



## ABSTRACT

Title of Thesis:       **THIS DEBRIS MATTERS: PRESERVING FIRE-DAMAGED HISTORIC BUILDINGS**

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Historic buildings are damaged every year by fire. Without proper intervention many of these buildings are demolished or altered without understanding the property's significance. This thesis research addresses the question: can a historic building damaged by fire retain its significance and integrity? Specifically it asks: can a historic building damaged by fire retain its significance and integrity as defined by the National Register of Historic Places? To address this question, this thesis research examines how different preservation standards are applied to preservation, rehabilitation, restoration, and reconstruction activities. It also examines the close interaction required for these activities by a number of stakeholders including property owners, architects, engineers, fire professionals, insurance companies, and historic preservation professionals.

This treatise is organized in two general parts. The first part examines how significance, identity, and integrity are understood by preservation professionals, as specifically related to fire damaged buildings. It also examines firefighting, fire

investigation, and insurance, and their role in preserving a building's significance, identity, and integrity. The second part consists of four case studies to place the hypothesis in real world context. This analysis shows that a building can retain significance and integrity after being damaged by fire.

This thesis research shows the importance of integrity of association and feeling in post-fire preservation. These two aspects of integrity can sometimes outweigh other aspects of integrity after a catastrophic event. This research also shows the importance of a building's identity. A building with historic significance but little identity sometimes has little chance of being preserved. However, a building with immense identity but little historic significance will be preserved because the community becomes a partner in preservation.

Subject Headings: Devereaux Mansion, disaster recovery, fire investigation, fire prevention, identity, integrity, insurance, Kearns Mansion, post-fire historic preservation, Provo Tabernacle, significance, Windsor Castle.

THIS DEBRIS MATTERS:  
PRESERVING FIRE-DAMAGED HISTORIC BUILDINGS

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Thesis submitted to the Faculty of Goucher College in partial  
fulfillment of the requirements for the degree of  
Master of Arts in Historic Preservation  
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## CHAPTER I INTRODUCTION

Approximately every minute a structure in the United States is damaged by fire. Most of these fires are preventable and fire professionals are working diligently to lower the numbers. Despite their efforts, fires still happen. When the fire is out, owners are left asking “now what?” They may wonder how to recover lost personal property or even if the building can be saved. Some post-fire preservation issues are common to every building but some issues become more complicated when the fire takes place in a historic building. This thesis research examines preservation issues and strategies for historic buildings damaged by fire. It asks: Can a historic building damaged by fire retain significance and integrity? Specifically; Can it retain significance and integrity as defined by the National Register of Historic Places criteria?

### The Problem

The National Fire Protection Association, the nation’s leading research, training and code organization devoted to preventing building fires has a number of statistics related to causes of fire and fire frequency in many building types. Unfortunately, none of their statistics relate specifically to fire in historic buildings.<sup>1</sup> Fires in historic buildings can be particularly damaging because many of these buildings do not meet current fire code in construction methods and materials.

Major fires in historic buildings in the last several decades have spurred some in the preservation community to seriously look at fire prevention measures that can be easily accommodated in historic spaces.<sup>2</sup> This may be due to increased press coverage of fires in historic building at the local, national, and international level. For example, in the past few years *Preservation Magazine* has noted fires in historic buildings including Eastern Market, Washington D.C.; the Texas Governor's Mansion; the Pagoda at Point Defiance Park, Tacoma, Washington; El Portal Market near Yosemite National Park; Georgia Theater, Athens, Georgia; and the First Mount Olive Freewill Baptist Church, Baltimore, Maryland to name but a few. Major fires outside the United States covered by the news media include those at York Minster, Castle Howard, and Windsor Castle in England, Odd Fellow Palace in Copenhagen, Mount Stromlo Observatory in Canberra, Australia, and Glienicke Jagschloss hunting lodge in Berlin, Germany.

### Scope

This thesis research focuses primarily on significance and integrity as defined by the National Register of Historic Places because those definitions are used to determine eligibility for inclusion in the National Register. However, there are a number of other definitions of significance and integrity that are explored; ones that are useful in considering the question posed by this thesis research. Some of these additional definitions are discussed in this treatise to provide context and contrast to the more narrow definitions prescribed by the National Register of Historic Places.

In addition, this thesis research uses the *Secretary of the Interior's Standards for Treatment of Historic Properties* as the basis for examining potential preservation

treatments and activities. These preservation activities range from stabilization to reconstruction with many in between. Post-fire preservation activities also include careful documentation of a building after a fire, salvage of the character-defining building features, thoughtful consideration of how to restore the building, and consideration of how to minimize the impact of future fires.

It should be noted that the preservation strategies for fire-damaged historic buildings discussed in this treatise could have application for preserving buildings damaged by other types of disasters. However, this thesis research focuses on retaining a historic building's significance and integrity after a fire. This work will contribute to the growing field of post-catastrophe preservation of historic buildings and will show how a building can retain National Register defined significance and integrity after a fire.

### Partners in Preserving Fire Damaged Buildings

In addition to historic preservationist professionals and property owners, firefighters, fire marshals, and insurance companies are critical partners in preserving historic buildings after fire. Their understanding of the importance of retaining historic fabric, particularly in the first few days after a fire, has a major influence on whether or not the building retains significance and integrity. Character-defining building elements are often at risk immediately after a fire. Rooms once kept at a relatively constant temperature may be susceptible to rapid temperature swings. Areas once protected from water may become flooded from the firefighting efforts. Rooms normally enclosed are fully open to weather. Without a quick response to save significant building elements

long-term decisions to retain significance and integrity may be more difficult or impossible.

By its very nature the firefighting process also has a major impact on historic character and thus significance and integrity. Fire personnel's first concern is the safety of persons in or near the burning building, their own safety in fighting the fire, containing the fire, and finally extinguishing the blaze. They have little concern with potential damage to character defining elements that may be affected by their actions. This treatise focuses on the role of all of these groups in preserving significance and integrity after a fire. This thesis research will show how property owners, historic preservation professionals, architects, construction companies, fire fighters, insurance companies, and others working together can retain the significance and integrity of building before, during, and after a fire.

### Thesis Organization

This treatise is organized into several sections. Chapter II creates the framework of significance and integrity as defined by the National Register. It also examines how these two important ideas are defined differently by historic preservation scholars and writers. This chapter analyzes various definitions and uses of significance and integrity. Chapter II also includes discussion of possible preservation treatments for historic buildings after fire. It concludes with review of how and why a property may be removed from the National Register of Historic Places.

Chapter III focuses on the team of people needed to preserve a historic building after fire. It reviews the basics of fire prevention, fire fighting, and fire investigation and

includes a discussion of the basic ideas of building insurance. After reviewing these basic ideas, Chapter III focuses on how property owners and others can be stronger advocates for their historic buildings and provides ideas of how to increase awareness of historic buildings among fire and insurance professionals.

The case studies in Chapters IV through VII are used to examine the ideas and principles outlined in Chapters II and III. These case studies are used to show the successes and failures of preserving historic buildings after fire. They provide real life examples of how significance and integrity were used to guide post-fire preservation treatments and show the critical roles each member of the team from property owners to architects and fire marshals to insurance companies play in helping a building retain significance and integrity.

The treatise concludes with a summary of the research findings in Chapter VIII. This research will show that a building can retain significance and integrity after fire and provide examples of how the criteria are used to determine preservation activities. After summarizing the research findings, the treatise concludes with recommendations for property owners who want to preserve a fire damaged historic building and gives some ideas for further research into the topics discussed in this work.

### Research Methods

The thesis topic was selected in part because of extremely limited literature on the topic of post-fire preservation. Extensive research in library databases, online article and book catalogues, and internet sources revealed very little information dealing directly

with post-fire preservation of significant historic buildings. Research began with a literature review of available information about fire prevention and fire recovery. Published information from organizations like the Federal Emergency Management Agency, the National Fire Protection Association, the European Cooperation in Science and Technology, and the International Council on Monuments and Sites led to other sources about fire prevention and recovery. Research into typical firefighting and fire investigation activities began with standard textbooks like *Kirk's Fire Investigation* and *Essentials of Fire Fighting and Fire Department Operations*.

Analysis of the ideas of significance and integrity began with the *Secretary of the Interior's Standards for Treatment of Historic Properties*. A literature review of significance and integrity in historic preservation sources as well as close reading of books like David Lowenthal's *The Past is a Foreign Country* also brought to light many relevant ideas with application to the challenges of post-fire preservation.

Finally, a literature review and multiple internet searches revealed numerous examples of historic buildings damaged by fire throughout the world. The availability of source material about specific fires led to a focus on fires in buildings with public access or community significance. Most of the information about the Provo Tabernacle fire came from my personal experience and observation along with numerous conversations with members of the salvage and design teams still working on the project. Information about the Kearns Mansion fire came primarily from sources available at the Utah State Archives and conversations with Wilson Martin, Utah State Historic Preservation Officer who worked on the restoration of the building after the fire. Information about the



Devereaux Mansion fire came from a Historic Structures Report completed in 2011, sources at the Utah State Archives and Church History Library in Salt Lake City, and conversations with building contractor Craig Paulsen. Most of the information on the Windsor Castle fire came from published articles and books about the building, the fire, and the recovery efforts. The Windsor Castle fire and recovery was the most published account of fire recovery of any building I could find.

### Case Studies

Four case studies are used to illustrate how significance and integrity were retained after fires. They were selected to show a variety of fire sources, extent of damage to buildings, and preservation strategies. The case studies were selected based on a number of criteria. First, all of the buildings were listed in the National Register of Historic Places or its equivalent before the fire took place. Second, all of the buildings suffered damage from the fire itself as well as damage from the firefighting efforts that affected structural systems and finishes. Third, while all of the buildings suffered major interior damage the exterior walls retained structural integrity. Fourth, all of the case study buildings underwent some kind of post-fire preservation activity. The four case studies show preservation decisions made over several decades. A case study from England was included because of the continued international discussions about fire prevention in historic structures.

Case Study 1 – Provo Tabernacle, Provo, Utah: The Provo Tabernacle, completed in 1898, is one of the most important public spaces in the city of Provo and is a landmark of The Church of Jesus Christ of Latter-day Saints. The building had been renovated a

few times since completion to make the space more functional. The tabernacle was heavily damaged on December 17, 2010, by an electrical fire caused by sound and light equipment brought into the building for a musical performance. The fire started in the attic and in the course of fighting the fire the roof collapsed. The interior of the building burned for an additional two days. The building is currently being stabilized and partially restored with an anticipated project completion date in 2015.

Case Study 2 – Kearns Mansion, Salt Lake City, Utah. The Kearns Mansion was built in 1902 as the residence of one of Utah’s wealthiest mine owners. The mansion became the home of Utah’s governors in 1937. In 1993 the interior of the home was heavily damaged by a fire caused by faulty wiring in a Christmas tree. While the fire damaged some of the most architecturally significant features in the building’s interior it did not cause a roof collapse. The building was restored by the State of Utah and is still used as the official governor’s residence.

Case Study 3 – Windsor Castle, Windsor, England: Windsor Castle is one of the principal residences of the British Monarchy. In 1992, a portion of the castle undergoing renovation was heavily damaged by fire. Portions of the roof collapsed causing damage to interior walls. Typical of all Crown buildings, the castle was uninsured. The Royal Family restored the structure using their own funds with the restoration work completed by professionals from throughout the British Isles. While some portions of the damaged building were restored exactly to their pre-fire condition, other spaces were redesigned to change aesthetics or improve functionality.

Case Study 4 – Devereaux Mansion, Salt Lake City, Utah: The Devereaux Mansion was one of Salt Lake City's most recognized late 19<sup>th</sup> century residences. The mansion fell into disrepair in the 20<sup>th</sup> century as surrounding land use changed. By the 1970s the building had been extensively altered and then abandoned. The State of Utah purchased the site in 1977 intending to restore the house. In 1979 the house was heavily damaged by an arson fire. A portion of the roof collapsed and there was major fire damage to some interior finishes while other finishes were only slightly damaged because of fire breaks. The State of Utah subsequently restored the home using tax dollars and a small insurance settlement as primary funding sources.

## CHAPTER II

### SIGNIFICANCE, INTEGRITY, AND PRESERVATION TREATMENTS

#### Introduction

Historic preservation is intrinsically linked to significance and integrity. A number of definitions and ideas about these concepts are available. However, historic preservation in the United States largely focuses on these concepts as defined by the National Register of Historic Places and the *Secretary of the Interior's Standards for Historic Preservation*. This chapter focuses on significance and integrity with special attention to the National Register definitions. It then explores the impact of these ideas on preservation treatments in historic buildings after devastating fires.

#### Historic Preservation and Significance

##### Definitions of Significance

Significance is related to something of importance or of consequence.<sup>3</sup> It can be personal or tied to a larger story, event or idea. It can be physical or emotional. Significance finds meaning in everyday events as well as the unique event. For example, someone could find significance in a new job, visiting a city they have never been to before, or participating in a sporting or cultural event. One historic preservation professional defined significance as “the quality of conveying some special meaning or import. Historical significance is carrying meaning about history.”<sup>4</sup> This means taking the

facts and dates about history and finding relevance or meaning in them. Historic significance creates context and connection for seemingly unrelated and mundane events of the past.

Valuing the past can lead to increased significance for certain people, places, events, or ideas. This increased value and interest in the past is often summed up in the ideas of heritage. Heritage is manifest in many ways. It can be the family history stories passed down from one generation to the next. It can be inherited property or other goods. Transmission of heritage explains why people celebrate anniversaries, carry on family traditions, or collect artifacts from their ancestors. Heritage has become one of the leading leisure activities in the United States as people seek to connect more personally with the significant events of history as well as their own families. Places that twenty years ago were largely unknown are now being protected as awareness of heritage increases.<sup>5</sup> An increased interest in heritage leads to an increased interest in visiting museums, historic homes, or cemeteries.

In *The Past is a Foreign Country*, David Lowenthal asserts that significance changes based on our perceptions and understanding of the past. “Valuing antiquity leads us to proclaim its existence; here it is, we want to say, an early, original, or ancient feature...Designation locates the antiquity on our mental map and lends it status.”<sup>6</sup> He also links significance closely to its value to one or more segments of a society. For example, a new building may have more significance than a several hundred-year-old building for a particular community or individual.

Lowenthal also views significance as an ongoing process that changes over time, not something that is fixed in time. This may occur due to alterations made to the building itself, changes to its surroundings, or changes in society at large that alters our perception of the importance of the building's architecture, events that occurred in the building or associated person. For example, an ordinary house may become historically important due to an event occurring years after it was completed, such as the McLean House at Appomattox, Virginia, where Lee surrendered to Grant. On the other hand, society's changing notion of what is significant may alter a building's status. When plantations were first listed in the National Register, few if any slave quarters were even mentioned. Over the past decade, as society has come to recognize the contributions of enslaved people to plantation development, many of the early nominations have been amended to expand their significance.

A building's significance must be clearly understood before undertaking any preservation activity. One of the first to recognize this was Viollet Le Duc in his essay "On Restoration."<sup>7</sup> Le Duc, a 19<sup>th</sup> century French architect and teacher, was noted for his restorations of a number of important buildings in France including Notre Dame de Paris and the Chateau de Pierrefonds, as well as the fortified city of Carcassone. He admonished anyone working with old and historic buildings to understand as much of the structure's history as possible through historical records and examination of the building itself. He also insisted that the restorationist document the building as-is during the process of understanding what was significant and what was not significant.

More recently, Lee H. Nelson, FAIA, one of the leaders of historic preservation in the United States provided guidance in understanding the physical characteristics of a historic resource in *Preservation Brief 17: Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character*. The preservation brief focuses on the importance of design, materials, and workmanship noting that, “if the various materials, features and spaces that give a building its visual character are not recognized and preserved, then essential aspects of its character may be damaged in the process of change.”<sup>8</sup> Many historic preservation professionals focus on the physical aspects of a building to determine significance, especially when that significance is connected to architecture. However, other definitions of significance provide broader ideas that connect to events, association, or other ideas as well as architectural significance.

#### Significance in the National Register of Historic Places

Unlike other definitions of significance the National Register of Historic Places provides a rather narrow definition of significance focusing on broad trends in American history. Under the National Register, a building, site, structure, or landscape may be significant under one or more themes, including;

“with events that have made a significant contribution to, and are identified with, or that outstandingly represent the broad patterns of United States history and culture and from which an understanding and appreciation of those patterns may be gained; or, are associated importantly with the lives of persons nationally significant in the United States history or culture; or, represent great historic, cultural, artistic or scholarly ideas or ideals of the American people; or, embody the distinguishing characteristics of a resource type that: is exceptionally valuable for the study of a period or theme of United States history or culture; or represents a significant, distinctive and exceptional entity whose components may lack

individual distinction but that collectively form an entity of exceptional historical, artistic or cultural significance (e.g., an historic district with national significance), or outstandingly commemorates or illustrates a way of life or culture; or, have yielded or may yield information of major importance by revealing or by shedding light upon periods or themes of United States history or culture.”<sup>9</sup>

The National Register examines significance in four distinct areas. First, a property may be significant for association “with events that have made a significant contribution to the broad patterns of our history.” Second, significance may be granted for association “with the lives of significant persons.” Third, a property may be significant when it “embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction.” Fourth, a property may be significant if it “has yielded or may be likely to yield, information important in history or prehistory.”<sup>10</sup> Basically, a site may be significant for its connection with an important person, event, architectural style, idea, or archaeological resource. In addition, the National Register states that a building, site, structure, or landscape may be significant at the national, state, or local level.

The physical character of a site is extremely important in the National Register while emotional, heritage, and other forms of intangible significance are discounted. Personal identity or heritage is not enough for a property to be listed in the National Register. Those who want local, state, or federal protection for their property must be able to tie it to the larger themes as designated by the National Register. The nomination process defines not only what is significant about a particular site, it defines what is significant about American history as a whole. The National Register criteria for



significance can be problematic because significance is included in the definitions. It can be difficult to know what is significant because the definitions make significant self-evident.

