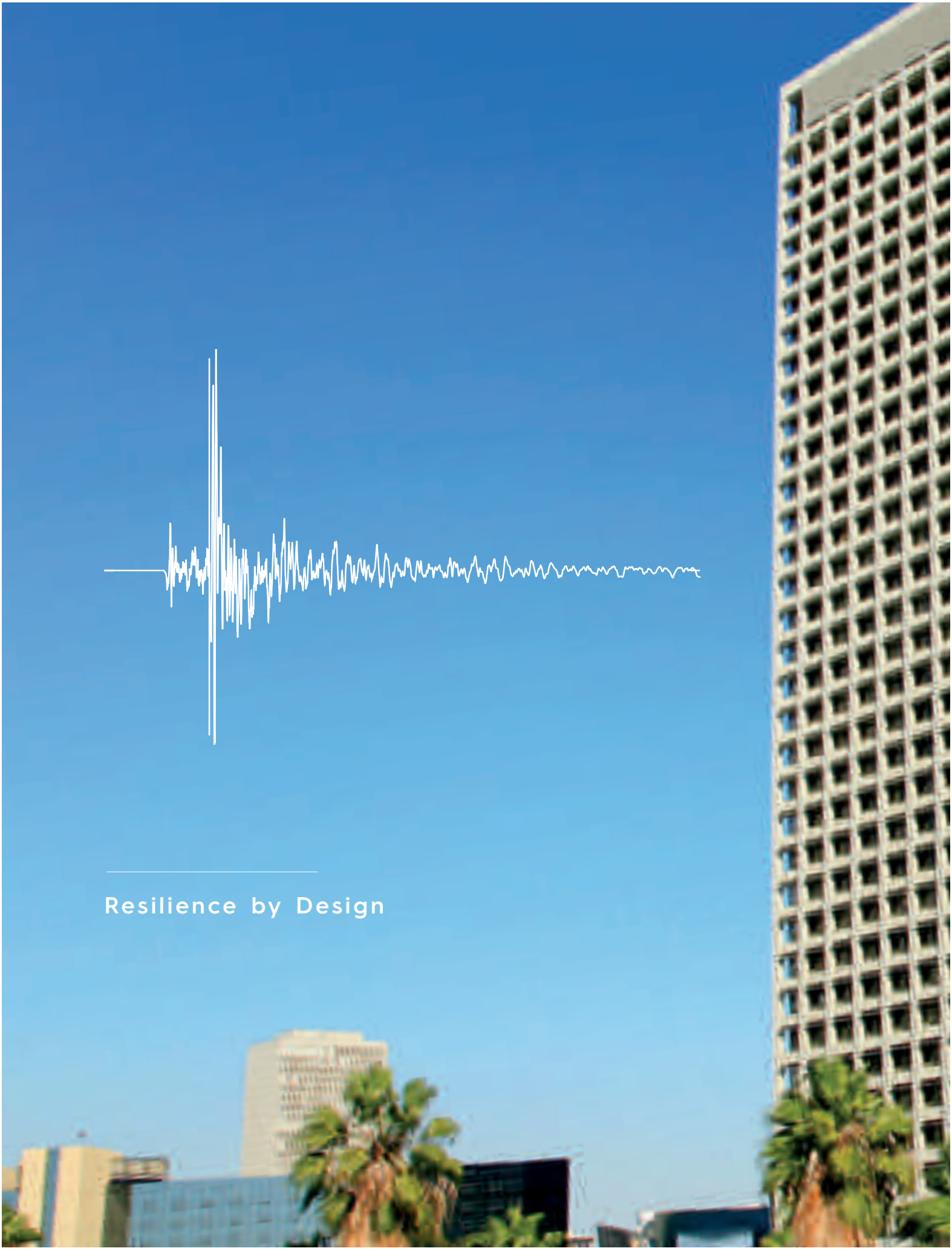
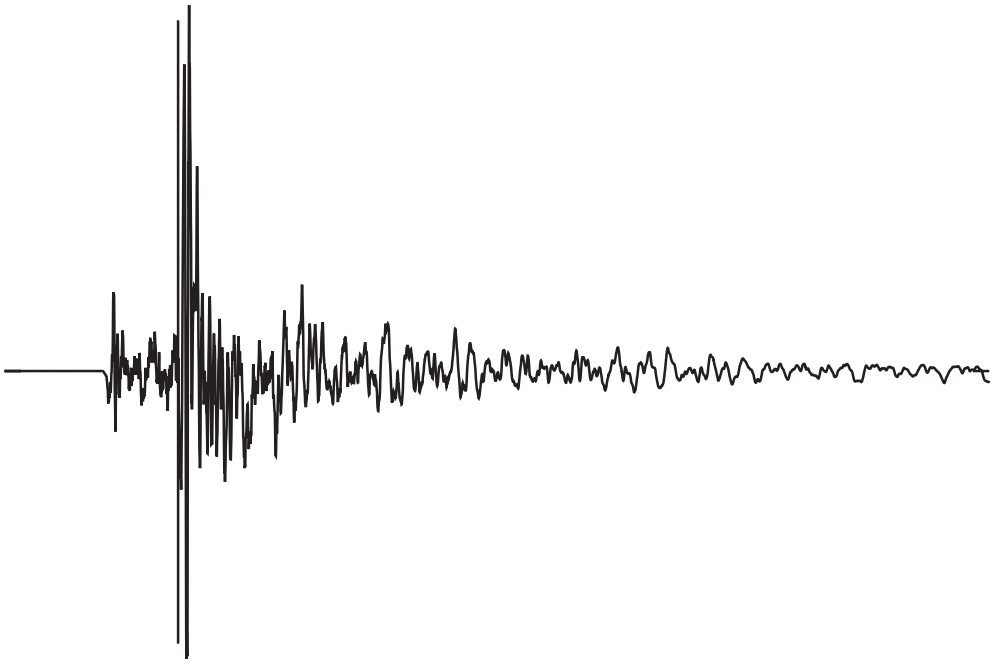


