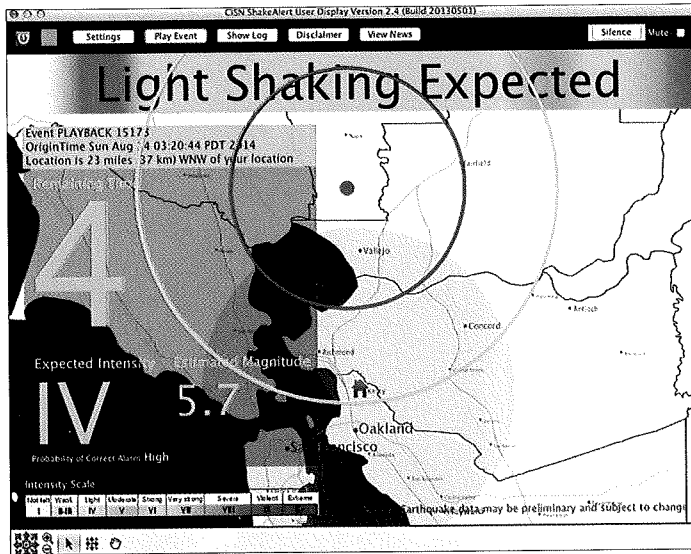


## INFRASTRUCTURE

# Picking Up Good Vibrations From Napa Post-Quake Report



**HEADS UP UC**  
Berkeley's early-warning system detects more benign fast-moving shock waves (yellow) in advance of slower vibrations, which cause more damage (red).

An earthquake-detection system under development by the University of California's Berkeley Seismological Laboratory proved its mettle on Aug. 24 by issuing a warning 10 seconds before a magnitude-6 temblor struck south of Napa, Calif. The alert could have gone out 2.5 seconds sooner if the ShakeAlert system, based on Japan's primary-wave detection system, were funded, and the lab were able to install more sensors, says a lab spokesperson.

"It was definitely a great proof-positive that the system works just like we'd hoped," says Jennifer Strauss, the lab's external relations officer. "One of the things the Napa quake did show us is you need to make sure there are enough sensors," says Strauss.

Bay Area Rapid Transit is testing the alert system and received eight seconds' warning, but none of its trains were running when the quake hit at 3:30 a.m.

California State Legislature unanimously passed Senate Bill No. 135 last year, which calls for the development of a comprehensive statewide earthquake early-warning system to alert Californians

in advance of dangerous shaking. But funding has not yet been found.

"It's an unfunded mandate, stipulating that we can't use general funds for the system," says Strauss. "Both Mexico and Japan built their early-warning systems after massive damaging earthquakes. This is the chance for California to build one before such a damaging quake."

## Schools Undamaged

The epicenter of the American Canyon quake was at the heart of the Napa school district's 30 campuses. Subsequently, three architectural and engineering teams assessed "every room in every school" and observed no structural damage following the quake, says Mark Quattrocchi, principal of Kwok Quattrocchi Architects and one of the survey team members. "There was not even a single panel of cracked drywall," he says.

The schools performed so well because they are built or retrofitted according to much stricter seismic codes than commercial and residential buildings.

"There was no structural damage to

any school in the district, even the ones built to older codes in the 1940s, 1950s and 1960s," says Quattrocchi. "Part of this is because seismic upgrades at the schools are treated the same as building an entirely new facility," he adds.

Schools fared well for three reasons: seismic building codes that are more stringent than those for commercial buildings, methodical reviews by the Division of the State Architect and "full-time" state inspection on school construction sites, Quattrocchi says.

A 2006 California Seismic Safety Commission report—the most recently published data on unreinforced masonry buildings in the state—says approximately 70% of California's 26,000 brick buildings have been demolished or retrofitted. About 8,000 brick buildings remain at risk, the report said.

In Napa, city inspectors remained at work tagging structures on the second round of damage evaluations. "As of 1 p.m., there are 1,053 structures in the city that have been tagged—153 are on the red-tag list and around 900 are on the yellow-tag list," the City of Napa reports. "It is possible these numbers will rise as more structures receive their second inspection and interiors are seen."

Ronald O. Hamburger, a senior principal with seismic structural engineer Simpson Gumpertz & Heger, says buildings in general fared well. "Overall, the performance of buildings in the Bay Area is a tribute to the effectiveness of building codes in general and seismic retrofit techniques," he says. Except for unreinforced

or poorly retrofitted masonry buildings and older houses not bolted to their foundations, "buildings did very well, despite ground accelerations, locally in Napa, that approached design levels. In part this was due to the relatively short duration (10 seconds of strong motion) of this earthquake, but also, at least in part, it is a tribute to the effectiveness of western U.S. design practices." ■

By Luke Abaffy and Nicholas Zeman,  
with Nadine M. Post