A historic resource's significance is manifest in the physical characteristics of its integrity. Integrity will be discussed later in this chapter. It is important to remember that significance and integrity are related and intertwined.

### Period of Significance

The National Register, unlike Lowenthal and others, ties a property's significance to a particular period of time. A building constructed in the 19<sup>th</sup> century may have a long and ongoing history but is usually nominated to the National Register for its connection to a specific period. This may be its original date of construction, a later renovation, or association over a specific period of time with an important person or event. For example, the period of significance of Eero Saarinen's TWA terminal in New York City dates from 1962, the year it was opened. It is considered significant due to its design, use of materials, and association with an important 20<sup>th</sup> century American architect. On the other hand, the period of significance for Thomas Jefferson's Monticello encompasses all of the changes he made to the building between 1809 when it was constructed and 1825 when he died.

A word of caution about period of significance may be helpful. Period of significance is helpful when a site is closely associated with a significant event. It is relatively easy to assess a building based on how it compares to its condition on a Tuesday in June 1873. It is more difficult to define a period of significance for a building

that has been continuously used and modified. Period of significance is used to place a building firmly in its historic context. The period of significance idea was in part adopted by the National Register to avoid potential controversies of listing buildings of more recent significance.<sup>11</sup> In some cases, the National Register is used as a political rather than an analytical tool.

### Identity

At its core, significance is about trying to define why something matters. A connected idea to significance is identity. Identity looks at individuality, personality, or those things that make something unique or distinct. While significance as defined by the National Register attempts to put resources into broad themes, identity looks into and attempts to define their special qualities; tangible or intangible. The identity of a community may be tied to a building or feature that appears on its official logo or marketing materials even if that community is significant for its connection to broader themes of history. For example, in discussing the Ise Shrine, one historian wrote that “what the Japanese wanted to preserve was not even the style as such in all its details but something else, some intangible essence within its style.”<sup>12</sup> For the Ise Shrine, identity is tied to the building tradition passed down from generation more than specific building materials used to construct the shrine.

Some look at historic preservation as a way to keep identity alive. Howard Mansfield in describing Civil War reenactments said that it is done to “preserve the history that’s in each soldier, in each regiment, in each town.”<sup>13</sup> He also describes preservation as a way in which we save ourselves.<sup>14</sup> Recreating stories of the past or

rebuilding a shrine makes a place unique and is a form of identity making and historic preservation. Identity is created and transmitted through storytelling, heritage tourism, or any activity that connects current generations to the past. Events like Civil War reenactments or even a Founder's Day Parade are part of how cultural identity is formed.

Identity changes over time as culture changes. The identity of a southern plantation 100 years ago was largely focused on the lost white culture of the pre-civil South. Identity of a plantation today often encompasses all of the stories of people who lived and worked at the place.

Identity and a specific location are often linked. For example, there are probably thousands of small county courthouses throughout the United States. No one, however, is advocating demolishing most of these courthouses because another one exists two towns over. Each town with a historic courthouse is known for their courthouse no matter the proximity of another courthouse. The connection between identity and location can also be seen in heritage tourism. People are willing to travel the globe to find an unique culture, building, or historical event. Travel websites often list historic buildings that must be visited as part of a trip. Just as every one who visits Paris, France, should see the Eiffel Tower, everyone who visits New York City should visit the Empire State Building. Significant buildings are often a major part of a city's identity.

Identity becomes a major factor in preserving historic buildings after a major fire. Buildings that suffer catastrophic fires are often part of the identity of a community. A building's identity as a community gathering place or its historic significance can be a major motivation for restoring a building. Identity is often retained in post-fire

preservation even when the building suffers a major loss of material integrity because identity is often focused on less tangible ideas of significance. A community may feel they have “saved” a fire-damaged building even though integrity has been lost because identity is still present.

### Historic Preservation and Integrity

#### Definitions of Integrity

Integrity is most often discussed as a moral virtue or character trait. For example, the 11<sup>th</sup> edition of *Merriam-Webster Dictionary* defines integrity as “firm adherence to a code of especially moral or artistic values, incorruptibility.”<sup>15</sup> However, integrity also has meaning for the physical environment. “When it is applied to objects, integrity refers to the wholeness, intactness or purity of a thing – meanings that are sometimes carried over when it is applied to people.”<sup>16</sup> Early discussions of integrity often focused on integrity of a work of art, such as a painting or sculpture. These discussions asked if a painting exhibited original features or if later artists had altered portions of the piece. It would ask if the Sistine Chapel ceiling actually looks like it did when Michelangelo painted it or if later attempts to clean and restore the painting actually destroyed the original artist’s original intent.<sup>17</sup> This same concept of integrity is also used to evaluate historic buildings, their character defining features, and their context.

The structural integrity of a building also has importance in assessing a historic building. It assesses if a building or an element can perform its required function without failure. It determines if an element is sound or needs repair. Determining structural

integrity after fire may be as critical as assessing other aspects of historic integrity. Some elements may have high historic integrity but low structural integrity and will need to be replaced. The other is also true. Some elements with high structural integrity may have no historic significance nor integrity and do not need to be preserved. For example, a piece of woodwork may be extremely significant but crumbles when it is touched. Or a steel beam added to a building to improve structural performance may still be intact after a fire but be removed for restoration activities.

Historic integrity is the way significance is manifest in a building. It explains which specific features aid in understanding significance and demonstrates that a building is what it purports to be. While significance can be explained in non-tangible terms, integrity is most often focused on the physical elements of a historic site, landscape, building, or object. Any preservation project whose goal is to retain significant character-defining features will in the end retain some or all of a building's historic integrity.

#### Integrity and the National Register of Historic Places

The National Register defines integrity of a historic resource as “the authenticity of a property's historic identity, evidenced by the survival of physical characteristics that existed during the property's prehistoric or historic period.”<sup>18</sup> The National Register also narrowly defines which aspects of integrity are relevant when assessing a property. A building, site, structure, or landscape can specifically possess integrity based on its location, design, setting, materials, workmanship, feeling, and association.<sup>19</sup> These criteria should be carefully understood and applied when making preservation decisions after a fire.

The first criterion focuses on location. This usually means that a building or character-defining element is currently in the location where it was found in during the period of significance. Structures that have been moved from their original location usually lose this type of integrity. Integrity of location is compromised if building elements are moved from one area of a building to another. This criterion takes on added importance when the location of a building or feature is tied to its significance. For example, a building listed in the National Register for its importance as a Civil War battle site loses integrity when the building is moved to a different state or inside a museum. Integrity of location is often connected to integrity of setting which will be discussed below.

The second integrity criterion relates to the design of the resource. For a building it asks if the original design is still intact in plan, elevation, workmanship, materials, and style. Buildings with major alterations often have a loss of design integrity. Integrity of design can be compromised in a fire by loss of a character-defining element such as a wall or roof or destruction of an interior feature. Integrity of design should be understood not only for high style buildings but for the more common vernacular buildings. Integrity of design is often connected to integrity of workmanship and materials. This may be especially true for older buildings that may have been designed and constructed by the same person or in the same tradition.

Integrity of setting focuses on the place, surrounding neighborhood, or building. A farmhouse originally surrounded by farmland but now surrounded by a subdivision or enclosed in a museum is seen as losing integrity of setting. Integrity of setting can also be

compromised in building interiors. An important interior feature such as a staircase may be significant for its association with other features such as a fireplace or crown molding in the same interior space. Similarly, parts of a staircase, such as the treads and risers, typically have a higher degree of integrity of setting when part of a complete staircase including railings, landings, balustrades, and the like instead of standing alone in a museum exhibit.

Integrity of materials is the fourth criterion. It asks if the materials used to construct the resource and contribute to its significance are intact or remain after changes are made.<sup>20</sup> This criteria often determines whether missing or damaged material should be copied when the resource is restored, or if a substitute material can be used. Typically substitute materials are considered if original materials are no longer available, if the historic methods used to create the element are no longer practiced, or if the original materials are of too poor quality to use.<sup>21</sup> Some materials, such as plaster containing asbestos, may not be used because of the environmental hazard associated with the material.<sup>22</sup>

Integrity of workmanship focuses on how a specific material or feature was created and installed. For example, hand formed adobe has a different workmanship than mass produced concrete masonry units. Hand carved woodwork is different from machine produced woodwork. Research into the significance of individual elements will reveal the original workmanship of a building element, including its assembly. Like materials, deciding between using original workmanship techniques or modern methods

is critical to retaining a building's integrity. This is especially true when a building is significant for construction methods or hand-crafted details.

Integrity of feeling may be the most intangible, but possibly the most useful to those who work with historic buildings. Those who spend considerable time in historic buildings usually have an understanding of the intangible aspects of the property and how they can be included with the tangible. Evaluation of integrity of feeling asks if the physical building conveys its historical significance, meaning, or memory. An abandoned mining town may not convey all aspects of its accurate history but feel like an old town to those who visit it. An accurately restored historic house museum has integrity of feeling when curators understand and design every small element of a room. Integrity of feeling can be retained in post-fire preservation even when the design of the space changes. This is especially true when the new design is historically compatible with designs from the period of significance. A historically compatible design will evoke memory and emotion that an incompatible design won't evoke. It is important to listen to the identity people connect to a building after preservation treatments have taken place to determine if integrity of feeling has been retained.

The final criterion is integrity of association. The evaluation of this criteria summarizes the previous six criteria and asks if the integrity of a property is intact from the period of significance. Integrity of association is relevant if a property is significant for its connection to an important person or event. If a property is significant for an event and all elements in the property are from the same period as that event, integrity of association is present. However, if a property is significant for an event but the property



was not built until thirty years after the event took place, its significance of association is non-existent. The criteria of feeling and association may be most important for a property's user. Many regular people don't know the difference between construction techniques and architectural elements that architects and historic preservation professionals understand. What the average person knows is if a property feels historic or not. They know if the stories and heritage they connect to the property can still be felt and understood. If a space can still be associated with the person, event, style, or idea that originally made it significant, the space has retained integrity of association.

While these seven aspects of integrity are usually applied to the overall property, they may also be applicable to specific property elements. For example, a grand staircase may have all of its original design and materials but could have been moved from its original location. Windows may be in their original location but have been replaced with new vinyl clad elements. No one aspect of integrity outweighs other aspects. An evaluation of the entire property using the integrity criteria will show how much integrity a property has in relation to its significance. All aspects of integrity can be retained in post-fire preservation in varying degrees based on the amount of damage from the fire. Preservation treatments should be selected to maximize the overall integrity of the property.

### Authenticity

The concept of integrity as applied to historic buildings and landscapes in the United States is almost synonymous with the international concept of authenticity.<sup>23</sup> Authenticity is usually defined as “the truthfulness of a cultural place.”<sup>24</sup> While integrity

as used in the National Register of Historic Places definitions is typically associated with tangible, physical materials and spaces, authenticity is associated with intangible ideas of identity and heritage as well as the tangible dimensions of historic resources. Authenticity is especially relevant when discussing structures like the Ise Shrine. Although of ancient origin, the Shrine is rebuilt every twenty years using traditional techniques. The materials are new but the authenticity is high because of this transmission of ancient tradition. Authenticity looks at “form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling.”<sup>25</sup> Authenticity allows for a more robust inclusion of heritage when deciding which sites or elements merit preservation. A building’s identity can be defined more clearly using authenticity than integrity.

#### Challenges of Assessing Significance, Identity, Integrity and Authenticity

Assessing a building’s pre- and post-fire significance and identity can be immensely challenging. A true understanding of these ideas cannot be done by just driving past a building. Assessing significance and identity takes time. It may require extensive archival research or detailed review and investigation of a building. It may require numerous conversations with community members, property owners, architects, historic preservation professionals, and other interested individuals and groups. Buildings are too often declared significant just because they are old without any real understanding of their historic context or individual, community, or national identity. New buildings or ideas are often overlooked in our search for the old building or continuation of an old idea. Likewise, assessing post-fire significance should take into account the changes

made to a building because of a fire. A building's identity may be heightened after a fire especially if the fire was high profile or if the community was involved in fire recovery decisions.

Challenges also exist in assessing integrity and authenticity of a historic building. First, context of similar building materials, styles, or use in the area is extremely important and can be very time consuming to evaluate. Knowing that a building element contains material integrity takes a trained eye in the workmanship and materials of that element. Understanding integrity of setting requires not only knowledge about a particular building but knowledge in how that building fits within broader themes within its neighborhood and the country. In-depth knowledge of context will lead to a more nuanced determination of integrity.

Another challenge in determining integrity is understanding changes over time. When period of significance is clearly understood and the building reflects that period, post-fire integrity can be relatively easily evaluated. But when a building is significant for its entire history, including changes to the building over the centuries, determining integrity is far more difficult. Understanding a building's integrity will take time but a careful evaluation will be instrumental in determining preservation treatments to retain significance.

#### Significance, Identity, Integrity and Authenticity and Post-Fire Preservation

In the best scenario, tangible and intangible ideas of significance and identity about a building are carefully documented. This provides invaluable information on a building's overall significance and those specific elements that contain meaning and

identity. Preservation decisions made without an understanding of the building's significance can lead to a piecemeal approach that can ultimately destroy its identity. Engaging the community in discussions about the significance and identity of a building before and after a fire is critical if a building is to retain its significance at the end of the preservation treatments.

The period of significance of a building is important when determining preservation treatments and activities after a fire. For example, a building element from a certain period may have survived a fire but may not be retained because it falls outside the building's period of significance. On the other hand, a character-defining element that contributed to the building's significance may have been totally destroyed by the fire. As part of the preservation plan how and if that element should be duplicated must be considered.

Unfortunately, detailed documentation of significant elements may not have been made prior to a fire, even if the building was listed in the National Register. In these cases, the post-fire preservation project team must rely on other resources including photographs of the building, written histories, or even the memories of those that used the building to understand the significant character-defining features as well as feelings and associations about a building.

Before undertaking any preservation project one needs a clear understanding of which building elements contribute to the significance of the building. Understanding and applying significance criteria allows project teams to focus their energy on preserving those features that add to a building's significance. A clear understanding of significance

can also help project teams know where to focus the schedule and budget of a project. This kind of understanding about significance cannot be accomplished in a quick walk through a building. An in-depth understanding of a building's significance is best gained through archival research, detailed documentation of a building, and interaction with property owners, neighbors, or others interested in the building.

It may be helpful to understand a building's integrity in three connected ways when preserving a building after a fire. The first way is to understand the building's integrity immediately before the event. Were the building's significant elements concealed by later renovations or exposed? Was the building's period of significance easily recognizable just before it was extensively damaged?

Historic buildings are generally not in perfect condition all the time. Deferred maintenance or a number of small design changes can negatively impact a building's integrity and are often not generally known. These factors of pre-fire integrity should be evaluated before determining post-fire integrity.

Second is to evaluate the building's condition immediately after the event. The damage may look devastating but as its character-defining elements are inventoried a different understanding of the building's integrity may emerge. Rather than focusing on everything that was lost, the evaluation should focus on what remains. A historic space may still be recognizable once all the damage is stabilized, removed, and inventoried. Post-fire integrity can be lost when a building is not carefully documented or salvaged.

For example, decorative plaster should be photographed in place. Elements that can be safely removed should be catalogued and photographed in place before they are removed and stored. Damaged windows should be boarded up to prevent vandalism.

It is also important to properly stabilize a building after a catastrophic event. A wall that lost structural integrity can completely collapse if not properly braced. Improperly drying materials or exposing them to weather will cause additional deterioration. Masonry walls that absorbed water can spall if the temperature drops below freezing. Standing water in a basement can undermine the foundation or cause mold to grow.

Third is to examine the building's integrity at the end of the restoration or reconstruction project. Instead of comparing the final preservation outcome to the building's original integrity, compare it to the integrity immediately after the event. Ask if the elements that survived the fire can still be recognized and understood. Ask if those significant features that were completely destroyed were reconstructed accurately. A frequent outcome of a post-fire preservation treatment is not a return to the building's original design. Rather, it is to preserve original fabric and modifications that contributed to the building's pre-fire significance. While a fire may destroy some of the building's material integrity, some or much of its significance may still be recognizable. Thus the concepts of significance and integrity must take into account a resource's evolving significance and integrity over time, including its loss during a disaster such as a major fire.

Careful preservation or restoration can mean retaining identity and authenticity even when some material integrity has been lost. A building in use, but altered, can retain its identity because so much of identity is in the minds of those who use it or see it. Authenticity can be retained when a project team understands and applies historic preservation principles in light of a building's true historic significance and historic identity.

### Preservation Treatments

Understanding the integrity of each character-defining building element allows for well-informed preservation decisions after a fire. Carefully assessing integrity before declaring a building or element as lost is crucial to post-fire preservation activities. A building that at first glance suffered a major loss of integrity may actually retain much of its historic integrity after careful assessment. Stabilizing a damaged building is necessary to adequately allow time to assess if integrity as well as significance is still intact.

According to the Secretary of the Interior Standards, four basic preservation treatments are used in preserving historic buildings.<sup>26</sup> Each applies primarily to resources that are subject to relatively slow changes, not rapid change such as experienced in most fires and other natural disasters. It is instructive to examine each of the four preservation treatments in light of an expanded understanding of significance and integrity. Most preservation projects after a fire are a combination of all four preservation treatments as well as new construction.

The first treatment is to maintain the building with as little loss of significant features, and thus integrity, as possible. Called preservation, this treatment is most

applicable when a building has a high functional use and is in generally good repair. This type of treatment requires a long term proactive approach to building care and maintenance. Preservation may be an option after a minor fire if a building's character-defining elements suffered relatively little damage and if its physical integrity is largely intact.

The second preservation treatment is known as rehabilitation. This treatment allows for invasive repairs to a building that are needed because of deferred maintenance, the need to bring it up to current building codes, or needed for a change in use. Replacement of damaged building elements is generally acceptable in rehabilitation projects if repair is not an option. Substitute materials should be carefully selected based on the relative significance and integrity of the damaged or destroyed element. This treatment is also used for many adaptive use projects that change certain aspects of a building to accommodate a different use. Rehabilitation may be an option after fire if the building's significance is tied to broad ideas or trends in architectural history and sufficient fabric remains to guide repair. Rehabilitation is less viable when a building is significant for connection to an important person, event, or design and when sufficient fabric or documentation exists for that significance.