Resilience by Design



Resilience by Design

My Fellow Angelenos:

As Mayor, I have no greater responsibility than the public safety of Los Angeles. And here in our city, it's not a question of if the so-called "Big One" will hit. It's a matter of when. So we cannot afford to be complacent. The known risks – to life, property and our overall economy – are too great.

Los Angeles has always been an epicenter of seismic risk. Now, the action steps in this report will make our city a nation-leading epicenter of seismic preparedness, resilience, and safety.

This package of action steps represents a tectonic shift of how earthquake policy is made in Los Angeles. To this point, earthquake policy has more often than not been developed in the immediate aftermath of a major earthquake. And even then, momentum quickly died out, leaving grave vulnerabilities behind. Today, Los Angeles is addressing our greatest earthquake vulnerabilities proactively and strategically.

I have set a clear agenda for my Administration – to get City Hall "back to basics" and to focus City government on our core responsibilities. Unfortunately, here in earthquake country, those responsibilities have been put to the wayside for far too long. That's why I appointed renowned seismologist Dr. Lucy Jones as my Science Advisor for Seismic Safety. Through an unprecedented partnership with the U.S. Geological Survey, she has spent the last year studying our vulnerabilities; convening stakeholders and experts from academia, industry, business, government and our communities; and developing this action plan.

The outcome of this extensive process, which also incorporates cutting edge research and lessons learned from past earthquakes, is that we are focusing on three major sectors: fortifying our buildings, fortifying our water system and fortifying our telecommunications networks. Tied together, these actions will strengthen resilience in our city for decades to come.

These action steps are designed to be best-in-class and achievable. This is not intended to simply be the latest "blue ribbon commission" report that sits on a shelf. It's designed so that government, property owners, and commercial and residential tenants can come together to strengthen Los Angeles against a known and major threat to life, property, and our economy.

This report represents a full year of work by dozens of people under the leadership of Dr. Jones. It is with the deepest gratitude to them that I present "Resilience by Design."

