

“To Do No Harm”: Conserving, Preserving, and Maintaining Historic Adobe Structures

Steadie R. Craigo

Abstract: Earthen adobe is a simple, natural, plastic building material, which will survive many centuries if properly maintained. In seismically active regions, such as California, the southwestern United States, and other areas of the world, maintenance must include sensitive structural repairs and seismic retrofitting. Seismic hazard mitigation efforts are needed both for occupant safety and for the preservation of historic adobe resources.

This paper provides an overview of conservation principles and the two differing definitions of the term conservation. Explanation is provided regarding The Secretary of the Interior’s Standards for the Treatment of Historic Properties (Weeks and Grimmer 1995), historic structure reports, and project regulatory review processes, and the paper discusses how these are applicable to best practice conservation and the seismic retrofit of historic adobe structures.

Introduction

Adobe is one of the most natural and organic of building materials. Simple earthen structures can last centuries with appropriate maintenance and repair. Unfortunately, efforts to enhance seismic resistance can be invasive, jeopardizing the material integrity and authenticity of historic adobe structures. In seismic-prevalent regions, such as California, there is a need to retain these important historic buildings and to improve the seismic resistance of the structures (fig. 1).

The California Context

In 1769 the founding of what eventually were to number twenty-one California Missions, in what was then known as Alta California, was begun by Franciscan Father Junipero Serra, as ordered by the king of Spain. This effort was the continuation of the mission chain from the south, in Baja California, Mexico, into the present-day state of California. The primarily adobe mission structures were constructed by local Indians, and the sanctuaries were also decorated by Indians. The Alta California missions were part of a settlement pattern that included *presidios* (royal forts) and *pueblos*



FIGURE 1 Main House, Rancho Camulos, damaged during the 1994 Northridge earthquake. Photo: E. Leroy Tolles, ELT and Associates.



FIGURE 2 Petaluma Adobe State Historic Park. This large two-story adobe residence was the central feature of General Mariano G. Vallejo’s rancho outside of Sonoma, California, the town that he founded. It was one of the largest and most important private ranchos in Alta California. Photo: California State Parks, © 1969.

(towns), *asistencias* (sub-missions), and, later, *ranchos* (ranches). The structures were largely constructed of adobe, although some fired brick and stone materials were also used. Following secularization of the churches by Mexico in 1834, after independence was won from Spain, the mission lands were mostly divided into private ranchos (e.g., fig. 2).

During the 1840s increasing trade and growing settlement by Americans created markets for milled lumber and fired bricks, and the California building stock began to shift away from adobe construction. The wealth and growth generated by the 1848 California Gold Rush and the resulting California statehood in 1850 influenced a major change in construction to mill- and factory-produced building materials. Although it largely disappeared, adobe construction continued to be used to a much smaller degree in the state.

In 1991 the Getty Conservation Institute compiled a list of about three hundred fifty adobe structures remaining in California, out of an estimated two thousand adobe structures constructed in the state since the late 1700s (Tolles, Kimbro, and Ginell 2002, 8). The exact number constructed is unknown. Some of the surviving adobes are in ruins or have been heavily altered and thus have suffered a diminishment of their authenticity and historic integrity. We do know from periodic mis-

sion reports to Spain and Mexico that the early mission buildings were repeatedly repaired after earthquakes.

California State Parks owns forty-two eighteenth- and nineteenth-century adobes, or about 12% of the surviving historic adobe structures in California, including three of the missions: La Purisima Mission State Historic Park, Santa Cruz Mission State Historic Park, and San Francisco Solano Mission in Sonoma State Historic Park. In 2000, eleven of these forty-two adobes were known to have been seismically retrofitted (Felton, Newland, and Kimbro 2000, 1-2). That percentage has increased in subsequent years, since several damaged adobe buildings were repaired and retrofitted after the 1989 Loma Prieta and 1994 Northridge earthquakes.

The Two Views on Conservation

Conservation is a term that carries different meanings in the United States and abroad. Internationally, in countries including Australia, China, Canada, and the United Kingdom, conservation is associated with a broad, inclusive view of historic preservation actions and is generally linked with cultural heritage values, management, planning, policy, and advocacy, as well as cultural heritage tourism.

