An Analysis of the Demolition of Seismically Damaged Historic Structures After the 1989 Loma Prieta Earthquake, California

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AN ANALYSIS OF THE DEMOLITION
OF SEISMICALLY DAMAGED HISTORIC STRUCTURES
AFTER THE 1989 LOMA PRIETA EARTHQUAKE, CALIFORNIA

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Historic Preservation

by
Claire Ann Cox
May 2024

Accepted by:
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ABSTRACT

The Loma Prieta Earthquake of 1989 was an event that greatly impacted the lives of those living in the greater San Francisco Bay Area. The 6.9M\textsubscript{w} earthquake severely damaged buildings and infrastructure, inevitably leading to the demolition of some of these structures. Older buildings constructed before modern seismic codes were most vulnerable to damage. Yet, age is the same reason many of these buildings were considered historic and valuable in their communities. In the wake of Loma Prieta, an alarming trend of the demolition of historic buildings arose.

This thesis analyzes the demolition of historic structures due to damage sustained in the Loma Prieta Earthquake. Using a case study approach, eight buildings are analyzed to understand what circumstances led to the demolition of each building, what decision-making processes led to a demolition decision, and what were the similarities and differences between the circumstances of each building.

This study found that the primary decision-making factor for the demolition of case study buildings was economic reasons. Contributing factors to demolition were related to the historic status of the building, the interpretation and implementation of laws and regulations, the will of city governments and property owners, and variations in engineering reports and cost estimation.
DEDICATION

This thesis is dedicated to my fiancé,

Alexander James Rieger,

without whom this thesis could not have been written.
ACKNOWLEDGMENTS

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I’d also like to thank the planning departments of the City of San Francisco, Oakland, Santa Cruz, and Watsonville for their extensive research into the documents necessary for the completion of this thesis. Also, the San Francisco and Santa Cruz Public Libraries and the UC Berkeley Pacific Earthquake Engineering Research Library (NISEE-PEER) for having such a wealth of information and assisting with research.
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CHAPTER I
INTRODUCTION

Living with earthquakes is part of reality for Californians, although serious earthquakes are far enough apart that it is not an everyday concern. A large damaging earthquake hadn’t occurred in the San Francisco Bay Area in 83 years, since the Great San Francisco Earthquake and Fire in 1906. On a balmy afternoon in October of 1989, an earthquake was the last thing on people’s minds. Many Bay Area residents were more concerned with Game 3 of the World Series. The series, dubbed “Battle of the Bay”, was between the Bay Area’s two MLB teams, the San Francisco Giants, and the Oakland A’s. Many had left work early to attend the game or watch at home, leaving significantly fewer people on the road during rush hour.¹

At 5:04 pm a section of the San Andreas Fault ruptured creating a 6.9Mw earthquake. The epicenter occurred in the Forest of Nisene Marks State Park in the Santa Cruz Mountains, near Loma Prieta Peak, which lent its name to the quake. The shaking lasted for only 15 seconds but caused great damage near the epicenter in Santa Cruz and through the Bay Area, with serious damage in Oakland and San Francisco.²

The Loma Prieta Earthquake took the lives of 63 people and injured over 3,700. Of the 63 people who were killed, all but one were due to structural failure of infrastructure or buildings. Of the 63 people who were killed, all but one were due to structural failure of infrastructure or buildings.3 43 people were killed in Oakland due to the structural failure of the Interstate 880 Cypress Structure, a double-decker highway that collapsed, crushing cars on the lower deck. In a study of earthquakes from 1900-1992, 75% of fatalities were due to structural collapse and accounted for 90% if follow-on disasters were excluded, such as tsunamis and fires.4 The danger in earthquakes is not due to the shaking itself but the effects it has on the built environment.

Figure 1.1: Collapsed Cypress Structure, Oakland, 1989. Source: Structural Engineers Association of Northern California.


The Loma Prieta Earthquake caused $6 billion dollars in damage to over 37,000 buildings, with 1,473 of those being demolished. There was widespread damage to communities near the epicenter including Santa Cruz, Watsonville, and Los Gatos. Damage also occurred to older structures in Oakland and San Francisco. Especially hard hit was the Marina District in San Francisco, due to being an area of filled land. This led to a phenomenon called liquefaction, when a soil deposit loses its strength and stiffness during shaking, behaving like a liquid. Liquefaction led to the collapse of soft-story wood-frame buildings and broke gas mains that ignited fires. The majority of damage to buildings occurred in older unreinforced masonry buildings (URMs) and wood-frame buildings. Structures that were designed according to modern seismic building codes performed well in the earthquake. Other than in the epicentral region, peak ground acceleration was less than what seismic building codes were designed for.

Older buildings are known to fail during earthquakes, as they were constructed before the implementation of modern building codes. Yet, many older buildings are considered historic and are highly valued by their communities. In the wake of the disaster, municipalities performed surveys of the damage and red-tagged buildings deemed unsafe for human habitation. As owners and municipalities moved to demolish

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these buildings, questions began to arise in communities and from preservationists over red-tagged historic buildings, many of which were landmarks in their communities. Luckily, many historic buildings that were damaged in the earthquake were rehabilitated due to the efforts of preservationists and community members, but still, many historic buildings were demolished.8

“The Soul of Santa Cruz Demolished. Sax plays ‘Taps’ as Cooper House, other landmarks fall under wrecking ball,” was the headline of a San Francisco Examiner article detailing the demolition of the Cooper House, a landmark building in Santa Cruz torn down after sustaining damage in the earthquake.9 Debates on whether the Cooper House really needed to come down continue to this day, with many community members lamenting its loss.10 The Cooper House was not the only historic building torn down due to damage from the quake. It was one of the 19 of the 36 contributing buildings that were demolished in Santa Cruz’s Pacific Avenue Historic District, which led to the delisting of the district from the National Register of Historic Places in 1992.11 A report published ten months after the earthquake found that approximately 70 listed historic buildings

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10 Jason Hoppin, “The Lost Landmark: Did the historic Cooper House really have to come down?,” Santa Cruz Sentinel, October 14, 2014, https://www.santacruzsentinel.com/2014/10/14/the-lost-landmark-did-the-historic-cooper-house-really-have-to-come-down/.

were demolished in the greater Bay Area. Yet, that number is much higher, as many more historic buildings were torn several years after sustaining damage.\footnote{Architectural Resources Group, “An Assessment of Damage Caused to Historic Buildings by the Loma Prieta Earthquake,” August 1990, 5.}

This study explores and analyzes the events of the Loma Prieta Earthquake and how it resulted in the demolition of historic structures the greater San Francisco and Monterey Bay Areas. It synthesizes several aspects of historic preservation, disaster studies, and seismic engineering to contribute to a growing scholarship in multidisciplinary preservation studies. Using a case study approach, this thesis analyzes eight historic buildings in the cities of San Francisco, Oakland, Santa Cruz, and Watsonville, which were damaged to some extent in Loma Prieta and demolished as a result. This thesis answers the following research questions, what were the circumstances that led to the demolition of each building? What were the decision-making processes that led to a demolition decision for each building? And what were the similarities and differences between the circumstances of each building?

To answer these multidisciplinary research questions, an in-depth analysis of eight case study buildings is undertaken. For each case study the analysis focuses on the events, damage assessments, legal framework that permitted the demolition, what government entities reviewed the demolition, what preservation and community efforts were implemented, and the recovery and replacement of buildings after demolition. Then a comparative analysis between the case studies is completed to compare and contrast the similarities and differences between each case study to highlight nuances and give
context to each building’s circumstances. The categories in which each building were compared are: year built, historic status at the time of the earthquake and before demolition, review process, structural system, damage patterns, primary demolition factors, difference in repair estimates, actual building replacement cost, difference between low and high repair estimates and actual replacement cost, time between the earthquake and demolition, and downtime, the time between the earthquake and re-occupation.

The findings of this thesis were that each case study building had unique circumstances that led to its demolition. There were clear similarities and patterns based on a building’s historic status, type and amount of damage, type of construction, ownership, preservation efforts, and laws it was required to follow. Still, each building had a unique combination of those circumstances that led to its demolition. This thesis found that the most common demolition factor, or reason a building was demolished was for economic reasons, rather than life-safety, ability to rehabilitate, or aesthetic reasons.

This study also found that there was a wide variability in repair cost estimates, which was likely a factor in the demolition for some buildings. These repair estimates were based on engineering reports that were completed at various stages after the earthquake. Some buildings had large-scale and in-depth engineering reports done while others had hastily done reports in the days after the earthquake. There was a correlation of higher repair estimates, or suggestions that it was not feasible to repair a damaged building, with engineers, contractors, and estimators that did not have extensive experience with historic buildings with archaic building systems and materials.
The significance of this thesis is that it is a unique synthesis of historic preservation, history, disaster studies, and earthquake engineering. The academic study of Loma Prieta was mostly completed in the following months and years after the earthquake. As it has been nearly 35 years since the event, and it morphs from a recent memory to a historical one, new perspectives can be derived to possibly gain novel insights into the future.

Figure 1.2: Earthquake Risk Map of California. Source: U.S. Geologic Survey.
This is most important because a Loma Prieta-sized earthquake will happen again in California. There is a 99% chance that a 6.7\textit{M}w earthquake will happen in the next 30 years anywhere in California. For the Bay Area, there is a 72% chance of an earthquake measuring a 6.7\textit{M}w, a 51% chance of a 7.0\textit{M}w, and a 20% chance of a 7.5\textit{M}w in the next 30 years.\textsuperscript{13} The circumstances surrounding the demolition of historic buildings after Loma Prieta should be used as a lesson in the failure to protect historic buildings. The only way to protect historic architecture in a seismically active region like California, is to seismically retrofit these structures. Luckily, awareness and the techniques and methods for seismically retrofitting historic buildings has come along since 1989. Strengthening schemes can protect a historic building but also be done in a historically sensitive way that respects the elements of a building that make it significant.\textsuperscript{14} As the Loma Prieta Earthquake fades from the memory of Californians, the academic study of the event is what will remain.


CHAPTER II
LITERATURE REVIEW

Introduction

The ultimate defeat of preservation is the demolition of a historic resource. Yet, the ultimate motivator for preservation is the threat of demolition. To the dismay of preservationists, a historic building is often not given much attention until it is too late. After the 1989 Loma Prieta Earthquake, approximately 1,473 buildings were demolished, 70 of which were considered historic. The loss of historic buildings caused outrage in communities and many questioned if some of these buildings could have been saved. There was so much pushback against the demolitions that there was legislative change that strengthened the requirements for demolition of historic properties in California after a natural disaster.

In seismically active areas, preventing demolition needs to take a more proactive approach. A seemingly intact building could be damaged beyond recognition in an instant. The best way to protect historic buildings, especially ones built before modern seismic codes, is to retrofit them. Still, there will inevitably be buildings that are not retrofitted, retrofitted only for life safety, or are unable to withstand an earthquake due to a multitude of factors. Making the decision to save a damaged historic building involves

many complex factors and decisions. Including how important the building is perceived, the will of the property owner, the extent of the damage, and often most importantly, the cost of repair, rehabilitation, and retrofit.

To answer the multidisciplinary and multidimensional research questions of this thesis: what were the circumstances that led to the demolition of each building? What were the decision-making processes that led to a demolition decision for each building? And what were the similarities and differences between the circumstances of each building? A survey of multiple aspects of the literature was undertaken. Subjects concerning; seismic engineering and how to estimate repair cost, how buildings perform during an earthquake, the effects of the earthquake on historic buildings, and the economic valuing of cultural heritage were reviewed.

Performance of Buildings During Loma Prieta

In the wake of Loma Prieta, scientists and engineers raced to understand the earthquake and its effects. In the months and years following the earthquake, many publications were published on the effects of the quake on various aspects of the built environment. An in-depth study of the effects of the earthquake on structures was completed by the United States Geological Survey. The “United States Geological Survey Professional Paper 1552-C: The Loma Prieta, California Earthquake of October 17, 1989- Building Structures” edited by Mehmet Celebi, is a collection of several academic papers that explore topics that include seismic responses of buildings and
statistical summaries.\textsuperscript{18} The first chapter “Performance of Building Structures- A Summary” details studies of the performance of buildings and structures instrumented prior to the earthquake. This allows for the careful examination of the effects of the quake which can aid the prediction of future event effects and inform the improvement of seismic design guidelines.\textsuperscript{19} The overarching theme of the various articles was that although Loma Prieta produced the best seismological recordings at that time,\textsuperscript{20} that more instrumentation was needed to fill in many gaps. There was a lack of understanding as to how soil conditions affected building structures and more scholarship was needed to identify what soils were beneficial or detrimental to structures and the mechanisms creating that relationship. In the 34 years since Loma Prieta, there have been great strides in the amount of instrumentation, the understanding of how soils and ground motion affect buildings, and a large update in the building code to reflect these findings.\textsuperscript{21}

\begin{flushleft}
\textsuperscript{19} Mehmed Celebi, “The Loma Prieta, California Earthquake,” C-5.
\textsuperscript{21} Mehmed Celebi, “The Loma Prieta, California Earthquake,” C37.
\end{flushleft}
Figure 2.1: Shaking intensity map for the Loma Prieta Earthquake of October 17, 1989. Source: UC Berkeley Seismology Lab.

One of the most detailed reports, published just three months after the earthquake, was by the National Institute of Standards and Technology. The “NIST Special Publication 778: Performance of Structures During the Loma Prieta Earthquake of October 17, 1989” edited by H.S. Lew. The report synthesizes data gathered following the earthquake by the Interagency Committee on Seismic Safety in Construction, which surveyed damage to buildings, utilities, and transportation systems in the epicentral
region near Santa Cruz and the greater San Francisco Bay Area. The study found that modern structures that were constructed according to code performed well with minimal to no structural damage. In areas except the epicentral region, peak ground accelerations were less than what is prescribed by modern building codes. So, it argues that Loma Prieta was not a severe test of buildings and modern building codes, meaning that the event cannot be used to test if contemporary seismic design codes were adequate.

Older structures that were constructed before the implementation of modern building codes contained the majority of structural failures. Most of those structures were unreinforced masonry buildings (URMs) and wood-frame dwellings. Damage was centered in the Marina and South of Market districts in San Francisco, other areas of San Francisco and Oakland, and in areas surrounding the epicentral region near Santa Cruz. In the Marina District, damage varied from total collapse to exterior cosmetic damage. The Marina District is an area that was largely built on landfill which led to liquefaction and strong ground motions. The typology most damaged in the district was the four-story apartment building. These buildings were built with a first story of garages with large openings which created a soft story. This soft story resulted in partial or complete collapse of the first story and/or the whole structure due to low lateral stiffness and strength. The Financial, South of Market, and Civic Center Districts were areas that held the highest concentration of unreinforced masonry buildings and masonry veneer

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walls. Combined with the deep soft soil deposits of these neighborhoods, this led to serious structural damage. Damage such as diagonal and X-cracking of masonry piers, pounding, and partial wall collapse. In Oakland, there was a variety of structural damage, especially to URM buildings and steel frame buildings with masonry veneer cladding.25 At the epicentral region, damage was focused around URM buildings and wood-frame buildings. Damage included collapse of masonry chimneys, wood-frame buildings slipping off of its foundation, cripple wall failure, parapet failure, and partial or total collapse of unreinforced masonry walls. The downtowns of cities and towns near the epicenter tended to have older unreinforced masonry buildings which led to extensive damage in these areas.26 This study also analyzed effects on transportation and infrastructure such as the collapse of the reinforced concrete I-880 Cypress Structure, which led to the death of 42 people, the largest loss of life during the earthquake, and the collapse of a portion of the upper deck of the Bay Bridge.27 The study ends by arguing for the increased study of earthquake-related sciences, the strengthening of seismic code as new scientific findings arise, and to increase the seismic retrofitting of older buildings. The study notably highlights the responsibility of the Federal government to construct, maintain, and retrofit structures it is responsible for as a life safety concern.28

The focus on damage to unreinforced masonry buildings was highlighted by the Earthquake Engineering Research Institute (EERI) in their journal *Earthquake Spectra* in

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28 H.S. Lew, “Performance of Structures,” 7-4-5.
a special issue on the Loma Prieta Earthquake. In the chapter “Buildings”, it details the various types of failure patterns in URM buildings in the disaster area from Monterey up to San Francisco. Although masonry buildings are strong in compression, they are weak in resisting flex and shear forces. When these forces are applied during an earthquake it can cause the brittle brick and mortar to crack and possibly collapse. Common failure patterns associated with URMs are out-of-plane failure, in-plane failure, diaphragm flexibility failure, and building pounding.29

Out-of-plane failure occurs when shaking is perpendicular to the structure which causes flexural stresses which exceed the tensile strength of the member. In URM buildings this is apparent with vertical cracks, cracks at the roof level, and partial or total collapse of a wall. In-plane failure occurs when shaking is parallel to the structure, which causes shear forces. This is often most evident in failure patterns such as diagonal or X-cracking, but also sliding shear failure and rocking. Another failure pattern exhibited is diaphragm flexibility failure which is caused when the in-plane flexibility of a sheathed diaphragm exceeds that which can be sustained from the wall itself. This causes the detachment and collapse of the masonry wall. The last common structural failure was building pounding. This occurs when two adjacent buildings continually collide with each other, which can cause the shear failure of the brick walls. On buildings of different heights, it can cause the bricks of the taller building to fall through the roof of the shorter building.

This study also undertook an analysis of the survey of damaged URM buildings in San Francisco by the City Building Department. The survey was performed using a form based on an ATC-13 scale.\textsuperscript{30} ATC-13 was a report by the Applied Technology Council which is a rapid assessment form which created a damage scale from 1- none to 7-destroyed which rated structural damage based on the percent of the replacement cost of the building.\textsuperscript{31} It concurrently used the Wailes and Horner damage scale which was developed in 1933 specifically for damage to URM buildings. Both of these damage scales are still in use today.\textsuperscript{32} The report found that the original raw data sample of 1,908 URM buildings were surveyed using the ATC-13 scale (Figure 2.2). Using additional survey forms the revised sample number was increased to 1,947 buildings. The authors of this paper were interested in the effects of the 16 buildings that were placed in the ‘major’ 80% replacement ratio and ‘destroyed’ 100% replacement ratio. Upon their reinspection, they found that none of the observed damage of these 16 structures should have been rated ‘major’ or ‘destroyed’. Instead, they were revised to ‘heavy’ or 60% of replacement cost ratio.\textsuperscript{33} The authors did not elaborate why the original survey categories ‘major’ and ‘destroyed’ were incorrect, but it implies that there could have been improper training of original surveyors. It is also important to note that there can be large discrepancies

\begin{itemize}
  \item [33] Earthquake Engineering Research Institute, “Buildings,” 130-134.
\end{itemize}
between the opinions of engineers who survey structural damage. There is a large
difference between labeling a building 60% replacement cost versus 100% replacement
cost, as this could result in the demolition of the building. Although ATC-13 and Wailes
and Horner damage scales are meant to be preliminary rapid assessments of buildings, it
could potentially have the unintended effect of influencing later more in-depth
assessments or sway the opinion of a property owner on how to proceed with the either
repair or demolition of a building.

Table 5.2 ATC-13 damage information for URM buildings in the City of San Francisco

<table>
<thead>
<tr>
<th>Damage Class</th>
<th>Central Damage Ratio</th>
<th>Number of Bldgs.</th>
<th>Damage</th>
<th>Square Footage</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw data sample of 1,908 buildings</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0.000</td>
<td>1,189</td>
<td>0.0</td>
<td>19,727,433</td>
<td>0</td>
</tr>
<tr>
<td>Slight</td>
<td>0.005</td>
<td>408</td>
<td>2.0</td>
<td>7,907,073</td>
<td>39,353</td>
</tr>
<tr>
<td>Light</td>
<td>0.055</td>
<td>183</td>
<td>10.1</td>
<td>3,313,655</td>
<td>182,251</td>
</tr>
<tr>
<td>Moderate</td>
<td>0.200</td>
<td>93</td>
<td>18.6</td>
<td>2,426,821</td>
<td>485,364</td>
</tr>
<tr>
<td>Heavy</td>
<td>0.450</td>
<td>19</td>
<td>8.6</td>
<td>563,362</td>
<td>253,513</td>
</tr>
<tr>
<td>Major</td>
<td>0.800</td>
<td>12</td>
<td>9.6</td>
<td>429,444</td>
<td>343,555</td>
</tr>
<tr>
<td>Destroyed</td>
<td>1.000</td>
<td>4</td>
<td>4.0</td>
<td>165,108</td>
<td>165,108</td>
</tr>
<tr>
<td>Totals</td>
<td>1,908</td>
<td></td>
<td>52.9</td>
<td>34,532,895</td>
<td>1,469,326</td>
</tr>
<tr>
<td>Total percent of damage</td>
<td></td>
<td></td>
<td>2.77</td>
<td>4.25</td>
<td></td>
</tr>
</tbody>
</table>

Figure 2.2: ATC-13 Damage information for URM buildings in the City of San Francisco. Source: Earthquake Engineering Research Institute.
Loma Prieta & Historic Buildings

When the Loma Prieta Earthquake struck it became quickly apparent to preservationists and community members that historic structures were in danger. Even in just the first few days after the earthquake, several historic structures had already been demolished. The most in-depth statistical report concerning historic resources was created by the architecture and planning firm Architectural Resources Group (ARG) commissioned by the National Trust for Historic Preservation entitled “An Assessment of Damage Caused to Historic Resources by the Loma Prieta Earthquake”, published in August 1990. This report is vital to understanding the effects on historic buildings and actions taken after the earthquake.

