Earthquake Hazards Program

Pay a Little Now, or a Lot Later

Odds are 2-in-3 that at least one disastrous earthquake will strike the San Francisco Bay Area before 2020. Faced with this threat, corporations and government agencies have stepped up efforts that will reduce future losses by billions of dollars.

When the 1989 Loma Prieta earthquake struck the San Francisco Bay Area, it revealed the vulnerability of a major metropolitan area to the damage and death that can result from a major earthquake. Unfortunately, Loma Prieta did not reduce the chances for future large earthquakes and even more devastation in the Bay Area. In 1990 the U.S. Geological Survey issued a report presenting geologic evidence for one or more destructive earthquakes to occur before the year 2020. This report served as a call to action for companies and government agencies to intensify efforts to reduce future losses. As shown in the following examples, considerable effort and millions of dollars are being spent now to save lives and billions later.

(Click on image for a full size version - 91K)
CALTRANS' strengthening of the intersection of two major Bay Area freeways- I-280 overpass of U.S. 101 in San Francisco.

ACTIONS BY UTILITIES

Utilities are spending hundreds of millions of dollars each year to safeguard critical "lifeline" transportation, power, water, and communication systems.

California Department of Transportation (CALTRANS)

- Strengthening San Francisco Bay bridges, including approaches and toll plazas
- Strengthening elevated freeway sections and overpasses throughout the area

East Bay Municipal Utility District (EBMUD)

- Proposed a $189 million seismic improvement program
- Held public meetings to explain the program to ratepayers
- Expects to save $1.2 billion in a future earthquake

Pacific Gas & Electric (PG&E)

- Implementing a company-wide seismic safety plan to help ensure that power and gas systems function after an earthquake.
- Spending $100 million each year to protect lives and reduce the risk of service disruption to customers
- Replacing100 miles of old, vulnerable gas pipe each year
- Replacing vulnerable transformers, circuit breakers, and other at-risk components of the electric system
- Replacing or strengthening substation buildings and other system structures

Pacific Bell Telephone (PacBell)

- Strengthening data centers and buildings that house equipment supporting emergency telecommunications services
- Installing backup power generators

(Click on image for a full size version - 111K)
This U.S. Geological Survey pamphlet alerted Bay Area residents to the 2-in-3 chance for a major earthquake in the San Francisco Bay Area and assisted them in preparing for future shocks. More than 3 million copies in English, Spanish, Chinese, and Braille editions have been distributed.

ACTIONS BY GOVERNMENT AGENCIES

Local governments are using hundreds of millions of dollars of general obligation bonds, approved by 2/3 of voters, to strengthen critical public facilities and to train employees and citizens to respond effectively to earthquakes.

Berkeley

- Training in disaster response for neighborhoods
- Training in search and rescue, disaster first aid, and fire suppression
- Passed a $55 million bond issue, including funds for a new independent emergency water system to protect vulnerable business district and residences from fires
- Salt water pumping stations near San Francisco Bay
- Grid of water pipes and hydrants in West Berkeley
- 75,000-gallon cisterns
- Formed citizens oversight committee to assess city's efforts

Oakland

- Passed $50 million bond issue
- New emergency response center
- Emergency shelter areas at schools
- Search-and-rescue capability

San Francisco

- Upgrade of extensive emergency water system built after the 1906 earthquake
- Shaking-activated shutoff valves to isolate vulnerable sections of pipe
- Computer control of system operation from several command posts
- Strengthen vulnerable major public buildings, such as the City Hall, Opera House, Civic Auditorium, and Veterans Building
- Passed $350 million bond issue to finance the strengthening of vulnerable, privately owned unreinforced masonry structures (URMs)
- Vulnerable commercial-use URMs tagged "hazardous" at public entrance
- Geologic conditions are used to set scheduling priorities for strengthening

San Leandro

- Passed $18 million bond issue to strengthen fire and police stations and public buildings
- Established radio station to provide earthquake-preparedness information
- Assists residents to strengthen homes
- Detailed, easy-to-understand instructions
- Loan of necessary tools
- Free, rapid inspection by city
- Certification to homeowners that home has been strengthened to city standards

Sunnyvale

- Conducts "Sunnyvale Neighborhoods Actively Prepare" (SNAP) program
- Prepares neighborhoods of 35-50 homes to be self-sufficient for 72 hours
- Identifies captains and provides extensive training to neighborhoods

(Click on image for a full size version - 66K)
Homeowners in San Leandro strengthening their residences-installing expansion bolt to secure wood frame to concrete foundation (left) and nailing plywood to reinforce cripple wall (right).

ACTIONS BY CORPORATIONS

Corporations are protecting their employees and facilities from earthquakes and taking steps to minimize the disruption of their business operations.

Genentech

- Strengthening all structures now to be operational within one week after an earthquake
- Preparing earthquake response plan
- Backup data and documents off-site

- Stock disaster-response command center to sustain all employees for 72 hours
- Maintain own search-and-rescue team
- Train on-site with the South San Francisco Fire Department and fund companion training for South San Francisco Fire Department personnel

Hewlett-Packard

- Evaluated and strengthened all structures to assure life safety of employees
- Assessing susceptibility of structures to damage and business disruption

IBM

- Evaluated and strengthened all owned and leased buildings
- Started monthly inspection of facilities to assure furniture and internal fixtures are adequately braced

Chevron

- Established disaster-response communication plan for employees and their families
- Located radio transceivers at 14 sites in the Bay Area
- Reinforcing refineries
- Strengthening of potentially vulnerable structures
- Strengthening of main crude supply line at Richmond refinery
- Established building-specific inspection plans for office buildings
- Documented pre-earthquake condition of critical structural elements
- Developed post-earthquake inspection plans for those same structural elements
- Developed plans with city inspectors so Chevron can "red tag" or "green tag" their own buildings

(Click on image for a full size version - 108K)
Steel bracing (red beams) added to strengthen a Hewlett-Packard concrete-frame fuilding in Santa Clara, CA.

Through improved understanding of past earthquakes, earth scientists have refined estimates of the high likelihood for an imminent destructive earthquake in the Bay Area. As shown by the preceding examples, this information has motivated many communities and corporations to prepare. By planning for emergencies, by training people in what actions to take, and by strengthening facilities with improved seismic resistance, we can better survive earthquakes. The cost of these preparations, which will reduce losses during the next big earthquake, is a small fraction of what would be spent without them.

William H. Bakun

U.S. Geological Survey Fact Sheet-169-95 1995