California Earthquake Loss Reduction Plan

Post-Earthquake Economic Recovery

Alfred E. Alquist

Seismic Safety Commission

1755 Creekside Oaks Dr., Suite 100

Sacramento, CA 95833

916-263-5506

CSSC 13-03

Publishing Information

The *California Earthquake Loss Reduction Plan* was developed by the Alfred E. Alquist Seismic Safety Commission in fulfillment of a mandate enacted by the Legislature in the California Earthquake Hazards Reduction Act of 1986 (*Government Code* Section 8870 et seq.).

In addition to this document, the Alfred E. Alquist Seismic Safety Commission publishes a variety of documents related to earthquakes and earthquake safety. To obtain a publications list with prices and ordering information, contact the Commission's office or visit it's Web site (see below).

Alfred E. Alquist Seismic Safety Commission
1755 Creekside Oaks Dr., Suite 100
Sacramento, CA 95833
(916) 263-5506; FAX (916) 263-0594
Web site: www.seismic.ca.gov

Contents

Copies of this document may be obtained by contacting the Alfred E. Alquist Seismic Safety Commission.

Acknowledgments

Alfred E. Alquist Seismic Safety Commission

Honorable Kenneth Cooley
Assembly Representative

Honorable Ellen Corbett
Senate Representative

Honorable Michael Gardner
Chairman
Local Government

Mark Ghilarducci,
Secretary, CalEMA

Dr. Margaret Hellweg
Seismologist

Helen Knudson
Social Services

Jim McGowan
Building Standards Commission

Dr. Emir José Macari
Geotechnical

Dr. Kit Miyamoto
Structural Engineer

Sheriff Mark Pazin
Emergency Services

Timothy Strack
Fire Protection

Chester Windom
State Architect

Alfred E. Alquist Seismic Safety Commission Staff

Richard J. McCarthy
Executive Director

Robert Anderson
Karen Cogan
Sue Celli

David King
Henry Reyes
Fred Turner

Project Staff

Guna Selvaduray, Ph.D.
Executive Director
Collaborative for Disaster Mitigation
San Jose State University

Laura Luong
Collaborative for Disaster Mitigation
San Jose State University

Gretta Wilson
Collaborative for Disaster Mitigation
San Jose State University

Executive Summary

The Alfred E. Alquist Seismic Safety Commission was established by legislation in January 1975 to set the State's goals and priorities for earthquake safety.

Formal earthquake policy planning began in 1974 with the publication of the *Final Report* by the Joint Legislative Committee on Seismic Safety. That report identified the basic need for continuing efforts to mitigate earthquake risks and spawned the establishment of the Commission. Since then, periodic loss reduction plans, formerly published under the title *California at Risk,* and numerous issue-specific reports have been published in concert with the Commission's mandate.

The *California Earthquake Loss Reduction Plan 2013* is devoted to developing a comprehensive post-earthquake economic recovery plan that will enable California to continue maintaining its economic vibrancy and leadership, and provide employment and services for its residents.

The following were taken into account in developing this *Plan*:

- California is the most productive state in the Union and is the 8th largest economy in the world
- 88% of the State's economy is derived from the private sector
- Agriculture is as important as industries are for California's economy
- Small businesses are a very important part of the State's economy
- The current global economy makes it possible for overseas companies to compete with California companies for markets
- Previous loss reduction plans have focused on the built environment and the public sector, with insufficient attention paid to the needs of the private sector, including small businesses.

Examination of the effects of earthquakes in California and other countries indicates that:

- Any part of California can experience the effects of earthquakes
- The **last major** earthquake in California was in 1906
- Earthquake damage in one location can have repercussions in several other countries
- Loss of production capability as a result of a natural disaster can result in the permanent loss of market share
- Damage due to earthquakes can result in businesses rebuilding in other regions
- Agriculture is as prone to earthquake damage as are industries and urban localities.

A more comprehensive study of past earthquakes worldwide will be undertaken next to examine economic recovery measures, taken by various local and national governments, to determine their efficacies. This information will be used to develop a comprehensive strategic plan for California's rapid recovery after an earthquake.

While much still remains to be achieved, California has made great strides towards improving seismic safety. It is perhaps one of the safest regions in the world in this aspect.

Earthquakes and California

More than 80 destructive earthquakes of magnitude 5.0 or higher have been recorded in California since the early 1800s. Since 1980, there have been more than ten damaging earthquakes ranging in magnitude from 5.8 to 7.3. These earthquakes were considered to be of "moderate" size, and fortunately, they generally occurred during nonworking hours and in locations with relatively low population density. Even with such good fortune, the resulting devastation clearly demonstrated the need for continued efforts to reduce both human and economic losses and accelerate recovery.

Some of the better-known damaging earthquakes that have occurred in California are shown in Figure 1. As can be seen earthquakes have occurred in most parts of California - not just along the San Andreas fault. While some of the regions prone to earthquakes are urban and industrialized, other regions are rural and largely agricultural.

Natural hazards exist everywhere, and California is no exception. Throughout its history, the State has experienced floods, tsunamis, wildfires, droughts, landslides, volcanic eruptions, windstorms, and earthquakes. But of all these natural disasters, earthquakes pose the greatest threat to the lives, property, and economy of California. The California Geological Survey estimated, in 2000, that California's annual amortized losses to structures, contents, and income will average $4.7 billion per year.[1] This is equivalent to $6.25 billion in 2012 dollars.

Some other important facts to consider are:

- California's 2011 GDP of $1.96 trillion placed it as the 8th largest economy in the world. It has the highest GDP among all 50 states in the USA and contributes towards 13.08% of the USA's national GDP.[2] The GDP generated by private industries was $1.73 trillion, or 88%.
- As of July 2012 the total nonfarm, employment was 14.3 million individuals[3] and those employed in the agricultural sector was approximately 2.5 million.[4]
- Key among California's industrial sectors is information technology, microelectronics, and biomedical technology. Recognizing California's global leadership in these areas, several multinational companies have located their research and development facilities in California.
- One important reason for California's leadership in the high-tech area is its intellectual capital as evidenced by the 400 odd public and private universities and colleges that produce more than 200,000 college graduates annually.[5]
- According to the United States Geological Survey, *"California has more than a 99% chance of having a magnitude 6.7 or larger earthquake within the next 30 years."*[6] The likelihood of an earthquake greater than magnitude 7.5 occurring is 46 % over the next 30 years. The

[1] *An Evaluation of Future Earthquake Loss in California*, Division of Mines and Geology, 2000

[2] US Bureau of Economic Analysis; accessed August 19, 2012

[3] California Labor Market Review, July 2012

[4] California Community Colleges Research Brief 2011

[5] California Investment Guide, Governor's Office of Business and Economic Development, July 2012

[6] http://www.usgs.gov/newsroom/article.asp?ID=1914#.UC_1UN2PXig, Accessed August 18, 2012.

1989 Loma Prieta Earthquake and the 1994 Northridge Earthquake had magnitudes of 6.9 and 6.7, respectively, considerably lower than 7.5. The reported economic losses (in constant 2012 dollars) were about $11 billion for the Loma Prieta Earthquake and between $20-30 billion for the Northridge Earthquake.

- The last truly major earthquake that California experienced was the San Francisco Earthquake of 1906, with a moment magnitude of 7.9 and approximately 3,000 casualties. Since then California has not experienced a truly "major" earthquake. If such a major earthquake were to occur today or in the future, the private sector which accounts for 88 % of California's GDP can be expected to suffer serious losses. This in turn can result in California losing its dominant leadership role in several industrial and commercial sectors.
- Any damage to the California economy will affect not just the state but also the entire nation and the world.

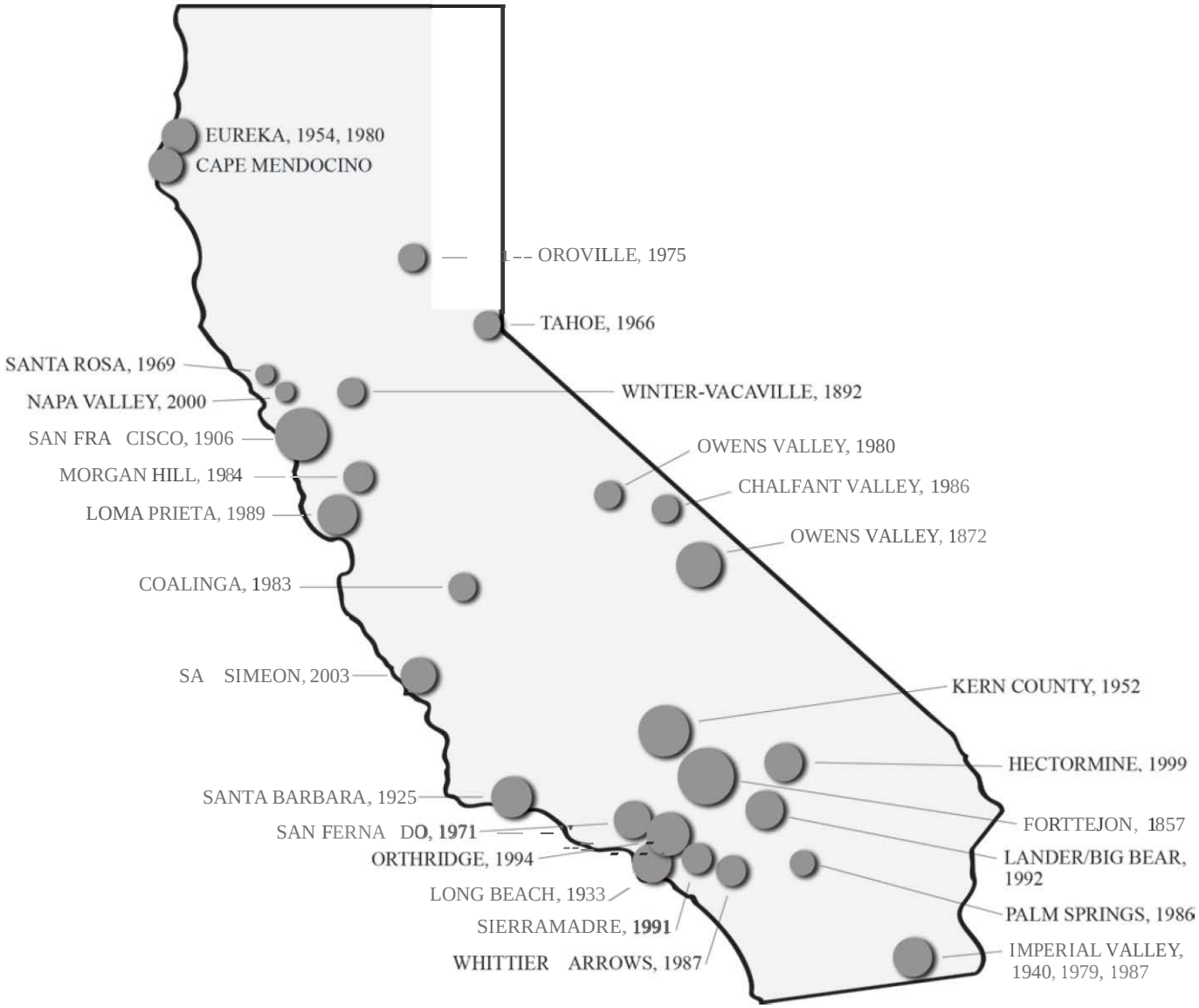
Thus far, the State of California has passed many laws/regulations that have contributed greatly towards reduction of earthquake risks and losses. These are briefly reviewed in the next section, and listed in Appendix A.

- **Notably absent are laws and/or policies that are aimed at reducing damage to the private sector and accelerating post-earthquake economic recovery.**

It is imperative that appropriate policies be adopted and implemented so that California's businesses and industries, including the agricultural sector, can recover rapidly from any damage they may incur as a result of the next major earthquake.

The failure to do so can result in California's economy taking a severe blow, both due to small businesses not being able to recover and reestablish themselves and by larger companies relocating to other states or even countries which are constantly attempting to lure them away.

Figure !-Earthquake history. California has experienced many damaging earthquakes in the past two centuries. The sizes of the dots on this map indicate the relative magnitude of earthquakes that occurred at these locations.



Sources: California Geological Survey, 1986; Earthquake History of the U.S., U.S. Department of Commerce and Interior, 1982; Records of California Office of Emergency Services; compiled and revised by California Seismic Safety Commission, 2004.

Loss Reduction Legislation in California

California has had a relatively long history of enacting legislation aimed at reducing earthquake-caused damage to its social systems and building stock.

The damage caused by the 1933 Long Beach Earthquake, and the potential consequences it could have had had it occurred at a different time, spurred the enact ion of the Field Act, within 30 days! As a direct result of this Act schools throughout California have not only experienced significantly less damage compared to the rest of the building stock, but have also been able to serve as centers of mass care.

The 1971 San Fernando Earthquake highlighted weaknesses in California's earthquake risk management policies. To address these weaknesses, in 1975 the state legislature created the independent California Seismic Safety Commission (CSSC) to provide a consistent earthquake policy framework for the state with the mission of providing "*decision makers and the general public with cost-effective recommendations to reduce earthquake losses and* ***expedite recovery from damaging earthquakes***."

Senate Bill 1279 in 1978 laid the foundation for California's strategic planning process for seismic safety. This legislation followed two significant earthquakes in China, a damaging earthquake in Haicheng in 1975 that had been "predicted," and a devastating earthquake in Tangshan in 1976 that had not. SB 1279 directed the Commission to assess the policy and program implications of earthquake prediction and to develop a strategic seismic safety program and financing plan for California.

The series of studies in pursuit of this objective have resulted in several reports and policy recommendations, beginning with *Earthquake Hazards Management: An Action Plan for California,* published in 1982.

