



SEVENTY YEARS OF THE RILEY ACT AND ITS EFFECT ON CALIFORNIA'S BUILDING STOCK

Fred TURNER¹

SUMMARY

Shortly after the 1933 Earthquake in Long Beach, California, the state government enacted a law called the Riley Act that required all cities and counties to establish departments to regulate building construction. While the Riley Act is the lesser known of two earthquake safety laws passed in 1933, it has arguably been more influential in improving the seismic safety of California's building stock than the more famous Field Act for public schools. This paper describes the Riley Act, later laws addressing building construction and how they changed the building industry. Still today, their implementation is lacking in some respects and in continual need of improvement.

Roughly 10 to 15 percent of California's building stock was built before 1933 when few cities had building codes. And while California still has a large stock of vulnerable existing buildings built before and after 1933, the seventy-year investment in building safety regulation has created substantially more earthquake-resistance in buildings, particularly when compared to regions of the world that do not regulate construction.

The repeated collapses of buildings throughout the world in earthquakes provide justification for laws like the Riley Act that institutionalize building safety regulation. Such laws are essential steps for all jurisdictions wanting to dramatically reduce the loss of lives and property in future disasters. Every city, county, prefecture, province, state and country should have building departments with:

- 1) Appropriately licensed professionals to review and approve construction plans and issue permits;
- 2) Qualified inspectors to ensure compliance and quality during construction;
- 3) Authority to stop improper construction and require that buildings be designed and constructed according to legally defined minimum standards;
- 4) Penalties in law for failure to comply with codes;
- 5) Comprehensive training and continuing education programs;
- 6) Organized post-disaster safety assessment programs; and
- 7) Adequate funding from fees for building permits or other sources to ensure that sufficient staff and resources will be available to effectively regulate construction.

¹Staff Structural Engineer, California Seismic Safety Commission, Sacramento, California, USA.
www.seismic.ca.gov

INTRODUCTION

This paper summarizes the events that lead to the enactment of the Riley Act, as well as other developments in the past 70 years that have enhanced the enforcement of building safety in California.

SIMPLE PEOPLE, EXTRAORDINARY DEEDS

Harry B. Riley was a lithographer (a printer of publications) who lived on Elm Street in Long Beach California. He got his start in politics by running for City Clerk. Several political positions later he was elected to the State Legislature as a Republican Assemblyman representing Long Beach and parts of Los Angeles.

On March 10, 1933, the Magnitude 6.3 Long Beach Earthquake killed 115 people mostly from falling unreinforced masonry [1]. In the aftermath, Los Angeles County's Coroner, Frank A. Nance, called for a special inquest into the deaths of two high school students and determined:

The great amount of damage that resulted from this shock was due to faulty construction of buildings... Masonry buildings were the principal sufferers and their failure occasioned the principal loss of life. Damage was mostly confined to those built with poor quality of lime mortar, inadequate bonding and anchoring, or of inferior workmanship, and built to designs that took no account of horizontal forces... They suffered serious damage not only because of inadequate provision for lateral stresses but in an important degree because of utter lack of efficiency in workmanship...Provision for lateral stresses should be insisted upon...

If it were found that criminal responsibility could be proven against any individual or individuals, it would no doubt serve as a salutary warning to others in the future, but a far more vital need is to bring the entire public to a realization of the fact that general laxity and indifference to adequate building practices have existed in the past, and to point out the importance of avoiding the continuance of such attitude as regards the future...Stability of construction was often sacrificed for architectural effects or for purposes of utility or convenience, or with an eye to economy...

We recommend that the "Uniform Building Code"[21] be immediately adopted as a legal code covering construction and/or repair of all buildings in Los Angeles County...