Restoration, the third treatment, is most likely to take place when a resource has a well-defined period of significance. Restoration often means returning a building's appearance to its period of significance by removing later additions and renovations. Restoration to the immediate pre-fire condition may be appropriate when its significance is related to larger themes of American history or continual change of building elements



over time. Buildings are often restored after fire to their immediate pre-fire condition, particularly if documentation or physical evidence exists so that accurate repair or replacement can be undertaken. In many cases this is driven by the property's insurance as well as the desire to rebuild the building as it was. Restoration is most appropriate when surviving building elements after a fire are the elements that convey significance.

The fourth treatment is reconstruction. It is typically undertaken when a building's period of significance is well understood and well documented. Since reconstruction using original materials and workmanship is often expensive, it is often only undertaken when the destroyed resource is underrepresented in its locale or is of extreme value for historical reasons. In the case of a major fire, reconstruction is often combined with restoration based on the resource's significance.

Despite their usefulness as a guide the four preservation treatments do not adequately describe what often happens in preserving a building immediately after a fire. Most preservation projects require a combination of all of the above treatments because of the changes that occur in buildings. The Secretary of the Interior's Standards for Historic Preservation originally included three additional preservation activities that can be applicable immediately after a fire: acquisition, stabilization, and protection.<sup>27</sup> While short-term treatments and not long term preservation strategies, they are very useful when faced with assessing the option for rebuilding after a fire. Acquisition involves purchasing or otherwise securing control of the damaged building to protect it from immediate demolition or long-term neglect. This demolition may occur when government officials deem the structure safe or uninhabitable or insurance companies deem the

building to be a total loss. Stabilization often occurs when the exterior walls of a building remain intact but require bracing due to the loss of interior structural elements. It may also involve supporting weakened floor or roof systems, boarding up openings such as windows and doors, and putting on a temporary roof. Protection usually includes ensuring that the building does not suffer further deterioration from weather, vandalism, or other activities that remove or damage character defining elements. It may require heat or humidity control.

Preservation projects after fire may also include new construction or renovations to make a building more functional or to bring a building to current building codes. These types of activities may not limit preservation activities if done thoughtfully. When a building's significance guides selection of preservation treatments and other construction methods integrity can be successfully retained.

#### Removing National Register Designation

While not a central focus of this research, it is important to at least mention that a listed historic property may be removed from the National Register or from state or local registers. This is often done because of a loss of integrity. Removal will usually occur if a building is demolished or occasionally when a building is moved. The National Register regulations note that properties may be removed from the National Register if “the property has ceased to meet the criteria for listing in the National Register because the qualities which caused it to be listed have been lost or destroyed.”<sup>28</sup> While this is typically interpreted to mean the loss of tangible aspects of integrity, there is no set

criteria for determining how much loss is too much. Additionally, the notion of a heavily damaged building retaining its intangible significance is rarely considered.

Decisions to remove buildings from the National Register are generally recommended by the State Historic Preservation Officer and acted on by the Keeper. No official count has been made of buildings de-listed due to loss of integrity.<sup>29</sup>

The National Historic Landmarks Program provides some criteria for removing designation of National Landmark status.<sup>30</sup> These criteria focus on loss of integrity, changed understanding of significance, or procedural error. About 30 properties have lost designation as National Historic Landmarks, generally because of demolition or major alterations.<sup>31</sup>

National Register nomination forms may be amended if significance or integrity changes. As noted earlier, nominations for plantations were amended to include new information based on expanded research into the lives of enslaved people. A building can often remain in the National Register after being moved if the State Historic Preservation Office approves the project before it is moved. An amended nomination form may be submitted after a post-fire preservation project if the significance or integrity was altered by the project. When the amended nominations are accepted by the Keeper the new information is entered in the National Register.

### Conclusion

A building damaged by fire does not always lose its significance even if material integrity is compromised. Thus it is extremely important to understand a building's significance and authenticity as well as its remaining integrity when selecting both short-

term treatments (acquisition, stabilization, and protection) as well as long-term treatments (preservation, rehabilitation, restoration, and reconstruction). A heavily damaged building can retain its significance and integrity after fire if the intangible as well as tangible aspects of those concepts are central in planning and completion of preservation treatments.

## CHAPTER III

### FIRE IN HISTORIC STRUCTURES

The discussion in Chapter Two regarding significance, integrity, and preservation treatments can be applied to almost any rapid change to a historic property. Rapid change may include natural disasters like hurricanes, earthquakes, tornados, and fires. Since this research focuses on fire, this chapter explores the effects of fire on significance and integrity, the impact of insurance on a fire damaged building, alterations because of fire, and actions of those involved in making decisions about fire damaged historic buildings.

The entire process of fighting fires and the immediate aftermath can be overwhelming to those who are not fire or fire insurance professionals. Understanding fire, how it is prevented, and how it is fought helps property owners and preservation project team members be better advocates for measures to protect a historic building's significance and integrity. This requires that those engaged in fighting fires, fire insurance professionals, and those involved in making decisions about the disposition of a building after fire understand a building's significance and integrity before a fire takes place.

#### Emergency Planning

Approximately 482,000 structures were damaged by fire in 2010, the last year data is available.<sup>32</sup> While this number may seem high, it is actually a marked decrease

from previous decades. In 1977 over one million structures were damaged by fire. The number of structure fires has remained relatively constant with only slight decreases and increases since 1990. Of those 482,000 structure fires in 2010 about 80% were in residential buildings. Kitchen fires are the leading source of residential fires. Other causes of structure fires include smoking, candles and other open flames, electrical failures, construction accidents, and many others. Most structure fires are accidental with only about 27,500 fires set intentionally. Structure fire damage can range from smoke and water damage in a few rooms to total loss of a structure. In 2010 property damage as a result of fires was about \$11.6 billion.<sup>33</sup>

In spite of the significant decrease in the number of fires in the past several years, fire prevention is still big business. Most of the research is focused on fire prevention or on lessons learned from previous fires to minimize the potential of future fires. Best practice fire prevention measures for historic buildings are codified in NFPA 914: Code for Fire Protection of Historic Structures, first published in 2001.<sup>34</sup> Some aspects of the Code deal with minimizing risk during construction projects and special events. Other aspects of the Code provide information on installing fire protection systems that minimize loss of life as well as the impact on significant building elements.

Codifying and defining best practice methods to minimize fire risk in historic buildings has taken precedence over other types of recovery and reconstruction processes.<sup>35</sup> One method is to remove as much combustible material from the building as possible. This usually means not storing flammable materials near open flames. It also means not storing any items, especially combustible items, in attics, crawlspaces, or other

areas where fire can spread more easily without being detected. Avoiding flammable building decorations such as live Christmas trees is also a means of minimizing risk. Similarly, curtains, drapes, and other flammable material should be treated with fire-retardation treatments.

Another method of fire prevention focuses on careful oversight during construction activities. Historic buildings are at a higher level of risk during rehabilitation or restoration because of the increased number of people in the building and construction equipment and materials that create conditions for fires to begin. For example, construction crews often use open flames to remove paint from surfaces, arc lights to work in interior spaces, and all kinds of flammable liquids during construction. While the fire may start while the work is in progress, it can often happen when the construction crew is finished for the day because the materials and equipment are rarely removed from the construction site each evening. In response to these common fire hazards it is now best practice for construction projects to provide detailed plans on how potential fire sources will be avoided and monitored during the project.

A third method of fire prevention in historic buildings focuses on upgrading building systems. This may mean replacing old electrical wiring and controls with systems that meet current electrical code. It may mean installing fire-rated doors or enclosing formerly open atriums. It may also mean installing fire detection, alarm, or suppression systems in the building.<sup>36</sup> While these changes will help prevent a fire from occurring, they can negatively impact a building's historic integrity.

It is often misunderstood that fire prevention measures are meant to completely extinguish any fire in a building. The main goal is to slow the spread of the fire so building occupants can safely exit the building. If fire prevention is done correctly, building occupants will be out of the building by the time firefighters arrive. Instead of searching for people still in the building, fire crews can focus on extinguishing the fire.

### Insurance and Historic Structures

Most insurance companies do not provide separate policies for historic buildings versus those of new construction. Most policies provide two types of coverage: replacement cost and actual cash value.<sup>37</sup> Replacement cost means the settlement will replace a damaged or destroyed building element with something of “like and kind quality” without taking into consideration any of the historic or architectural significance of the original element. This means that a damaged staircase will be replaced by a new staircase but one not necessarily of the original design or materials.

Actual cash value is also based on “like and kind quality” replacement, but only an amount equal to the depreciated value of the element.<sup>38</sup> For historic buildings this means that handcrafted details which have depreciated in value will not be provided funds for exact replacement since that is generally run much higher than replacement in “like and kind quality.”

Historic property owners should be aware of both replacement cost and actual cost as determined by the insurance policy. Many buildings are probably underinsured in part because of rising construction costs in recent years. Insurance companies recommend a building to be insured to at least 80% of its actual replacement cost so as to not incur



penalties for underinsurance. Property owners should reassess the amount of insurance they carry on their buildings every few years to make sure they have sufficient funds if a disaster happens.

Because most insurance policies are written for new construction they can be inadequate in dealing with the costs associated with reconstruction of a historic building. A two hundred year old hand crafted architectural wood element may not be worth much in modern construction terms but it may be almost priceless in historic significance. Repairing or reconstructing a damaged item like that architectural wood element is likely to cost far more than the standard price for a wood element in new construction. Gilding, stenciling, and other historic finishes can also be far more costly to restore than finishes in new construction.

One way property owners can ensure their insurance policy adequately covers their historic building is to add riders to their policy. A rider is usually added to a policy to cover a significant item or character-defining feature.<sup>39</sup> For example, a piece of artwork may have an insurance rider to cover damage above the regular insurance policy coverage. Riders allow property owners and insurance companies to fully document individual building elements, fixtures, or fittings before a fire and to agree on the value of an item before disaster. Riders however can add significantly to the insurance cost of a building and may not be as useful when the entire building is significant above the average insurance policy.

It can also be difficult to insure historic buildings because of the perceived risks. Historic buildings are often not constructed to meet current fire or building codes, are

considered combustible, or contain hazardous materials. Many insurance companies are hesitant to insure historic buildings or will charge higher insurance premiums because of these perceived risks.

Despite the pitfalls, insurance is a necessity for almost all historic buildings.<sup>40</sup> Most property owners could not afford to preserve their buildings after a fire without insurance funds. In some cases the actual cost of preserving a building is more than that provided by the insurance company. In these cases, the owner must raise the balance to preserve the building or the building could be condemned as a public hazard. Some historic buildings that did not suffer major damage in a fire have been demolished because insurance funds were not available for preservation.<sup>41</sup>

Because of the elevated risks, higher construction costs, and higher premiums most historic buildings are not adequately covered under standard insurance policies. In recent years the National Trust for Historic Preservation has encouraged insurance companies to fill that gap. The most notable insurance company for historic buildings is National Trust Insurance, a subsidiary of the National Trust for Historic Preservation. They insure historic public buildings, private residences, religious buildings, hotels, and other types of historic structures.<sup>42</sup> A smaller insurance company notes that their insurance for historic properties includes coverage for increased cost of construction, historic certification expenses, increased building assessments, and flexible property valuations.<sup>43</sup> Premiums may be higher for specialized historic building insurance but that insurance will be more helpful in post-fire preservation.

## Construction Types

Firefighters are primarily concerned with the type of structural systems and materials in the building since this will determine how to fight the fire.<sup>44</sup> This concern was a driving force behind the development of building codes in the later 19<sup>th</sup> and early 20<sup>th</sup> centuries.<sup>45</sup> These codes rated materials and structural systems according to the length of time it would take a fire to compromise the structure to the point of collapse.

The current building code used throughout the United States is the International Building Code. It is written by code officials, engineers, and other professionals involved in the construction business, with input from the National Fire Protection Association.<sup>46</sup> It categorizes buildings as to their fire resistance based on the materials of their structural systems.

Type I buildings are considered the safest form of construction and are fire resistant. They are generally built of reinforced concrete with steel structural elements encased in fire resistant material. These buildings are designed to confine fire to a small area due to the lack of combustible material and separated fire areas. However, they are a challenge to ventilate and bring water to the fire because it is very difficult to cut through reinforced concrete or other materials used in Type I construction.

Type II buildings are of similar construction and materials to Type I buildings except that structural elements are typically exposed and thus will not resist prolonged exposure to fire. Structural steel will buckle at 1300°F, a temperature that is often exceeded in a major fire. In particular, roof systems in Type II buildings, which are often constructed of steel joists, are susceptible to collapse during fire.

Type III buildings are usually constructed of non-combustible exterior materials such as concrete block, stone, or brick load bearing walls with combustible wood internal structural elements such as beams, joists, and load bearing walls. Many historic buildings, including the four case studies in this research, are constructed of Type III construction.

Type IV buildings are constructed of heavy timber, which means that structural wood columns and beams are greater than 8"x8", wood joists are greater than 6"x6", and flooring is a minimum of 3" thick. Historic warehouses and factories, as well as historic assembly halls and churches are often constructed with heavy timber in addition to masonry exterior walls. Despite being made of wood, fire spreads slowly because of the thickness of the structural wood members, with external charring providing protection to the unburned core. However, water damage from fighting the fire can be extensive and difficult to repair in Type IV buildings since timber will absorb and retain the water and is difficult to dry.

Type V buildings are built entirely of dimensional lumber or some other combustible material. In these buildings, fire can spread rapidly between floors and from interior to exterior. Wood frame construction was extremely common in 19<sup>th</sup> and early 20<sup>th</sup> century residential and small commercial buildings, many of which are listed individually in the National Register or as contributing to historic districts.

### Fighting Structure Fires

It is not the purpose of this thesis analysis to present detailed methods of fighting fires. Rather, this analysis is intended to give a general understanding of the typical process used to extinguish structure fires to help property owners be stronger advocates

for their building. The process of fighting a fire is similar regardless of the type or historic significance of a building. The firefighter's main goal is to extinguish a fire by removing those elements that caused the fire. This is done by lowering the temperature of the fire, by removing fuel sources from the fire's path, or by removing oxygen from the fire area.<sup>47</sup> The most common method of achieving these goals is by pouring water or some other flame retarding substance on the fire. While this puts out the fire, water in particular can have an extremely detrimental effect on building elements not damaged directly by the fire.

The first priority in fighting fire is safety of human life.<sup>48</sup> Fire safety measures almost always focus on giving occupants enough time to safely exit a building during a fire. These measures include the number and locations of means of egress, width of egress corridors, stairs and doors, places of refuge, and alarm and fire suppression systems as detailed in the International Building Code depending on the building's construction type and use. Upon first arriving at a fire, fire crews will determine if anyone is inside the burning building or likely to be hurt by the firefighting process. Once occupants are safe, fire crews will determine how to fight the fire while limiting risk to the firefighters. Typically consideration will focus on determining to fight the fire from inside or outside the building or from above or below the fire. Some buildings can sustain heavy damage because the best place to fight the fire and the safest place to fight the fire are not always the same. For example, an attic fire is best fought from the attic but access points and structural weaknesses in an engulfed attic may endanger the lives of

firefighters in those spaces. Attic fires fought from outside the building are safer for the firefighter but can limit equipment and water access to the center of the fire.<sup>49</sup>

The second goal when fighting fire is to stop the spread of the fire as much as possible.<sup>50</sup> Known as exposure protection, this may mean stopping the fire from spreading to neighboring structures as well as attempting to confine the fire to a specific area within a building. A building's construction materials and methods, more than its age, has a major impact on limiting damage to a building. Proximity of neighborhood buildings directly affected by the fire impacts exposure projection. Fire in an urban neighborhood has a far greater chance of spreading to adjacent properties than a fire in a suburban area.

The third step in fire fighting is to limit damage to property and the building. This is done only after the first two criteria are met. Fire will spread very differently in a heavy timber frame building than in an unreinforced masonry building because of the number and types of gaps within walls where fire can spread. Some demolition may be necessary to create fire breaks between walls, rooms, or floors. Firefighters may limit property damage by covering furniture with salvage covers, removing important items, limiting water impact to unburned areas, and removing hazardous materials left after the fire. This final step also involves a thorough check of the building after the fire is extinguished to ensure no hot spots are left when the fire crew leaves.<sup>51</sup>

Firefighters focus their efforts on ventilating a building during a fire. Ventilation will draw the fire to certain areas of the building and allow for hot gases to dissipate. This can be done by opening windows and doors or using fans and other mechanical systems.

It may also mean breaking windows or doors to properly ventilate a building or cutting holes in walls to prevent fire from spreading to other floors. If gases are vented properly flashover is avoided which also can limit damage to the building.<sup>52</sup>

A firefighting crew is also tasked to leave as much evidence in place as possible so fire investigators can determine the cause of the fire. Fire investigators need to know the initial fuel, the ignition source, the ignition sequence, and the event that brought the fuel and source together. Thus a firefighter's role is to not only save human life and limit damage to the structure but to protect and preserve the evidence of the cause of the fire.<sup>53</sup>

### Types of Fire Damage

A building can be damaged in many ways during a fire. The most obvious form of damage is material combustion as evidenced by wood charring. The depth of combustion as seen in the depth of charring shows the length of the fire. A partially charred item usually burned for less time than a completely charred item.

Radiant heat and convective heat can do the most damage in a fire. Heat and gases trapped in a small area can destroy finishes and weaken structure without causing combustion. This can be seen in buckled steel or spalled concrete after a fire. Heat without combustion, usually noticed as smoke, can also cause soot to build up on unburned surfaces such as walls and ceilings, as well as any building voids. Heat and smoke without charring can also do immense damage because of soot build up. Soot is usually accompanied by odor, which is hard to remove from surfaces and voids. Structural systems weakened by combustion, radiant heat, or convective heat can collapse, leading to more damage in areas not directly impacted by flame.