Sincerely,

ERIC GARCETTI

Mayor

Executive Summary

Resilience by Design presents the recommendations of the Mayoral Seismic Safety Task Force, the members of which are listed in the Acknowledgements Section of this document. These recommendations address the city's greatest vulnerabilities from earthquakes with significant and attainable solutions to:

- Protect the lives of our residents
- Improve the capacity of the City to respond to earthquakes
- Prepare the City to recover quickly from earthquakes
- Protect the economy of the City and all of Southern California.

The Mayoral Seismic Task Force evaluated four areas of seismic vulnerability, namely:

- Pre-1980 "non-ductile reinforced concrete" buildings
- Pre-1980 "soft-first-story" buildings
- Water system infrastructure (including impact on firefighting capability)
- Telecommunications infrastructure

Strengthen Our Buildings

The most obvious threat from earthquakes is physical damage to vulnerable buildings. Soft story and concrete buildings built before the implementation of Los Angeles' 1976 revision of the building code pose a significant risk to life in strong earthquake shaking.

Assess And Retrofit Pre-1980 Soft Story And Concrete Buildings

This report recommends that these buildings be assessed and retrofitted as necessary:

Soft Story

Soft story buildings are wood frame buildings where the first floor has large openings, for example tuck-under parking, garage doors, and retail display windows. This Report recommends that building owners be required to, within one year of passage of the implementing legislation, submit to the City documentation establishing that an acceptable retrofit has already been conducted, or that a retrofit is required. It is further recommended that retrofitting be required so that first floors are strengthened to the same capacity as second floors within five years.

Concrete

"Non-ductile reinforced concrete" buildings (most concrete buildings built before the implementation of the 1976 code) are at higher risk of collapse, because some parts of the building such as columns and frame connectors are too brittle and break in strong shaking. The weight of the concrete makes them particularly deadly when they fail.This Report recommends that building owners be required to, within five years of passage of the implementing legislation, submit to the City documentation establishing that an acceptable retrofit has already been conducted, or that a retrofit is required. It is further recommended that retrofitting be mandated within 25 years to either the Basic Safety Objective of the American Society of Civil Engineers (ASCE) standard 41 or to the equivalent standard if other approaches are approved.

Strengthen Our Buildings

Implement a Seismic Safety Rating System

Our building code is designed around a life-safety requirement that mandates construction that ensures a low probability of collapse in the worst earthquake. The code is not designed, however, to make it so buildings, while still standing, are also likely to remain usable after an earthquake. This report recommends a voluntary rating system to encourage building owners to invest in the resilience of their buildings so that they not only stay standing after an earthquake, but so that they also remain functional.

Create a Back To Business Program

In the aftermath of a major earthquake, it is important that our business community is able to rebound as quickly as possible to minimize negative economic impacts and to provide residents access to important goods and services. Following a major earthquake, however, the City's ability to certify buildings as safe for use will be hampered by city services being focused on emergency response and by high demand on our cadre of building inspectors. Deploying inspectors from outside of the city through mutual aid agreements is time consuming.

This report recommends that the City develop a "Back to Business" program to rapidly supplement the capacity of the city's building inspection force in the event of a major earthquake.

Mandatory Retrofit of Buildings that are Excessively Damaged in Earthquakes

Mandate retrofitting of buildings that incur excessive damage in a low level of earthquake shaking.

Fortify our Water System

The water system is the utility most vulnerable to earthquake damage, and that damage could be the largest cause of economic disruption following an earthquake. Portions of the system are more than a century old and vulnerable to many types of damage. Lack of water would impede recovery and the long-term loss of a water supply could lead to business failure and even mass evacuation. Developing a more resilient water system is imperative for the future of Los Angeles.

Fortify our Water System

This report recommends the following actions:

Develop an Alternative Water System For Firefighting

Create a resilient, redundant alternative water system for firefighting by using reclaimed water, pressurized seawater, seismic resilient pipes and other methods.