The practical problem before us, then, appears to be this: shall we permit a possible repetition of the loss in lives and property at some future date when by the application of common sense methods of preparedness, such losses as occurred as a result of the recent shock may be avoided... Los Angeles County has not been fond wanting as regards other problems it has been compelled to meet in the past, and it is not unfitting to believe that its constituted authorities, and its citizens alike, will lend their best efforts to the end that in this instance too, there shall not be a departure from a course which so far has made possible the community's remarkable development. [2]



Figure 1. Compton Union High School in Long Beach after the 1933 Earthquake. [13]

In the State Legislature, Assemblyman Harry B. Riley represented the region that was most heavily damaged. With the support of architects, engineers, and the Chambers of Commerce [3], Riley introduced a bill that proposed the following:

An act to regulate the construction of buildings in the State of California, in respect to resistance to horizontal forces, providing penalties for the violation thereof and providing that this act become effective immediately

Section 1. Every building of any character, and every part thereof which is hereafter constructed in any part of the State of California, including every local government... shall be designed and constructed to resist and withstand horizontal forces from any direction of not less than either two percent of the total design load or twenty pounds per square foot wind pressure on the projection of the exposed surface, the horizontal force used to be the one that produces the greater stresses in the building.²

Section 2. For the purposes of computing the resistance of any building to such horizontal forces as required by section 1 hereof, the computed stresses resulting from the combined vertical forces and horizontal forces shall not exceed one and one-third times the allowable working stresses as hereinafter provided.

Section 3. For the purposes of this act, allowable working stresses shall be those specified in the ordinance governing the erection and construction of buildings...If no such ordinance is in effect at the place at which the work is done then the allowable working stresses shall be those specified by the Division of Architecture of the State Department of Public Works...

Section 4. (This section listed various building types that were exempt from the law including those not intended for human occupancy and single- and two-family-dwellings in rural areas. It is not repeated here.)

Section 5. Any person who constructs a building not meeting the requirements of Section 1 of this act and not excepted under section 4 of this act shall be guilty of a misdemeanor.

² While these criteria are now considered too low, they nevertheless caused a marked improvement in the quality of design and construction and in the performance of post-1933 buildings in later earthquakes. Even in the 1930's, these original design criteria were considered by many local governments to be minimal, so many developed their own enhanced requirements. The criteria have been updated many times since this original version to incorporate research and observations from earthquakes. The latest statewide minimum criteria can be found in the California Building Standards Code [14]. Note, however, that California's 2001 building codes are currently out-of-date and undergoing revision.

Section 6. It shall be the duty of the building department of every local government to enforce all of the provisions of this act. In every local government it shall be the duty of the department, officer or officers who are charged with the enforcement of ordinances or laws regulating the erection, construction, or alteration of buildings in the local government to enforce all of the provisions of this act.

Section 7. Nothing in this act contained shall be construed as a limitation on the powers of local governments to establish by ordinance further standards for the construction of buildings beyond the requirements of this act.

Section 8. This act is hereby declared to be an urgency measure necessary for the immediate preservation of the public peace hereof and safety within the meaning of Section 1 of Article IV of the Constitution and shall therefore go into immediate effect.

The facts constituting the necessity are as follows: The series of earthquakes occurring in the southern portion of the State (of California) has caused great loss of life and damage to property. Much of this loss and damage could have been avoided if the buildings and other structures had been properly constructed. The buildings which will be constructed and reconstructed to replace the buildings damaged or destroyed by the earthquakes should be so constructed as to resist, in so far as possible, future earthquakes. These buildings will be constructed and reconstructed at once and accordingly it is necessary that this act go into immediate effect in order that these buildings be so constructed that the lives and property of the people will be safeguarded.

In spite of the severe economic depression in 1933, the Riley Act was signed on May 26 by Governor "Sonny Jim" Rolph, Jr. and became immediately effective. [4]

A separate bill by Assemblyman C. Don Field, a Republican contractor, was also enacted. The Field Act transferred the regulation of public school design and construction from local governments to the State's Division of Architecture.[5][6] Its enforcement on over 70,000 school construction projects since then has generated significant improvements in the practice of earthquake engineering. [7]