Among the many achievements of the Commission is the sponsoring of, and successful passage of, the California Earthquake Hazards Reduction Act of 1986, shortly after the 1985 Mexico City Earthquake.

Subsequently the Commission was also charged with being responsible for implementing the California Earthquake Hazards Reduction Act, which requires the CSSC to "*prepare and administer a program setting forth priorities, funding sources, amounts, schedules, and other resources needed to reduce statewide earthquake hazards*."

In keeping with the spirit of hazards management and loss reduction, the Commission has continued to study the issues related to improving seismic safety. The *California Earthquake Loss Reduction Plan 2007-2011*, published in 2007, is one such study that views seismic safety in a truly multidisciplinary manner and has identified the vast array of actions that still need to be taken.

Several major pieces of legislation have been passed immediately after major earthquakes occurred in California and other countries. Legislation that has a direct bearing on earthquake safety and loss reduction is summarized in Appendix A.

In the next section some of the major earthquakes that have occurred worldwide, and some of their economic consequences, are briefly described.

Economic Effects of Earthquakes

Major earthquakes have occurred, and continue to occur, worldwide, with damaging economic consequences and loss of life. Some have triggered tsunamis, with devastating consequences. In other instances, landslides have led to loss of life. Major conflagrations and technological and environmental hazards have also been triggered by earthquakes. In some cases, damaging aftershocks have followed the main shock. A selection of these earthquakes are listed in Table 1

Today, the economies of the major industrialized nations are intricately inter-connected. It is practically impossible to purchase any product which contains components that are all manufactured in one country. Components that are incorporated into major assembled units such as computers, automobiles, farm equipment, and others are most frequently manufactured in several countries. As a direct result of this inter-connectedness, a disaster in one country or region can have ripple effects in other countries and regions.

After the 1995 Kobe Earthquake, several automobile manufacturers in Japan had to cease production for different periods of time.

- Toyota Motors lost their supplier of brake parts and radios, resulting in the loss of production of 20,000 vehicles.
- The Malaysian automobile manufacturer, Proton, had to cease operations for some time because the parts they were receiving from Mitsubishi Motors could not be shipped due to the damage to Kobe Port.
- In the US, Chrysler Motors came very close to having to suspend operations.

Recovery of the greater Kobe region, after the January 1995 earthquake, has not been rapid.

- Non-leather shoe production, a major industrial sector in Hyogo Prefecture, in October 2007 was still at 78.8% of what it was in October 1994 - three months prior to the 1995 earthquake.
- Sake shipping figures in October 2008 were 40.4% of what they were in the same month in 1994.
- Damage to the port facilities resulted in shipping traffic being diverted to other ports in the region. While goods destined for Japan were diverted to other Japanese ports, goods for transshipment, a major activity in the port of Kobe, were diverted to Pusan in Korea.

The 1999 Chi-Chi Earthquake in Taiwan, a major producer of DRAM chips for the semiconductor industry, resulted in prices spiking to six to eight times, affecting computer prices worldwide. Similarly, the 2011 floods in Thailand, producer of 25% of world consumption of computer hard drives, also resulted in severe shortages.

Manufacturers today source their supplies globally. The loss of productive capability in one country or region generally results in the manufacturers obtaining their parts, components, and raw materials from a different supplier who is located in a different region of the same country or a different country.

While major emphasis has always tended to be placed on losses sustained by the manufacturing sector, losses sustained by the agricultural sector have also been significant. This is particularly relevant to California where agriculture is not only

a major contributor to the economy but is also a major employer. Table 2 is a summary of some of the type(s) of agricultural damage caused by some earthquakes.

In the current competitive global economy, many international companies are competing to supply the same goods or services to their customers. Once a customer is "lost", the effort to win them back can be enormous. The experience of some of the industrial sectors in Kobe drives home the fact that this loss can persist even after 10 or more years have passed.

If California companies are incapacitated after a major earthquake, the competitors seeking these markets are located all over the world.

- The wine industry, for example, faces competition from Chile, South Africa, New Zealand and Australia, just to name a few
- The semiconductor industry continues to face stiff competition not only from China, but also other states in the US; these states are constantly trying to attract California's high technology industry with a variety of incentives including less rigorous environmental standards.

Table 1: Twenty Major Damaging Earthquakes Since 1960

No.	Event	Date	Magnitude	Loss of Life	Economic Losses		Tsunami & Other Effects
					Actual	In 2012 $	
1	***Northern Italy***	May 2012	6.1, 5.8	27	~$8 billion	~$8 billion	Damage to agricultural facilities & biotech industries; about 2,000 farms damaged; 10% of Parmesan cheese inventory lost
2	***Japan***	March 11, 2011	9.0	>20,000	$309 billion	$315.7 billion	Major tsunami (>30 m); nuclear power plants damaged
3	***New Zealand***	Sept 2010 – June 2011	7.1, 6.3, 6.3	181	~$16 billion	~$16 billion	Buildings weakened by 1st quake damaged by subsequent quakes and aftershocks
4	***Mexico***	April 4, 2010	7.2	2	$1.15 billion	$1.2 billion	Major agricultural losses; about 250 miles of irrigation canal damage
5	***Maule, Chile***	February 27, 2010	8.8	523	$30 billion	$31.6 billion	Agricultural losses
6	***Haiti***	January 12, 2010	7.0	316,000	$7.8 billion	$8.2 billion	Small tsunami (12 cm) Main port in Port-au-Prince suffered extensive damage
7	***Central Italy***	April 6, 2009	6.3	300	>$16 billion	>$17.1 billion	
8	***Sichuan, China***	May 12, 2008	7.9	>87,000	$85 billion	$90.7 billion	At least 3,473 dams, 53,000 km of roads and 48,000 km of water pipelines damaged; landslides
9	***Northern Sumatra, Indonesia***	December 26, 2004	9.1	>250,000	$4.5 billion	$5.5 billion	Major tsunami (about 15 m) affected 14 countries
10	***Chi-Chi, Taiwan***	September 20, 1999	7.6	>2,400	$14 billion	$19.3 billion	Pipeline breaks resulted in fire

Table 1: Twenty Major Damaging Earthquakes Since 1960 (continued)

No.	Event	Date	Magnitude	Loss of Life	Economic Losses Actual	Economic Losses In 2012 $	Tsunami & Other Effects
11	***Izmit, Turkey***	August 17, 1999	7.6	>17,000	$6.5 billion	$8.97 billion	Major damage from conflagration triggered by broken gas pipes; fire raged on and off for two days
12	***Kobe, Japan***	January 16, 1995	6.9	>6,000	>$100 billion	$150 billion	Thousands of aftershocks
13	***Northridge, California***	January 15, 1994	6.7	60	$13-$20 billion	$20-$30 billion	
14	***Loma Prieta, California***	October 18, 1989	6.9	63	$6 billion	$11 billion	
15	***Mexico City, Mexico***	September 19, 1985	8.0	>9,500	$3-$5 billion	$6.5-$11 billion	
16	***Tanghsan, China***	July 27, 1976	7.5	>250,000	$5.6 billion	$22.6 billion	
17	***San Fernando, California***	February 9, 1971	6.6	65	$505 million	$2.9 billion	Lower Van Norman Dam and the Pacoima Dam severely damaged
18	***Peru***	May 31, 1970	7.9	70,000	$530 million	$3.1 billion	
19	***Prince William Sound, Alaska***	March 27, 1964	9.2	128	$311 million	$2.5 billion	Major tsunami
20	***Chile***	May 22, 1960	9.5	1886	$675 million	$5.2 billion	Tsunami (about 25 m) caused casualties and losses in Hawaii, Japan and Philippines

Table 2: Agricultural Losses Caused by Earthquake

Earthquake	*Date*	*Damage Type(s) and Losses*
Emilia Romagna Italy	May 20-June 5, 2012	Approximately $970 million, primarily to dairy industry; about 2,000 farms and irrigation canals damaged; localized liquefaction
Tohoku, Japan	March 11, 2011	About $30 billion; massive damage to fields and facilities, including inundation by sea water and radioactive contamination; loss estimate does not include fishing industry
Baja California, Mexico	April 4, 2010	More than US$400 million; heavy damage to agricultural and irrigation facilities
Maule, Chile	February 27, 2010	$430 million losses, mostly to whine industry; loss of stock and damage to facilities
Wen Chuan, China	May 12, 2008	About US$6 billion direct agricultural economic losses; significant damage to seed crops and swine farming
Pakistan	October 2005	More than $440 million in livestock, crops and irrigation system losses
San Simeon, California	December 23, 2003	Winery facilities damaged
Napa, California	September 5, 1999	Winery facilities damaged
Chi-Chi, Taiwan	September 21, 1999	About $225 million total agricultural losses
Kern County	July 21, 1952	>$50 million (approximately $430 million in 2012 $); major damage to agricultural facilities in land reclaimed from Kern River delta
New Madrid	1811-1812	About 4,000 square miles of farm land damaged by liquefaction; damage persists to date – 200 years later

Post-Earthquake Economic Recovery

Rapid economic recovery after a major earthquake, or any other natural or human-caused disaster for that matter, is essential for maintaining the economic health of any region. This is particularly true for the State of California which is a world leader in many areas including technology, finance, tourism, and agriculture. Due to the highly competitive and integrated nature of the global market place, producers of the same goods and services are usually available in different parts of the globe. The ease of modern-day communications and transportation networks enables replacement of one supplier with a different one relatively easy.

A major earthquake in California, similar to the 1906 San Francisco Earthquake, or others that have occurred more recently in other parts of the world, can cause major damage to California's economy both in the short-term and long-term. The short-term losses are generally due to damage to public and private (industrial and agricultural) sector facilities. Long-term economic damage results from a combination of businesses suffering losses from which they are not able to recover, such as permanent loss of customers, or from relocating outside California. The latter can be the case with companies that have facilities both in California and outside, and relocating operations to an outside facility can result in faster corporate recovery.

California has indeed been a world leader in improving the seismic safety of the built environment, due to constant improvements in the building codes and inspection standards, mitigation, and education. Significant effort has also been devoted to developing response methodologies that are often the envy of the other states and countries. These have been documented in detail in the *California Earthquake Loss Reduction Plan, 2007-2011 Edition*. The Plan, the Plan Matrix, and detailed descriptions of the Elements and the Initiatives within each element have been retained in their entirety in this document, as Appendix B, to ensure that the knowledge gained in developing that plan will not be lost.

However, the fact that 88% of the economy is accounted for by the private sector needs better recognition. Further, if the resilience and recovery of the private sector is not adequately addressed, then the long-term economic health of California could be damaged by the next major earthquake or similar disaster. The larger corporations frequently tend to have more than one operational site, thus enabling them to shift operations and/or manufacturing to a different site and thus maintain corporate financial health, regardless of the effect on the financial health of California. The smaller businesses and agricultural businesses do not have this luxury. In general, if they are not able to resurrect themselves in the same location, they go out of business, resulting in the loss of economic activity, jobs, and tax revenues for local and state governments.

Rapid economic recovery after a major earthquake is essential for maintaining California's vibrant economy and dominance in the world. This is essential for keeping jobs in California, which in turn will generate the revenues needed for enabling the recovery and new economic growth. While both preparedness and mitigation are essential elements of recovery, there are several other factors that also come into play in the recovery and rejuvenation process.

In order to enable rapid recovery and maintain employment at acceptable levels, pathways to post-earthquake economic recovery need to be explored and identified prior to the earthquake. This will enable speedy implementation of the measures necessary for the recovery.

Many regions in the USA, and other countries, have unfortunately suffered damages from major natural disasters such as earthquakes and severe storms, and have subsequently implemented a variety of measures to stimulate economic recovery. However, a careful study of the measures and policies that were developed and implemented, and the extent to which these were effective, or not, has not been undertaken.

In other words, "*What worked and what did not work?*" By undertaking such a study California has the opportunity to build upon the lessons learned from the experience of others and develop a set of measures and policies that can have a very high potential for success.

The 2013 Edition of the California Earthquake Loss Reduction Plan is devoted to the topic of post-earthquake economic recovery. The Commissioners and others have come together and contributed their collective wisdom towards identifying the various factors that they have thought are important contributors towards rapid economic recovery. A more detailed study of this topic needs to be undertaken next

Factors Affecting Post-Earthquake Economic Recovery

A variety of factors have been identified as being important for post-earthquake economic recovery. These have been categorized into six elements, with each element having initiatives that are recommended for further development and implementation. The significance and relevance of each element is first described, followed by the initiatives recommended. Many of initiatives can be thought of as being a part of more than one element; while duplication has been avoided as far as possible, in some cases this has been unavoidable due to the different implications of the main theme of an initiative.

Elements for further research, development and/or implementation

- Research
- Education and Information
- Economics and Finance
- Recovery
- Utilities and Transportation
- Preparedness and Emergency Response

A comprehensive California Post-Earthquake Redevelopment Plan needs to be developed next so that the knowledge gained during the course of developing the *California Earthquake Loss Reduction Plan, 2013 Edition*, and the subsequent research, will serve to ensure loss reduction in the short-term and long-term, and maintain California's economic might.

Research Element

Different regions in the US, and several nations such as China, Japan, Italy, and Taiwan, among others, have experienced major earthquakes and other natural disasters that have affected urbanized and/or industrialized regions. In each instance the national and local governments have taken several measures to specifically stimulate economic recovery. To date there has been no systematic examination of the measures that were implemented and the extent to which these were effective. The scarce research that has been done in this area has tended to have been carried out by academic researchers with little to no involvement by the business community which would not only be the best judge of its effectiveness but can also add valuable insights into their applicability to California. The purpose of the initiatives identified here is to encourage the type of research that will produce results that can be used by local and state governments, and the business community.

