The Kong Yick Building was constructed in 1910 and the original architect is unknown. The recent rehabilitation architect was Rick Sundberg of Olson-Sundberg-Kundig designs (the firm has since changed). The Kong Yick building was retrofitted in 2008 and the building square footage is 14,400. Based on permit records there were no major damages that needed repair after the 2001 earthquake.

Historically, the building was used as apartment spaces for Asian immigrant families, and it is currently used as an Asian American Cultural Museum as well as various commercial uses. The focus of this precedent study will be the importance of retrofitting the structure due to its social value in the local community, specifically the Asian community.

Building History

The Kong Yick Building was built in 1910 by Chinese Immigrants. Originally, the building was commissioned by Goon Dip who was a wealthy Chinese entrepreneur and diplomat. He owned and operated the King Yick Investment Company which was comprised on over 150 Chinese immigrants in Seattle (*Kreisman 1986, 23*). The group pooled their money together to construct this building which was the first Chinese-built structure nearby and became a hub for development in the area. The building was promoted the building as the "nucleus of the new Chinatown" to attract residents and bring more investment in the area. The building was constructed of unreinforced masonry with a concrete foundation. The façade of the building had brick column capitals at each end with metal columns that framed the storefronts (*Kreisman 1986, 14*). Sheet metal banding, which has since been replaced with stucco, separated the commercial and apartment spaces. The western bay had recessed balconies at mezzanine levels. There was originally a series of double doors on the third floor with iron balconies which have been removed. The façade is also clad with cast stone sills and keystones that stand out against the brick façade. The building to the west of the Kong Yick Building is very similar in design which creates a unifying street wall along the block. There alleyway that is shared between the two buildings also have storefronts which is an important aspect in Asian commerce (*Kreisman 1986, 29*).

The building initially housed a mercantile store, restaurant, and other immigrant owned businesses. The upper floors have over 155 single room occupancy apartment rooms with nine storefronts at street level. The upper floors housed over 100 Chinese immigrants, many of whom worked in canneries, railroad, mines, and other popular businesses in Seattle (*Kreisman 1986, 34*). This building was also important because it not only housed Chinese immigrants, but other Asian immigrants such as Japanese, Cambodian, Vietnamese's, Thai, and others, making the area one of the most diverse immigrant communities in the US.

The museum in the building is named after Wing Luke, was born in Canton, China and immigrated to the United States when he was five years old. Wing Luke became a prominent figure in Seattle, becoming the first Asian American in Seattle to hold a seat in Seattle City Council in 1962. While on city council, Wing Luke was instrumental in the passing of the Open Housing Ordinance in 1963 (*Wing Luke Museum 2017, 2*). This law offered greater protection against racial discrimination in the housing and renting market in Seattle. Before his death in 1965 Wing Luke pushed for greater protection of culture and rights for Asian Immigrants through civil rights regulations, urban renewal, and historic preservation (*Wing Luke Museum 2017, 1*).

Retrofitting Information

Currently, the Kong Yick Building is home to the Wing Luke Museum of the Asian Pacific American Experience. The upper floors of the building are preserved apartment spaces from the Freeman Hotel so visitors can experience what life for the immigrants was like. The rehabilitation of the East Kong Yick Building was completed in 2008 by Rick Sundberg of Olson Sundberg Kundig Allen. The renovation was partially funded by the Wing Luke museum which

raised $23.2 million to move to the Kong Yick Building. The money was raised by mainly private donations include grants from local companies such as 4Culture.

After sitting down the Rick Sundberg to discuss his work with the Wing Luke museum, I was able to gain insight into the design process, community, involvement, and lessons learned. While private investment was a main source of funding for the project, the design team claimed it wouldn't have been possible without grants from the city (*Sundberg 2019*). However, even with the large amounts of donations the project had a very tight budget. Rick Sundberg stated that the team of professionals that work on this project was similar to project that deal with new construction with the exception of some preservationists. Before beginning the design, it was important that the design team understood the history of the building and area as well at the community the building serves. Rick stated that "the process of understanding what you have before you draw is very important" (*Sundberg 2019*).

The role of the community also was large in the process of designing this building. There were often two community meeting a day to gather their feedback. Rick also specified that these community meetings were unlike others that their firm had dealt with because everyone wanted to project to succeed since it was important to their community. While some community members had different programmatic ideas for the project, the overall goal of the building was similar across all community members (*Sundberg 2019*). Overall, working with the community on this project was many of the design team members favorite parts of the project. One of the greatest take-aways from the project according the Rick Sundberg is that community-based projects are extremely valuable and that it is important to listen to community member to make the buildings into what they want, and so you can better understand the location.

Figure 5: Interior Steel X bracing in Kong Yick buildings (Source: Rachel Vickers, 2019)

Important design aspects of this project were focusing on texture and scale. The initial condition of the building was fair; however, the south west corner of the building had sunk almost two and a half feet (*Sundberg 2019*). Rick said that when working with URM buildings it is important to look at the ground floor first and get that stabilized, and then work with the rest of the structure. The design team also wanted to reuse all part of the building instead of sending them to the landfill which also help create an interesting design with their tight budget. For example, wood that was found in the building Rick noted that when you insert something new

into an old building, it is important that the new feature is separate and stands apart from the historic parts of the building (*Sundberg 2019*).

Conclusions: Community Significant in URM Buildings

In all the Kong Yick buildings is important to the community it serves. For decades it has served the Asian immigrant community in Seattle's Chinatown neighborhood. When the Wing Luke museum wanted to house its new facility in the Kong Yick Building, the architecture firm Olson Sundberg Kundig began a design plan that would adaptively reuse the building while bring the structure up to modern building code, and deeply involving the community during the design process. This precedent study shows the importance of making buildings important to the community safe spaces for them to live and run their daily commerce in.

King Street Station

Figure 6: King Street Station northern façade and courtyard (Source: Rachel Vickers, 2019)

General Building Information

This building was historically called King Street Station and continues to go by that name. The station was built in 1906 and designed by the architecture firm Reed and Stem (*ZGF Architects and Seattle Department of Transportation 2013, 2*). The recent rehabilitation architects were ZGF Architects. King Street Station was originally built as a train terminal and continues to be used for that function now a days. The retrofitting project for this building consisted of a very large team that had professionals from multiple fields. The cost of this retrofit also totaled over $55 million and the focus of this precedent study will be the retrofitting

methods and financial aids that were used. The rehabilitation began in 2010 and the building square footage is 67,775. Based on permit records there was no major work done after the 2001 earthquake the repair any damages. The focus of this precedent study is funding options and retrofitting methods.

Building History

King Street Station is located at 301 S Jackson St and was originally constructed in 1906 and was designed by Reed and Stem who also designed New York's Grand Central Terminal (*ZGF Architects and SDOT 2013, 2*). The base of the building is concrete with the exterior of the building clad in pressed red brick with terra cotta stone trim and a tile roof. There are three stories to the L-shaped building with a 120-foot-tall clock tower. The architectural style of the building is based on the Piazza San Marco in Venice. Th exterior of the building also has projecting piers and trabeated openings as well as stylistic trims and a classical entablature. The waiting hall had an intricate ornamental plaster ceiling and fluted Corinthian columns spaced out on the walls. The lower part of the walls was clad with white marble and colorful glass mosaic tiles (*ZGF Architects and SDOT 2013, 4*). There was a large bronze chandelier in the center of the room with four smaller chandeliers and sconces to provide additional lighting. There was also a compass shaped pattern in the terrazzo floor tiles.

King Street Station began construction in 1904 and took two years to complete (*ZGF Architects and SDOT 2013, 3*). At the time of construction, the station was located on the edge of Seattle commercial district and was the first showpiece train station in the city. The location was chosen due to the proximity to the waterfront. King Street Station was very important in Seattle history because it signified the city's victory to be the major railroad terminus in the nearby area, other cities that had been competing included Tacoma, Mukilteo, and Port Townsend. In

addition, the large clock tower became one of the largest landmarks in Seattle skyline in addition to Smith Tower.

Retrofitting Information

By 1973 the station was placed on the National Register of Historic Places, however as train travel became a less popular method of travel, the station became neglected. In 2008 the City of Seattle purchased the station from the Burlington Northern Railway Company for $10. In 2010, the city began to partner with the Seattle Department of Transportation, the local community, and ZGF Architects to restore the building (*ZGF Architects and SDOT 2013, 2*). The goal of the project was to preserve and restore the original character of the building while reestablishing King Street as a major transportation hub. Some key elements of this included rehabilitating the clock tower, restoring the ornamental ceiling, floors, and windows, as well as making significant structural upgrades to bring the building up to code. The team on the project included the owner, contractor, historic preservation consultant, architect, civil engineer, structural engineer, mechanical/electrical/plumbing consultant, geotechnical/soil consultant, lighting design consultant, acoustic consultant, and plaster restoration consultant (*ZGF Architects and SDOT 2013, 8*).

The overall construction costs were $55 million. The project received $33 million in federal funding from the Federal Railroad Administration, Federal Transit Administration, and the Federal Highway Administration. They also received $9 million in state funding from the Washington State Department of Transportation and Washington State Historical Society. The city of Seattle provided $10 million in funds and $.2 millions of private funds were provided by the South Downtown Foundation, 4Culutre, and the National Trust (*ZGF Architects and SDOT 2013, 2*). After talking with Trevina Wang, who was in charge of finding funding for this project,

she said that with these types of projects that costs a lot of money, it is important you have someone dedicated to funding sources of funding and applying for grants. The majority of the renovation included removing the alternation that had been made in the 1940-60's. Carrara marble that was almost an exact match to the original material was sourced as well as mosaic tiles from Murano, Italy. To restore the plaster work, the original pieces were used, and molds were created from them and recreated to match the original design. Part of the restoration the happened in the mid 1900's included hanging a plaster ceiling from the original one in an attempt to modernize the building (*Frost 2019*). The restoration project removed the ceiling addition and repaired the ceiling where damages had been made.

Since the building is located at the convergence of two prominent neighborhoods in Seattle (Pioneer Square and the International District) as well as near two major Seattle sports arenas the designers also wanted to improve pedestrian and multi-modal connections within the property. This included turning the parking lot on Jackson Street into a plaza to re-establish community connections. A stairway that had been boarded up was reopened to connect Jackson Street with the lower level of the station. The exterior lighting and granite that surrounded the property were also restored along with the original green roof tiles on the station (*ZGF Architects and SDOT 2013, 9*).

In addition to complying the City of Seattle building code and preservation guidelines the design team also wanted to focus on sustainability and earning a LEED Platinum Certification. This was done through a variety of design decisions. Mechanical systems were replaced with ground source heat pumps which covered all of the buildings heating a cooling need. Photovoltaic systems were installed on roofs to help the building produce its own energy (*ZGF Architects and SDOT 2013, 6*). Daylighting was improved through the restoration of the glass

canopy to cut down electrical costs associated with lighting. Insulation was added to walls and the roof to reduce the need for heating and cooling during the summer and winter months. Before the building was restored it consumed 118 KBTU/sf/yr (*ZGF Architects and SDOT 2013, 9*). After the restoration, the building uses 38 KBTU/sf/yr which equates to a 68% reduction in energy use.

Figure 7: Lobby of King Street Station (Source: Rachel Vickers, 2019)

Half of the budget for the project was used for seismic upgrades since the building was unreinforced (*Frost 2019*). Support elements were carefully added behind existing historic elements as to not affect their aesthetic quality. Over 1,300 tons of structural steel was added to the building to reinforce it. Since the building in located on a liquefaction zone, the new steel structure was inserted into the old unreinforced structure (*Frost 2019*). Before the structures were added, the team used performance-based building design to ensure the seismic upgrades would perform properly and not disturb the historic character of the building. To preserve the historic

elements of the main waiting hall, 35-foot high slots were cut into the perimeter brick walls into which steel was inserted. High strength grout was then used around the steel to add additional seismic reinforcement. This reinforcement design allowed the team to increase the structural capacity while abiding by the preservation guidelines on the building. After talking with Chris Frost who was the lead architect for this project, he stated that the retrofitting work for this building took the most time and money, but it was important that it was done well so that the historic fabric of the building was not altered.

Conclusions: Retrofitting Methods and Financing

Overall King Street Station was a large retrofitting project. The design team was able to receive large amounts of funding from federal transportation grants since to building would continue to serve as a train station. In addition, they also had a dedicated staff person to apply for grants and find other sources of funding. Having the preservation of the historic character of the building a main design concern, the design team used advance retrofitting methods to strengthen the structure of the station to modern building code. While there were many elements to this project that contributed to its large budget, the seismic work was the most expensive aspect.

Morrison Hotel

Figure 8: Morrison Hotel eastern façade (Source: Rachel Vickers, 2019)

General Building Information

The historical name for this building was the Morrison Hotel and it continues to go by that name today. This building was constructed in 1908 by the architecture firm Jack Schnack and Daniel Huntington (*Historic Seattle 2016, 1*). The recent rehabilitation in the building had been overseen by the Downtown Emergency Services Center (DESC). Historically, the Morrison Hotel was used as an SRO hotel with a few commercial uses on the street level. Currently, the building is used for a few commercial uses on the street level, as well as office and tenant space for the DESC. The Morrison Hotel was retrofitted in 2001 and the building square footage is 116,900. Based on construction permits, after the 2001 earthquake the Morrison Hotel didn't

experience any severe damages that needed immediate repair besides some electrical and plumbing work. Due to the nature of the tenants and the available resources, the Morrison Hotel encountered significant barriers to completing a full retrofit and the process to find funding was long. The focus of this precedent study will be those barriers that the Morrison Hotel experienced to fully retrofit the building and how those lessons learned can be applied to this thesis's case study.