The firefighting process can also heavily damage a building. Large amounts of water can be poured on a building during firefighting because the typical fire house can deliver 500 gallons of water per minute.<sup>54</sup> Many building elements can become waterlogged. Wood, plaster, and metal if not dried immediately and properly can be irreparably damaged. This can be compounded if a fire happens in winter and waterlogged elements freeze. The weight of accumulated or frozen water or building debris can also cause floors to collapse.<sup>55</sup>

Fire causes chemical changes in materials and structural systems that can damage a building. Smoke and soot will adhere to plaster differently than to drywall because of the chemical change to those materials. Heat will react differently to wallpaper than paint. Often interior finishes must be completely removed from the building even if they were not directly affected by combustion, or damaged by water used to fight the fire because of the chemical properties of soot and smoke reacting with existing finishes.

#### Post-Fire Investigation

A fire site is often considered a crime scene and protected until the fire investigator determines cause.<sup>56</sup> Because of this, owners, insurance companies, and others are generally not allowed access to the building until a determination of criminal act has been made. A building contractor may be allowed onsite under the direction of the fire investigator to stabilize the structure so the scene can be safely examined. Fire investigation is generally guided and restricted by statutes with “authority having jurisdiction” as codified in city or county code in charge of the investigation.<sup>57</sup>



Generally, nothing is removed from a structure unless directed by the fire investigator or until the investigation is complete.<sup>58</sup> This can be problematic for historic buildings because very fragile elements can be further damaged if exposed or unprotected until the end of the fire investigation.

A fire investigator focuses on the fire's cause and spread to determine responsibility. The investigator is also working to ensure no human life was lost in the fire, and if the origin and cause of the fire was a criminal or non-criminal act. Their determination of the fire's cause has a major impact on any insurance settlement and thus the funds available for the building's restoration and reconstruction.

### Fire Recovery

Every state has a number of disaster recovery companies that help owners recover buildings and belongings from fire, flood, earthquake, tornado, etc. These companies are also leading research in post-disaster recovery. However, because their focus is on making buildings fit for occupancy as quickly as possible, they typically do not specifically address historic building recovery. This typically means that as soon as the fire investigator has completed their work and the building is released to the owner, the recovery company strips the building of all combustion damaged materials, removes damaged and unsafe structural elements, and stabilizes what remains. Sometimes the removed material may be taken to a lab for conservation work but most often it ends up in a dumpster.

A historic preservation team should be consulted immediately when a fire occurs at a historic building. A historic preservation professional onsite during the fire may be

able to direct fire fighters to save historic building elements. They then may be able to direct the activities of a disaster recovery company. A post-fire preservation team may consist of a property owner, trained historic preservation professional (including federal, state, or local government representatives), historic architect, building contractor with expertise in historic building projects, architectural historian, and craftsmen with expertise in historic building materials and workmanship. Each of these professionals will be able to add insight into every stage of fire recovery based on their understanding and application of building codes, insurance policies, construction, history, design, and the significance of the building.

#### Firefighters and Historic Structures

Firefighters are generally not trained to understand a building's significance, integrity, or character defining elements. However, some fundamental understanding of these concepts and their importance to rebuilding a fire damaged building may be possible if the property owner works closely with the local fire authority before and after a fire event. This may include a scheduled walk through the historic building to access those materials and features important to its significance and integrity. It may also include drills with the firefighters likely to respond to a fire at the building. Firefighters who know the significance or monetary value of individual elements, spaces, or furnishings may be able to take extra steps to protect those elements from combustion, smoke, or water damage.

Property owners can be extremely valuable to the fire fighting process if they are well informed. Owners who know how their building was constructed, where the

potential structural weaknesses are, and the presence of fire breaks can assist firefighters in making more informed decisions about how to best fight the fire. Likewise, property owners should take an active role in post-fire activities. Critical decisions impacting the long-term integrity of a building should not be left entirely in the hands of disaster recovery and insurance companies. Property owners should work closely with historic preservation professionals and others in the days immediately after the a fire to ensure every short term decision made has a long term positive consequence for preservation of the building's significance and integrity.

### Conclusion

In general, the fire fighting and insurance industries are not immediately concerned with the special challenges of preserving historic buildings. Because these groups are usually involved in historic preservation only during a short-term crisis their knowledge is limited to only deal with that crisis. The firefighter's goal is to put out a fire with as little loss of human life and property as possible. The insurance company's goal is to pay for replacement of any damaged building elements in accordance with the insurance policy. The historic preservation community should be more involved with these groups to help them meet their goals. Historic preservation professionals should engage on a more routine basis with insurance companies, the National Fire Protection Association, and their local fire station to ensure historic buildings are considered when writing policies and procedures. Helping firefighters and insurance companies meet their goals will ultimately aid in the long-term preservation of historic buildings. Fire

professionals can be great allies in preserving significance and integrity if they are given the proper information, tools, and support.

## CHAPTER IV PROVO TABERNACLE CASE STUDY

### History and Significance

Provo, Utah, is home to one of the tabernacles of The Church of Jesus Christ of Latter-day Saints (LDS Church). Tabernacles were a fairly common building type during the late 19<sup>th</sup> and early 20<sup>th</sup> century but have not been constructed since the 1950s. Of the more than one hundred tabernacles constructed less than twenty have survived until 2012, thus making those that survive historically, and often architecturally, significant. The tabernacle in Provo was among the most intact examples of the type, and an architectural gem for the state of Utah. It was listed in the National Register of Historic Places in 1975 for its architectural and religious significance.<sup>59</sup>

The first public meetings were held in the Provo Tabernacle in 1885 although the building was not completed and dedicated until 1898.<sup>60</sup> It hosted weekly religious meetings as well as many non-religious community events requiring a large hall, such as concerts, lectures, graduation ceremonies, plays, and recitals. Almost everyone who lived in Provo in the last century attended at least one event inside the tabernacle. The building remained in continuous use until it burned in December 2010.

The building had been renovated several times since its completion. Its large exterior center tower (see Figure 1) was removed in phases between 1907 and 1917 because of structural concerns. Art glass windows replaced clear glass windows around

1918. Congregants purchased the first phase of a pipe organ in about 1907. The interior of the building was remodeled several times to improve functionality.<sup>61</sup> Most of these changes were compatible with the original design of the building but were easily distinguishable from each other and original building design. Later projects copied faux-graining and the general late Victorian design of the building but used modern building materials and methods such as wire nails and drywall instead of cut nails and lath and plaster. Interior staircases featured four different newel post designs reflecting the decade in which the staircases were built.



Figure 1: Provo Tabernacle Exterior, circa 1900. The center tower was removed in phases between 1907 and 1918 because of structural concerns. [Image courtesy LDS Church History Department.]

The Provo Tabernacle had significance for its architectural style and connections to broader themes of American history. However, this building's significance was largely tied to the identity and heritage for the local community. This building was the cultural and religious center of the Provo community. Everyone in the city knew this building and had a story about this building. Many even had a favorite architectural feature without knowing how that feature fit within the timeline of the building's construction.



Figure 2: Provo Tabernacle Interior in 2006. Note the pipe organ installed in 1907. Other renovations apparent in the photograph include small meeting rooms to the sides of the rostrum, widening of the rostrum stair case, and a decorative carved panel behind the pulpit. [Image courtesy LDS Church History Department.]

Like many other historic buildings, the Provo Tabernacle was assumed to be one of those buildings that would be around forever. The building was frequently used and in

good condition. Unfortunately, the building was not fully documented: no original architectural plans survived and more recent projects left little documentation. Some rooms had never even been photographed.

### Cause of the Fire

The Provo Tabernacle building had a fire detection system installed but no fire sprinklers. The fire detection system had been malfunctioning in the months before the fire; thus the frequent alarms were mostly ignored. On December 17, 2010, a group was preparing the main hall for a Christmas concert. The event called for an elaborate stage and an equally elaborate lighting plan. Similar events had been held in the past and those planning this concert felt very comfortable in the building. As part of the lighting design, a three hundred watt can light was relocated from its position in the attic to make room for a lighting truss. Rather than disconnecting power to the can light the lighting contractor simply placed it on a wood speaker box. A few hours later someone turned on the light switch for the can lights but no one noticed because the lights were not in their usual position.<sup>62</sup> That 300-watt light fixture started a fire in the attic that eventually destroyed the entire interior of the Provo Tabernacle.

### Fighting the Fire

By the time the fire was noticed it had already spread throughout the attic. First responder firefighters entered the building as the ceiling started to collapse. Rather than risk injury by fighting the fire from within the already engulfed interior, fire crews retreated to the exterior of the building. While the building was likely a total loss, the



firefighters followed the protocols of avoiding injury to themselves and others and keeping the fire from spreading to other structures.

Because the fire started in the attic and burned through the king truss, the entire roof collapsed within the exterior walls only a few hours after the first firefighters arrived on scene. Due to the collapsed roof and other debris confined within the masonry exterior walls, the building continued to burn for another 48 hours. This meant that little of the building's interior walls or finishes survived. Every surface in the building was affected by combustion, smoke, or water (See Figure 3).



Figure 3: Provo Tabernacle on Fire, December 17, 2010. [Image courtesy LDS Church History Department.]

### Investigating the Fire

The Provo City fire marshal began investigating the cause of the fire before the flames were extinguished. Because the fire marshal was onsite during the fire fighting process he was quickly able to identify the areas of greatest interest for the investigation. The fire marshal collected photos and video from onlookers, took witness statements, and spoke to many of the people involved with setting up the Christmas concert.

Portions of building debris were also removed from the building under the fire marshal's direction to make the building safe to investigate. This debris included heavy roof structural members made of wood and steel. The debris was laid out in a grid next to the building in the exact location it had been found inside the building. Removing dangerous building debris and laying it out in a systematic way after removal are fairly standard practice for investigation of complicated structure fires. This coordinated removal process helped the later salvage process run more smoothly.

Removing building fragments that don't pose a safety hazard to fire investigators before an investigation is complete is not normally done. In an unusual move, the fire marshal allowed the removal of art glass windows that survived the fire because they were not relevant to understanding the fire's cause. The building contractor hired to remove the windows labeled each sash as it came out of the building, making it easier to identify windows later. Removing the art glass windows in the days immediately following the fire allowed this building feature to survive in fairly good condition while a number of other building features deteriorated in the building debris. Most of the surviving windows will be restored because of this early preservation effort.<sup>63</sup>

In another rare move the fire marshal also allowed employees of the LDS Church to enter the building to look for a significant painting. Art is normally a low priority after a major fire loss but the significance of the piece allowed for the search through dangerous building conditions. Unfortunately, the painting “Restoration of the Melchizedek Priesthood” by influential LDS artist Minerva Teichert was almost completely destroyed in the fire. Searchers were able to identify the painting remnants mainly through the melted Plexiglas cover that had been placed over the painting to protect it from people touching or brushing up against it. Fire crews mentioned after the fire that if they had known the painting’s significance they would have tried to remove it before the roof collapsed.

After a few weeks investigation the fire marshal released the building to the owner with the determination that the fire’s cause was not a criminal act. This allowed the insurance company and salvage crew to enter the building and begin their work.

### Salvage and Documentation

The salvage crew consisted of construction workers, architects, and historic preservation professionals. A small team of construction workers under the direction of John Emery from Jacobsen Construction Company managed debris removal and operated machinery. The number of workers varied from four to twenty based on the type of debris removal and the amount of work to be completed. Tim Maxwell, historic architect with FFKR Architects, worked on site almost every day to create record drawings of the building and details. He was occasionally assisted by other staff architects from FFKR Architects. The author managed the salvage of significant character defining features and

documented the salvage process in her capacity as a Historic Sites Curator for the Church History Department of the LDS Church.

Two questions guided the next few months of work on the project: Were the exterior walls stable? Did any character defining elements on the building's interior survive the fire? Portions of the exterior masonry bearing walls collapsed as the roof separated from the walls but overall they were stable and in good condition. Some projecting sandstone courses were broken off by falling building debris and some brick was smoke and soot stained. The exterior walls were structurally braced with steel as a precautionary measure (See Figure 4).

The interior of the building was a far different story. Most of the building had burned and collapsed into an at least six-foot deep pile debris. This debris mixed with the water used to fight the fire then froze in the frigid December weather. Most of the interior plaster separated from the walls. Many wood lintels above doors and windows were completely destroyed. The balcony burned completely, leaving only beam pockets along the exterior walls. Most of the cast iron columns supporting the inside edge of the balcony remained standing. All of the rooms under the front stage area were damaged. Every interior surface, if not charred, was damaged by smoke and water. Because all of the surviving interior finishes were buried under several feet of debris and ice there was little priority in putting a temporary roof on the structure.

The insurance company focused their efforts on the areas where the fire started and initially spread. Because they were primarily looking for electrical information they cared little about room arrangements or interior architecture. The architects and historic

preservation professionals engaged to assess the damage to the building and its possible reconstruction cared little about the electrical details but focused their attention on the floor plan and interior architectural and decorative features. Because of the high total replacement value of the building and potential litigation, the insurance investigators managed the initial salvage operations. The primary goal was to identify locations and details of the source of the fire: the electrical and AV equipment.

Fortunately, these two groups worked side by side. As a shovelful of debris was removed, the insurance company and architects each salvaged building fragments they needed to reconstruct the building's history and the fire's cause. Between December 2010 and May 2011 at least 150 tons of debris were sorted and reviewed in this process. The building was laid out in a grid much like an archaeology project. Each salvaged building fragment was documented according to its position in the grid and labeled as to fragment type and condition.

In the two weeks after the fire the project team created a list of character defining features for the building. This list became almost the wish list of items they hoped to find in the debris or questions they hoped to answer during the salvage process.

The basic building structure was documented only as it helped provide information on changes to the building since the structure and construction methods were fairly typical for the region and time period. This decision to save interior finishes as much as possible but to photograph and then dispose of wood framing was one of the most critical decisions in the project. The entire preservation process and the cost would

have been radically different if interior room framing structures had been a preservation priority.



Figure 4: Provo Tabernacle Interior, March 2011. Note the steel bracing at almost all of the window openings. Most of the plaster was destroyed in the fire and most headers were also destroyed. The floor was partially removed in anticipation of construction of a new full height basement instead of the pre-fire crawlspace. Plastic sheeting was placed over the tops of masonry walls to protect them from further deterioration after the roof collapse. [Image courtesy LDS Church History Department.]

As the salvage process continued it became clear that restoration and reconstruction was possible while the amount of interior damage greatly limited possibilities for preservation and rehabilitation. No single finish completely survived but enough fragments survived that a clear picture could be created of the building originally and immediately before the fire. Because the building had been a large auditorium finishes were fairly uniform. A single style of window trim was used throughout the

building. The building had two baseboard types; one for the main hall and one for ancillary spaces. All original interior doors were made in the same style while doors from later additions to the building were made in styles consistent with the time period of the additions.

In many areas of the building fire burned away the most recent finishes exposing earlier finishes to examination. For example, nine different types of wallpaper and decorative painting were found mostly intact underneath heavily damaged coats of paint. Thus, the fire also presented an opportunity to research a building's construction in a way that can rarely be done. Many of the finishes and construction details would not have been discovered during a typical preservation project. These revealed details aided in a greater understanding of the building's history and change over time. The building's construction and finish history could be clearly seen because the building was so heavily damaged. These details were not readily apparent in historic photographs of the building and were not explicitly stated in archival documentation about the building.

### Preservation Decisions

The initial decision for the future of the Provo Tabernacle was to restore the building to its 19th century period of significance. This was possible because of the detailed salvage process, relative intact exterior of the building, and the fact that the building was insured for total replacement value. The preservation project team also determined that the tabernacle filled a critical public need for the community.<sup>64</sup> Restoring original building finishes did not include exact restoration of the original 1898 floor plan. Improvements in technology and building codes made exact floor plan restoration

impractical. The building did not meet current building code and needed better handicap access. The building would also need a seismic upgrade to meet current code. In February 2011 a meeting of stakeholders and others decided that the acoustics in the building needed to be upgraded and more support space for meetings, event preparation, and restrooms was desired. To accommodate these additional spaces and needs, the design team decided to construct a basement that did not exist in the original building as well as slightly expand the rostrum.

These floor plan changes were possible because while the exterior walls still had a high level of integrity using the seven criteria established by the National Register, interior walls were heavily damaged or did not exist. This allowed the project team the flexibility to accommodate the spaces requested as well as bring the building up to code. Thus, the original plan for the Provo Tabernacle was a rehabilitation and restoration of the exterior with new construction inside the damaged shell of the building.

In summer 2011 the Provo Tabernacle project was cancelled. The president of the LDS Church, Thomas S. Monson, upon review of the project, decided adaptive use was a better option. This option was available because while the exterior had retained most of its integrity, the interior was almost completely destroyed. President Monson decided to turn the Provo Tabernacle into a new LDS temple for the Provo area. While all of the considerations for this decision are not known, he likely considered cost and the fact that the nearest temple was already over capacity and another temple was needed in the area.<sup>65</sup> He decided that the uses of the Provo Tabernacle could be absorbed by other



structures. This change in use impacted personal significance of the building for many Provo residents but justified the expense in restoring the exterior of the building.

Announcing his decision, President Monson said,

“May I mention that no Church-built facility is more important than a temple...Late last year the Provo Tabernacle in Utah County was seriously damaged by a terrible fire. This wonderful building, much beloved by generations of Latter-day Saints, was left with only the exterior walls standing. After careful study, we have decided to rebuild it with full preservation and restoration of the exterior, to become the second temple of the Church in the city of Provo. The existing Provo Temple is one of the busiest in the Church, and a second temple there will accommodate the increasing numbers of faithful Church members who are attending the temple from Provo and the surrounding communities.”<sup>66</sup>

It is important to note that President Monson stated that the building’s exterior, its only extant feature, would be restored and preserved. This statement provided directed vision guiding all aspects of the project.