Sir Bernard Feilden, in his book *Conservation of Historic Buildings*, defines conservation as the “action taken to prevent decay . . . that embraces all actions that prolong the life of cultural and natural heritage . . . preserving character . . . with minimal effect, reversible action, which will not prejudice future interventions” (Feilden 2003, 3). Further, Feilden writes that conservation of the built environment ranges from town planning to the preservation of a crumbling artifact—a very broad scope.

In the United Kingdom, “Conservation Areas,” defined as “areas of special architectural or historic interest, the character or appearance of which it is desirable to preserve or enhance,” have been established (Great Britain 1967). This definition was broadened in practice to include familiar and cherished local scenes, existing communities, and social fabric. Conservation Areas usually encompass or include listed historic buildings, but not always. Conservation Areas are similar to historic districts within the United States, which are generally described as groupings of historic buildings, structures, and resources that collectively contribute to a particular sense of time and place and historical development.



FIGURE 3 Interior of Mission San Miguel Chapel after the 2004 San Simeon earthquake. The decorative interior wall finishes were badly damaged. Photo: E. Leroy Tolles, ELT and Associates.

In the United States, the term *conservation* is more narrowly defined. As the narrative at the Colonial Williamsburg Research Division Web site (no longer available) stated, “the field of architectural conservation emerged out of the historic preservation movement as a new and distinct discipline in the late 1960s.” Considered a subset of the field of historic preservation, conservation is closely allied with object or art conservation, with a focus on material science and preservation theory. Architectural or material conservation is considered to be treatment of building fabric and elements, including the stone foundations, clay roof tiles, adobe walls, and earthen coatings of historic adobes (figs. 3 and 4).

The decade of the 1960s was a time of major historic preservation achievements in the United States and Europe. In 1966 the United States National Park Service established the National Register of Historic Places for listing individual historic buildings and groups of historic buildings, such as districts. Almost concurrently, a comprehensive conservation law enacted in the United Kingdom established Conservation Areas. The emphasis of both laws was on the preservation of the building or of the built environment as a whole, the sense of time and place, and the significant architectural fabric associated with its historic significance. Logically, this led to a desire to protect and preserve—as well as to restore and sometimes reconstruct when justified—



FIGURE 4 Adobe garden wall at Cooper-Molera State Historic Park, Monterey, California. Freestanding adobe structures are difficult to maintain and retrofit seismically.

historic buildings and missing architectural elements. Rather than an emphasis on historic properties valued as sites of associative and commemorative significance (“George Washington slept here”), the importance of preserving the physical historic fabric grew increasingly more important. Guidelines were developed to properly treat the building’s significant architectural elements and character-defining features and eventually also to treat the environs of the historic property. These guidelines progressed into suggested scientific treatment protocols and directives designed to preserve the significant historic fabric from deterioration and damage. This approach has led to increasingly more scientifically and analytically based treatments of historic properties. As a result, conservation treatments have been developed, and preventive conservation has emerged as a widespread practice.

The American Institute for Conservation of Historic and Artistic Works (AIC) defines conservation as “the profession devoted to preservation of cultural property for the future.” Cultural property is defined by AIC as “objects, collections, specimens, structures, and sites identified as having artistic, historic, scientific, religious, or social significance” (American Institute for Conservation of Historic and Artistic Works 1997).

The current trend in the United States is to move from the narrow focus of material conservation to the

broader understanding of conservation as used internationally. The term *conservation* is being used in lieu of *preservation* more frequently by American professionals, but the latter term is still in common use in the United States. Concurrently, there has been a growing use of the terms *cultural heritage* and *heritage preservation* as part of a parallel trend to broaden the application and perception of historic preservation to more than historic districts and old buildings—to include historic landscapes and to encompass intangible social, cultural, and diverse ethnic heritage.

