

ABSTRACT

The population in Tangerang Regency is increasing, with an average growth rate from 2017-2021 of 3.61% per-year. This is accompanied by limited land for residential buildings and high prices. Therefore, it is necessary to implement vertical development patterns such as apartments. Multi-storey buildings must be able to withstand gravity and earthquake loads. Given the geographical location of Indonesia is in an earthquake-prone area. Building structure planning methods usually use Force Based Design (FBD) which is done linearly. In fact, during a large earthquake, structural behavior can be nonlinear. Therefore, it is necessary to plan building structures that consider the nonlinear behavior of structures. This research begins with the preliminary design of a 10-storey apartment building structure with a typical plan, calculating the earthquake load from the base shear using the Direct Displacement Based Design (DDBD) method, analyzing the structural capacity in ETABS using the earthquake load from DDBD, determining the level of structural performance with pushover analysis using ATC-40 (1996) and FEMA 356 (2000) assessments, finding the comparison value of drift and displacement between the results of DDBD analysis and pushover analysis, ending with analyzing the lower structure. The results of this research show that the building structure designed with DDBD at the performance level of the life safety plan, obtained base shear of 6042.958 kN and 5678.579 kN for the x-direction and y-direction. The structural performance levels of pushover analysis results with ATC-40 and FEMA 356 assessments for x-direction are damage control and life safety respectively, for y-direction are damage control and immediate occupancy. Comparison of drift and displacement from both directions resulted in a not too far difference. A pile foundation with a variety of pile caps with square and triangular shapes having a thickness of 0.8-1 m was used.

Keywords : *Earthquake, Performance, linear, Nonlinear, Design, Structure*