Section 4 of the Riley Act was amended in 1935 to exclude more agriculture buildings in unincorporated, rural areas.[8] In 1939, Section 1 was amended to lower the wind pressure to 15 pounds per square foot for buildings 60 feet or less in height. [9] Later amendments removed all specific engineering criteria and adopted the Uniform Building Code by reference. The most significant amendment to the Riley Act occurred in 1941. It required local governments to issue building permits prior to any construction [10]:

Section 1. No person shall construct a building subject to this chapter unless they have obtained a written permit for that purpose from the appropriate enforcement agency. Any person desiring a permit shall file an application therefor with the appropriate enforcement agency, which application shall contain:

- (a) The name and address of the applicant;
- (b) A detailed written statement of the work to be done;
- (c) A complete set of the plans of the work proposed; and
- (d) A set of specifications describing the materials to be used in the work.

Section 2. The enforcement agency shall examine the application, plans, and specifications filed with it by an applicant, and if it appears that the work to be done will not result in a violation of

this chapter, shall approve them and issue a permit to the applicant. The enforcement agency may approve changes in any application, plans or specifications previously approved by it. The enforcement agency may revoke any permit if the permittee refuses, fails, or neglects to comply with any provision of this chapter, or if it finds that any false statement or misrepresentation was made in the application, plans, or specifications filed by the permittee. The work authorized by a permittee shall be performed only in accordance with the application, plans, and specifications filed by the permittee. The issuance of a permit does not constitute approval of any violation of any provision of this chapter.

This law clarified the authority of local governments as well as the limited extent to which they were responsible for identifying violations. Then in 1945, California established a system for charging minimum fees for building permits and allowing local governments to increase the fees when the costs to enforce the Riley Act were no longer met by the original fees. [11] Other state laws required licensed architects and engineers to design major buildings and prepare construction plans and specifications.

THE IMPACT OF THE RILEY ACT ON UNREINFORCED MASONRY BUILDINGS

From the mid 1800's to 1933, unreinforced masonry was the building system of choice in older commercial and industrial zones because of its fire-resistive capabilities. The Long Beach Earthquake and the Riley Act prompted the building industry in California to eventually stop constructing unreinforced masonry buildings (URM's) because they could not be designed to comply with the act. Of those built before the effective ban, about 25,000 are still in use throughout California. Building codes allow the continued use of existing buildings that don't conform to requirements for new construction provided there are no major alterations and the actual uses by occupants are no more risky than the buildings' original uses.

Unreinforced masonry buildings comprised only a small fraction – on the order of 2 percent - of California's building stock in the 1930's.[19][16] The vast majority of California's buildings were and continue to be constructed of wood framing due to the wide availability of timber.

With the decline of new unreinforced masonry, other building systems such as reinforced concrete, reinforced masonry, and structural steel gained market share in fire-resistive construction. Their increased use gradually improved earthquake resistance of the overall building stock, but in some cases also introduced new earthquake vulnerabilities. [20]

THE INSTITUTIONALIZATION AND CULTURE OF BUILDING CODE ENFORCEMENT

The Pacific Coast Building Officials Conference was founded in California in 1922 as a private, non-profit corporation composed of local building officials who participate as volunteers. The Conference published the first edition of its Uniform Building Code (UBC) in 1927.[21] Later the conference changed its name to the International Conference of Building Officials (ICBO). It recently merged with two other national model code development organizations to form the International Code Council.

Up to the late 1970's, many local governments published their own codes, typically based in part on the UBC with local amendments. In recent years, local amendments have decreased significantly. "The ICBO family of Uniform Codes has been adopted by reference or has been used as a pattern by most local governments. The UBC established uniformity of building codes in California." [14]

These code development organizations offer venues where ideas and debates on the future direction of building codes take place. But the International Code Council and its predecessor organizations have

provided more than just code development opportunities. Regional Chapters and a statewide chapter called the California Building Officials provide monthly and yearly opportunities where building officials can receive continuing education and updates on the latest code developments. Through these professional and cultural exchanges, they share problems of managing building departments with colleagues in other parts of the region and the nation. More experienced building officials are held in high esteem and offer advice to their younger colleagues. Many building officials devote volunteer time to improve their profession, teach courses, and help recruit top prospects for other building departments throughout the state.

