ABSTRAK

Judul : Desain Alternatif Gedung The Smith dengan Efektivitas Penempatan dan Ketinggian Dinding Geser, Nama : Ignatius Wasiaji, NIM : 41115120167, Dosen Pembimbing : Ir. Zainal Abidin Shahab, M.T., 2020.

Dinding geser menyerap gaya lateral yang diterima struktur sehingga gaya lateral yang masuk ke frame lebih kecil dan berdampak pada efisiensi besarnya kolom. Penempatan dan ketinggian dinding geser pada struktur gedung dapat berpengaruh terhadap simpangan antar lantai dan tahanan beban horizontal pada struktur gedung apa bila dibebani gaya lateral. Ada perbedaan perilaku rangka dan dinding geser akibat gaya lateral gempa. Perbedaan perilaku tersebut menyebabkan struktur sistem ganda terjadi penambahan gaya geser pada struktur kolom bagian atas. Agar tidak terjadi penambahan gaya geser pada struktur kolom bagian atas perlu dilakukan analisis ketinggian dinding geser yang efektif.

Pada penelitian ini digunakan gedung bertingkat dengan 35 lantai, bentuk gedung persegi panjang. Analisis struktur menggunakan software ETABS v.9.5. Terdapat empat model konfigurasi peletakan dinding geser yang dianalisis: Gedung sistem ganda existing, Konfigurasi 1: dinding geser berbentuk L di ke-empat tepi bangunan, Konfigurasi 2: sepasang dinding geser berbentuk U di tengah bangunan arah x, dan Konfigurasi 3: sepasang dinding geser berbentuk U di tengah bangunan arah y.

Perbandingan hasil analisis pada ke-empat model konfigurasi penempatan dinding geser diperoleh bahwa sepasang dinding geser berbentuk U di tengah bangunan arah X adalah paling efektif, di mana portal mampu menahan 32,4% dan dinding geser menahan 67,6% gaya gempa arah X. Pada gaya gempa arah Y portal mampu menahan 29,33% dan dinding geser menahan 70,6% gaya gempa.

Struktur desain yang terpilih sebagai penempatan dinding geser yang paling efektif dioptimasi ketinggian dinding gesernya. Hasil Optimasi ketinggian dinding geser adalah ± 15% tinggi gedung = lantai 28. Ketinggian optimum ini dapat mengurangi biaya konstruksi yang dibutuhkan.

Hasil analisis ETABS diperoleh volume beton bertulang struktur desain = 8.104,436 m^3. Volume beton bertulang sistem ganda existing = 8,277,15 m^3. Volume beton bertulang struktur desain lebih kecil dibandingkan dengan volume beton bertulang struktur sistem ganda existing.

Kata kunci : Dinding Geser, Penempatan, Optimasi Ketinggian, Sistem Ganda

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ABSTRACT

Title: Alternative Design of The Smith Building with Placement and Height Effectivity of Shear Wall, Name: Ignatius Wasiaji, NIM: 41115120167, Advisor: Ir. Zainal Abidin Shahab, M.T., 2020.

Shear wall absorbs lateral force received by structure so the lateral force that enters to frame is smaller and impacts the efficiency of the column size. The placement and height of the shear wall in the building structure can affect the intersection between floors and horizontal load resistance in the building structure when burdened with lateral forces. There is a difference between frame and shear wall behavior due to earthquake lateral forces. This difference in behavior causes a dual system structure to occur with the addition of shear forces to the upper column structure. To prevent the addition of shear forces in the upper column structure, an effective shear wall height analysis is needed.

In this study used a 35-storey building with a rectangular building shape. Structure analysis using ETABS software v.9.5. Four shear wall laying configuration models were analyzed: Existing dual system building, configuration 1: L-shaped shear wall at the four edges of the building, configuration 2: a couple of U-shaped shear walls in the middle of the x-direction building, and configuration 3: a couple of U-shaped shear walls in the middle of the y-direction building.

Comparison of the results of the analysis on the four shear wall placement configuration models found that a couple of U-shaped shear walls in the middle of the x-direction building is the most effective, the portal is able to absorb 32.4% and the shear wall absorb 67.6% of the X-direction earthquake force. In the Y-direction earthquake force the portal absorb 29.33% and the shear wall absorb 70.6% of the earthquake force.

The Structure design that selected as the most effective shear wall placement is optimized for the height of the shear wall. The results of optimized for the height of the shear wall is ± 15% of building height or up to the stories 28th. This optimum height can reduce the construction costs needed.

The ETABS analysis results that volume of reinforced concrete structure design = 8,104,436 m3. Volume of reinforced concrete structure existing = 8,277.15 m3. The volume of reinforced concrete structure design is smaller than the volume of reinforced concrete structure of the existing dual system structure.

Keywords: Shear Wall, Placement, Height Optimization, Dual Systems

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