Initiatives

- Encourage and sponsor research on the effects of past earthquakes, worldwide, on their effect(s) on the economy and businesses
- Research economic recovery measures that were effective
    - Include business community professionals in research
- Research the unique risk reduction and recovery needs of small businesses
- Research cost-effectiveness of mitigation approaches in accelerating economic recovery
- Establish formal partnerships with other countries to share economic recovery information
- Research how social media and the Internet can be used effectively to facilitate and promote economic recovery

Education and Information Element

A large amount of information and educational materials related to earthquakes have been created and published thus far. However, the type of information needed to aid policy makers, business owners, and the general public to make effective decisions is still lacking. The initiatives identified in this element are intended to provide information that can be used not only for risk reduction implementation and preparedness before an earthquake, but also to inform business owners and the general public about the economic recovery process and assistance available post-earthquake.

Initiatives

- Demonstrate and communicate benefits of risk reduction programs for building contents and plant facilities, in addition to buildings, to business and government officials
- Establish one location to serve as the information clearinghouse which business owners can contact for reliable information; inform business owners of this location and how to contact it
    - Establish telephone/internet hotline
    - Compile and maintain list of cell phone numbers of business owners
    - Employ social media/SMS manager to inform businesses
- Provide businesses with reliable post-earthquake information regarding restoration of services such as power, water, phone, internet, and transportation
- Convey the importance of, and potential danger from, aftershocks
- Develop a post-earthquake communication strategy publicizing recovery
- Assist businesses develop a strategy for post-earthquake communications with their customers
- Request cities and local governments to inform the business community of local emergency plans and how the business community is included
    - Let businesses know how they can help in recovery
- Inform businesses of economic recovery assistance programs.
    - Develop a marketing campaign to inform businesses of post-disaster assistance and how to obtain it
- Develop "Business Recovery" materials, make them available online, and conduct workshops

Economics and Finance Element

The availability of sufficient capital for both risk reduction and post-earthquake recovery is essential. It has been demonstrated that the benefit-cost ratio for funds invested in mitigation is at least four to one. While no data are currently available for benefit-cost ratios for funds invested in recovery, the alternative to not providing sufficient capital for economic recovery casts a rather bleak picture. The lack of ready availability of capital after a major disaster continues to be an obstacle that needs to be overcome.

Initiatives

- Develop incentives for risk reduction measures taken by home owners and businesses, including non-structural and contents mitigation
  - Seek cooperation of the insurance industry
- Create funding for mitigation in a manner similar to that provided for clean energy
- Facilitate availability of capital for recovery
  - Speed up insurance payments
  - Simplify paperwork for securing loans and shorten processing time
  - Ensure availability of cash from ATMs
  - Inform businesses about how to gain access to capital
- Provide special provisions for small businesses that lack collateral
  - Create a Small Business Emergency Loan Program
  - Explore the feasibility of interest-free loans and "bridge" loans
  - Enable rapid capital availability for small businesses
  - Set up Business Counseling Centers
- Create a one-stop shop that explains to businesses the various incentives available for rebuilding as rapidly as possible
  - Loan programs and guarantees
  - Incentive programs
  - USDA loans for agribusinesses
  - SBA loans
  - Consider providing assistance with renting alternate facilities
- Provide marketing assistance to businesses to help them recover their customer base
- Provide tax relief for both physical losses and opportunity losses
- Accelerate depreciation schedule for capital equipment

- Provide tax credits for maintaining employment at pre-earthquake levels
- Provide tax incentives for investment/staying in disaster-affected areas
    - Exempt sales tax for one or two years for businesses that rebuild
    - Delay/postpone tax payments
    - Declare EQ-affected regions as "Enterprise Zones", with extended tax credit periods
    - Attract new investments by creating and publicizing a New Markets Tax Incentive

Recovery Element

While recovery methods have improved with each earthquake, there still exist several areas where further improvements are required. In particular, strategies aimed at improving rapid recovery of the private sector have been insufficient.

Initiatives

- Establish an "A-Team" for post-earthquake Economic Recovery and Development
  - Include business representatives in recovery planning and implementation committees and task forces
  - Seek the assistance of local businesses in the recovery process
    - Develop methods for better coordination between public and private sectors during recovery
  - Establish post-disaster business outreach centers
  - Provide updates on progress of recovery
  - Launch a "California is Open for Business" campaign, with specific disaster-affected regions targeted, e.g., "San Francisco is Open for Business".
- Create a one-stop shop, at the local level, to expedite permitting and rebuilding process
  - Fast-track reconstruction permits
  - Reduce cost of reconstruction related to building codes
  - Accelerate damage assessment of commercial buildings
  - Encourage commercial building owners to contract structural engineering services before the earthquake
- Create employment services clearing houses in affected areas so that employers can connect with potential employees
  - Engage residents in recovery to prevent emigration, especially of skilled personnel
  - Enable employees to return to work as soon as possible
- Make prompt payments for services
- Prioritize debris removal
- Control onset of blight
- Target low-income areas for economic development and redevelopment
  - Limit requirements for, or streamline, environmental permits required during a finite post-earthquake period, e.g., 6 months

Utilities and Transportation Element

Restoration of utilities and transportation in a timely manner is crucial for the resumption of normal life and economic activities. Previous disasters have demonstrated that even facilities that do not sustain damage need to shut down operations either when the utilities required for operation are not available and/or transportation facilities are not available for the transportation of goods and services.

Initiatives - Utilities

- Investigate all means for accelerating restoration of all utilities including water, natural gas, electricity, sewers, communications (phones, internet), and gasoline supplies
- Consider prioritizing business/industry districts for restoration
- Encourage business owners to install solar and other alternate energy electricity generation capability to make businesses more resilient to post-earthquake power outages

Initiatives - Transportation

- Identify alternate routes and means for transportation
- Develop emergency transportation plan for employees, supplies and products
- Identify and upgrade critical points in transportation routes, e.g. overpasses
- Accelerate restoration of roads, airports, ports, railways

Preparedness and Emergency Response Element

The potential for loss of life and injuries, loss of property, and economic losses are all heavily dependent on the extent of preparedness and implementation of mitigation. It is important to convey to business owners the benefits of preparedness so that their recovery can be as quick and smooth as possible. Effective and rapid emergency response is essential for keeping the extent of the disaster at the minimum extent possible.

Initiatives

- Communicate the benefits of preparedness and mitigation programs to business owners in language that is understandable to them
- Include Economic Recovery as an integral part of the Recovery Plan
    - Draft a Plan of Priorities for recovery, e.g., health care first, etc.
- Encourage businesses to develop and sign contracts with contractors needed for recovery
- Create Industrial Zone Mutual Aid Agreements, via trade/business groups, to foster mutual support and assistance
- Permit local governments to provide training for businesses
- Develop Business Continuity Plans suitable for small businesses
    - Assist small business community develop recovery/continuity plans
    - Establish Business Preparedness Clinics
    - Encourage backup of electronic records and data, including for small businesses
- Prioritize areas for reconstruction
- Identify and determine location of Disaster Assistance Center(s) ahead of time
- Establish Mutual Aid agreements with other agencies to provide skilled staff for all aspects of recovery, not just fire, police and rescue
- Secure adequate housing and food for:
    - Mass care and shelter of anticipated number of victims
    - Lodging of aid personnel from outside affected region
- Create network/alliance of major corporations across the State that can assist small businesses in affected areas recover rapidly
    - Capitalize/build upon corporate citizenship and community relations
- Improve K-16 preparedness, mitigation and recovery
- Place limit on post-earthquake lawsuits

Appendix A:

California Regulations Related to Earthquake Loss Reduction

Field Act (Education Code-§17281, et seq.): Established regulations for the design and construction of K-12 and community college buildings. The Division of the State Architect enforces the Field Act. (1933)

Riley Act: Required local governments to have building departments that issue permits for new construction and alterations to existing structures and conduct inspections. The Act also set minimum seismic safety requirements that have since been incorporated into all building codes. (1933)

Garrison Act: Required school boards to assess building safety of pre-Field Act schools, ordered modernization of non-field act compliant structures. (1939)

Strong Motion Instrument Act (Public Resources Code§§2700-2709.1): Established a statewide network of strong motion instruments to gather vital earthquake data for the engineering and scientific communities. Data obtained from the strong motion instruments is used to recommend changes to building codes, assist local governments in the development of their general plans, and help emergency response personnel in the event of a disaster. (1972)

Seismic Safety General Plan Element (Government Code § 65302) -Required city and county plans to include seismic safety elements.

Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code § 2621-2630): Required cities and counties to require a geologic investigation, before issuing building permits, to ensure that proposed buildings will not be constructed across active faults. Proposed building sites must be evaluated by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault. (1972)

Alfred E. Alquist Hospital Facilities Seismic Safety Act (Health and Safety Code§129675): Regulated the design, construction and alteration of hospitals; set seismic safety standards for new hospitals; created an advisory Hospital Building Safety Board. Office of Statewide Health Planning & Development enforces this Act. (1973)

Seismic Safety Commission Act (Business and Professions Code §1014): Created the independent California Seismic Safety Commission (CSSC) to provide a consistent earthquake policy framework for the state. The mission of CSSC is "to provide decision makers and the general public with cost-effective recommendations to reduce earthquake losses and expedite recovery from damaging earthquakes. (1975)

SB 1279 (Alquist): Required the Seismic Safety Commission to conduct a study to determine the feasibility of establishing a comprehensive program of earthquake hazard reduction and earthquake prediction. (Chapter 154, Statutes of 1978)

AB 2438 (Wray): Authorized local governments to adopt ordinances requiring earthquake gas shut-off valves in buildings open to the public. (Chapter 971, Statutes of 1980)

ACR 96 (Perino): Requested the Seismic Safety Commission to study the problem of mobile-home bracing and make recommendations to the Department of Housing and Community Development for implementation. (Resolution Chapter 99, Statutes of 1980)

SB 360 (Alquist): Required mobile home bracing devices. It also required the Department of Housing and Community Development to administer the program, test devices, and issue certifications. (Chapter 533, Statutes of 1981)

SB 961 (Alquist): Required the Office of Statewide Health Planning and Development to institute plan review and field inspection of hospital buildings being constructed to ensure building safety. Requires the State Fire Marshal to ensure fire safety of these buildings. (Chapter 303, Statutes of 1982)

Alquist Hospital Facilities Seismic Safety Act of 1983 (Health and Safety Code §§130000 -130070): Required design and construction standards for hospitals; requires that after Jan. 1, 2008 any general acute care hospital building determined to be at potential risk of collapse or poses a risk of significant loss of life be used only for nonacute care. (1983)

Economic Disaster Act of 1984, Government Code §8695: Institutionalized the planning and response of state agencies to disasters in order to reduce economic hardship stemming from these disasters to business. Upon the completion of the emergency phase and the immediate recovery phase of a disaster, appropriate state agencies shall take actions to provide continuity of effort conducive to long -range economic recovery. (1984)

SB 239 (L. Greene): Created the Essential Services Building Act and declared the intent of the Legislature that essential services buildings be designed and constructed to a higher standard to resist damage from earthquakes. Established design and construction requirements. (Chapter 1521, Statutes of 1985)

SB 548 (Alquist): Created the California Earthquake Hazard Reduction Act which called for the Commission to administer a program to "significantly reduce hazards by January 1, 2000." (Chapter 1491, Statutes of 1985)

AB 3249 (Katz): Required private schools constructed after July 1, 1987 to have plans that meet applicable code standards. Required their plans to be reviewed by a structural engineer, and that the project's design professionals periodically review the construction. (Chapter 439, Statutes of 1986)

California Earthquake Hazards Reduction Act of 1986 (Government Code §8870, et seq.): Called for a coordinated state program to implement new and expanded activities to significantly reduce the earthquake threat. (1986)

Un-reinforced Masonry Building Law (Government Code §§ 8875-8875.10): Required local governments in high seismic regions of California to inventory un-reinforced masonry buildings, establish mitigation programs, and report progress to the CSSC. (1986)

Essential Services Building Seismic Safety Act (Health and Safety Code §16000): Required enhanced regulatory oversight by local governments during the design and construction of new essential service facilities, such as fire and police stations and emergency communications and operations facilities. The Division of the State Architect within DGS enforces this Act. (1986)

AB 631 (Bradley): Required the Department of Housing and Community Development to adopt regulations governing the installation of earthquake-resistant bracing systems on manufactured homes or mobile homes. (Chapter 304, Statutes of 1989)

ABX1 38 (Sher): Required Caltrans to develop revised seismic standards for earthquake resistance to be utilized in the design and construction of new state highways and bridges and for the retrofit of existing highways and bridges, including emergency repairs of highways damaged by the October 17, 1989 earthquake. Also requires Caltrans to incorporate state-of the art technology in those standards, to continue to revise and update the standards periodically, and to disseminate the standards, together with supporting data, to other public agencies engaged in the design, construction, or inspection of streets, roads, highways, and bridges. Created the Seismic Safety Retrofit Account in the State Transportation Fund. (Chapter 17, Statutes of 1989)

AB 1890 (Cortese): Required new and replacement water heaters to be braced and anchored. (Chapter 951, Statutes of 1989)

SB 1742 (L. Greene): Required local agencies to review the structural design and construction of certain bridges, and required the Caltrans director to establish a statewide priority list for retrofit projects based on these reviews. (Chapter 1082, Statutes of 1990)

SB 2104 (Kopp): Required Caltrans to prepare an inventory of all state-owned bridges that needed strengthening or replacement to meet seismic safety standards, and to prepare a multi-year plan and schedule, along with cost estimates, for completing the retrofitting or replacement of those bridges. (Chapter 265, Statutes of 1990)

SB 2453 (Maddy): Required surgical clinics to hire architects and structural engineers to assure that medical equipment are properly anchored. (Chapter 1579, Statutes of 1990)

AB 2959 (Klehs): Required the Seismic Safety Commission to develop, adopt, and publish a Homeowner's Guide to Earthquake Preparedness by January 1, 1992 (SSC 97-01). (Chapter 1499, Statutes of 1990)

AB 3313 (Woodruff): Required the State Architect and the Building Standards Commission – with the concurrence of the University of California, the California State University system, the Structural Engineers Association of California, and the Seismic Safety Commission – to develop and adopt seismic retrofit guidelines for state buildings, including public universities. (Chapter 1511, Statutes of 1990)

Earthquake Safety and Public Buildings Rehabilitation Bond Act of 1990 (Prop 122 & Government Code §§ 8878.50-8878.52): Authorized the state to issue $300 million in general obligation bonds for the seismic retrofit of state and local government buildings ($250 million for state-owned buildings and $50 million for partial financing of local government essential services facilities). (1990)

Seismic Hazards Mapping Act (Public Resources Code §§ 2690-2699.6): Directed the Department of Conservation to identify and map areas prone to liquefaction, earthquake-induced landslides, and amplified ground shaking. Also requires geotechnical investigations to identify hazards and formulate mitigation measures before permitting most developments within mapped Zones of Required Investigation. (1990)

Health & Safety Code § 1226.5-Established seismic safety standards for ambulatory surgical centers; requires fixed medical equipment (floor roof or wall mounted) to be installed using services of licensed architect or structural engineer; and requires inspection every five years. (1991)

AB 43 (Floyd): Excluded seismic retrofit improvements to hazardous buildings from property-tax reassessments. (Chapter 8, Statutes of 1991)

Executive Order D-86-90: Required CalTrans to prepare plan to retrofit transportation structures; requests UC and requires CSU to give priority consideration to seismic safety in allocation of funds for construction projects.