The scope of the report includes information and survey data on the extent of damage to historic structures, identifies financial and technical resources available to stabilize and repair damaged resources, and recommends policies and strategies for the future protections of resources from major disasters. The data for the survey was compiled from a report entitled “Historic Properties in California’s 1989 Earthquake Area Directory” compiled by the California Office of Historic Preservation. ARG also analyzed national, state, and local historic registers and interviewed local preservation organizations to ensure accuracy. They acknowledged the lack of comprehensive historic resource surveys so there are some generalizations on the estimations. Although some
registers included information about buildings eligible for a register, many buildings that would be considered eligible for listing, would have been inevitably omitted.\textsuperscript{34}

The survey found that the number of historic buildings damaged was 472 of 38,943 total historic buildings in the earthquake zone. The approximated economic cost of this damage was $350,100,000. At the time of publication, ten months after the earthquake, 70 of those historic buildings had been electively demolished (Figure 2.3). Meaning a choice was made to demolish and the structure was not demolished by the earthquake itself.\textsuperscript{35} Yet, several more historic buildings would be demolished years after the earthquake, even as late as 2001, with the demolition of the iconic de Young Museum in Golden Gate Park.\textsuperscript{36}

\textsuperscript{34} Architectural Resources Group, "An Assessment of Damage Caused to Historic Resources by the Loma Prieta Earthquake" August 1990. 19-20.
\textsuperscript{35} Architectural Resources Group, "An Assessment of Damage," 5.
The survey found that historic buildings suffered from expected failure patterns from an earthquake the size of Loma Prieta. It found failure patterns such as; in wood frame buildings the failure of cripple walls or sliding off of their foundation, collapsed soft-story wood frame buildings, cracked or collapse unreinforced masonry walls, collapse of masonry walls in steel framed buildings, collapse of inadequately anchored

### Summary of Total Damage to Historic Buildings

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Total No. of Historic Buildings</th>
<th>No. of Buildings Damaged</th>
<th>No. of Buildings Destroyed</th>
<th>Cost of Damage to Historic Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contra Costa County</td>
<td>4,000</td>
<td>1</td>
<td>0</td>
<td>$500,000</td>
</tr>
<tr>
<td>Alameda County</td>
<td>12,000</td>
<td>20</td>
<td>NA</td>
<td>500,000</td>
</tr>
<tr>
<td>City of Berkeley</td>
<td>3,000</td>
<td>10</td>
<td>0</td>
<td>100,000</td>
</tr>
<tr>
<td>City of Oakland</td>
<td>797</td>
<td>94</td>
<td>13</td>
<td>63,000,000</td>
</tr>
<tr>
<td>City and County of San Francisco</td>
<td>15,000</td>
<td>92</td>
<td>7</td>
<td>44,800,000</td>
</tr>
<tr>
<td>San Mateo County</td>
<td>65</td>
<td>15+</td>
<td>0</td>
<td>30,000,000</td>
</tr>
<tr>
<td>Santa Clara County</td>
<td>243</td>
<td>100+</td>
<td>0</td>
<td>190,000,000</td>
</tr>
<tr>
<td>Town of Los Gatos</td>
<td>393</td>
<td>51</td>
<td>11</td>
<td>NA</td>
</tr>
<tr>
<td>City of San Jose</td>
<td>2,200</td>
<td>9</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>Santa Cruz County</td>
<td>500+</td>
<td>24</td>
<td>2</td>
<td>3,500,000</td>
</tr>
<tr>
<td>City of Santa Cruz²</td>
<td>500+</td>
<td>12</td>
<td>16</td>
<td>2,000,000</td>
</tr>
<tr>
<td>City of Watsonville</td>
<td>104</td>
<td>23</td>
<td>5</td>
<td>12,600,000</td>
</tr>
<tr>
<td>Monterey County</td>
<td>26</td>
<td>10</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>City of Monterey</td>
<td>13</td>
<td>1</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>City of Salinas</td>
<td>74</td>
<td>NA</td>
<td>10</td>
<td>3,100,000</td>
</tr>
<tr>
<td>San Benito County</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>NA</td>
</tr>
<tr>
<td>City of Hollister</td>
<td>24</td>
<td>10</td>
<td>6</td>
<td>NA</td>
</tr>
</tbody>
</table>

Totals: 38,943 472 70 $350,100,000

Figure 2.3: Summary of Total Damage to Historic Buildings. Source: Architectural Resources Group
masonry veneer walls, parapet failure, collapse of masonry chimneys at the roof line, and cracking and collapse of interior plaster walls and ceilings.\textsuperscript{37}

At the time of Loma Prieta, the ability to demolish so many historic buildings in such a short amount of time was due to an overlooked legislative loophole in the most important piece of legislation that protects historic buildings in California, the California Environmental Quality Act (CEQA). Normally, the demolition of buildings listed in the California Register of Historical Resources, the National Register of Historic Places, or found eligible for listing in a register, are required to complete an Environmental Impact Report (EIR) before proceeding. An EIR is an assessment of the potential effects a project or demolition may have on the environment, which includes historic resources in its definition of environment. But in a Declared State of Emergency, such as Loma Prieta, the environmental review provisions of CEQA are suspended. This allows for the approval of demolition permits by government agencies with little regard for the historical significance of that building. Federal legislation such as Section 106 of the National Historic Preservation Act, which required an EIR for projects receiving Federal monies is also suspended during a declared disaster, furthering the opportunity to demolish.\textsuperscript{38} The report notably criticized the handling of historic resources after the disaster by local, state, and federal institutions. “Many buildings were needlessly demolished in the first few days after the earthquake, owners and civic leaders frequently had incomplete or erroneous information upon which to base their decisions. Some

\textsuperscript{37} Architectural Resources Group, "An Assessment of Damage," 29.
\textsuperscript{38} Architectural Resources Group, "An Assessment of Damage," 17.
community leaders felt that any action, including demolition, was better than no immediate action because this indicated they were back in control of the situation.”

This quote is at the heart of what many preservation professionals and preservation-minded community members were feeling at this time after the earthquake. The haste at which some buildings were condemned and demolished was astonishing. As many of these buildings were icons and centers of their downtown communities.

One month after the earthquake, emergency legislation called California State Senate Bill 3X was passed to combat hasty demolitions. It required that before a demolition of a historic building, approval must be given by the California Office of Historic Preservation, unless there was an “imminent threat to life safety or adjacent buildings exists.” The interpretation of “imminent threat” was up to each local government and many cities ignored the provisions of 3X. Notably, 3X did not apply to buildings that were not officially listed in the National Register.

The case study which highlights the staggering effect the loss of historic buildings can have on a community is the Pacific Avenue Historic District in Santa Cruz. This was covered in detail in a Master’s Thesis entitled “Fifteen Seconds in the Fall: The Loma Prieta Earthquake and Downtown Santa Cruz,” by Erin McMurray. McMurray explains that the historic district was at the center of downtown Santa Cruz, where along with the famous Boardwalk and Pier, was the heart of the beach town. When Loma Prieta hit, it caused severe damage to the district, which had many unreinforced masonry buildings.

Three people died when buildings collapsed in the Pacific Garden Mall. The downtown area was quickly cordoned off and engineers hired by the City of Santa Cruz quickly assessed the damage. There was much disagreement between the city, engineers, property owners, and preservationists about which buildings could be saved or not. The city, with the permission of property owners, often opted for demolition in many cases. In just two months after the quake in December 1989, 23 buildings had been demolished in the downtown area.\textsuperscript{41} In total 41 buildings were demolished downtown.\textsuperscript{42} By 1992, 19 of the 36 contributing buildings to the Pacific Avenue Historic District had been demolished which led to the delistment of the district from the National Register.\textsuperscript{43} The most indelible loss was that of the Cooper House. The Cooper House was originally constructed in 1894 as the Santa Cruz County Courthouse. It had been rehabilitated and turned into shops and restaurants in the 1960s and quickly became a central meeting place for locals.

The Cooper House demolition was questioned in an article in \textit{Pacific Monthly} titled “Razing Questions”. The article begins with a poignant anecdote about the demolition. “Two hundred witnesses gathered at the juncture of Front and Cooper Streets, the crowd was somber, if not funereal. A young saxophonist standing on the sidewalk played “Taps.” As the first swings of the demolition ball bounced off the building’s

\textsuperscript{43} Erin McMurray, “Fifteen Seconds in the Fall,” 4.
stubborn walls, the crowd let out a loud, approving cheer. For a brief moment people smiled. Then the roof caved in.”44 The article claims that “for over five months, two significant aspects of the Cooper House destruction have been kept under lid from the Santa Cruz community: first, a concentrated effort to save the Cooper House launched by the National Trust for Historic Preservation went ignored by Santa Cruz officials in the days following the earthquake; and second, city officials substantially misrepresented a series of engineering reports conducted on the Cooper House prior to the demolition.”45 The Santa Cruz City Manager, Richard Wilson, who was in charge of the emergency response claimed that “The Cooper House was one of the most heavily damaged buildings on the mall. There was a unanimous consensus that it couldn’t be saved. We did not act hastily. I didn’t know anyone who didn’t think that.” The Cooper House was examined by five engineers under the Office of Emergency Service. Yet, these five reports were anything but unanimous. Two reports did recommend demolition, but three other reports suggested that restoration was possible with two suggesting a restoration price tag of $2 million. Preservation engineer Michael Krakower who produced one the reports, claimed that the Cooper House could be saved. He pointed out that the structure was in the process of seismic strengthening, which likely saved the building. He offered, with the backing of the National Trust, to produce a detailed assessment and rehabilitation plan for the building pro-bono.46 The rehabilitation would have been a huge

45 Dunn, Hildreth, “Razing Questions,” 33-34.
cost, but one has to take into account the extra-financial value such an iconic building as the Cooper House had. The Cooper House not only had historic and aesthetic value but held an important place in the community of Santa Cruz as an anchor point for the downtown and as a gathering place. The loss of the Cooper House and so many other historic buildings downtown changed the landscape and feel of Santa Cruz forever. The question of the demolitions is periodically brought up in local news sources, with community members still lamenting the loss.

Two books *History at Risk: Loma Prieta, Seismic Safety, & Historic Buildings* and *The Engineer’s View: Loma Prieta, Historic Buildings, Earthquake Damage, & Seismic Strengthening* were publications commissioned by the California Preservation Foundation with the purpose of understanding the effects of the Loma Prieta Earthquake and how to improve the future for the preservation of historic buildings. *The Engineer’s View* was published in 1991 written by well-known preservation engineers John Kariotis, Mike Krakower, and Nels Roselund. The publication provides evidence for three assertions; “that damage repair is usually very possible and cost-effective, seismic strengthening can be carried out carefully, with respect for the design integrity and retention of the historic fabric of vintage buildings, and property owners, city officials, and preservationists should encourage efforts to prepare for future earthquakes.”47 This seems to be a common sentiment among engineers who have experience with historic buildings.

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History at Risk: Loma Prieta, Seismic Safety, & Historic Buildings, written by John F. Merritt published in 1990 synthesized the information that the CPF found when studying the effects and challenges faced in the aftermath of the earthquake and to reassess local and state policies regarding earthquake preparedness and response concerning historic structures. In the immediate aftermath of the earthquake the study found four main deficiencies that put buildings at risk. Those were: that responsibility for the immediate disaster response was put in the hands of a few appointed persons who were unelected, the influence of the community on city council members and other elected officials were excluded from decision-making processes; the physical damage was rapidly surveyed by volunteers, many of whom were unfamiliar with the communities they were in and the significance of historic structures there; buildings which were red-tagged, meaning they were unsafe to enter which were sometimes over-estimated, being red-tagged was also conflated with meaning condemned; if additional inspections followed, sometimes the damage assessments were downgraded, but many structures were demolished so quickly that a second opinion was not possible. Other factors cited included the suspension of the CEQA during a declared state of emergency and that for FEMA to reimburse demolition costs without questions about the necessity of the action had to occur within the first thirty days. The argument that was presented in bold was “The most important lesson is that serious building damage can be repaired. But possible technical structural solutions are often ignored because economics plays a

49 John F. Merritt, History at Risk, 5-7.
more critical role.” This idea is often overlooked when analyzing damage to structures. While it is true that if a building completely collapses in an earthquake, it is unsavable. Yet, in the case of Loma Prieta, very few buildings were complete collapses. When considering demolition, cost is generally thought of as the most important factor. When it comes to historic buildings this can seriously convolute things because the intangible value historic buildings possess is not easily quantified in dollar terms.

**Economics & Decision-Making**

It is well known that cultural heritage is often considered priceless, intangible, and irreplaceable. But economics plays a much more important role in preservation than is often recognized. Preservation can be thought of as so important it should ascend things like cost, but historic buildings and sites are commodities that have economic value. The demolition of historic buildings undertaken after Loma Prieta was often done under the guise that it was more economical to demolish and rebuild rather than rehabilitate and retrofit. Economics being applied to decision-making within the world of cultural heritage is a growing area of academic study.51

A tool for decision-making for demolition decisions is cost-benefit analysis. At its simplest, cost-benefit compares the costs incurred by a project and the potential profits of a project and determines the most economical choice. An example of using cost-benefit

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analysis for application to retrofit decisions is highlighted in a master’s thesis entitled “Cost-Benefit Analysis for Various Rehabilitation Strategies” by Serkan Çetinceli. Çetinceli’s thesis uses cost-benefit analysis to evaluate two different seismic retrofit strategies for reinforced concrete buildings to determine if no retrofit, or one of two retrofit techniques is the most cost-effective. The author used a methodology based on Kunreuther, et al. ’s five step process for determining cost-effectiveness. After determining the cost of the retrofit techniques, the benefits of those alternatives were calculated against a probable future earthquake. This used fragility curves, which represents the probability of exceeding a certain damage state depending on the structure and expected ground motion. Then the net present value and cost/benefit ratio were calculated. The benefit of using cost-benefit analysis is the ability to incorporate different inputs which makes the method adaptable to many different calculations and sectors. As applications for cost-benefit analysis grow, so will the multitude of sectors that will utilize the method.

When considering that historic buildings often have more than just economic value, cost-benefit analysis alone is not sufficient when considering demolition of a historic building. An innovative approach in economic analysis led decision-making is posited by Sfakianaki and Moutsatsou. “A decision support tool for the adaptive reuse of demolition and reconstruction of existing buildings” creates a unique methodology combining financial, environmental, and social decision-making processes for building

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reuse or reconstruction. The “weighted decision support tool” as it is called uses eco-cost value (EVR) for the environmental factor, life cycle cost (LCC) for the economic factor, and the social factor based on German art historian Alois Riegl’s theory of the value of monuments. Riegl’s theory is based on his writings from 1903 entitled “The Modern Cult of Monuments: Its Essence and Its Development”. In his writing, he creates a framework for the value of historic buildings and monuments. He developed five specific values; memory value, age value, historical value, use value, and art value. These social values are determined by stakeholders interviewed before the project.

Due to the difficulty of expressing these social values as dollar amounts, Sfakianaki and Moutsatsou turn these values into a ranking table based on 1-3, 1 being most significant and 3 being least significant, as identified by the stakeholders. The innovative use of a mixed methodology assessment tool allows for values and inputs that would otherwise be excluded from some traditional cost assessment methods. The adaption of Alois Riegl’s theory on the value of monuments and buildings and applying it to current historical structures allows for a more thoughtful and holistic approach to demolition decision-making.

The process of valuing cultural heritage, tangible or intangible, is very difficult. There is no single methodology that can be used to determine if a historic site, building, or object has historic, social, or religious value, let alone economic value. Historic


buildings have intrinsic value that is hard to quantify, but it can be agreed that that value originates from the socio-cultural values of the people that use, see, own, or have memory of it. There are valuation methodologies that have been developed which use surveys to quantify stakeholder values and their opinions on the value of an aspect of cultural heritage. In the book *Valuing Cultural Heritage: Applying Environmental Valuation Techniques to Historic Buildings, Monuments and Artifacts* the authors explore why to value cultural heritage and methodologies to do so. These methodologies are mostly stated-preference techniques, which take into account stakeholders’ responses to questions, which have inherent biases. These methodologies analyzed in the book include hedonic pricing technique, travel cost method, contingent valuation, and willingness-to-pay. These methodologies do have their benefits in analyzing choice and valuation in cultural heritage but have their weaknesses as they require large sample sizes and the biases that come with surveys. The applicability of these methods are outside of the scope of this thesis but it is important to understand alternative methods for valuing heritage and the built environment.

**Conclusion**

A literature review of relevant sources was undertaken to begin to explore the subjects related to the research questions of this thesis. The complex nature of these questions requires a review of multidisciplinary literature. A wide variety of sources,

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including historic preservation, social science, seismic engineering, and economics was included. While certain aspects of the demolition of historic buildings, decision-making analysis, cultural loss, valuation of cultural heritage, and the application of economic analyses to the built environment, have been implemented in various published studies, papers, and books, the combination of all of these aspects presented in this thesis is a novel approach. This thesis continues the growing academic study of multidisciplinary studies of historic preservation and the built environment.
CHAPTER III
METHODOLOGY

Introduction

This thesis is a case study based inquiry into the demolition of historic structures due to seismic damage incurred during the Loma Prieta Earthquake. To approach this subject, a two-part methodology is undertaken to answer the research questions of this study, what were the circumstances that led to the demolition of each building? What were the decision-making processes that led to a demolition decision for each building? And what were the similarities and differences between the circumstances of each building? The analysis is split into two chapters, Analysis of Circumstances and Decision-Making Processes, and Comparative Analysis. The first analysis chapter includes narrative sections of each case study building that lay out the circumstances and decision-making that led to a demolition decision. The second analysis chapter is a comparative analysis that compares and contrasts the various circumstances and factors related to the demolition of each case study.

Data Collection

To approach the research questions in this thesis, a wide range of distinct data categories from a variety of sources is necessary. Initial research was performed to locate what repositories, libraries, and organizations would have the necessary information for this study. It was determined that the most important source of information would be city
planning offices. These offices hold information such as building and demolition permits, city council and landmark board meeting minutes, engineering reports, correspondence, historic resource evaluations, environmental reports, and many other sources of information. The city planning offices and building departments of the City of San Francisco, Oakland, Santa Cruz, and Watsonville were contacted. Each city has a unique way of requesting information either through an online forum, through email, or FOIA request system. Other government organizations contacted were the California Office of Emergency Services, California Office of Historic Preservation, the Federal Emergency Management Agency, as well as the County offices of Alameda and Santa Cruz.

Preservation non-profit organizations were also contacted for information on their involvement with preservation efforts, reports, or for information leads. These organizations include, the National Trust for Historic Preservation, California Preservation Foundation, San Francisco Heritage, Oakland Heritage Alliance, and the Pajaro Valley Historical Association.

Online repositories were extensively used. Most importantly was the UC Berkeley Pacific Earthquake Engineering Research Library (NISEE-PEER), a subscription based repository with extensive articles, documents, and information about earthquakes and engineering. The online collections of the San Francisco and Santa Cruz Public Libraries, and the UC Santa Cruz Digital Library provided wide-ranging information, reports, and photographs. Other online sources included Newspapers.com, the California Digital Newspaper Collection, San Francisco Chronicle Archive, and Internet Archive.
From these sources and others, the following types of information were used in the creation of this thesis: newspaper articles, academic articles, engineering reports, damage and cost reports, historic resource evaluations, environmental reports, HABS reports, meeting minutes, appeals, public hearings, correspondence, letters, building permits, photographs, and court cases. The wide range of sources was necessary to piece together the narratives of each building to be able to analyze what led to the demolition of each case study.

