

# Earthquakes

## Experts disagree on freeway safety

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OAKLAND — Engineers and state transportation officials presented conflicting testimony yesterday on the safety of freeway overpasses in the wake of the collapse a 1¼ mile portion of the Nimitz Freeway that killed 41 people during the Oct. 17 earthquake.

Robert K. Best, director of the California Department of Transportation, assured the California Senate Transportation Committee, which is investigating the disaster, that all of the 1,500 freeway overpasses in the state other than those damaged in the recent earthquake were safe. They are not in danger of collapsing in any earthquake of magnitude 7.1 — the strength of last month's quake — or smaller, he said.

The department can only know how much earthquake stress an overpass can tolerate by observing what happens to the structures in earthquakes, Best said. Standards therefore are based on earthquakes the structures have survived, he said.

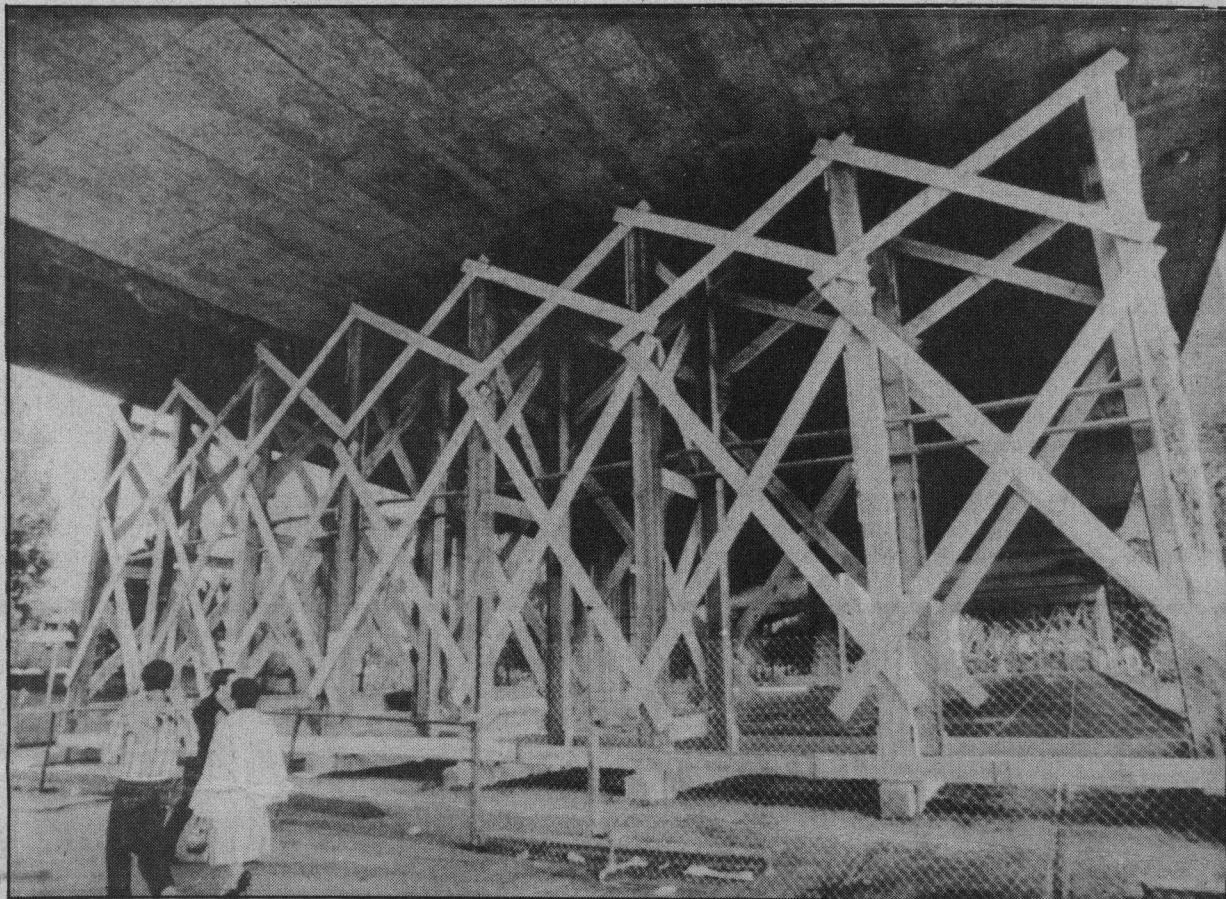
But Ian Buckle, deputy director of the National Center for Earthquake Engineering Research in Buffalo, N.Y., countered that the state transportation department was not well enough prepared for a future earthquake.

"We need a higher level of standard," Buckle said. "I would urge a review of Caltrans (the transportation department) design procedures."

Although formal investigations into the collapse of the Nimitz Freeway (Interstate 880) are not complete, speculation continues to point to weaknesses in several joints in the structure, particularly in that joining the upper and lower columns that support the two decks.

James Roberts, chief of the division of structures with the transportation department, and other engineers also indicated that the soft soil underneath the structure and the motion of this particular earthquake might have added to the stress on the structure.

The motion may have set up a



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**The Embarcadero freeway has been closed since the earthquake.**

kind of resonance, Roberts said, which made the structure sway and bend at its most vulnerable points.

"The earthquake created just the right vibrations so the structure destroyed itself," Roberts

said, attributing the theory to engineers at the UC-San Diego.

The last two bodies found in the collapsed structure were recovered from the most compacted section Tuesday. The body of James J. Flores, 39, was pulled

from his flattened pickup truck, while the body of Joyce Ann Mabry, 31, was found in another part of the debris. Workers are continuing to dismantle the collapsed sections and are expected to complete the job by Dec. 1.