Building History

The Morrison Hotel is located at 501 3rd Avenue. It was originally designed and built in 1908 by the architecture team Jack Schnack and Daniel Huntington and the building team Cawsey and Lohse (*Historic Seattle 2016, 1*). The architectural style was a mix between Beaux-Arts and Classicism. The structure consists of a rectangular structure with seven stories with a penthouse with exterior brick walls and an internal steel structure of beams and columns that are encased in concrete. There is a wooden roof and wood frame flooring. The majority of the exterior is brick, with the exception of various sheet metal belts (*Link 2007, 14*). The main facade faces third avenue with multiple storefront openings defined by brick arches. The two prominent storefronts that are flanked by slightly projecting wings with two wide storefronts as well. There is also a low pediment crest at the parapet height on this façade. The second story has smaller paired segmental openings that correspond to the openings on the ground floor (*Link 2007, 16*). The upper floors have full sized window openings that alternate with smaller openings. The full-size window openings on these floors have double hung windows with transom lighting. The windows on the upper floors of the Morrison Hotel do not line up with the openings on the first two floors. Some notable features a stained-glass window in the south most

storefront on 3rd avenue that depicts a mountain range as well as the original iron catwalk on the seventh story (*Link 2007, 17*).

Originally, the Morrison Hotel Housed the Artic Club and the Seward Hotel and was built during a time where the commercial district in Seattle was seeing immense growth. The building is unique because of the brick trim, large openings on the ground level, few discrepancies in composition, and the various sizes of fenestration. The Artic Club was housed on the second floor of the building and served as a social club for the veterans of the Klondike Gold Rush as well as a space to discuss and plan business ventures between Alaska and Seattle (*Link 2007, 23*). However, as the years progressed the club focused more on the social aspects instead of the business opportunities. The club was known for is elegant rooms such as the tea room, lady's reception room, and the library. There were main decorations in the room such as large oriental rugs that covered the hardwood floors. Many of the rooms had oak or mahogany paneling as well as large painting of the natural landscapes in the Pacific Northwest and Seattle (*Link 2007, 24*).

The Article Club receive the recognition of being one of the most important and richest places in the city in newspaper articles from 1909 and 1912. Some businesses that were on the ground floor included a barber shop, tavern and waffle shop. In 1932 the Article club moved locations and the second story of the Morrison Hotel was remodeled. The building underwent several renovations between 1976 and 1980 by Tonkin Koch Architects (*Link 2007, 24*). In 2004 and additional rehabilitation was done to upgrade the structural elements of the building. Currently the building is home to the Downtown Emergency Service Center which is a non-profit organization that serves many homeless adults daily.

Retrofitting Information

The Morrison Hotel has served low income vulnerable groups for many decades. In the 1974 the building was purchased by the Seattle Housing Authority (SHA) to provide free urban shelter to low income and homeless groups. However, since the SHA purchased the building, they continuously experienced a significant operating deficit despite over $50,000 annually in subsidies to maintain the building and shelter program (*Seattle Housing Authority 1974, 3*). The SHA determine that they would need over $2.5 million to provide decent living to all of its residents. As a response, the Mayor hired a task force in 1978 to develop a plan to make the Morrison Hotel economically viable once again. The task force had two primary goals, to identify the need of city run shelters, as well as find an appropriate use for the Morrison Hotel (*Seattle Housing Authority 1974, 5*). Based on their research the task force determined that there was still a need for the shelter space in the Morrison Hotel, the shelter space should be expanded to women and children, and finally, care should be taken when developing city run shelters so that economic deficits like this don't repeat.

The task force also identified four goals that were specific to the Morrison Hotel, should it continue to be used as the city's shelter space. First, the Morrison Hotel should be used for the lowest of the low-income groups in the city due to the severe lack of this resource in the city (Seattle Housing Authority). Second, if the Morrison Hotel were to house a free shelter, it should be confined to the mezzanine space and be limited access from the other tenants in the building. Third, the Morrison Hotel would need $400,000-$500,000 in renovations to bring the building up to safe and decent living standards (*Seattle Housing Authority 1974, 15*). Finally, the future use of the building should be designed as close to the break-even point as possible.

In 1984 the SHA received $4.2 million from the Seattle Senior Housing Program to renovate the space. The SRO rooms were remodeled to provide 175 studio spaces and 30 one-bedroom units that had private toilets and showers (*Seattle Housing Authority 1984, 3*). In 1997 the SHA created the Section 8 assistance program in 169 of the 205 units within the Morrison Hotel so that it could continue to serve extremely low-income groups. By 2000 the SHA no longer wanted to manage the Morrison Hotel and put together another task force to find a sustainable and economically viable plan for the Morrison Hotel so that it could continue to serve vulnerable populations. The tasks force created a profile of the typical residents that were currently served by the Morrison Hotel. 83% of its population was male and 94% were disabled through either mental illness or chemical dependency (*Seattle Housing Authority 1984, 5*). All of the residents were homeless at their time of move in to the Morrison, and they had an average income of $6,335 with 80% of the residents on disability pay. The average length of residency in the Morrison Hotel was 2.8 years (*Seattle Housing Authority 1984, 9*).

After gathering all of the resident information the task force had three recommendations. First, to maintain the resident profile, second to maintain the rent affordability, and finally to ensure no less of permanent units. They also suggested that the Morrison Hotel be sold to a private company who could maintain the shelter, run the commercial space on the bottom floor, and make the necessary renovations to the hotel to improve tenants living spaces (*Seattle Housing Authority 1984, 14*). Later that year, the Morrison Hotel was purchased by the DESC who had been a long-time tenant. When the company purchased the building, they knew they would have to do a major renovation of the space. At the time, the goal of the renovation was to bring the building up to current building code. According to the Executive Director of the DESC, Daniel Malone, funding the retrofit of the building was the biggest challenge to the project.

Figure 9: Detailed view of eastern façade of Morrison Hotel (Source: Rachel Vickers, 2019)

Since the Morrison Hotel provides low income housing, they were able to utilize low income tax credits. Then also used the historic tax credits and sold both of those to investors (*Malone 2019*). They were able to use public dollars from the city, county, and state for long term deferred loans. Prior to this retrofitting project, the DESC had not relied on private fundraising, but since the costs of retrofitting the hotel were so large, they did multiple private fundraising events. One of the events they hosted helped to raise $3 million for the retrofit (*Malone 2019*). Due to the vulnerable nature of the tenants the live in the Hotel, the DESC wanted to make sure that the retrofit could be done in one large project so that its tenants didn't

have to live through multiple construction projects. To retrofit the hotel, almost half a million pounds of structural steel was added to the building in the form of steel columns and cross bracing (*Malone 2019*). They also used anchor bolts to tie the floors and roof of the building to the exterior walls. Concrete sheer walls were added in some area and every floor had plywood added.

An important part of the retrofitting process for the Morrison Hotel was making sure the tenants wouldn't have to relocate during the process. They were able to retrofit the building in three phases. This required a lot of communication with the tenants because they often had to move to different rooms depending on where the construction was happening (*Malone 2019*). When the retrofitting work was happening in the middle of the hotel, many of the tenants had to cross through construction zones. The architecture firm that the DESC contracted had prior experience doing historic rehabilitations so they were able to create a knowledgeable design team which helped the process. Since most of the retrofitting work was done inside the building it didn't affect the historic character of the Hotel. There was an iron catwalk on the top floor of the building that had to be preserved. Daniel Malone stated that if there hadn't been preservation regulations, they would've removed the structure all together to save money (*Malone 2019*). *Historic Seattle* owns the easement on the exterior of the building. They hired a contractor to survey the exterior brick work to be sure it was properly adhered to the side of the building and be sure that all parapets and decorative features are braced to the side of the building so they would not collapse in the event of an earthquake.

Conclusions: Barriers to Retrofitting and Piece-Meal Process

In all, the Morrison Hotel is an applicable precedent study because it shows how many building owners will face barriers when the mandatory retrofitting policy is enacted. The

building had a long history of struggling economically and finding funds for the retrofit was one of the biggest challenges to the project. However, the owner of the DESC stated that it is important the these URM building that serve vulnerable communities are retrofitted to improve their life safety.

Conclusion

While all four precedent studies were rehabilitated due to the need for be brought up to current building code, each study had a different focus and lesson to be learned that can be applied to this thesis's case study. The Cadillac Hotel shows the benefits of retrofitting a URM before an earthquake happens, and conversely, the detriments of trying to rebuild a URM after it has been damaged in an earthquake. The Kong Yick Building shows how these historic buildings add social value to the community it serves, and it is important to make them safe for its tenants to use as well as having them involved in the design process. King Street Station shows advanced retrofitting methods for historic URM buildings while preserving every aspect of the historic character and retaining the buildings integrity. It also shows different financial opportunities that other URM structures could possible use. Finally, the Morrison Hotel shows the barriers that many building owners will face when trying to retrofit their buildings. This study also highlights the important of the need for funding and more widespread knowledge on retrofitting processes that building owners can have access to.

Case Study: The Northern Pacific Hotel

History of NP Hotel

The NP Hotel was constructed in 1914 and was designed by John Graham from the architecture firm P.J. Murphy. John Graham was a prominent Seattle architect who also designed the Frederick Nelson Building, Plymouth Church, and the Dexter Horton Building (*Kreisman 1986, 13*). The six-story structure was constructed of masonry with a heavy timber frame on a concrete foundation. The NP Hotel is a U-shape configuration in plan, and there were originally 130 single room occupancy rooms and two commercial spaces on the ground floor. Some of the character defining features include the ornate sheet metal canopy over the main entrance on 6th Ave S. The entrance also has two French windows by the staircase above the main entrance (*Kreisman 1986, 14*). Brick pilasters and terra cotta capitals add ornamentation to the façade and a masonry course separates the first and second floors.

On the exterior of the building there are ledges with dentils on the third and sixth floor. The NP Hotel also has one of the most detailed sheet metal cornices in this historic district (*Kreisman 1986, 14*). The 8 over 1 double hung wooden windows have terra cotta sills on the fourth and sixth floors. To attract Japanese business men and tourists arriving by rail, a large sheet metal sign saying "NP Hotel" is placed 2.5 floors above the entrance. The interior lobby of the building has original terrazzo floors, plaster walls and ceiling, light fixtures, picture molding, wooden stairs, entry wood vestibule, glass doors, and glass in the elevator with a window to the exterior (*Kreisman 1986, 15*). The retail spaces on the bottom floors have gone through multiple tenants and no longer poses any historic integrity. While the second-floor plan originally had some variation in floor plan, the third though sixth floors have the same plan.

In 1993 the NP Hotel hired Robert Kovalenko from Kovalenko Architects to undergo a major renovation of the structure. Through research done to put together this statement of significance the architect was able to find that the NP Hotel was important to the Japanese immigrant community in the CHID. This population developed the neighborhood known as Japantown from 2nd to 12th Ave S between Yesler and S Jackson Street. After the building's construction, it was purchased by Mr. Niroku Shitamae and a few other prominent business owners, however Mr. Shitamae soon bought out the other owners. Many of the rooms in the NP Hotel were rented to Japanese professionals for residential and offices uses (*Kovalenko Architects 1994, 3*). The first commercial uses on the ground floor was a barber and tailor shop.

Soon, the NP Hotel became a cultural center for Hiroshima immigrants, which was Seattle's largest immigrant population at the time. There were many rooms on the main floor that served a meeting places were immigrants could locate relatives, exchange information, socialize, and create community (*Kovalenko Architects 1994, 4*). Some notable residents of the NP Hotel include WWI admiral and future Japanese Prime Minister Admiral Tomosaburo Kato, parliament representative Mr. Arakawa, a Japanese baseball team, and the Takarazuka Girls. The NP Hotel soon became recognized for its service and luxury. This community was destroyed with the construction of Interstate 5 and low costs housing projects in the mid 1900's.

The lobby of the NP Hotel served as an exhibition space for the Wing Luke Museum in April of 1995. The exhibit showcased historical information of prewar Japantown as well as the post war redevelopment (*Wing Luke Museum 2017, 2*). The exhibit included photos, artifacts, and maps as well as narrative text. The coordinator of the exhibit said the goal was to convey the "rich contributions of Japanese Americans to the economic, social, and political life of the International District" (*Wing Luke Museum 2017, 2*) Many of the Japanese resident had recently

been vacating the area, and many were worried this part of the Seattle's history would be lost. This exhibit in the hotel was significant because it was the first time the Wing Luke had an exhibition piece outside of its museum. The hope of this was that the NP Hotel would become an important part of the historical narrative of the CHID. That same year a building manager of the NP Hotel, Yoshito Fujii passed away. He was an important figure in the CHID community overseeing important roles in the Seattle Buddhist Church, First Hill Lions club, Wisteria View Housing Corporation, Japanese Community Service Club, Seattle Japanese Hotel and Apartment Owners Association, University Club, and the Japan American Society. He also received the Jackson Street Councils *Man of the Year* award in 1964 (*Kovalenko Architects 1994, 5*).

