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NEWSLETTER

Editor Diana Todd
Associate Editors Harry W. Shenton III
Ann Bieniawski
Gerald Brady
Editorial Assistant Shirley Taylor

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Earthquake Engineering Research Institute
499 14th Street, Suite 320
Oakland, California 94612-1934
Phone:(510)451-0905 Fax:(510)451-5411

Learning From Earthquakes

Magnitude 7.6 Quake Hits Manzanillo, Mexico

A Richter magnitude 7.6 earthquake hit the west coast of Mexico on October 9 close to the coastal town of Manzanillo, approximately 220 km southwest of Guadalajara and 550 km west of Mexico City. Early reports indicated that 30-40 people were killed in the earthquake which caused the most damage in the central states of Jalisco and Colima. The quake lasted one minute and 40 seconds and collapsed numerous buildings. In the seaside resort of Manzanillo the 12-story Costa Real Hotel collapsed, killing at least 12 people. The Jalisco State Judicial police headquarters in Manzanillo also fell to the ground, killing eight people. A more detailed report of this earthquake will be an insert in the December Newsletter.

Learning From Earthquakes

Earthquake Strikes in Guerrero, Mexico

On September 14, at 8:04 am local time an earthquake of $M_s = 7.2$ ($M_w = 7.3$) occurred along the Pacific coast of the State of Guerrero, Mexico, close to the town of Copala. The shallow focal depth (17.5 km), the focal mechanism (thrust), and the low dip angle indicate that it was a typical earthquake of the Mexican subduction zone in the interface between the North American and Cocos plates.

The earthquake produced high intensities in the epicentral area where it caused considerable damage in some villages in South Guerrero and Southwest Oaxaca. The region is sparsely populated so only six people died, although 2,000 people remained homeless and more than 5,000 houses were affected with a distinct level of damage. Typical adobe houses are made of walls without any type of horizontal or vertical reinforcement for continuity and confinement, and of light roofs of palms and logs. Failures recorded are similar to those observed in other earthquakes in Mexico and include diagonal tension cracking, out-of-plane wall failures, and roof collapses.

Among the population of Mexico City this earthquake produced distress and interest disproportionate to its actual intensity and consequences, perhaps because the date brought back memories of the tragedy of September 19, 1985. However, the intensity in the city was moderate, similar to that caused by the event of April 25, 1989.

With the exception of about 10 buildings with structural damage, mostly nonstructural elements were distressed. Typical nonstructural damage observed included inclined cracking of masonry and gypsum partition walls, cracks along the wall-frame element joints, distorted window and door frames, and cracks along construction joints. In most instances, distress was attributed to excessive lateral flexibility of the structural system. Most damaged structures exhibited tilting; flexural and shear cracking in reinforced concrete beams, columns and walls; and minor inclined cracking in beam-to-column and slab-column connections.

It is encouraging that severe damage in buildings and infrastructure did not occur within the city. The fact that three days after the earthquake outstanding structural damage had not been detected indicates the effectiveness of measures adopted to reduce the seismic vulnerability there (more stringent building code requirements, better quality control procedures during construction, repair/strengthening of damaged and weak structures). However, structures must survive more severe motions than those inflicted by this latest event. Therefore authorities and engineers must carefully evaluate the effects produced by this earthquake and detect evidences of inadequate response. Particularly, buildings which exhibited some nonstructural damage or important foundation movements must be examined. Among the buildings that were distressed are some that were rehabilitated after 1985. Their behavior in this earthquake may indicate that a successful upgrade has not yet been accomplished.

The information for the above report was compiled by Sergio M. Alcocer, Roberto Meli, Mario G. Ordaz, and Roberto Quaas from the National Center for Disaster Prevention (CENAPRED) in Mexico City. The publication and distribution of the report was funded by NSF Grant #BCS-9215158, EERI's Learning From Earthquakes project. *For information on the early warning system which was tripped before this earthquake, see page 5.*