Figure 5: Rendering of the Provo City Center Temple. The center tower will be reconstructed. Paint colors and materials for the new roof were being finalized at the time of treatise completion. [Image courtesy LDS Church Special Projects Department.]

At the time of this writing in 2013, construction at the site had just begun. The design team intends for the building to retain its National Register status but the success of that endeavor will not be known until the project is completed in about 2015. At that time an addendum to the original National Register nomination will be submitted. The exterior walls will remain standing with a seismic upgrade located on the inside so as to retain original exterior integrity. The art glass windows will be restored or replicated and the roof reconstructed to its 1898 appearance with a center tower (see Figure 5).

Although the tower and art glass windows were not present at the historic building at the same time, both are character defining features for the building and create much of the building's exterior public identity. Interior finishes salvaged from the fire are being used as design precedents for the temple interior. Even the floor plans have parallels to room locations and dimensions to those in the tabernacle. While the interior of the building will be new construction inside a restored exterior, the interior will feature design consistent with the period of significance.

### Lessons Learned

The Provo Tabernacle rehabilitation and restoration project reveals several important decision factors helpful to future preservation projects after fires. The first is to have a strong working relationship between firefighters, fire investigators, insurance companies, contractors, architects and the property owner before and after the fire. More of the building likely could have been saved if the fire department was more familiar with the building's floor plan, significant features, and potential hazards.

The second lesson is that establishing a clear preservation vision is crucial immediately after a fire. The salvage and documentation process occurred relatively quickly because architects, historic preservation professionals, and contractors all knew the significance of individual building elements. The architectural and preservation team trained the contractor to look for character-defining features in the building's rubble. Some of the construction workers tagged and documented items from the debris field even when the architect was not on site to supervise the work. Every member of the project team understood the significance of the building and the meaning it held in the local community. This heightened community awareness also helped the project team during the salvage process because the team knew how closely their work was being observed.

A third critical lesson learned was understanding significance and integrity before and after the fire. A thorough understanding of each building element's pre- and post-fire integrity allowed for quick analysis and clear direction on the appropriate preservation activity. The integrity of surviving building features were analyzed using the seven National Register criteria. Significant building features that needed conservation work after the fire were quickly identified so they could be protected. As use of the building will change after preservation, an expanded understanding of significance is relevant. It was critically important to understand significance and identity beyond definitions in the National Register. Intangible ideas of identity provided as much motivation for preservation of the building as the National Register's statement of significance. The project team took time to understand the meaning of the building to the local community.

They asked community members about their favorite architectural feature and what the building meant in their family. That identity is informing design of new construction, ensuring that the building's authenticity is not completely lost.

Finally, the Provo Tabernacle fire also highlights the need for disaster protection and mitigation plans. Important historic buildings should be fully documented in case disaster happens. At minimum this should include floor plans and elevations, photographs of every room, and written descriptions of significant spaces. Detailed drawings and photographs of individual elements may also be warranted. Historic buildings should have a functioning alarm and fire suppression system. Disaster planning is particularly important in publicly accessible buildings.

## CHAPTER V KEARNS MANSION CASE STUDY

### History and Significance

Thomas Kearns, original owner of the Kearns Mansion, made his fortune in mining. He built one of the most fashionable mansions on the most fashionable street, South Temple Street, in Salt Lake City, Utah in 1902. Its interior was among the most opulent of the early 20<sup>th</sup> century mansions in Salt Lake City. The house featured imported hand-carved hardwoods, a grand gold leafed interior dome above the central stair, rich furnishings, and even a bowling alley in the basement. The mansion was completed while Thomas Kearns was serving as United States Senator. The Kearns Mansion was donated to the State of Utah for use as a governor's mansion in 1937. Despite decades of use and changes to interior design, the mansion was still an opulent and richly appointed home for Utah's Governor. The mansion was listed in the National Register of Historic Places in 1970 for its architectural, educational, industrial, political, and social significance.<sup>67</sup>

### Cause of the Fire

About 240 Christmas trees catch on fire every year in the United States.<sup>68</sup> That number may not seem high but the damage from Christmas tree fires can be extremely serious. The Kearns Mansion fire demonstrates the risk and impact of Christmas tree fires.



Figure 6: Kearns Mansion Exterior, 1907. [Image courtesy Utah State Historical Society.]



Figure 7: Kearns Mansion Interior, 1954. Note the opening in the ceiling that extended up two stories. This opening became a major path for the fire. [Image courtesy Utah State Historical Society.]

A three story high atrium through the center of the house was the perfect place for a Christmas tree. In 1993 Governor Michael Leavitt and his family placed a tree in this traditional spot. Unfortunately an overloaded extension cord, rated for only six amperes, was used and a fire ensued.<sup>69</sup> Its effect was exacerbated because decorative flammable moss and firewood had been used to hide the extension cords.

The Kearns Mansion was equipped with a fire detection system but not with a suppression system. The building had fire rated doors at the exits. Other security and alarm systems were installed in the building because it was a governor's residence. Ironically, on December 15, 1993, work crews were onsite reviewing the status of the fire detection system when the fire began.<sup>70</sup> Several members of the Leavitt family and their staff were also in the house and safely evacuated the building. The fire spread rapidly through the three story atrium making it difficult to remove any personal items or significant furnishings or artwork from the building. First Lady Jaclyn Leavitt barely had time to grab a jacket before fleeing the building.

### Fighting the Fire

The fire department arrived with minutes because the fire detection system activated immediately. After determining everyone was safely out of the building, they focused their efforts on containing the fire to as small an area as possible. Most of the loss of building material was limited to the area around the atrium because of the firefighters' quick response. The fire crew placed dams across doorways and covered the most significant furnishings to minimize water and other kinds of damage to other rooms.<sup>71</sup> Because of the fire crew's quick response the fire did not penetrate the roof,

which was one of the most critical aspects in saving the building from post-fire deterioration due to exposure.

Representatives from the insurance company also arrived on scene within minutes of the fire's start. The insurance company knew the building's significance and was able to review the firefighting operation as it was taking place. This careful oversight and involvement also simplified the fire recovery efforts. Staff from the State Historic Preservation Office also arrived onsite before the fire was out. These professionals advised firefighters on the significance of the building and guided the placement of dams to limit fire and water damage to other rooms.

#### Salvage and Documentation

Because the roof was still intact, stabilization activities could begin as soon as the fire was extinguished. Windows damaged by the fire and fire fighting efforts were immediately boarded up and a disaster cleanup company immediately placed equipment in the building to dry out damaged rooms. Quickly drying wood finishes and restoring heat and humidity prevented deterioration of significant interior finishes.<sup>72</sup>

The fire marshal began his investigation while the building was drying out and before anything was removed from the building. Fire investigation was fairly straightforward and revealed few surprises. The point of origin was clearly identifiable as the Christmas tree and extension cord. The fire marshal released his final report on the fire less than a month after the fire took place.

These quick response activities immediately after the fire made it easier to restore the building. All stakeholders including the property owner, fire professionals, architects,



engineers, and historic preservation professionals were present and engaged in the restoration and reconstruction process immediately. Initial preservation treatment decisions were made while the building was still on fire instead of waiting for months to begin stabilization activities or cover damaged windows.

While interior finishes were damaged in the fire the underlying structure remained intact. The most direct damage from the fire was in the grand hall immediately around the atrium where some of the interior finishes were almost completely destroyed. Unfortunately this area also had some of the most significant woodwork in the building. Other areas of the building suffered only smoke and water damage. This relatively high level of interior integrity allowed for the possibility of detailed restoration.

### Preservation Decisions

Because of the building's symbolic identity as the governor's mansion as well as its architectural and historic significance, the decision was made to restore the Kearns Mansion to its original 1902 period of significance, not to its appearance the day before the fire. In addition, the project team decided to take the opportunity presented by the fire to upgrade mechanical systems, install a fire suppression system, and install seismic and structural upgrades.

The project team focused on retaining integrity of workmanship and materials. Wilson Martin, representing the State Historic Preservation Office on the project team, noted that "where the original materials could not be kept, accurate replacements would be installed. Woods that matched original woods were located, and millwork and carvings were completed by the best available tradespeople."<sup>73</sup>

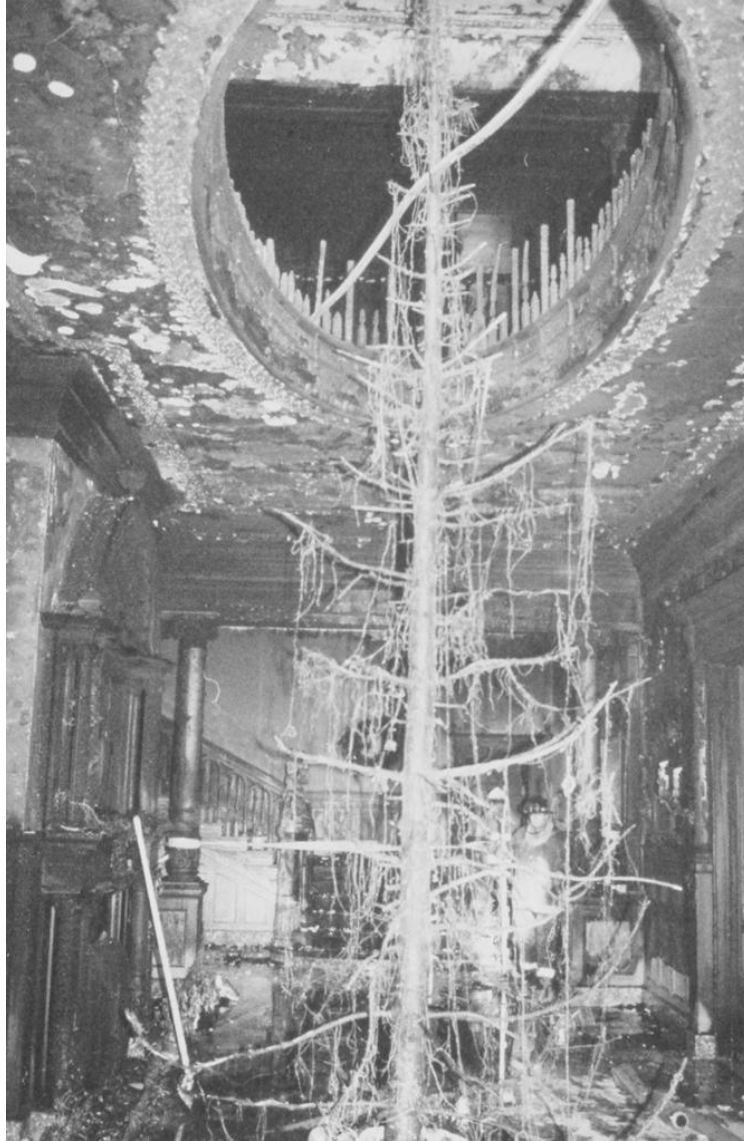


Figure 8: Kearns Mansion Grand Hall showing fire damage, December 1993. The Christmas tree that started the fire can clearly be seen in the center of the photo. Note partial combustion of materials immediately around the tree with less significant damage of finishes at the rear of the hall. [Image courtesy Utah State Fire Marshal.]

One of the unforeseen preservation challenges for the Kearns Mansion restoration was odor. Soot had collected in every wall cavity and the smell of smoke impregnated the plaster walls and ceilings. Unfortunately no amount of scrubbing would completely

remove the soot from plaster and wall cavities. This meant that almost all interior wall surfaces, including plaster, wood paneling, and window frames had to be removed even though at first glance they were intact. The wall cavities were then thoroughly cleaned and deodorized before restored or reconstructed finishes were installed.<sup>74</sup>

Unlike other case studies presented in this treatise, the underlying building structure contributed to the significance of the building. Research by the project team revealed that the Kearns Mansion was among the first structures in Utah to use metal lath in the early part of the 20<sup>th</sup> century.<sup>75</sup> This metal lath was largely undamaged and could be retained. Damaged walls were rebuilt using the same materials and techniques because of the significance of the original material.

Minor changes to layout of the private quarters were made to increase security and functionality, but otherwise the pre-fire plans remained intact. The building's high degree of functionality as well as high level of post-fire integrity meant that an accurate and complete restoration could take place.

One of the most significant interior restoration projects was the reconstruction of the dome that had originally been on the ceiling above the atrium. The dome was almost completely destroyed because it was directly above the fire's origin. Each surviving piece of the dome was carefully consolidated then replicated in plaster. All of the replica plaster pieces were then combined to create a new dome. The new dome replicated the old dome in materials, construction method, and appearance.<sup>76</sup> The dome retained integrity of workmanship and design even though original material integrity had been

compromised in the fire. The craftsmen did not attempt to “improve” the original design, understanding that the original design integrity was more important than a new design.

The high level of post-fire integrity made extremely accurate restoration possible. Original paint colors and stenciled patterns found beneath damaged finishes were used to restore rooms to their original appearance. Original woodwork damaged in the fire was reconstructed by hand using the same techniques used by the original carvers. The historic wood was sent to a lab for analysis to determine exact species and grain before new wood was selected and carved. Architects and interior designers studied historic photos of the building and original building furnishings to accurately restore each room. All of this work was restored to a level of finish as if the building had never been burned. The project team prided themselves on knowing that the new was “nearly indistinguishable from the old” in materials, finishes, and appearance.<sup>77</sup>

Perhaps most importantly, the building has retained integrity of feeling and association. Only those who are aware of the building’s history know about the fire. Most visitors to the building today recognize it as an opulent early 20<sup>th</sup> century mansion with all of the craftsmanship and expensive materials common to the time of its original construction. Because of careful restoration the Kearns Mansion is an authentic example of a residence and public building from Utah’s first decades as a state.

### Lessons Learned

The building’s use as the Governor’s Mansion increased its significance and aided in its restoration. The building is a showpiece for the state of Utah and is part of the public political face for the state. Restoring the mansion showed the attention the state

pays to its history and highlighted craftsmanship and preservation professionalism available in Utah. The building was able to retain its identity because so much of the project focused on retaining integrity of design, workmanship, and materials.



Figure 9: Kearns Mansion Grand Hall in 2010. All interior architectural and decorative were restored or reconstructed. A removable art glass skylight was placed in the center of the atrium to act as a fire break for upper floors and to improve building security. [Image from Google Images, accessed February 2012.]

The detailed restoration of the Kearns Mansion was possible in part because of the insurance policy on the building. The insurance policy had been written specifically for the historic building and assumed additional expenses because of the building's age and significance. Most of the project costs were covered by the insurance policy. Some donations covered restoration of ornamental details or commission of new art and ornament. Minor additional funds came from state funds used to maintain the mansion.

These good relationships between the owner, insurance companies, and other funding sources were critical to preserving the Kearns Mansion.

The success of the building's restoration was also due in part to the expertise of the project team. State Historic Preservation Office staff were key members of the project team, as was a project architect experienced in historic building projects. Many of the craftsmen had worked on another historic mansion in Salt Lake City damaged by fire a few years earlier, as had the insurance company.

The location of the fire also had a major impact on the scope of the restoration project. A fire that starts at floor level does much less structural damage than a fire that starts at the ceiling or in an attic. When a fire starts at ground level, the flames will move toward a window, door, or other opening. When the fire starts at the ceiling or in an attic, flames usually destroy the roof or do major damage to walls as it spreads down to windows and doors. Unfortunately, the Kearns Mansion suffered more damage than a typical ground floor fire because it spread quickly to upper floors through the open atrium. Fortunately, the atrium also acted as a chimney, drawing the fire up instead of helping to spread it out to other parts of the building. Thus, most of the heavy fire damage was contained within the atrium area.

One of the most important lessons learned was the ability of a roof to limit post-fire damage to a building. Because the roof stayed on the building, heat and humidity could quickly and safely be reintroduced immediately after the fire. In addition, because the roof stayed on the building, floors underneath did not collapse, thus floor joists were not heavily damaged and remained structurally sound. However, retention of the roof was

not without its drawbacks. Soot damage would likely have not been as widespread had the roof partially collapsed.

A highly detailed restoration to the building's 1902 period of significance was possible at the Kearns Mansion. The building's historic significance and meaning to the state of Utah was clearly understood before the fire. The amount of combustion, though severe in some areas, was not widespread throughout the building. This localized loss of building fabric made it easier to argue for a total restoration of the entire building. Good interior photographs and some architectural drawings aided in the restoration effort. Because the project team decided at the beginning of the project to focus on retaining integrity of workmanship, other aspects of integrity were also retained or restored. Critical decisions about which building elements to restore were relatively easy because the entire project team agreed to the restoration focus.

## CHAPTER VI WINDSOR CASTLE CASE STUDY

### History and Significance

Windsor Castle has been one of the homes of the British Monarchy for almost nine hundred years. It represents British architecture since the time of the Norman conquest and houses extremely significant art, material culture objects, and archival collections that record much of British history. The castle is perhaps best known as one of the official residences of the British Royal Family.<sup>78</sup> In addition to public state rooms the castle contains private rooms for the family as well as offices, staff rooms, and other spaces not open to the public.

Because of the significance of the castle and its collections, disaster plans were in place prior to the 1992 fire. Staff knew which collections were significant and had been trained to properly remove important collections from the building if the need arose. The castle also had a fire brigade assigned to it that was familiar with the building and were trained in the unique challenges of mitigating disaster in the building. Unfortunately, despite the overall significance of the building, not all of the rooms had been thoroughly documented at the time of the fire.



### Cause of the Fire

In 1992 Windsor Castle was in the midst of a program to update the building's electrical and HVAC systems. The project included fire compartmentation and detection systems but no suppression systems since, "it was calculated that the damage to important historic interiors, which the installation of sprinklers would involve, let alone what they might do if they went off by mistake, would not be worth the reduction of fire risk which they would bring."<sup>79</sup> Because the large building was in constant use the upgrades were done in phases. As one room was completed, furniture was removed from the next room and work begun. The Private Chapel was used a staging area to inspect paintings as they were removed for safekeeping during the construction work or returned to the building. The fire in Windsor Castle started in this room on November 20, 1992.