AB 204 (Cortese): Created a model, minimum building code for the retrofit of buildings with brick-bearing walls. (1991)

AB 908 (Farr): Specified that liquefaction and other seismic hazards are geologic hazards to be addressed in the safety element of a general plan. (1991; Chapter 823, Statutes of 1992)

AB 958 (Areias): Directed the Seismic Safety Commission to administer a privately funded task force, with specified membership, to consider the development of seismic safety building guidelines for the use of state and local governmental agencies in evaluating applications for the construction of new cellular facilities. (Chapter 813, Statutes of 1991)

AB 1968 (Areias): Required the Seismic Safety Commission to develop, adopt, and publish a Commercial Property Owner's Guide to Earthquake Safety for distribution to real estate licensees. (Chapter 859, Statutes of 1991)

SB 119 (Hart): Enacted the Higher Education Facilities Bond Act of June 1992 and required five-year capital outlay plans at colleges and universities to include a schedule that prioritized the seismic retrofitting needed to significantly reduce seismic hazards. (Chapter 13, Statutes of 1992)

SB 597 (Alquist): Required the state architect to develop seismic retrofit guidelines and standards for certain buildings enclosing more than 20,000 square feet of floor area with concrete or reinforced masonry column construction. (Chapter 1079, Statutes of 1992)

SB 131 (Roberti): Placed the Earthquake Relief and Seismic Retrofit Bond Act of 1994 (Proposition 1A) on the state ballot to authorize $2 billion in state general obligation bonds for: (1) the repair, renovation, reconstruction, replacement, or retrofit of transportation facilities and other public infrastructure, including schools, hospitals, utilities, sewers, and emergency centers, damaged by the quake; (2) earthquake hazard mitigation projects for public buildings and facilities in the counties of Los Angeles, Orange, and Ventura; (3) the seismic retrofit of state-owned transportation facilities throughout the state; and (4) housing repair loans to address the effects of the quake. It was not approved by voters. (1993)

California Proposition 192 (Seismic Retrofit Bond Act of 1996): Authorized $2 billion for seismic retrofitting, including $650 million for seismic retrofitting of toll bridges.

SB 577 (Rosenthal): Replaced references to earthquake sensitive or seismic gas shutoff valves with the term earthquake sensitive or seismic gas shutoff devices. Also revised the bracing requirements for water heaters to apply to all new and replacement water heaters, and all existing residential water heaters; requird any water heater to be secured in accordance with the California Plumbing Code. (Chapter 152, Statutes of 1996)

AB 1302 (Wayne): Required the San Diego Association of Governments to include a $33 million plan for seismic retrofit of the San Diego-Coronado Bridge in the regional transportation improvement program. Required not less than $10 million of the $33 million to be paid from local toll revenue reserve funds, and the balance to be paid from toll bridge revenue bonds. (1997)

SB 1122 (Alarcón): Required the Office of Emergency Services, in cooperation with the State Department of Education, the Department of General Services, and the Seismic Safety Commission, to develop an educational pamphlet for use by grades K-14 personnel to identify and mitigate the risks posed by nonstructural earthquake hazards. (Chapter 294, Statutes of 1999.)

Government Code §8587.7- Required Office of Emergency Services, in cooperation with State Department of Education, Department of General Services and the Seismic Safety Commission to develop an educational pamphlet for use by K-14 personnel to identify and mitigate risks posed by nonstructural earthquake hazards.

AB 964 (Aroner): Required the California Earthquake Authority to establish, in the operational rules of the Earthquake Loss Mitigation Fund, a plan for the expedited expansion of the residential retrofit program statewide. (Chapter 715, Statutes of 1999)

California Earthquake Authority (Insurance Code §§ 10089.5-10089.54): Created the California Earthquake Authority and authorized CEA to issues policies of basic earthquake insurance.

Education Code§17317: Required the Department of General Services to conduct an inventory of public school buildings that are concrete tilt-up or have nonwood frame walls that do not meet requirements of the 1976 UBC, by Dec. 31, 2001.

Health and Safety Code §§19180-83 & §§19200-05: Authorized local governments to adopt ordinances requiring installation of earthquake sensitive gas shutoff devices in buildings; allowed Division of the State Architect to establish a certification procedure for installation.

Streets & Highways Code §188.4: Authorized retrofit of state-owned toll bridges using seismic toll surcharge.

Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 (Proposition 1B, Government Code §8879.23(i)): Essential Facility Seismic Safety Program. Provided $125 million funding for seismic retrofit work on local bridges, ramps, and overpasses; established Local Bridge Seismic Retrofit Account. (2006)

California Emergency Services Act (Government Code §8550): Provided the legal authority for emergency management and the foundation for coordination of state and local emergency response, recovery, preparedness, and mitigation activities throughout California.

Disaster Recovery Reconstruction Act, Government Code §8877.1: Authorized, guided, and otherwise enabled cities, counties, and other entities to prepare in advance of a disaster, such as a devastating earthquake, for the expeditious and orderly recovery and reconstruction of the community or region; Includes plans and ordinances facilitating the expeditious and orderly recovery and reconstruction and contingency plan of action and organization for short-term and long-term recovery and reconstruction to be instituted after a disaster.

Natural Disaster Assistance Act, Government Code §8680: Provided state financial assistance for recovery efforts to counties, cities and/or special districts after a state disaster has been proclaimed.

Natural Hazards Disclosure Act, Civil Code §1102: Required transferor of real property, consisting of not less than one nor more than four dwelling units, to disclose to transferee if the real property lies within any of the following hazardous areas: a Special Flood Hazard Area (any type Zone A or V) designated by FEMA; an area of potential flooding shown on a dam failure inundation map; a very high fire hazard severity zone; a wildland area that may contain substantial forest fire risks and hazards; an earthquake fault zone; and/or a seismic hazard zone**.**

Appendix B:

California Earthquake Loss Reduction Plan (2007-2011)- Plan Matrix and Initiatives

The Plan

The *California Earthquake Loss Reduction Plan* sets forth basic government policy directions in pursuit of the vision for a safer California. Mitigation works! Loss reduction is possible and practical. Significant progress has already been made, and with continued commitment, losses can be dramatically reduced.

The Plan rests on the fact that increased levels of seismic performance—through the upgrading of existing vulnerable structures, better design of new structures, and increased preparedness in all areas—provide the most cost-effective method to reduce loss and improve recovery from earthquakes.

The Plan is a road map to achieve a safer California. It contains 11 major elements, each addressing a distinct but interrelated area of concern. It defines statewide objectives and strategies to support the Plan goals. Each element targets specific areas of earthquake risk, but it also supports many of the other elements to provide a coherent framework to address the entire spectrum of loss reduction.

Each element is important in the quest for a safer California, and each is considered an indispensable part of the plan. The elements do not make up a list of detailed action items, but rather present broad policies and strategies to guide the activities of government agencies, public and private institutions, and the public. Individual one-page policy statements for each element follow.

More detailed actions that support the Plan are presented in "The Initiatives" and provide refinement to the overall plan of action. Ultimately, it is the responsibility of agencies and individuals to ensure that their actions fulfill the intent of the Plan.

The Plan Matrix

	Learning About Earthquakes				
	Geosciences	**Research and Technology**	**Education and Information**	**Economics**	**Land Use**
Concerns	Insufficient use of current geologic knowledge	Insufficient technical knowledge	Insufficiently educated and informed citizenry	Unacceptable economic losses	Seismic hazards not incorporated in general plans
Objective(s)	Full application of geosciences	Sustained research, effective transfer of technology	Increased knowledge to make effective decisions	Shift of design and construction policies to economic value basis	Balance between growth and seismic hazards
Strategies	Improve use of current geoscience knowledge	Support risk reduction research	Promote competency of professionals	Demonstrate cost-effectiveness	Incorporate seismic hazards data in general plans
	Apply consistent geoscience standards	Ensure applicability to risk reduction	Increase public awareness	Develop incentives	Strengthen the California Environmental Quality Act (CEQA) process
	Show cost-effectiveness	Demonstrate value of research for improving seismic safety	Inform public officials	Include property protection in model codes	Develop mitigation techniques
	Support ongoing research	Coordinate research activities	Strengthen K–12 earthquake programs	Protect functionality of infrastructure	Protect areas from inundation
Benefits	Better performance to reduce losses	Greater levels of risk reduction	Better educated policy makers and professionals	Improved economic viability and reduced tax impact	Avoid negative impact on planning goals
Responsibilities	State is prime motivator; local entities are enforcers.	State to operate the program.	State is prime motivator; local entities are enforcers.	State is prime leader; all levels participate.	State to develop data; local entities to implement; owners to use.
Costs	State = ongoing Local = minimal User = < 2 percent	State = minimal Local = none User = varies	State = minimal Local = none User = negligible	State = minimal Local = minimal User = varies	State = minimal Local = varies Owner = minimal
Incentives	Building and zoning trade-offs, insurance rates, tax benefits	Reduced insurance rates, tax benefits	Strong state policy, public demand	Strong state policy, public demand	Zoning trade-offs, density rights, transfers, etc.

Existing Buildings	New Buildings	Utilities and Transportation	Preparedness	Emergency Response	Recovery
Property protection deficiencies in buildings	Unacceptable levels of personal and economic impact	Catastrophic personal and economic loss	Insufficient understanding and action	Insufficient responsive and sustainable systems	Impairments to effective and speedy recovery
Upgrade vulnerable buildings to acceptable performance levels	Increased life, property, and economic safety	Protect life, limit property damage, resume function	Increased understanding and ability to act	Improved communications and medical response	Statewide recovery plan and implementation
Provide incentives to retrofit	Include all new buildings	Ensure performance standards	Increase understanding of potential impact	Improve communications	Establish a statewide strategic recovery plan
Initiate broad educational efforts	Develop integrated approach to seismic design	Mitigate secondary effects	Develop comprehensive approach	Improve medical response	Expand interim and long-term housing capability
Develop effective methodologies	Adopt California-specific standards	Evaluate and prioritize mitigation measures	Encourage individuals to act	Improve search and rescue	Expedite permitting and rebuilding processes
Upgrade vulnerable buildings and other structures	Do performance-focused research	Retrofit critical systems	Improve K–12 school preparedness	Improve emergency management capability	Provide accurate and timely information
Significant reduction in loss of life and costs	Improved life-safety, reduced economic impact	Economic viability of the region and state	Minimized personal losses	Preservation of lives and property	Minimized economic disaster
State is prime motivator; all levels participate.	State must enforce plan for its own properties.	State is the lead; each system owner must participate.	State provides leadership; individual entities implement.	State provides facilities, equipment, and training.	State provides leadership; local entities implement.
State = minimal Local = minimal User = varies	State = minimal Local = minimal User = < 2 percent	State = minimal Local = none Utility = varies	State = minimal Local = minimal User = minimal	State = considerable Local = minimal User = negligible	State = considerable Local = minimal User = negligible
Economic and regulatory	Economic and regulatory	Economic and regulatory	Strong state policy, public demand	Strong state policy, public demand	Strong state policy, public demand

Format for the Initiatives

The *California Earthquake Loss Reduction Plan, 2002–2006* sets forth the basic policy and direction with which to seek the vision and reach the goals (see pages 3 to 5) by the year 2010. The initiatives provide definitive statewide strategies that will lead to the intended goal. Just as each element of the Plan is considered an integral part of the vision for a safer California, the initiatives provide a necessary and integrated vehicle to focus the State's efforts in that quest. The initiatives have been developed in recognition of, and with experience from, ongoing programs and are intended to set forth practical plans of action to guide the implementing agencies.

Each initiative is expressed as an action to be accomplished, indicating its priority, and, in the case of those deemed "Critically Important," the time frame for its accomplishment. The primary goal of the plan is loss reduction. The actions called for in these initiatives are intended to help achieve that goal. As the detailed action plans are developed, they must be evaluated for the contribution they make toward achieving the goal, the practicality of their accomplishment, and the economic benefit they provide.