Study Area

The geographic range of this study is the area affected by shaking from the 6.9M$_w$ Loma Prieta Earthquake that occurred on October 17, 1989, at 5:04 pm local time. The epicenter was a section of the San Andreas Fault in the Santa Cruz Mountains in the Forest of Nisene Marks State Park in Santa Cruz County. The areas affected were the greater San Francisco Bay and Monterey Bay Areas. The counties with the most severe damage were Santa Cruz, Santa Clara, San Mateo, Alameda, and San Francisco. This was due to a multitude of factors including proximity to the epicenter, density, number of older buildings, and soil conditions. Case study buildings were located in the cities of San Francisco, Oakland, Santa Cruz, and Watsonville. These cities were established early in the history of colonization of California, which explains the amount of old and historic buildings in these locations. San Francisco was incorporated in 1850, Oakland in 1852,

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Santa Cruz in 1866, and Watsonville in 1868, with earlier colonization in these areas by the Spanish and later Mexico and the United States. The long development of these cities resulted in having larger concentrations of older buildings. These buildings were constructed before the advent of modern seismic codes making them much more likely to be damaged or fail during an earthquake. Yet, this age is what makes many old buildings historically significant and worthy of preservation.

Figure 3.1: Shake Map of Loma Prieta Earthquake. Source: Encyclopedia Britannica.

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Case Study Selection

Case study buildings for this thesis were selected based on a variety of factors. First, the building needed to be documented as damaged in the earthquake and demolished as a result of that damage. There is no singular survey that documents all buildings that sustained damage in the quake, nor one that specifically lists all historic buildings damaged. This data was found from various sources such as newspaper reports, individual surveys, HABS reports, and online resources. Some case study buildings were highly publicized at the time due to the preservation efforts to stop the demolition, making those buildings easier to identify.

<table>
<thead>
<tr>
<th>Site</th>
<th>Location</th>
<th>Historic Status in 1989</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Rose Academy</td>
<td>San Francisco</td>
<td>local survey</td>
<td>1904</td>
<td>1991</td>
</tr>
<tr>
<td>Cathedral House</td>
<td>San Francisco</td>
<td>local survey</td>
<td>1911</td>
<td>1993</td>
</tr>
<tr>
<td>Cooper House</td>
<td>Santa Cruz</td>
<td>Contributor</td>
<td>1894</td>
<td>1989</td>
</tr>
<tr>
<td>Trust Building</td>
<td>Santa Cruz</td>
<td>Contributor</td>
<td>1910</td>
<td>1992</td>
</tr>
<tr>
<td>Elks Building</td>
<td>Santa Cruz</td>
<td>Contributor</td>
<td>1910</td>
<td>1993</td>
</tr>
<tr>
<td>Odd Fellows Building</td>
<td>Watsonville</td>
<td>local survey</td>
<td>1893</td>
<td>1989</td>
</tr>
<tr>
<td>St. Francis de Sales Cathedral</td>
<td>Oakland</td>
<td>local survey</td>
<td>1893</td>
<td>1993</td>
</tr>
<tr>
<td>Sacred Heart Church</td>
<td>Oakland</td>
<td>none</td>
<td>1903</td>
<td>1993</td>
</tr>
</tbody>
</table>

Table 3.1: Case Study Buildings
Other criteria for case study selection were age, historical significance, and historic status. As a general rule, buildings may be assessed for historical significance once they become 50-years old. The “50-Year Rule” has its origins in the National Park Service and the National Historic Preservation Act of 1966, which allows resources to be nominated to the National Register of Historic Places.59 Although many buildings are not

considered or assessed as historic until they are much older. All of the case study buildings in this study achieved 50-years of age by the time of the earthquake in October 1989. Generally, in the United States, historic status can be one of four categories: federal, state, local, or considered eligible for listing for one of those registers.\textsuperscript{60} The determination of historic status for this thesis is based on the definition found in the California Environmental Quality Act (CEQA) passed in 1970. Today, CEQA defines historic resources as:

1. A resource listed in or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources.
2. A resource included in a local register of historical resources, or
3. Considered to be an historical resource by a lead agency
4. The fact that a resource is not listed in or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources does not preclude a lead agency from determining that the resource may be an historical resource.

The criteria for listing as a historic resource are:
(A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
(B) Is associated with the lives of persons important in our past;
(C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
(D) Has yielded, or may be likely to yield, information important in prehistory or history.\textsuperscript{61}


\footnotesize{\textsuperscript{61} Cal. Code Regs. Tit. 14, § 15064.5, “Determining the Significance of Impacts to Archaeological and Historical Resources”}
In California, properties may be listed to the California Register of Historical Resources and properties nominated to the National Register of Historic Places are automatically placed on the California Register. The creation of the California Register was not enacted until January 1993, so the provisions of CEQA in 1989 included properties listed or eligible for the National Register of Historic Places.\textsuperscript{62} Since the events of this study predate the creation of the California Register, this status is exempted as a category.

For this study, case study buildings are classified into one of six historic status categories. These categories are: None, building is not listed in any historic survey or register; Local Survey, building is not a designated resource but was identified or rated in a local historic survey; Local Designation, building is listed in a local historic register; Eligible for National Register; building was formally determined eligible for listing in the National Register; Contributor to National Register, building is listed as a contributing building in a National Register Historic District; and Individual National Register, building is individually listed on the National Register.

These status categories were used to encapsulate the possibilities of historic statuses of buildings in California at that time. Local Survey and Local Designation were differentiated as categories to clarify a distinction between the two. Local Survey is a category since local governments perform historic surveys where buildings are generally rated on a scale. This is different from Local Designation, due to this being a formal

process of a building being placed on that city or counties official local register. Both of
these statuses make that building requisite to environmental reviews of CEQA. None is
a status in this study because buildings that do not have an official status, may be
considered historically significant by the communities itself. A building may not have a
historic status because that building had yet to have been surveyed or evaluated. For the
purpose of this study, buildings that were formally determined to not be eligible for
historic listing by a qualified agency were not included in this status.

A practical reason for case study selection, which may create bias in the results of
this study, was the availability of information and data. Considering that there is no
holistic survey of buildings demolished after the earthquake, that limits results to
buildings which were documented, generally through newspapers or other reports. This
has resulted in all case study buildings being large commercial or public buildings.
Single-family home demolition data was not found during research, and thus has been
omitted from the sample.

Methods for Analysis

A multimethodological approach is necessary to broach the subject of this thesis,
to understand why each case study building was demolished after sustaining damage in
Loma Prieta. The analysis section is split between two chapters; Chapter IV, Analysis of
Circumstances and Decision-Making Processes and Chapter V, Comparative Analysis.

Chapter IV answers the first two research questions of this thesis, what were the circumstances that led to the demolition of each building? And what were the decision-making processes that led to a demolition decision for each building? Chapter V is a comparative analysis that answers the final research question, what were the similarities and differences between the circumstances of each building?

The first analysis chapter is set up into a narrative of each case study building. Each section is divided by case study, with the exception of the combined sections of the Trust Building & Elks Building and St. Francis de Sales & Sacred Heart Church. These case study sections were combined due to the buildings’ shared proximity, ownership by the same entity, and similar demolition narratives. This chapter’s methods for analysis are an in-depth investigation of the events, circumstances, and decision-making that led to the demolition of each case study. Specifically, it highlights the events, damage assessments, historic status, legal framework that permitted the demolition, what government entities were involved in the decision-making, how its historic status affected its outcome, what preservation and community efforts were implemented, and the recovery and replacement of buildings after demolition.

The information and data presented in the first analysis chapter informs the analysis of the second analysis chapter. The second analysis chapter is a comparative analysis of both qualitative and quantitative data categories. This comparative study analyzes eleven different comparative categories for each case study building. Those categories are, year built, historic status at the time of the earthquake and before demolition, review process, structural system, damage patterns, primary demolition
factors, difference in repair estimates, actual building replacement cost, difference between low and high repair estimates and actual replacement cost, time between the earthquake and demolition, and downtime, the time between the earthquake and re-occupation. A comparative analysis is undertaken to give a greater context for the demolition factors for each case study. By comparing case studies, one can identify patterns, trends, nuances, and differences that may not be as apparent if each case study was presented in isolation.

<table>
<thead>
<tr>
<th>Comparative Category</th>
<th>Type of Data</th>
<th>Presentation of Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>Qualitative</td>
<td>Table</td>
</tr>
<tr>
<td>Historic Status Change</td>
<td>Qualitative</td>
<td>Chart</td>
</tr>
<tr>
<td>Review Process</td>
<td>Qualitative</td>
<td>Table</td>
</tr>
<tr>
<td>Structural System</td>
<td>Qualitative</td>
<td>Table</td>
</tr>
<tr>
<td>Damage Patterns</td>
<td>Qualitative</td>
<td>Table</td>
</tr>
<tr>
<td>Demolition Factors</td>
<td>Qualitative</td>
<td>Table</td>
</tr>
<tr>
<td>Difference in Repair Estimates</td>
<td>Quantitative</td>
<td>Chart</td>
</tr>
<tr>
<td>Building Repair Cost</td>
<td>Quantitative</td>
<td>Table</td>
</tr>
<tr>
<td>Difference in Low Repair Estimates and Replacement Cost</td>
<td>Quantitative</td>
<td>Chart</td>
</tr>
<tr>
<td>Difference in High Repair Cost Estimate and Replacement Cost</td>
<td>Quantitative</td>
<td>Chart</td>
</tr>
<tr>
<td>Time between Earthquake and Demolition</td>
<td>Quantitative</td>
<td>Table</td>
</tr>
<tr>
<td>Downtime</td>
<td>Quantitative</td>
<td>Table</td>
</tr>
</tbody>
</table>

Table 3.2: Comparative Analysis Categories.
CHAPTER IV

ANALYSIS OF CIRCUMSTANCES & DECISION-MAKING PROCESSES

This chapter answers two of the three research questions of this thesis, what were the circumstances that led to the demolition of each building? And what were the decision-making processes that led to a demolition decision for each building? This chapter approaches these questions by analyzing the circumstances and decision-making processes that led to the demolition of the eight case study buildings, specifically focusing on the factors that were central to each demolition decision. For each case study building this includes the events, damage assessments, historic status, legal framework that permitted the demolition, what government entities reviewed the demolition, what preservation and community efforts were implemented, and the recovery and replacement of buildings after demolition.

This chapter is organized by a narrative section of each case study building. The start of each narrative section begins by presenting a brief history and significance of each building. Following this is an account of the events of the earthquake and the damage the building sustained. Then the circumstances that lead to a demolition decision are presented, which include the decision-making processes, what entities were involved, the legal processes, and preservation efforts. Each case study building had similarities between demolition factors and events, but a unique combination of these factors led to each demolition decision.
### St. Rose Academy, San Francisco

Figure 4.1: St. Rose Academy, San Francisco, c.1930s. Source: *The New Fillmore.*

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structural System</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Rose Academy</td>
<td>2475 Pine Street, San Francisco</td>
<td>local survey</td>
<td>Eligible for NR</td>
<td>unreinforced masonry, brick</td>
<td>1904</td>
<td>November 1991</td>
</tr>
</tbody>
</table>

Table 4.1: St. Rose Academy.
St. Rose Academy was an all-girls Catholic high school in the Pacific Heights neighborhood of San Francisco. The Beaux-Arts building was designed by prominent architect Albert Pissis and constructed in 1904. St. Rose was the oldest girl’s school in San Francisco, founded in 1862 by the Dominican Sisters of San Rafael. The school opened to classes in January 1906, three months before the devastating 1906 Earthquake. The building notably survived the 1906 Earthquake with little to no damage, unlike its patron St. Dominic’s Catholic Church, which was severely damaged and demolished and later rebuilt. The St. Rose Academy building itself was owned and independently operated by the Dominican Sisters of San Rafael, but the land was owned by the Dominican Priory, who owned the whole lot including St. Dominic’s Church.

When the Loma Prieta Earthquake struck in 1989 it significantly damaged the 85-year-old structure. It was red-tagged and deemed unsafe for habitation. The school’s 300 students temporarily used classroom space at the nearby Congregation Sherith Israel. Just seven days after the quake, the school’s principal Frank Grijalva announced that the school would be permanently closing at the end of the school year. Along with the cost of the seismic repairs, declining enrollment and financial problems were cited. It was mentioned by principal Grijalva that a study four years prior found that it would be more cost-effective to build a new school than to renovate the current building.

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66 Examiner Staff Report, St. Rose Academy damaged, must close,” San Francisco Examiner, October 24, 1989.
67 San Francisco City Planning Commission, Motion No. 13012, St. Rose Academy, January 31, 1991. 1-3.
The Dominican Sisters and the Dominican Priory filed a request for demolition in September 1990. In November 1990 the Landmarks Preservation Advisory Board determined St. Rose Academy was eligible for listing on the National Register of Historic Places. The Board recommended that the project and demolition permit be rejected. In January 1991, the City Planning Commission conditionally approved the demolition permit. Also published was a Certificate of Determination of Exemption/ Exclusion from Environmental Review. The document said,

The building was damaged as a result of the 1989 earthquake, which was a declared emergency in the Santa Cruz-San Francisco Bay Area. CEQA contains two identical provisions that hold that CEQA does not apply to actions to demolish property or facilities damaged or destroyed as a result of a disaster in a disaster-stricken area in which a state of emergency has been proclaimed by the Governor.70

This exemption from CEQA allowed projects that would potentially cause adverse effects to environmental and cultural resources to continue without normal oversight. This usually meant that large-scale studies and reviews such as an Environmental Impact Report would not be required. This led to many historic buildings being demolished after Loma Prieta, which may have been saved if proper review was given.71

St. Rose was examined by six engineering firms; four on behalf of the Academy, one on behalf of the City of San Francisco, and one on behalf of San Francisco Heritage. The cost of repairs and rehabilitation were as follows,

(1) $1.3 million dollars without the right to re-occupy the building; (2) $3.1 million dollars to repair the damaged structure to meet the special procedure standard of the UBC; (3) $3.7 million dollars to meet the San Francisco Building Code Standards; and (4) $5.8 million dollars to meet the State Building Code standard for private schools.\(^{72}\)

Preservation and community groups as well as St. Rose alumni opposed the demolition. This included the creation of the group “Save St. Rose!” by current and former students. “Save St. Rose!” partnered with San Francisco Heritage and the Western Addition Neighborhood Association. They advocated for the adaptive reuse of the 50,000 square-foot building, not necessarily for educational purposes, but possibly for housing. “Save St. Rose!” and San Francisco Heritage commissioned a study that posited that federal and state funds were available and presented this at a public hearing on the project to the City Planning Commission.\(^{73}\) Attorneys for San Francisco Heritage claimed in a San Francisco Examiner article that “more federal earthquake relief money to rehabilitate St. Rose would be available in the next fiscal year.”\(^{74}\) The demolition permit was meant to be approved in March 1991, but the decision was delayed when new evidence was submitted that the Mayor's Office of Housing reported that FEMA could make up to $5.4 million dollars in relief funds available if the structure were converted into housing.\(^{75}\)

The Commission pointed to several issues relating to St. Rose that led to their decision to allow the demolition. The main focus of this was the inability to pay for repairs and rehabilitation due to the financial insolvency of St. Rose Academy and the

\(^{72}\) San Francisco City Planning Commission, Motion No. 13012, St. Rose Academy, January 31, 1991. 3.
Dominican Sisters of San Rafael. The Dominican Sisters were an independent organization from the Dominican Priory and the overall Catholic Diocese of San Francisco. The Academy was entirely funded by tuition, around $4,100 per student, and alumni and charitable donations. Since the Dominican Sisters had closed St. Rose, they no longer had a use for the large structure. The Dominican Priory, the owner of the land, also said they had no use for the structure. However, in a later paragraph, they say “The Priory has indicated that they plan to use the site underlying the St. Rose Academy in the future for a parish hall and to add a 7th and 8th grade to the St. Dominic School.”76 The Priory also stated that their focus was on fundraising for St. Dominic’s which also sustained extensive earthquake damage, for which they had raised over $5 million dollars in donations.77

The San Francisco City Planning Commission officially voted 3-2 to allow the demolition of St. Rose in June 1991. San Francisco Heritage, as well as Michael Crowe, Landmarks Preservation Board President filed appeals to the project, which were reviewed and dismissed by the Planning Commission.78 The demolition permit was fully approved in June 1991. St. Rose Academy was demolished in November 1991, two years after the earthquake. Today, three decades later, the site where St. Rose Academy stood is a parking lot for St. Dominic’s Church.

What is unique about the case of St. Rose Academy is that its sister building St. Thomas Hall in San Rafael, California was also demolished under similar circumstances.

76 San Francisco City Planning Commission, Motion No. 13012, St. Rose Academy, January 31, 1991, 3-5.
77 San Francisco City Planning Commission, Motion No. 13012, St. Rose Academy, January 31, 1991, 4.
78 San Francisco Heritage, et al., v. San Francisco Department of Public Works, Appeal No. 91-091, Board of Permit Appeals, City and County of San Francisco.
St. Thomas Hall, part of the Dominican College (now University) was also designed by Albert Pissis commissioned by the Dominican Sisters of San Rafael and completed in 1913. The Dominican Sisters and Dominican College had the building demolished in 1995 after considering it “obsolete due to its unreinforced masonry construction.” The HABS documentation that was completed before the demolition reported “For a building that has passed its eighty-second year, St. Thomas Hall appears to be in excellent condition. Minor surface cracks following the 1989 Loma Prieta earthquake were deemed superficial, and the building continues to be occupied.”\(^79\) An official Dominican University “Heritage and History” podcast cites the reason St. Thomas Hall was demolished was due to earthquake damage.\(^80\)


Cathedral House, San Francisco

Table 4.2: Cathedral House.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structural System</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cathedral House</td>
<td>1051 Taylor Street, San Francisco</td>
<td>local survey</td>
<td>Eligible for NR</td>
<td>steel, unreinforced masonry infill walls</td>
<td>1911</td>
<td>May 1993</td>
</tr>
</tbody>
</table>

Figure 4.2: Cathedral House, after earthquake, 1993. Source: HABS, Library of Congress.
The Cathedral House, also known as the William Gibbs Memorial Hall, was a historic building constructed in 1911 in the Nob Hill neighborhood of San Francisco. The building was identified by the California State Office of Historic Preservation to be a contributing resource to a National Register-eligible historic district. In the 1976 Citywide Architectural Survey, it was rated a “3”, on a scale of lowest being “-2” to “5” being the highest and included in the Here Today survey book from 1968. Both surveys are considered when determining eligibility of historic resources in San Francisco.

The Cathedral House was the first building built on the site as part of the original 1907 plan for the Grace Cathedral Close. The original Grace Cathedral was completed in 1862 and sat on the corner of California and Stockton Streets. The Gothic style brick and granite church was destroyed in the Earthquake and Fire of 1906. The current location of the church complex was originally the site of the Crocker Mansion, the residence of prominent banker and businessman William H. Crocker. Crocker, a member of the Episcopal Church, donated the land to the Church when his mansion was destroyed in 1906. English architect George F. Bodley was hired and designed an English-style Gothic style cathedral that included a quadrangle of supporting buildings around the cathedral. Bodley died unexpectedly in 1907, so his assistant Lewis P. Hobart took over the project.

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The Cathedral House began construction in 1911 and was designed to house the Church Divinity School. Around the completion of the Cathedral House is when Hobart began to change the designs of the Close. The revisions in his 1912 proposal included a larger cathedral and a change of the orientation from north/south to east/west. It included a substantially larger cathedral with a grand staircase leading up to the front facade. This design put the Cathedral House right in the center of this grand staircase design and blocked the viewshed of the ornate front facade. For this, Hobart wanted the Cathedral House demolished. This wish never came about due to the Great Depression in 1929. Yet, plans to demolish the Cathedral House were never forgotten.

