

**DEPARTMENT OF THE INTERIOR**

**U.S. GEOLOGICAL SURVEY**

**COLOR PHOTOGRAPHS (35mm SLIDES) SHOWING EXAMPLES OF  
STRUCTURAL DAMAGE AND SURFICIAL EFFECTS OF THE M7.1  
OCTOBER 17, 1989, LOMA PRIETA, CALIFORNIA EARTHQUAKE**

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**OPEN-FILE REPORT 89-687**

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Menlo Park, CA

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The thirty-six slides in this Open-File Report were collected and collated in the week immediately following the M7.1 Loma Prieta, California, earthquake of October 17, 1989. A preliminary description of the effects of this earthquake can be found in USGS Circular 1045, "Lessons learned from the Loma Prieta, California, earthquake of October 17, 1989" which is available from the Book and Open-File Reports Section, Branch of Distribution, U.S. Geological Survey, Box 25435, Denver Federal Center, Denver, Colorado 80225. A copy of the order form is included in this Open-File Report as Appendix A.

### SLIDE CAPTIONS

1. Collapsed unreinforced masonry, Pacific Garden Mall, Santa Cruz, California. (L. Carroll/USGS)
2. Collapsed unreinforced masonry, Pacific Garden Mall, Santa Cruz, California. (L. Carroll/USGS)
3. House that was shaken off foundation, Corralitos epicentral area, California. This house was built in the late 19th century and was undamaged by the 1906 San Francisco earthquake. (M. Rymer/USGS)
4. Two-story frame house with collapsed first story, Corralitos epicentral area, California. (D. Schwartz/USGS)
5. Southwesterly view of San Francisco-Oakland Bay Bridge with barge removing collapsed section. (T. Holzer/USGS)
6. Collapsed section of the San Francisco-Oakland Bay Bridge. (H. Wilshire/USGS)
7. Collapsed section of Cypress I-880 freeway structure, Oakland, California. Photo taken 1-1/2 days after earthquake. (M. Rymer/USGS)
8. Cypress I-880 freeway structure column, Oakland, California. Crater in road paving caused by impact of top of fallen column. Columns in this part of the collapsed structure fell free, landing in adjacent roadways. Column was later moved to pictured position by clean-up crew. (M. Rymer/USGS)
9. Highway 1 bridge collapse, Struve Slough, Pajaro Valley, California. (J. Tinsley/USGS)
10. Settlement, 48 cm, around columns of Highway 1 bridge at Struve Slough, Pajaro Valley, California. (J. Tinsley/USGS)
11. Left-lateral component of offset along surface fracture, Summit Road area, southern Santa Cruz Mountains, California. Same surface fracture as shown in slides #12, 13, 14; same site as #12. (M. Rymer/USGS)
12. Vertical component of slip along surface fracture at same site as in slide #11. Same Surface fracture as slides #13 and 14. (M. Rymer/USGS)

13. Vertical component of slip across crack, Summit Road area, California. Same surface fracture as shown in slides #11, 12, and 14. (M. Rymer/USGS)
14. Extension across surface fracture, Summit Road area, California. Extension was dominant sense of movement along entire crack. Same crack as shown in slides #11, 12, and 13. (M. Rymer/USGS)
15. Aerial view of landslide blocking north-bound lanes of Highway 17, Santa Cruz Mountains, California. (T. Holzer/USGS)
16. Toe of landslide blocking north-bound lanes of Highway 17, Santa Cruz Mountains, California. (D. Keefer/USGS)
17. Lateral spread into adjacent sag pond along San Andreas fault, Hazel Dell Road, Santa Cruz County, California. (M. Rymer/USGS)
18. Rockfall on Eureka Canyon Road, epicentral area, California. Photo taken three days after earthquake. (M. Rymer/USGS)
19. Permanent ground deformation and damaged house, Santa Cruz mountains, California. (D. Keefer/USGS)
20. Damage to house from permanent ground deformation and shaking, Santa Cruz Mountains, California. (D. Keefer/USGS)
21. Landslide on coastal bluff, Daly City, San Francisco Peninsula, California. (D. Keefer/USGS)
22. Post-earthquake collapse of coastal bluff, Tunitas Creek, California. (D. Peterson/USGS)
23. Aerial view from northwest end of main runway of Oakland International Airport, Oakland, California. Liquefaction and lateral spreading damage in foreground. Damage forced closure of one-third of the runway. (T. Holzer/USGS)
24. Close-up of sand boils and lateral spreading crack on taxiway near northwest end of main runway of Oakland International Airport. (T. Holzer/USGS)
25. Close-up of sand boils at eastern end of Marina Green, San Francisco, California. (M. Bennett/USGS)

26. Close-up of sand boils at eastern end of Marina Green, San Francisco, California. Large white objects are shells extruded with the hydraulic fill. (M. Bennett/USGS)
27. Sand boil caused by liquefaction in the Marina District, San Francisco, California. (M. Bennett/USGS)
28. Sand debris in street was ejected inside of garages along foundation of structures, Marina district, San Francisco, California. (M. Bennett/USGS)
29. Deformed curbing due to liquefaction, on Webster between Beach and North point, Marina district, San Francisco, California. (M. Bennett/USGS)
30. Deformed curbing and structural damage caused by liquefaction. View is north on Divisadero, between Beach and Jefferson, Marina district, San Francisco, California. Severely damaged building in center was later demolished. (M. Bennett/USGS)
31. Ground cracking on 7th Street at Howard is associated with liquefaction in the area south of Market Street, San Francisco, California. (M. Bennett/USGS)
32. Connection damage at the Embarcadero Freeway, San Francisco, California. (M. Celebi/USGS)
33. Lateral spreading in field along Pajaro River, near Watsonville, California. (J. Tinsley/USGS)
34. Sand boils ejected along lateral-spread crack in field adjacent to Pajaro River, near Watsonville, California. (J. Tinsley/USGS)
35. Tilting of San Jose State University marine laboratory at Moss Landing, California. Tilting was caused by liquefaction beneath structure. (R. Wilson/USGS)
36. Sand boils at San Jose State University marine laboratory at Moss Landing, California. (R. Wilson/USGS)