Fortify the Los Angeles Aqueduct

Los Angeles is dependent on imported water that is transported across the San Andreas Fault in aqueducts. Therefore, mitigation alternatives for the Los Angeles Aqueduct crossing the San Andreas Fault should be identified and implemented.

Fortify Other Aqueducts

The city is dependent on several other aqueducts that are the responsibility of outside agencies with whom we must cooperate to ensure our water supply. The City should create a Seismic Resilience Water Supply Task Force with the DWP, California MWD, and the DWR, in an effort to create a collaborative and regional approach to protecting the resiliency of our water supply.

Fortify Water Storage

DWP dams must be maintained at a level that ensures a reliable water supply and public safety in the event of an earthquake.

Increase Local Water Sources

Increased use of local water reduces the risk posed by reliance on water imported via fault-crossing aqueducts. Initiatives to improve local water supplies through storm water capture, water conservation, water recycling, and San Fernando Valley Groundwater Basin contamination remediation provide the best possible protection and should be supported as fundamental earthquake resilience measures.

Create a Seismic Resilient Pipe Network

The water distribution pipes that carry water to our homes are vulnerable to failure during earthquakes, and large earthquakes that cause shaking over wide geographic areas can cause hundreds or thousands of simultaneous pipe breaks. DWP should commit to a future water system that utilizes seismically resilient pipes. The long-term goal should be to do this across the City. Due the complexity of the water system and the cost of pipe replacement, this will be a long-term project that begins in strategically critical areas serving essential facilities and firefighting needs.

Implement a Resilience by Design Program at DWP

L.A.'s power and water infrastructure is incredibly complex and susceptible to earthquake damage. The City should establish a Resilience by Design Program within the DWP, covering both the power and water systems, with resources and authority to keep an institutional emphasis on seismic resilience as a core function of the agency.

Develop a Statewide Seismic Resilience Bond Measure

Developing a strong resilience effort in a timely manner requires an investment greater than currently available budget allocations. The City should work with local, regional, and state partners to develop a seismic resilience bond measure to help fortify our water infrastructure and make other critical investments.

Enhance Reliable Telecommunications

Modern society and economic activity are dependent on telecommunications, including cell phones and Internet access. The Northridge earthquake occurred prior to these services being widely available, so we do not have direct experience with their vulnerabilities. We can, however, use the experiences in other countries and in other disasters to inform the efforts needed to protect vital communications systems.

Telecommunications

This report recommends initiatives to:

Maintain Internet Access After Earthquakes

To mitigate service impacts after an earthquake, the City should partner with service providers to remove barriers to bandwith and Internet access during emergencies. Under these agreements, service providers would, during declared disasters, share bandwidth and allow free temporary Wi-Fi access in public locations.

Protect the Power System at Fault Crossings

Our cellular network is vulnerable to power outages caused by earthquakes, and our electric grid is at high risk caused by powerlines that cross the San Andreas Fault. The City should create a Southern California Utility Resiliency Consortium to develop solutions for cascading failures in the interacting utilities as they cross the San Andreas fault. The lifelines belong to many different entities, public and private, that will need to cooperate to find solutions to the problems.

Create a Citywide Backup Internet System

Develop a solar-powered Citywide Wi-Fi to provide residents with a way to access the Internet at a time when the primary system is disrupted. This low power system could also serve as way to maintain communication through email and texting should electrical system failures cause other communications systems to fail.

Fortify Cellular Towers

Cellular towers are designed and constructed to life-safety standards, meaning that they are designed to be unlikely to collapse, but not necessarily be functional following an earthquake. The City should amend its building code to require new freestanding cellular communication towers to be built with an Importance Factor of 1.5. Existing towers would not be affected.

Advancement of Earthquake Early Warning

The City of Los Angeles and the U.S. Geological Survey have agreed to begin implementation of early warning in Southern California with projects with the Los Angeles Fire Department and the Los Angeles Unified School District. This partnership will allow the early warning development to eventually create a better system for all of California and other states. The City should work with Congressional representatives to ensure a robust Earthquake Early Warning system.