

EVALUASI KINERJA STRUKTUR GEDUNG PERPUSTAKAAN DAN AUDITORIUM UNIVERSITAS SULAWESI BARAT MENGGUNAKAN ANALISIS PUSHOVER

Gaver Septhian Yara^[1] Dwi Kurniati, S.T., M.T.^[2]

Program Studi Teknik Sipil Fakultas Sains dan Teknologi Universitas Teknologi Yogyakarta;
gaversepthian@gmail.com^[1], dwikurniati.tsipil@gmail.com^[2]

ABSTRAK

Perpustakaan dan Auditorium Universitas Sulawesi Barat yang berada di daerah Mamuju Secara tektonik wilayah pesisir dan lepas pantai Sulawesi Barat terletak di zona jalur lipatan dan sesar (fold and thrust belt). Bangunan Gedung Perpustakaan dan Auditorium Universitas Sulawesi Barat sangat menarik untuk dilakukan evaluasi kinerja karena penulis ingin mengetahui apa yang akan terjadi setelah gempa terjadi, apakah bangunan tetap berdiri tanpa kerusakan struktur ataupun non-struktur sehingga dapat memicu keruntuhan pada gedung. Analisis pushover merupakan analisis statik non-linear untuk mengetahui perilaku keruntuhan suatu bangunan atau struktur. Analisis dilakukan dengan memberikan suatu pola beban lateral statik pada struktur, yang kemudian secara bertahap ditingkatkan dengan faktor pengali sampai suatu target perpindahan bangunan tercapai. Tujuan dari penelitian ini yaitu mengetahui nilai capacity curve, mengetahui nilai performance point pada kurva pushover sesuai hasil SAP2000 v22. serta mengetahui kriteria kinerja seismik struktur Gedung Perpustakaan dan Auditorium Universitas Sulawesi Barat berdasarkan ATC-40 dan FEMA 356. Metodologi penelitian pada Tugas Akhir ini ialah Pushover Analysis dengan bantuan data respon spektrum wilayah gempa Mamuju dengan nilai $S_d=1,22$ nilai $S_{d1}=0,57$ sesuai kategori risiko gempa SC (Tanah Keras) serta kategori desain seismik menggunakan nilai $R=8$ hal ini guna memperoleh kriteria kinerja bangunan berdasarkan ATC-40 dan FEMA 356 dengan menggunakan software SAP2000 v22. Dari hasil analisis pushover didapatkan nilai hasil Titik Kinerja (Performance Point) ATC- 40 dengan nilai $S_a = 0,46$ dan $S_d = 0,045$ untuk Push X, sedangkan nilai push Y $S_a = 0,454$ dan $S_d = 0,043$, Hasil analisis kedua evaluasi tingkat kinerja struktur menggunakan ATC-40 menunjukkan nilai drift ratio arah X 0,00730 dan drift ratio arah Y 0,00740 dan hasil analisis ketiga evaluasi tingkat kinerja struktur menggunakan FEMA 356, menunjukkan nilai target perpindahan lateral struktur arah X = 0,00428 (0,0428 %) dan nilai target perpindahan lateral struktur arah Y = 0,00428 (0,0428 %) .berdasarkan FEMA 356 dan ATC-40 menunjukkan bahwa Gedung Perpustakaan dan Auditorium Universitas Sulawesi Barat termasuk dalam level kinerja Immediate Occupancy (IO) hal ini berarti bahwa bila terjadi gempa gedung tidak mengalami kerusakan struktur dan non struktural sehingga bangunan tersebut tetap aman digunakan

Kata Kunci : ATC-40, FEMA 356, Immediate Occupancy, Pushover Analysis, Respons Spectrum

PERFORMANCE EVALUATION OF THE WEST SULAWESI UNIVERSITY LIBRARY AND AUDITORY BUILDING USING PUSHOVER ANALYSIS

Gaver Septhian Yara^[1] Dwi Kurniati, S.T., M.T.^[2]

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

gaversepthian@gmail.com^[1], dwikurniati.tsipil@gmail.com^[2]

ABSTRACT

West Sulawesi University Library and Auditorium located in the Mamuju area. Tectonically, the coastal and offshore areas of West Sulawesi are located in the fold and thrust belt zone. The University of West Sulawesi Library and Auditorium building is very interesting for performance evaluation because the author wants to know what will happen after the earthquake occurs, whether the building remains standing without structural or non-structural damage so that it can trigger the collapse of the building. Pushover analysis is a non-linear static analysis to determine the failure behavior of a building or structure. The analysis is carried out by providing a pattern of static lateral loads on the structure, which is then gradually increased by a multiplier factor until a target displacement of the building is achieved. The purpose of this research is to know the value of the capacity curve, to know the value of the performance point on the pushover curve according to the results of SAP2000 v22. as well as knowing the seismic performance criteria for the structure of the Library and Auditorium Building at the University of West Sulawesi based on ATC-40 and FEMA 356. The research methodology in this Final Project is Pushover Analysis with the help of response data from the spectrum of the Mamuju earthquake area with a value of $S_d = 1.22$, a value of $S_{d1} = 0.57$ according to the SC earthquake risk category (Hard Soil) and the seismic design category using a value of $R=8$ to obtain building performance criteria based on ATC-40 and FEMA 356 using SAP2000 v22 software. From the results of the pushover analysis, the ATC-40 Performance Point results obtained with a value of $S_a = 0.46$ and $S_d = 0.045$ for Push X, while the value of push Y $S_a = 0.454$ and $S_d = 0.043$. The results of the second analysis evaluate the performance level of the structure using ATC-40 shows the value of the drift ratio in the X direction is 0.00730 and the drift ratio in the Y direction is 0.00740 and the results of the third analysis evaluating the performance level of the structure using FEMA 356, show the target value of the lateral displacement of the structure in the X direction = 0.00428 (0.0428 %) and the target value of the lateral displacement of the structure in the Y direction = 0.00428 (0.0428%). Based on FEMA 356 and ATC-40 it shows that the Library and Auditorium Building of the University of West Sulawesi is included in the Immediate Occupancy (IO) performance level, this means that if In the event of an earthquake, the building does not experience structural and non-structural damage so that the building remains safe to use

Keywords : ATC-40, FEMA 356, Immediate Ocupancy, Pushover Analysis, Spectrum Response