Conservation Principles

The principles below are adapted from the AIC Code of Ethics and Guidelines for Practice (American Institute for Conservation of Historic and Artistic Works 1994, 8–9):

- *Minimal intervention*: To do no more than what is required to protect and to preserve the historic resource.
- *Retreatability* (formally known as reversibility): Treatment shall be of such a nature that it will not preclude or prohibit future treatment to preserve the historic resource.
- *Historic fabric as a source of information and as a cultural resource*: Material architectural fabric and also construction methodology are significant documents of the builders and users of the historic structure.

“To Do No Harm”: The Conservationist’s Hippocratic Oath

Declare the past, diagnose the present, foretell the future; practice these acts. As to [the conservation of historic adobes], make a habit of two things—to help, or at least to do no harm.

Hippocrates, *Epidemics*

The above, slightly modified oath from the fourth century BC is attributed to Greek physician Hippocrates (Hippocrates 1923–88). By replacing the word *diseases* with the word *conservation*, you will see that the oath is readily applicable to the work of conservationists of his-

toric resources. The directive “to do no harm” provides the basic foundation to guide all treatment of historic buildings, including adobe structures, and it has been philosophically incorporated into the core of the U.S. historic preservation efforts.

The U.S. national historic preservation program was established by the National Historic Preservation Act of 1966. The act requires each state to establish a state historic preservation office. These offices are responsible for the various aspects of the national program and are each administered by a state historic preservation officer, generally appointed by the governor.

The National Historic Preservation Act of 1966, as amended (United States 2002), established the following historic preservation programs and regulations:

- State and tribal historic preservation offices
- State historic resources commissions
- Historic resources inventories
- National Register of Historic Places
- Regulatory review: sections 106 and 110
- Certified Local Government Program
- Federal preservation tax incentives
- Technical assistance and education

In California the national historic preservation programs are administered by the State Office of Historic Preservation (OHP) within California State Parks. The OHP is also responsible for certain state historic preservation programs.

The California state historic preservation programs administered by the OHP include:

- State Historical Resources Commission and Public Resources codes 5024 and 5024.5 (California Code Commission, n.d., Division 5)
- California Register of Historical Resources and other state registers
- Preservation tax incentives for historic buildings
- California Environmental Quality Act (CEQA) (California Code Commission, n.d., Division 13)
- California Main Street Program
- State grants

Both the national and state preservation programs use *The Secretary of the Interior's Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995) to provide a basic framework of guidance for work on historic structures. The document was developed over several decades by the National Park Service and is firmly based upon the philosophical framework of the 1964 *International Charter for the Conservation and Restoration of Monuments and Sites* (*Venice Charter*) (International Council on Monuments and Sites and Second International Congress of Architects and Technicians of Historic Buildings 1964). The standards provide guidance for each treatment developed largely upon the principle “to do no harm.”

Four treatments are defined: preservation, rehabilitation, restoration, and reconstruction. Each treatment has ten standards, with guidelines to provide further direction. The guidelines cover the areas of energy conservation and building codes, as well as cultural landscapes and archaeology.

The principles derived from *The Secretary of the Interior's Standards* include:

- “To do no harm”
- “Less is more”¹
- Preserve historic materials
- Preserve historic character-defining features

The conservation principles above and the principles of *The Secretary of the Interior's Standards* are similar and philosophically inclusive of each other.

The last two principles are fundamental to best practices in conservation and historic preservation, as well as to regulatory compliance. Conserving/preserving historic materials means to repair rather than replace, to replace deteriorated materials in kind when repair is not possible, and to clean with the gentlest means possible. Conserving/preserving historic character requires finding a compatible use for the property; retaining distinctive features, finishes, and spaces; respecting significant changes over time; and avoiding conjectural designs.

Architectural or material conservation of historic adobes is fundamentally problematic because of the traditional use of sacrificial coatings for adobe maintenance. For example, the Bolcoff Adobe has developed a picturesque character over the decades, but the appear-



FIGURE 5 Don Jose Antonio Bolcoff Adobe, ca. 1840, Wilder Ranch State Park, near Santa Cruz, California. The Bolcoff Adobe's deteriorated condition is the result of deferred maintenance. Photo: California State Parks, © 1988.

ance clearly reveals some physical deterioration (fig. 5). The current historic appearance would be challenging, if not impossible, to retain if the building materials were properly conserved.

