EVALUASI KINERJA STRUKTUR BANGUNAN DENGAN NON LINEAR STATIK *PUSHOVER ANALYSIS*

(Studi Kasus : Ruang Bersalin RSUD Pandan Arang Boyolali)

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ABSTRAK

Perancangan perencanaan bangunan sangatlah penting agar penggunan gedung tetap aman dan nyaman. Bangunan gedung rumah sakit, Ruang Bersalin RSUD Boyolali contohnya harus bisa bertahan dalam berbagai intensitas gempa. Oleh karena itu perlu dilakukan evaluasi kinerja bangunan untuk menghasilkan kurva kapasitas performanced point dan mengetahui tahap terjadinya sendi plastis hingga gedung mengalami keruntuhan, dan juga mengetahui tingkat layan bangunan tersebut. Penelitian menggunakan metode non-linear statik analisis pushover. Tujuan dari analisis pushover adalah memperkirakan gaya deformasi maksimum yang terjadi akibat pembebanan lateral hingga tercapai kondisi kritis. Pemodelan struktur menggunakan software SAP2000 V14 yang mengacu pada SNI 1726:2019 dan SNI 2847:2019. Pembebanan mengacu pada aturan SNI 1727:2020 untuk beban hidup, beban mati dan beban gempa. SNI 1726:2019 untuk pengecekan simpangan lateral dan drift ratio. Metode yang digunakan dalam analisis pushover menggunakan acuan capacity spectrum ATC-40 dengan perhitungan SAP2000 dan perhitungan manual. Berdasarkan hasil analisis pushover didapatkan kurva kapasitas x menghasilkan base force maksimum 428,940kN dan displacement 0,312m. Sedangkan kurva kapasitas y menghasilkan base force maksimum 82,313kN dan displacement 0,069m. Level kinerja analisis SAP2000 masing-masing kondisi gempa yaitu SLE X drift ratio 0,128%, SLE Y drift ratio 0,147 % dengan level kinerja immediate occupancy, DBE X drift ratio 0,192%, DBE Y drift ratio 0,218 % dengan level kinerja immediate occupancy, MCE X drift ratio 0,295%, MCE Y drift ratio 0,327% dengan level kinerja immediate occupancy. Sedangkan perhitungan manual SLE X drift ratio 0,784%, SLE Y drift ratio 0,802 % dengan level kinerja immediate occupancy, DBE X drift ratio 1,274%, DBE Y drift ratio 1,126% dengan level kinerja Damage Control, MCE X drift ratio 1,941%, MCE Y drift ratio 1,633% yang menunjukkan kinerja Damage Control.

Kata kunci: Performanced Point, Analisis Pushover, Kurva Kapasitas, Gempa, Respon Spektrum

EVALUATION OF BUILDING STRUCTURE PERFORMANCE WITH NON LINEAR STATIC PUSHOVER ANALYSIS
(Case Study: Maternity Room at Pandan Arang Hospital Boyolali)

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ABSTRACT

The design of the building plan is very important so that the use of the building remains safe and comfortable. The hospital building, the Maternity Room of the Boyolali Hospital, for example, must be able to withstand various earthquake intensities. Therefore, it is necessary to evaluate the performance of the building to produce a performanced point capacity curve and determine the stage of the occurrence of plastic hinges until the building collapses, and also determine the service level of the building. This study uses a non-linear static pushover analysis method. The purpose of pushover analysis is to estimate the maximum deformation force that occurs due to lateral loading until a critical condition is reached.

Structural modeling using SAP2000 V14 software which refers to SNI 1726:2019 and SNI 2847:2019. Loading refers to the rules of SNI 1727:2020 for live loads, dead loads and earthquake loads. SNI 1726:2019 for checking lateral deviation and drift ratio. The method used in the pushover analysis uses the ATC-40 capacity spectrum reference with SAP2000 calculations and manual calculations. Based on the results of the pushover analysis, the capacity x curve produces a maximum base force of 428.940kN and a displacement of 0.312m. While the y capacity curve produces a maximum base force of 82.313kN and a displacement of 0.069m. The SAP2000 analysis performance level for each earthquake condition is SLE X drift ratio 0.128%, SLE Y drift ratio 0.147% with immediate occupancy performance level, DBE X drift ratio 0.192%, DBE Y drift ratio 0.218% with immediate occupancy performance level, MCE X drift ratio 0.295%, MCE Y drift ratio 0.327% with immediate occupancy performance level. While the manual calculation SLE X drift ratio is 0.784%, SLE Y drift ratio is 0.802 % with an immediate occupancy performance level, DBE X drift ratio is 1.274%, DBE Y drift ratio is 1.126% with Damage Control performance level, MCE X drift ratio is 1.941%, MCE Y 1.633% drift ratio which shows the performance of Damage Control.

Keywords: Performanced Point, Pushover Analysis, Capacity Curve, Earthquake, Response Spectrum