In 1983 the City of San Francisco moved forward with the local landmarking of the entire Cathedral Close as Landmark No.170. The mayor-appointed City Landmarks Board and Planning Commission moved to designate the entire site. When it reached the Board of Supervisors, under pressure from the lobbying of the Episcopal Diocese, the Cathedral House was not included in the designation. This is reflected in how the Cathedral House is described in the final landmarking designation as opposed to other buildings included in the nomination. The Cathedral House is described as “Hobart’s final plan (1926) required the demolition of Cathedral House to make way for a great stairway to the Cathedral’s main entrance.” One of the criteria, importance as a visual landmark the building is described as,

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None, its visual value outweighed by its obstruction of the magnificent and beautiful main facade of the cathedral and limits the capacity of the main stairway. In addition, it obstructs the sweeping view from the cathedral plaza of Huntington Park and the city below Nob Hill. As noted, its position will require eventual removal.\textsuperscript{87}

Yet newer structures are given a much different treatment in the document. The Cathedral School for Boys, a building on the site constructed in 1965, just 19 years old at the time, was included in the designation. It was described as,

Possessing continuity as the structure reflects the transition of central Nob Hill from residential mansions to public and institutional uses with an emphasis on community awareness and importance as a visual landmark, consciously blended into its surroundings to preserve continuity of atmosphere on the Cathedral Close and Nob Hill.\textsuperscript{88}

The efforts to demolish the Cathedral House were once again brought up in the wake of the 1989 Loma Prieta Earthquake, this time successfully. The Diocese officially began a plan to complete Hobart’s design for the Close in 1990. This plan is detailed in the Environmental Impact Report (EIR) that was required under the California Environmental Quality Act (CEQA) due to the determination in January 1992 that the project may have a significant effect on cultural resources.\textsuperscript{89} The project included the demolition of the Cathedral House for the construction of a grand staircase leading up to the front entrance of the Cathedral. Also, it would make way for the construction of a subterranean parking garage with the entrance where the Cathedral House stood. It also included the removal of a portion of the Crocker Fence. The cast iron fence was the only surviving remnant from the original Crocker Mansion and was part of the 1983

\textsuperscript{87} City of San Francisco, “Ordinance No. 323-84,”
\textsuperscript{88} City of San Francisco, “Ordinance No. 323-84,”
\textsuperscript{89} City and County of San Francisco, Department of City Planning, Notice that an Environmental Impact Report is Determined to be Required, January 9, 1992.
Landmark No. 170. The final determination of the EIR was that all of the project alternatives, including the retention of the Cathedral House and portion of the Crocker Fence were rejected.  

Although it is unknown if an engineering report was completed, there are several piece of evidence that point to the building being not damaged or very minimally damaged in the earthquake. Yet, the suggestion that the Cathedral House was being demolished not only for aesthetic reasons but because the building was also earthquake-damaged began immediately. A January 1991 article in the San Francisco Examiner announced the “Diocese to ‘open’ Grace Cathedral front view, church wants to demolish historic building, create ceremonial stairs.” The article also quoted the Cathedral Chancellor Rev. Mark duPlane Lee as saying, “Although the Cathedral House is still in use as headquarters for the Diocese of California, Lee said the unreinforced masonry building is too cramped and too antiquated for its functions and was damaged in the October 1989 earthquake.” The reference to the Cathedral House still being in use is significant because it means the building was not red or yellow-tagged after the earthquake. There were no building permits between 1989 and 1991 that would suggest that the building was repaired to facilitate the reoccupation of the building.

Other references to earthquake damage were also quoted in newspapers as referring to the Cathedral House as, “Earthquake-crippled, crumbling internally and

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92 Gerald D. Adams, “Diocese to ‘open’ Cathedral front view.”
simply unusable as is the case with the 82-year-old limestone edifice that blocks the view of Grace Cathedral.”⁹³ And “The Cathedral House is badly earthquake damaged. It doesn’t serve the church’s needs. It was meant to be torn down years ago. And it was a mistake almost from the beginning of its existence. A small band of misguided preservationists must ask themselves what exactly they want to preserve.”⁹⁴

The use of earthquake damage as the reason for demolition is still one that is perpetuated by the Episcopal Diocese. Found on the official Diocese website, the demolition of the Cathedral House is described as,

Just as the destruction of the 1906 Earthquake and fire gave rise to the movement to build a great Cathedral, the 1989 Loma Prieta earthquake provided the impetus needed to more fully realize the original vision for the Cathedral. Due to significant damage caused by the earthquake, the Chapter (Cathedral) House, which stood immediately in front of the Cathedral, was torn down to make way for the Great Steps.⁹⁵

The mention of earthquake-caused damage was notably missing from the 152-page Environmental Impact Report. The only mention of seismic issues of the building was in the mitigation alternatives section. The mitigation measure “no project” detailed

If this alternative were implemented, and if the Cathedral House was not rehabilitated and maintained, the limestone on the exterior of the buildings would continue to deteriorate. In addition, some seismic strengthening and renovation of the Cathedral House would most likely be required.⁹⁶

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As part of the EIR mitigation measures Historic American Building Survey (HABS) documentation was required. This documentation described the condition of the building in 1992,

Condition of fabric: The building is solidly constructed and structurally in good condition. The limestone facing on the east and west elevations is badly deteriorated. A major crack is evident in the brickwork on the south elevation. Wall paneling and moldings have been removed in the major rooms on the first floor.⁹⁷

After the completion of the EIR, the question of the project moved to the mayor-appointed Landmarks Preservation Advisory Board. The Board voted to reject the project, yet the ultimate decision lay with the City Planning Commission, which was vocal about approval for the project. The opposition to the project was joined by what was called a “scant majority” of preservationists including the California Preservation Foundation and the Foundation for San Francisco’s Architectural Heritage.⁹⁸ The public hearing concerning the project was noted as “Climaxing in one of the City’s most hard-fought preservation battles, protectors of the past and redevelopers tussled verbally for nearly five hours.”⁹⁹ On March 4, 1993, the City Planning Commission unanimously approved the project. The Cathedral House was demolished in May of 1993 and the entire Cathedral Close Alteration project was completed in September 1995.¹⁰⁰

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⁹⁹ Gerald D. Adams, “Diocese to ‘open’ Cathedral front view.”
Cooper House, Santa Cruz

Figure 4.3: Cooper House, c. 1970s. Source: *Sidewalk Companion to Santa Cruz Architecture*.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structure</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper House</td>
<td>110 Cooper Street, Santa Cruz</td>
<td>Contributor to NR District</td>
<td>Contributor to NR District</td>
<td>unreinforced masonry, brick</td>
<td>1894, 1906</td>
<td>October 1989</td>
</tr>
</tbody>
</table>

Table 4.3: Cooper House.
The Cooper House in downtown Santa Cruz was a historic masonry building and contributing building to the Pacific Avenue National Historic District. Originally constructed as the Santa Cruz County Courthouse in 1894. The corner lot on Cooper Street and Pacific Avenue was donated to the City of Santa Cruz by the Cooper Brothers and Thomas W. Moore in 1866 with the intention of constructing a new Courthouse. The brick Courthouse was completed the following year. In April 1894, a fire completely destroyed the structure and many of the buildings downtown. The city commissioned architects N.A. Comstock and R.H. McCabe and builder Thomas Beck to rebuild the Courthouse. The new Courthouse was designed in the Richardsonian Romanesque style and was constructed of local light buff brick and faced with Plumas County bluestone. The building was seriously damaged in the 1906 Earthquake, it was described as “a total wreck; the cupola had fallen through the ceilings and landed in the basement.” The building was partially rebuilt and expanded by the original builder, Thomas Beck.101

The Courthouse and surrounding buildings were damaged in the December 1955 San Lorenzo River Flood. The water rose approximately 10 feet in the building, destroying countless documents. This led to the decision to construct a new Courthouse away from the flood zone, completed in 1967. The Cooper Street Courthouse was put up for sale in 1967, with one developer offering $90,000 for the lot if the building were demolished, and $75,000 if the building were to remain. A demolition permit for the Courthouse was granted in 1969, but it was purchased in 1970 by developer Max Margaret Souza, “The History of the Santa Cruz Courthouse,” 1966, SCPL Local History. https://history.santacruzpl.org/omeka/items/show/130743.

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Walden. Walden adaptively reused the Old Courthouse into an eclectic array of shops and restaurants renaming it the Cooper House.¹⁰²

The Cooper House quickly became the heart of downtown Santa Cruz. The shops and restaurants became a gathering place for locals. The outdoor patio always had patrons and local musicians were known to set up and play on the sidewalk out front. The Santa Cruz Sentinel reported that, “The Cooper House became an institution, maybe even a legend, in downtown Santa Cruz, a focal point of the new Pacific Garden Mall.”¹⁰³ The Cooper House was purchased by developer Jay Paul in 1987. By this time, it had a lot of deferred maintenance and Paul began a large-scale renovation. This included seismic retrofit work. Building permits from 1988-89 detail seismic work such as cement bond and steel work, installation of seismic restraints in the attic, and installation of bracing.¹⁰⁴

The ongoing seismic work was not complete on October 17, 1989, when the Loma Prieta Earthquake struck, and the Cooper House was severely damaged. The damage was detailed by preservation engineer Loring A. Wyllie Jr. who examined the building in the days after the quake,

Damage was extensive in the Loma Prieta Earthquake, A portion of the rear wall fell out, one roof gable slid to the ground, brick walls were cracked extensively, and the clay tile walls on the second floor virtually all collapsed. Several interior clay tile arched floors collapsed and large interior cracks about one inch wide appeared as the building spread apart laterally. Virtually all of the interior plaster decoration was lost as it fell to the floors.¹⁰⁵

Although the building was severely damaged, the seismic work that had been completed was credited for saving lives. The Cooper House was immediately red-tagged by the city and a large section of Pacific Avenue was cordoned off. In the days following the quake the building was assessed by several engineers to determine the extent of the damage. There was disagreement between the engineers as to whether the building could be saved or not. The consensus according to the city was that the Cooper House not only wasn’t financially feasible to save but was also too dangerous to attempt to save.106

The first mention in the newspapers that “City Officials confirmed the Cooper House was doomed”107 was in the Sentinel on October 24, given that the paper is published the next day, that means that the decision to demolish the Cooper House was made on October 23, if not earlier. This means just six days, or less, were given to assess the building before making a decision. On October 25, the City had Cooper House owner Jay Paul consent to the demolition. The demolition was approved by the City Manager Dick Wilson as well as the City Council. Demolition began on October 26, nine days after the quake. The then Zoning Chair Mark Primack was quoted as saying, “The City’s Zoning Committee was even meeting in a last-ditch attempt to save the Cooper House. As the meeting continued, the thuds from the wrecking ball hitting the Cooper House shook City Hall.” The Cooper House was not subject to CEQA due to it being a declared

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107 Guy Lasnier, “Mall demolition less than feared, Cooper House is doomed,” *Santa Cruz Sentinel*, October 24, 1989.
state of emergency and the City of Santa Cruz determining that the building was a danger to public safety.  

The headline of the Santa Cruz Sentinel on October 27 was “Cooper House Starts to Fall, symbol doesn’t succumb easily,” an article in the San Francisco Examiner said “‘Soul’ of Santa Cruz demolished, Sax plays ‘Taps’ as Cooper House, other landmarks fall under wrecking ball.” A crowd of nearly 200 people gathered behind the fence on Front Street to view the demolition. The crowd gasped and some cheered as the demo began. A man was playing ‘Taps’ and ‘Auld Lang Syne’ on his saxophone as the building fell. Reports said that it took several hits from the wrecking ball to nudge the heavy masonry walls. It took three days to completely demolish the building.  

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108 Jason Hoppin, “The Lost Landmark: Did the historic Cooper House really have to come down?,” Santa Cruz Sentinel, October 14, 2014. https://www.santacruzsentinel.com/2014/10/14/the-lost-landmark-did-the-historic-cooper-house-really-have-to-come-down/.  
Questions about the justifications for demolition from the community began immediately after it was announced that the Cooper House had to come down. There was a united front from the City of Santa Cruz officials, that there was no choice but to demolish the Cooper House. This sentiment remains to this day, with former officials
defending their decisions. Santa Cruz City Manager Dick Wilson, who was called the
“effective incident commander” of the disaster, was quoted as saying in 2014,

The engineers [Wilson] heard from said the Cooper House could not be saved…
“Even if in theory the building could have been saved there was no way to put the
theory into practice, the building was so unstable engineers couldn’t even get
needed measurements. It has no structural integrity in any direction, none, there
was no circumstance under which that building was going to be saved.”\(^{110}\)

Santa Cruz City Councilwoman Katherine Beiers, who was on the city council in
1989, said in 2009,

It was an obvious decision to take it down. The city brought in many engineers
from all over to inspect it; they all agreed,” she says. “The damage to the Cooper
House was so great that it was too dangerous even to enter. Every expert’s
opinion was the same, nobody should go in there. It was a shame because The
Cooper House was the closest, we ever had to a downtown plaza.\(^{111}\)

Although City officials claim that all of the engineers agreed that the building
needed to be demolished, this was not the case. Two structural engineers, both with
extensive experience in historic and old buildings disagreed. A *Santa Cruz Sentinel*
article quoted preservation engineer Michael Krakower of Kariotis & Associates,

A Pasadena engineer who inspected the building last week with nine others,
agreed it could be saved. “Sure, it could have been done,” said Michael
Krakower. “It’s just a question of how much you’d have to spend.” Krakower said
the building was doomed after a “cursory consensus” of the engineers who
inspected it. “It certainly did not reflect a detailed analysis.”\(^{112}\)

Engineer Loring A. Wyllie Jr. of H.J. Degenkolb Associates, Engineers examined
the Cooper House in the days after the quake. In his assessment of the building he said,

\(^{110}\) Jason Hoppin, “The Lost Landmark: Did the historic Cooper House really have to come down?,” *Santa Cruz Sentinel*, October 14, 2014. https://www.santacruzsentinel.com/2014/10/14/the-lost-landmark-did-the-historic-cooper-house-really-have-to-come-down/.


\(^{112}\) Guy Lasnier, “Cooper House starts to fall,” *Santa Cruz Sentinel*, October 27, 1989.
The author reviewed the building several days after the earthquake. It is the author’s opinion that the added steel bracing was very effective at restraining the top of the brick walls and preventing further damage. It was technically feasible to repair the Cooper House after the earthquake and further strengthen it, but the cost would have been considerable. It is not known to the author the basis for the decisions that were made and the trade-offs that were reached. Presumably, economics dictated the decisions, although the loss of a beautiful building and the loss of about one million dollars of recent restoration costs raises questions if the trade-offs were justified for the economics that resulted.113

In 1990, Gary Keeley, owner of the Crepe Place, a restaurant in the basement of the Cooper House and three other former shop owners in the Cooper House sued owner Jay Paul and the City of Santa Cruz for loss of property, taking of property, breach of contract, and negligence. The former tenants all submitted claims for damages to the City of Santa Cruz for their lost property. These claims were denied, leading to the lawsuit. The City of Santa Cruz claimed that they were not liable for damages due to being justified under its police powers in an emergency and immunities under the California Emergency Services Act. The lawsuit went to the Supreme Court of California, which upheld the lower court’s decision siding with the City of Santa Cruz.114

Plans to replace the Cooper House with a larger mixed-use building were drawn up. It would be nearly a decade until the new building would be completed and with over $1 million in taxpayer subsidies, at a total construction cost of $15 million.115

### Table 4.4: Trust Building

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structural System</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
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<tbody>
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<td>Eligible for NR</td>
<td>unreinforced masonry, brick</td>
<td>1910</td>
<td>April 1992</td>
</tr>
</tbody>
</table>

Figure 4.5: Trust Building with earthquake damage, 1989. Source: Santa Cruz Public Library
<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
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<th>Historic Status at Demo</th>
<th>Structural System</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elks Building</td>
<td>Santa Cruz</td>
<td>Contributor to NR District</td>
<td>Eligible for NR</td>
<td>unreinforced masonry, brick</td>
<td>1910</td>
<td>July 1993</td>
</tr>
</tbody>
</table>

Table 4.5: Elks Building.
The Trust and Elks Buildings were sister buildings adjacent to each other on Pacific Avenue in downtown Santa Cruz. The Colonial Revival style buildings were designed by local architect Edward L. Van Cleek and completed in 1910. The Trust Building was designed for businessman Len Poehlman. Poehlman named it the Trust Building after his wife’s family, the prominent Trust Family.¹¹⁶ The Elks Building, originally named the Hagemann-McPherson Building, was built for Frederick Hagemann, businessman and associate of sugar magnate Claus Spreckels. The building originally housed the Hotel Waldo. The Santa Cruz Elks Lodge purchased the building in 1919 for use as their lodge.¹¹⁷ The Elks Building was subdivided at some point, sharing bearing party walls with both the rest of the Elks Building and the Trust Building. The Kett Family owned the Elks and Trust Buildings, purchasing the center subdivided portion in 1991. This portion of the building was sometimes referred to as the Twohig Building, although not technically a separate building.¹¹⁸

The Trust and Elks Buildings were identified in the 1976 Santa Cruz Historic Building Survey as “excellent” and “exceptional”, the two highest ratings. The buildings were described as “an unusual but very successful adaptation of the Colonial Revival Style to commercial architecture. It features corbelled and bowed bays, swag frieze, and wood trim on a brick wall… As a larger building [compared to Elks] on a corner it serves

to close the composition along Pacific Avenue, giving greater definition to the block.”¹¹⁹

The Trust and Elks Buildings were listed as contributing buildings to the Pacific Avenue Historic District listed on the National Register of Historic Places in 1985. The district listed 36 contributing buildings and 18 non-contributing buildings. The contributing buildings were described as being exemplars of Santa Cruz’s historic commercial core and representing the unique commercial architecture of the late 19th and early 20th centuries.¹²⁰

Like many of the other unreinforced masonry buildings in the downtown core of Santa Cruz, the Trust and Elks were damaged during Loma Prieta. As buildings began to fall to demolition in Santa Cruz in the weeks following the quake, the buildings were put on a list of pending and potential demolitions.¹²¹ Due to the strong culture of demolition in Santa Cruz following the quake, it seemed like any building that suffered some kind of damage in the historic downtown was at risk of being demolished.

The Trust and Elks Buildings were structurally analyzed by several different structural engineering firms in the weeks and months after the quake. Due to the widely varying reports of the Trust Building, it was cited in a case study in History at Risk, a publication by the California Preservation Foundation, detailing the alarming trends in the Bay Area of the demolition of historic buildings in the wake of Loma Prieta. The chapter “Comparative Study: Differing Assessment of the Same Building in Santa Cruz”

¹²⁰ Larry Pearson, “National Register Nomination, Pacific Avenue Historic District,” Santa Cruz City Planning Department, 1985, 7.
offered those reports. The first report was completed by a local structural engineer on October 27, 1989, ten days after the quake. The engineer’s report concluded that the building should be demolished as it was not feasible to restore the building nor economical.122

Another report was completed by three National Park Service structural engineers on October 31, 1989. The rating of the exterior walls was rated a 3 (moderate, 11%-40%) damage with the most pressing falling hazard being loose brick on the south and western walls. The interior framing damage was rated a 1 (slight 1%-10%) and the non-bearing partition walls were rated 4 (moderate 11%-40%), plaster cracked and fallen, plaster keys weakened. Their report concluded that the Trust Building was moderately damaged and was repairable. Their immediate recommendations were to remove loose bricks, tie brick walls, and to temporarily strengthen walls with plywood to increase lateral strength in case of aftershocks.123

A report from Southern California-based preservation engineering firm Kariotis & Associates detailed their findings. The damage they found in their inspection included, the south brick wall tilting outwards, damage to the top of the west brick wall, the interior partition walls have plaster damage, and the veneer bricks had been displaced and dislodged from the structural brick behind. The most hazardous conditions were the loose bricks on the south and west facades, which were a danger to pedestrians. Their main

finding was that it was feasible to repair the building. The most pressing repair was the fixing of the loose veneer. This would be repaired with the injection of cementitious grout. The main hazard reduction recommendation was the anchorage of the walls to the floor and ceiling framing. The total cost estimate for the work was $308,800.124 Kariotis & Associates also commissioned Eagle Builders to create a more in-depth cost analysis. They quoted for grand total of $292,800.125

These assessments by highly qualified professionals in the structural engineering of historic and archaic buildings, were generally ignored. In February 1990, attorneys on behalf of the owners, the Kett Family, sent a letter to the City of Santa Cruz demanding a demolition permit. They appeared to have selectively chosen the engineering reports that confirmed their own priority, demolition. The report said,

The building as it presently stands has been thoroughly evaluated by competent experts to determine the proper course of action. Based on the findings and opinions of those experts, our client has reached the following conclusions: 1) The building is presently unsafe, cannot be occupied, and constitutes an unacceptable hazard to the public. 2) Any attempt to repair the damage and protect against future seismic activity would expose workers to an unacceptable level of risk. 3) There is no practical way to repair the structure to meet current building standards. Given the location of the property at the corner of Soquel and Pacific Avenues, any attempt to repair without meeting current codes would result in an unsafe building, and a hazard both to the occupants of the building and the general public. 4) Even absent the safety considerations, which are the primary concern, repair of the building is not economically feasible.126

A demolition permit for the Trust and Elks Buildings were filed with the City of Santa Cruz in November of 1990. The city deferred their decision, under pressure from

124 John F. Merritt, "Comparative Study,” 77-80.
125 John F. Merritt, "Comparative Study,” 81-82.
126 John F. Merritt, "Comparative Study,” 83-84.
preservationists, until more information could be obtained about the feasibility of saving the building. The city hired Loring A. Wyllie Jr. of H.J. Degenkolb Associates, an expert in structural engineering of old and historic buildings, for an unbiased opinion. His report, of the two buildings, found that “In general it is our opinion that the Trust Building and Elks Building performed well in the recent earthquake. Repair of the damage to these buildings would be reasonably simple.”127 Although this report did not include a cost estimate, the owner hired more engineering and construction firms to price out the potential for preservation of the buildings.