These institutions and the culture they promote are an essential part of the success of code enforcement. Administering effective building departments is not an easy task. California's success relies in large part on building officials who contribute to their institutions and share expertise with colleagues.

PRESSURES CONFRONTING BUILDING DEPARTMENTS

The International Conference of Building Officials surveyed California's local Building Officials in the late 1970's and summarized their responses in the publication titled *Issues Which Affect the Role of Building Departments in Earthquake Hazard Mitigation*. [15] Building Officials articulated the many pressures that continue to confront them daily:

- Governments need less-complex requirements for use in constructing smaller, simpler buildings.
- Governments are struggling with the problems of existing earthquake hazardous buildings.
- Historical buildings represent unique problems due to pressures to prohibit visual alterations.
- Building Departments without engineering staffs or capability usually have a poor understanding of seismic safety.
- Smaller jurisdictions generally do not have the same commitment to seismic safety as larger jurisdictions.
- Low pay and understaffing contribute to poor code enforcement.
- About half of all building departments received inadequate support from elected officials and top management in their jurisdictions. Over 40 percent did not support tighter enforcement of seismic regulations.
- The public is apathetic toward building departments' seismic safety operations.
- The frequency of changes to regulations is excessively high.

In a publication titled *The Construction Process: Quality Control, Inspection, and Performance* [17], the Seismic Safety Commission found that:

The downward trend in construction quality appears to be continuing with no relief in sight. Local government inspection runs the gamut from the very poor to very good. Budgets are typically inadequate, one reason being the local practice of using part of the fees generated by the building department for purposes not related to building department services. Many local building departments now operate with inadequate funding and staffing. We must therefore expect the average quality of inspection to be only fair, at best.

Similarly, and from a national perspective, EERI identified findings in its *Construction Quality, Education, and Seismic Safety* [23]:

- Seismic resistance is not currently a priority for building officials, inspectors or trades.
- There is a lack of conceptual understanding of building performance in earthquakes.

- There is inadequate communication among (code enforcement) education providers.
- Training materials are inadequate in content, and delivery methods are ineffective.
- There is a lack of certification and continuing education programs.
- There is a need for improved on-the-job training.

FUNDS FOR TRAINING BUILDING DEPARTMENT STAFF

In response to California's need for training staff in building departments, California enacted a law in 1995 that authorized increased building permit fees.[18] It dedicated a portion of the new funds to train inspectors, plans examiners and building officials. In return, they were required to become trained and certified:

Section 1. All construction inspectors, plans examiners and building officials who are not exempt from the requirements of this chapter pursuant to Section 2 or previously certified, shall complete one year of verifiable experience in the appropriate field, and shall, within one year thereafter, obtain certification from a recognized state, national, or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, as determined by the local agency.

Section 2. Any person who is currently and has continuously been employed as a construction inspector, plans examiner, or building official for not less than two years prior to the effective date of this section shall be exempt from the certification provisions of this section, unless and until that person obtains employment as a construction inspector, plans examiner, or building official with a different employer.

Section 3. Nothing in this article is intended to prohibit a local agency from prescribing additional criteria for the certification of construction inspectors, plans examiners, or building officials...

Section 4. The local agency shall bear the costs of certification, certification renewal, and continuing education, as mandated by this chapter. The local agency may impose fees, including, but not limited to, fees for construction inspection and plan checks, which may be used to cover the costs of compliance with this chapter. A local agency's actual costs of compliance with this chapter may include, but are not limited to, training and certification courses, certification exam and renewal fees, employee salary during training and certification courses, and mileage and other reimbursable costs incurred by the employee...

Increased attendance at classes offered by the California Building Officials's Training Institute, the International Code Council and other education venues suggest that most local building departments are now investing more heavily in training and certifying their employees than they did prior to this law.

