

which yield slightly, so that the stress is spread widely and not concentrated at one level. Closely knit iron girders give the same firm but flexible connection between roof and walls. The roof can also be supported on posts that rise from a platform of stonework or cement, which forms the sole-plate of the building; the posts are connected by cross-beams and rafters, and as the roof moves with the ground, there is less tendency to horizontal fracture. The roof should have a gentle slope, or the tiles may be shaken off. The leverage of the roof is less on low than on tall buildings; hence in some earthquake areas houses are restricted to two or three storeys. Doubts have been expressed as to the safety of American sky-scrapers with their 35 or 50 stories; but these buildings have the advantages of strong construction and a firm foundation.

LEVEL OF GREATEST DAMAGE—A building when disturbed by an earthquake, away from the epicentre, sways like an inverted pendulum with a period dependent on its height. The level most liable to damage depends on the rate of vibration of the earthquake and the oscillation period of the building. If the latter be the longer the upper part tends to continue its sway forward while the lower part has begun to swing back, and a rupture may occur between the parts moving in opposite directions. Thus in the San Francisco Earthquake of 1906 a tall building 20 storeys high, had an oscillation period of 26 times a minute. The oscillation of the ground was 50 a minute, and the greatest stress on the building was two-thirds of its height from the ground. Lower buildings with an oscillation period of 50 a minute moved as a whole; but still lower buildings with an oscillation quicker than that of the earthquake were broken close to the ground, for adjacent parts of a wall often moved in opposite directions.

SUITABILITY OF MATERIALS—Dewell (*Building against Earthquake Shock*, Commonwealth, San Francisco, 1st September, 1925) classifies constructions in order of resistance to earthquakes as follows: (1) the best is a structural steel frame with walls of re-enforced concrete; (2) low ferro-concrete buildings; (3) steel frame and brick walls; (4) re-enforced concrete frame and brick walls; (5) the weakest, brick buildings without structural frame.