The findings from the engineering firm, Urfer & Associates, hired by the Kett Family found that the preservation and seismic retrofit of the Trust Building would be feasible both economically and repair wise. The cost to repair and retrofit the building was estimated to be $1.1 million versus $900,000 to demolish and reconstruct. This change in direction was from the suggestion by this firm to purchase the portion of the Elks Building that was subdivided, between the main Elks Building and Trust Buildings, referred to as the Twohig Building. The Twohig Building shared structural party walls with both buildings. The plan was to demolish the Elks and Twohig Buildings to be able to construct the Trust Building with its own reinforced concrete bearing wall. Urfer & Associates found that “the most prudent solution structurally seems to be to separate all three buildings.” They also found that “for the Elks Building, the economics for saving it do not support rehabilitation as a prudent choice.”128 The estimate completed by local

construction company estimated that the repair would cost $2.2 million. The Kett Family moved forward with this plan, but no additional work was done on the buildings.\textsuperscript{129}

On March 5, 1992, at around 7pm, a large fire broke out at the Trust Building. “Within minutes 30-food flames leaped from the ornate windows on the building’s third floor. Soon after the roof collapsed.”\textsuperscript{130} The two-alarm fire was contained within 20 minutes but smoldered for hours. There were known trespassers at the site and people were likely taking shelter in the building. The article also mentions that the Trust Building is the third landmark building damaged in the earthquake to be destroyed by suspicious fires.\textsuperscript{131}

In the wake of the fire the Ketts had a structural engineer survey the damage, the repair of the fire damage would add another half a million dollars to the price tag, which they cited already at $1.1 million, bringing the total to $1.6 million. The City approved a demolition permit in early April after rejecting a last-ditch appeal by a preservationist. The city cited the new cost of the project since the fire. Chief Building Officer, Richard Stubendorf was quoted “Most of the unique decoration of this building has been destroyed or damaged by fire, smoke, or water to a point of not being serviceable.” The Trust Building was demolished on April 8, 1992.\textsuperscript{132}

The Elks Building sat for another year while the Ketts Family fought to have the building demolished. Again, the issue of shared walls presented itself, the Elks Building

\textsuperscript{130} Paul Rogers, “Trust Building goes up in flames,” \textit{San Jose Mercury News}, March 6, 1992.
shared a wall to the north side with the 1887 Ferrari Building, also a contributor to the district. The Ferrari Building owner, David Pera, argued with the Ketts’ to have FEMA pay for the demolition costs. FEMA officials refused to pay for the demolition due to a huge discrepancy between repair estimates.

FEMA documents show there is a $2.24 million discrepancy between estimates by FEMA’s engineers and the owners for the cost of saving the Elks Building. Engineers hired by the State Office of Historic Preservation say it would cost about $160,000 to repair the building, excluding architectural work. Engineers hired by Fuentes say it would cost more like $2.4 million to repair, and only $1.6 million to demolish and rebuild. Lehman [FEMA] says part of the reason there is such a difference in the estimates is because Fuentes’ figures show how much it would cost to bring the Elks up to strict new codes, which Lehman said, don’t apply to the building.133

The Santa Cruz City Council agreed to loan the Ketts Family $135,000 for the demolition using funds from the city's Redevelopment Agency Funds. “The incentive for us is it’s the last demolition. It needs to be concluded or it will languish in bureaucracy forever,”134 said City Manager Dick Wilson. The Elks and Ferrari Buildings were demolished on July 5, 1993, the last seismically damaged buildings demolished in Santa Cruz, nearly four years after the quake.135

Local developer Redtree Properties purchased the lots where both the Trust and Elks Buildings once stood from the Ketts Family in December 1996 for $1.2 million.136 The new building designed by San Francisco firm Tanner, Leddy, Maytom, Stacy, was completed in 1999 for a cost of approximately $15 million. The 75,000 square foot

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133 Martha Mendoza, “Ferrari, Elks Buildings are Quake’s Final Legacy,” Santa Cruz Sentinel, March 6, 1993.
building included ground floor commercial space, office space, and penthouse loft apartments.\textsuperscript{137}

Odd Fellows Building, Watsonville

Figure 4.7: Odd Fellows Building with earthquake damage, 1989. Source: Pajaro Valley Historical Association.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structure</th>
<th>Year Built</th>
<th>Year Demolished</th>
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</thead>
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<td>Odd Fellows Building</td>
<td>17 E Beach Street, Watsonville</td>
<td>local survey</td>
<td>local survey</td>
<td>unreinforced masonry, brick</td>
<td>1893</td>
<td>November 1989</td>
</tr>
</tbody>
</table>

Table 4.6: Odd Fellows Building.
The Independent Order of Odd Fellows Building, also known as the Odd Fellows Building and I.O.O.F. Building was an unreinforced masonry building in the heart of downtown Watsonville. The building had no official historic designation but was widely considered historic in the community. The Independent Order of Odd Fellows is a fraternal organization founded in 17th century England. The Watsonville Pajaro Lodge #90 was chartered in 1859, with many of the early pioneers of Watsonville being members. By 1893 the Odd Fellows raised enough money to build a dedicated lodge at a cost of $17,500, with the clock that sat atop the belfry financed by public subscription for $1,400. The bell was cast at the McShane Bell Foundry in Baltimore in 1893. The Odd Fellows Building housed the first public library in Watsonville and served as a meeting place for dozens of organizations and community groups over its lifetime. The building was not damaged in the 1906 Earthquake and services for the Methodist-Episcopal Church were held in the building while their church was repaired. It was considered a “landmark” as early as 1952 and was renovated in the same year in preparation for the centennial celebration of the founding of Watsonville.\textsuperscript{138} It was listed in the Watsonville Historic Resources Inventory.\textsuperscript{139}

Although the building survived unscathed in the 1906 Earthquake, it was damaged in the 1989 Loma Prieta Earthquake. The brick parapet on the front facade


\textsuperscript{139} Architectural Resources Group, “An Assessment of Damage Caused to Historic Resources by the Loma Prieta Earthquake,” National Trust for Historic Preservation, 1990, 43.
collapsed killing Elida Ledesma Ortega aged 44. She died shielding her young grandson from the falling bricks, saving his life.140 There is a memorial dedicated to her and the earthquake in front of the Watsonville City Hall.141

The City of Watsonville assessed the damage to the City’s buildings and inspected over 7,500 structures in the weeks after the earthquake. Being close to epicenter, 338 buildings red-tagged in Watsonville.142 The building suffered serious damage due to its unreinforced masonry construction. On October 30, the National Park Service assessed the damage. They noted damage to the front and rear parapet, facade ornamentation, front and rear edges of the roof structure, pounding damage from adjacent structures, cracked and loose plaster, broken windowpanes, and that the brick veneer of the front wall could collapse. Yet their overall assessment was that the damage was repairable and that the damage was about 39%, moderate.143 Assessments done by engineers hired by the city estimated that the damages to the Odd Fellows Building totaled to $2.4 million.144

In the wake of the earthquake, there was much confusion concerning demolition and who bore responsibility for the cost. The Federal Emergency Management Agency would pay 100% of the cost of demolition for 30-days after the declared emergency

unless an extension is filed. Although FEMA did continue to fund demolitions well after
the 30-day period, there was a lack of communication between local government officials
and FEMA officials which likely led to many demolition decisions being rushed. FEMA
funding is not available to private property owners for the repair of buildings. What many
building owners were not aware of was that FEMA would also pay for emergency
building shoring, stabilization, and fencing to protect the site. In Watsonville, the 30-
day deadline was cited as a concern for City officials and building owners. Many
building owners were unable to get full engineering reports or second opinions in this
time frame due to a serious shortage of professionals. This may have led to property
owners being rushed into demolitions before the full picture could be assessed.

The Odd Fellows Building was red-tagged in the days after the earthquake. The
decision to demolish the building was made approximately on or before October 26, nine
days after the quake. This original decision was made without the full consent of the
property owners, the Pajaro Lodge. On October 26 the famous clock and bell were
salvaged from the belfry of the building via crane. Other artwork and furnishings were
also salvaged through an opening in the roof. HABS photo documentation was done of
the exterior and interior of the building by representatives of the National Park Service.
The owners of the Odd Fellows Building as well as the owners of five other seismically

145 Steade Craigo, “A Helping Hand,” Disaster Management Programs for Historic Sites, (San Francisco,
146 Lance Wallace, “Big downtown buildings falling to wrecking ball,” Register Pajaronian, November
17, 1989.
148 Historic American Buildings Survey, HABS CA-2814, I.O.O.F Building, East Beach Street, between
Union and Main Streets, Watsonville, Santa Cruz County, CA, 1989.
https://www.loc.gov/pictures/item/ca3649/.
damaged properties requested a hearing to request the preservation of their buildings. Watsonville City Manager John Radin was quoted, “We’re telling the people our structural engineers said their buildings need to be demolished. They have to come up with a plan to fix them, or we’ll tear them down, if we wait too long FEMA won’t pay for the demolition. They pick up practically 100 percent of the cost now.” On November 15 it was reported in the Register Pajaronian that Radin had received consent for the demolition. The demolition of the Odd Fellows Hall began on November 17, the last day to supposedly qualify for the FEMA deadline.

The cornerstone of the Odd Fellows Building was salvaged, and it was discovered that there was a time capsule inside. Inside were newspapers from 1893, a coin from the 1893 World’s Fair in Chicago, a list of the Odd Fellows members, and a program for the dedication of the building. The bell that was salvaged from the building now lives at the Pajaro Valley Historical Association in Watsonville. The Pajaro Lodge sold the land to the El Pajaro Community Development Corporation and in 1995, the construction of a replacement building began. The $1.3 million 15,000 square foot building, known as Plaza Vigil, was inspired by the architecture of the Odd Fellows Building, having near-identical massing and the iconic belfry. Plaza Vigil opened in May 1996 with fourteen retail spaces with the purpose of supporting “low-income, Spanish-speaking

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150 Lane Wallace, “Murphy seeks federal trailers for displaced businesses, too,” Register Pajaronian, November 15, 1989.
151 Jamie Marks, “Main Street crumbles further,” Santa Cruz Sentinel, November 19, 1989.
entrepreneurs a place to start their retail business and become successful before venturing out into the community.\textsuperscript{153}

Cathedral of St. Francis de Sales & Sacred Heart Church, Oakland

![Image of St. Francis de Sales Cathedral with earthquake damage, 1992. Source: HABS, Library of Congress.](image)

Figure 4.8: St. Francis de Sales Cathedral with earthquake damage, 1992. Source: HABS, Library of Congress.

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structure</th>
<th>Year Built</th>
<th>Year Demolished</th>
</tr>
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<td>unreinforced masonry, brick</td>
<td>1893</td>
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Table 4.7: St. Francis de Sales.
Figure 4.9: Sacred Heart Church, 1931. Source: Oakland Public Library.

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<tr>
<th>Name</th>
<th>Location</th>
<th>Historic Status at Quake</th>
<th>Historic Status at Demo</th>
<th>Structure</th>
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<th>Year Demolished</th>
</tr>
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<td>Eligible for NR</td>
<td>unreinforced masonry, Colusa sandstone</td>
<td>1903</td>
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Table 4.8 Sacred Heart Church.
St. Francis de Sales Cathedral and Sacred Heart Church were two historic Catholic Churches on Martin Luther King Jr. Way, originally named Grove Street, in Oakland. Both churches were constructed and owned by the Archdiocese of San Francisco, which later became the Diocese of Oakland. Sacred Heart Parish was founded in 1876, the second Catholic Parish in Oakland. The first church was a timber frame building completed in the same year. This church was destroyed by fire in 1897. The temporary building was outgrown and in 1901 plans for a new church were made. The Romanesque style stone church was designed by architect Etienne Garin and constructed by P.G. McIntyre, with the stonework by O.E. Brady & Son of San Francisco. The church was constructed of Colusa sandstone quarried in nearby Livermore. The cornerstone was laid in December 1901 and the church was completed and dedicated in December 1902. There were no references to earthquake damage to Sacred Heart in 1906 in local newspapers. The church could have suffered some damage, but articles from after April 1906 mention services and funerals being held.

St. Francis de Sales Parish was established in 1886, the fifth Catholic Parish in Oakland, founded to serve the growing Irish Catholic immigrant community. The church was designed by the official architect for the Archdiocese of San Francisco, J.I. Devlin. In September 1891, the cornerstone of St. Francis de Sales was laid. The Gothic Revival church was completed and dedicated in July 1893, making it the second masonry church constructed in Oakland. The Cathedral suffered minor damage in the 1906 Earthquake,

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damage included a crack in the wall of the transept and broken finials on the altar. Like
many other churches in the area, it served as a shelter for refugees of the quake. Due to
the widespread destruction of San Francisco in 1906, many people left for Oakland and
the rest of the East Bay, leading to a population surge and growth of parishioners at St.
Francis. The second population boom of Oakland after World War II led to the creation
of the Diocese of Oakland, separate from the Archdiocese of San Francisco. In 1962, St.
Francis was designated the Cathedral of the Diocese. St. Francis was remodeled in 1966,
removing much of the ornate detailing and furnishings for a more reserved interior and
painting the exterior brick white.156

A full structural evaluation of St. Francis de Sales was performed in March 1989
by David L. Messinger, Associates, Structural Engineers and H.J. Degenkolb Associates,
Engineers. This study found that the unreinforced masonry building was vulnerable to
seismic damage in an earthquake and recommended a seismic retrofit. Just a few months
later, in October, the earthquake hit. It was said that the damage predictions were nearly
identical to those estimated in the seismic study. The damage to St. Francis was
extensive, and the damages was detailed as,

Large cracks appeared in the brick walls of the bell tower, the transepts and in
other upper wall areas. Inside, the ceiling was cracked, and much plaster fell in
the south transept. The building was immediately provided with cables and braces
for temporary stabilization.157 Extensive cracking of the brick tower with cracks
up to three inches wide. It also caused cracking at the base of all the gable walls

https://www.loc.gov/item/ca1797/.
and extensive damage to the wood roof framing as the earthquake tried to pull the building apart.\footnote{Loring A. Wyllie, Jr., “The Balance Between Historic Preservation and Seismic Safety- Can We Achieve It?,” \textit{The Seismic Retrofit of Historic Buildings Conference, San Francisco}, 1991. 5-7.}

The damages to Sacred Heart were,


Just eight days after the quake, it was announced by Bishop of Oakland John Cummins, that St. Francis and Sacred Heart may need to be demolished.\footnote{Don Lattin, “Some May Have to Be Razed, Historic Churches Badly Damaged,” \textit{San Francisco Chronicle}, October 25, 1989.} Both churches were deemed unsafe and red-tagged by the City of Oakland. Parishioners of St. Francis met at the nearby First Baptist Church and later merged with St. Mary’s Catholic Church.\footnote{Historic American Buildings Survey, “HABS CA-2345, St. Francis de Sales Church,” 1993, 24. https://www.loc.gov/item/ca1797/}

The Diocese hired H.J. Degenkolb to create seismic retrofit proposals for both churches. For St. Francis, the building was temporarily stabilized with exterior bracing and steel tie rod cables on the interior. Loring A. Wyllie Jr. detailed the repairs in the report completed in March 1990,
An extensive repair and strengthening scheme were developed. It involved strengthening many of the brick walls by various methods, adding roof and attic diaphragms and ties and various other methods… the owner wanted a scheme that provided some assurances that there would not be another expensive repair project after the next earthquake. The budget grew considerably when it was discovered that the historic stained glass windows were in poor repair and would need complete restoration to survive the removal and reinstallation to permit the work to proceed.162

In the next several months, the Diocese of Oakland had commissioned economic feasibility studies and deliberated on how to fundraise for the restorations of the two churches. October 7, 1990, Bishop John Cummins announced in a press conference that the cost to repair and retrofit St. Francis de Sales would be $6 million and $3.5 for Sacred Heart Church. The Church found that it was not feasible to raise this amount of money, nor to spend it on such old structures. The Diocese had applied for demolition permits to have both churches razed at a cost of $220,000.163

After this announcement concerned preservationists from the National Trust for Historic Preservation, East Bay AIA, Oakland Heritage Alliance. Community members founded the group “Friends of Landmark Churches.” A special hearing of the Landmarks Board was requested. The Landmarks Board found that since Sacred Heart was not listed as a City Landmark nor identified in any historic building surveys, it was exempt from environmental review and the demolition permit could proceed. The demolition permit for St. Francis was denied since the building was listed in a historic building survey.

Later, the Board determined that St. Francis would have to undergo a full environmental impact review. Although the Diocese initially refused, they agreed to have a feasibility study done by experts hired and funded by the National Trust. The study included consultants such as experts in religious structures, an architect, fundraising experts, and preservation engineer Michael Krakower. The study concluded that St. Francis could be made as safe as new construction. The study also found that the estimate of $3.5 million for repair and retrofit for Sacred Heart was high and the work could be done for around $1 million. The Trust also pointed out that the reason Sacred Heart was not on a historic survey was due to the area being unsurveyed, not that it was intentionally excluded.\footnote{Editors, “Friends of Landmark Churches,” \textit{Oakland Heritage Alliance News}, Spring 1991, 9. https://www.oaklandheritage.org/newsletter Editors, “National Trust Team Studies Cathedral,” \textit{Oakland Heritage Alliance News}, Summer 1991, 10. https://www.oaklandheritage.org/newsletter. The author could not locate the National Trust Report.}

A report titled “An Alternative Seismic Retrofit Proposal for Sacred Heart Church,” by architectural conservator Randolph Langenbach and engineer Sven proposed an alternative retrofit scheme for Sacred Heart over one done by Loring A. Wyllie Jr. This proposal was commissioned to offer alternatives to demolition. The original Degenkolb proposal, hired by the Diocese, was $3.5 million total. The report offered two repair estimates, one of which was an actual bid from local contractor I.D.C. to complete the work specified in the report. Those estimates were $779,000 from I.D.C. Contractors and an estimate of $1.2 million by Oliver & Waszink. The main cost saving differences between the Degenkolb and Langenbach proposals were,

\begin{quote}
Degenkolb recommendations eliminated by the alternative procedure: the roof diaphragm, and the cost of re-roofing the building with slate is eliminated. The roof should be adequate as it exists. The projected cost of this item alone is approximately $300,000. The need for the steel reinforcement of the masonry
\end{quote}
walls is eliminated. The buttresses, pilasters, and the crosswalls are located so as to make these walls meet the UCBC requirements for hit (height over thickness) without additional reinforcement. With the reinforcement of the tower, and the reduction in the height of the gables, the conclusion of the engineers on the review panel is that further analysis is likely to prove that the walls are adequate for in-plane shear as well. The need for the replacement of timbers in the transept, and the addition of the steel braced frame inside the church is replaced by the exterior buttress. This will result in a considerable saving, and substantial improvement to the aesthetic quality of the church interior.\textsuperscript{165}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure4.10.png}
\caption{Alternative seismic retrofit scheme for Sacred Heart Church, showing reinforced concrete buttressing on the exterior. Source: Randolph Langenbach}
\end{figure}

The Oakland City Council voted 5-4 to allow the demolition of Sacred Heart in July 1992. Several appeals were filed, but these appeals were denied. Also in July 1992, Friends of Landmark Churches filed a lawsuit in Alameda County Superior Court to force the issue of requiring environmental review. Sacred Heart was nominated to the National Register of Historic Places, although it was not officially listed, the finding that it was “eligible” meant that it was subject to the laws of CEQA. The Friends argued that the exemption from CEQA review in a declared State of Emergency no longer applied to Sacred Heart since the emergency had expired. The case made its way through the lower courts until it was heard by the California Supreme Court. On April 2, 1993, the Supreme Court rejected the request for stay of demolition, allowing the demolition. On April 5, the Diocese began salvaging the pews, stained glass windows, and other objects from the church. On April 13, 1993, demolition of 91-year-old Sacred Heart Church began.