Each initiative has been given a priority. Detailed action plans will be developed, and costs will be determined as each initiative is implemented.

Priority

All of the initiatives are considered necessary to achieve the State's goals. However, for effective administration of the overall plan, they have been organized into three priority levels: *Critically Important, Very Important,* and *Important.*

Date

Each initiative should be started and completed as soon as practical. The time to accomplish each will vary depending on the action plan. The time indicated for those initiatives deemed Critically Important is considered a reasonable time by which the initiatives should be accomplished.

Progress

Progress on each of the initiatives is presented in the *Progress Report for the California Earthquake Loss Reduction Plan.*

Implementing the initiatives will require a cooperative effort of various entities, both public and private, at the local, state, and national levels. Precise action plans or tactics that define who is responsible and how an initiative is to be accomplished and how an initiative is to be accomplished will be developed by the Administration, the Legislature, and others responsible and affected.

The following pages summarize the initiatives within each element of the plan.

Geosciences Element

Effective land use planning and design must recognize the geologic environment and identify earthquake hazards. Every major earthquake yields new geologic data. Planning, design, and construction are not adequately incorporating this new knowledge, however. Most advances have been motivated by reaction to disasters rather than good risk reduction strategies based on current and proven geoscience knowledge.

Objectives

To continue to improve the structural performance of new and existing buildings and utility and transportation systems through effective use of current geoscience knowledge. To ensure consistent application of that knowledge and to continuously improve risk reduction strategies based on application of the most current knowledge available.

Strategies

Improve Use of Current Geoscience Knowledge

Require land use planning, building codes, and design standards to use the most up-to-date and appropriate geoscience knowledge as the basis for seismic risk reduction policy and application.

Apply Consistent Geoscience Standards

Require consistent statewide geoscience knowledge-based methods and quality standards for seismic and fault rupture risk reduction as basic elements of land use planning, building codes, design, construction quality control, and enforcement. Ensure that geoscience knowledge is infused in all phases of the process.

Show Cost Effectiveness

Demonstrate the value of using existing geoscience information to reduce seismic losses within the built environment, particularly for identifying site-specific hazards for which project-specific risk reduction measures will have a high benefit-to-cost ratio.

Support Ongoing Research

Establish a system for supporting and applying the research and knowledge available from existing research institutions and entities as a fundamental part of the state's seismic risk reduction policy. Geoscience knowledge should be an integral part of the state's public policy on seismic risk reduction.

Benefits

The benefits are better use of geoscience knowledge, which will enable professionals to improve planning and design in order to achieve higher levels of performance and ensure reduced losses.

Responsibilities

The state should take the lead in motivating and coordinating the application of knowledge developed by the geoscience community and the strategies outlined. Local agencies will be responsible for implementation and enforcement.

Costs

Cost to the state for seismic hazard mapping will be in the $40 million range; $20 million for the urban areas is the first priority. Cost to local governments will be minimal; their role will be primarily that of administrators of the policy. Cost to the public will average less than 1 percent of the value of structures in most areas of the state and less than 5 percent in high seismicity areas. Cost can be as low as 2 percent if proper, cost-effective design solutions are incorporated.

Incentives

Incentives may include zoning and building code options, reduced insurance rates, and tax relief that reflect the value of the improved seismic engineering.

Geosciences Element (Continued)

Objective: *Full Application of Geosciences*

Strategies and Initiatives

1.1 Improve Use of Current Geoscience Knowledge

1.1.1 Ensure efficient, accurate, and reliable completion of the statewide Seismic Hazard Mapping Program for California's high-risk, developed and developing areas. Utilize independent review and acceptance of appropriate procedures to compile the data and construct the maps. Include end users and others affected as part of the independent review.

Priority: **Critically Important**
Time to Accomplish: **10 years**

1.1.2 Include as part of the Seismic Hazard Mapping Act continuous identification and mapping of all potential seismic sources.

Priority: Very Important

1.1.3 Develop uniform standards for installing and maintaining strong motion instruments, including timely and effective processing and disseminating of the resulting data, for purposes of real-time notification and earthquake engineering and damage evaluations as a part of the Strong Motion Instrumentation Program.

Priority: Very Important

1.1.4 Require federal and state dam owners to comply with and pay for strong motion instrumentation of their dams as a part of the Strong Motion Instrumentation Program.

Priority: Important

1.1.5 Encourage owners of hazardous waste and municipal solid waste containment facilities to pay for strong motion instrumentation for their facilities as part of the Strong Motion Instrumentation Program.

Priority: Important

1.1.6 Expand the network of strong motion reference stations in major urban areas throughout California so there will be one per zip code to provide critical information for emergency response and postearthquake evaluation of structures.

Priority: Very Important

1.2 Apply Consistent Geoscience Standards

1.2.1 Require local governments to provide consistent application and enforcement of the Seismic Hazard Mapping Program and the Alquist-Priolo Earthquake Fault Zone Act criteria in all zoning and building code applications.

Priority: Very Important

1.2.2 Incorporate geoscience knowledge and peer review in planning, design, and construction processes at the initial phase of public consideration and ensure that the application of site-specific data is a required element of all projects.

Priority: Very Important

1.2.3 Ensure that the design of new, and the performance of existing, facilities (including major transportation and utility systems and hazardous material facilities) address the appropriate earthquake hazards.

Priority: Important

1.3 Show Cost Effectiveness

1.3.1 Develop and implement effective educational and informational programs demonstrating the cost effectiveness of using site-specific data in designing new and retrofitting existing facilities. Make use of existing case histories where possible.

Priority: Important

1.3.2 Develop and implement effective educational and informational programs aimed at the technical professions to increase their understanding of strong motion phenomena, including near-source and ground deformation. Demonstrate success in the use of good standards of practice by the technical professions.

Priority: Very Important

1.3.3 Develop and implement effective educational and informational programs demonstrating the cost effectiveness of the use of data to provide accurate planning scenarios for earthquake preparedness and response planning.

Priority: Important

1.4 Support Ongoing Research

1.4.1 Develop data necessary to provide accurate and useful planning scenarios to reduce the risk from seiche and tsunami hazards.

Priority: Important

1.4.2 Support geoscience research that can be used to reduce earthquake risk and losses.

Priority: Important

1.4.3 Improve methods of assessing the cost effectiveness of geoscience information in earthquake loss reduction policy.

Priority: Very Important

Research & Technology Element

Earthquake professionals and decision makers still do not have sufficient knowledge to implement effective measures to protect our communities from earthquake losses. Many continue to rely on outdated or ineffective technologies and methods. Several factors contribute to the problem:

1. Financial support for research has not kept pace with the need.
2. Research on issues critical to California has been inadequate.
3. Mechanisms to validate, adopt, and implement research findings are insufficient.

Objectives

To develop and sustain research that identifies cost-effective methods to improve seismic safety. To facilitate the implementation of validated research findings.

Strategies

Support Risk Reduction Research

Ensure adequate state funding for cost-effective research as presented in the Seismic Safety Commission's *A Safer, More Resilient California: the State Plan for Earthquake Research.*

Ensure Applicability to Risk Reduction

Involve earthquake professionals and decision makers in the research process to help set priorities, validate results, and provide feedback on implementation.

Demonstrate Value of Research for Improving Seismic Safety

Demonstrate the effectiveness of research for improving seismic safety using laboratory tests, seismic simulations, and postearthquake investigations.

Coordinate Research Activities

Review and evaluate federal, state, and industrial earthquake research activities to ensure that California earthquake risk reduction priorities are being adequately addressed.

Benefits

The benefits are more cost-effective techniques to retrofit existing structures in order to provide life safety and to design new construction to achieve higher protection of both lives and property.

Responsibilities

The state is responsible for creation and operation of the Risk Reduction Program; universities and private research institutions, local agencies, building code officials, industry, corporations, and the professional communities will be involved in the process.

Costs

Cost to the state for the Risk Reduction Program will be $5 to $10 million annually. Cost to local agencies and the design professionals will be negligible since The Plan envisions better use of research results. Cost to end users will vary; large entities may share in the cost since they will benefit significantly. Cost to small entities will be negligible.

Incentives

Incentives for using advanced performance technology may include reduced insurance rates and tax policies that reflect the value of improved seismic performance without penalizing users.

Research & Technology Element

Objective: Cost-effective Methods to Improve Seismic Safety

Strategies and Initiatives

2.1 Support Risk Reduction Research

2.1.1 Support and cofund California-based seismic research programs funded by federal agencies or the private sector.

Priority: **Critically Important**
Duration: **Ongoing**

2.1.2 Update and carry out the Seismic Safety Commission's *A Safer, More Resilient California: The State Plan for Earthquake Research*. Include provisions for 1) public oversight and priority-setting functions; 2) researchers who work with end users to implement the plan; and 3) research that is conducted by other public and private parties.

Priority: Important

2.1.3 Expand and fund cost-effective research directed at providing information about seismic safety in California, with priority on integrated, multidisciplinary research efforts. Maintain a specific implementation element in the program to facilitate and encourage the incorporation of existing and new knowledge into professional practice.

Priority: Very Important

2.1.4 Continue support of problem-focused research by Pacific Earthquake Engineering Research Center to provide the technical basis for development of performance-based building codes, standards, and practices.

Priority: Important

2.1.5 Establish a program to systematically gather ephemeral data from damaging earthquakes, including strong ground motion, ground deformation and failure, facility performance, and impacts.

Priority: Very Important

2.2 Ensure Applicability to Risk Reduction

2.2.1 Apply cost-effective defense and space technologies to earthquake risk reduction efforts.

Priority: Important

2.2.2 Require all state-funded seismic research to include active participation by earthquake professionals and decision makers from the outset through implementation and dissemination.

Priority: Very Important

2.2.3 Promote links between earthquake research organizations and industry to evaluate the performance of new technologies, components, and systems.

Priority: Important

2.2.4 Work with federal agencies and research organizations to support development of education programs for design professionals, building officials, and decision makers who implement research results.

Priority: Very Important

2.2.5 Promote programs of continuing education through existing professional associations to communicate research results to design professionals and land-use planners.

Priority: Very Important

2.3 Demonstrate Value of Research for Improving Seismic Safety

2.3.1 Document the effectiveness of research for improving seismic safety using laboratory tests, seismic simulations, and postearthquake investigations. Communicate that information to design professionals, researchers, policy makers, and the public.

Priority: Very Important

2.4 Coordinate Research Activities

2.4.1 Convene workshops, seminars, and public hearings involving users of earthquake research to help establish priorities for reducing earthquake risk. Ensure that the results of these activities will be reflected in research objectives, plans, and priorities.

Priority: Very Important

2.4.2 Maintain a database of California earthquake research activities, investigations, and research results that are relevant to California's needs.

Priority: Important

Education & Information Element

Policy makers, professionals, and the public have an increasing awareness of earthquake risks but are still not adequately prepared for making effective decisions to reduce seismic risk. Consistent educational programs and information dissemination systems are still lacking.

Objective

To initiate a comprehensive strategy for education and information sharing that will increase the knowledge of policy makers, professionals, and members of the public, enabling them to make effective decisions about reducing losses from earthquakes and to encourage them to undertake effective implementation action.

Strategies

Promote Competency of Licensed Professionals

Require professionals involved in the design and construction of the built environment to demonstrate competency in seismic design as a licensing and relicensing requirement. Higher-education systems and technical professions should provide appropriate educational programs to develop and maintain that competency.

Increase Public Awareness

Develop an effective system for communicating information about the overall impact of earthquakes and loss reduction strategies to the general public. Convey demonstrated cost-effectiveness strategies and incentives aimed at reducing losses. Use an informed media and other sources to promote and disseminate accurate information on a continual basis.

Inform Public Officials

Develop an effective system for communicating information about seismic risk and loss reduction strategies, including demonstrated cost-effectiveness approaches, to public officials at all governmental levels.

Strengthen K-12 Earthquake Programs

Strengthen K-12 public and private school programs to integrate effective earthquake education within existing curricula. Provide teacher training and develop materials that address earthquake science, school preparedness, and individual safety.

Benefits

Public officials, design professionals, and the public will be better educated and informed about and supportive of earthquake loss reduction strategies and will implement mitigation techniques that will reduce the potential loss of life and property and minimize business disruption.

Responsibilities

Responsibility rests primarily at the state level, with other public and private sector involvement in much of the implementation. State government should take the lead in promoting and coordinating the strategies outlined and place a high priority on initiating programs necessary to achieve this goal. Local governments are responsible for implementation and code enforcement.

Costs

Cost to the state will be minimal since its role is one of promoter, setting policy and direction. Cost to educational systems and other implementing agencies will be minor since the strategies envision redirecting resources within existing programs as opposed to additional programs. Cost to the professional, for additional educational tuition, will be offset by increased capability and marketability. Cost to the public will be negligible.

Incentives

Without an educated and informed public at the core of this issue, we cannot hope to achieve the goals of seismic safety that this document envisions. There is a moral and ethical obligation to focus efforts on elevating public understanding of these issues.

Education & Information Initiatives

Objective: Increased Knowledge to Make Effective Decisions

Strategies and Initiatives

3.1 Promote Competency of Licensed Professionals

3.1.1 Require licensing renewals for all professionals associated with siting, design, inspection, and construction of structures to include adequate continuing education on all applicable seismic safety issues.

Priority: Very Important

3.1.2 Integrate earthquake loss reduction principles in all appropriate land use, design, and construction-related professional education programs as a part of the basic curricula.

Priority: Important

3.2 Increase Public Awareness

3.2.1 Develop educational approaches and tools in seismic hazard mitigation, including earthquake fundamentals, identification of seismic hazards, safety information about potentially hazardous building contents, workplace safety, emergency plans, and risk assessment techniques and tools for those responsible for facilities operation and management.