10 Northwest Asian Weekly May 20 – May 26, 1995

N.P. Hotel Exhibit Opens

by Deni Luna
NW Asian Weekly

"Often history is presented best at its original site," maintains Ron Chew, director of the Wing Luke Asian Museum.

That's the concept behind the Museum's NP Hotel Exhibit, due to open this Thursday, May 25, from 4:30 p.m. to 7 p.m. in the hotel lobby.

The exhibit is – where else – but at the NP Hotel itself.

In addition to museum standards like photographs and displa panels with narrative text, it features a host of artifacts and even recreation of an original hotel room. The room is complete wi original radiator, period-style gadgets, even a door with advertisemer

The NP Hotel, built in 1914, was at the center of Seattle's thriv Nihonmachi, or Japantown, up until World War II and the in ment of Japanese Americans. Never fully recovering from tha nomic blow, the hotel struggled on until the early 1970s. It closed its doors in 1973, and lay dormant for nearly two dec

Then, its fortune reversed.

Interim purchased the hotel in 1991 and renovated it spending $5.8 million. A few months ago, the building with 63 units of low-income housing and commercial spac

With the revitalization of the hotel, it seems fitting permanent exhibit on-site, said Chew. "It's appropriate to exhibit in the heart of where the community once was. over from the renovation are going to this exhibit," says

The NP Hotel Exhibit is more than a history of a the historical account of Nihonmachi. And an accou lives.

"The history of the hotel caps a history of the are measure of the raise and fall of Nihonmachi," adds

Chew has other long-term plans. Ideally, the Inte could have several on-site exhibits, envisions Chew. be linked through an historic walking tour throug

Background: The Northern Pacific Hotel, circa 1920. Courtesy Yukiko Fujii.
Upper Left: Frank Niroku Shitamae and daughter Yukiko on the roof of the hotel, circa 1920. Mr. Shitamae leased the hotel with two other Japanese business men shortly after its completion in 1914. Courtesy Yukiko Fujii.
Lower Left: Sammy Santos and son Bob. Sammy was a resident at the hotel from the early 1940s to 1962. Courtesy Bob Santos.
Lower Right: Many visiting sports teams and entertainers from Japan stayed at the N.P. Hotel. Courtesy Interim.

Figure 10: Flyer for Wing Luke Exhibit in NP Hotel lobby (Source Seattle Municipal Archives)

Renovation History

The Interim CDA purchased the NP Hotel in 1992 and soon planned to retrofit the building, rehabilitate some of the historic features, as well as renovate the residential spaces to provide low income housing to the elderly population in the CHID. At the time, the 1990 Census data had indicated 55% of the residents in the CHID were below the poverty level, whereas King County was at 8% (*Interim CDA, 2013, 4*). This purchase was notable because while the Interim CDA had been doing community development projects in the CHID for 25 years, the NP Hotel was the first building it had purchased and planned to own and operate. The renovation would change the use of the NP Hotel from a hotel to apartments. All aspects of this renovation were approved by the National Parks Service to follow the Secretary of the Interiors *Standards for Rehabilitation*.

The estimated cost of the rehabilitation was $2,800,000 (*Special Review District Certificate of Approval 1994, 3).* The rehab would also decrease the number of housing units from 130 to 62 low to moderate income units. The 1994 renovation included 14 projects. The first was work on the exterior brick façade. The brick mortar condition at the east and south elevations of the building were in poor condition with some of the joints deteriorated to a quarter of an inch (*Special Review District Certificate of Approval 1994, 4*). Water from the downspouts on the gutters were also causing the brick to change in color. The renovation work would chemically clean the brick, hand clean the deteriorated joints and repoint to match existing patterns.

The second project was working with the terra-cotta on the west elevation. While the material was in good shape overall, there was a missing block from one of the brick pilasters on the southwest side of the building. The missing block was replaced with a pre cast concrete block

that matched the existing masonry coating (*Special Review District Certificate of Approval 1994, 4*). The rest of the terra cotta was chemically cleaned and repointed with mortar and joint width to match the original design. Working on the ornamental sheet metal on the building was the next part of the renovation. The west elevation was in good condition but there were rust spots and holes in the cornices and some parts on the second level were unsecured. The fix these issues, the design team replaced the damaged sheet metal to match the original and installed a water tight cap flashing on the cornices. The next project was working on the canopy over the main entrance of the hotel. The structure was missing many elements from its original construction and the ornamental sheet metal that wrapped around the canopy was damaged (*Special Review District Certificate of Approval 1994, 5*). The support system that held the structure up was missing some supportive elements. The design team repaired the structural support and replace the ornamental sheet metal with a matching design.

The next part of the renovation was the repair of the wood windows. The windows on the south, west, and north elevation were in good condition. However, the eastern windows were in poor condition. The renovation repaired the windows on the west and south elevations and retrofitted aluminum double hung windows were placed on the north and east elevations. All of the windows had the sashes removed and the paint striped (*Special Review District Certificate of Approval 1994, 6*). Loose corners were reinforced with dowels, screws, or epoxy. Loose glazing and broken windows were replaced with new double strength float glass. Weather stripping was installed on all of the windows and they were repainted. A varnish was added to the exteriors. The neon sign was in poor condition before the renovation. The sheet metal was rusting, and neon elements were missing. Most of the damage was on the bottom half of the sign. To repair the sign, the sheet metal was cleaned of rust, and repainted to match the original design. New

neon elements were added, and all structural supports were checked for stability (*Special Review District Certificate of Approval 1994, 8*).

The two retail storefronts of the NP Hotel had been altered by the previous tenants. One of the retail spaces that housed a restaurant had made alterations to the entry doors and transom with material that was not historically correct. The other retail tenant, a printing shop, had installed a new door. To correct this, the storefronts were remodeled to match the original design of the hotel. The next project for this renovation was working on the entry vestibule for the hotel (*Special Review District Certificate of Approval 1994, 9*). It was in good condition overall, with some worn wood and loose trim. The loose trim was secured, and the hardware was replaced. A layer of varnish was added to the wood work that matched the original color. The terrazzo floor in the lobby of the hotel was bordered by eight inches of tile that had grown discolored and dirty, with some tiles missing. The renovation team resurfaced the terrazzo floor, repaired the holes, and replaced the missing tiles with a similar design (*Special Review District Certificate of Approval 1994, 6*).

The lobby wainscot was in good condition, with the exception of missing piece from the cap rail. Those pieces were replaced with a similar design and the tiles were cleaned and varnish was added. The plaster walls were in good condition at the time of the renovation, but some patch work was needed in the lobby and in rooms. The next part of the renovation included the four-hanging light fixture in the lobby. Many of them were missing glass shades and the electrical work had deteriorated. The renovation team rewired the electrical work and replaced the missing glass shades with a similar design. The main staircase had all original materials at the time of the renovation with some missing balusters and worn treads. The missing balusters were replaced and treads that were extremely worn were replaced when needed (*Special Review*

District Certificate of Approval 1994, 7). The stairs were sanded, and a varnish was added that matched the original color. The secondary staircase also had its original materials but had missing balusters and worn treads. The missing pieces were replaced, the staircase was sanded, and a new layer of varnish was applied. On May 16, 1995 the NP Hotel was selected to receive a State Historic Preservation Officer's Award for the major rehabilitation. This award honors significant accomplishments in the identification, evaluation, and protection of cultural resources (*Special Review District Certificate of Approval 1994, 9*).

Figure 11: Renovation photos of stairwell (Source: Seattle Municipal Archives)

In 1995 the NP Hotel applied for a certificate of approval to change the use of southern store front from retail to office. During the 1994 renovation the space was established as a retail space. A travel agency wanted to move into the retail space, however the Special Review District preferred retail and commercial uses on the ground floor, and offices on the second floor. After review of the application the Special Review Board stated that since a travel agency is customer

service facing, that it could be defined as a commercial use (*Special Review District Certificate of Approval 1995, 3*). The certificate was given in May of 1995 and had to be completed within one year. Later that year, in September of 1995, the NP Hotel was awarded the Washington Fannie Mae Foundation's Maxwell Award for Excellence for the Production of Low-Income Housing. This award was given to the NP Hotel due to the 1994 rehabilitation goals of preserving the architectural significance of the structure while creating 63 affordable housing units (*Special Review District 1995, 1*). This Special Review Board stated that this project helped with the revitalization efforts in the CHID. The neighborhood had many 1900's era hotel buildings that are left vacant due to age and code compliance issues. The Special Review Board stated that the efforts to bring the building up to code and provide housing were commendable. Special efforts were also made to keep the Maneki Restaurant, one of the oldest Japanese restaurants in Seattle, from relocating out of its retail space in the NP Hotel (*Special Review District 1995, 2*).

In 1996 the NP Hotel rehabilitation was reviewed to see if it could certify for the Special Tax Valuation of Historic Properties. The board approved the rehabilitation based on four points. The first was that the NP Hotel was a contributing property in the Special Review District. The second was the rehabilitation did not alter the building in an adverse way. Specifically, the significant and character defining features had not been altered in any way (*Special Review District 1995, 3*). Third, the NP Hotel had been issued a Certificate of Approval prior to the rehabilitation work. Finally, the rehabilitation was done within the allotted time frame that was agreed upon in the certificate of approval.

In June of 2007 the NP Hotel applied for a certificate of approval from the Special Review District to replace the original 30' flag pole on the roof of the building with a new 35'

flag pole that would be painted a similar color (*Special Review District Certificate of Approval 2007, 2).* Due to severe deterioration, the flag pole became structurally unsound and needed to be removed. Originally the building owner requested to remove the flag pole without replacement, however the Special Review Board agreed that the flag pole was a landmark in the historic district and should be replaced with a similar flag pole. The cost of the flagpole replacement was estimated between $25,00 and $45,000 (*Special Review District Certificate of Approval 2007, 5*).

In November of 2018 the NP Hotel hired Bob Hale from Rolluda Architects to make alterations to the exterior metal canopy over the entrance of the building. The design team applied for a certificate of approval from the International Special Review District. The change that was requested was to replicate and replace the canopy. This was due to the need to shorten the canopy to allow for oversized vehicles to park in the loading area outside of the building. For years the metal canopy had been damaged by trucks parking out front on 6th Ave S. To mitigate the damages and secure the canopy, building maintenance would add thin wires between the building and the canopy (*Special Review District Certificate of Approval 2018, 3*). While the board denied the request to replicate and replace the canopy, they allowed the hotel to shorten the depth of the original canopy a full medallion so that the style remined consistent. The decorative metal trim was replaced with a stamped metal trim manufactured by WF Norman Company who used historic photographs to match the style (*Special Review District Certificate of Approval 2018, 7*).

Information from Interviews with NP Hotel Building Manager and Owner

The first interview that was conducted was with the building manager, Rachtha Dahn. We were introduced by MaryKate during an initial tour of the International District. At the time I was deciding between two buildings, the NP Hotel and the Chong Wa Benevolent Center.

Rachtha was able to take me on a tour of the NP Hotel and discuss what the building meant to the community. After I decided to focus on the NP Hotel for my thesis, I set up another meeting with Rachtha to discuss the more about the NP Hotel. Rachtha had been working with the NP Hotel for almost ten years as their building manager. He also manages a few other buildings in the area and works for SCIDpda. While there has been general maintenance of the building since Rachtha has worked there, it is most notable that the building has deteriorated since he has been working there. The NP Hotel serves an important role in the community because it serves very low-income groups in the CHID. There are rooms in the NP Hotel that are part of an affordable housing program that is run by the City of Seattle. Many of those residents end up staying in the NP Hotel for an extended period of time, even if the program is meant to serve as a short-term program while the residents gain stability.

While Rachtha wasn't positive about all of the retrofits that had been done on the building, he stated that the parapets had been braced, which was confirmed by the rosettes that were on the top façade of the building and bracing that was evident on the roof. When asked about the structural stability of the building and what work needed to be done seismically, Rachtha stated that he wouldn't be surprised if the building collapsed in an earthquake and that it would need extensive retrofitting work the be stable. When I asked why a retrofit hadn't been done, he said that the process is very expensive and there is not much education by the city on how to properly do a seismic retrofit. We also discussed Seattle's upcoming mandatory retrofitting policy and he was aware of what would happen due to his involvement with SCIDpda. He stated that he was worried about what would happen to the building in the CHID because most of them were URM and housed low income groups that didn't speak English as a first language. He stated that if the City of Seattle were to move forward with the policy, there

would be lots of confusion over what needs to be done and that the City should think of how they will specifically address the residents in the CHID.

Figure 12: Parapet bracing on roof of NP Hotel (Source: Rachel Vickers, 2019)

The tour of the building included walking through the lobby, riding in the elevator, walking around a residential floor, looking into one of the rooms, as well as walking on the roof. From the initial tour, it was apparent that the building had some important and unique character defining features. I asked Rachtha what some of the important features on the building were and he stated that the residents and neighborhood valued the exterior brick, the painted sign on the south facade of the building, the windows, the canopy over the main entrance, and the natural light in the lobby. I also asked if the residents were aware that the building wasn't up to seismic code and he stated that some were but there was a lack of knowledge around the whole process and he felt like many of the residents didn't care to know what building management did. At the

end of our interview, Rachtha was able to connect me with Valerie Neng who works for Interim CDA, the owner of the NP Hotel.