The City of Oakland found that an Environmental Impact Report was required under CEQA for St. Francis de Sales since the building was identified as a historic resource in a local survey. The EIR determined that the St. Francis was architecturally significant and eligible for listing on the National Register of Historic Places under criteria A, B, and C. The mitigation measure for the effects of the demolition was the preparation of a HABS report documenting the history of the building, an architectural

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description, and photographic documentation. The Draft EIR was completed and approved in August 1992 by the Oakland Planning Commission with a recommendation for a demolition permit. The Commission withheld the demolition permit until September 1993 to allow time for the Diocese to place St. Francis for sale to potential buyers who would be willing to repair and restore the property.\textsuperscript{169}

Ads were put in the local newspapers and the Wall Street Journal in February 1993 in attempts to find a buyer. The ads said that the church, community center, and rectory were for sale. But that the church was severely damaged, and the potential buyer would need to repair and restore the building but retain its historic character and integrity.\textsuperscript{170} It was announced in August 1993, that the Diocese had found a buyer, Oakland’s Trinity Missionary Baptist Church. Trinity wished to rehabilitate St. Francis due to outgrowing their 600-seat church on Eighth Street. This announcement was right before the September 1st deadline set for demolition.\textsuperscript{171} This deal fell through in part because of a new assessment by architect Jack Byars who was selected to restore the church if the deal would continue. He estimated that the church would cost $10 million to restore, nearly double the original estimate. This was due to the finding that the stained-glass windows were in poorer condition than originally understood would need to be removed and fully restored during the retrofit work.\textsuperscript{172} Trinity missed their first payment in October 1993 and failed to provide the Diocese with a financing plan that was part of

\begin{flushleft}
\end{flushleft}
the purchase agreement.173 Once the deal fell through, the Diocese proceeded with the demolition. A ceremony outside of St. Francis de Sales was held to allow parishioners and community members a chance to say goodbye to the Cathedral. In a now iconic photograph, Bishop John Cummins donned a hard hat with his gold robes and locked the grand front doors to the Cathedral forever. The demolition was completed in November of 1993, over four years after it was damaged in the earthquake.174

Sacred Heart Church was reconstructed on the same site. Ground for the new church broke in Spring 1998 and was completed in February 1999 at a cost of $1.4 million. The new octagonal design of the church was meant to represent the baptismal font which symbolized rebirth and renewal.175 The lot where St Francis de Sales stood remained a parking lot until, along with the 1914 rectory building, was sold to the Oakland Housing Authority. In 2014 a $60 million affordable housing project called Cathedral Gardens was completed. It renovated the rectory building, since landmarked by the City of Oakland, into housing. A 100-unit apartment building was constructed for families making no more than 60% of the area median income.176

Since the demolition of St. Francis de Sales, the Diocese of Oakland was without a Cathedral. In 2000 the Diocese began plans for a replacement, hiring Skidmore,
Owings, and Merrill to design a modern glass, steel, and pine church. The Cathedral of Christ the Light began groundbreaking in 2005 and was completed in 2008 at a cost of $175 million. The high cost of the cathedral was criticized, pointing to the settlements of the ongoing sex abuse scandals and that the money could be better used for social services the church provides. Yet the unique modern design was praised for bringing the church into a new era.

Conclusion

The demolition of these earthquake damaged historic structures after the Loma Prieta Earthquake was caused by a complicated combination of economics, fear, legal ambiguities, misunderstandings of historic materials, and the will of city governments. As historic buildings began to fall, it became clear there were serious issues with the disaster response and suspension of the normal review processes in a state of emergency. Overnight, unelected city officials, like city managers and building officials, became responsible for the disaster response in their cities. These officials were expected to “fix” the disaster with serious pressure from their constituents. The ethic of “get back to normal,” was an influential factor in the demolition of historic buildings. The supposed inaction of allowing a red-tagged building to sit, while long review and restoration processes were completed, posed bad optics for city governments in crisis. This is one

aspect that led to hasty demolition decisions. Yet, many damaged historic buildings were caught up in legal battles that look months or years after the earthquake to resolve.179

City governments were able to demolish damaged buildings because protections normally afforded to historic properties under legislation such as the National Historic Preservation Act (NHPA), National Environmental Protection Act (NEPA), and California Environmental Quality Act (CEQA), were suspended in a Declared State of Emergency declared by California Governor George Deukmejian. This legislation held core review processes that would normally prevent, or require significant review, for the demolition of historic buildings. In California, a historic resource is subject to the provisions of CEQA, if that resource is listed on the California Register of Historical Resources or the National Register of Historic Places, or if that resource is found eligible for listing on a register. This is significant because a property does not have to be officially listed to be subject to CEQA. Under CEQA, the demolition of a building found eligible for the National Register would be subject to an Environmental Impact Report (EIR), regardless of if the owner of the property was private or public. The EIR by no means ensures a certain outcome, rather that all effects of the proposed demolition are taken into account and mitigation measures to those effects are considered.180

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But in a Declared State of Emergency, these reviews are exempted. In the wake of Loma Prieta, the alarming rate of the demolition brought attention to this failure to protect seismically damaged historic buildings, arguably many of which were unnecessary demolitions. One month after the earthquake, emergency legislation called State Senate Bill 3X was passed. It required that before a demolition of a historic building, approval must be given by Office of Historic Preservation, unless there was an “imminent threat to life safety or adjacent buildings exists.” The interpretation of “imminent threat” was up to each local government and many cities ignored the provisions of 3X.\textsuperscript{181} The vague legal language led to an unsuccessful lawsuit filed against the City of Santa Cruz for violating 3X for the proposed demolition of the St. George Hotel. Notably, 3X did not apply to buildings that were not officially listed in a register.\textsuperscript{182}

In the case study of Sacred Heart Church in Oakland, the church was not listed but was later found to be eligible for the National Register. After a long legal battle, the Supreme Court of California found that the building was not subject to an EIR, although the Declared State of Emergency had expired.\textsuperscript{183} In July 1992, Governor Pete Wilson signed Executive Order W-26-92. This Order strengthened protections for historic


buildings damaged in earthquakes. It found that historic buildings are no longer exempted from CEQA in a Declared State of Emergency, unless the building poses an active threat to life-safety. Yet, still required the involvement of the SHPO in decisions. It also applied to buildings that were found eligible for listing or were identified in local surveys.\textsuperscript{184}

Preservationists and community members concerned about the demolition of historic buildings in their communities used a variety of tactics to prevent demolition. These included: organizing groups such as “Friends of” groups to have a united front; filing petitions and appeals to city councils; requesting hearings; involving preservation organizations such as the National Trust for Historic Preservation, California Preservation Foundation, and local preservation groups; filing lawsuits; and publicizing the issue.\textsuperscript{185} While this study is about demolitions, there are many cases after Loma Prieta of successful preservation advocacy efforts that led to the preservation of historic buildings, such as the Broadway Building and City Hall in Oakland and St. Dominic’s in San Francisco.\textsuperscript{186}


CHAPTER V
COMPARATIVE ANALYSIS

Comparative analyses are a tool often used in the academic study of historic preservation to compare and contrast various aspects of two or more subjects. The use of comparative analysis allows for a greater understanding of a subject, often pointing to nuances missed if the context of another subject is not presented. The use of multiple case studies allows for an even greater context to be uncovered.187 This comparative study analyzes ten different comparative categories of eight case study buildings damaged in the 1989 Loma Prieta Earthquake. Those categories are, year built, historic status at the time of the earthquake and before demolition, review process, structural system, damage patterns, primary demolition factors, difference in repair estimates, actual building replacement cost, difference between low and high repair estimates and actual replacement cost, time between the earthquake and demolition, and downtime, the time between the earthquake and re-occupation. These comparative categories were selected to give a greater context and understanding to the reasons, processes, and circumstances that led to the demolition of each historic building. This chapter is organized into separate discussions of each category, followed by a synthesis of the patterns identified.

Year Built & Historic Status

As a general rule, buildings may be assessed for historical significance once they become 50-years old. The “50-Year Rule” has its origins in the National Park Service and the National Historic Preservation Act of 1966, which allow resources to be nominated to the National Register of Historic Places. Although many buildings are not considered historically significant until they are much older. All of the case study buildings in this study achieved 50-years of age by the time of the earthquake in October 1989. The age range of buildings is from 1893-1911, an 18-year spread. Five of the eight case study buildings survived the 1906 Earthquake with varying amounts of damage.

Figure 5.1: Buildings by year of construction and age in 1989.

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In the U.S. a historically significant building may be placed on a local, state, or national historic register. The determination process of the historic status of a building varies between jurisdictions, as well as what protections that historic status offers. Most local and state registers are generally based on the nomination process to the National Register of Historic Places. National Register nominations are based on four criteria for evaluation, generally simplified to, events, people, design, and information potential/archaeology.\(^\text{189}\) In California, properties may be listed to the California Register of Historical Resources and properties nominated to the National Register of Historic Places are automatically placed on the California Register. The California Register was not enacted until January 1993, so this status is exempted as a category for this study. In California, to be subject to the provisions of the CEQA, a property does not need to be officially listed on the National Register, or later California Register, rather just found eligible for either register. This would require that the property owner be required to complete an Environmental Impact Report. Still, a building’s historic status did not give it protection under CEQA in a governor-declared State of Emergency in 1989.\(^\text{190}\) In practice, determining if an earthquake-damaged building was subject to environmental review was decided by each city government, leading to inconsistencies between jurisdictions. Cities such as Santa Cruz, determined that any buildings that were earthquake-damaged were exempt from CEQA, no matter if the State of Emergency had


expired. While Oakland determined that if a building had been identified in a local survey or was a designated historic resource it would be subject to environmental review no matter if the building would be exempted due to earthquake damage. In the wake of Loma Prieta, legislation was passed to protect historic buildings. Senate Bill 3X, protected earthquake damaged historic buildings from demolition. Yet this only applied to buildings that had been designated on a historic register, excluding buildings which were identified as historically significant in a local survey and buildings found Eligible for the National Register but not actually listed. In July 1992, the Governor of California passed Executive Order W-26-92, which extended demolition protections to buildings identified in local surveys and those found Eligible for the National Register. 191 Local jurisdictions also passed their own ordinances to protect historic resources from demolition. Oakland Ordinance 11217 was passed in June 1990, which prevented the demolition of historic resources without review, including ones listed in local surveys and those found eligible for the National Register, thus increasing protections to hundreds more buildings citywide.192

Case study buildings are classified into one of six historic status categories. These categories encompass the possibilities of historic statuses in California in 1989. While a building could have more than one listing, the highest or “most important” listing is

considered. These categories are: None, building is not listed in any historic survey or register; Local Survey, building is not an official designated resource but was identified or rated as historically significant in a local historic survey; Local Designation, building is listed in a local historic register; Eligible for National Register; building was formally determined eligible for listing in the National Register; Contributor to National Register, building is listed as a contributing building in a National Register Historic District; and Individual National Register, building is individually listed on the National Register.

<table>
<thead>
<tr>
<th>Building</th>
<th>Historic Status at Earthquake</th>
<th>Historic Status at Demolition</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Rose Academy</td>
<td>local survey</td>
<td>Eligible for NR</td>
</tr>
<tr>
<td>Cathedral House</td>
<td>local survey</td>
<td>Eligible for NR</td>
</tr>
<tr>
<td>Cooper House</td>
<td>Contributor to NR District</td>
<td>Contributor to NR District</td>
</tr>
<tr>
<td>Trust Building</td>
<td>Contributor to NR District</td>
<td>Eligible for NR</td>
</tr>
<tr>
<td>Elks Building</td>
<td>Contributor to NR District</td>
<td>Eligible for NR</td>
</tr>
<tr>
<td>Odd Fellows Building</td>
<td>local survey</td>
<td>local survey</td>
</tr>
<tr>
<td>St. Francis de Sales</td>
<td>local survey</td>
<td>Eligible for NR</td>
</tr>
<tr>
<td>Sacred Heart Church</td>
<td>none</td>
<td>Eligible for NR</td>
</tr>
</tbody>
</table>

Table 5.1: Historic status at time of earthquake in 1989 and historic status at time of demolition.
Figure 5.2: Change in historic status between earthquake and demolition.

At the time of the Loma Prieta Earthquake, one building had no historic status, four were identified in a local survey, and three were contributing buildings in a National Register Historic District. The historic status of six buildings changed between the time of the earthquake and the time of its demolition. At the time of demolition all of the buildings had been deemed historically significant, one building was identified in a local survey, six were found eligible for the National Register, and one was a contributor to a National Register Historic District. The Odd Fellows Building was rated in a local survey of historic buildings in Watsonville. The building was facing and directly across the street from the Watsonville Plaza Historic District, nominated to the National Register in 1978.
It only included the confines of the Plaza itself, not the surrounding buildings.\(^ {193} \) The Odd Fellows Building had little protections against demolition due to its lack of designated historic status. It was demolished only four weeks after the earthquake, leaving little time for preservation efforts.

Four buildings, St. Rose Academy, Cathedral House, Sacred Heart Church, and St. Francis de Sales were found eligible for the National Register before their demolition. This was an intentional strategy from preservationists in an attempt to save the buildings from destruction. While the attempts to nominate the four case study buildings were unsuccessful in their preservation, there are examples in the Bay Area after the earthquake of buildings being saved this way, such as the Broadway Building in Oakland.\(^ {194} \) The three buildings that were Contributors to a National Register Historic District at the time of the earthquake, the Cooper House, Elks Building, and Trust Building, were part of the Pacific Avenue Historic District in Santa Cruz. Santa Cruz was near the epicenter and its historic downtown was seriously damaged. The city had a strong ethic of demolition, leading to the destruction of the Cooper House just eight days after the quake, with many following.\(^ {195} \) By 1991, 16 of the 36 contributing buildings had been demolished. This led the California State Historic Resources Commission to recommend to the Keeper of the National Register to delist the district. In March 1992,

the resolution was passed, and the Pacific Avenue Historic District was no more.\textsuperscript{196} This put remaining damaged historic buildings in a serious predicament. The Trust and Elks Buildings were then stripped of their contributing status but were still considered eligible for the National Register by the SHPO. The Trust Building was secondarily damaged by a large fire, leading to the approval of its demolition in April 1992. The Trust Building just missed the July 1992 passage of Executive Order W-26-92, as it included protections for eligible buildings.\textsuperscript{197} Although this would likely not have prevented its demolition due to the serious fire damage. The Executive Order also did not protect the Elks Building, as the City of Santa Cruz granted a demolition permit in July 1993, making it the last building demolished in downtown Santa Cruz.\textsuperscript{198}

\textbf{Review Process}

The demolition review process for each building was dependent on several factors and there was no uniform review process across case studies. Compared in this section were the different review processes that each case study underwent. These categories are Local Landmark Board Review, Demolition Permit Appeal, CEQA Exemption, Environmental Impact Report, Litigation, and Preservation/ Community Group Involvement. Each of these categories were important in determining the difference between decision-making processes in the same and differing jurisdictions.

\textsuperscript{198} Katherine Edwards, “And the wall comes tumbling down: last remains of quake falling to wrecking ball,” \textit{Santa Cruz Sentinel}, July 7, 1993.
The most important factors in determining which review processes were required were jurisdiction and historic status. There are federal, state, and local laws and ordinances that protect historic buildings from demolition. In California, the most important law protecting historic buildings, CEQA, was suspended in a Governor-declared State of Emergency. Normally, CEQA requires an Environmental Impact Report before the demolition of a listed or eligible historic resource. The issue of CEQA exemptions was quickly identified as the cause of many unnecessary demolitions of historic buildings after Loma Prieta. This led to the passing of various laws, such as Senate Bill 3X and Executive Order W-26-92, that prevented the demolition of historic buildings damaged in natural disasters without review from outside agencies, except in extreme cases of life-safety or imminent damage to surrounding buildings.199 All but two case studies, the Cathedral House and St. Francis de Sales, were exempted from the provisions requiring environmental review under CEQA. The Cathedral House was found to be required to complete an Environmental Impact Report by the City of San Francisco under CEQA. Although it was claimed publicly by the Episcopal Diocese and in newspapers that the Cathedral House was “severely earthquake damaged,”200 that reasoning was not used in official documents, such as the EIR. Without the earthquake damage reasoning, the Cathedral House was not exempt from environmental review. St. Francis de Sales was required to complete an EIR due to the Oakland-specific Ordinance 217 which required listed historic buildings to undergo environmental review despite

CEQA exemptions. Under the same ordinance, Sacred Heart Church in Oakland was not required to complete an EIR since it was not officially listed on a historic register, although it had been found eligible for listing.

In 1989, the case study buildings in cities with landmarks review boards were Oakland, San Francisco, and Santa Cruz. Watsonville, a much smaller jurisdiction did not have a board. In all three cities, at this time, these boards were advisory boards with no power to prevent demolitions. In San Francisco, the Landmarks Advisory Board was only an advisory committee to the San Francisco Planning Commission, who had the ultimate say in approval of a demolition of a historic building. In the case of the Cathedral House and St. Rose Academy, the Landmarks Board voted to deny the demolitions, then was overruled by the Planning Commission who voted yes to the demolitions. In 2008, the San Francisco Historic Preservation Commission was created, which has wide-ranging powers including denying permits for alterations or demolitions to historic resources.

The two buildings demolished the quickest, the Cooper House and the Odd Fellows Building expectedly had less review processes undertaken. The Cooper House, demolished eight days after the quake, did not need to be reviewed by the Santa Cruz Landmarks Board because the demolition was considered an emergency, and the building

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was deemed an imminent threat. In Watsonville, the small community did not have a historic preservation commission nor board to review the demolition of the Odd Fellows Building. Due to the quick timeline of demolition, both buildings also did not have any demolition permit appeals. While there were serious concerns and dissent from preservation and community groups before the demolitions of both buildings, no legal challenges or appeals were filed.

Other than the Cooper House and Odd Fellows Building, preservation and community groups were significantly involved with the legal challenges to the demolition of each case study. The types of groups involved included non-profits such as the National Trust for Historic Preservation, California Preservation Foundation, and local groups like the Oakland Heritage Alliance, San Francisco Heritage, and neighborhood associations. Also involved was the California Office of Historic Preservation. At the time of Loma Prieta, the SHPO did not have a formal role in disaster assistance or review of demolitions. Senate Bill 3X and Executive Order W-26-92 required SHPO involvement and approval of demolitions of historic buildings. Purpose-created groups such as Friends of Landmark Churches for St. Francis and Sacred Heart and Save St. Rose! were created by concerned community members and patrons of those organizations. These groups were able to file appeals, lawsuits, attend hearings, and often most importantly, influence public opinion.

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<table>
<thead>
<tr>
<th>Review Process</th>
<th>St. Rose Academy</th>
<th>Cathedral House</th>
<th>Cooper House</th>
<th>Trust Building</th>
<th>Elks Building</th>
<th>Odd Fellows Building</th>
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Table 5.2: Case studies by review process.

In two cases, the Cooper House and Sacred Heart Church, litigation was brought forward and heard by the California Supreme Court. For the Cooper House, the lawsuit was brought as a result of the demolition and Sacred Heart was filed in an attempt to prevent the demolition. The Cooper House lawsuit was filed by the commercial tenants of the building who were prevented from recovering any property before the demolition. The tenants sued the owner Jay Paul and the City of Santa Cruz for loss of property, taking of property, breach of contract, and negligence. The case was dismissed, and the ruling found that the demolition of the Cooper House was warranted under the police
power and immunities awarded to the City of Santa Cruz under the California Emergency Services Act.\textsuperscript{206} The Sacred Heart lawsuit was brought forward by preservation group Friends of Landmark Churches, to force the environmental review process before a demolition permit could be issued. This was rejected by the courts since Sacred Heart was never listed on a historic register or local survey, thus being exempted from review.\textsuperscript{207}

**Damage Patterns**

While age is an important criterion for determining if a building is historic, it may also mean that a building was constructed before modern seismic building codes. In seismically active areas such as California, seismic codes have developed over time only because hard lessons have been learned due to several large earthquakes over the last century and a half. After the 1906 Earthquake it would seem that the noticeable failures of unreinforced masonry buildings would cause alarm. Yet what destroyed most buildings in 1906 was the fire, not the earthquake. While there was change in building codes after 1906, most concerned fire safety. The narrative around the event was fear of urban fires, not a focus on earthquakes. This led to many new buildings being reconstructed in unreinforced masonry. Brick has long been seen as a fire-resistant building material, yet its association as earthquake-susceptible would take time. The first


state-wide seismic building code was after the destructive 1933 Long Beach Earthquake, which saw the passing of a series of laws which effectively banned the use of unreinforced masonry in new construction.208

All case study buildings were constructed before the 1933 ban on URM construction. And all case study buildings’ structural systems are unreinforced masonry, with the exception of the Cathedral House, which has a steel frame with unreinforced masonry infill walls. Structural system was not a considering factor when choosing case study buildings. Yet it is logical that a structural system that is earthquake susceptible and dates to pre-1933, thus being age eligible for historic listing, would be included in this study.

