

News of the Profession

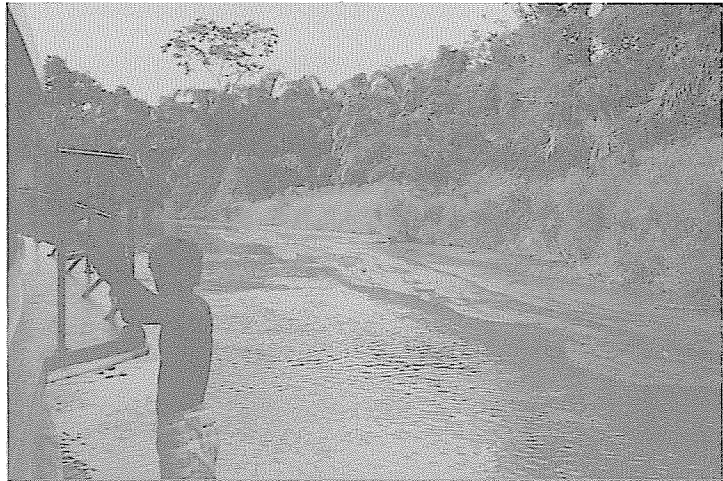
Eyewitness News

MORE ON THE COSTA RICA EARTHQUAKE, APRIL 22, 1991

A fascinating first-hand report on observed piping and its implied causative liquefaction: Bob McCarthy, of Bakersfield, reports that his friend Bill Balch, the author, is a civil engineer and an accurate reporter. Tom Tobin, of Sacramento, forwarded this account.

Here are some of my observations and recollections of the Costa Rican earthquake of April 22, 1991.

We were on a small boat (about 35 feet in length) in the coastal waterway from Puerto Limon to Tortuguero. The earthquake



occurred about 4 pm, grounding us, when we were about one half of the way between Moin and Parismina. The waterway itself is mostly natural with visible improvements at a few locations. It is open to the ocean at several points in its 40-plus mile length. There is apparently slight tidal effect, and only

slight water currents were visible where we were grounded.

The banks of the channel and adjacent lands are a few feet above the water level and were composed of heavier alluvial type soils which probably ranged from very fine sand to clay. While wading in the channel, in an attempt to move the boat, our feet would sink only about six inches into the bottom of the channel.

During the earthquake the trees in the background bent at least 30 degrees from the vertical. The most striking thing was that the grass in the foreground was swaying in one direction while the trees were swaying in the opposite direction. Also it was quiet; there was no loud rumbling noise like we heard in town during the Bakersfield and Tehachapi quakes.

The most interesting thing to me was the piping action that occurred later. This action started perhaps 5 to 15 minutes after the first shock and lasted for an hour or two. The piping started on a random basis; i.e., scattered about as to location and as to when each pipe started and stopped. Most of those that we saw were in the channel. There



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were also several on the surrounding banks, but were partially hidden by the weeds. In a few spots water was running back into the channel from the piping action. At the peak of the activity muddy water shot up six inches to a foot above the water level. The maximum height of the spout of water occurred at different times at each pipe which appeared to be related more to the development of that particular pipe than to the general overall condition. While attempting to move the boat we found that the water coming from the pipes was noticeably cooler than the water in the channel.

The pictures show the pipes in their final stages, perhaps an hour or so after the initial shock. Most of the mud along the edge of the waterway was not apparent before the quake. Therefore I assume that the action of the quake on the relatively unstable area had a leveling effect by slightly raising the channel as well as concentrating the more fluid materials near the banks.

In retrospect I wish I had been more interested in pictorially recording the development of the piping action, but for some time we were more focused on attempting to move the boat!

With best regards,
Bill Balch

Crandall Firm Changes Name



The Facade of the Citadel, a former tire factory in Los Angeles, shows the extent of Assyrian styling. Law/Crandall, Inc., is one of the tenants of the commercial property.

The Southern California geotechnical consulting organization, LeRoy Crandall & Associates, has changed its name to Law/Crandall, Inc., and moved its corporate headquarters and Los Angeles branch office to the Citadel, a \$118 million, multi-use commercial complex fronting on the Santa Ana Freeway in the City of Commerce.

The firm also announced formation of a new group to provide comprehensive consulting services for owners of buildings requiring repair, rehabilitation or renovation. Known as the building services division, the unit was established as a "one-stop" source for assessing and correcting a full range of building deficiencies.

L. LeRoy Crandall (EERI, 1968) is

chairman of the board and J. D. Kirkgard is president of Law/Crandall. They are both civil engineers. The firm also maintains offices in San Diego, Anaheim, Los Alamitos, Riverside and Marina del Rey.

Law/Crandall now occupies a 44,000 square foot, two-story building at the Citadel, located on the site of a former tire factory, which has been a familiar landmark for passing motorists for nearly 60 years.

Scheduled for completion and full occupancy in 1993, the Citadel will include five office buildings, a hotel, conference center, dining facilities, health club and retail outlet center. Law/Crandall conducted geotechnical foundation studies.

FEMA EQ Position Open

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EERI, effecting coordination on FEMA's earthquake activities. This position is open to individuals with expertise and/or experience in earthquake hazards reduction and public administration/intergovernmental relations.

This position is a GS 13 with a salary range of \$47,896 to \$62,262. The vacancy announcement number is R9-91-016 and is open from August 19 to September 20, 1991. For information about the position, Contact Nicholas B. Nikas, FEMA Region IX, Building 105, Room 206, Presidio of San Francisco,

California 94129-1250, telephone (415) 923-7175. For additional information about applying for the position, please contact Byron Williams, 16825 South Seton Avenue, Bldg. E, Room 003, Emmitsburg, Maryland 21727, telephone (301) 447-1390.