

Seismic Performance of Buildings during the Last Two Decades Earthquakes in Turkey

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Many buildings (poorly engineered or non-engineered) experienced heavy seismic damages or totally collapsed during the last two decades earthquakes in Turkey. This presentation describes the lessons learned from on-site investigations in the aftermath of those earthquakes. Observations on damaged and undamaged buildings following the 1992 Erzincan, 1999 Kocaeli, 1999 Duzce, and the recent 2011 Van earthquakes are given. Seismic damages to mostly reinforced concrete (RC) and unreinforced masonry (URM) buildings are classified and their potential reasons are discussed. Especially, buildings with several irregularities in plan and elevation, having insufficient lateral stiffness leading to excessive P- Δ effects, with poor material properties, and with nonductile details (e.g. lack of confinement in RC members around beam-to-column connections) experienced severe damage. In addition, behavior of historic masonry buildings during the 2009 L' Aquila, Italy earthquake is also evaluated with unique details caught in the damaged buildings. The consequences of the L' Aquila earthquake are significant since the building stock in many historic European cities (including Istanbul) is quite similar to the damaged/collapsed building stock in L' Aquila. A vast amount of building retrofit applications has been carried out and this capacity has contributed to the seismic retrofit experiences of Turkish structural engineers. Both classical and contemporary methods have been adopted in these applications. Addition of RC shear walls, steel braces of various types and configurations, and even seismic isolation and passive energy dissipation devices (when needed) have been used to upgrade the lateral load capacities of damaged or undamaged buildings. Specific retrofit design details from real-life building examples from Turkey will be shared. Second part of the presentation is devoted to the research activities in the Structural and Earthquake Engineering Laboratory (STEEL) at the Technical University of Istanbul.

Past and recent experimental studies on masonry, RC, and steel structures are summarized. Seismic energy dissipation devices that are being developed in this laboratory are introduced.

次回のお知らせ 今回で2学期の地質学セミナーは終了です。3学期の予定は決定次第改めてお知らせします。

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