

BRICK BUILDING DAMAGE IN GROUND FAILURE AREAS
IN THE 1906 SAN FRANCISCO EARTHQUAKE

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A search of historic records has provided new information about the pre-fire damage to many buildings in San Francisco that were affected by the 1906 California earthquake. Because the buildings can be located in old directories, the geographic pattern of the pre-fire damage in San Francisco can be examined.

The new data indicate that the pattern of damage to brick buildings is significantly different than was indicated on the seismic intensity map of H.O. Wood (in Lawson and others [Ref.1]), which was based on a post-fire study. The largest differences with Wood's map occur in the areas where ground failure was associated with liquefaction. On his map, Wood showed these areas as the highest intensity (greatest building damage), but the detailed data indicate differently.

Of the 25 described brick buildings in the ground-failure areas, only 2 buildings (8%) suffered internal collapse, and the other 23 buildings (92%) apparently did not have internal collapse. Of these 23 buildings, 13 (52%) had major or minor fall of bricks outward from the building, including the outward fall of a whole brick wall in some instances, and 10 (40%) had only cracking or no damage. The overall percentage rating of the damage (8-52-40) can be compared with the reports of brick building damage in the rest of San Francisco. Of the 128 described brick buildings not on bedrock or in the ground failure area, 11% had full or partial collapse, 62% had major or minor fall of bricks outward from the walls, and 27% had little or no damage, for a percentage rating of 11-62-27. The 11 brick buildings on bedrock had less than average damage, with a damage percentage rating of 9-27-64.

The damage to brick buildings was apparently less in the ground failure areas than in the rest of San Francisco, excluding bedrock. This result indicates that the seismic shaking which damages brick buildings was somewhat less destructive in the areas of ground failure than in the nearby areas without ground failure. Perhaps there was a significant absorption of seismic wave energy in the soft materials of the ground failure areas, because of a low Q value in the sediments or because of energy absorption in the ground failure process.

REFERENCE

Ref. 1: Lawson, A.C., and others, The California earthquake of April 18, 1906: Carnegie Inst. of Washington, Publ. no. 87, p. 220-245 and map no. 19.

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