Priority: **Critically Important**
Time to accomplish: **5 years**

3.2.2 Provide tools to media practitioners to ensure reporting accuracy and to increase the level of understanding among reporters and writers.

Priority: Important

3.2.3 Provide educational tools to homeowners aimed at increasing their awareness of fundamental seismic risks, and encourage implementation of mitigation efforts.

Priority: Very Important

3.2.4 Develop and communicate information about 1) demonstrated strategies for cost-effective seismic mitigation techniques; and 2) programs and incentives for reducing losses.

Priority: Important

3.2.5 Provide in the higher-education systems programs that increase knowledge and awareness of earthquake fundamentals, loss reduction, preparedness, and response issues.

Priority: Important

3.3 Inform Public Officials

3.3.1 Conduct educational sessions, including workshops for state, city, and county officials, as well as other community-based organizations, institutions, and agencies, on vulnerability assessment and loss reduction measures.

Priority: Very Important

3.3.2 Develop and disseminate information on how public officials can establish and manage community coalitions to support loss reduction.

Priority: Important

3.3.3 Require continuing education in all applicable seismic safety issues for building officials.

Priority: Important

3.4 Strengthen K–12 Earthquake Programs

3.4.1 Implement cohesive K–12 curriculum elements on earthquake fundamentals and mitigation as an integral part of the state's educational standards. The dual aim of this effort is that California schools will produce an informed public and new generations of scientists, planners, legislators, communicators, and business leaders.

Priority: Important

3.4.2 Provide preservice and in-service training of teachers relating to earthquake fundamentals, loss reduction, preparedness, and response issues within the sciences, environment, mathematics, history–social science, and language arts curricula.

Priority: Very Important

Economics Element

With respect to earthquakes, model codes, design, construction, and retrofit have been driven by life-safety standards. This approach has provided a high degree of life safety, but the preservation of property and the impact on economic value have been largely ignored. Earthquakes have caused economic losses that could have been significantly reduced if the state had had more effective policies that protected the functionality of buildings and infrastructure.

Objectives

To emphasize policies in design, construction, and retrofit practices that protect property, contents, and functionality in both public and private sector facilities, including infrastructure. To develop incentives for cost-effective loss reduction.

Strategies

Demonstrate Cost Effectiveness

Demonstrate to decision makers the cost effectiveness of mitigation policies for seismic loss reduction.

Develop Incentives

Develop economic and regulatory incentives to enhance seismic performance of existing and new construction.

Include Property Protection in Model Codes

Incorporate cost-effective protection of property and functionality as an integral part of model code regulation.

Protect Functionality of Infrastructure

Incorporate protection of system functionality as an integral part of infrastructure design, construction, and operation policies.

Benefits

The benefits are higher levels of seismic mitigation that reduces the risk to life, the vulnerability of the state's economic base, and potential unemployment after an earthquake. The tax impact will be reduced by maintaining a more reliable employment and property tax base while reducing post-earthquake recovery costs and recovery time.

Responsibilities

Responsibility rests at the state level, with other public and private sector involvement in much of the implementation. The state should provide strong leadership in directing a shift in public policy from a minimum prescriptive basis to a higher-performance basis for seismic risk reduction. This shift will require participation from all elements of the public-policy spectrum, including state and local government agencies, the League of California Cities, financial and insurance institutions, and code organizations.

Costs

Cost to the state for agency implementation will be minimal, because the state's role is to motivate and to set policy and direction, rather than to undertake new programs. Costs to local governments will also be minimal since they will primarily be administrators of the policy. Cost to the public will depend on the amount of mitigation required, but will be offset by the benefits.

Incentives

Achieving the objectives of this element depends on strong policy as part of the state's overall risk reduction plan. While reducing seismic risk in each structure will be valuable to the building owner, the greatest motivation will be in the public's demand for significant reduction in personal and financial losses normally resulting from earthquakes.

Economics Element

Objective: Emphasize Earthquake Mitigation Policies That Recognize Economic Value

Strategies and Initiatives

4.1 Demonstrate Cost Effectiveness

4.1.1 Develop economic models and real-case studies that demonstrate the cost effectiveness of specific design, construction, and retrofit methods based on increased levels of property, contents, functionality, and tax base protection. Make those findings available to the policy makers and the lending, insuring, and taxing agencies.

Priority: **Critically Important**
Time to accomplish: **3 to 5 years**

4.1.2 Develop reliable simulation models that demonstrate the cost effectiveness of enhanced performance standards.

Priority: Very Important

4.2 Develop Incentives

4.2.1 Establish state and local revenue-generating policies to provide incentives for cost-effective loss reduction.

Priority: Very Important

4.2.2. Work with the mortgage lending industry to establish objective criteria in which increased seismic performance of structures is incorporated into mortgages and underwriting practices.

Priority: Very Important

4.2.3 Work with the insurance industry to establish objective criteria in which increased seismic performance of structures is incorporated into insurance and underwriting practices.

Priority: Very Important

4.2.4 Identify and eliminate federal, state, and local regulatory and financial disincentives for seismic retrofit.

Priority: Very Important

4.2.5 Define measurable goals for economic loss reduction as a result of increased incentives.

Priority: Very Important

4.3 Include Property Protection in Model Codes

4.3.1 Incorporate cost-effective seismic design standards in model codes based on protection of property and functionality.

Priority: Very Important

4.3.2 Develop statewide constituency to establish the cost-effective levels of property-based performance codes.

Priority: Important

4.3.3. Define measurable goals for economic loss reduction as a result of performance-based codes and standards.

Priority: Very Important

4.4 Protect Functionality of Infrastructure

4.4.1 Establish public policy that incorporates increased seismic design standards in the design, construction, and operation of infrastructure, based on the need to maximize functionality after earthquakes.

Priority: Very Important

4.4.2 Define measurable goals for economic loss reduction as a result of increased standards.

Priority: Very Important

Land Use Element

Efficient use of land is one of the most critical issues in effective loss reduction and recovery from the disastrous effects of earthquakes. Because the risk of loss from earthquakes increases as the population increases, several areas of concern emerge with respect to land use: 1) generally, seismic hazard knowledge is neither adequately incorporated nor consistently applied in land use decision making; 2) acceptable levels of seismic performance in new developments are not clearly understood; 3) environmental review procedures are not adequately addressing seismic hazards; and 4) developments subject to inundation due to potential dam or levee failure or tsunami effects are not adequately identified and protected.

Objective

To improve land use planning to achieve optimum balance between the needs for the state's population and economic growth and the constraints imposed by seismic hazards.

Strategies

Incorporate Seismic Hazard Data in General Plans

Update all urban area general plans with new information about seismic hazards, including potential inundation. Ensure that all local general plans are updated within one year of the date that the state and other recognized agencies publish new seismic hazards maps. Ensure consistent enforcement of all requirements.

Strengthen the California Environmental Quality Act (CEQA) Process

Require that all projects subject to environmental review in accordance with the CEQA are properly evaluated and adequately mitigate seismic hazards, using the latest data published by state and other recognized agencies.

Develop Mitigation Techniques

Develop and incorporate standards that reflect acceptable levels of seismic performance and loss reduction techniques for new and existing development.

Protect Areas from Inundation

Ensure that all areas subject to potential inundation from earthquake-induced dam or levee failure or tsunami run-up have been adequately identified and appropriate loss reduction strategies have been incorporated in general plans.

Benefits

Land planning that incorporates strategies to deal with seismic hazards will help eliminate loss of life and mitigate property damage, including potential abandonment ("ghost-town" effects) and its negative impact on long-range planning goals, and will ensure economic and environmental viability.

Responsibilities

The state is primarily responsible for development of data and publication of seismic hazard maps. Local agencies are responsible for incorporation of the maps into their general plans and for enforcement. Public and private land owners and property developers are responsible for using the knowledge effectively and incorporating cost-effective mitigation techniques into each of their projects.

Costs

Additional cost to the state for review and coordination of local general plans will be minimal. Cost to local governments for formalizing the seismic hazard maps into their general plans will vary depending on how and when updating occurs. Cost to private developers will vary depending on site-specific conditions.

Incentives

Land use and zoning incentives such as density rights transfer, historic district bonuses, and zoning options should be considered. Incentives should be provided, or negative incentives removed, for owners who voluntarily comply with the latest known seismic hazard data and upgrade buildings' seismic performance without increasing the size or use of the facilities.

Land Use Initiatives

Objective: Achieve Balance Between Growth and Seismic Hazards

Strategies and Initiatives

5.1 ***Incorporate Seismic Hazard Data in General Plans***

5.1.1 Require geotechnical and geological reports addressing seismic hazards for all subdivisions pending completion and adoption of mapping under the Seismic Hazards Mapping Act for any jurisdictional area.

Priority: **Critically Important**
Time to accomplish: **2 years**

5.1.2 Amend state planning law to require local governments to review and update the safety element every five years (or sooner if appropriate) to incorporate the most recent geologic and technical information available.

Priority: Very Important

5.2 Strengthen CEQA Process

5.2.1 Amend the *California Environmental Quality Act Guidelines,* including Appendix G and Appendix I, to explicitly require initial studies and environmental impact reports (EIRs) to address and provide for adequate mitigation of seismic hazards.

Priority: Very Important

5.2.2 Require the seismic hazards portion of initial studies and EIRs to be prepared by appropriate technical experts.

Priority: Very Important

5.2.3 Give local government emergency managers opportunity to review initial studies and EIRs so that seismic hazards may be adequately identified.

Priority: Very Important

5.3 Develop Mitigation Techniques

5.3.1 Require local governments to list and catalog, in accordance with geologic data, seismic and geologic hazards reports submitted to them with normal environmental, subdivision, and other project review procedures. Make reports available to the public as required by the Public Information Act.

Priority: Important

5.3.2 Amend state planning law to establish policies and mitigation requirements in safety elements of local general plans related to the use, occupancy, and rehabilitation of buildings that are considered seismically vulnerable.

Priority: Very Important

5.3.3 Review potential tsunami hazards, prepare inundation maps, and recommend appropriate mitigation strategies and responsibilities.

Priority: Important

5.3.4 Encourage general plan policies to recognize the aggregate effect of potential seismic hazards on adjacent uses and consider appropriate mitigation.

Priority: Very Important

5.4 Protect Areas from Inundation

5.4.1 Require owners, developers, and flood control districts to prepare and revise inundation maps every ten years in light of major new downstream development. Amend land use laws to require current and updated dam inundation maps be available and reviewed before approving development of critical facilities and large-scale developments.

Priority: Important

5.4.2 Require proponents of critical facilities and major large-scale developments located downstream of dams to review the latest inundation maps and update the maps as necessary in light of their development.

Priority: Important

5.4.3 Amend statutes to impose sanctions on dam owners who fail to prepare and submit inundation maps as required.

Priority: Important

5.4.4 Amend the state planning law to require that state and local agencies make specific findings known regarding the acceptability of inundation hazards before approving development of critical facilities and major large-scale developments.

Priority: Important

Existing Buildings Element

Many of California's existing buildings, including homes, are vulnerable to damage or collapse from earthquakes. Most seismic retrofit projects to date have focused appropriately on life safety and have not significantly reduced the potential loss to property, personal disruption, and productivity. Continuing occurrence of earthquake damage to older and recently constructed buildings clearly demonstrates the need for heightened awareness of the benefit of increased performance levels beyond life safety.

Objectives

To initiate aggressive efforts toward reducing loss of life and vulnerability of property in existing buildings. To ensure that all existing high-occupancy and essential services buildings are upgraded to remain occupiable following earthquakes.

Strategies

Provide Incentives to Retrofit

The economic structure affecting property ownership and the building industry should provide compelling incentives for retrofitting structural and nonstructural elements of existing buildings in accordance with standards that improve seismic performance.

Initiate Broad Educational Efforts

Educate building owners, design professionals, and others involved in the retrofit design and construction process about the benefit of retrofitting existing buildings for improved performance, including basic structures, nonstructural components, and operational elements.

Develop Effective Methodologies

Continue to develop a reliable and practical performance-based methodology to ensure that seismic retrofit design and construction can be accomplished with consistent results.

Upgrade Vulnerable Buildings and Other Structures

Establish effective risk reduction programs to upgrade seismically vulnerable buildings. Priorities should include essential services buildings, public and private schools, single- and multifamily housing, parking structures, and facilities housing hazardous materials.

Benefits

Significant reductions in loss of life, property damage, and business interruptions, which may lead to loss of market share and tax revenues, will result from applying aggressive retrofitting strategies to vulnerable buildings.

Responsibilities

Responsibility rests at all levels of the public and private sectors. The state of California should take the lead in motivating and initiating the strategies and in implementing them for state-owned buildings, and it should place a high priority on legislation, education, financial approaches, and code development necessary to achieve this goal.

Costs

The state's cost in setting policy and direction will be considerable. Cost to local jurisdictions for implementation will be considerable. Retrofit costs to the state, school districts, local governments, and other property owners will be significant and will vary depending on the effectiveness of design and the incentives.

Incentives

Economic incentives for seismic retrofit may include alternative funding, reduced insurance rates, tax benefits, and extended longevity of the property function. Experience indicates the value of retrofitting is stifled by a lack of clear financial incentive. Significant improvement, within an accelerated time frame, can be accomplished only by recognition of the economic advantage of improved seismic performance.

Existing Buildings Initiatives

Objective: Upgrade Vulnerable Buildings and Structures

Strategies and Initiatives

6.1 Provide Incentives to Retrofit

6.1.1 Encourage economic incentives, such as improved mortgage terms, reduced insurance rates, and positive tax benefits, for upgrading structural and nonstructural elements in buildings.

Priority: **Critically Important**
Time to accomplish: **10 years**

6.1.2 Amend the *California Building Code* to allow upgrading of the structural and nonstructural elements of buildings without triggering other code upgrade requirements, providing the work is intended to improve seismic performance.