POST-DISASTER SAFETY ASSESSMENT PROGRAMS

Building Departments have also learned lessons from past major disasters. They realize that future disasters will create demands for code enforcement professionals and inspectors that will outstrip local resources. In response, Departments have created a Mutual Aid System that includes a post-disaster Safety Assessment Program using personnel from building departments in other jurisdictions, as well as volunteer engineers and architects. With this additional help, they can rapidly perform safety assessments

of damaged facilities after disasters, and post placards to keep people out of unsafe buildings and allow reuse of safe buildings. The state’s Office of Emergency Services designs the training for Safety Assessment Program Evaluators and Coordinators, issues identification cards for volunteers, and helps allocate the extra personnel to Building Departments after disasters through mutual aid. [22]

GROWTH IN POPULATION SINCE THE 1930’S AND WOOD CONSTRUCTION

While it may have seemed daunting, even futile, to try to change California’s building construction and regulation practices back in 1933, the effects of the Riley Act made a marked impact on the state’s overall earthquake resistance. In addition to the Riley Act and the other institutional developments described above, two other factors contribute greatly to California’s earthquake resistance: rapid population growth and the prevalence of wood construction.

First, California’s phenomenal growth generated over 10 million new buildings since 1933, more than six times the number of buildings at that time. The vast majority of these newer buildings have been built to codes with some form of earthquake safety requirements that have gradually improved over the years. Today California has approximately 12 million buildings. [16][19]

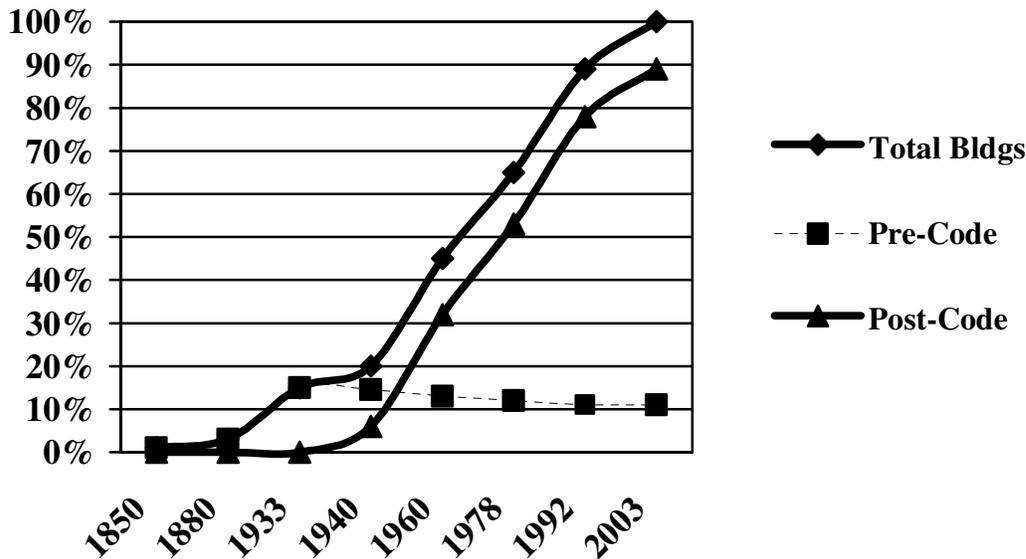


Figure 2. The Growth of California’s Building Stock from 1850 to the Present. [16][19]

Second, California benefits from the predominance of wood frame construction. Well over 95 percent of its building stock continues to be wood construction, which tends to be inherently resistant to catastrophic earthquake damage. Some exceptions to this generality exist such as crawl-space walls below first floors in older homes and multi-unit dwellings with soft stories.

MEASURING BUILDING CODE ENFORCEMENT EFFECTIVENESS

The Insurance Services Office created a national Building Code Effectiveness Grading System that surveys Building Departments and ranks them on a scale of 1 to 10 for both residential construction and commercial buildings.[22] Building Departments ranked 1 are considered the most effective. Those ranked 10 are least effective.