Compliance with the Secretary's Standards and conservation principles requires a thorough understanding of the historic structure. Its historical significance, construction methodology and evolution, physical condition, building code issues, and potential existing or new-use impacts must be available to permit carefully considered treatment.

Historic Structure Report

The Past, Present, and Future of Historic Buildings

A Historic Structure Report (HSR) is an essential conservation tool that provides information necessary to make informed decisions regarding treatment of a historic structure (Look, Wong, and Augustus 1997; Slaton 1997). Preparation of an HSR is usually the effort of a team that includes a preservation architect and structural engineer, historian and/or architectural historian, archaeologist, and material conservator. The report can provide a brief history, construction history, architectural evaluation, existing conditions analysis, maintenance requirements, archaeology issues, proposed work recommendations, and historic documentation. These components, encompassing the past, present, and future,

are very similar to the conservationist’s Hippocratic oath. An HSR can also be a focused study, specific to providing developmental history, treatment and use, or record of treatment, including a ranking of character-defining features, architectural elements, and rooms, to guide new work and future planning efforts, such as a seismic retrofit.

Understanding the Building’s History

The preparation and research necessary for an HSR can lead to discoveries of changes, alterations, and treatments of the buildings which may not be visible. Prior to the commencement of work, sensitive in situ removal and visual examination beneath current layers of wall covering and/or paint can provide physical evidence of early decorative treatments. Original treatment can be found beneath later plaster coatings and applied gypsum board. Historic photographs may reveal interior decorative treatment to walls or ceiling surfaces that have been covered during the intervening years. Two historic adobes within the California State Parks system are discussed below to illustrate this point.

The de la Ossa Adobe, now part of Rancho Los Encinos State Historic Park, was constructed about 1849 in the San Fernando Valley area of Los Angeles (fig. 6). The adobe was heavily damaged during the 1994

Northridge earthquake. An interior faux stone wall treatment was discovered during the planning process for the adobe’s repair and seismic retrofit work (fig. 7). While inspecting the earthquake-damaged interior wall surfaces, State Archaeologist Karen Hildebrand and the project architect, Senior Architect Maria Baranowski, both of California State Parks, noticed varying colors in a deep crack that had exposed wall layers in Room 4B, the former *sala*. Conservation scientist Frank Preusser examined the room and found that the walls of the entire *sala* had been decorated in this manner during the ownership of the Garnier brothers. Conservator Molly Lambert performed the conservation work.

La Purisima Mission, a California State Historic Park, was founded in 1787, destroyed by earthquake in 1812, and subsequently rebuilt at a new site. After the secularization of the California missions in 1834, the La Purisima Mission buildings fell into ruin (fig. 8). Beginning in 1933, under the direction of the National Park Service, several of La Purisima’s more significant buildings were either restored or reconstructed by the Civilian Conservation Corps (CCC) (figs. 9–10). The CCC construction photographs are examples of important documentation that was included in a historic structure report. These photographs can assist in identifying the surviving significant historic materials and the location



FIGURE 6 Exterior of de la Ossa Adobe, Los Encinos State Historic Park, Encino, Los Angeles. The adobe was damaged by the 1994 Northridge earthquake. Photo: Courtesy of Karen Hildebrand, California State Parks.



FIGURE 7 Conserved *sala* wall, de la Ossa Adobe, Los Encinos State Historic Park. This decorated surface was discovered beneath later paint layers. Photo: Courtesy of Karen Hildebrand, California State Parks.

