SUMMARY

Landslides caused an estimated minimum of $57 million damage to public and private property in San Mateo County as a consequence of 1997 winter storms. Hundreds of hillside failures occurred throughout the county, most during the weeks of February 2. The most common types of damaging failures were earthslides and earthshocks, ($30 million) in La Honda, Moss Beach, Pacifica, Daly City, and Portola Valley. The pre-existing Polhemus landslide (northern slump in San Mateo was reactivated. Earthshocks involved rockslide activity on seafloor exposures in the Ecuadorian and offshore areas, and long the entire of the county coastal sea cliffs. Slopes that minimized debris flows were overlain by a variety of vegetative cover, including grassland, rock, and shrub, as well as roads and steep to developed residential areas. Debris flows occurred on steep undercut by Pleistocene and Pliocene placer deposits. Pleistocene to Recent clastic rocks (sandstone, siltstone, and shales) and Mesozoic Franciscan mélanges (argillite matrix mélanges).

Most of the damaging debris flows were triggered on February 2-3 between 11:30 pm and 2:30 am over Skystyle Bridge and around 2:00 am over Skyline Ridge. One or two failures in residential areas of Portola Valley and San Bruno were also triggered while the tsunami was exceeding the debris flow threshold for natural slopes. The interaction of debris flow activity in suburban areas as well on natural hillside, in conjunction with the increase of debris flows on natural slopes in suburban areas, indicates that the debris flow threshold was exceeded in several parts of the county during the February 2-3 storms. A home in February 7 triggered debris flows in the southeastern part of the county due to similar conditions.

Damage due to earthshocks occurred primarily during the first 3 weeks of February. Hillsides that were stimulated during this period tended to be active into March, but with much decreased rates of movement. These included the Sonia and Recreation Drive landslides in La Honda, the Polhemus Ridge landslide in San Mateo, the Trinity Creek and Moss Beach landslides in Half Moon Bay, the Sierra Drive and Sea View Way landslides of Daly City, and the Esperanza landslide (rockslide activity of Pacifica. These hillside failures are overlain primarily by Pleistocene and Pliocene sands and silts (La Honda, Trinity Creek, Moss Beach, Daly City) and by Franciscan mélanges (Pacifica and Polhemus). Thirteen of the major damaging earthshocks overlaid valley bottom areas or hillside morphology that had been mapped (La Honda, Polhemus Road, and Daly City).

The losses incurred due to structural damage associated with hillside failures during the February storms of 1997 were estimated from information provided by the San Mateo County Building and Planning Department. In addition, aerial reconnaissance flown on April 22, 1998, over parts of San Mateo and San Bruno identified areas not identified by the county as having sustained significant damage and included information provided by the county. Approximately $15 million in damage has been estimated by public property and $30 million by public and private property. Debris flows destroyed 35 homes and damaged 17, 17 homes destroyed and 17 homes damaged by debris flows of various kinds. "Tagged" structures are those that have been affected but need to be taken down by the county. These structures were identified by the county as having sustained significant repair activity or they were recorded by the county. Municipal and county building inspection departments are responsible for structures that need to be repaired. The distribution of structural damage was most strongly influenced by the distribution of development in hillside areas. Because much of modern San Mateo County is in residential neighborhoods, less damage events were recorded, although hillside failures were widespread. The damage in that region tended to be concentrated along the transportation routes, where most residences are located. Major road repairs on State highway 92 and Highway 94 have been estimated at about $30 million, bringing the total direct costs to the county to approximately $55 million. Highway 94 was closed for 4 months following the February storms with only one lane open at three locations as of August 2, 1998. The County estimated $10-20 million road damage due to debris flows, damage to State highways was more extensive.

We thank Bill Cameron, San Mateo County Planning Department, for providing information on the locations and costs associated with damaging hillside failures.  

EXPLANATION

Location of damaging landslide. The number identifies the landslide in the database. Data on file with authors, U.S.A., Menlo Park, California, and Golden, Colorado.

MAP SHOWING LOCATIONS OF DAMAGING LANDSLIDES IN SAN MATEO COUNTY, CALIFORNIA, RESULTING FROM 1997-98 EL NIÑO RAINSTORMS

By

Angela S. Jayko, Joan De Moultrie, Kenneth R. Ligon, David W. Ramsey, and Jonathan W. Golt

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