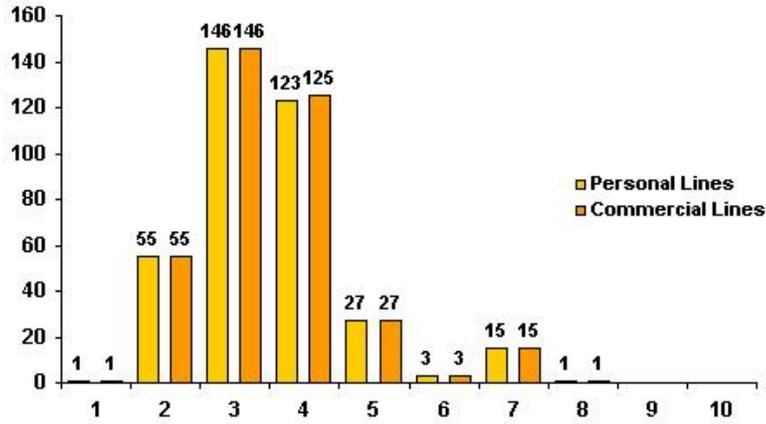


Figure 3. California's local government Building Department rankings by ISO in 2001. [12]

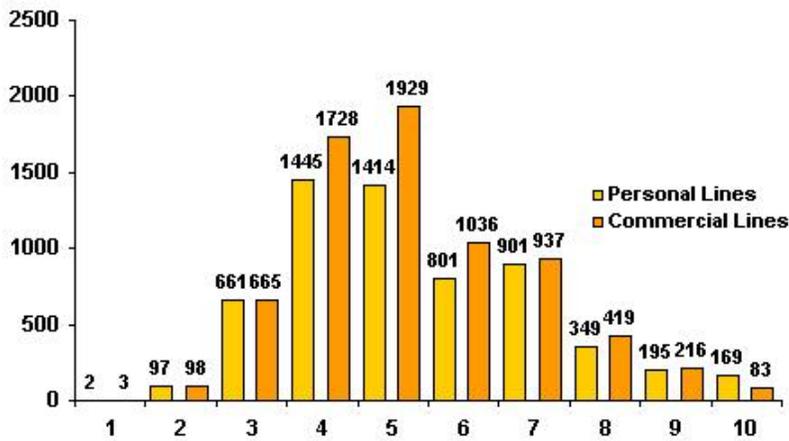


Figure 4. The United State's local government building department rankings by ISO in 2001. [12]

ISO makes this ranking information available to insurance companies so that they can reflect the quality of code enforcement when establishing insurance premium rates for each jurisdiction. Personal lines of insurance are for residences and commercial lines are for commercial buildings. ISO also informs each local government of their scores and encourages them to improve future scores. California's Building Departments on the whole have higher rankings as shown in Figure 3, compared to the rest of the U.S. in Figure 4. Nevertheless, a significant number of California's departments score lower than the national average.

CONCLUSIONS

California's laws and experiences with enforcing building codes may provide other regions of the world with a variety of approaches that might be adaptable to their circumstances. Although California is fortunate to have a large number of effective building departments, in many respects there is still a great deal of room for improvement. The greatest challenges to California's building departments continue to be: 1) The lack of public awareness and political support for effective code enforcement; 2) The risks of existing vulnerable buildings in earthquakes; and 3) The need to enhance staff sizes and qualifications to keep up with phenomenal growth.

The repeated collapses of buildings throughout the world in earthquakes warrant legislation like the Riley Act. It is an essential step for all jurisdictions intending to dramatically reduce the loss of lives and property in future disasters. Every city, county, prefecture, province, state and country should strive to have building departments with:

- 1) Appropriately licensed professionals to review and approve construction plans;
- 2) Qualified inspectors to ensure compliance and quality during construction;
- 3) Authority to stop improper construction and require that buildings be designed and constructed according to legally-defined minimum standards;
- 4) Penalties in law for failure to comply with codes;
- 5) Comprehensive training and continuing education programs;
- 6) Organized post-disaster safety assessment programs;
- 7) Adequate funding from building permit fees or other sources to ensure that sufficient staff and resources will effectively regulate construction; and
- 8) The public's awareness and support for government efforts to ensure safety in buildings.

