ABSTRACT

PERFORMANCE EVALUATION OF HIGH BUILDING STRUCTURES DUE TO EARTHQUAKE BASED ON DRIFT WITH SPECTRUM RESPONSE ANALYSIS (CASE STUDY: KINLAND AVENUE APARTMENT SERPONG)

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Kingland Avenue Serpong Apartment is a high-rise building located on Serpong KM. 08 Pakulonan Highway, North Serpong, South Tangerang. This building consists of 2 basements, 24 floors, and a roof with an elevation of ±116.70 m, has a risk category II. A building must have optimal performance, including in resisting earthquake loads, so that the safety of the occupants in it is guaranteed. Response spectrum analysis is one of the methods commonly used in analyzing earthquake loads to determine the performance of buildings based on their deviation values. This study aims to determine the performance level of the structure and the deviation between levels. Based on the results of the spectrum response analysis, the overall value of the deviation between levels is below the deviation between the levels of permits, with a roof deviation in the x direction of 0.2034 m and 0.2467 m in the y direction and the maximum total deviation ratio value in the x direction of 0.0016 and 0.0020 in the y direction. Based on ATC-40, the

performance level of the Kingland Avenue Serpong Apartment structure is at the Immediate Occupancy performance level, with little impact on structural damage. The characteristics and capacity of the vertical and lateral force resisting system on the structure are still the same as the conditions where the earthquake has not occurred, so the building is safe and can be used immediately. Comparison of the volume of installed reinforcement with the new reinforcement design in beams B9 and column K5 overall there is a decrease in the amount of basic reinforcement and the number of stirrups with the same diameter of reinforcement. In beam B9, the difference in the weight of the main reinforcement installed with the new reinforcement design is 18% and the stirrup reinforcement is 6%. Meanwhile, in column K5, the difference in the weight of the main reinforcement installed with the new reinforcement design is 9% and the stirrup reinforcement is 32%.

Keywords: Response spectrum, ATC-40, Immediate Occupancy, earthquake, drift

ABSTRAK

EVALUASI KINERJA STRUKTUR BANGUNAN BERTINGKAT AKIBAT GEMPA BERDASARKAN SIMPANGAN DENGAN ANALISIS RESPON SPEKTRUM (STUDI KASUS APARTEMEN *KINGLAND AVENUE* SERPONG)

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Apartemen *Kingland Avenue* Serpong adalah gedung bertingkat tinggi yang berada di Jalan Raya Serpong KM. 08 Pakulonan, Serpong Utara, Tangerang Selatan. Gedung ini terdiri dari 2 *Basement,* 24 lantai, dan atap dengan elevasi ±116,70 m, memiliki kategori resiko II. Sebuah gedung harus memiliki kinerja yang optimal termasuk dalam menahan beban gempa sehingga keselamatan penghuni di dalamnya lebih terjamin. Analisis respon spektrum adalah salah satu metode yang umum digunakan dalam menganalisis beban gempa untuk mengetahui kinerja bangunan berdasarkan nilai simpangannya. Penelitian ini bertujuan untuk mengetahui level kinerja struktur dan simpangan antar tingkat. Berdasarkan hasil analisis respon spektrum secara keseluruhan nilai simpangan antar tingkat berada di bawah simpangan antar tingkat izin, dengan nilai simpangan atap arah x sebesar 0,2034 m dan 0,2467 m pada arah y serta nilai rasio simpangan total maksimum arah x sebesar 0,0016 dan 0,0020 pada arah y. Berdasarkan ATC-40, Level kinerja

struktur Apartemen *Kingland Avenue* Serpong berada pada level kinerja *Immediate Occupancy*, dengan dampak sedikit kerusakan struktural yang terjadi. Karakteristik dan kapasitas sistem penahan gaya vertikal dan lateral pada struktur masih sama dengan kondisi dimana gempa belum terjadi, sehingga bangunan aman dan dapat langsung dipakai. Perbandingan volume tulangan terpasang dengan desain penulangan baru pada balok B9 dan kolom K5 secara keseluruhan terjadi penurununan jumlah tulangan pokok dan jumlah sengkang dengan besar diameter tulangan masih sama. Pada balok B9 selisih berat tulangan pokok terpasang dengan desain penulangan baru adalah sebesar 18% dan tulangan sengkang 6%. Sedangkan pada kolom K5 selisih berat tulangan pokok terpasang dengan desain penulangan baru adalah sebesar 9% dan tulangan sengkang 32%.

Kata Kunci: Respon spektrum, ATC-40, *Immediate Occupancy*, gempa, simpangan