UNIVERSITI TEKNOLOGI MARA

MODELLING OF FOUR BAY NINE-STOREY TUNNEL FORM BUILDING USING RUAUMOKO 2D PROGRAM

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ABSTRACT

Four bay nine-storey tunnel form building with reinforced concrete rigid shear walls had been designed using STAAD PRO V8i program in accordance to British Code (BS8110) and modelled using Ruaumoko 2D under seven past earthquake excitations. These ground motions are the 1986 Mexico City Earthquake, the Norway Earthquake, the 1940 EL-Centro North South Earthquake, the Grace Earthquake, the 1971 Pacoima Dam Earthquake, the 1940EL-Centro East West Earthquake and the 2007 Bukit Tinggi Earthquake. The four bay nine-storey tunnel form building had been modelled and run under seven past ground motions records based on time history-analysis by considering the nonlinear behaviour of the construction materials. This prototype had been successfully modelled under low, moderate, major, strong and great earthquake excitations using the Ruaumoko 2D program. The seismic behaviour of tunnel form building was analysed and evaluated in terms of mode shape, frequency, spectral displacement, earthquake excitations, pseudo spectral acceleration, maximum displacement for positive and negative envelops under these ground motions based on the nodes 9, 20, 30, 39 and 50. All these nodes are located at top of the tunnel form building where the maximum lateral displacements occurred. The moment capacity of the floor slabs namely element 46, 55, 64 and 73 which obtained from STAAD PRO V8i program was compared with moment capacity demand from the Ruaumoko 2D. From the analysis results, the reinforced concrete four bay nine-storey tunnel form building is safe and able to resist the 2007 Bukit Tinggi Earthquake. However, the RC tunnel form building is not safe, fully damage and full collapse under the 1986 Mexico City Earthquake, the Norway Earthquake, the 1940 EL-Centro North South Earthquake, the Grace Earthquake, the 1940EL-Centro East West and the 1971 Pacoima Dam Earthquake. Therefore, the modelling of RC tunnel form building using Rauamoko 2D program need to be carried out to evaluate the level of safety. Seismic performance and seismic vulnerability of this type of building under low, medium and high level of earthquake excitations. It can be concluded that RC tunnel form building which designed using BS8110 (non-seismic code of practice) will suffer severe damage and collapse of buildings under medium, strong, major and great earthquakes

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