Figure 10: St. George's Hall, circa 1900. The hall is used primarily for state receptions. [Image from Google Images, accessed November 2012]

While the exact cause of the fire is uncertain, it appears that a spotlight used to light the room ignited a curtain. This may have happened because there were a number of people working in the building that were not part of the castle's usual staff. This unfortunate accident during a work project illustrates the need to plan to protect buildings during construction projects. Although the work project was focused on improving fire safety within the building a moment of haste during the project did more damage than any part of the planned work.

### Fighting the Fire

Within minutes the fire had spread across the ceiling and into the roof structure. The fire became increasingly difficult to contain because it spread through attics and wall voids. However, because the fire was at the ceiling level it did provide an opportunity to remove interior furnishings. This was done by trained castle staff under the careful direction of the fire brigade once they had determined it safe for people to enter the building. Because the fire brigade was trained to direct removal operations, only a few objects were destroyed in the fire. The destroyed items, including a table and chandeliers, were too large to remove from the building or were near the fire's origin. The types, amount, and significance of saved furnishings helped guide preservation decisions later in the project.

While most of the furnishings were saved, interior architectural features and rooms were a different story. Fire crews tried to limit damage to individual rooms but this was a difficult task because the attics were connected. Without fire breaks, the fire spread quickly to drawing rooms, the state dining room, and St. George's Hall, as well as a

number of kitchens. The fire crew was able to stop the spread to other portions of the building only because the building's original stone construction provided some fire breaks. If Windsor Castle had been built at one time instead of over hundreds of years, fire could have destroyed the entire building. As it was, over one hundred rooms were damaged or destroyed (see Figure 12).

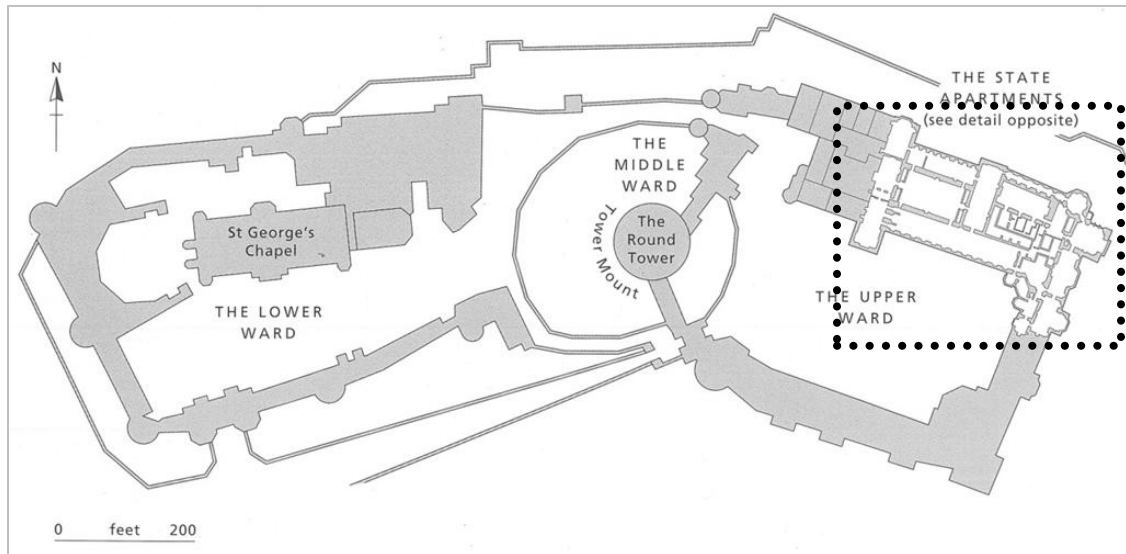


Figure 11: Windsor Castle Floor Plan. The fire damaged area of the castle is marked on the northeast side of the building. [Image from *Restoration: the Rebuilding of Windsor Castle*.]

In the fire fighting process, the fire crew followed the general protocol of protecting human life, limiting spread to other portions of the building, and limiting damage to portions of a building already engulfed. Complicating their efforts was the inability of the crews to safely reach the flames. The fire had to be fought from outside the castle on ground that could not fully support the weight of fire engines. This location was the only option because the fire engines could not fit through all of the gates that provided the best locations to fight the fire. New buildings often include landscape design

plans to enable quick access to a building by firefighters. However, this type of access would have severely impacted the historic integrity of the site. The needs of access to a site and preservation of site integrity should be carefully understood and balanced before a fire.

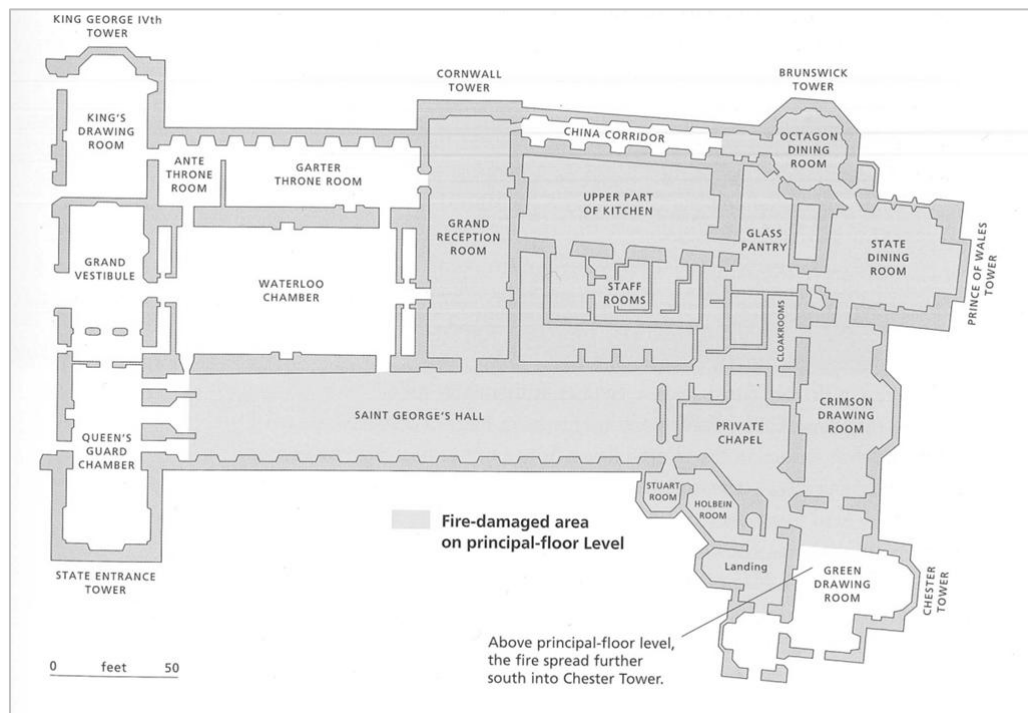


Figure 12: Fire Damaged Areas of Windsor Castle. The fire, which started in the Private Chapel, spread quickly because attic spaces above these rooms were connected. [Image from *Restoration: the Rebuilding of Windsor Castle*.]

Rooms that suffered heavy damage were associated with roof collapse while other rooms where the roofs remained intact escaped mostly unharmed. All the rooms on the upper levels were completely destroyed as was the Brunswick Tower. Portions of the drawing rooms had to be demolished so fire crews could access and suppress fire in the wall voids. The Private Chapel, where the fire started, was completely destroyed as was most of St. George's Hall. The kitchens, recently refurbished, also suffered heavy

damage. Rooms at the bottom of the debris pile were less damaged than rooms near the roof. However, water damage affected lower floor rooms.

### Salvage and Documentation

Work began to preserve the damaged portions of the building even before the fire was fully out. The most experienced staff from English Heritage and other government agencies were organized quickly to begin preservation efforts. Even though the building was uninsured there was no question that the building would be preserved. The question for the Royal Family was how to pay for preservation. Since public outcry after the fire prohibited the use of tax funds, the Royal Family paid for the preservation from fees collected for tours of the Crown properties.<sup>80</sup> Because the preservation was self financed the Royal Family had control over the entire preservation process and design decisions for the building.

The first step after the fire was extinguished was to stabilize walls and assess the structural integrity of the remains. No one was allowed to salvage additional items until this assessment and stabilization took place. This was done because no building finish, however important, was more important than human life. While great care was taken to preserve building fragments during stabilization, some elements were likely lost during the effort. The most notable loss was a large malachite urn from Queen Victoria's reign, damaged by the work crew tasked to stabilize the walls.

Because of the significance of building features and the scale of the fire the next step was to erect a temporary roof to allow the interior to dry out and stabilize. This was particularly necessary for some of the lower floors that had not been directly damaged by

the fire but had been extensively damaged by the water used to fight the fire. Even with the temporary roof the interior was still at risk. Some walls were still wet months after the fire, making it difficult to stop fungal growth as well as conserve existing finishes or construct new interior finishes. Some preservation activities had to be delayed while these areas dried and were cleaned.

After the temporary roof was installed the full salvage process began. The first step was to document the building and debris layers using photogrammetry, which allowed a detailed three dimensional survey to be made to accurately document each building fragment and its location in the building.<sup>81</sup> Then an archaeological project was undertaken to document and carefully remove building fragments. All of the building debris was carefully documented and catalogued before it was removed from the building and stored offsite for further documentation and conservation. Decorative plaster was carefully gathered and put back together almost like a jigsaw puzzle. A room by room assessment was made of the extent of damage each had suffered. This meticulous process was possible in part because the Royal Family was guiding the schedule and preservation effort and because the best professionals in the country were all working on the project.



Figure 13: Grand Reception Room after the Fire. Note that the ceiling was completely destroyed while wall finishes were left almost completely intact. A temporary roof and scaffolding has also been erected above the Grand Reception Room. This room was restored to its original condition because wall finishes retained their integrity after the fire. [Image from *Restoration: the Rebuilding of Windsor Castle*.]

### Preservation Decisions

At Windsor Castle the historical and architectural significance of the building somewhat compromised its functionality. There were many odd corners and under-utilized spaces created when the building had been expanded and changed over the centuries. The fire at Windsor Castle allowed for close examination of all affected spaces. This information was combined with the understanding of architectural integrity and significance to determine which spaces to restore and which spaces could have a change of function or design. The only limitation on designing new rooms was to not change the building's exterior including the pitch of the roof.

One major question facing restoration of Windsor Castle, indeed facing any major restoration, had to do with restoring underlying structure or just restoring finishes. Windsor Castle used the British concepts of “authentic restoration” and “equivalent restoration.”<sup>82</sup> Authentic restoration meant that a building is restored using all the techniques of the original construction. Most of the cost in this type of restoration is in features like trusses, floor joists, plaster, lath walls, and other elements using traditional methods and materials rarely seen by the public. Equivalent restoration allows modern construction systems and materials supporting historic finishes. This form of restoration was used in many parts of the building because it was less expensive, did not greatly change the public's experience in the building, and allowed for modern health and safety systems. Since offices and private rooms on the upper floors were completely destroyed they were redesigned to better serve modern functions. These purely functional spaces are rarely mentioned in published accounts of the castle's restoration.



The fire revealed significant historic features in the kitchens that had been obscured by later renovations. The design team restored those features and changed some of the room arrangements in this area to increase functionality and to allow better access to these previously hidden significant spaces.<sup>83</sup> The redesign of these ancillary spaces was possible because they had suffered a major loss of integrity in the fire. One of the most significant restorations was in the Undercroft; an area of the building completely obscured by later renovations. The Undercroft was underneath St. George's Hall and suffered major damage from water used to fight the fire. Damage from the fire revealed the historic and architectural significance of this Undercroft area for the first time in several hundred years.

The biggest debates focused on the drawing rooms, dining room, Private Chapel, and St. George's Hall. In the end several different preservation treatment decisions were made. The drawing rooms and dining room were extremely significant examples of early 19<sup>th</sup> century interiors as well as functional public spaces. Fire damage in these rooms varied but because they were originally designed as a single architectural statement the decision was made to restore them to their original appearance. The decision was also based on the significance and integrity of the furnishings, most of which survived the fire. The furniture had been specifically designed for those rooms and had survived due to removal during the early stages of fire fighting.<sup>84</sup>

Another important restoration discussion for the drawing and dining rooms was whether to restore them to their original 19<sup>th</sup> century condition or their condition the day before the fire. While a historic house museum interpreter may value the faded quality of

a room to tell its history, Windsor Castle is a working building. Everything in the building needed to be of the best quality and finishes regardless of its age. The restored rooms may have looked slightly different to people in them every day but they were painstakingly restored to be accurate to original historic design and appearance from the early 19<sup>th</sup> century. In this case, the rooms were restored to a historically accurate level of authenticity instead of a perceived or sentimental level of authenticity.

St. George's Hall and the Private Chapel posed a different kind of problem. Although significant architectural spaces, they had some serious functional and design challenges for castle staff. As use of those rooms had expanded and changed over the centuries, original minor functional inconveniences had become major flow issues for staff trying to support state dinners, receptions, and other large public events. A relatively major amount of damage to these rooms allowed for the possibility of new designs to increase functionality and improve design. This was because material integrity had been severally compromised. In addition, careful analysis of castle functions revealed that the significance of support spaces in those areas was not extremely high. Awkward corridors and hidden corners were redesigned to better fit the current staff needs of those areas. The Private Chapel was redesigned to improve flow in that part of the building. Major combustion loss and structural damage of the somewhat poorly executed design in St. George's Hall allowed for a redesign of the space. The first attempt at new designs were completely revolutionary for the history of Windsor Castle. One called for a series of skylights and an open atrium along the flight path to Heathrow Airport. Another called

for a modern exposed steel structure to symbolically show the castle's rise from the ashes.

In the end, the design team decided on a plan to find something historically compatible with the castle but incorporating modern construction and function.<sup>85</sup> This approach worked because the significance of the space was tied more to association and feeling than to specific qualities of design and materials. A different approach would have been taken had the rooms not suffered major damage or if the original design was more functional. These rooms lost material and workmanship integrity but retained integrity of association and feeling because new designs were compatible with the historic designs of the building. The rooms retained largely the same function and the new designs carefully followed the historic precedents available in the building and in the area.

### Lessons Learned

Overall, preservation and reconstruction of Windsor Castle after the devastating fire in 1992 preserved its significance and much of its existing integrity. The exterior character of the building remains unchanged because it was not heavily damaged by the fire. The interior rooms damaged by fire were restored or given new designs based on functional, significance, and integrity decisions. All of these decisions were made based on careful analysis and understanding of the overall significance of the building and each room. This case study shows how important post-fire integrity is when planning a preservation project. Rooms with a high level of integrity were restored while rooms with less integrity had some design changes. It also shows the importance of understanding the

significance of each room as it relates to the entire building. At no time did the significance of an individual room outweigh the overall significance of the building. Every change to the building was made to maintain or increase the building's identity for the Royal Family and the general public.

One of the most critical decisions of any preservation project after a fire is determining which building materials are significant enough to attempt to save. There is wide debate within the historic preservation community about whether the building materials themselves are as important as the final appearance. At Windsor Castle it was decided that new steel roof trusses were appropriate as long as the finished roof material and interior architectural finishes had integrity of feeling, design, materials, and workmanship. In other areas new technologies, materials, and systems were used to lower costs and shorten the reconstruction time. All of these preservation decisions were made to maintain the building's extremely significant historic identity.

Another factor contributing to the success of the building's preservation was the professionalism of the project team. The team had years of experience restoring some of the most significant historic buildings in Britain. Many of the team members had been involved in restoring other fire-damaged historic buildings and thus understood the specific problems and challenges associated with this type of restoration and reconstruction.

Perhaps the most critical lesson learned from the Windsor Castle fire is the importance of a clear design vision and preservation goal from the property owner. The Royal Family not only supervised the preservation process and approved each room's

design, they paid for the project. The flexibility and success of the project was due in large part to this single voice guiding the entire process.



Figure 14: New Roof Design for St. George's Hall. This design, while new, retained integrity of feeling because of its consistency with historic precedent. [Image from *Restoration: the Rebuilding of Windsor Castle*.]

## CHAPTER VII DEVEREAUX MANSION CASE STUDY

### History and Significance

The Devereaux Mansion in Salt Lake City, Utah, was built in phases beginning in 1867 to replace a smaller cottage already on the site. William Jennings, owner of the property, was most interested in the beautiful gardens on the property and wanted to build a home that fit the surroundings. Jennings was an influential Salt Lake City businessman and community leader who needed a home to entertain frequent visitors and dignitaries. With its mansard roofs and elegant drawing rooms finished in eastern hardwoods the Devereaux Mansion quickly became one of the most important homes in late 19<sup>th</sup> century Salt Lake City.

Unfortunately, the home lost some of its integrity of setting with the construction of industrial buildings and railroad terminals on surrounding blocks at the beginning of the 20<sup>th</sup> century. The building was used as a facility for recovering addicts from 1904 to 1919 when it was purchased by the Coan family and returned to residential use. By the 1940s the property had become headquarters of the Coan family's mining equipment supply company. The building became severely neglected in this period. Heavy equipment damaged floor joists in various parts of the building. A truck scale was built inside the building destroying both exterior and interior walls. By the 1970s the house

was extremely dilapidated and structurally unsound and had become home to a number of transients.

