

INTISARI

Underpass Yogyakarta International Airport (YIA) terletak di pesisir Pantai Selatan Jawa dekat dengan pertemuan lempeng tektonik. Kondisi geologi di lokasi *Underpass YIA* termasuk formasi geologi endapan alluvial, dimana sepanjang *underpass* ditemukan lapisan tanah berupa lempung pasiran dan pasir. Aktivitas seismik serta kondisi geologi dan geoteknik menyebabkan wilayah *Underpass YIA* rentan terhadap gempa bumi berpotensi likuifaksi. Penelitian ini bertujuan untuk menganalisis respon dinamik tiap lapisan tanah berpotensi likuifaksi dengan ragam spektrum *Multi Degree of Freedom* serta memodelkan lapisan tanah berupa *shear building*.

Evaluasi bawah permukaan didasarkan pada data pengeboran dan *N-SPT* serta data tanah pada 5 titik di sepanjang *Underpass YIA*. Nilai percepatan batuan dasar ditentukan berdasarkan peta gempa SNI 1726-2012. Piranti lunak MATLAB digunakan sebagai alat bantu dalam perhitungan analisis perilaku dinamik.

Hasil analisis menunjukkan bahwa nilai simpangan tiap lapisan tanah semakin mendekati permukaan cenderung semakin besar karena nilai kekakuan tanah semakin mengecil. Kekakuan tanah yang semakin kecil menghasilkan nilai frekuensi sudut semakin besar dan periode getar semakin kecil mendekati permukaan tanah. Demikian juga nilai percepatan tanah yang meningkat mendekati permukaan tanah. Hasil analisis menunjukkan adanya potensi likuifaksi pada kedalaman 4-6 m dari permukaan tanah jika terjadi gempa bumi dengan nilai percepatan muka tanah maksimum (a_{max}) lebih besar dari 0,44g.

ABSTRACT

Underpass Yogyakarta International Airport (YIA) is located on the south coast of Java nearby to the tectonic plate subduction zone. The geological conditions beneath the YIA Underpass include alluvial sedimentary geological formations, which are found layers of soil in the form of sand and clay along the underpass. Seismic activity, as well as geological and geotechnical conditions, make the YIA Underpass is vulnerable to liquefaction-induced by an earthquake. This study focus on analyzing the dynamic response of each potential liquefaction soil layer with a variety of Multi Degree of Freedom spectrums and modelling the soil layer in the form of shear buildings.

The subsurface evaluation is established of drilling and *N-SPT* data and soil data at 5 points along the YIA Underpass. The value of bedrock acceleration is determined based on SNI 1726-2012 earthquake map. MATLAB software is a tool for the calculation of dynamic behavior analysis.

The analysis results explains the deviation value of each soil layer approaches the surface tends to be higher in line with the value of soil stiffness decreases. The smaller soil stiffness generates higher angular frequency values and a shorter vibrating period, which closer to the ground surface. Likewise, the value of land acceleration increase as it approaches the ground surface. The analysis demonstrates there is potential liquefaction at depths of 4-6 m from the ground surface if an earthquake occurs with a maximum ground acceleration value (a_{max}) higher than 0,44g.