

Applications and Challenges to using HAZUS-MH for Building Seismic Risk Awareness

By Stefan Otto

A suite of software products has been developed by the US Federal Emergency Management Agency and US Geological Survey to assist owners of building portfolios in earthquake country to mitigate risk and manage their response prior to and following a seismic event. These tools require the creation and/or maintenance of an asset database. In order to maximize the utility of these products, it is recommended that these assets are tracked at the building level and that a HAZUS-MH "Model Building Type" is assigned to each object within the database. These classifications describe the construction materials (wood, steel, reinforced concrete, etc.), the system used to transmit earthquake forces from the ground through the building (referred to as the lateral force-resisting system) and sometimes, height category, which is governed by the number of stories. Additionally the building data should also describe one of four building-code eras (high code, moderate code, low code and pre-code). Taken together, there are 128 choices of HAZUS model building type and code era.

For large property owners, especially those operating across a wide geographical region, the creation and/or maintenance of such an inventory can be a challenge in and of itself. To add the additional requirements of HAZUS-MH building model type demands an investment of significant time and resources which must compete with other interests and reporting requirements. Furthermore, the capacity to identify building model type requires some prior knowledge of the principles of structural engineering and a familiarity with the construction history of the building portfolio. Even with such knowledge, arriving at a single classification type may still prove a subjective task.

The Los Angeles Unified School District (LAUSD) owns approximately 14,000 buildings spread over 500 square miles of Southern California. In prior efforts to create an electronic inventory of 600 of these buildings, LAUSD structural engineers searched for and examined structural drawings of each one. The cost was hours or more of labor per building, a prohibitive effort at the scale of the full portfolio. LAUSD is now attempting to implement an end-to-end seismic risk mitigation and response solution of all 14,000 buildings. It is using FEMA's Rapid Observation of Vulnerability and Estimation of Risk (ROVER); the HAZUS-MH software; and USGS' ShakeCast system. Though more efficient for data collection and providing a more complete risk picture, such an effort still poses significant challenges.

We hope the system will allow us to gather the inventory data in a consistent, structured manner at an affordable cost; react to earthquakes with a more-targeted inspection approach; return students to classes more quickly; and recoup post-earthquake expenses more effectively. Major challenges are that the labor is still substantial at 10-20 minutes per building; the resulting categorizations are more approximate than those derived from a thorough examination of structural drawings; and arranging a training and implementation program must take place in a large, cost-conscious administrative structure.

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