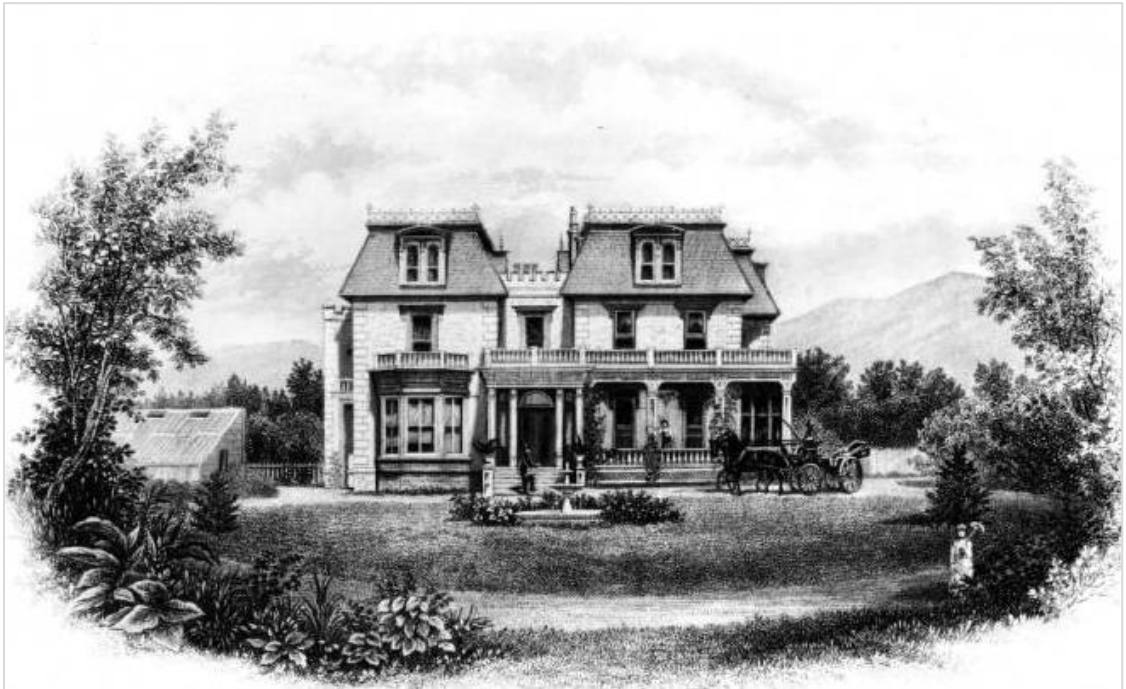


Figure 15: Devereaux Mansion, circa 1890. [Image courtesy LDS Church History Department.]

Fortunately, underneath the dilapidation some of its original architectural splendor could still be seen. A full survey of the building was completed by the Historic American Building Survey (HABS) program in 1967. In the early 1970s the Utah Heritage Foundation, a local preservation advocacy group, began discussing purchase and restoration of the building. The Devereaux Mansion was listed in the National Register of Historic Places in 1971 as part of a plan to raise awareness about the building.<sup>86</sup> The Mansion was listed for its architectural, political, and landscape significance.<sup>87</sup> The State of Utah purchased the house in 1977 to begin that restoration

process with the support of the city, the Utah Heritage Foundation, and a private group planning a redevelopment project on neighboring blocks.



Figure 16: Devereaux Mansion before Restoration, about 1980. The fire caused a partial roof collapse and damaged exterior woodwork around the front door. Other exterior problems were caused by neglect and poor management of the building. [Image courtesy LDS Church History Department.]

### Cause of the Fire

On August 9, 1979, the Devereaux Mansion caught on fire, probably due to transients living in the building. Some people thought the fire had been set by opponents of the restoration project. Firefighters arrived on scene within minutes of it being noticed and worked to limit damage. Unfortunately their efforts were hampered by the structural problems and dilapidated condition of the building. Because of this fire crews focused their efforts on saving the parts of the building with the most structural integrity.



### Salvage and Documentation

In the hours after the fire, restoration project architects said the fire was “‘somewhere between a minor and major setback’ to restoration plans – but restoration will definitely go forward.”<sup>88</sup> The fire further damaged an already weakened structure. Approximately one-third of the roof was destroyed, but did not completely collapse, as the fire spread upward. Most of the loss of original building fabric was contained within the grand hall and staircase where the fire began. Side rooms were damaged by smoke and water with only minimal combustion damage because most interior doors were closed, creating fire breaks. Most interior finishes in these rooms, including wallpaper and paint, were still intact.

The first step in the restoration process was to install a temporary roof. Although the building’s roof had leaked for years, a complete roof loss in some areas of the building caused further deterioration of some building finishes. Because the building had burned in August it was deemed unnecessary to install temporary heating. By the time cold winter months arrived the building was completely dry.

With a temporary roof on the building, documentation and planning began. This process took more than three years in part due to budget problems and limited staff. Detailed profiles were made of slightly charred building elements then conserved if possible. Badly charred elements were reconstructed using the HABS drawings and photographs from a decade earlier. After the building had been fully documented selective demolition began. Structurally weak parts of the building were removed as were

damaged interior plaster work and details. Original wood floors and other wood finishes in good condition were left in the building and carefully restored.<sup>89</sup>



Figure 17: Damaged Finishes in the Devereaux Mansion Grand Hall, 1979. The woodwork around the door was partially destroyed by the fire but profiles remained intact for reconstruction. Wall plaster was likely damaged by the fire. It is unknown if the damaged ceiling plaster was caused by the fire or by the general building neglect. [Image courtesy LDS Church History Department.]

### Preservation Decisions

At the end of the documentation phase, the decision was made to restore the building as closely as possible to its 1876-1880 appearance, the period of the building's highest design significance. This preservation goal was clearly understood and defined because while the building had lost some integrity, those damaged spaces were well enough documented that accurate restoration and reconstruction was possible.

In order to justify restoration of the state owned building, the project team needed a viable post-restoration use for the building. The most feasible option was to make the building a restaurant and event space.<sup>90</sup> Some minor floor plan modifications were made for that use including an expanded kitchen and ballroom and turning several small bedrooms on upper floors into larger rooms. However, none of these modifications changed the exterior character of the building or impacted rooms with the highest level of architectural significance and integrity before or after the fire.

One of the most critical preservation decisions was not to use original construction techniques. The north portions of the building, heavily damaged by mining equipment, were completely demolished at the beginning of the work. While the original portion of the building was constructed of brick with a stucco finish, the new north wing was constructed of concrete masonry units with a stucco finish. A new concrete foundation and steel framing was also used instead of the traditional stone foundation and wood framing. Rather than spending money on historically accurate structural systems that would never be seen, the project team spent its money on architectural finishes. All of the new woodwork and plaster closely matched the appearance and finish of the original materials and design.

Funds for the restoration came from a variety of sources. Approximately \$84,000 came from the insurance settlement on the fire damaged portions of the building.<sup>91</sup> This paid for repairs to fire damaged finishes but was not sufficient to address underlying structural problems. This insurance settlement addresses an interesting point. Insurance paid for the portion damaged by a fire. It didn't pay for deferred maintenance or problems

caused by a previous owner's changes to the structure. The rest of the more than \$1 million restoration funds came from a combination of state and city funds and support from the Triad Center Corporation, a private redevelopment firm doing major construction work in the blocks immediately surrounding the house. Some of the immediate cash flow for the project came from a federal Urban Development Action Grant.



Figure 18: Devereaux Mansion after Restoration, circa 1985. [Image Courtesy LDS Church History Department.]

Since the project's completion in 1984 the building has functioned primarily as a restaurant or event space. The property has had a number of owners as individual businesses thrived or failed. The house was used as a hospitality center for visiting dignitaries at the 2002 Winter Olympics. The Church of Jesus Christ of Latter-day Saints

currently owns the building and leases it to a wedding event company. This continued use with a variety of owners is probably due to the project team's decision that the most feasible use option was turning the building into a restaurant. The large kitchen and large rooms make it difficult to see the building as an office or smaller meeting space. Through all of these owners the building has retained its National Register status. Even though exterior construction is different, the appearance is consistent with the stated goal to restore the building to its 1876-1880 appearance and the building has retained most of its integrity.

### Lessons Learned

A primary preservation treatment after a fire is stabilization through installation of a temporary roof. While potentially costly, this temporary roof protected already fragile interior building features. The combination of a roof and boarded up windows prevented further damage from natural elements and human interference while the preservation project was documented and salvage operations were undertaken.

This case study reveals the challenges of restoring a building when fire loss is just one of the construction issues involved. While the fire did some damage, the building already suffered from years of neglect. Unlike the other case studies examined in this thesis research in which the fire prompted the restoration, the Devereaux Mansion fire became the final catalyst for restoration. The fire did not drastically change the scope or goal of the restoration project. Extra money needed to restore damaged finishes fortunately came from the insurance settlement.

The major motivation for restoration of the mansion came in part because of the change to the building's setting. Urban blight almost destroyed this building as the neighborhood declined. The wealthy neighborhood setting was largely replaced with industrial and commercial yards. Urban renewal then became an opportunity to preserve the building. Once the building's significance was understood it became a major part of the urban renewal of the area. The building is overshadowed with neighboring office buildings but the building would not be standing if the office buildings had not been constructed. Integrity of setting has been severely compromised on this building while integrity of design, location, association, and feeling has been retained. The building's original significance as the Devereaux House and its continuing significance as a community gathering space was retained in this preservation project. Significant spaces like the sitting rooms, dining room, and corridors were carefully restored while secondary spaces like bedrooms were slightly modified to meet current functional needs. The relative integrity of each room was considered when deciding for restoration or change. This preservation prioritization was possible because the significance of the building was carefully understood before the project began.

## CHAPTER VIII CONCLUSION

### Findings

This research has given a positive response to the hypothesis: can a historic building damaged by fire retain significance and integrity? Specifically, this research has shown that a building can retain significance and integrity as defined by the National Register of Historic Places criteria. This is possible if project teams share a common preservation vision and goal for the project. A building can also retain its significance as defined by the National Register if that significance guides the preservation project. A building's integrity as defined by the National Register may be retained, especially when that integrity is connected to broad themes and not specific workmanship and materials. Fire often becomes the catalyst for restoring a building to its period of significance or it may provide the impetus to undertake needed alterations and repairs. This thesis research provides some guidance and thoughts on how significance and integrity can be successfully retained after fire.

### Understanding Identity, Association, and Feeling

Understanding of a building's identity is often among the primary reasons for preservation after a catastrophic fire. As the case studies in this research have shown, the identity people connect to a place as a royal residence, a community gathering place, or

iconic piece of architecture, can inspire owners to preserve a building despite catastrophic fire loss. The identity associated with specific aspects of a building can inform the type of preservation treatment implemented. The National Register of Historic Places criteria often ignores identity in its focus on finding connections to larger national stories and context as well as national or regional significance. Because identity is so critical for a community to preserve a historic building, the National Register should more seriously consider the role identity plays in determining significance. A building with significance may tell part of the American story but a building with identity helps keep a community alive.

Integrity of association and feeling become very important in preserving historic buildings after fire. Material integrity may be lost and floor plans may change to accommodate new uses or current building codes. Integrity of materials and workmanship may be compromised as substitute materials are used to replicate or restore damaged materials. However, the building can retain integrity of feeling and association if the project team is focused on retaining significance and identity. New designs that are compatible with the historic period of significance or a new use that helps a building remain part of a city's skyline helps a building retain integrity of association and feeling. As preservation decisions are made it is important to remember that there are seven integrity criteria to evaluate and assess in relation to each other. All seven criteria should be understood as part of the goal to retain significance and integrity.



### Expanding Ideas of Significance and Integrity

This treatise began with a discussion of significance and integrity as defined by the National Register of Historic Places. While useful, these narrow definitions can limit a fulsome understanding of a building's history. A building's significance may be found in its connection to a significant event, person, theme, or architectural style as defined by the National Register. However, its significance may also be found in personal heritage or in the intangible ideas of identity. Similarly, a building's integrity may be found in design, materials, workmanship, setting, location, feeling, and association as defined by the National Register. But it may also be found in the authenticity of carrying on ancient tradition or in our perception of how the past looked. This thesis research has shown that these broader ideas of identity and significance must be understood and considered when undertaking preservation activities after fire. Buildings like the Provo Tabernacle and Devereaux Mansion were preserved in part because of the immense personal and local significance tied to the buildings. A building's heritage can be as much a reason for preservation as architectural significance as defined by the National Register.

### Retaining Significance and Integrity

This thesis research focused on how a building can retain significance and integrity after a fire. Too many historic buildings that are heavily damaged, but not completely destroyed, by fire are considered lost because people do not know how to properly evaluate the surviving aspects of significance or integrity. This research has shown several successful projects that retained significance and integrity of a building despite catastrophic fire loss. A building's significance may be slightly changed after a

fire but integrity is not necessarily lost if preservation, rehabilitation, restoration, and reconstruction principles are carefully weighed and executed.

Windsor Castle has remained one of England's most important royal residences despite major damage to state rooms because preservation principles were carefully considered. The castle lost some integrity of design, especially in St. George's Hall, but retained integrity of feeling and association in every damaged room. In addition, the castle retained some integrity of materials and workmanship because new finishes were created using the same materials and methods as the original destroyed or damaged finishes. The identity of Windsor Castle as a royal residence is unchanged because of the careful restoration project and the careful attention to all aspects of design by the Royal Family.

The Provo Tabernacle will maintain its exterior architectural integrity despite a change in use because preservation is the primary goal of the project. The tabernacle has lost some integrity of association because of the change in building use. However, integrity of association will also be partially retained because the building's grounds will remain open as a kind of community park just as they have been for over a hundred years. The building will also remain a piece of iconic 19<sup>th</sup> century architecture in an area that has few surviving examples from that era. The community lost a gathering space and community event space central to its identity despite retention of material, design, and location integrity. Conversion of the building to a LDS Temple will partially alter the identity of the local community while at the same time reinforcing the connection of the

area to its historic pioneer past. Integrity of feeling will be retained because new designs are sympathetic to the building's original design.

The Kearns Mansion retained almost all aspects of integrity despite heavy damage because of the careful restoration focus of the project. The mansion's architectural, governmental, and historical significance has not been altered in the restoration project. The building's identity as a governor's residence and as one of the best early mansions in Salt Lake City is unaltered. New finishes replicate the materials, workmanship, and design of original damaged finishes and help the building retain those aspects of integrity.

The Devereaux Mansion is probably the hardest building in which to define significance and integrity because it had been neglected for decades before the fire. The building's identity had been largely discarded. An end result of the preservation project reinforced the significance of the building and used the building to establish a new identity for the area. The exterior and major interior rooms retained integrity of design but lost some integrity of materials because so many substitute materials were used in the project. The building has retained integrity of authenticity and feeling. Many visitors to the building today are surprised to hear about the fire because the building seems to be an authentic representation of late 19<sup>th</sup> century Utah.

Retaining significance and integrity is dependent on the level of pre-fire documentation and the amount and type of fire damage. It is most dependent on a strong project team with a unified goal to preserve the damaged building. A historic preservation professional can have little impact on a project if the owner, architect, or contractor does not have a preservation goal in mind. Critical decisions about what to preserve and how

to preserve are more difficult when project team members don't understand or apply basic preservation principles.

Two things are critical in preserving historic buildings immediately after a fire to allow long-term preservation decisions to be made. First, the exterior walls need to retain most of their integrity. In all of the case studies the exterior walls needed cleaning and repair as well as some minor reconstruction. None needed to be demolished and completely reconstructed because of the fire. This structural integrity makes other preservation decisions possible.

The second is to protect what remains of building structure and finishes, typically by installing a temporary roof and boarding up openings. This protects undamaged finishes and seals the building from the weather while research, documentation, stabilization, and design takes place. Heating and ventilation systems are often needed in a building after a fire to properly conserve surviving finishes.

#### Pre-Fire Planning and Post-Fire Recovery

After discussing significance and integrity this thesis research turned to the areas of disaster planning and recovery not often considered by historic preservation professionals. This section showed the need for greater collaboration between preservation and fire professionals. Fire professionals who understand historic buildings are more likely to help retain a building's significance and integrity. While most fire professionals are not generally concerned with a building's historic significance training may be possible and necessary to help them better understand the value of original fabric and the significance of elements, and thus know how to fight fire in historic buildings.

The appropriate amount and type of insurance for a historic building is also critical for post-fire preservation to take place. Without specialized insurance for historic buildings many could not retain integrity after a fire or other catastrophic disaster. All of the case studies had adequate funding in place or available to restore integrity of materials and workmanship when needed. For example, the quality of the Kearns Mansion restoration would have been severely compromised had funds not been available to restore the dome.

Also critical is a carefully assembled post-fire preservation team. Professionals with experience in historic preservation and fire recovery must be consulted to ensure significance and integrity can be safely and properly retained. Their expertise may expand a previously poorly understood period of significance or integrity.

#### Recommendations for Property Owners

Property owners must take the lead in preserving historic buildings after fire. They may have a more nuanced understanding of a building's significance and must guide a project team to retain those significant building features. They may also more fully understand the building's personal and community identity and can guide a project team to decisions that will retain that identity.

Property owners also have responsibilities before a fire. They should ensure a building has been properly and thoroughly documented. This level of documentation will make post-fire preservation decisions easier. Property owners should also ensure their buildings are properly insured before a fire takes place.

A property owner's most critical role after fire is assembling the right project team. If the building is to retain significance and integrity every member of the team must have that goal as the first priority. Historic preservation professionals, preservation architects, construction contractors, engineers, and insurance professionals with experience in historic buildings should be engaged for the project. They will be able to help the property owner understand how significance and integrity can be retained and how to repair the fire damage.

The project team, working with the property owner, should determine the best preservation treatment after a fire. The preservation treatment should be selected based on post-fire integrity and pre-fire significance. A building that has suffered major loss in one room with minimal loss in others can be faithfully restored and preserved to pre-fire condition. A building that has suffered major loss in a number of spaces may be restored or can easily become an adaptive use project with rebuilding that is sensitive to the values of feeling and association because of the loss of original integrity.

### Further Research

A number of future research topics arise from this thesis research. The first is a more robust analysis of the National Register definitions of significance and integrity. Allowing for a broader view of these ideas could alter the way we approach historic preservation in the United States. This understanding will help engage non-historic preservation professionals more fully in historic preservation dialogue. The historic preservation community should also engage in more discussion and analysis of identity as an approach to historic preservation activities.

Research should also continue on the use of historic materials and the historic appearance of a building. All of the case studies analyzed in this thesis research involved making critical decisions about using historic materials in the preservation project. In some cases, historic finish materials were used while modern construction techniques were also employed in areas not viewed by the public. This question of alternate building materials in historic buildings will only become more critical as new technologies become available and old materials are deemed unsafe or impossible to procure.