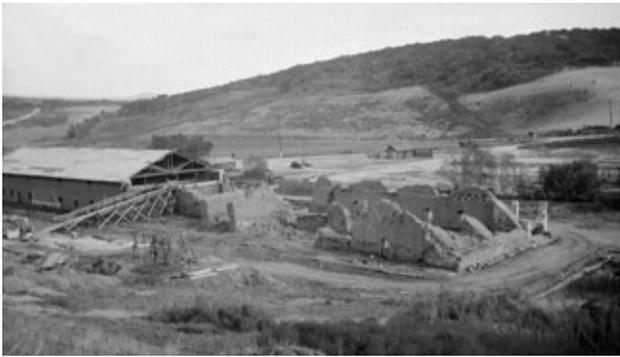


FIGURE 8 The Convento of La Purisima Mission, Lompoc, California, in 1935. The structure was in ruins prior to reconstruction by the Civilian Conservation Corps. Photo: Courtesy of California State Parks, 2007.

of 1930s structural work, so as to guide future work to avoid unnecessary loss of surviving historic building fabric and to reduce the impact of new seismic work.

The National Park Service also provides an outline for preparation of a Historic Landscape Report (HLR) (Birnbaum 1994). Similar to an HSR, the HLR guides the proper treatment of cultural and historic



FIGURE 9 The Convento of La Purisima Mission, under reconstruction in 1935. The Civilian Conservation Corps documented building materials and structural work photographically. Photo: Courtesy of California State Parks, 2007.

landscape properties. The HSR facilitates informed decisions regarding the treatment and preservation of landscapes such as the historic gardens and landscaping adjacent to historic adobe buildings. The HLR also provides direction in the conservation of archaeological resources remaining from vanished adobe structures, such as foundations, flooring, and surviving ruins. The HSR and HLR are important documents that must be prepared to help assure the proper conservation of historic properties.

Maintenance

Proper regular maintenance is critical to the preservation of all historic properties, especially adobe structures. The exterior wall and roof surfaces must be maintained and usually require periodic renewal of paint, stucco, windows, mortar joints, drainage, and roofs to protect the structure from decay. The interior must also be maintained to protect the interior fabric from wear and damage, rising damp, vandalism, moisture, and decay. A maintenance plan is a critical document that must be followed for the long-term survival and preservation of a historic building or landscape.

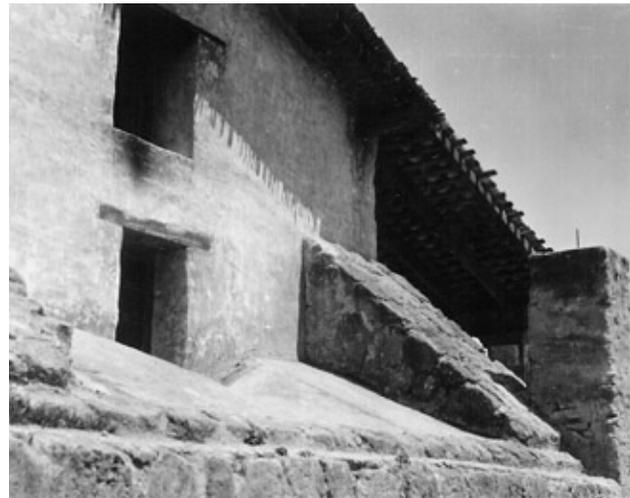


FIGURE 10 The southwest end of the Convento of La Purisima Mission, after reconstruction, ca. 1937. Note the buttresses in photos prior to and after reconstruction (compare fig. 8). Photo: Courtesy of California State Parks, 2007.

By their nature, adobes require regular cyclical maintenance, typically the renewal of exterior coatings and materials (U.S. National Park Service 1997). A weathertight roof is of primary importance. Maintenance of sacrificial exterior wall coatings is also important, as is drainage of moisture away from the bases of earthen walls to prevent rising damp and basal erosion. Historically, maintenance of adobe or earthen buildings was very low-tech, using common, easily available, inexpensive materials requiring more labor than anything else. While this may continue to be true in many parts of the world, in the United States, materials and labor are now both expensive. Because of the rising costs of adobe maintenance in the United States, there is an inevitable interest in using new treatments, coatings, and materials to reduce expenses. Such new—and in some cases untested—treatments are usually found to be detrimental to adobe structures.