I was able to set up an interview with Valerie to discuss her involvement with the NP Hotel and gather more information. She told me the Interim CDA purchased the building and did a gut renovation in 1994. The building used to be an SRO hotel, but during the renovation they turned it into 63 affordable housing units. The second floor was left in the SRO floor configuration. Once the building was developed, the rooms served residents who were at 30-60% of the area median income. There are also some Section 8 and project-based residents within the building. The residents that currently used the building are families, single professionals, older folks, and groups trying to look for more permanent housing. Most of the residents are extremely low income at 0-50% of the area median income. Most of the rent is offered at $350 a month. There are still two retail spaces on the street levels of the building, one is a Japanese restaurant and the other is a graphic design firm. Lately they had been looking at how to recapitalize the property in preparation for the upcoming mandatory retrofitting policy. Some other rehabilitation work that the Interim CDA wants to do along with the seismic retrofit is replacing the roof and getting the bricks on the building envelope repointed. They also want to replace the windows but know that will be difficult since they will have to get that approved by the Special Review District, and the windows are an important character defining feature in the historic nomination report.

We then began to discuss the mandatory retrofitting policy that Seattle was thinking of passing and Valerie was very familiar with the topic. Stakeholders from the Interim CDA had been a part of round table discussion that were led by the city during the policy's inception. Valerie stated that even though she has been very involved in the process she is still very

confused on the overall process. She stated she would like information on when the policy will go into place, how the City of Seattle plans on informing URM building owners throughout the entire process, what the timeline of the project is, if there will be funding, and how the city will prioritize the buildings that need to be retrofitted. Valerie stated that it is important that the City of Seattle find a solution to the barriers to retrofitting before this policy is passed. She thinks this policy, while provided important life safety, will have very negative impacts on minorities and low-income groups and further displace them from the Seattle area. She suggested that Seattle used its Race and Social Justice Initiative Toolkit on the mandatory retrofitting policy before it is passed so that the adverse effects can be minimalized. Valerie further wanted clarification on how the process of retrofitting building would be, what the costs would be, and how much of the buildings was retrofitted in the 1994 renovation of the NP Hotel. She also stated that it would be very helpful to have a comprehensive history of the building and renovation work. Currently that information was spread amongst multiple documents and it would be very helpful to have it all in one.

Retrofitting Plan

The URM retrofitting standard as put forth by the City of Seattle will require that parapets be braced, floors and roofs be structurally connected to unreinforced interior and exterior walls, framing be interconnected to strengthen roofs and floors and finally, weak interior and exterior bearing walls be strengthened (*SDCI 2015, 4*). This method has been defined as the bolts-plus method, however the city states that this method might not be adequate for all building types and some structures might requires more substantial retrofits. While this policy will bring URM building structures up to current building code, it is not guaranteed that these retrofitted

buildings will not be damaged during a seismic event. This next section of the thesis will detail the retrofitting process that he NP Hotel can follow from notification to project completion.

The process to retrofit the NP Hotel will begin long before the construction begins. First, the City of Seattle will notify the building owner by letter that their building is a URM structure and will have to go through the retrofitting process. In 2016 the city of Seattle presented a list of 1,154 confirmed URM buildings (*SDCI 2015, 6*). These buildings excluded single family buildings and duplexes. To determine which buildings within the city of Seattle were URM, the city researched permit records, architectural drawings, and conducted visual examinations through walking tours or Google Street View. The NP Hotel was on the confirmed list of URM buildings and was determined by Google Street view (*SDCI 2015, 3*). The building retrofit level was categorized as a permit and its building risk was classified as a medium risk structure (Confirmed URM List SDCI 2017, 2). Permitted retrofit can be defined as a structure that has its parapets braced or other retrofitting work.

Building vulnerability is separated into three categories. The first is critically vulnerable buildings which generally include schools and critical facilities such as fire stations and hospitals. The next category is high vulnerability which include buildings greater than 3 stories which are located on poor solid and have more than 100 occupants. The final category, which the NP Hotel is listed, is medium vulnerability which include all other URM structures in the city. There are 77 building within Seattle that are designated as critically vulnerable, 183 that are designated as high vulnerability, and 902 buildings designated as medium vulnerability (*URM Technical Committee 2015, 14*).

Through research done by talking with the building manager, visiting city archives, and looking through construction permits, it seems as though the NP Hotel has only braced the

parapets and no other retrofitting work has been done. However, if information is gathered later on that lead the building owner to believe the NP Hotel has been retrofitted more substantially, they can challenge the URM building designation and get the NP Hotel removed from the list of confirmed URM retrofits. First, the owner must hire a licensed structural engineer to determine if the building is a URM (*SDCI 2018, 4).* They can do this through building plans, a visual survey, or more invasive methods such as opening up walls. The engineer must then submit a written report to the Seattle Department of Construction and Inspections (*SDCI 2015, 6*). The report must include all survey data that was collected, the engineer stamp, and the permit review fee. This fee is paid when the report is submitted and will cost the hourly review rate for one hour. This fee for this permit will be $180 unless any permit rates are changed in the near future (*SDCI 2018, 6).* The SDCI will then review the engineer report and either confirm that the building is not a URM and remove it from the list, request additional information, or deny the removal request. If a removal request is denied, the building owner can challenge the decision if they are able to present new information that wasn't in the initial engineering report (*SDCI 2018, 9*).

According to Nancy Devine form the City of Seattle SDCI the mandatory retrofitting policy is still far away from being passed. The following steps can be taken after the policy is accepted by Seattle City Council and passed as an ordinance. Then the SDCI will send written notifications to all URM building owners. This notification will include information about the retrofitting policy, information on the purpose and goals of the policy, a timeline that needs to be followed, as well as a description of funding sources and incentive programs (*Devine 2019*). Building owners will then have to hire a licensed structural engineer to do a seismic assessment of the building. This will determine what the specific seismic vulnerabilities of the building are

and identify which retrofitting methods should be used (*URM Policy Recommendations SDCI 2017, 13*).

The building owner will then have to apply for a permit to complete the retrofitting work that will be competed to bring the building up to current code. During the permitting process, the SDCI may ask for more information, ask clarifying questions, or suggest changes be made to the permit application (*URM Policy Recommendations SDCI 2017, 15*). The permit will cost will vary depending on which retrofitting methods will be used. Once the permit has been approved by the SDCI, the building owner and rehabilitation team can begin construction work and notify the city once the work is completed. It is here that the City of Seattle should provide expedited permitting review for URM retrofitting permits to help expedite the process. Since the NP Hotel is within the Special Review District, a Certificate of Approval will also have to be obtained from the Special Review Board prior to construction. Currently, the Special Review District regulates the exterior of the building and some interior alterations, if visible from the street. If this retrofitting policy is passed the City of Seattle and the Special Review Board will have to determine how to compromise seismic retrofits and preservation regulations in order to make the retrofitting process easier. As with the case of the retrofitting ordinance in California, it would be suitable to allow for leeway on preservation regulations when making seismic retrofits. Depending on the vulnerability level that the building was categorized by, the timeline to completely retrofit will need to be done within seven to thirteen years from the preliminary notification (*URM Policy Recommendations SDCI 2017, 19*). There was debate that the timeline to complete the retrofits should be less due to life safety concerns, but the city ultimately decided to give building owners more time to retrofit so that they could have more time to fund the process.

Each step in the retrofitting process will have tools to aid in completion as well as enforcement measures for non-compliance. It is important to note that these tools and enforcement measure were recommended by the URM Policy committee and not the City of Seattle. However, after my discussion with Nancy Devine, they are considering applying many of these methods. Once the NP Hotel receives its initial notification from the City that they will need to retrofit, they will have three years obtain funds and hire a structural engineer and asses the building (*URM Policy Recommendations SDCI 2017, 22*). To help with this step there will be city officials to help work with building owners understand the retrofitting policy. The city will also provide a curated list of engineers that the building owners could use. In addition, the city is developing various funding resources that can be used in this step of the process. If the assessment is not completed within the three years, there will be a fine each quarter the assessment is delayed (*URM Policy Recommendations SDCI 2017, 18*). There may also be a block put on any other permits that are submitted for the building until the assessment is completed. After the assessment it complete, they will have an additional two years to apply for the permit and source the necessary fund for the application. To help with the process there will be additional city staff to help with the permitting applications as well as various outreach events to help educated building owners on the process (*URM Policy Recommendations SDCI 2017, 18*). There may also be city staff dedicated to the review of these permit to help expedite the process. If the permit is not submitted in time, there will be another quarterly fine imposed.

Once the application is submitted, the City of Seattle will take up to one year to review the permit. After the permit has been approved, the NP Hotel will have seven years to complete the retrofitting work. To help with this step of the process, a curated list of construction contractors will be made available along with a list of funding sources (*URM Policy*

Recommendations SDCI 2017, 19). If the retrofit is not completed by the deadline, an expensive fine will be imposed quarterly, and permits will once again be blocked for the building. If this process is significantly delay, the city may deem the building as dangerous. It is important to note that this is a fixed timeline. This means that if the building owner finished a deadline late, they will not have extra time to complete the next step (*URM Policy Recommendations SDCI 2017, 19*). Conversely, if the building owner completes a step early, they will have more time to complete the following retrofitting steps. Therefore, it is recommended that an engineer is hired to assess the building as soon as possible to allow for more time to develop a retrofitting plan and secure funds. Based on the proposed timeline it is important that the NP Hotel creates a plan for the seismic retrofit and adheres to the timeline, as last fines can add additional costs.

Once the NP Hotel decides to retrofit the building, it is critical that they create a retrofitting plan. Before creating the retrofitting plan, it is important that three central ideas are considered. First, historic materials should be preserved as much as possible during the retrofit. Second, the retrofitting systems that are added should respect the character and integrity of the building. And third, the seismic work should be made reversible incase other repairs need to be made in the future. The Secretary of the Interiors *Standards for the Treatment of Historic Properties* should be read and understood prior to developing the retrofit plan. Since the building is a known unreinforced brick structure, it is known that it will perform poorly in a seismic event. However, the shape of the building also plays into its seismic performance. Since the building is a U shape in plan, there is an unequal distribution of force during an earthquake and greater retrofitting focus should be placed on the corners and intersections of the building (*Look 1997, 34*).

The next part in the retrofitting process is developing a team to work with. It is important that the team that is chosen understands that the two primary goals of the seismic retrofit are life safety and the preservation of the historic building. Based on the literature review and interviews a successful retrofitting team will include an architect, engineer, contractor, preservation consultant, and a code specialist (*Frost 2019*). However due to budgetary constraints that this project may face, it is most important that the NP Hotel's retrofitting team includes a structural engineer, code specialist, and architect. To best understand how this building code will work, it would be useful to hire a building code official that works for the City of Seattle. Once the rehabilitation team has be created, there are four tasks that should be completed before developing the retrofitting plan. The first task included compiling all documentation that is available on the NP Hotel. This include original building plans, historic nominations, building permits, alteration documents, maps, and photographs (*Look 1997, 18*). While some of this work has been competed in an earlier section of this thesis, further research can be found through City of Seattle archives.

The next step includes determining the significant features and spaces of the NP Hotel. These include features that possess integrity and historical significance to past and current residents. After my interview with Rachtha it seems that the significant features on the NP Hotel include the windows, the metal canopy over the front entryway, the lobby space, as well as the two NP Hotel signs on the West and South elevations. The third step before the retrofit plan should be created is to assess the condition of the building to determine the risks. This will require the expertise of a structural engineer to survey the building. Through this survey, the level of seismic retrofit needed to bring the building up to code will be determined and areas that are more vulnerable will also be highlighted (*Look 1997, 15*). This structural engineer should pay

close attention to the strength and durability of the building materials as well as the strength of their connections. This step is critical in developing the retrofitting plan because it can help to determine cost saving decisions with retrofits that are on a limited budget. After the significant historical features of the building and seismic performance of the building are determined, the team will have to determine if either of the two factors will impact the other and how that will be handled in the retrofitting plan. The final step that should be done before developing the retrofitting plan is understanding the local and state building codes.

Figure 13: Neon NP Hotel sign and metal canopy on western façade (Source: Rachel Vickers, 2019)

Overall, the process to retrofit the NP Hotel will take time and collaboration between the building owner, tenants, city officials, Special Review Board, and members of the design team. The NP Hotel should work to create a detailed retrofitting plan so that they can adhere to the City's proposed timeline to complete the retrofits. The City should make sure that they work with the Special Review District to make the permitting process and certificate of approvals more streamlined. For the NP Hotel it will be beneficial to develop a plan that requires multiple treatments as this allows more time for funding. It is also critical to have a structural engineer do a seismic survey of the building as soon as possible, even if it means having it done before the city passes the retrofitting policy. This would allow more time to develop a retrofitting plan which could make the process more efficient and possible cut costs.

