

# BUDGET PLAN EFFICIENCY AND STRUCTURE STRENGTH COMPARISON OF HADININGRAT TERRACE APARTMENT REDESIGN WITH A SHEARWALL ADDITION ON THE SPECIAL MOMENT RESISTING FRAME

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## ABSTRAK

Negara Indonesia merupakan negara yang banyak mempunyai gunung api vulkanik dan termasuk dalam daerah cincin api (*ring of fire*), sehingga beberapa kawasan di Indonesia rawan terjadi bencana seperti gempa bumi. Beberapa bangunan bertingkat yang terletak di Yogyakarta didesain khusus sehingga mempunyai ketahanan terhadap gempa bumi. Selain kekuatan, efektivitas biaya dalam pembangunan juga dipertimbangkan sebagai pilihan. Dinding geser (*shearwall*) merupakan struktur dinding yang didesain khusus untuk menahan gaya gempa, untuk selanjutnya tipe struktur berpengaruh pada kekuatan bangunan.

Perbandingan efisiensi rencana anggaran biaya dilakukan pada struktur asli (tanpa *shearwall*) dan struktur *redesign* ( dengan penambahan *shearwall*), dengan cara modelling struktur *redesign* pada SAP (Structure Anaysis Program). Output SAP berupa gaya dalam digunakan untuk perhitungan tulangan, Selanjutnya dilakukan perhitungan rencana anggaran biaya dari perhitungan tulangan dan dilakukan perbandingan dengan perhitungan rencana anggaran biaya struktur asli (tanpa *shearwall*) yaitu dari rekapitulasi tulangan yang didapatkan dari *shopdrawing* Apartemen Hadiningrat Terrace Yogyakarta. Selanjutnya pengecekan kekuatan struktur didapatkan dengan metode perbandingan *drift ratio* masing-masing struktur.

RAB total pada struktur dengan penambahan *shearwall* adalah Rp 25.055.676.433,38, untuk RAB total pada struktur tanpa penambahan *shearwall* adalah Rp 25.197.989.370,39. Selisih dari RAB struktur keduanya adalah Rp 142.312.937,01. Rasio struktur dengan penambahan *shearwall* pada arah x dan arah y adalah 2,530 dan 2,124, sedangkan rasio struktur tanpa *shearwall* arah x dan arah y adalah 2,142 dan 1,165. Hal ini menunjukkan bahwa struktur dengan penambahan *shearwall* memiliki kekuatan yang lebih baik daripada struktur tanpa *shearwall*.

**Kata Kunci** : *Drift Ratio*, Rencana Anggaran Biaya, SAP, *Shearwall*

## ABSTRACT

*Indonesia is a country that has many volcanoes, and it is located in an area known as the 'ring of fire', therefore, several areas in Indonesia are prone to earthquakes. Many high rise buildings in Yogyakarta are specially designed to be able to withstand earthquakes. Other than strength, cost effectivity in constructing the buildings must also be considered. Shearwall is a type of wall structure designed specially to withstand the force from earthquakes, and later, the type of structure affects a building's strength.*

*Budget plan efficiency comparison was performed on the original structure (without shearwall) and the redesigned structure (with a shearwall addition) by means of structure redesign modelling in the SAP (Structure Analysis Program). The SAP output in the form of inner force was used to calculate reinforcement. Afterwards, a budget plan calculation was conducted from reinforcement cost calculation, and the results were compared with the results of an original structure cost (without shearwall), that is,*

*from the recapitulation of reinforcement cost obtained from the shop drawing of Hadiningrat Terrace Apartment, Yogyakarta. Next, the structure strength checking was obtained with a drift ratio comparison method on each of the structures.*

*The total budget plan for the structure with a shearwall addition was Rp. 25,055,676,433.38, the total budget plan for the structure without a shearwall addition was Rp. 25,197,989,370.39. There was a difference of Rp. 142,312,937.01 between the two budget plans. The structure ratios with a shearwall addition towards x direction and y direction were 2.530 and 2.124, whereas the structure ratios without a shearwall addition towards x direction and y direction were 2.142 and 1.165. This shows that the structure with a shearwall addition had better strength than that without a shearwall addition.*

**Keywords:** *drift ratio, budget plan, SAP, shearwall*