

EVALUASI SEISMIK STRUKTUR DENGAN ANALISIS PUSHOVER MENGUNAKAN SAP2000

Anang Khoirur Rosidin^[1] Eka Faisal Nurhidayatullah, S.T., M.T^{2]}

Program Studi Teknik Sipil Fakultas Sains dan Teknologi Universitas Teknologi Yogyakarta;
e-mail:[1] kmpngsyndct@gmail.com

ABSTRAK

Indonesia merupakan Negara yang rawan terjadi gempa bumi karena berada diwilayah jalur gempa pasifik (Circum Pasific Earthquake Belt) sehingga mengakibatkan seringnya terjadi gempa bumi yang mengakibatkan keruntuhan gedung. Akibat kerusakan yang terjadi menyebabkan kerugian ekonomi yang cukup besar. Saat ini arah metode perencanaan tahan gempa beralih dari pendekatan kekuatan (*force based*) menuju pendekatan kinerja (*performance based*) dimana struktur direncanakan terhadap beberapa tingkat kinerja. Struktur bangunan Rumah Susun (Prototipe) Bantul menggunakan *Nonlinear Dynamic Pushover Analysis* memungkinkan bisa mencegah terjadinya kecelakan ataupun meprediksi pola keruntuhan suatu gedung akibat adanya gempa. Penelitian tugas akhir dilakukan dengan tujuan untuk mengetahui level kinerja bangunan (*performance level*) berdasarkan ATC-40. Serta mekanisme terbentuk sendi plastis pada balok kolom dan memprediksi perilaku keruntuhan. Metode penelitian menggunakan *respons spektrum* dengan program SAP2000v14. Berdasarkan hasil perhitungan analysis pushover, kurva kapasitas diatas dapat disimpulkan bahwa kurva kapasitas x menghasilkan base force maksimum sebesar 8126.755 kN dan displacement sebesar 0.0468 m. Sedangkan kurva kapasitas y menghasilkan base force maksimum sebesar 28278.933 kN dan displacement sebesar 0.25055 m. Kurva kapasitas X dan kurva kapasitas Y, memiliki kekakuan yang sama yaitu sama-sama kaku tidak terjadi keleleha. Gedung termasuk dalam level kinerja *immediate Occupancy* yakni ada kerusakan pada struktur dimana kekuatan dan kekakuannya hampir sama dengan kondisi sebelum gempa dan gedung dapat digunakan Kembali. Pada hasil perhitungan sendi plastis yang didapatkan pada arah X dan arah Y gedung tidak mengalami sendi plastis dikarenakan gedung terlalu kaku, hal tersebut terjadi karena elemen struktur pada bangunan besar dan memiliki tulangan yang besar. Dalam kategori ini sistem penahan gaya lateral dalam bangunan dapat menahan karakteristik dan kapasitas beban gempa, resiko korban jiwa sangat rendah, dan kerusakan struktur dalam batas toleransi.

Kata kunci : *non-linier, performance, pushover*, sendi plastis

STRUCTURE SEISMIC EVALUATION WITH PUSHOVER ANALYSIS USING SAP2000

Anang Khoirur Rosidin [1] Eka Faisal Nurhidayatullah, S.T., M.T 2]

Civil Engineering Study Program, Faculty of Science and Technology, University of Technology
Yogyakarta;

e-mail:[1] kmpngsyndct@gmail.com

ABSTRACT

Indonesia is a country that is prone to earthquakes because it is in the Pacific earthquake belt (Circum Pacific Earthquake Belt), which results in frequent earthquakes that result in building collapses. The resulting damage caused considerable economic losses. Currently, the direction of earthquake resistant planning methods is shifting from a force-based approach to a performance-based approach where structures are planned at several levels of performance. The structure of the Bantul Flats (Prototype) building using Nonlinear Dynamic Pushover Analysis makes it possible to prevent accidents or predict the collapse pattern of a building due to an earthquake. The final assignment research was carried out with the aim of knowing the building performance level based on ATC-40. As well as the mechanism for forming plastic hinges in beams and columns and predicting failure behavior. The research method uses spectrum responses with the SAP2000v14 program. Based on the results of the pushover analysis calculation, the above capacity curve can be concluded that the x capacity curve produces a maximum base force of 8126.755 kN and a displacement of 0.0468 m. While the y-capacity curve produces a maximum base force of 28278.933 kN and a displacement of 0.25055 m. The X capacity curve and the Y capacity curve have the same stiffness, that is, they are equally stiff and no melting occurs. The building is included in the Immediate Occupancy performance level, namely there is damage to the structure where the strength and stiffness are almost the same as before the earthquake and the building can be used again. In the calculation of plastic hinges obtained in the X and Y directions the building does not experience plastic hinges because the building is too stiff, this occurs because the structural elements in the building are large and have large reinforcement. In this category the lateral force resisting system in the building can withstand the characteristics and capacity of earthquake loads, the risk of fatalities is very low, and structural damage is within tolerance limits.

Keywords: non-linear, performance, pushover, plastic hinge