Priority: Important

6.1.3 Amend local regulations to allow increased use or area in consideration of seismic retrofit.

Priority: Important

6.2 Initiate Broad Educational Efforts

6.2.1 Develop and implement continuing education programs aimed at increasing the knowledge of those responsible for enforcing seismic design principles, including building inspectors, plan checkers, and others involved in the construction trades.

Priority: Very Important

6.2.2 Develop and implement plans to increase the building owner's general knowledge of and appreciation for the value of seismic upgrading of the building's structural and nonstructural elements.

Priority: Very Important

6.3 Develop Effective Methodologies

6.3.1 Continue efforts to develop reliable and practical methodologies and codes for: 1) minimum prescriptive retrofit standards; and 2) enhanced performance-based retrofit standards for the structural and nonstructural elements of all types of existing public and private buildings, including essential services buildings and higher-education institutions, that can provide cost-effective improved seismic resistance.

Priority: Very Important

6.4 Upgrade Vulnerable Buildings and Other Structures

6.4.1 Report to the public the changes in understanding of the seismic vulnerability of selected buildings, or conditions that warrant wide attention. Address the problems discovered through continual study of earthquake effects on buildings. Include methods to handle the associated technical, administrative, and public policy issues.

Priority: Very Important

6.4.2 Ensure that essential service and hospital buildings remain occupiable and the time to regain full operability is minimized. Operation includes the continuance of all utility services and systems necessary for proper function of such facilities.

Priority: Very Important

6.4.3 Identify and prioritize all seismically vulnerable public and private buildings. Establish a mitigation plan to reduce the risk posed by those buildings, including structural and nonstructural elements, equipment, and contents. The most vulnerable and the most essential buildings should be addressed as the highest priority.

Priority: **Critically Important**
Time to accomplish: **10 years**

6.4.4 Adopt, by legislation, appendix chapters 2 and 3 of the *International Existing Building Code,* or comparable sections of successor documents, for the seismic retrofit of tilt-up buildings and older homes.

Priority: Very Important

6.4.5 Adopt modifications to the building codes, including the *California Historic Building Code,* to require seismic retrofit of seismically vulnerable buildings when major modifications, alterations, or additions to the building require issuance of a building permit.

Priority: Important

6.4.6 Enforce the *California Building Standards Code* for all modifications, alterations, or additions to state-owned buildings.

Priority: Important

6.4.7 Encourage building occupants, lease holders, mortgage providers, and insurers to require building owners to disclose seismic risks and the options to mitigate them prior to executing new or continuing financial commitments in connection with the building use.

Priority: Important

6.4.8 Adopt legislation to require compliance with the current Unreinforced Masonry (URM) Building Law in accordance with the *International Existing Building Code.*

Priority: Important

6.4.9 Develop and adopt postearthquake repair and retrofit standards for damaged buildings.

Priority: Very Important

New Buildings Element

Earthquake protection of new buildings based on providing life safety and collapse-resistant structures has been reasonably successful in moderate earthquakes. Protection of property and economic loss control have not received as much emphasis and are not yet as successful. As a result, property and economic loss due to earthquake damage to recently completed buildings and contents has been unacceptable. Losses have been due to 1) limited knowledge of the performance of materials and systems; 2) lack of a complete approach to seismic design, including all elements of buildings and their contents; and 3) inadequate quality control of design and construction. The damage from recent earthquakes clearly demonstrates the need for continued improvement in these three areas to achieve cost-effective seismic performance of new construction.

Objective

To achieve more consistent levels of safety by developing techniques that provide higher levels of earthquake resistance that will reduce potential property losses, minimize environmental damage, and protect the economic viability of the state.

Strategies

Include All New Buildings

Require all new construction, including publicly owned facilities and other buildings now effectively exempt from regulation, to conform to state-of-the-art seismic safety provisions.

Develop Integrated Approach to Design

Design new facilities based on an integrated approach considering all elements of the construction (structural and nonstructural elements, support systems, building contents, and site improvements) that contribute to seismic performance.

Adopt California-Specific Standards

Develop, adopt, and enforce state-of-the-art model building codes and amendments that affect seismic safety and meet the specific needs of the state.

Do Performance-Focused Research

Sponsor and encourage problem-focused research and development to improve the reliability and economic effectiveness of performance-based seismic design and construction methods.

Benefits

The benefits are significant reductions in of loss life, property damage, and business interruptions.

Responsibilities

The state should, by example, take the lead in implementing the strategies and motivate all public entities to enforce current seismic regulations on all new construction.

Costs

Costs to the state and to local jurisdictions and building owners will be minimal. Overall, the cost will be an insignificant fraction of the total life-cycle cost of a building.

Incentives

Incentives are the key to achieving increased levels of performance. Direct-to-owner economic incentives may include improved funding options, reduced insurance rates, tax relief, and the availability of unconventional funds similar to the "energy fund." Other incentives should be considered, such as zoning and building code options that reflect the value of improved seismic performance.

New Buildings Element

Objective: *Increased Reliability for Human Safety and Property Protection*

Strategies and Initiatives

7.1 Include All New Buildings

7.1.1 Require that all state and local agencies and special districts have construction projects regulated by independent building code enforcement entities with enforcement, citation, and stop-work authority. Assign government officials to be responsible for enforcement of codes and regulations.

Priority: Very Important

7.1.2 Require public utilities, essential facilities, publicly owned facilities and hazardous waste facilities not currently regulated under the Alquist-Priolo Earthquake Fault Zone Act and the Seismic Hazards Mapping Act to incorporate mitigation for earthquake-induced site instability.

Priority: Very Important

7.2 Develop Integrated Approach to Design

7.2.1 Clarify the *California Building Code* to assign responsibility for seismic resistance design coordination and quality assurance during construction of all building elements and components.

Priority: Very Important

7.2.2 Implement training, quality control, and enforcement procedures to ensure that all new construction is built in accordance with the design and the building code.

Priority: Very Important

7.3 Adopt California-Specific Standards

7.3.1 Amend statute to allow California to adopt seismic-specific amendments to national model building codes that meet the specific needs of the state and that apply to all state and local jurisdictions.

Priority: **Critically Important**
Time to accomplish: **2 years**

7.3.2 Amend the *California Building Code* to require that seismic design strategies of public and private acute-care hospital facilities be applied to equipment and contents as well as structural and nonstructural elements so that they remain functional after an earthquake.

Priority: Very Important

7.3.3 Ensure that essential service and hospital buildings can continue to operate in the event of earthquakes, as required by current law, including the continuance of all utility services and systems necessary for proper operation of the facility.

Priority: Very Important

7.3.4 Amend the *California Building Code* to require independent professional review for important, irregular, complex, special-occupancy, and critical facilities, and for all buildings where mandated enhanced performance objectives are required.

Priority: Important

7.3.5 Amend statute to allow any interested party to submit proposed seismic-specific amendments to the *California Building Code* for consideration and adoption by the California Building Standards Commission.

Priority: Important

7.3.6 Require every building department to have an appropriately licensed design professional, on staff or under contract, to provide advice on structural and seismic safety issues.

Priority: Very Important

7.4 Do Performance-Focused Research

7.4.1 Provide substantial, continuing support to develop the knowledge and practical basis for developing performance-based design procedures for buildings and systems.

Priority: Important

7.4.2 Provide continuing support to develop performance-based design and construction procedures for buildings and systems, participating with other organizations to the extent practical.

Priority: Important

Utilities & Transportation Element

Utilities and transportation systems can experience severe disruptions under earthquake conditions: 1) major supply lines and high-volume routes are insufficiently resistant to earthquakes or lack adequate redundancy (alternate systems); and 2) when secondary lines and routes are seismically vulnerable and alternate systems are overwhelmed by earthquake damage. Primary concerns about utilities include the critical lack of redundancy or upgrading in public and private facilities. This applies to water and waste water (including dams), natural gas, communications, and electrical systems. Transportation concerns are similar and include highway bridges, roadways, railroads, airports, and harbors. Significant disruption of these systems would cause extensive long-term economic losses, societal disruption, and personal danger.

Objective

To ensure that all public and private utilities and transportation systems can withstand earthquakes to the degree that they will be able to: 1) provide protection of life; 2) limit damage to property; and 3) provide for the resumption of system functions as soon as practicable. The intent of this objective is to limit the impact to only short-term interruptions, with minimal life loss and economic disruption to the affected regions.

Strategies

Ensure Performance Standards

Establish seismic performance standards for utilities and transportation systems, including interdependency of different systems (such as water and gas) to ensure adequate risk reduction strategies.

Mitigate Secondary Effects

Establish a comprehensive program for minimizing the secondary effects (such as gas fires, hazardous material spills, sanitation overflows) resulting from damage and disruption to utility or transportation systems in order to minimize life and property losses, environmental damage, and economic degradation.

Evaluate and Prioritize Mitigation Measures

Evaluate each system to identify vulnerabilities for life safety and service disruption and prioritize risk reduction strategies, including redundancy, to minimize those vulnerabilities.

Retrofit Critical Systems

Ensure that retrofit of all critical utilities and transportation systems is funded and authorized so that the work can be accomplished in the funding time frame.

Benefits

Benefits to California include timely restoration of utilities and transportation systems that ensures a significant reduction in loss of life, societal costs, and economic disruption.

Responsibilities

Public and private owners of utility or transportation systems are responsible for attaining the objective and for preparing and carrying out their own seismic safety implementation plans. The state should establish policies on acceptable levels of performance and monitor statewide utilities and transportation systems to accomplish the strategies outlined.

Costs

Cost to the state for agency administration will be minimal. Cost to public and private owners of utility or transportation systems will depend on the amount of mitigation work required. The retrofit of critical systems may require considerable expenditures.

Incentives

Incentives may include improved funding options, reduced insurance rates, tax benefits, public recognition of good performance, governmental certification of reliable service, and regulatory options or trade-offs that reflect the value of the system's improved seismic performance.

Utilities & Transportation Initiatives

Objective: Protect Life, Limit Property Damage, and Resume Functions

Strategies and Initiatives

8.1 Ensure Performance Standards

8.1.1 Establish and/or update performance standards for system and facility design, construction, maintenance, operation, and inspection of all public and private utility and transportation systems. Include related critical facilities and consideration of the interdependency between systems. Include minimum performance standards for critical wireless systems, such as cellular telephones, the Internet, and emergency radios, including their related fiber-optics, towers, and emergency power. Include minimum performance standards for natural gas pipelines, oil pipelines, refineries, and electrical transmission lines. Include minimum performance standards for water conveyance systems, tunnels, elevated roadways, rail systems, and ports.

Priority: Very Important

8.1.2 Require utilities that are not regulated by the California Public Utilities Commission (PUC) to adopt the equivalent seismic performance standards required of utilities that are regulated by the PUC.

Priority: Very Important

8.1.3 Require public and private utilities and transportation systems to address the earthquake hazards identified in the Alquist-Priolo Earthquake Zone Act and the Seismic Hazards Mapping Act.

Priority: Important

8.2 Mitigate Secondary Effects

8.2.1 Develop and implement a comprehensive educational program aimed at instructing providers and users about potential secondary hazards inherent in disruption or failure of a system. Include all forms of secondary hazards, including, but not limited to, those from major transportation spills of hazardous materials, natural or liquefied petroleum gas leaks at mobile home parks, electrically ignited fires, and unbraced gas water heaters.

Priority: Important

8.2.2 Educate local governments and the public about the application of gas safety devices such as automatic shutoff valves.

Priority: Very Important

8.3 Evaluate and Prioritize Mitigation Measures

8.3.1 Develop effective methods of minimizing utility system disruption from earthquake-damaged transmission and distribution lines (gas, oil, electrical, water, and waste water), including earthquake-activated shutoff and restart, monitoring, and management systems.

Priority: Important

8.3.2 Develop methods to ensure effective inter-provider coordination for maintaining and restoring critical systems to reasonable levels of service subsequent to damaging earthquakes. Encourage the voluntary actions of existing and future interprovider seismic working groups, consisting of representatives of each type of utility and transportation provider.

Priority: Important

8.4 Retrofit Critical Systems

8.4.1 Identify potentially vulnerable public and private primary water supply and distribution facilities, including state- and federally regulated dams and public and private levees. Upgrade vulnerable systems to ensure timely reactivation of essential systems after damaging earthquakes.

Priority: Very Important

8.4.2 Identify potentially vulnerable major transportation arteries that have minimal redundancy and whose service disruption would cause significant hardship on the communities they serve. Establish functional priorities and upgrade or replace as appropriate to ensure restoration of major arteries to reasonable levels of service.

Priority: Very Important

8.4.3 Identify potentially vulnerable public and private utility systems, including electric, gas, oil, water, and communication systems. Upgrade vulnerable essential systems to ensure their operation and timely restoration to reasonable levels of service.

Priority: **Critically Important**
Time to accomplish: **5 years**

Preparedness Element

Individual business owners and corporate decision makers do not fully understand the potential loss of life, property, personal dislocation, social disruption, and economic losses resulting from earthquakes. Several areas are of concern: 1) limited awareness of the potential for loss of life and property; 2) a false sense of security based on the assumption that the government will protect against all economic losses; 3) no clear understanding that a problem really exists ("It won't happen to me."); 4) an attitude that fails to recognize the need for self-reliance ("Preparedness starts at home."), expressing itself instead as "There is nothing I can do about it"; and 5) limited knowledge of what to do and how to pay for it.

Objectives

To increase understanding of the consequences (personal loss, social disruption, and economic impact) that can result from earthquakes. To increase understanding of the options for mitigation and the need to take action. To develop a comprehensive approach to preparedness for individuals, business owners, and corporate decision makers.

