

Evaluasi Berbasis Kinerja pada Struktur Gedung 6 Lantai berdasarkan Prosedur ASCE 41-17 dengan Metode Analisis Respons Spektrum dan Pushover = Performance-Based Evaluation of A 6-Story Building Structure Based on ASCE 41-17 Procedures with Response Spectrum and Pushover Analysis Methods

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Abstrak

Evaluasi kinerja struktur bangunan eksisting menjadi hal yang penting untuk memastikan kelayakan dan keamanan bangunan terhadap beban gempa, terutama bila terdapat perubahan fungsi maupun penurunan mutu material. Penelitian ini bertujuan untuk mengevaluasi kinerja seismik sebuah bangunan gedung 6 lantai yang mengalami penurunan mutu beton sebesar 50% dari mutu rencananya menggunakan prosedur evaluasi berbasis kinerja (Performance Based Evaluation) sesuai pedoman ASCE 41-17. Evaluasi dilakukan dengan metode statik non-linear pushover untuk mengetahui sejauh mana level kinerja struktur yang dapat dicapai. Selain itu, evaluasi juga dilakukan pada setiap elemen struktur seperti balok, kolom, dan sambungan balok-kolom untuk mengidentifikasi elemen kritis berdasarkan hasil analisis tersebut. Hasil menunjukkan penurunan mutu beton secara signifikan mempengaruhi level kinerja struktur, dimana struktur tersebut tidak mencapai titik performanya dan banyak elemen mengalami kerusakan melebihi batas Life Safety (LS) dan Collapse Prevention (CP). Berdasarkan kerusakan terbesar dari beberapa aksi yang ditinjau pada setiap elemen, terdapat 11,97% balok yang melewati batas LS dan 13,51% balok yang melewati batas CP. Lalu, terdapat 5,56% kolom yang melewati batas LS dan 7,07% kolom yang melewati batas CP. Kemudian, terdapat 59,04% sambungan yang melewati batas LS dan 62,65% sambungan yang melewati batas CP.

.....Performance evaluation of existing building structures is crucial to ensure their feasibility and safety against earthquake loads, especially when there are changes in function or degradation of material quality. This study aims to evaluate the seismic performance of a 6 story building that has experienced a 50% reduction in concrete quality from its planned strength using the Performance-Based Evaluation procedure according to the ASCE 41-17 guidelines. The evaluation was conducted using the non-linear static pushover method to determine the extent to which the structure's performance level could be achieved. In addition, the evaluation was also carried out on each structural element such as beams, columns, and beam-column joints to identify critical elements based on the analysis results. The results show that the decrease in concrete quality significantly affects the performance level of the structure, where the structure does not reach its performance point and many elements experience damage exceeding the Life Safety (LS) and Collapse Prevention (CP) limits. Based on the greatest damage from a review of several actions on each element, 11.97% of the beams exceeded the LS limit and 13.51% of the beams exceeded the CP limit. Then, 5.56% of the columns exceeded the LS limit and 7.07% of the columns exceeded the CP limit. Subsequently, 59.04% of the joints exceeded the LS limit and 62.65% of the joints exceeded the CP limit.