Continual maintenance of adobes is less expensive in the long run and has been shown to keep structures more seismically resistant. The State of California’s examination of damaged buildings after the 1994 Northridge earthquake revealed that buildings that were maintained responded better to lateral movement and had less damage than did poorly maintained buildings (Seismic Safety Commission 1995, 117–18). Furthermore, buildings that were even minimally seismically retrofitted, such as with lateral bracing and wall anchors, had less damage than those not retrofitted (Todd et al. 1994, 47). Both observations are clearly important to the survival of historic adobe buildings.

Federal, State, and Local Regulatory Processes

In California the three levels of regulatory processes applicable to work upon historic adobe structures have three aspects in common. First, they require consideration of the effect or impact of the proposed undertaking or project on the historic building. Second, each process provides for the participation of interested parties, including the general public. Interested parties and individuals can submit both oral and written comments regarding the proposed project, creating a more transparent and open process that is responsive to public input and concern. And third, *The Secretary of the Interior’s Standards for the Treatment of Historic Properties* (Weeks and Grimmer 1995) is utilized to

determine the appropriateness of the proposed project on the historic property.

The federal historic preservation regulations are sections 106 and 110 of the National Historic Preservation Act of 1966, as amended (United States 2002). The National Advisory Council on Historic Preservation administers the regulations at the federal level. Within the regulatory framework, each state historic preservation officer is responsible for ensuring appropriate consideration of the undertaking’s effect upon historic properties.

Additionally, California has a strong state environmental regulation called the California Environmental Quality Act (CEQA). Impact to historic resources is a consideration under CEQA. The regulation requires that the lead agency, such as a city, district, municipality, or state agency, determine whether a proposed project may have a significant effect on a qualified historic resource, as defined by the regulation. If the lead agency determines that there will be a significant effect on a qualified historic resource, an environmental impact report must address the effect. The state law is enforced at the local level by municipal governments and responsible agencies and at the state level by state agencies for state projects. The California Public Resources Code permits the California Office of Historic Preservation to comment on environmental documents for both local and state projects. Additionally, Public Resources code 5024.5 requires state agencies with projects potentially impacting historic buildings, as defined, to provide the Office of Historic Preservation with the opportunity to comment formally on the work.

Furthermore, there will very likely be a review process of projects impacting historic properties by local-level historic preservation review boards or commissions. The Secretary’s Standards are often utilized by local review boards to frame their comments and determinations regarding individual projects.

Given regulatory reviews, which may occur at federal, state, and local levels, historic property developers, architects, interested parties, and owners are always advised to consult early with responsible agencies. This consulting will expedite the review process, as well as provide guidance that will ensure best practice treatment of historic resources and compliance with conservation ethics. In the United States, this will also mean

compliance with *The Secretary of the Interior's Standards for the Treatment of Historic Properties*.

Conclusion

Adobe structures require carefully considered treatment to preserve their surviving authentic historic fabric and historic integrity, in compliance with both the principles for conservation and the Secretary's Standards.

Succinctly, recommendations for appropriate best conservation practices for historic adobe structures, including seismic retrofit and material fabric repair, are included in the following four points:

- “Do no harm.”
- Conform to the Secretary of the Interior's Standards.
- Have a full, multidisciplinary, experienced, and knowledgeable conservation/preservation project team.
- Consult early with interested parties and local, state, and federal regulatory agencies, as well as with preservation organizations and agencies.

Note

- 1 This aphorism was used by architect Mies van der Rohe. The phrase originated in the Robert Browning poem “Andrea del Sarto.”