All of the case studies in this treatise addressed buildings that did not totally lose their structural integrity. How to retain historic integrity when structural integrity has been compromised has implications for other types of disaster recovery including earthquakes, tornados, and floods. Further research by the engineering professions on these topics could prevent future demolition of historic buildings after catastrophe.

Further research may also include more technical research into new fire suppression systems, removing soot damage without removing finishes, how to properly remove water from a building, and other technical preservation tools.

Lack of clear guidance on how extensive the damage to historic buildings must be to remove listing in the National Register hampers the decision making process after a disaster. A comprehensive list of buildings removed from the National Register should be compiled to give context and deeper understanding to how a building can remain listed in the National Register despite change.

### Final Conclusion

This research has shown that a historic building damaged by fire can retain significance and integrity. It has also shown that a building can retain significance and integrity as defined by the National Register of Historic Places criteria. Perhaps most importantly, this work has shown that some aspects of integrity hold more weight in post-fire historic preservation. Historic preservation professionals should take more seriously the ideas of association and feeling when determining preservation treatments after a fire. In addition, historic preservation professionals should spend more time understanding a building's identity. A building with historic significance but little identity sometimes has little chance of being preserved. However, a building with immense identity but little historic significance will be preserved because the community becomes a partner in preservation.



## GLOSSARY

**Arson:** The crime of maliciously and intentionally, or recklessly, starting a fire or causing an explosion.

**Char:** Carbonaceous remains of burned organic materials.

**Combustion:** An exothermic chemical reaction that is a self-sustaining process of rapid oxidation of fuel, that produces heat and light.

**Convective Heat:** Transfer of heat by the movement of heated fluids or gases, usually in an upward direction.

**Dam:** A temporary or permanent barrier that controls or directs the flow of water. It is used in fire fighting to protect undamaged areas of the building from water used to fight fire.

**Egress:** Place or means of exiting a structure.

**Fire Break or Fire Barrier:** A continuous membrane or a membrane with discontinuities created by protected openings with a specified fire protection rating, where such membrane is designed and constructed with a specified fire resistance rating to limit the spread of fire, that also restricts the movement of smoke.

**Flameover:** Condition that occurs when a portion of the fire gases trapped at the upper level of a room ignite, spreading flame across the ceiling of the room.

**Flashover:** Stage of a fire at which all surfaces and objects within a space have been heated to their ignition temperature and flame breaks out almost at once over the surface of all objects in the space.

**Fuel Load:** The total quantity of combustible contents of a building, space, or fire area, including interior finish and trim, expressed in heat units or the equivalent weight in wood.

**Overhaul:** Those operations conducted once the main body of fire has been extinguished that consist of searching for and extinguishing hidden or remaining fire, placing the

building and its contents in a safe condition, determining the cause of the fire, and recognizing and preserving evidence of arson.

**Point of Origin:** Exact physical location where the heat source and fuel come in contact with each other and a fire begins.

**Radiant Heat:** The transfer of heat energy from one body to another body of a lower temperature through intervening space by electromagnetic waves such as infrared thermal waves.

**Soot:** A black carbonaceous substance or deposit consisting of fine particles formed by the combustion of coal, wood, oil, or other fuel.

## ENDNOTES

1 "Printable Fact Sheets" at [www.nfpa.org](http://www.nfpa.org)

2 ICOMOS has been involved in a number of publications and initiatives including *Preservation in Peril: Disaster Planning, Rapid Response, and Sustainable Recovery in the 21st Century*, conference held in New Orleans, Louisiana, 12 March 2009. COST Action C17, sponsored by Historic Scotland, looked at fire loss in historic buildings. Finally, the NFPA published its first building code specifically for historic buildings in 2001.

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4 Howard L. Green, "The Social Construction of Historical Significance in Michael Tomlan, ed., *Preservation: Of What, For Whom?: A Critical Look at Historical Significance* (Ithaca, NY: The National Council for Preservation Education, 1998), 87.

5 Cheryl M. Hargrove, "Heritage Tourism," *CRM* 1(2002) 10-11.

6 David Lowenthal, *The Past is a Foreign Country* (Cambridge: Cambridge University Press, 1985), 265.

7 For more information on Le Duc and his writings on understanding significance before undertaking restoration see *The Architectural Theory of Viollet-Le-Duc: Readings and Commentary*, edited by M. F. Hearn, Boston: Massachusetts Institute of Technology, 1990.

8 Lee H. Nelson, FAIA, "Architectural Character: Identifying the Visual Aspects of Historic Buildings as an Aid to Preserving Their Character," *Preservation Brief 17*, Department of the Interior, 1988.

9 "National Register Criteria for Evaluation" in "How to Apply the National Register Criteria for Evaluation" National Register Bulletin, National Park Service, Department of the Interior.

10 Ibid.

- 11 John H. Sprinkle, Jr., "'Of Exceptional Importance': the Origins of the 'Fifty-year Rule' in Historic Preservation, *The Public Historian* 29:2 (Spring 2007), 81-103.
- 12 Kenzo Tange and Noboru Kawazoe, "Ise: Prototype of Japanese Architecture" (Cambridge: MIT Press, 1965), 202.
- 13 Howard Mansfield, *The Same Ax, Twice* (Hanover and London: University Press of New England, 2000), 34.
- 14 Ibid, 274.
- 15 "Integrity", *Merriam-Webster's Collegiate Dictionary*, 11th Edition, 2003.
- 16 Cox, Damian, La Caze, Marguerite and Levine, Michael, "Integrity", *The Stanford Encyclopedia of Philosophy (Spring 2012 Edition)*, Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/spr2012/entries/integrity/>.
- 17 Recent additions to the ongoing discussion about integrity and art include Jack Flam, "Defending the Integrity of an Artist's Life's Work," *Wall Street Journal*, 7 December, 2011 and Glenn Wharton, "The Challenge of Conserving Contemporary Art," in *Collecting the New: Museums and Contemporary Art*, edited by Bruce A H Shuler (Princeton University Press, 2007).
- 18 "How to Complete the National Register Registration Form" National Register Bulletin, National Park Service, Department of the Interior.
- 19 "How to Apply the National Register Criteria for Evaluation," National Register Bulletin, National Park Service, Department of the Interior.
- 20 James P. Delgado and Kevin J. Foster, "Guidelines for Evaluating and Documenting Historic Aids to Navigation to the National Register of Historic Places," *National Register Bulletin* 34, National Park Service.
- 21 Sharon C. Park, "The Use of Substitute Materials on Historic Building Exteriors," *Preservation Brief* 16, National Park Service, 1988.
- 22 Asbestos was commonly added to plaster as a binding agent in the first half of the 20th century. While harmless if the plaster is undisturbed, once the fibers are released in the atmosphere, they can be breathed in, causing health problems.
- 23 For examples of this interchangeability of terms see Christina Cameron, "From Warsaw to Mostar: The World Heritage Committee and Authenticity," *APT Bulletin* 39:2/3 (2008), Pamela Jerome, "An Introduction to Authenticity in Preservation," *APT*

*Bulletin* 39:2/3 (2008), and Robert W. Passfield, "Evaluating Authenticity: Reconstructed Timber Swing Bridges," *The Journal of the Society of Industrial Archaeology* 31:2 (2005).

24 Christina Cameron, "From Warsaw to Mostar: The World Heritage Committee and Authenticity," *APT Bulletin* 39:2/3 (2008), 20.

25 Nara Document on Authenticity, Nara Conference on Authenticity in Relation to the World Heritage Convention, 1993.

26 "Choosing an Appropriate Treatment for the Historic Building" in "Introduction to Standards and Guidelines," National Park Service, Department of the Interior.

27 For examples of the application of these treatments see "Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines," National Park Service, 1983. [http://www.cr.nps.gov/local-law/arch\\_stnds\\_10.htm](http://www.cr.nps.gov/local-law/arch_stnds_10.htm) accessed April 2013

28 National Register Federal Program Regulations, Title 36, Chapter 1, Part 60, Section 60.15.a.

29 The most complete list of properties removed from the National Register is on Wikipedia. The list is largely anecdotal and does not evenly represent every state.

30 National Historic Landmarks have been designated since 1935. National Historic Landmarks have national significance, whereas National Register Properties have local, state, or national significance. To date, about 2,400 properties are National Historic Landmarks while more than 85,000 properties are included in the National Register.

31 "Withdrawal of National Historic Landmark Designation," National Historic Landmarks Program, [www.nps.gov/nhl](http://www.nps.gov/nhl) accessed November, 2012.

32 Michael J. Karter, Jr., *Fire Loss in the United States During 2010* (National Fire Protection Association, Fire Analysis and Research Division, September 2011).

33 Data summarized from Michael J. Karter, Jr., *Fire Loss in the United States During 2010* (National Fire Protection Association, Fire Analysis and Research Division, September 2011).

34 NFPA 914: Code for Fire Protection of Historic Structures (Quincy, MA: NFPA, 2010 Edition), 1.

35 *National Fire Protection Association 914, Code for Fire Protection of Historic Structures* (Quincy, MA: NFPA, 2010 Edition).

36 There is some controversy about installing fire suppression systems in buildings because of the impact to historic integrity and the possibilities of damage to a space if the suppression system activates prematurely. Installing a system may negatively impact the visual character of a room and may require demolition of interior finishes.

The most common suppression system uses water. Water that remains in the pipes at all times is called a wet system while water that is released into the pipes only when an alarm sounds is called a dry system. A wet suppression system that goes off accidentally or in response to a minor fire often does as much damage as an actual fire in a historic building. Another common suppression system, especially in museums, uses inert gases or other chemicals to suppress a fire.

37 Genny Dill, "Getting the Right Insurance for your Historic Building," *Forum News* 15:4 (March/April 2009).

38 Depreciated value is the loss of value that occurs when an object is used or ages.

39 Riders are an addition to an insurance policy, purchased separately from a basic policy, that provides additional benefits at additional cost.

40 Typically historic and non-historic buildings owned by government entities are not insured. Rather their restoration or reconstruction costs are paid for by existing bond funding of construction or special appropriations from the government body.

41 Recent examples include private residences burned in Flint, Michigan, the Pullman Couch Company Warehouse in Chicago, Illinois, retail buildings in Byron, Michigan, and a warehouse in Binghamton, New York.

42 For more information see <http://nationaltrust-insurance.org> accessed 14 March 2013.

43 "Fireman's Fund Launches New Insurance Program for Historic/Vintage Commercial Buildings," <http://www.buildingonline.com/apps/news/article/6450> accessed 14 March 2013.

44 Carl Goodson and Lynne Murnane, ed., *Essentials of Fire Fighting and Fire Department Operations* (Upper Saddle River, New Jersey: Brady/Prentice Hall Health, 5th Edition), 146-150.

45 "A History of Building Codes and Fire Protection," in Francis L. Brannigan and Glenn P. Corbett, *Brannigan's Building Construction for the Fire Service* (Quincy, MA: National Fire Protection Association, 4th Edition), 66.

46 The National Fire Protection Association is a non-profit organization that promotes fire safety in buildings, researches fire protection methods and materials, and publishes fire protection codes and standards.

47 Carl Goodson and Lynne Murnane, ed., *Essentials of Fire Fighting and Fire Department Operations* (Upper Saddle River, New Jersey: Brady/Prentice Hall Health, 5th Edition), 130.

48 Ibid, 18.

49 “Fire Control” in Carl Goodson and Lynne Murnane, ed., *Essentials of Fire Fighting and Fire Department Operations* (Upper Saddle River, New Jersey: Brady/Prentice Hall Health, 5th Edition)

50 Carl Goodson and Lynne Murnane, ed., *Essentials of Fire Fighting and Fire Department Operations* (Upper Saddle River, New Jersey: Brady/Prentice Hall Health, 5th Edition), 18.

51 Ibid, 868-869.

52 Ibid, 118-120.

53 Ibid, 909.

54 Chemical fires are an exception to this idea. Because chemical fires are not extinguished using water the impact of the chemicals used should be carefully considered.

55 The additional weight of water and building debris on historic timbers was noted as a partial cause of structural failure in areas damaged in the Windsor Castle fire.

56 John D. Dehaan and David J. Icove, *Kirk’s Fire Investigation* (Boston: Pearson, 7th Edition), 6.

57 The National Fire Protection Association defines “authority having jurisdiction” as “the organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.” See Ronald L. Green, “Authorities Having Jurisdiction,” *RLGA Technical Services* 9, April 2005.

58 John D. Dehaan and David J. Icove, *Kirk’s Fire Investigation* (Boston: Pearson, 7th Edition), 234.

59 *Provo Tabernacle*, National Register of Historic Places Nomination Form, National Park Service, Department of the Interior.

60 Manuscript History, Utah Stake, Church History Library, Salt Lake City, Utah.

61 These changes included adding restrooms and small meeting areas under the rostrum. Emily Utt, Provo Tabernacle Historic Structures Report, Church History Department, 2012.

62 The Provo Tabernacle Fire: Origin, Cause, and Circumstance, Provo Fire Marshal, March 31, 2011.

63 Jacobsen Construction, under the direction of project manager John Emery, removed the windows. This work was done before a historic preservation professional was allowed on the site. John was able to follow preservation principles in removing the windows because of his long-standing interest in preservation focused construction projects.

64 The project team consisted of Andy Kirby, project manager; Bernard Messina, in-house architect; Emily Utt, historic preservation specialist; FFKR Architects, consulting architect; Jacobsen Construction, general contractor; and Revealey Engineers, consulting structural engineers. An executive team consisting of department heads from the LDS Church Special Projects, Church History, Risk Management, and Audio Visual Departments provided direction and information to church leadership.

65 Tabernacles can be considered the 19th century equivalent of a meetinghouse. They generally were one large auditorium that occasionally included a small office behind the rostrum. Tabernacles were a fairly common building type but became obsolete by the 1950s as LDS meetinghouse design expanded to include small classrooms, gymnasiums and kitchens. Tabernacles and meetinghouses are open to the general public and used weekly, usually on Sundays, for large worship meetings. A typical Latter-day Saint congregation includes about 300 people and the LDS Church owns or rents thousands of buildings around the world. Temples are more rare and serve a slightly different function. As of December 2012, 140 LDS Temples are in operation around the world with another 28 announced or under construction. Temples are open only to church members in good standing. All temple activities take place during the week and the building is usually closed on Sunday. In the temple, people meet in small groups to witness or participate in marriages and other ordinances.

66 Thomas S. Monson, "As We Meet Again," *Ensign*, November 2011.

67 *Thomas Kearns Mansion and Carriage House*, National Register of Historic Places Nomination Form, National Park Service, Department of the Interior.

68 Marty Ahrens, "Home Christmas Tree and Holiday Light Fires," National Fire Protection Association, November 2011.



69 Utah Governor's Mansion, Utah State Fire Marshal's Office Report of Investigation, 1994.

70 The identities of the work crew in the building to complete the inspection were not named. See Lisa Riley Roche, "Leavitt Family Finds Little to Salvage as They Sift Through Belongings," *Deseret News*, 16 December 1993, B11.

71 "Fire, Smoke and Repairs," Utah Governor's Mansion Reopening, Utah State Archives, 1.

72 Ibid, 1.

73 Wilson Martin, et. al, "The Governor's Mansion: Ready for Utah's Second Century," *Utah Preservation* 1, 18.

74 "Fire, Smoke and Repairs," Utah Governor's Mansion Reopening, Utah State Archives, 2.

75 Metal lath is used to key plaster to framing members. During the 19th century and much of the early part of the 20th century, wood strips were commonly used in residential applications instead of metal.

76 "The Dome – an Important Architectural Component," Utah Governor's Mansion Reopening, Utah State Archives.

77 "Woodcarving and Plasterwork," Utah Governor's Mansion Reopening, Utah State Archives.

78 The British Royal Family owns or leases a number of official and private residences. Besides Windsor Castle, other royal residences include Buckingham Palace, Palace of Holyroodhouse, Frogmore, Balmoral Castle, Sandringham House, St. James's Palace, Kensington Palace, and Clarence House.  
(<http://www.royal.gov.uk/theroyalresidences/reschannel.aspx> accessed April 2013)

79 Adam Nicolson, *Restoration: The Rebuilding of Windsor Castle* (London: Michael Joseph, 1997), 4-5.

80 "Q&A Written Replies: Windsor Castle Fire Bill is Pounds 35M," *The Independent*, 18 May, 1995.

81 R.W.A. Dallas, J.B. Kerr, S. Lunnon, and P.G. Bryan, "Windsor Castle: Photogrammetric and Archaeological Recording After the Fire," *Photogrammetric Record*, 15:86 (October 1995), 225-240.

82 Adam Nicolson, *Restoration: The Rebuilding of Windsor Castle* (London: Michael Joseph, 1997), 78.

83 Donald Insall, *Living Buildings: Architectural Conservation: Philosophy, Principles and Practice* (Mulgrave, Australia: Images Publishing, 2008), 214-216.

84 Ibid, 212-214.

85 Adam Nicolson, *Restoration: The Rebuilding of Windsor Castle* (London: Michael Joseph, 1997), 94-103.

86 Elwin C. Robison, *Historic Structures Report of the Devereaux Mansion (formerly known as the Devereux House)*, Church History Department, 2011.

87 *Devereaux House*, National Register of Historic Places Nomination Form, National Park Service, Department of the Interior.

88 LaVarr Webb, 9 August 1979, *Deseret News*, “Flames sweep Devereaux House: Fire only a setback, restoration planners say.”

89 Craig Paulsen, “A Brief History of the Reconstruction Work on the Devereaux Mansion,” in Burtch Beall, Devereaux Mansion Files, Church History Library, Salt Lake City, Utah.

90 Devereaux House: Final Report to the Devereaux Committee and Governor Scott M. Matheson, August 25, 1980, copy in Burtch Beall, Devereaux Mansion Files, Church History Library, Salt Lake City, Utah.

91 Craig Paulsen, “A Brief History of the Reconstruction Work on the Devereaux Mansion,” in Burtch Beall, Devereaux Mansion Files, Church History Library, Salt Lake City, Utah.

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