



Earthquake Loss Assessment

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I. The earthquake loss is an estimate of the direct physical damage to the buildings which would occur due to earthquake strong ground shaking. Other site seismic hazards that may or may not be present at a site (e.g., liquefaction, surface fault rupture) may be considered in the damage estimates. The physical damage estimate is expressed as a percentage of replacement cost of a building's structural and nonstructural elements. The loss estimates are based on motion-damage relationship data based on past studies by others, proprietary methodology, and data gathered by the Applied Technology Council (ATC) and the National Center for Earthquake Engineering Research (NCEER). The motion-damage relationship data gathered by ATC and NCEER are based on specific building classifications which account for such factors as type of structural system, materials of construction, and number of stories. Those damage relationships are an expression of the collective judgment of a number of earthquake engineering specialists. Additional factors considered include the code to which a structure was designed, unusual deficiencies or strengths in the seismic force resisting, general state of repair, and vulnerability of nonstructural elements and building equipment. For a given intensity level and class of building, there will be a range of damage actually experienced due to variations in the earthquake motion and in the structural characteristics of the individual buildings in each building class.

II. A common method for estimating this risk has been the Probable Maximum Loss (PML) or seismic risk study. Generally speaking, a PML is a mathematical ratio where the expected maximum damage in terms of dollars (monetary risk) is divided by the project's replacement value in terms of dollars. The number is expressed as a percentage. The monetary risk is a function of the construction type, the local geology, the location of the site relative to known faults and the amount of energy that can be released from nearby faults during the "maximum possible seismic event." A PML is an estimate of the damage that can be expected. The PML is calculated as the 90th percentile damage for the 475-year recurrence interval earthquake intensity. An acceptable score generally depends on each party's risk tolerance threshold. The general industry standard indicates a PML of less than 20% as desirable. The 20% means that a given building in a given location is anticipated to sustain approximately 20% damage in the event of a worst-case earthquake.