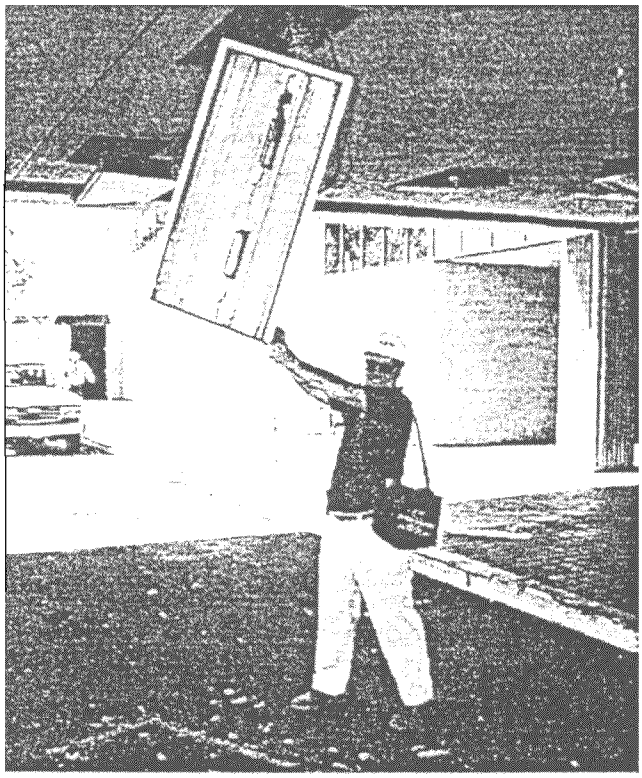


PHOTOGRAPH B7.4: Light fixture partially fell due to pull-out of the anchor of one of two safety wires, Olive View Hospital. *photo credit: Bob Reitherman, Earthquake Engineering Research Institute*

mistake. In 1983, recommendations were developed to phase out pre-Act buildings gradually over a 40-year period, but broad-based support for the idea was lacking. However, the Seismic Safety Commission document, *California at Risk: Reducing Earthquake Hazards 1987 to 1992*, recommended that OSHPD develop a program to bring existing hospitals into substantial compliance with the Hospital Act (1972b). The current five year plan (SSC, 1991c) maintains this objective and estimates it would cost *$8 to $10 billion* to retrofit the twenty-five percent of the hospitals with the highest life-safety risks to Hospital Act requirements, and $12 to $20 billion to retrofit all pre-Act hospitals. Following completion of the statewide survey previously mentioned, which indicated both a slow turnover of old buildings and poor emergency preparedness, the Building Safety Board and OSHPD reissued the 1983 program in a more formal format in the 1990 report, *A Recommended Program to Seismically Strengthen Pre-Hospital Act Hospital Facilities* (informally termed The Milestone 4 Report). This long-term plan to bring existing pre-Act hospitals up to the Act's requirements was introduced as SB1953 (Alquist) and was enacted in September 1994.

Several earlier reports have made recommendations concerning California hospital hazard reduction. Two key issues raised by the Seismic Safety Commission Task Force on the Hospital Act (SSC, 1977) are still unresolved: a plan for relocation of all essential services into post-Act buildings and a precise definition of essential hospital services.