The next section of this thesis will discuss the specific retrofitting methods that can be used. However, before those are discussed the following questions should be discussed between the rehabilitation team. These questions often relate to aesthetic qualities of adding these seismic structures and will likely be asked by the Special Review Board. While there may not be one right answer for each question, these will help to determine which alternatives will need to be made. If bracing is the preferred method, what are ways that they can be inserted into the structure without changing the appearance of decorative features such as parapets. If anchor ties will be used, are the washers designs to blend in with the exterior of the building? Could the anchors be inserted into the exterior of the building, so they are not visible? (*Look 1997, 9*). If brace framing is used throughout the building, should it be painted to match the interior of the building or left distinguished? Conversely, if brace framing is determined necessary, could moment frames be added around the storefronts and main entry to avoid the large steel braces. If shear walls are added, can they be confined to utilitarian spaces, so they don't impact character

defining and resident spaces? (*Look 1997, 10*). If ornamental features need to be removed during the retrofitting process, will there be adequate funds to retain, repair, and reinstall those finished once the retrofit is completed. Are these retrofitting procedures created to be removable so that future repairs and restoration work can take place?

A URM building is defined by the City of Seattle as "a building with one or more bearing walls made of plan clay brick or clay tile masonry that provide the primary support for vertical loads from floors or roofs that was constructed prior to May 7, 1977 (*Gibson Economics 2015, 2*). This mandatory retrofitting policy will require that all identified URM building within the city are retrofitted to current Seattle Building Code. The next section of this thesis will discuss the different retrofitting methods that may be used during the NP Hotels retrofit. It will be stated if a method should be avoided due to damage of important historical qualities and should only be used as a last resort.

The first method, anchor bolts or bolts plus, is one of the more preferred retrofitting methods and was also recommended by the City of Seattle. During this process half inch bolts and flat washers tie the exterior wall to the floors and roofs. This causes the building to move as a single unit during an earthquake, which often prevents bricks from falling off the building or walls collapsing (*Sylvia 1997, 4*). The structural engineer would determine the locations the anchors need to be inserted and the NP Hotel will have to work with the Special Review District to determine which type of washer would be appropriate. Since there has already been this type of retrofitting work done on the parapets, the same type of materials and design should be used throughout the rest of the building. Care should be taken to be sure the anchors are lined up and symmetrical so that they don't stand draw attention away from the other character defining

features of the building. To prevent rust, these anchors and washers should be made of stainless or galvanized steel, or a painted ferrous metal (*Sylvia 1997, 6*).

Figure 14: NP Hotel parapet bracing. Anchor bolts should match alignment and style of these bolts (Source: Rachel Vickers, 2019)

The method of retrofitting the building by tying the elements together is the likely technique that will being the NP Hotel up to building code for this retrofitting policy. This is good because it is often the cheapest and least invasive methods to retrofit a building and can be

done in many phases to allow for more fundraising time. While this method can be used on the exterior of the building in the Bolts Plus method, the same principal can be used on the interior of the building. Sill plates could also be bolted to the foundations while adding plywood stiffeners to load bearing areas (*Sylvia 1997, 6*). The stiffeners are often visible from the interior of the building so care should be taken to how those will be designed into the historic fabric. Joist hangers, metal straps, bolts, or other types of fasteners can be inserted to strengthen the connection between floors and the exterior walls. These types of connections could also be used to tie staircases to the building structure. Since theses ties are visible on the interior of the building, they will not have to be approved by the Special Review Board, however they should be designed in a similar style and size to other fixtures within the NP Hotel. If the wood framing within the building needs strengthening, additional members can be added to the structure. The additional bracing should be done in a similar wood if it is visible and tied to the existing members with a non-ferrous metal strap to avoid rusting (*Sylvia 1997, 7*). If metal bracing is needed to strengthen partition walls or other interior walls, they should be consistently designed through the building and placed only where necessary, such as near the corners of the building.

While the parapets have previous been braced, projecting decorative elements on the exterior of the building should be tied to the building with similar bolts to the exterior. These changes will have to be approved by the Special Review District. If after the engineering assessment the previous retrofitting work on the parapet of the NP Hotel has been found to be insufficient, a concrete beam can be added to further reinforce the structure (*Sylvia 1997, 8*). If subflooring or roof sheathing needs to be added, they should be anchored to the structure in a similar fashion to the other building ties for consistency. Since these additional structures are often large, they should be inserted beneath existing materials to preserve historic character.

Often times the weakest parts of URM building will be near corners or large opening such as doors or windows. To improve the shear strength of these areas moment frames or metal bracing can be used (*Sylvia 1997, 8*). This may be necessary in the NP Hotel by the entrance lobby since there are large glass openings and a tall vaulted space. From a preservation standpoint, it is often preferred if these structural members can be inserted into the building, however that process is very expensive and would likely not be an option for the NP Hotel if this type of retrofitting method is needed.

Figure 15: Lobby of NP Hotel. Steel K Bracing should be used near the windows of the lobby (Source: Rachel Vickers, 2019)

Therefore, the bracing in this space should match the interior quality and sizing of the space so that it does not detract from the historic character. If exterior masonry walls are found to need additional strengthen beyond tying the structure together, concrete reinforcements or fiber wrap systems can be added (*Sylvia 1997, 9*). While concrete spray may be the cheaper option, it is strongly advised that that method of concrete reinforcements is not used as it covers up the historic brick on the interior of the building. Instead, a carefully designed concrete member should be added through the building so that they don't detract from the windows, trim, and majority of the brick finish on the interior.

The addition of shear walls to help disperse transfer loads from the roof of the building to the foundation may be necessary in this retrofit. If possible, these additional should be placed behind historic material if funding allows, if not, the walls should be in secondary spaces such as utility rooms or service corridors. If possible, additional reinforcement can be added to basement level walls by adding a grout mixture the increase the mass and density of the base (*Augustus 1997, 4*). Since the NP Hotel is U shape in plan, the retrofit should prepare to focus additional funds and retrofitting efforts on the corners and intersections of the building. If additional structures need to be added to the NP Hotel to strengthen the building, they should be added to a non-primary façade such as the north and east façade, so that the character of the building is not altered.

The next retrofitting method, infill windows, is not recommended unless it must be used as a last resort. Infill windows are used when the sheer capacity of the wall needs to be improved (*Augustus 1997, 8*). This method also helps to more evenly distribute seismic forces in the exterior walls. In most cases, brace framing can be used in place of infill windows, but that process is much more expensive, in which case infill windows may be needed. In this case, the

rehabilitation team will have to work closely with the Special Review Board to determine where these infill windows can be placed as to not change the overall appearance of the building to the greatest extend possible. If absolutely needed, these infill windows should be limited to the corners of the building where the structure may be the weakest. If this method is used, similar brick should be used in the windows and they should be set back to define the infill from the original exterior. The next retrofitting method, securing ornamentation, has already been partially completed. Bracing the parapets on the top of the building with anchors and ties has secured the decorative elements at the top of the building to the exterior wall. The metal canopy over the main entry and the neon NP Hotel sign on the west elevation of the building should be evaluated and properly braced to the side of the building.

The next method includes interior brace framing or exterior buttressing. Generally interior brace framing is preferred unless the interior of the building possess more character defining features than the exterior. In the case of the NP Hotel, since the exterior of the building is regulated by the Special Review District interior brace framing will be the likely option. Like infill windows, this method to increase the sheet capacity of the walls by adding steel "X" or "K" frames (*Augustus 1997, 11*). This retrofitting method severely alters the interior of the building and is one of the more expensive retrofitting methods and should only be considered if the structure of the building is extremely weak.

New technologies have been developed to retrofit URM buildings. These methods include vertical and center core drilling, base isolation at the buildings foundation, superstructure damping systems, bonded resin coatings, as well as replace certain materials with lighter ones (*Augustus 1997, 13*). These methods require advanced computer modeling before construction takes place to determine how the building will react in an earthquake and which retrofitting

methods need to be used. These methods are less commonly used in currently retrofitting practice and are often significantly more expensive than the previous retrofitting methods and would likely not be proper methods for the NP Hotel.

After the rehabilitation is complete there are certain maintenance measures that should be done. Moisture in the building foundation, roof, and gutters should be checked periodically as this can lead to building erosion which causes weakness in the structure. Metal ties that have been inserted into the building to seismically retrofit the structure should also be periodically checked for rust as this can lead to deterioration (*Augustus 1997, 14*). Wooden structural elements should also be monitored to be sure that there is no infestation of termites or other wood boring insects that can cause structural damages. The mortar of the building should be repointed if there is erosion of other damages so that the strength of the exterior walls remains intact.

Many scientists believe that another strong earthquake will pass through the Puget Sound Region within the next 30 years. For this reason, it is important that certain preparedness measures are established during the rehabilitation. First, the Seattle Public Utilities and Seattle City Light should be contacted to inquire about flexible connectors for gas and water lines (*American Society of Civil Engineers 2014, 38*). If possible, installing earthquake activated shut off values would be best. Oil tanks and water heaters should be properly strapped to the walls. Local emergency material should be collected and distributed to each resident. It would also be beneficial to hold an emergency preparedness meeting with all of the residents so that an emergency preparedness plan can be developed, and any questions can be answered.

In conclusion there are multiple retrofitting methods that can be used to improve the seismic performance of the NP Hotel. While the City of Seattle can require a full seismic retrofit

of all buildings, the economic hardship that building owners will experience that may be too great to outweigh the retrofitting costs. Requiring the bolts plus method with some steel bracing in vulnerable areas would be a good compromise to increase seismic performance while limiting retrofitting costs. For retrofitting methods, the NP Hotel should plan to use anchor bolts through the exterior of the building that match the style and placement of the one used for the parapets. Steel K bracing should be used in the lobby of the building since that section of the building will likely experience damages during an earthquake. If the seismic assessment determines the need for additional reinforcements, additional sheer walls should be added in the corners and basement areas of the building. These combined retrofitting measures would be the most effective methods to increase seismic performance because they can be done in phases and are often the cheaper retrofitting methods.

Figure 16: NP Hotel sign on southern façade (Source: Rachel Vickers, 2019)

This next section of my thesis will focus on how much the retrofit may cost, and different financial options that could be used to fund a retrofit. To obtain information on how much a retrofit will cost the NP Hotel I interviewed Andy Cluness who works with a cost estimator group. He stated the construction alone will add $40-$70 a square foot for a seismic retrofit (*Cluness 2019*). However, there are often other costs associated with a rehabilitation that are harder to predict. These include permitting costs, non-seismic structural components, mechanical

electrical and plumbing costs from their relocation, construction equipment, tower cranes, and the survey work that will need to be done prior to the retrofit. Since this is an old building, there is a good chance there will be led and asbestos abatements as well which can be a significant cost (*Cluness 2019*).

Unfortunately, there are no financing options that have been created to specifically help fund the mandatory retrofitting policy, however there are other financing methods that the NP Hotel could apply to use. Generally, the two most viable types of financing will be though levies or an incentive program that already exists or is created (*Gibson Economics 2015, 11*). A levy is a tax, fee, or fine, that can be created to help source funding to secure bond financing. The funds from those bonds can then be used to help fund different project or programs, in this case the retrofitting policy. Washington state already has multiple levies in place to help fund school, libraries, and housing projects. While many levies are sourced from the general tax base of the state, it is unlikely that that will be a viable option for this policy. It is more likely that a levy cold be imposed on a special assessment or improvement district. Since there is already ample mapping of URM buildings in Seattle, dense areas that have URM buildings could be created for these districts (*Gibson Economics 2015, 12*). However, it should be noted that an equity lens should be applied when creating these districts as many URM buildings are home to underrepresented and minority communities. While the costs of the retrofit would still focus on URM dense areas, the costs would be more disperse amongst all residents and businesses in the area. In addition, if Seattle City Council were to determine that retrofitting these URM building was a top city priority, they could focus money from the general fund for this policy (*Gibson Economics 2015, 13*).

The other form of financing the retrofitting of building is incentives. While these sources are funding would be more feasible if this policy wasn't mandatory, it is still valuable to review them in case they are made available. Theses incentives often either have monetary benefits at the beginning of the project to lessen the initial costs, or end in the form of tax rebates. Some incentives will only work for certain properties due to zoning, land use, or property type. While there are many different types of incentives, this next section will only go over the incentives that could be applicable to the NP Hotel. There are some incentives that will be mentioned that are not currently legal within state law, however they are mentioned in hopes that legislature could change by the time this policy is enacted. The NP Hotel could use Transfer of Development Rights (TDR). In this process, the NP Hotel would sell the unused air space to another developing property for current market price. The NP Hotel is currently zoned at International District Residential 170. While the NP Hotel could earn around $10 a square foot, there is an oversupply of TDR's in Seattle which may depreciate their value (*Gibson Economics 2015, 14*). The City of Seattle has also discussed creating areas that have increased FAR that can be transferred, however the concern of inflation within this commodity is still a concern and may not be worth as much as other financing methods (*Gibson Economics 2015, 14*).

Community Development Block Grants could be used for the NP Hotel since it provides housing to low income groups in Seattle. Each year the Housing and Development Authority supplies Seattle with almost $10 million to help low in communities (*Gibson Economics 2015, 15*). Generally, this grant is split evenly between funding emergency shelters, preserving affordable housing, and economic development in low income areas. Since a retrofit in the NP Hotel would help to preserve affordable housing, part of this grant could be used for the retrofit. The main downside to these grants is that they are highly competitive and are not a guaranteed

source of funding. The Historic and Rehabilitation Federal Income Tax Credits would be a viable financing method for the NP Hotel. Since the building is a certified historic structure, they could receive anywhere from $4-$8 per square foot of the building (*Gibson Economics 2015, 16*). The NP Hotel would have to adhere to the Secretary of the Interior's *Standards for Rehabilitation* and have the retrofit approved by the Special Review District. Building owners could also sell their tax credits to have the money upfront.

