ABSTRACT

In an effort to anticipate to the risk of future earthquake disasters, the government has renewed the Indonesian National Standard (SNI) relating to the design of earthquake-resistant building structures. It should be noted that the new standard produces a moderate design of earthquake building structure. However, not all of new buildings are designed using the latest standards. The Twin Building of UMY for example, still used the old standard (SNI 1726-2002). Therefore, an evaluation of the structure based on the latest standard (SNI 1726-2012) is needed to evaluate the building performance with regard to the future earthquake-disaster mitigation.

This study used three methods to evaluate the structure of the Twin Building of UMY, namely linear static analysis, non-linear pushover analysis and seismic fragility analysis. A Linear static analysis produces the value of the storey-drift ratio and demand capacity ratio (DCR) which shows the behavior of the structure in a linear condition, while a non-linear pushover analysis computes a capacity curve, a spectrum capacity and structural limits. Seismic fragility analysis based on the HAZUS methodology provides a fragility curve producing the probability of structural damage in various conditions of damage (slight, moderate, extensive, and complete).

The results of linear static analysis show that there are several structural components with DCR values more than 2, indicating that a non-linear static analysis of the structure should be hundertaken. The non-linear pushover analysis presents the displacement and the base shear limits values are 0,220037 m and 60320,78 kN respectively for the x earthquake direction, while for the y earthquake direction consist of 0,263347 m and 161227,1 kN. The seismic fragility analysis results of the Twin Building UMY due to the maximum earthquake in Yogyakarta area (Sa = 0,7523g) in conditions of slight, moderate, extensive and complete damage were respectively 99,95%; 99,4%; 84,42% and 31,92% for the x earthquake direction, while for the y earthquake direction consist of 94,87%; 83,11%; 23,65% and 1,35%. If the maximum earthquake occurs in the Yogyakarta area (Sa = 0,7523 g), the damage condition that can be a reference in overcoming the risk due to the disaster is the extensive condition for the x direction, and the moderate condition for the y direction. The reference is taken based on the level of the damage that is more severe and exceeds the percentage of 50%.

***Keywords**: Seismic fragility, Fragility Curve, Pushover*