<table>
<thead>
<tr>
<th>Building</th>
<th>Structural System</th>
</tr>
</thead>
<tbody>
<tr>
<td>St. Rose Academy</td>
<td>unreinforced masonry, brick</td>
</tr>
<tr>
<td>Cathedral House</td>
<td>steel, unreinforced masonry infill walls</td>
</tr>
<tr>
<td>Cooper House</td>
<td>unreinforced masonry, brick</td>
</tr>
<tr>
<td>Trust Building</td>
<td>unreinforced masonry, brick</td>
</tr>
<tr>
<td>Elks Building</td>
<td>unreinforced masonry, brick</td>
</tr>
<tr>
<td>Odd Fellows</td>
<td>unreinforced masonry, brick</td>
</tr>
<tr>
<td>St. Francis de Sales</td>
<td>unreinforced masonry, brick</td>
</tr>
<tr>
<td>Sacred Heart Church</td>
<td>unreinforced masonry, stone</td>
</tr>
</tbody>
</table>

Table 5.3: Case studies by structural system.

In the Loma Prieta Earthquake, unreinforced masonry building damage was seen in a seven-county area: San Francisco, San Mateo, Santa Clara, Alameda, Santa Cruz, San Benito, and Monterey. In case study cities, San Francisco, Oakland, Santa Cruz, and Watsonville, URM damage correlated to distance from the epicenter. Santa Cruz and Watsonville saw nearly all URM buildings damaged to some extent due to their close proximity to the epicenter.\textsuperscript{209} The older downtown areas of Santa Cruz and Watsonville, where URMs were concentrated, were constructed on the alluvial soils of the nearby rivers of the San Lorenzo River and Pajaro River respectively. This led to increased amplification of the earthquake shaking in these areas.\textsuperscript{210}

<table>
<thead>
<tr>
<th>City</th>
<th>Distance from Epicenter</th>
<th>Total URMs</th>
<th>Total Damaged</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>San Francisco</td>
<td>58 mi</td>
<td>2030</td>
<td>728</td>
<td>35.7%</td>
</tr>
<tr>
<td>Oakland</td>
<td>59 mi</td>
<td>2000</td>
<td>400</td>
<td>20%</td>
</tr>
<tr>
<td>Santa Cruz</td>
<td>9 mi</td>
<td>43</td>
<td>39</td>
<td>90.7%</td>
</tr>
<tr>
<td>Watsonville</td>
<td>11 mi</td>
<td>26</td>
<td>26</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 5.4: Unreinforced masonry damage in case study cities. Source: Rutherford & Chekene, S.A. Mahin.


The mechanisms of failure of unreinforced masonry buildings in earthquakes is a complex interplay between forces, loads, and material properties. While a full structural engineering analysis is not within the scope of this study, the damage patterns observed in each case study building are compared to give context to demolition decisions. Common URM damage patterns observed during the Loma Prieta Earthquake include masonry cracking, “X”-cracking, parapet failure, ornamentation/ cornice failure, gable failure, chimney failure, corner damage, pounding damage, anchorage failure, diaphragm deflection, broken windows, foundation damage, roof/ floor damage, interior partition wall damage, soft story collapse, and partial and complete structural collapse. Damage patterns reported for case study buildings are listed in Figure 5.7. The most common damage found in all case study buildings was masonry wall cracking, as this is the simplest form of damage that requires the least amount of force. All case study buildings suffered from damage patterns that could be indicative of serious structural damage, those patterns are partial collapse, parapet and gable failure, masonry cracking, corner damage, roof damage, diaphragm connection failure, and pounding damage. For the Cathedral House, the masonry cracking could not be determined if that was due to the 1989 Earthquake or not.

Roof damage can refer to non-structural or structural damage, in the case of St. Francis de Sales, some of the roof shingles fell, but the structural system of the roof was

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undamaged. While in the Cooper House, the structural system of the roof was damaged and the connection between the roof and the masonry wall was also damaged. One of the most serious is diaphragm failure, the connections between the flooring and/or roofing and the masonry walls. With the exception of the Cathedral House, which had steel framing, the interior framing of the buildings was wooden framing. When the connections at the wall fail, in its most serious case, the floor or roof can collapse. The buildings with the most amount of types of damage patterns were the Cooper House and Odd Fellows Building. While this is not a direct indication of the total damage percentage each building suffered, both buildings were seriously damaged and were the first two case study buildings to be demolished. The Cathedral House was the least damaged case study building with only masonry cracking reported, which could be related to its steel skeleton, a much more earthquake-resistant form of construction than URM.

Falling hazards are the most dangerous non-structural hazards posed by unreinforced masonry. Falling hazards were reported in all case studies other than the Cathedral House. Failures grouped under falling hazards include parapet failure, gable failure, interior plaster damage, and broken windows. The most serious case of falling hazard was at the Odd Fellows Building. The collapse of the parapet and top of the wall led to one fatality and the injury of others.\textsuperscript{212} A side effect of falling masonry in an earthquake is the visceral reaction from the public and city officials. While rightly identified as a serious issue, visible damage such as bricks lying along a sidewalk with a large gap in the wall gives that building an inherent negative connotation. The untrained

observer may view that building as unrepairable or that it could not become as safe as a new construction. Falling hazards such as parapet and gable wall failure have relatively straightforward seismic retrofit solutions or repairs.\textsuperscript{213} The issue of optics can be a powerful influence in the decision to demolish older buildings.

Non-structural damage patterns such as interior plaster damage, interior partition wall damage, and broken windows still pose a serious threat to life safety, but generally do not seriously jeopardize the whole structural system. Although they can be indicative of other more serious structural damage. All buildings except the Cathedral House suffered from these non-structural failures. Pounding damage was seen in three buildings, Trust, Elks, and Odd Fellows Buildings. Pounding, sometimes referred to as wracking, is when two adjacent structures collide with one another due to uneven movement during shaking. This type of damage is unique to dense urban areas and most seriously effects URM buildings.\textsuperscript{214} The Elks and Trust Buildings collided with each other creating visible cracking in the masonry. The Elks Building also collided with the adjacent Ferrari Building, a wood frame building with a masonry veneer, cracking masonry in both buildings. The Odd Fellows Building pounded on either side of its façade with the adjacent buildings, all of which were demolished.\textsuperscript{215} The other case study buildings were stand-alone buildings with no adjacent structures to collide with.

<table>
<thead>
<tr>
<th>Failure Pattern</th>
<th>St. Rose Academy</th>
<th>Cathedral House</th>
<th>Cooper House</th>
<th>Trust Building</th>
<th>Elks Building</th>
<th>Odd Fellows Building</th>
<th>St. Francis de Sales</th>
<th>Sacred Heart Church</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Collapse*</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Falling Masonry</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Parapet Failure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gable Failure*</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Masonry Cracking*</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Corner Damage*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Roof Damage*</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interior Plaster Damage</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Interior Partition Wall Damage</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Broken Windows</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diaphragm Connection Failure*</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pounding Damage*</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.5: Reported damage patterns of case study buildings. Failure patterns with * denotes this pattern is generally considered serious structural damage.
Demolition Factors

The decision to demolish each case study building was analyzed based on the numerous reports collected for this study. This included city planning documents, appeals, court cases, environmental impact reports, HABS reports, engineering and damage assessments, newspapers, academic articles, and public hearings. The most common demolition factor was economics, followed by singular cases of life-safety, secondary damage, and aesthetic reasonings.

<table>
<thead>
<tr>
<th>Building</th>
<th>Primary Demolition Factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper House</td>
<td>life-safety</td>
</tr>
<tr>
<td>Odd Fellows</td>
<td>economic/FEMA funding</td>
</tr>
<tr>
<td>St. Rose Academy</td>
<td>economic</td>
</tr>
<tr>
<td>Trust Building</td>
<td>secondary damage/economic</td>
</tr>
<tr>
<td>Cathedral House</td>
<td>aesthetic</td>
</tr>
<tr>
<td>Elks Building</td>
<td>economic</td>
</tr>
<tr>
<td>Sacred Heart Church</td>
<td>economic</td>
</tr>
<tr>
<td>St. Francis de Sales</td>
<td>economic</td>
</tr>
</tbody>
</table>

Table 5.6: Case studies by demolition factor.
The most common demolition factor, economics, was the primary factor for St. Rose Academy, the Elks Building, Sacred Heart Church, and St. Francis de Sales. St. Rose, Sacred Heart, and St. Francis were owned by religious organizations that claimed the cost was too high. As charitably funded organizations, they claimed they could not fund the rehabilitations. Alternative repair proposals for Sacred Heart and St. Francis claimed that the rehabilitations could be done for significantly less than original estimates. The Elks Building was owned by a private owner who claimed that the cost to rehabilitate was significantly higher than to demolish and reconstruct, although this number was disputed by FEMA. The Odd Fellows Building was demolished for economic reasons specifically to receive FEMA funding for the demolition. It was claimed that FEMA would only fund 100% of the demolition cost within the first 30-days after the earthquake. Although FEMA continually funded demolitions well after the 30-days. FEMA funds are not available for the repair or rehabilitation of seismically damaged buildings, but funds for emergency shoring and fencing is available, which seems to have not been well-known information. Economics and differences in estimation will be discussed in the following section.

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217 Martha Mendoza, “Ferrari, Elks Buildings are Quake’s Final Legacy,” Santa Cruz Sentinel, March 6, 1993.
The Cooper House was demolished due to life-safety concerns. The City of Santa Cruz determined, through the recommendations of several structural engineers, that the Cooper House could not be saved and would be a danger to keep standing. Although the justification, reasoning, and haste at which the decision was made has been consistently questioned, the city believed it was acting in the best interest of the community.\textsuperscript{219} The demolition of the Trust Building was due to secondary fire damage and economics. Due to the large number of vacancies after the earthquake in downtown Santa Cruz there was an issue with trespassing and squatting. It was reported that the fire on the night of March 5, 1992, was caused by a trespasser. A suspicious fire also is what led to another Pacific Avenue Contributor to be demolished, the St. George Hotel.\textsuperscript{220} According to the building owner, the price of the restoration of the Trust Building increase from $1.1 million to $1.6 million.\textsuperscript{221} The Cathedral House was demolished for aesthetic reasons, it was blocking the view of the façade of Grace Cathedral. The Episcopal Diocese was very much upfront about the wish to demolish the Cathedral House for this reason, yet earthquake damage was consistently cited as another reason for demolition.\textsuperscript{222} It was reported that the Cathedral House was not only in use after the quake, but the HABS report required as a mitigation measure by the EIR documented that the “building is


solidly constructed and structurally in good condition.”\textsuperscript{223} The demolition factor for the Cathedral House was purely aesthetic to allow for a better view of Grace Cathedral, constructed after the Cathedral House.

Evidence uncovered in this study shows that the reason for demolition posited by either the building owner or city government in charge of demolition decision was not always the complete reasoning for demolition. This is most evident in the case of the Cathedral House. For all of the case study buildings, the reasoning behind each demolition decision was questioned by preservationists, community members, and other agencies.

**Economics**

Economics is often the most important factor in the decision-making between demolition and rehabilitation of a building after a natural disaster, as demonstrated in the section above. Although it is widely accepted historic buildings have extra-financial value, this is often overshadowed in the wake of an earthquake. As the expected costs of rehabilitation are often the determining factor in whether a building is demolished, accurate and unbiased repair estimation is vital. Still, large variations in repair estimates were common in Loma Prieta. These variations came from differing estimates from different engineers, contractors, and estimators. The large price difference generally came from differences in scope of work. These repair estimate differences are highlighted in

Figure 5.9. The bar chart shows the difference between the lowest repair estimate at the bottom with the highest repair estimate at the top.

![Bar Chart: Range of Repair Estimates](image)

Figure 5.3: Range of estimates for repair. Repair cost data for Cooper House and Cathedral House was not reported. Low repair estimate for the Trust Building was before fire damage.

The average range of the difference in repair estimates for the case studies was $3.2 million, which is a large difference that could mean the difference between a building being demolished or rehabilitated. The largest estimate range was St. Francis, as the low estimate was $1 million, while the high estimate was $10 million. The low estimate was from a report commissioned by the National Trust for Historic Preservation and the high report was from an architect who was hired by the potential buyers, another church, who wanted to back out of the deal. While neither of these reports were located to investigate further, it is very possible the estimates were biased based on the goals and motivations of its commissioners.
The lowest range was the Odd Fellows Building, as only one repair estimate was uncovered during research $2.4 million, from engineers hired by the City of Watsonville. Other repair estimates may have been performed, but those were not found. It is unclear what engineering firm completed the estimate and whether the standards of the State Historic Building Code and if the engineer had experience with archaic building materials. The lowest repair estimate range, the Trust Building, was $1.3 million, but the low estimate of $300,000, was before the building was secondarily damaged by a fire.

Repair cost data was not found through research for the Cathedral House and Cooper House. Considering the extensive damage to the Cooper House, the estimate likely would have been in the millions. Since the damage to the Cathedral House was less severe, the cost may have coincided. Without more detailed damage assessments, closer estimates cannot be speculated. Since the demolition factors for these buildings were not economic, it is logical that there is not economic data. The issue of differences in repair cost estimation was highlighted in “An Alternate Seismic Retrofit Proposal for Sacred Heart Church” by conservation professional Randolph Langenbach with engineering by Sven Thomasen. The proposal offered a much lower estimate for the repair and retrofit of the church than an original proposal by the engineer hired by the Diocese of Oakland. The proposal not only gives two separate estimates for the repair of Sacred Heart but

offers an actual bid by a local contractor to complete the work detailed in the proposal. The bid for this work was $779,000, more than four times less than the original estimate by H.J. Degenkolb of $3.5 million. The significant difference in cost comes from different seismic retrofitting techniques. The Degenkolb estimate placed steel braced frame on the interior of the building, while the Langenbach proposal placed reinforced concrete buttresses on the exterior of the building. While this would not have been the most attractive solution, when considering the survival of a building, some exterior alteration should not be disqualified.

In the case of Loma Prieta, not only did repair estimates varied widely, but engineering reports also differed on whether it was feasible to repair the building or not. This issue was highlighted in a study that compared different engineering reports of the Trust Building. An initial report from a local engineer suggested that the Trust Building was too damaged, and it was not feasible to repair and suggested demolition. Other reports, done by those with experience with historic materials, found that not only was the building repairable, but it was also economically feasible to do so. The reports offered two estimates in the $300,000 range. Much lower than the $1.1 million estimate completed by another firm. This wide range between estimates highlights the issue of finding an engineer and contractor that has experience with archaic building materials. During Loma Prieta, engineers without experience with historic buildings often were not

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aware of the provisions of the California State Historic Building Code, which has alternative engineering solutions unique to older buildings. So many of those estimates were based on the provisions based on new construction according to the 1988 Uniform Building Code.\(^{227}\)

For most of the case studies, economics was the primary reason a building was torn down. Due to the large amount of time since the event in this study, the actual replacement cost of each building could be obtained. For each case study, a new construction project was undertaken at the lot where the building once stood. With the exception of St. Rose Academy, which was never rebuilt and the lot is now a parking lot for St. Dominic’s, so the replacement cost for this building was put at zero.\(^{228}\) The replacement cost for each building ranged between $1.3 million and $15 million, with the extreme outlier of St. Francis de Sales’ replacement, Cathedral of Christ the Light, costing $175 million.\(^{229}\) The replacement cost for the new Cooper House was $15 million, for a much larger structure than the original.\(^{230}\) The Cathedral House project cost an estimated $11 million. This project did not replace the Cathedral House with another building but was the creation of an underground parking garage and grand staircase.\(^{231}\)


Considering that for most case study buildings, economics was the primary demolition factor, the difference in costs between estimated repair and actual replacement costs were compared. Both the lowest repair estimate and highest repair estimate were compared against the actual replacement cost. The demolition cost of the original building was not included, as data for all buildings could not be located. The incredibly high cost of the construction of Cathedral of Christ the Light pales in comparison to the estimated repair cost of St. Francis de Sales. The Diocese of Oakland claimed that they could not afford the cost of repairing both St. Francis de Sales and Sacred Heart Church. Yet the high estimate of both churches combined, $13.5 million, is thirteen times less than the construction cost of Christ the Light.\textsuperscript{232}

In the case of Sacred Heart, it was the only case study where the low cost estimate was less than the actual replacement cost, while the high estimate was more than the actual replacement cost. Although the lower estimate was submitted to the Diocese of Oakland, it did not change their mind to preserve Sacred Heart.²³³ Yet, it is important to present differing estimates and bids, as it may change another property owner’s mind. The cost and calculations for the Elks and Trust Building were combined, since the lots were joined, and a singular building was constructed. The difference between estimates and replacement cost ranged between $11.2 million and $14.5 million. A consideration for a higher construction cost than it would be to repair a historic structure is that a larger and more modern new construction can be built. These buildings may be able to produce higher incomes and revenue than the originals thus increasing the value of the lot and building. All of these factors may weigh in a demolition decision. In the case of the Redtree Building, the replacement for the Elks and Trust Building, and the new Cooper House, were much larger structures than the originals, thus increasing the rents and value of the properties. Still, by demolishing the historic structures, the inherent historic and cultural values that those buildings had is lost. Those values are not easily economically quantifiable, leaving those values often less important.

Figure 5.5: Difference between low repair cost estimate and actual replacement cost. Does not include demolition cost.

Figure 5.6: Difference between high repair cost estimate and actual replacement cost. Does not include demolition cost.
Time

The time between the earthquake on October 17, 1989, and the demolition of each case study was dependent on a multitude of factors. Those factors included, amount of damage, review processes required, appeals, preservation efforts, and litigation. The Cooper House was the first case study to be torn down, just eight days after the earthquake. The hasty demolition of the Cooper House and others has consistently been cited as an impetus for the alteration of laws around protection of historic resources after natural disasters. The demolition factor for the Cooper House, life-safety, is the reason the building was demolished so quickly. The City of Santa Cruz claimed that the building was an imminent threat to the safety of the community. \(^{234}\) The Odd Fellows Building was the second building to be demolished, exactly one month after the earthquake. This was due the minimal historic review processes and the belief that FEMA would not pay for demolitions after 30-days, although this was disproven. \(^{235}\) The demolition of the other case study buildings took much longer, ranging from 25 months (2 years) to 48 months (4 years). This was due to bureaucratic processes such as reviews, appeals, and litigation; preservation efforts from various groups; and time to come up with alternative solutions for demolition. St. Francis de Sales took the longest amount of time to demolish, four

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years after the earthquake. This was due to a long review and hearing process as well as a large preservation effort from groups such as the National Trust, Oakland Heritage Alliance, and the Friends of Landmark Churches. The Oakland Diocese was also required to complete an EIR and to make attempts to find a buyer who would repair the church.\textsuperscript{236}

![Figure 5.7: Months between earthquake until demolition of building.](image)

In post-earthquake recovery analysis, downtime is an important metric when considering rehabilitation approaches and options. Downtime is defined as the vacancy period between the disaster and re-occupancy of the building. Downtime includes time to assess the damage, decision-making processes, permitting, repair or demolition and new

construction, and reopening.\textsuperscript{237} In a study of downtime in Loma Prieta and the 1994 Northridge Earthquake, red-tagged buildings that were repaired took a mean of 22 months (1.8 years) versus demolition and new construction were a mean of 43 months (3.6 years), double the amount of time.\textsuperscript{238}

![Downtime, Years](image)

Figure 5.8: Downtime, years between earthquake and completion of replacement.

The buildings in this study had significantly longer downtimes than the overall averages found in Loma Prieta and Northridge. While further research outside of the


\textsuperscript{238} Mary C. Comerio, et al., "Estimating Downtime from Data on Residential Buildings after the Northridge and Loma Prieta Earthquakes," \textit{Earthquake Spectra}, Vol. 26, Issue 4, 2010. https://journals.sagepub.com/doi/full/10.1193/1.3477993?casa_token=K3mBrWJJZNUAAAAA%3AYzB9Z6kGXeMbGkELRaPCHcCF1BuVHfv4kXNT5x4gD7akNwGIDwNLgZ_pDHuoj9foWB2S6qGRc9Bm. This study notably omitted downtime data from Santa Cruz and Oakland.
The scope of this study would be needed to give a definitive answer as to why, these may be related to the long demolition processes related to preservation efforts, securing funding for new construction, and five of the eight case studies being owned by non-profit organizations. The shortest downtime was the Cathedral House at six years. While there was a long demolition decision-process, 42 months (3.5 years), the completion of construction after demolition was 28 months (2.3 years). This is likely related to the fact that the replacement of the Cathedral House was not the reconstruction of a building but the construction of a staircase and subterranean parking garage.239

The longest downtime is that of St. Rose Academy. The downtime for this building is 34 years and counting, as the lot where St. Rose stood had remained vacant. St. Rose Academy was also not relocated, as the school itself closed as a result of the earthquake.240 St. Francis de Sales also had long downtimes both with the replacement church that was constructed on a different site and at the lot where it once stood. The replacement church, Cathedral of Christ the Light was completed in 2008, 19 years after Loma Prieta. This timeline was due to several factors such as the sheer scale of the new construction and high cost. Also, there was a seven-year gap between the demolition of St. Francis and the start of the planning process for the new church in 2000.241

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where St. Francis stood remained vacant for 25 years until it was purchased by the City of Oakland. A large affordable housing project called Cathedral Gardens was constructed and completed in 2014. The replacement for the Elks and Trust Buildings was one building on the combined lots, called the Redtree Building. The mixed-use commercial, office, and residential building was completed in 1999, ten years after quake and seven and eight years after the demolitions of each building respectively. The new Cooper House was also completed at the same time in 1999 as the Redtree Building, marking the opening two large replacement buildings on Pacific Avenue in Santa Cruz.