Strategies

Increase Understanding of Potential Impact

Develop an effective program for increasing the understanding of the potential for loss of life, personal dislocation, social disruption, and economic losses. Provide consistent, focused, in-depth information to individuals, business owners, and corporate decision makers on proper steps for earthquake preparedness.

Develop Comprehensive Approach

Develop a comprehensive approach to cost-effective earthquake loss reduction. Include all aspects of an individual's life, from home to workplace, including such areas as personal planning, securing of contents and fixtures, building retrofit, and stockpiling of critical supplies.

Encourage Individuals to Act

Develop a methodology that will encourage everyone to act. Develop economic and regulatory incentives to facilitate and reward actions that will reduce potential losses.

Improve K-12 School Preparedness

Ensure effective preparedness of K-12 public and private schools, their staffs, students, and facilities. Provide emergency response training for staffs and students. Minimize nonstructural hazards and stockpile critical supplies.

Benefits

A fully informed and prepared citizenry will reduce loss of life and property, personal dislocation, social disruption, and indirect economic losses.

Responsibilities

The state should take the lead in motivating and coordinating the statewide preparedness system and the strategies outlined. Local agencies working with the statewide plan will be responsible for implementation within their jurisdictions. Private sector efforts need to be coordinated with the implementation plans of the state and local governments.

Costs

Overall, the cost of preparedness is expected to be low. Cost to the state and to local jurisdictions, individuals, and building owners will be minimal depending on the extent of preparation undertaken.

Incentives

The greatest incentive to improve the current system will be the public's demand for significant reduction of the personal and financial losses that normally result from earthquakes.

Preparedness Element

Objective: Comprehensive Approaches to Preparedness

Strategies and Initiatives

9.1 Increase Understanding of Potential Impact

9.1.1 Develop information for individuals, families, and the business sector about the human and economic impact of earthquakes. Disseminate consistent information in appropriate forms and languages.

Priority: Very Important

9.1.2 Develop information for community-based organizations about the impact of earthquakes on their organizations and those they serve. Include information about actions they can take to prepare for and mitigate the effects of earthquakes.

Priority: Important

9.2 Develop Comprehensive Approach

9.2.1 Encourage community-based organizations to expand training programs for individuals in preparedness so that they can effectively help their constituents reduce potential losses and continue to serve them after an earthquake.

Priority: Important

9.2.2 Extend the scope of the existing *Home Owner's Guide* to include all multifamily housing.

Priority: Important

9.2.3 Develop public policy establishing a comprehensive program for seismic upgrading of private homes. Include procedures for strapping water heaters, reinforcing masonry chimneys, bolting foundations, bracing cripple walls, and strengthening weak (soft story) configurations.

Priority: Important

9.2.4 Encourage voluntary seismic inspections (including estimates of the cost for correcting deficiencies) at the time of resale of any residential property as part of the Home Warranty inspection process.

Priority: Important

9.3 Encourage Individuals to Act

9.3.1 Promote the establishment of Community Emergency Response Team (CERT) programs in all communities throughout the state.

Priority: Important

9.3.2 Expand the scope of Neighborhood Watch programs to include earthquake preparedness and neighborhood earthquake response information in all communities in the state.

Priority: Important

9.3.3 Develop economic and regulatory incentives for home and business owners to facilitate and reward actions that will reduce potential losses, such as securing nonstructural elements, contents, and fixtures that pose potential hazards.

Priority: Very Important

9.3.4 Develop and maintain a state presence on the Internet that spotlights earthquake preparedness, inviting discussion and informing the public about regulations, methods, and procedures for loss reduction. Include related public domain documents.

Priority: Important

9.4 Improve K-12 School Preparedness

9.4.1 Require compliance with the Standardized Emergency Management System (SEMS). Ensure schools, district governing boards, and administrators develop and implement school emergency plans and provide staff training as required by the *Education Code.*

Priority: **Critically Important**
Time to accomplish: **3 to 5 years**

9.4.2 Ensure schools, district governing boards, and administrators implement the requirements for minimizing nonstructural hazards and ensuring a sufficient stockpile of water and other critical supplies to be used for first aid, sanitation, and food.

Priority: Very Important

Emergency Response Element

Emergency management and response systems continue to improve with each event; however, systems can be further strengthened through greater collaboration and partnership with and between public, private, nonprofit agencies, and the community. Deficiencies still exist in 1) resources needed for better communication during an event; 2) resources in and coordination among the public and private medical response systems; 3) resources for sustained search-and-rescue operations; 4) reliable and timely information management; and 5) adequate and sustained resources for emergency management at all levels of government.

Objective

To improve emergency management and response systems

Strategies

Improve Communications

Improve statewide communication systems to provide for effective transmission of information among response organizations.

Improve Medical Response

Encourage and support the public and private medical response systems, with an emphasis on adequate resources, planning, training, and coordination.

Improve Search and Rescue

Expand the local, regional, and statewide urban search-and-rescue capability, including strategically located search-and-rescue training facilities, additional teams, and adequate equipment, through a sustained funding source.

Improve Emergency Management Capability

Develop a workable system for enhancing emergency management, including the collection and dissemination of damage assessment information and other critical data.

Benefits

The benefits are improved and effective emergency responses leading to preservation of lives and property.

Responsibilities

The state should take the lead in motivating and coordinating the statewide emergency response system. The state is responsible for creating and operating training facilities. Local agencies will be responsible for staff utilization. Other public levels, the medical community, media, and private sector will be involved in much of the implementation

Costs

Cost to the state for implementation of the strategies will be considerable. Cost to local agencies could also be considerable, although the use of existing personnel and resources is envisioned.

Incentives

Achievement of the objectives of this element will be dependent on strong state policy as part of the state's overall risk reduction plan. While the need for effective emergency response is obvious, the greatest motivation to improve the current system will be the public's demand for significant reduction in personal and financial losses normally resulting from earthquakes.

Emergency Response Initiatives

Objective: Improved Emergency Management and Response Systems

Strategies and Initiatives

10.1 Improve Communications

10.1.1 Provide interoperable, upgraded regional and local emergency communications, including 1) mutual-aid channels for police, fire, and emergency medical services; 2) regional emergency communications councils with authority to establish regional standards for emergency communication; and 3) response and recovery public broadcast channels for the public.

Priority: **Critically Important**
Time to accomplish: **3 year**

10.1.2 Provide more efficient use of the rapidly changing wireless-, cellular-, and potential satellite-telephone system during emergencies. Include priority access to wireless cellular service for emergency use, the deployment of portable wireless satellite cell sites, and limited public access to wireless cellular phone service during emergencies and the possible extension of communications ability by use of other emergency technologies.

Priority: Very Important

10.1.3 Equip all local government operational areas to both send and receive Emergency Digital Information Systems (EDIS) messages.

Priority: Important

10.2 Improve Medical Response

10.2.1 Provide sustainable resources, including funding for regional planning personnel and other improvements in the medical and health mutual-aid system.

Priority: Very Important

10.2.2 Integrate public and private outpatient clinics, skilled-nursing facilities, and speciality clinics in the local medical and health disaster response system.

Priority: Very Important

10.2.3 Provide adequate training for nongovernmental staff and personnel providing medical and health disaster response in accordance with the Standardized Emergency Management System's approved course of instruction and the Hospital Emergency Incident Command System.

Priority: Very Important

10.3 Improve Search and Rescue

10.3.1 Establish and maintain strategically located and properly equipped and staffed search-and-rescue training facilities to provide real-time preparedness training for emergency response personnel.

Priority: Very Important

10.3.2 Ensure that all teams have a complete cache of specialized urban search-and-rescue equipment.

Priority: Very Important

10.3.3 Improve emergency response coordination between all state and local levels of government, emergency response organizations, and supporting private sector entities.

Priority: Important

10.3.4 Evaluate the need for expanded urban search-and-rescue capability, which could include additional teams and/or support to local urban search-and-rescue providers.

Priority: Important

10.3.5 Provide adequate resources for maintenance and replacement of specialized urban search-and-rescue equipment cache.

Priority: Very Important

10.4 Improve Emergency Management Capability

10.4.1 Improve the capability and quality of computer simulation models for projecting where to expect damage in the immediate aftermath of an earthquake.

Priority: Very Important

10.4.2 Finalize procedures and training for use of Emergency Managers Mutual Aid (EMMA). Ensure input from local emergency officials. Include criteria for selection and methods for reimbursement.

Priority: Important

10.4.3 Develop and distribute coordinated public informational products for governmental public information officers and news media representatives' pre- and postearthquake use.

Priority: Important

10.4.4 Develop emergency response and recovery public information that is broadcast-ready.

Priority: Important

10.4.5 Develop improved tools and technologies for use by emergency responders to make accurate and rapid initial damage assessments.

Priority: Very Important

10.4.6 Develop sustainable funding sources for adequate emergency management at all levels of government.

Priority: Very Important

10.4.7 Develop procedures and training for use by emergency managers when providing or receiving mutual aid. Ensure input from local emergency managers and include criteria for selection and methods for cost reimbursement.

Priority: Important

Recovery Element

Recovery methods have improved with each earthquake; however, there are still a number of deficiencies that impair effective and speedy recovery and have resulted in unacceptable levels of personal and financial loss. Deficiencies exist in 1) funding for effective management of the recovery process (including mitigation); 2) adequate interim shelter and housing, particularly for those with special needs; 3) plans and resources to accommodate interim and long-term postearthquake housing; and 4) adequate knowledge and preparation by the public, business, and service sectors for effective recovery.

Objective

To establish and fund a statewide earthquake recovery plan aimed at social and economic recovery in the public and private sectors through better and more responsive plans, procedures, and utilization of resources.

Strategies

Establish Statewide Strategic Recovery Plan

Establish a statewide strategic earthquake recovery plan aimed at normalizing the social and business environments, public and private, and minimizing the time and cost of recovering from an earthquake.

Expand Interim and Long-term Housing Capability

Develop plans for interim and replacement housing responsive to varying levels of loss and strategies for the financing of long-term housing reconstruction based on state-of-the-art data collection on housing losses and recovery costs.

Expedite Permitting and Rebuilding Process

Develop guidelines to streamline the permitting and rebuilding process so that disruption of individuals and businesses is minimized and rapid personal and economic recovery is ensured.

Provide Accurate and Timely Information

Establish a coordinated public information strategy to provide accurate and timely recovery and mitigation information to the public and private sectors through all available means.

Benefits

Economic and social impact over the long term will be minimized, and communities will be able to return to normal more rapidly.

Responsibilities

The state shall take the lead in motivating and coordinating the statewide strategic recovery plan and the strategies outlined. Local agencies will be responsible for implementation. Other public levels and the private sector will be involved in much of the implementation.

Costs

Planning cost to the state should be similar to the cost of other statewide planning efforts. Cost to local agencies will vary depending on whether existing resources can be used for planning, implementation, and maintenance.

Incentives

Achieving the objectives of this element will be dependent on strong state policy on recovery and mitigation in the overall risk reduction plan. The strongest motivation to improve the current system will be in the demand for significant reduction in personal, business, and public losses resulting from earthquakes.

Recovery Initiatives

Objective: Statewide Recovery Plan and Implementation

Strategies and Initiatives

11.1 Establish Statewide Strategic Recovery Plan

11.1.1 Develop a strategic Statewide Disaster Recovery Plan.

Priority: Very Important

11.1.2 Identify and secure sources of funding for disaster recovery and mitigation.
Priority: Very Important

11.1.3 Maintain and augment, as necessary, provisions for such continued human services as interim housing, feeding, medical care, and psychological assistance.

Priority: Very Important

11.1.4 Develop a public and private partnership program for incorporating disaster assistance recovery teams (including appropriate specialties such as psychology, nursing, communications, clergy, and building inspection) into local emergency plans, including coverage of all areas of assurance and all jurisdictional levels.

Priority: Important

11.1.5 Plan for shelter, interim housing, and other recovery needs unique to people with special needs, including the frail, elderly, disabled, and others.

Priority: Important

11.1.6 Establish the definition of the emergency period of a disaster to include the beginning phases of recovery, the organizational responsibilities, the use and coordination of volunteer assistance, and other elements as necessary.

Priority: Important

11.1.7 Develop comprehensive operational guidelines tailored to the needs of each region for the effective removal, recycling, and/or disposal of rubble after earthquakes.

Priority: Important

11.1.8 Update and distribute the state's earthquake recovery manuals for local governments.

Priority: Important

11.2 Expand Interim and Long-term Housing Capability

11.2.1 Establish plans for accommodating large displaced populations on an interim basis by using military facilities, publicly owned parks and recreational facilities, manufactured housing, and other appropriate options.

Priority: **Critically Important**
Time to accomplish: **5 years**

11.2.2 Develop guidelines and incentives for landlords to make existing vacancies available for interim housing.

Priority: Important

11.2.3 Develop and maintain a database of actual housing (and other sector) losses and recovery costs from all earthquakes.

Priority: Important

11.2.4 Develop a strategy for the use of manufactured housing in a postdisaster environment.

Priority: Important

11.3 Expedite Permitting and Rebuilding Process

11.3.1 Develop guidelines to help local governments expedite the permitting and rebuilding process through the use of "one-stop" centers. This process will minimize the disruption of individuals and businesses and accomplish personal and economic recovery in the fastest time possible.

Priority: Important

11.3.2 Develop a model plan, standards, and training for postdisaster permitting of repairs and modifications.

Priority: Important

11.3.3 Develop an implementation strategy (such as training manuals) to disseminate information regarding the permitting and rebuilding process (11.3.1) and the standards for repairs and modifications (11.3.2).

Priority: Important

11.4 Provide Accurate and Timely Information

11.4.1 Identify stakeholders and develop a strategy to integrate emergency and recovery public information into emergency and recovery management.

Priority: Important