Strength or ductility seismic design? A case study in Sabah Using the Eurocode 8 Malaysian national annex

ABSTRACT

This paper shares the experience of a building project which piloted seismic design using Eurocode 8, with the Malaysian National Annex legislated in 2017. The 23-storey reinforced concrete building features geometric irregularity with podium and two towers, located in Kota Kinabalu, the capital city of Sabah, Malaysia. Sabah had experienced a magnitude-6 earthquake in 2015, where the epicentre Ranau was just 50 km away from Kota Kinabalu. Conventional Probabilistic Seismic Hazard Assessment has indicated that Kota Kinabalu has a peak ground acceleration (PGA) on rock of only 0.04g for a 475-year return period, which appears to be counter-intuitive for such a potentially destructive near-field magnitude 6 earthquake. Hence, four possible scenarios are postulated, i.e., PGA of 0.04g, 0.08g and 0.12g designed with ductility class low (DCL), assuming force-based non-dissipative mechanism and 0.12g designed with ductility class medium (DCM), engaging seismic detailing to form plastic hinges. This paper is written to give local engineering practitioners, who have either no prior experience in seismic design or have been using the basic equivalent force method, to develop a better sense of response spectrum seismic analysis, code-based design and choice of strength or ductility seismic design in low-to-moderate seismicity regions.