CHAPTER VI

CONCLUSION

Findings

This thesis was a study of the demolition of historic buildings damaged in the 1989 Loma Prieta Earthquake. Using a case study model, it sought to answer the following research questions: what were the circumstances that led to the demolition of each building? What were the decision-making processes that led to a demolition decision for each building? And what were the similarities and differences between the circumstances of each building?

This study analyzed eight case study buildings in San Francisco, Oakland, Santa Cruz, and Watsonville. It laid out the circumstances leading to the demolition of each building, such as what organizations, agencies, and owners were involved; how the damage to the building was assessed; which laws and regulations applied to each structure; what preservation efforts were undertaken; and what factors led to each demolition. Overall, each case study building had distinct circumstances that led to its demolition. While there were similarities and patterns between case studies, each was unique based on a combination of its historic status, location, type of damage, building construction, ownership and use, and laws and regulations it was beholden to. The decision-making processes for the demolition of each case study was based on a complex interplay between local city governments, property owners, and preservationists. City governments were the most important decision-maker, as they were the arbiter of
demolition permits. For two case studies, the Cooper House and Odd Fellows Building, city governments were the ones directing the demolition, yet still received approval from the property owners. For the other case study buildings, the property owners were the initiators for demolition, but a property owner still needed approval from its jurisdiction before proceeding with demolition.

Property owners sought demolition for each case study building for a variety of factors, but the most common was economic, meaning it was viewed that the cost of repair and seismic retrofit of the building would be more expensive than demolition and new construction. This economic reasoning was based on the assessment of the building from engineers hired by either the city or property owner. This study found that there was large variation between cost estimations for the repair of the buildings. This could be due to a multitude of factors such as repair or retrofit techniques, differences in scope of work, understandings of building codes, and if the engineer had experience with archaic building materials and systems. Once each building was demolished, with the exception of St. Rose Academy, a replacement building was constructed. For case study buildings where the primary demolition factor was economic, the high and low repair cost estimates were compared to the actual replacement cost. There was a split between case studies on whether the replacement cost was higher or lower than the estimated repair cost. The two buildings where the replacement cost was higher than both the low and high repair estimate, St. Francis de Sales and the Elks & Trust Building, the replacement buildings were much larger in scale than the original historic building. While further research would be required, it is possible a motivating factor for the demolition of
historic buildings could be that a much larger, thus higher income producing, building could be constructed in its place.

This study found that the historic status of six of the eight case study buildings changed between the earthquake and their demolition. Two case study buildings, the Elks and Trust Buildings in Santa Cruz were “demoted” in their historic status. This was due to the significant number of Contributing buildings being demolished in the Pacific Avenue Historic District that it was de-listed from the National Register. This removed the buildings’ Contributor status and placed the buildings’ status as Eligible for the National Register. This status had less protections under law than Contributor status did. For four of the buildings, the historic status change was used as a tool by preservationists to save the building. The finding of a building as Eligible for the National Register of Historic Places puts legal protections on that building under laws such as CEQA and Section 106 of the NHPA. These laws generally require environmental review before the demolition can proceed. In 1989, once a state of emergency was declared, the protections for historic buildings under these laws were suspended. So, the normal process of review before demolition was not necessary and demolitions were approved often only by the city government, with no outside reviews. Ultimately the attempts to change the historic status to save the buildings were unsuccessful, but this tactic was successful in other cases after Loma Prieta.

Overall, the demolition of these eight buildings were a serious loss to the communities they belonged to. Some people lost their places of worship, their community meeting place, their school, and businesses lost their long-standing locales. For every
case study, there were aspects of the demolition decisions, factors, and review processes that were questionably handled. These issues came in the form of disputing the demolition factors or reasoning, whether that factor be a disagreement on economics, or the feasibility of repairing a building. The issues also stemmed from an inconsistent and uneven review process and applications of the law. Jurisdictional differences between local ordinances and how jurisdictions applied and enforced state laws such as CEQA, led to uneven review processes.

This Loma Prieta Earthquake identified serious pitfalls in the protections of historic resources from unnecessary or improperly reviewed demolitions. Two important pieces of legislation were passed in the wake of Loma Prieta, Senate Bill 3X passed in November 1989 and Executive Order W-26-92 passed in July 1992. Senate Bill 3X prevented demolitions of listed historic resources without review and approval from the California SHPO. Although it only applied to listed historic resources. W-26-92 removed the State of Emergency exemption from CEQA, and applied to historic resources found in local surveys, local registers, or found eligible for a historic register.245 Today, California Code, Public Resources Code - PRC § 5028 is the most important law governing the demolition of damaged historic structures. It details that no structure that is listed on the National Register, California Register, or any local register, that has been damaged in a natural disaster, may be demolished, destroyed, or significantly altered, unless the structure presents an imminent threat to the public of bodily harm or of

damage to adjacent property, without SHPO approval. The SHPO may make its determination based on the extent of the damage, the cost of rehabilitation, the historical significance. Also, a team of selected by the SHPO comprised of three residents with historic preservation experience who reside in the affected county will be consulted in the demolition decision.246 Local jurisdictions have also increased their historic building protections such as Santa Cruz’s Historic Preservation Ordinance passed in 2003, which found that a demolition permit for buildings listed in the Santa Cruz Historic Building Survey, or State or National Register, cannot be demolished without approval from the Historical Commission. Although there is an exemption for hazardous or dangerous buildings.247 It is unclear how this ordinance would be applied to earthquake damaged historic buildings. Other ways of protecting historic resources can be preemptive, through seismic retrofitting. California and each local jurisdiction have specific seismic retrofitting requirements, some mandatory depending on building type, use, and occupancy, and some voluntary. Seismic retrofitting greatly decreases the likelihood a historic building will be damaged and demolished due to structural damage. There are also several grants aimed at increasing seismic retrofitting throughout California.248

In 1994, the Northridge Earthquake struck Los Angeles, the last large earthquake in California to affect a largely populated area. There does not appear to be a comprehensive survey that detailed demolitions of historic buildings after Northridge. But awareness about historic buildings and earthquakes did seem to increase in the five years since Loma Prieta. This is evidenced in the Benson House, a 1912-San Fernando bungalow that was damaged. Since the building was found eligible for the National Register, they were given a significant repair grant from the Historic Preservation Partners for Earthquake Response, a group that found grants through FEMA, U.S. Department of the Interior, local banks, and several historic preservation groups. This group appears to no longer exist, but funding resources of the sort could be the deciding factor in a demolition decision in the future.249

While there have been significant legislative changes aimed to protect natural disaster-damaged historic buildings from demolitions, these laws have not been tested in the thirty-years since the Northridge Earthquake. Both earthquakes were noted by scientists to be much smaller earthquakes than what is possible.250 If a 1906 Earthquake-sized 7.9 Mw earthquake were to strike a populated area in California, the damage would be immense and devastating. It is unclear if the legislation aimed at protecting historic buildings would hold up to an all-encompassing mass-casualty disaster. It is also unclear if the strong preservation ethic fostered in California after the last few decades would be present in a disaster where so much of the built environment would be damaged or

destroyed. Time will tell if the legislative changes made will truly protect historic buildings from demolition.

Areas of Future Research & Recommendations

This thesis was a comparative analysis of buildings demolished in the wake of the Loma Prieta Earthquake. Using a case study model, an in-depth analysis of these buildings was achieved. An area of further research would be to complete a more holistic study of the demolition of historic structures after Loma Prieta. From this data, statistical analysis could be completed to determine large-scale patterns found across buildings. A pattern noticed by the author was that four of the eight case study buildings were owned by religious institutions. While it is plausible that ownership by religious institutions may be a contributing factor to demolition, without a more holistic survey of demolished structures, that can’t be determined. It is possible this is due to unintentional case study selection bias. A limitation to completing such a study would stem from the availability of data from city governments. Due to inconsistencies between different jurisdictions and cities, holistic and comprehensive data concerning the demolition of buildings, especially ones determined to be historic, is not available. Only one report, “An Assessment of Damage Caused to Historic Buildings by the Loma Prieta Earthquake,” from August 1990 completed by Architectural Resources Group, provided any statistical data concerning historic buildings in Loma Prieta. Since the report was published less than a year after the earthquake, it left out the demolition of several historic buildings. The sources it cited were reports completed by city governments. These types of reports,
which were continually sought by the author, no longer exist in city archives due to the
time elapsed since the earthquake.

Another area of future research would be to complete more in-depth engineering
study of the damage of case study buildings or other buildings damaged in the
earthquake. A limitation of this thesis is that engineering reports were not consistent
across case studies. This is due to the availability of these reports or due to various types
of reports being completed for each building. Through extensive research and document
requesting from different agencies, it was determined that some of these engineering
reports no longer exist. Also, engineering reports created for private property owners are
not part of the public record. To complete a reassessment of the damage to a building that
no longer exists would be difficult. Still, someone experienced within the field of
engineering could make interesting revelations about the demolitions of these buildings
or others. A study such as this may be able to inform potential hazards or seismic
retrofitting techniques to better equip historic buildings for the next earthquake.

This study identified several issues that arose in Loma Prieta, that nearly 35 years
later, are still pressing concerns for the next large earthquake. An issue is having
engineers, but also architects, estimators, and contractors who are versed and experienced
with historic and archaic building systems and materials. There are no specialist degree
programs in the United States for preservation engineering and most engineering
programs have no curriculum on archaic systems. This limits preservation education for
engineers to on-the-job training or attaining another degree in historic preservation. There
are efforts to increase preservation engineering education through organizations such as
the Association for Preservation Technology (APT) and the National Center for Preservation Technology and Training (NCPTT).  

Still, there are concerns that if a large earthquake hit a city with a historic urban core, there would not be enough engineers trained in historic materials and would result in improper assessments and treatments. This could ultimately lead to the demolition of historic building or improper treatment of historic fabric. Organizations such as APT’s Preservation Engineering Technical Committee created the Disaster Response Initiative Task Group (DRI), which maintains a database of trained disaster responders and holds disaster assessment training workshops. Still, more education on historic buildings and their materials, historic buildings codes, and proper treatments are needed in preparation for the next disaster.

The Loma Prieta Earthquake and the loss of historic buildings can be used as a warning for other places with seismic activity in the U.S. and abroad. Like California, other seismically active places such as the Pacific Northwest, Alaska, Hawaii, Missouri, and South Carolina are at risk of a large earthquake that will damage historic resources. A report in 2019 found that there were 4,500 hazardous unreinforced masonry buildings in

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Washington State alone. An increase in seismic awareness is desperately needed in places where seismic activity is not as common. While a damaging earthquake is less likely, this also means that location also has a less resilient built environment, if an earthquake occurs. Cities with large amounts of historic resources such as, Charleston, Washington DC, Philadelphia, New York, Boston, and other major cities should consider seismic retrofit ordinances, as well as demolition-preventative codes and measures to protect historic buildings before and after an earthquake occurs.

Significance

The purpose of studying the Loma Prieta Earthquake’s effect on historic resources is to understand the past to better inform the future. It brings awareness to what can happen with improper management of historic resources after an earthquake or other large-scale natural disasters. There is a 99% likelihood of a large 6.7Mw or greater earthquake in California in the next 30 years. While earthquake preparedness has increased greatly, in large part to damaging quakes like Loma Prieta and Northridge, there will inevitably be serious damage to historic structures in the next large earthquake. The answer to protecting historic buildings in earthquake prone areas is seismic retrofitting. Strengthening schemes can protect a historic building and there are

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thoughtful ways to strengthen a building while disturbing the historic fabric as little as possible. Yet, a common misunderstanding about seismic retrofitting buildings is that it will prevent all damage once complete. There can be different goals of a retrofit project ranging from reducing collapse risk, protecting life-safety, limiting damage, to limiting downtime after an earthquake. Still, the best way to protect lives and historic buildings is to increase retrofit efforts.

While most, but not all of California’s unreinforced masonry buildings have either been retrofitted or demolished, there are still other serious seismic hazards. Attention has turned to the lesser known hazard of non-ductile concrete buildings that were constructed before 1980. There is also still the issue of wood-frame buildings with soft-stories throughout cities in California. The seismic retrofitting of these structures has been steady, yet a recent Los Angeles Times report found that there were over 6,000 hazardous structures in Los Angeles alone. In 2023, the Structural Engineers Association of California said “Despite our global leadership on seismic safety and commendable work in Los Angeles, Santa Monica, San Francisco, Berkeley, Oakland, and San Jose to identify vulnerable structures, these measures are not enough. California cities are plagued with thousands of buildings at risk of collapse.”


earthquakes such as Loma Prieta and Northridge, so too will the urgency of retrofitting our buildings. It is important that the next large earthquake is accounted for and expected, so it is not a “wake up call” type event.

The focus of this thesis was not to determine whether a building should or should not have been demolished. A question that may be near impossible to truly determine. Rather the purpose was to shed light on the decision-making processes and circumstances that led to demolition. While the author may have her own opinions and conclusions on the justifications of each demolition, the purpose of this thesis is to gather and present data so the reader may make their own conclusions. It serves as a cautionary tale as to the loss of cultural heritage that may happen when action is not taken to seismically retrofit our beloved old buildings.
APPENDIX A:
SELECTED DAMAGE PHOTOGRAPHS

Cathedral House, San Francisco

Cathedral House, 1993. Source: HABS.
Cathedral House, 1993. Source: HABS.
Cathedral House, 1993. Source: HABS.
Cathedral House, 1993. Source: HABS.
Cathedral House, 1993. Source: HABS.
Cathedral House, 1993. Source: HABS.
Cathedral House West Elevation Drawing, 1993. Source: HABS.
Cathedral House East Elevation Drawing, 1993. Source: HABS.
Cathedral House North and South Drawings, 1993. Source: HABS.
Cooper House, Santa Cruz

Cooper House, 1989. Source: Santa Cruz Public Library.
Cooper House, 1989. Source: Santa Cruz Public Library.
Cooper House, 1989. Source: Santa Cruz Sentinel
Cooper House, 1989. Source: Santa Cruz Public Library.
Cooper House Interior, 1989. Source: Santa Cruz Public Library.
Cooper House Interior, 1989. Source: Santa Cruz Public Library.
Cooper House Interior, 1989. Source: Santa Cruz Public Library.
Cooper House Demolition, 1989. Source: Santa Cruz Public Library.
Cooper House Demolition, 1989. Source: Santa Cruz Public Library.
Cooper House Demolition, 1989. Source: Santa Cruz Public Library.
Cooper House Demolition, 1989. Source: Santa Cruz Public Library.
Trust & Elks Building

Trust and Elks Building, 1989. Source: Santa Cruz Public Library.
Trust Building, 1989. Source: Santa Cruz Public Library.
Trust Building, 1989. Source: Santa Cruz Public Library.
Trust Building, 1989. Source: Santa Cruz Public Library.
Trust Building, 1989. Source: Santa Cruz Public Library.
Trust Building, 1989. Source: Santa Cruz Public Library.
Trust Building after Fire, 1992. Source: Santa Cruz Public Library.
St. Francis de Sales

St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
St. Francis de Sales, 1992. Source: HABS
Bishop John Cummins locking the door of St. Francis before its Demolition, 1993. Source: *San Francisco Chronicle*
Sacred Heart Church

Sacred Heart Church, 1990. Source: Oakland Heritage Alliance.
Sacred Heart Church, 1992. Source: Oakland Heritage Alliance.
Sacred Heart Church, 1992. Source: Oakland Heritage Alliance.
Odd Fellows Building, Watsonville

Odd Fellows Building, 1989. Source: Spenneman & Look
Odd Fellows Building, 1989. Source: HABS.
Odd Fellows Building, 1989. Source: HABS.
Odd Fellows Building, 1989. Source: HABS.
Odd Fellows Building, 1989. Source: HABS.
Odd Fellows Building Interior, 1989. Source: HABS.
St. Rose Academy, San Francisco

St. Rose Academy, c.1930s. Source: *The New Fillmore.*
St. Rose Academy Door, n.d. Source: Flickr.
The author could not locate any additional images of St. Rose Academy from any time period. No images of earthquake damage could be located.

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260 The author could not locate any additional images of St. Rose Academy from any time period. No images of earthquake damage could be located.
REFERENCES


Cackler, Jamie S. “City takes over ownership of Cooper House’s bricks.” Santa Cruz Sentinel, November 2, 1989.


California Earthquake Authority, “Earthquake Retrofit Grants.”

https://codes.findlaw.com/ca/public-resources-code/prc-sect-5028/#:~:text=(a)%20No%20structure%20that%20is,%2C%20may%20be%20d
molished%2C%20destroyed%2C.


https://digitalcommons.law.ggu.edu/cgi/viewcontent.cgi?article=1186&context=caldocs_agencies


“Cathedral of Christ the Light.” SOM. Accessed March 8, 2024.


City and County of San Francisco, Department of City Planning. “Notice that an Environmental Impact Report is Determined to be Required.” January 9, 1992.

City and County of San Francisco. “San Francisco Preservation Bulletin No.16.” City and County of San Francisco Planning Department, 2008, 1-43. Accessed October 20


https://journals.sagepub.com/doi/full/10.1193/1.3477993?casa_token=K3mBrWJJZNUAAAAA%3AYzB9Z6kGXeMbGkELRaPCHcCF1BuVHfv4kXNT5x4gDi7akNwGDwNLgZ_pDHuoj9foWB2S6qGRC9Bm


https://www.uvm.edu/~dwporter/ncptt/papers/fidler_plenary_ENGINEERING%20AND%20CONS%20EDUCATION.pdf


https://www.galvestonhistory.org/preservation/preservation-resources


https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=ddb14f53ccc9d820a6e4292a2d144014009d5bcb


Hao, Claire. "About 3,900 San Francisco buildings are made in the same way as Turkish ones flattened in the earthquake.” *San Francisco Chronicle*, February 18, 2023.


https://savingplaces.org/stories/preservation-tips-tools-how-to-save-a-place-apply-for-historic-designation


Lasnier, Guy. “Mall demolition less than feared, Cooper House is doomed.” Santa Cruz Sentinel, October 24, 1989.


https://www.govinfo.gov/content/pkg/GOVPUB-C13-db7c73224cd4609bae7fee3f9840d6ec/pdf/GOVPUB-C13-db7c73224cd4609bae7fee3f9840d6ec.pdf

https://scholarsmine.mst.edu/cgi/viewcontent.cgi?article=3614&context=icrageeds


Marks, Jamie. “Main Street crumbles further.” Santa Cruz Sentinel, November 19, 1989.


Mendoza, Martha. “Ferrari, Elks Buildings are Quake’s Final Legacy.” *Santa Cruz Sentinel*, March 6, 1993.


https://www.asce.org/publications-and-news/civil-engineering-source/civil-engineering-magazine/issues/magazine-issue/article/2023/07/hands-on-experience-is-key-to-historic-preservation-engineering


Sacred Heart Church Oakland. “Get to Know Our History.” Accessed March 2, 2024. https://sacredheartoak.org/get-to-know-our-history


*San Francisco Heritage, et al., v. San Francisco Department of Public Works,* Appeal No. 91-091, Board of Permit Appeals, City and County of San Francisco.


https://news.ucsc.edu/2009/10/3221.html


https://books.google.com/books?id=DrNI5epOEQgC&pg=PP1#v=onepage&q&f=false

USGS, “What is the probability that an earthquake will occur in the Los Angeles Area? In the San Francisco Bay Area?” Accessed November 22, 2023.


Wilson, Donald L. “Memories in the Rubble of the Cooper House.” Santa Cruz Sentinel, October 27, 1989.