Another feasible incentive for the NP Hotel would be Property Tax Special Valuation for Historic Properties. This is a deduction on rehabilitation expenses from assessed value for buildings within registered historic districts. The rehabilitation costs must be over 25% of the current assessed value of the building (*National Parks Service 1997, 1*). This deduction can be spread out over ten years which would total $4-$5 per square foot (*Gibson Economics 2015, 15*). Another incentive for historic properties is tax benefits for preservation easements. A preservation easement is a legal agreement that is voluntarily entered into that protects a historic property. An easement restricts the changes that can be made to the property and transfers the rights to whoever owns the easement. Often times, the easement is solid to a private preservation group. The owner of the building then becomes eligible for the federal income tax deduction. Easements can be placed on a full building or on part of the building such as the exterior. These tax incentives have proven useful to help preserve historic building, and it is important to note that once a building is deemed historic, access to grants and other sources of money become more easily available.

The City of Seattle has discussed offering increased incentives for early retrofitting projects. This value of this incentive would be based on a timeline and would decrease overtime (*URM Policy Recommendations SDCI 2015, 6*). This incentive would also likely be paired with

penalties for noncompliance. This therefore makes hiring a structural engineer to assess the building as soon as possible an important step in potentially cutting costs on the retrofitting project. The last possible incentive for funding these retrofits would be a seismic retrofitting property tax exemption. This would provide a full property tax exemption for the duration of the retrofitting policy timeline of 15 years. This would be valued at around 1% of the taxable property value which could provide around $430,000 by the end of the 15 years (*Gibson Economics 2015, 17*). While this incentive provides a large economic incentive, a state law would have to be created to allow for this. However, there has been similar legislature in the past such as the Affordable Housing Tax Exemption Program. There would likely have to be increased mapping of URM dispersion around the state of Washington before this type of legislature could be passed.

Low Income Housing Tax Credits is federal housing tax credit that was created to help invest in more affordable housing throughout the United States. This program was created in 1997 and has been used on more than 46,550 housing projects and have created over 3 million affordable housing units (*HUD Office of Policy Development and Research 2017*). Through this program state and local companies that are certified by this program are given almost 8 billion dollars annually to distribute to these projects. These funds can be used for rehabilitation or new construction of low-income affordable housing projects. The NP Hotel current receives this low-income tax credits, which means that to do another retrofit and continue to receive these funds, rents could not be raised to help cover the costs. Since the building owner is adamant about not raising rents and displacing its residents, this is a viable source of funding for the retrofitting project.

The HOME program is operated by the US Department of Housing and Development Services and provides grants to states and local governments to use to implements housing strategies that increase homeownership and affordable housing for very low-income populations (*HUD Office of Policy Development and Research 2017*). This housing programs can vary across jurisdictions depending on the specific housing needs in the area. Some of the programs that have received HOME funds in the past include tenant based rental assistance, housing rehabilitation, assistance to homebuyers, and new construction of housing. In more rare cases, HOME funds have also been used for site acquisition, tenant improvements, and demolition or relocation of affordable housing. To be eligible to receive HOME funds, 90% of tenants must have income below 60% of the area median income (*HUD Office of Policy Development and Research 2017*). The jurisdiction that applies for these funds must match 25% of the fund they are given. 15% of the fund must also be given to housing operated by housing development organizations. HOME funds are distributed by 40% given to states and 60% is given to local jurisdictions. States that are eligible for HOME funds automatically receive $3 million and local jurisdictions automatically receive $500,000 (*HUD Office of Policy Development and Research 2017*). Communities that do not automatically qualify for HOME funs can join together with neighboring areas to try to meet requirements to receive HOME funds. While the NP Hotel could also receive funding from this source since they serve low income groups, the city would have to determine if seismically retrofitting buildings that provide affordable housing are eligible for these funds

There are three types of loans that could be readily available to finance retrofits. The first is private loans from banks or other private institutions. These loans would be available for building owners who meet their credit requirements. However, these loans also come with

interest based on market rates which makes them a riskier option to finance these retrofits. A Housing Levy was approved by Seattle voters to support to production and rehabilitation of affordable housing. If the City of Seattle were to recognize low income URM buildings as being threatened, then funds from this levy could be allocated to assist with the retrofitting of these buildings (*SCIDpda 2016, 6*). The two additional requirements of these funds would be that the contractors working on the building be paid the minimum wage of the local jurisdiction and the affordable housing in the building must remain for 50 years after the rehabilitation is completed. The Washington Housing Trust Fund supports and maintains affordable housing across Washington state. There is a competitive application process which is open to local jurisdictions, nonprofits, and housing authorities. Once these funds are received, the housing must stay affordable for at least 25 years (*SCIDpda 2016, 7)*. While the NP Hotel could use these loans since they are a URM building that provides affordable housing, the amount of money they would receive is unknown and should not be relied upon as a main source of funding.

There are four different types of loans that could potentially be used to finance seismic retrofits but aren't fully in place yet. The Washington Community Reinvestment Pool (WCRA) which offers loan to private and nonprofit property owners as well as public private partnerships. These loans are used for properties that are being rehabilitated or developed for low to moderate income residents. Housing loans can be offered as high as $7.5 million and commercial can be as high as $2.5 million (*SCIDpda 2016, 7)*. These loans typically last thirty years and the housing must stay affordable for the term of the loan. Special loan pools that would help finance URM retrofits in the CHID. To do this, many financial institutions in the neighborhood would pool money together to provide the loans. This type of loan is beneficial because it reduced the risk associated with each individual bank and so credit requirements to receive the loans can be more

flexible. Since there is a high concentration of URM building within the CHID, this may be a good source of funding for all URM building owners in the neighborhood.

The City of Seattle could also guarantee a portion of private loans that would be dedicated to URM retrofits. If this were to happen, many banks would be able to offer loans at a lower interest rate which would increase associability to these loans. State legislatures had also been discussing a loan program that would support the rehabilitation of historically designated buildings (*URM Policy Recommendations SDCI 2015, 14*). The term of these loans would likely be set at seven years and contractors would be required to be paid minimum wage. The last type of loan that may be available for URM retrofits are bonds by public entities. These entities, such as the city of Seattle of SCIDpda could issue bonds which would provide money to property owners for rehabilitation (*URM Policy Recommendations SDCI 2015, 15*). The money that would be offered would be in the form of loans and would likely have a higher interest rate than private loans. As stated before, loans with high interest rates should be taken out with caution as they can be difficult to pay back, especially if the retrofit end up having unforeseen costs that need to be paid for.

In conclusion there are multiple financial options that could be used to help fund a seismic retrofit. The finical methods that he NP Hotel should use that are already in place are historic and low-income tax credits, special tax valuation for historic properties, as well as a smaller private loan. Care should be taken when deciding how much money to be taken out for the private loan and what interest rate will be chosen. There are two financial methods that are not yet in place but would be very beneficial in helping to cover retrofitting costs. The first would be a levy that is imposed on areas with high concentrations on URM structures. This way, the costs would be distributed through the community. The next financial method that should be

in place by the time this policy is passed is a property tax exemption for URM buildings. This would offer almost $500,000 by the end of the policy which would greatly help cover the costs for retrofitting URM buildings.

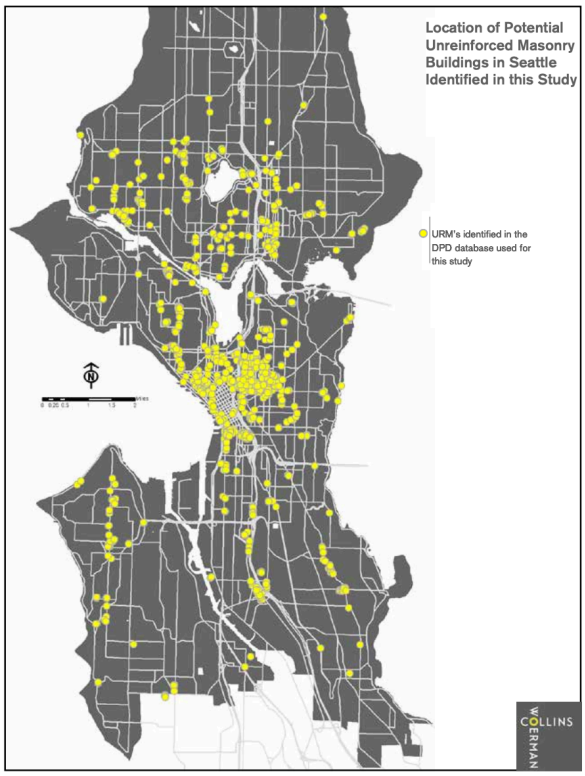

Figure 17: Map of URM buildings which could be used to create levy for funding (Source: Woerman Collins)

Reflections and Lessons for Practice

In conclusion, the purpose of this thesis was to better understand how the upcoming mandatory retrofitting policy that the City of Seattle may pass would affect historic URM buildings. First, the literature review provided information on four different topics. Through literature read on financing retrofitting projects, I was able to gain insight on how much these projects may cost, and where these costs can come from besides construction. I was also able to see different federal, state, and local funding methods that may be available to retrofitting projects. Through literature on preserving historic character while retrofitting, I was able to learn how to balance seismic retrofits and preserve historic character, as well as information on how retrofitting work could be done to complement historic character. The literature on the process of retrofitting helped me to see how other projects had developed retrofitting plans, and all of the important questions a design team should consider before they begin construction. Finally, through literature on the benefits of retrofitting URM structures I was able to learn how retrofitting a building could benefit the community and if the costs associated with a retrofit were worth the improvements in life safety.

There were also four different precedent cases that were studied before working on the retrofitting resource for the NP Hotel. Each of these case studies were historically designated buildings that had recently undergone a full seismic retrofit. This first case study, the Cadillac Hotel was not retrofitted during the 2001 Nisqually earthquake experienced some severe building damages. From this precedent study I was able to learn the damages that could happen to a URM building during an earthquake, and how that would complicate the renovation process. The second precedent study was the Kong Yick Building, which houses the Wing Luke Museum. This building was important to the Asian community it served and through this study I was able

to learn the importance of community-based design when retrofitting historic buildings. This third case study was King Street Station which was a city owned and active train station, that had gone through a renovation in the 1960's that ruined some of the original historic fabric. Through this case study I was able to learn retrofitting methods that preserve the historic fabric well and learn how a team could finance a large retrofitting project. The final precedent study that I research was the Morrison Hotel. This building has served extremely low-income groups for the past few decades and has often struggled with finances. Through this case study I was able to learn what the barriers to retrofitting can be, and how this policy will affect buildings that serve low-income groups.

For my thesis I conducted nine different interviews that were conducted in person or over the phone. The people that were interviewed for this project included the building manger and owner of the NP Hotel, Kji Kelly from Historic Seattle, Nancy Devine and Trevina Wang from the City of Seattle, Chris Frost from ZGF architects, Andy Cluness from the ARC Cost Estimating Group, Daniel Malone from the DESC, and Rick Sundberg from SKL Architects. Each of these people had an important role in a retrofitting project and were able to provide very useful information for this thesis that filled gaps that the literature review and precedent studies were unable to.

While this thesis was designed for a single building, I think the idea of the City having dedicated staff in place to be resources to building owners during the retrofitting policy would be a suitable idea. Based on the interviews that were conducted and information from newspaper articles, there is some confusion and concerns about how this retrofitting policy will affect building owners and tenants. Even building owners who received the initial written notice still had unanswered questions. If the City were able to meet with building owners in person, or host

workshops that educate residents on this policy that may increase education and awareness which could clear up some common questions and concerns. It would be important that the city provide outreach in different languages and styles to different community groups since many residents of URM buildings are from minority groups who don't speak English as a first language.

There are three goals of the mandatory retrofitting policy. First and foremost is improving life safety within the city. The second is the protection of historic resources that create neighborhood identity. The third goal of the policy is to prevent widespread building damage or vacancy after an earthquake. There are many in support of the retrofitting policy. The structural engineering community is in support of this policy because of life safety concerns. Many in the historic preservation community are also in support of this policy because it will help to better protect historic resources. Within the City of Seattle, the Office of Emergency Management is in support of this project because it will help to increase Seattle's resiliency to natural disasters, as well as their recovery time afterwards. There are also many who oppose or have critique this retrofitting policy. The majority being building owners and tenants who are worried about the costs associate with seismic upgrades.

The cost for retrofitting a building can be large, at almost $70 a square foot for construction costs alone. Many of the cost benefit analysis that were studied for thesis showed that the benefits of increase life safety due to seismic retrofits did not outweigh the costs. Financing these retrofitting projects is arguably going to be the biggest barrier to getting these buildings retrofitted. During my discussion with Nancy Devine, she said that the city hired economists and policy makers to create a list of viable financing methods that building owners could use to help fund these retrofits. The report was currently being reviewed by the mayor's

office and would likely be published by the end of May or early June. However, I think that information gathered in this thesis shows the need for financial tools to be in place before this policy is adopted.

