KERENTANAN BANGUNAN AKIBAT GEMPA BERDASARKAN

PUSHOVER ANALYSIS DAN METODE HAZUS MH

Vicki Adi Prasetyo[1] [1] Eka Faisal Nurhidayatullah [2]

[1],[2],Program Studi Teknik Sipil Fakultas Sains dan Teknologi

Universitas Teknologi Yogyakarta

[1] vickyadipraset07@gmail.com [2] ekafaisal@staff.uty.ac.id

ABSTRAK

Gedung Sekolah setinggi 4 lantai dengan ketinggian 15 m dan kemungkinan memiliki rentan terhadap kerusakan disebabkan adanya gempa yang mengakibatkan jatuhnya korban jiwa. Gempa bumi yang telah banyak menelan korban menyebabkan tahapan mitigasi penting untuk dilakukan. Kegiatan mitigasi memprediksi probabilitas kerusakan serta estimasi kerugian yang ditimbulkan akibat gempa pada bangunan. Penelitian ini dilakukan dengan memeriksa kinerja *seismic* dengan *pushover analysi*s dan kerentanan bangunan dengan metode *HAZUS* dari rangka beton bertulang apabila gempa terjadi. Hal ini berguna untuk mengetahui presentase kerusakan gedung tersebut sebagai bagian dari mitigasi bencana.
Penelitian ini dievaluasi kinerja strukurnya dan dihitung probabilitas tingkat kerusakan akibat gempa dengan metode *Hazuz MH*. Tujuan dari penelitian ini mengetahui *capacity curve* bangunan setelah dilakukan *pushover analysis* menggunakan progam SAP2000 v.14, kemudian mengetahui level kinerja pada bangunan gedung Sekolah *Global Islamic School* setelah dilakukan *pushover analysis* berdasakan FEMA 440 dan ATC-40. Penelitian tugas akhir ini dilakukan dengan bantuan progam SAP2000 v.14 untuk melakukan *Analysis Pushover* dengan peraturan yang digunakan berdasarkan SNI 1726-2019, kemudian mencari level kinerja bangunan berdasarkan FEMA 440, ATC-40, dan menghitung probabilitas kerentanan bangunan menggunakan metode *HAZUS MH* untuk mendapatkan presentase kerusakan bangunan.Hasil analisis menunjukkan level kinerja gedung pada arah-x dan arah-y dengan parameter *Maximum Total Drift Ratio* adalah *Immediate Occupan*cy dan untuk *Maximum Inelastic Drift Ratio* adalah *Immediate Occupancy*. Dapat disimpulkan bahwa bangunan masih mampu menahan gempa yang terjadi, resiko korban jiwa manusia sangat kecil. Perhitungan kerentanan bangunan akibat gempa menggunakan meode *HAZUS MH*, kerentanan yang diperoleh akibat gempa bumi untuk bangunan dari arah sumbu x potensi bangunan *no damage* 27,68%, *slight* 39,08%, *moderate* 31,18%, *extensuve* 1,88%, dan *complete* 0,17%. Sedangkan jika gempa terjadi pada arah sumbu y probabilitas bangunan *no demage* 25,21%, *slight* 38,72%, *moderate* 33,61%, *extensuve* 2,25%, dan *complete* 0,21%. Potensi kerusakan baik arah x maupun arah y bangunan akibat gempa besar didominasi oleh kerusakan ringan "*slight*".

Kata Kunci: *HAZUS MH, Pushover analysis*, Probabilitas Bangunan.

VULNERABILITY OF BUILDING DUE TO EARTHQUAKE BASED ON PUSHOVER ANALYSIS AND HAZUS MH METHOD

Vicki Adi Prasetyo[1] [1] Eka Faisal Nurhidayatullah [2]

[1],[2] *Civil Engineering Study Program Faculty of Science and Technology*

University of Technology Yogyakarta

[1] vickyadipraset07@gmail.com [2] ekafaisal@staff.uty.ac.id

ABSTRACT

The 4-storey high school building with a height of 15 m may be vulnerable to damage caused by the earthquake so that it can cause casualties. The earthquake that has claimed many victims causes important mitigation steps to be carried out. Mitigation activities predict the probability of damage as well as estimates of losses caused by earthquakes in buildings. This research was conducted by examining the seismic performance with pushover analysis and the vulnerability of the building using the HAZUS method of reinforced concrete frames when an earthquake occurred. This is useful for knowing the percentage of damage to the building as part of disaster mitigation.

This study evaluates the performance of the structure and calculates the probability of damage caused by the earthquake using the Hazuz MH method. The purpose of this study is to determine the capacity curve of the building after a pushover analysis using the SAP2000 v.14 program and to determine the performance level of the Global Islamic School building after a pushover analysis based on FEMA 440 and ATC-40. This final project research was conducted using the SAP2000 v.14 program to perform a Pushover Analysis with the regulations used based on SNI 1726-2019, then look for the level of building performance based on FEMA 440, ATC-40, and calculate the probability of building vulnerability using the HAZUS MH method to get the percentage Damage to buildings. The analysis results show the performance level of the building in the x-direction and y-direction with the Maximum Total Drift Ratio parameter is Immediate Occupancy and for Maximum Inelastic Drift Ratio is Immediate Occupancy. It can be concluded that the building is still able to withstand the earthquake, the risk of human casualties is very small. The calculation of the vulnerability of buildings due to earthquakes using the HAZUS MH method, the vulnerability obtained due to earthquakes for buildings from the x-axis direction, the potential for buildings no damage 27.68%, slight 39.08%, moderate 31.18%, extensuve 1.88% and complete 0.17%. Meanwhile, if the earthquake occurs in the y-axis direction, the probability of building no damage is 25.21%, slight 38.72%, moderate 33.61%, extensive 2.25%, and complete 0.21%. The potential for damage in both the x and y directions of buildings due to a large earthquake is dominated by light damage.

Keywords: *HAZUS MH, Pushover analysis, Building Probability.*