

EVALUASI KINERJA STRUKTUR BANGUNAN DENGAN NON LINEAR STATIK PUSHOVER ANALYSIS

(Studi Kasus : Perpustakaan Daerah Boyolali “Remen Maos”)

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ABSTRAK

Perpustakaan Daerah Boyolali adalah fasilitas pendidikan untuk mengembangkan ilmu pengetahuan dimana kategorinya tergolong paling tinggi keamanan untuk mempertahankan fungsi struktur dari guncangan gempa sehingga bangunan tetap aman untuk pengguna gedung dan didapatkan keselamatan dan kesiapan pakai. Menggunakan analisis pushover untuk mengetahui perilaku keruntuhan bangunan dengan memberi beban lateral statik yang ditingkatkan sampai terjadi deformasi yang tujuannya mengetahui kurva kapasitas dari SAP2000 V.14, serta mengetahui level kinerja pada kondisi gempa Serviceability Level Earthquake, Design Basis Earthquake, dan Maximum Credible Earthquake menggunakan SAP2000 V.14 dan perhitungan manual. Pemodelan menggunakan SNI 1726:2019 dan 2847:2019, pembebanan menggunakan SNI 1727:2020. Metode melihat level kinerja menggunakan pushover analysis aturan ATC-40 dengan SAP2000 V.14 dan perhitungan manual yang kemudian mendapatkan perbandingan. Kurva kapasitas SAP2000 V14 X nilai displacement 0,315628m, gaya geser maksimum 373,8807kN, gaya geser leleh (V_y) 315,6230kN, displacement (δ_y) 0,204705. Arah Y displacement 0,230811m, gaya geser maksimum 329,3584kN, gaya geser leleh (V_y) 308,2725kN, displacement (δ_y) 0,174902. Drift ratio SLE SAP2000 arah X 0,611% level kinerja Immediate Occupancy, arah Y drift ratio 0,554% level kinerja Immediate Occupancy, perhitungan manual X drift ratio 0,85% level kinerja Immediate Occupancy, arah Y drift ratio 0,87% level kinerja Immediate Occupancy. Drift ratio DBE SAP2000 X 0,919% level kinerja Immediate Occupancy, arah Y drift ratio 0,820% level kinerja Immediate Occupancy, perhitungan manual X drift ratio 1,3% termasuk level Damage Control, arah Y drift ratio 1,35% level kinerja Damage Control. Drift ratio MCE SAP2000 X 1,420% level kinerja Damage Control, arah Y drift ratio 1,102% level kinerja Damage Control, perhitungan manual X drift ratio 1,89% level kinerja Damage Control, arah Y drift ratio 1,77% level kinerja Damage Control.

Kata Kunci : Pushover Analysis, ATC-40, Respons Spectrum, Immediate Occupancy, Damage Control

EVALUATION OF BUILDING STRUCTURE PERFORMANCE WITH NON LINEAR STATIC PUSHOVER ANALYSIS

(Case Study: Boyolali Regional Library “Remen Maos”)

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ABSTRACT

The Boyolali Regional Library is an educational facility to develop knowledge where the category is classified as the highest security to maintain the function of the structure from earthquake shocks so that the building remains safe for building users and safety and readiness for use are obtained. Using pushover analysis to determine the collapse behavior of the building by giving an increased lateral static load until deformation occurs which aims to determine the capacity curve of SAP2000 V.14, and determine the level of performance in earthquake conditions Serviceability Level Earthquake, Design Basis Earthquake, and Maximum Credible Earthquake using SAP2000 V.14 and manual calculations. Modeling using SNI 1726:2019 and 2847:2019, loading using SNI 1727:2020. The method of seeing the level of performance uses pushover analysis of the ATC-40 rules with SAP2000 V.14 and manual calculations which then get a comparison. The capacity curve of SAP2000 V14 X displacement value is 0.315628m, maximum shear force is 373.8807kN, yield shear force (V_y) is 315,6230kN, displacement (δ_y) is 0.204705. Y direction displacement 0.230811m, maximum shear force 329.3584kN, yield shear force (V_y) 308.2725kN, displacement (δ_y) 0.174902. SAP2000 SLE drift ratio X direction 0.611% Immediate Occupancy performance level, Y direction drift ratio 0.554% Immediate Occupancy performance level, manual calculation X drift ratio 0.85% Immediate Occupancy performance level, Y direction drift ratio 0.87% Immediate Occupancy performance level DBE SAP2000 drift ratio X 0.919% Immediate Occupancy performance level, Y direction drift ratio 0.820% Immediate Occupancy performance level, manual calculation X drift ratio 1.3% including Damage Control level, Y direction drift ratio 1.35% Damage Control performance level. MCE SAP2000 drift ratio X 1.420% Damage Control performance level, Y direction drift ratio 1.102% Damage Control performance level, manual calculation X drift ratio 1.89% Damage Control performance level, Y direction drift ratio 1.77% Damage Control performance level.

Keywords: Pushover Analysis, ATC-40, Response Spectrum, Immediate Occupancy, Damage Control