While this thesis looked at many retrofitting methods and financing options there were various recommendations to the NP Hotel and City of Seattle to try and mitigate the concerns over retrofitting costs and improving life safety. First, A retrofitting plan should be created, and a seismic study should be performed as soon as possible to allow for ample time for funding and planning. Next, there are multiple levels of seismic performance that a building can be built to, but the City of Seattle should require anchor bolts on the exterior of the building and steel bracing in very weak areas to help lower the costs of retrofitting. The NP Hotel should plan to use anchor bolts on the exterior of the building in a similar style and position to the ones on the parapets and well as steel K bracing in the lobby. For funding options, the NP Hotel should plan on using historic and low-income tax credits, historic special tax valuation, as well as a private loan. The City of Seattle should plan on using a levy for areas with high concentrations of URM buildings as well as a URM building property tax exemption to help fund these retrofitting projects. It is also important to note that since this thesis was written, the City of Seattle released their report for funding the project, but those methods were not applied to this thesis and should be further studied.

It is also important to note the gaps that this thesis has when studying the effects of this retrofitting policy. While the research in this thesis spoke to the importance of community-based design, I was unable to interview residents within the building of the NP Hotel to gather their throughs and opinions on the topics covered in this thesis. There was also concern about the implications this policy would have on low income minority groups within the city. I think it is

important the further research is dedicated to this topic in the form of applying Seattle's Race and Social Justice Initiative Toolkit to the retrofitting policy to see where the inequities lie. While this thesis discussed financing methods for retrofitting project, many of the methods were not readily available to all URM building owners. IT is important that some of the gaps and general ideas in from this thesis are further researched so that a loss or affordable housing or historic fabric is not an effect of this retrofitting policy.

Based on the information presented in this thesis I think there are two main takeaways. First, I think it is critical that buildings that may be affected by this policy take preventative measures before Seattle City Council passes this policy. URM building owners should hire a structural engineer to do a seismic survey as soon as possible. If this is done, they can start developing a retrofitting plan to know how much the project would cost. This would provide more time to fundraise for the project as well. Secondly, I think it is also important that buildings going through a seismic retrofit involve their residents and community members from the start. In doing this they can determine what the important aspects of the building are and try to design a retrofitting plan that doesn't harm those features.

Appendix

Interview Questionnaires – Rough Notes

Questionnaire with Rachtha Dahn, Building Manager of NP Hotel

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on URM buildings and more specifically the financial and aesthetic aspects. For my thesis I would love to provide your building with a possible retrofit plan the would describe the various methods you could use, how much it would cost, various areas you could find funding, as well as preserving the important historic characteristics that are important to the NP Hotel

- *How long have you been working with the Hotel? In What position?*
    - Been with the NP Hotel for 5-10 years as the building manager. I also manage a few other buildings in the CHID and work for SCIDpda. I currently live in the NP Hotel.
- *In your time here can you share how the physical fabric of how the building has changed*
    - Since I have been here the building hasn't undergone any major renovation work or change. There is a lot of work that needs to be done on the building
- *How do you see the community connecting with this building and in what ways?*
    - The NP Hotel houses many Asian people and families as well as a large elderly population. Most of the people here are low to extremely low income. The HP Hotel is part of the affordable housing program in Seattle and is meant to be an intermediate housing option but many of our residents stay her for a long time.
- *Can you share about the types of retrofitting that has been happening since your time in the building?*
    - I am not aware of what has been done but I can put you in contact with the building owner who would know.
- *Have you considered doing a complete retrofit? Do you see any barriers what keeps you from retrofitting? Ask to elaborate on barriers? Lack of info, money?*
    - We are aware that the NP Hotel needs to be retrofitted, it needs lots of repair and we know there will be a lot of damage in the event of an earthquake. We just don't have the money to fund a retrofit right now.
- *Have you heard about the mandatory retrofitting policy? What are your thoughts on that?*
    - With my involvement with SCIDpda I have heard about the retrofitting policy, but I don't know a lot of details about the retrofitting policy and how it will exactly affect the NP hotel, but I know a lot of people are worried about it.
- *What has been the role of this building in the community and connection to the past?*
    - The NP Hotel is important to the community because it serves a vulnerable population. There are also important historic qualities of the building that the residents really value.
- *Is this what you want your building to continue to be used for?*

- Yes, we think it is important that those building continue to serve low income vulnerable minority groups within the CHID. Especially in light of all of the affordability and displacement issues within Seattle at the moment.

Questionnaire for Rick Sundberg, SKL Architects

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on unreinforced masonry buildings (URM) and the mandatory retrofitting policy that Seattle will be passing in the upcoming years. For one of precedent studies I am focusing on the Wing Luke Museum, specifically how the community connected with the project. I was hoping I could ask you a few questions about your involvement with the project?

- *Who was all part of the renovation team?*
    - We served as the main architecture and design team for the project but there were others on the team as well such as contractors and a few city employees. In total the project took 9 years. I was also very close with the project since our office is so close, I would often walk down to the building and be heavily involved in the process.
- *From what I understand the Wing Luke Museum is important to the history and identity of the local community, how did the community play into the design process?*
    - Community was extremely important in this process. There we community meetings during every phase of the project starting in the earliest design concepts. Sometimes there were even two community meetings a day. It was a very interest project because everyone in the community was very excited about the project and wanted it to happen which was a unique experience. There was a lot of collaboration between community members, some had differing opinions on how some design features should look, but they all worked together because they shared a common goal.
- Your firm works with many adaptive reuse projects, how are redesigning those buildings different from designing from the ground up?
    - For this building texture and scale were extremely important. First you really need to understand the buildings history, place, and community so you can properly reuse the building. It was also important to us that we reuse all parts of the building. For example, we used old wood in the building to create a beautiful staircase in the building. It is important when working with historic buildings to understand what you have before you start designing. History and place are some of the most important aspects when adaptively re using a building.
- *The east Kong Yick building was an URM building. How did that effect the design process?*
    - We were familiar with the retrofitting process from previous project, so we knew how to work with that. In this specific project one of the corners of the building had sunk almost 2 inches so we had to use a large chunk of our budget on fixing that issue. This create a tight budget, so we had to find was to save money.
- *In your opinion why is retrofitting these historic buildings important?*
    - They are important places to these communities and losing them to earthquake damages would have major implications
- *What aspects of retrofitting the building and bringing it up to code made the design process different? Has all historic project you have worked on need to be retrofitted?*
    - Most often historic buildings need to be retrofitted when we work with them.
- *Have you heard of the mandatory retrofitting policy that city of Seattle will be enforcing soon?*
    - Haven't focused on it much, but make sure to understand the history and community of historic buildings before you do any rehabilitation work.

- *What was your favorite aspect of this design project?*
    - I think working with the community was my favorite part of the project. They really wanted their story to be told through this project and wanted their community to be recognized. I also like the layers of the building and the daylighting aspects.
- *Any lessons learned from this project that you have used on others?*
    - Community based design is very important in ever project. Every project is also different and should be treated as such.

Questionnaire for Chris Frost, ZGF Architects

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on unreinforced masonry buildings (URM) and the mandatory retrofitting policy that Seattle will be passing in the upcoming years. For one of precedent studies I am focusing on King Street Station and I was hoping I could ask you a few questions regarding your work with the building?

- *Who was all part of the renovation team?*
    - This was a very big we had engineering, architects, preservationist, environmental groups, transportation people, city officials, and others on the project.
- *King Street Station is an important landmark in Seattle, how was preservation of the building an important aspect of the design?*
    - We had to keep the historical aspect of the building because it was a designated building. This was different because we don't often work with preservation projects. Every part of the project we had to work with the preservation board of pioneer square which added a few extra steps.
    - It was also important that when we design new spaces in the station that we distinguished them from the old historic fabric. For example, to help desks and luggage area were newly designed to look similar but you could tell that the design was complimentary but not identical.
- *What were some big design and construction aspects of this project?*
    - Bring the building back to it original historic fabric was a major part of this project. There had been a renovation in the 1960's that cause a lot of damage to the historic fabric especially the ceiling. We also added some very sustainable features to the building such as a geothermal heating and cooling system underneath the site. There was some urban planning involved because we wanted to create a space that the community could use which was the redesigned courtyard that we created.
- *How did you do a seismic retrofit of the building?*
    - One of the biggest challenges was creating a stable foundation. The building is on fill land, so it is very unstable, and we needed to add pilings into the ground to provide a stable base. We also reinforced the floor and have to do a lead and asbestos abetment project since we were opening up the walls.
    - Because this project focused on preserving the historic fabric of the building the retrofitting work that we did, such as the steel frames, couldn't show. Often times, we had to go with more expensive methods of retrofitting the building due to preservation regulations and kick back from the preservation board.
- *I understand this project cost a lot of money, what were some of the funding sources?*
    - We were able to get some FRA funding as well as smaller grants. We also received a lot of money from transportation sources since this is an active train station. The most expensive part of this project by far was the seismic work.
    - Since the owner of the building was the City of Seattle, they were able to invest more money into this project.
- *Have you heard of the mandatory retrofitting policy that city of Seattle will be enforcing soon?*
    - Haven't heard much about it. We don't often work on historic buildings
- *Any suggestions for someone wanting to do a seismic retrofit of a historic building?*
    - Use historic tax credits and put together a well-rounded and knowledgeable team.

- *Any lessons learned from this project that you have used on others?*
    - This was a big project with a lot of stakeholders, so communication and collaboration are key as well as having expert knowledge of people who have done this work before.

Questionnaire for Kji Kelly, Historic Seattle

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on unreinforced masonry buildings (URM) and the mandatory retrofitting policy that Seattle will be passing in the upcoming years. For one of precedent studies I am focusing on the Cadillac Hotel and I was hoping I could ask you a few questions regarding your involvement with the project.

- *Who was all part of the renovation team?*
    - We helped direct the project but there were lots of other players.
- *From my research I can tell the Cadillac Hotel was almost torn down before you purchased the property. Can you speak more to that?*
    - Lots of the building was damaged in the 2001 earthquake and the sidewalk had to be closed because it was deemed a public hazard. The owner started to tear the building down and historic Seattle had to get a cease action order from the City of Seattle. They eventually bought the building, but it took two years of negotiations with Seattle and the previous owner, to develop a team, and secure enough funding for the project.
- *How was this project different from other projects that Historic Seattle has worked with?*
    - There were a lot of negotiations that went into this project and we had to fight to keep the building from being torn down. The initial condition of the building was also terrible. Aside from the damages that happened because of the earthquake, it was in a state of disrepair. There were also lots of pigeons living in the building which made it very messy and they were nesting within the structure.
- *How was this project funded?*
    - We used historic tax credits, low interest loans and private funds. A big part of being able to afford the project was having future tenants lined up that would help to pay off the loan.
- *Do you think the retrofit cost more money because the building was damage after the earthquake as opposed to having retrofitted it before?*
    - While I think the construction costs would have been the same either way the process was much more drawn own and complicated because the building was damaged.
- *Have you heard of the mandatory retrofitting policy that city of Seattle will be enforcing soon? What are your thoughts on it? How do you think it will affect historic building stock?*
    - I think the mandatory policy will have some very negative effects on historic URM buildings. Since they are protected through preservation regulations, they cannot be torn down so I think that the rate of foreclosures on historic URM buildings will jump up. I think some buildings will also become moth balled and they won't be used any more, similar to what happened with the Ozark Hotel. After the fire the city mandated that building have certain fire safety regulations. Many building owners couldn't afford to make these changes so they stopped having tenants on the top floor of their buildings and continue the use of the bottom floors so they wouldn't have to make the upgrades. I think this URM policy can have very similar implications.
- *What were the biggest challenges to this project?*
    - Keeping the building from being torn down.
- *Any lessons learned from this project that you have used on others?*

- Also plan on having to pay for lead and asbestos abatement when you retrofit a historic building. It can be a large cost and increase construction time.

Questionnaire for Valerie Neng, Building Owner of NP Hotel

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on URM buildings and more specifically the financial and aesthetic aspects. For my thesis I would love to provide your building with a possible retrofit plan the would describe the various methods you could use, how much it would cost, various areas you could find funding, as well as preserving the important historic characteristics that are important to the NP Hotel. I was hoping I could ask you some questions about the NP Hotel and your involvement with the building.