References

- American Institute for Conservation of Historic and Artistic Works [AIC]. 1994. Code of Ethics and Guidelines for Practice. <http://aic.stanford.edu/about/coredocs/coe/index.html> [accessed 21 Oct. 2008].
- . 1997. Definitions of Conservation Terminology. <http://aic.stanford.edu/geninfo/defin.html> [accessed 7 Aug. 2008].
- Birnbaum, Charles A. 1994. *Protecting Cultural Landscapes: Planning Treatment and Management of Historic Landscapes*. Preservation Briefs 36. Washington, DC: National Park Service. <http://www.nps.gov/history/hps/tps/briefs/brief36.htm>.
- California Code Commission. N.d. California Public Resources: Division 5: Parks and Monuments: Chapter 1: State Parks and Monuments, Article 2: Historical Resources, sect. 5024–5024.5. <http://ohp.parks.ca.gov/pages/1071/files/public%20resources%20code%205024.pdf> [accessed 21 Oct. 2008].
- California Code Commission. N.d. California Public Resources: Division 13: Environmental Quality: Chapter 1: Policy, sects. 21000–21006. <http://law.justia.com/california/codes/prc/21000-21006.html> [accessed 21 Oct. 2008].
- Feilden, Bernard M. 2003. *Conservation of Historic Buildings*. 3d ed. Oxford: Architectural.
- Felton, Larry, Jim Newland, and Edna Kimbro. 2000. Adobe preservation: Blessings and curses. Paper presented at *The 54th National Preservation Conference: Saving America's Treasures in the 21st Century*, Los Angeles, California, October 31–November 5, 2000. National Trust for Historic Preservation.
- Great Britain. 1967. Preservation of areas and buildings of architectural or historic interest. In *Civic Amenities Act of 1967*, chap. 69. London: Her Majesty's Stationery Office.
- Hippocrates. 1923–88. Epidemics, bk. 1, sect. 11. In *Hippocrates*, trans. W. H. S. Jones, 165. Loeb Classical Library. Cambridge: Harvard University Press.
- International Council on Monuments and Sites [ICOMOS] and Second International Congress of Architects and Technicians of Historic Buildings. 1964. *International Charter for the Conservation and Restoration of Monuments and Sites [Venice Charter]*. Venice: ICOMOS. http://www.international.icomos.org/e_venice.htm.
- Look, David W., Terry Wong, and Sylvia Rose Augustus. 1997. *The Seismic Retrofit of Historic Buildings: Keeping Preservation in the Forefront*. Preservation Briefs 41. Washington, DC: National Park Service. <http://www.nps.gov/history/hps/tps/briefs/brief41.htm>.
- Seismic Safety Commission, State of California. 1995. *Northridge Earthquake: Turning Loss to Gain*. SSC Report 95-01. Sacramento: State of California. <http://www.seismic.ca.gov/pub/cssc95-01/cssc5-01b-toc.pdf>.
- Slaton, Deborah. 1997. *The Preparation and Use of Historic Structure Reports*. Preservation Briefs 43. Washington, DC: National Park Service. <http://www.nps.gov/history/hps/tps/briefs/brief43.htm>.
- Todd, Diana, Nicholas Carino, Riley M. Chung, H. S. Lew, Andrew W. Taylor, William D. Walton, James D. Cooper, and Roland Nimis. 1994. *1994 Northridge Earthquake: Performance of Structures, Lifelines, and Fire Protection Systems*. NIST Special Publication 862. Gaithersburg, MD: National Institute of Standards and Technology.
- Tolles, E. Leroy, Edna E. Kimbro, and William S. Ginell. 2002. *Planning and Engineering Guidelines for the Seismic Retrofitting of Historic Adobe Structures*. GCI Scientific Program Reports. Los Angeles: Getty Conservation

Institute. http://www.getty.edu/conservation/publications/pdf_publications/seismic_retrofitting.pdf.

United States. 2002. National Historic Preservation Act of 1966, as Amended. In *Federal Historic Preservation Laws*, ed. Joe Wallis, 34–98. Washington, DC: National Center for Cultural Resources, National Park Service, U.S. Department of the Interior. http://www.nps.gov/history/local-law/FHPL_HistPrsvt.pdf.

United States National Park Service. 1997. *Preservation of Historic Adobe Buildings*. Preservation Briefs 5. Washington,

DC: National Park Service. <http://www.nps.gov/history/hps/tps/briefs/brief05.htm>.

Weeks, Kay D., and Anne E. Grimmer. 1995. *The Secretary of the Interior's Standards for the Treatment of Historic Properties: With Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings*. Washington, DC: U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, Heritage Preservation Services. <http://www.nps.gov/history/hps/tps/standguide/index.htm>.