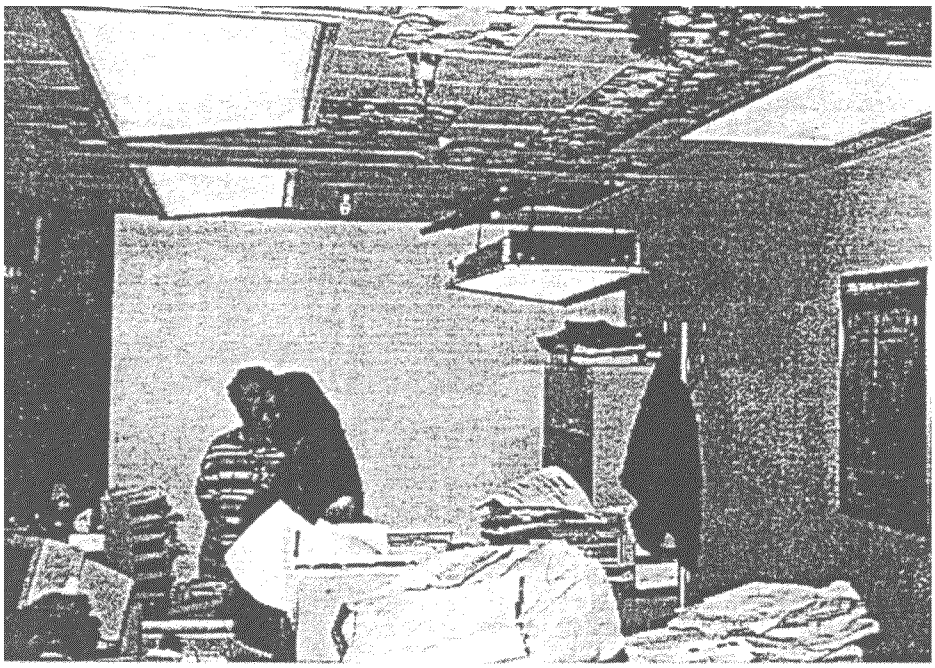
The post-Loma Prieta letter from OSHPD to California hospital administrators (Meeks, 1990) recommended that a checklist of nonstructural components be used to review a hospital's vulnerability, citing generators, elevators, water supply, communications, furniture, and equipment. In addition, it was pointed out that "the most serious concern, not only for damage control and continued operation, but also for basic life safety, is the structure itself" (p. 1). The joint state/federal hazard mitigation report for the 1989 Loma Prieta earthquake (OES/FEMA, 1990, p. 40) recommended that the Joint Commission on Accreditation of Hospitals, JCAH (now Joint Commission on Accreditation of Healthcare Organizations, or JCAHO) "make nonstructural hazard reduction training for hospital building safety officers and engineers a part of the hospital accreditation requirements."

The report on the Loma Prieta earthquake of the California Association of Hospitals and Health Systems (CAHHS, 1990) made over 50 recommendations, emphasizing these two: Improvement of coordination and communication among hospitals and government agencies, and reduction of and preparedness for nonstructural damage.

RESULTS OF THE NORTHRIDGE EARTHQUAKE

Statistical data on the performance of hospitals in the Northridge earthquake are difficult to tie down for several reasons.

- The information changed frequently (the number of red- or yellow-tagged buildings, for example), so the exact time of reports from various sources must be verified.
- Characterization of damage to an individual building has sometimes been mistakenly inferred to extend to an entire facility. For example, at some hospitals, penthouse mechanical room structural damage caused a "red tag" or structurally unsafe rating, although this only pertained to a small portion of the facility. In some reports, quasi medical buildings such as medical office buildings, storage buildings, or hospital parking structures (none of which is generally covered by the Hospital Seismic Safety Act) have sometimes been mixed in with the acute-care facilities that provide overnight care and emergency room facilities
- In general, the red-yellow-green post-earthquake safety rating system is heavily weighted toward the structure of the building. For example, approximately 75 facilities that had one or more buildings tagged green actually suffered nonstructural damage severe enough to at least temporarily curtail services or require localized cordoning off of interior spaces. Eleven of these green-tagged buildings had elevator damage. (OSHPD, 1994a)
- Skilled nursing facilities, which are covered by the Act and were inspected by OSHPD, but which are often fundamentally different than hospitals in construction and service capability, may also sometimes be mixed into hospital damage data.



PHOTOGRAPH B7.5. Successful performance of two back-up support wires for fluorescent light fixture, Olive View Hospital. At this facility, this good performance was common and the failure shown in **PHOTOGRAPH B7.4** was rare *photo credit Bob Reitherman, Earthquake Engineering Research Institute*