- *How long have you been working with the NP Hotel? In what position?*
    - I work with Interim CDA which is a nonprofit and affordable housing. The company owns the NP Hotel and I currently manage this property for Interim.
- *How has the fabric of the building changed since you have worked here?*
    - We did a major gut renovation of hotel in 1994. The NP Hotel used to be a SRO hotel and during the 1994 renovation we created 63 low income apartments. 2nd floors in SRO hotels
- *Who currently lives in the building?*
    - The NP Hotel serves 30-60% of area median income, some are very low income with section 8 and project-based section 8 housing
- *What are some focuses or projects you are currently working on with the NP Hotel?*
    - We have been looking at how to recapitalize the property because we have large capital needs. This summer we are trying to have a roof replacement done, have the exterior masonry walls repointed, and make fixes to the historic exterior wood finished around the windows. The last project has been difficult because the Special Review District really value the integrity of original windows in the neighborhood.
- *Have you heard about the upcoming mandatory retrofitting policy the City of Seattle is trying to pass? What are your opinions on it?*
    - The URM policy is very unclear at the moment and many in the neighborhood are confused about how it will affect URM buildings and what resources will be available. Other members and I of Interim CDA have been a part of round table discussion with the City on this topic and been able to voice our concerns. Our main concerns are that this policy will cause further displacement in the area due to the costs of retrofitting these URM building. We cannot raise rents because they are capped by low income housing tax credits
- *What are some of your main questions surrounding the policy?*
    - What will the funding sources be with low income and historic tax credits tied to building? While the Interim CDA is familiar with grants in the area, what grants will be available, if any, that are specific to fund this policy? Will there be a costs estimator? What exactly will this policy be requiring and how will they educate people? How will they prioritize the different URM buildings in the city? What is the timeline for this policy and when will it begin? how is the city trying to combat displacement that may be cause because of this policy? Figure out how to get government to apply the RSJI toolkit because we believe this policy disproportionately affect low income and minority groups.
- How do you see the community connecting with this building and in what ways?
    - There are two small businesses in the commercial space, a restaurant and a graphic design firm. The restaurant is the oldest Japanese's restaurant in Seattle, and they were long time tenants. There is a mix of

residents in the NP hotel and we serve low and very low-income people 0-50% AMI. There are families, single professionals, older folks, trying to look for more permanent housing. We generally charge $350 a month for the low-income programs in the city and to get tax credits.

- Is there anything else you want to tell me about the building, retrofit, URM?
    - It will be helpful to know more about what the URM policy will require, when it can be excepted to begin, what the timeline will be, and how notification will happen.

Questionnaire for with Nancy Devine, City of Seattle DCSI

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on URM buildings and more specifically the financial and aesthetic aspects. I was hoping I could ask you questions about your involvement with the URM policy within the City of Seattle.

- *How long have you been involved with the City of Seattle work with the mandatory retrofitting policy?*
    - I was hired in 2015 and my main tasks were validating URM building inventory and finalizing the confirmed URM list
- *What building code will the URM buildings have to be retrofitted to?*
    - That depends on when it is adopted. Seattle created the ASAW existing building committee. As the city we don't want to be the only ones developing the technical standard, so we pulled in engineers. The technical standard 2009-10 based on 2009 building code, currently we are using the 2015 existing building code, however we are approaching using the 2018 building code. In the end URMs will have to comply with the technical standard building code
- *Do you know when the policy is expected to be adopted?*
    - Doesn't know when this will be adopted – technical standard will have to be adopted
    - Current status it is a departmental priority for 2019 to take next step. Next steps are ordinance – mayor's office may want them to do something else. We won't write ordinance unless exec branch requests it
- *What are opinions on the URM Policy?*
    - Support comes from structural engineering community for life safety concerns, the historic preservation community also supports the policy because they want to see buildings preserved, the office of emergency management is also very interested.
    - Critiques come from building owners because of the high costs and they don't see a way to fund the retrofit.
- *What are the challenges to this policy?*
    - Challenge lies within communities that these are located in historically underrepresented Columbia city, Georgetown, CHID. There is already gentrification in these areas, and people see this policy can drive gentrification further. City is cognoscente of that and wants to address that and write policy and provide resources and tools to prevent gentrification
- *Has there been effort to find financial support for building owners that are affected by this policy?*
    - Ideas for financing summarized in support in policy committee, however they aren't financing experts and many of those ideas aren't legal (property tax rebates). City hired national development council to look at financing tools, in process of being transmitted to mayor office by end of May or June will be made public
- *What type of outreach do you plan on doing before this goes?*
    - In 2012 there was a preliminary list of URM buildings and building owners were notified by letter, and 2016 confirmed list building owners were notified. There have been 2 written notifications. Great deal of concerns by council members of written letters because many of the residents in Seattle are not English speakers. As a response the City did a pilot study in Columbia City where they tested methods of communicated with non-English speaking communities and there are ideas from that pilot study. Primary

thing is we need to use community leaders to relay information. It will be challenged to communicate highly technical document in multiple languages.

- *What steps do you think a building owner should take if they want to retrofit their building and don't have many resources*
    - First step would be to hire structural engineer to do a tier one assessment from ASCE 41 check list – informs building owner of pieces of retrofit that need to be done. FEMA has some pre disaster grant money that is available each year. In order to apply to owner has to have the engineer complete a survey.

Questionnaire for Trevina Wang, City of Seattle Liaison for King Street Station

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on unreinforced masonry buildings (URM) and the mandatory retrofitting policy that Seattle will be passing in the upcoming years. For one of precedent studies I am focusing on King Street Station and I was hoping I could ask you a few questions regarding your work with the building

- *From what I understand you worked with the City of Seattle for the project? What was your involvement and goals of working with the project?*
    - Overall project manager for rehabilitation. Planned and hired design and construction team and funding in 2013.
- *What is some background on the project?*
    - DNSC Burlington northern station and WSDOT had been working with them with Amtrak. WSDOT got funding for passenger and freight. DNSF asked Seattle to take over cause WSDOT fell through – Seattle paid $10.
- *What are some of the funding sources for this project and how were they obtained?*
    - WSDOT got federal and state dollars that had to finish dollar, but it was not enough to do the work. None of the grants were tied to seismic retrofitting. Seattle wanted to get $10 million city dollars for retrofitting – they had done maintenance. Fixed roof and clock tower. As they were applying to retrofit, they went to federal, state, nonprofits to raise funds.
    - City of Seattle funding was specifically for retrofit. Pot of funding worked with each other. Deferral dollars had to have matching funds from the city. Grants had to have matches. Each grant had to have a specific purpose. Some were just for sustainable features of the courtyard and other eco friendly features.
    - General funds would cover more of seismic work such as state, federal, City of Seattle dollars. Did not use any historic tax credit and new market but since there were federal dollars and they don't like the tax credits so. Got at least 50% of the funding for the project though grants.
- *How do you see the community connecting with this building and in what ways?*
    - Community was pulled in to be aware because it was during the recession, lots of projects were moved forward. Grants funds, getting people working – project costs less because of depression. There wasn't lots of competition. Part of pioneer square preservation district – had to give lots of presentations to board and those were open to the public had to give to city council and mayor. Outreach to groups interested in projects. Groups were very supportive
- *Do you have and advice for a building wanting to retrofit?*
    - Seismic is no good if you can't restore the historic fabric as well.
    - Retrofits take a long time
    - Hire structural engineers and architects and understanding of the current code. Depending on what building you have there are different degrees of retrofitting and usage.
    - If the building is in historic district there is more scrutiny on what you do. Amount of effort has to be higher with review by preservation board. Funds to retrofit historic building is great because of the integrity of the structure.
    - People are interested in historic buildings

    - Available resources are different for private project because there is more constraint in their funding.
    - Don't rely on tax credits or subsidies – they can be uncertain
- *What do you think may happen if this policy is adopted?*
    - I think building owners will take a look at the costs and decide if they want to keep the building. They might sell to be demolished depending on location.
    - IF enough people are upset, they may band together to have a lawsuit with the city because of the costs.
    - This may also affect the value of historic building because if it is passed it will depress the price of the historic building because of the retrofitting costs

Questionnaire for Daniel Malone, Executive Director of DESC

Hello, my name is Rachel Vickers. I am a graduate student in Urban Planning at UW and got my undergrad there in Architecture as well. For my thesis I am focusing on unreinforced masonry buildings (URM) and the mandatory retrofitting policy that Seattle will be passing in the upcoming years. I am gathering information on four previous retrofitted historic buildings to help me develop a retrofitting resource for the NP Hotel. I was hoping I could ask you some questions regarding the retrofit that the Morrison Hotel went through.

- *How long have you been working with the DESC? In what position?*
    - I've been with the Morrison for 29 years and the retrofitting work was done in 2005.
- *What is some general information on the retrofit that happened in 2005?*
    - We acquired building in 2001 knowing they would renovate it. We had been the main tenets prior to this and had been renting out most of the Morrison Hotel
    - WE did the retrofit while the building was still occupied
    - The main reason that we wanted to do the retrofit was to meet current building code
- *How did you notify the community of the retrofit?*
    - Had to communicate a lot with the tenant because they had to move out (some completely) at times. Everyone had to move at least twice. We communicated in person and in writing.
- *Can you share about the types of retrofitting that has been happening since your time in the building?*
    - There was lots of steel that was added as structural support, I think around half a million pounds was added to the building in the form of steel columns and cross bracing. Concrete sheer walls were added in some locations. Every floor had plywood added to it. There was a masonry exterior to floor plate had already been in place during retrofit in the 1980's.
    - The renovation was done in three phases, so people were able to stay in the building during construction. However, renovating the middle section of the building was the most difficult because tenants had to cross through construction zones. Overall it was a very difficult process.
- *How did you finance this retrofit?*
    - We utilized public financing tools including low income housing tax credits. Through this we sold the tax credits to investors. Public dollars and tax credits you have to commit to rent levels that are applicable to income levels so you cannot raise rents. We also had public dollars from city, county, and state for long term deferred loans. There was a lot of private fundraising involved. Fundraising took place over extended period of time and was focused on large donor gifts. Prior to this the DESC has not done lots of private fundraising campaigns but for this they did. One of the fundraising events raised $3 million.
- *The Morrison hotel is in the Pioneer Square Preservation District, how did that play into the retrofit project?*
    - The architecture firm we used has a lot of history in doing historic renovations and they had their own consultants that we used for the rest of the project.
    - The preservation board didn't add any difficulty. They mainly focused on exterior and ground level so none of that was affected seismic retrofit. However, there is a fancy iron catwalk at top floor of the building and that had to be preserved and it wasn't in great shape, so we had to restore that which costed addition funds. If we hadn't been in a historic district, we likely would've removed the structure to save money. The

DESC was also able to get money from preservation easement and Historic Seattle. That was a convenient way to get some additional resources to fund the project, especially the catwalk.

- *Is there anything else you want to tell me about the building, retrofitting, or the URM policy and its possible effects?*
    - Public entities are going to have to figure out how to fund these projects because many of these URM buildings are long term committed to low income housing. And if there is going to be new code requirement then the city should ensure that no affordable housing will be lost in the process. It is admirable reason to make places as they can be, but it might have adverse effects to low income groups.
    - For example, the Ozark Hotel in 1970's there was a fire and a bunch of people died because building didn't have modern fire safety. The city passed some ordinances that created mandatory fire life safety protections and some buildings couldn't afford them, so they shut down. So, the city lost a lot of cheap housing stock. There was good intent on the front end but problematic side effects of trying to increase public safety.
    - Some useful ways to fund the project may be transfer of development rights. In this, buildings situated in a place where the zoning would allow a taller building could sell their air rights to another building. There is development happening in Pioneer Square they need to purchase rights from another building so that is a current viable option.

Questionnaire for Andy Cluness, President of the ARC Cost Group

Hello, my name is Rachel Vickers and I am a current master's student at UW working towards my degree in Urban Planning. My thesis is focusing on the upcoming mandatory retrofitting policy and the effect that may have on historic buildings. I was hoping I could ask you a few questions about financing these projects.

- *How long have you worked in cost estimation?*
    - For a long time, right now I am working on a very large project. Seismic renovation on a school can be more historic nature. Warehouse on Boeing in Everett. Hospitals. Often in manufacturing and healthcare
- *What are some factors that affect the cost of retrofitting projects?*
    - Each retrofitting project can vary quite a lot. Some factors include the existing condition of the structure, is it severely deteriorated or not. Type of construction and how the project is procured or contracted can affect costs. Our projects use GCCM contractor to negotiate contract to provide schematic design and provide estimate. It also depends on floor to floor heights. Occupied space can vary – when you renovate historical high school building is empty so you can get in, no productivity has to be done, if you did hospital, floor can be occupied so you have more constraints.
- *Do you work with on-retrofitting projects? And if so, how do those costs differ?*
    - Typically, with the projects I work on it's the whole seismic retrofit. A building might originally start with the renovation of the space, however when it goes over a certain size it triggers a seismic upgrade. You might be adding another 80 a square foot architectural
- *Are there any ways to save costs of seismic retrofits?*
    - No not really. When meeting building code, there is no flexibility on seismic portion. Retrofitting method can vary in cost, for example, concrete sheet wall more expensive than buckling restraint brace frame. It is important that the project works closely with an engineer throughout the process so they can suggest the most effective retrofitting methods, you may be able to save money that way.
- *Where do the costs come from for seismic retrofits?*
    - None seismic structural components, such as if you have to insert the seismic work you will have to pay to remove part of the building and put it back together. MEP - mechanical electrically and plumbing impacts for relocation of those elements. Architectural costs impact from putting in the structure require for the seismic upgrade, mainly finished and, if brace frames are on outside it can affect, minimal side costs, site disturbance, equipment, tower cranes, amending the site work, there is engineer survey cost.
- *Do you think the high costs of retrofitting a building are worth it?*
    - Costs are definitely worth it; you can't put a price on life. I especially think hospitals are a critically important URM building type that need to be retrofitted immediately.
- *How much do you think a retrofit would cost in Seattle?*
    - The range can vary quite considerably but the structural components of the retrofits are generally $40-$70 a square foot.

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