REFERENCES

1. USGS. *Large Earthquakes in the United States*. Long Beach, California, 1933
http://neic.usgs.gov/neis/eq_depot/usa/1933_03_11.html
2. Nance, Frank A. *Verdict of Coroner's Jury in Earthquake Inquisition*, County of Los Angeles, March 29, 1933.
3. Geschwind, Carl-Henry. *California Earthquakes: Science, Risk, and the Politics of Hazard Mitigation*, Johns Hopkins University Press, 2001.
4. California Legislature. Original Riley Act (Chapter 601, Statutes of 1933). 50th Session, *Session Laws of the California Legislature*. <http://192.234.213.35/clerkarchive/>
5. California Legislature. Original Field Act (Chapter 59, Statutes of 1933). 50th Session, *Session Laws of the California Legislature*. <http://192.234.213.35/clerkarchive/>
6. California Seismic Safety Commission. *The Field Act and California Schools*, March 1979, SSC 79-02 www.seismic.ca.gov
7. Meehan, John F., Jephcott, Donald K. *The Review and Analysis of the Experience of Mitigating Earthquake Damage in California Public Schools*, National Science Foundation Grant BCS-9117732, 1993.
8. California Legislature. Revision to the Riley Act – Agricultural Building Exclusions (Chapter 65, Statutes of 1935). 51st Session, *Session Laws of the California Legislature*. <http://192.234.213.35/clerkarchive/>
9. California Legislature. Revision to the Riley Act – Lower Wind Pressure (Chapter 60, Statutes of 1939). 53rd Session, *Session Laws of the California Legislature*. <http://192.234.213.35/clerkarchive/>
10. California Legislature. Revision to the Riley Act – Permit Requirements (Chapter 301, Statutes of 1941) 54th Session, *Session Laws of the California Legislature*. <http://192.234.213.35/clerkarchive/>
11. California Legislature. Revision to the Riley Act – Fees for Building Permits (Chapter 1147, Statutes of 1945) 56th Session, *Session Laws of the California Legislature*. <http://192.234.213.35/clerkarchive/>
12. Insurance Services Office, *Building Code Effectiveness Grading System*, 2001.
<http://www.isomitigation.com/bcegs1.html>
13. Snyder, Patricia. *Photo Collection from the 1933 Long Beach Earthquake*. Donated by Former Chairman Snyder to the CA Seismic Safety Commission, 1999.
14. California Building Standards Commission. *California Building Standards Code*, 2001, www.iccsafe.org and www.bsc.ca.gov/abt_bsc/abt_hstry.html

15. International Conference of Building Officials. *Issues Which Affect the Role of Building Departments in Earthquake Hazard Mitigation*, (ICBO, 1980).
16. Jones, Barclay and Lewis, Blane. *Estimating Size Distributions of Building Areas for Natural Hazards Assessments*, EERI Earthquake Spectra, Vol. 6 No. 3, August 1990.
17. California Seismic Safety Commission. *The Construction Process: Quality Control, Inspection, and Performance* (CSSC 83-05) www.seismic.ca.gov
18. California Legislature. Fees for Training and Certifying Building Department Staff (Chapter 623, Statutes of 1995) www.leginfo.ca.gov
19. California Department of Finance, Demographic Research Unit. *Population and Construction Estimates*, 2004. www.dof.ca.gov
20. California Seismic Safety Commission. *Potentially Hazardous Buildings*. CSSC 85-04. www.seismic.ca.gov
21. International Code Council (formerly International Conference of Building Officials). *Uniform Building Code*, 1927 Edition. <http://www.iccsafe.org/dyn/prod/101S27.html>
22. Office of Emergency Services. *Safety Assessment Program. Mutual Aid Guidance for Building Officials*. www.oes.ca.gov
23. Earthquake Engineering Research Institute. *Construction Quality, Education and Seismic Safety*, April 1996. www.eeri.org