ABSTRACT

SEISMIC MICROZONATION MAP DESIGN FOR SEMARANG CITY BY DEVELOPING SEISMIC HAZARD PROGRAM AND ADJUSTING BUILDING FRAGILITY CONDITION.

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The new Indonesian code for building design, SNI 1726:2012, has been issued recently. It follows the concept of Risk-Adjusted Maximum Considered Earthquake MCE_R used by ASCE 7-10 and it provides maps of MCE_R for the whole Indonesian Country. Development of seismic risk microzonation of Semarang City is required for disaster preparedness and hazard mitigation. The purpose of this research is then to propose the seismic microzonation of Semarang City based on the seismic hazard analysis, site specific response analysis and risk assessment.

The seismic hazard analysis is adapted from ASCE 7-10 to produce MCE_R ground motion at bedrock level for the whole area in the city by combining the results of deterministic, probabilistic seismic hazard analysis, and fragility curves of buildings. The analysis was performed by using calculation procedures, seismic source model, attenuation functions, and geological and seismological data previously used to develop national seismic hazard and risk maps by Team for Revision of Seismic Hazard Maps of Indonesia 2010.

The site response analysis and risk assessment were conducted by carrying one-dimensional ground response analysis. Geotechnical parameters are interpreted from previous and recent measurements and depth of engineering bedrock is estimated based on Single Station Feedback Seismometer measurement. Two engineering bedrock elevation models were performed to obtain the distribution of site response such as peak ground acceleration (PGA), spectral acceleration at ground surface and amplification factor due to ground motions at bedrock. The seismic microzonation is carried out by selecting time histories of ground motion records for input motions in one-dimensional propagation analysis. Five ground motions for all sources and five ground motions for shallow crustal fault sources (with magnitude ranging from 6 to 7 and maximum distance 20 km) are collected from worldwide historical earthquake database records. Site response analysis is then conducted for each ground motion to obtain peak ground acceleration, spectral acceleration and amplification factor.

Keywords: Seismic Microzonation, Seismic Hazard Analysis, Site Specific Response Analysis, Single Station Feedback Seismometer Measurement.