

## ABSTRAK

Alvira Damayanti NIM 5213250045: Pengaruh Penggunaan *Seismic Base isolation System* Terhadap Respon Struktur Gedung Bertingkat (Studi Kasus: Apartemen Sentraland Medan)

Perkembangan pembangunan gedung bertingkat di Indonesia yang semakin pesat menuntut perencanaan struktur harus mampu menjamin keselamatan dan kenyamanan bangunan, khususnya terhadap beban gempa. Apartemen Sentraland Medan merupakan bangunan gedung bertingkat 20 lantai tanpa basement yang menggunakan sistem struktur beton bertulang konvensional (*fixed base*) dan berdiri pada kondisi tanah lunak. Bangunan bertingkat dengan sistem *fixed base* cenderung mengalami respon dinamik yang besar akibat pengaruh gempa, seperti meningkatnya gaya geser dasar, simpangan antar lantai, dan periode getar alami struktur. Oleh karena itu, diperlukan sistem struktur yang mampu mereduksi pengaruh gempa, salah satunya dengan penerapan *sistem seismic Base Isolation tipe High Damping Rubber Bearing (HDRB)* yang berfungsi meredam energi gempa dan meningkatkan kinerja seismik bangunan.

Penelitian ini bertujuan untuk menganalisis pengaruh penggunaan sistem *seismic base isolation tipe High Damping Rubber Bearing (HDRB)* terhadap respon struktur Gedung Apartemen Sentraland Medan. Analisis dilakukan dengan membandingkan respon struktur antara kondisi gedung eksisting dan kondisi menggunakan *base isolation*. Parameter respon struktur yang ditinjau meliputi periode getar alami struktur, gaya geser dasar, dan simpangan antar lantai. Metode analisis yang digunakan adalah analisis riwayat waktu (*time history analysis*) sesuai dengan ketentuan SNI 1726:2019, dengan bantuan perangkat lunak analisis struktur. Hasil penelitian diharapkan dapat menunjukkan efektivitas penerapan *base isolation* dalam meningkatkan kinerja struktur gedung bertingkat terhadap beban gempa..

Secara keseluruhan, penggunaan sistem *seismic base isolation tipe High Damping Rubber Bearing (HDRB)* menunjukkan peningkatan kinerja seismik struktur yang signifikan. Penerapan *base isolation* meningkatkan periode getar alami struktur rata-rata sebesar 90%, sehingga respons struktur menjadi lebih fleksibel. Selain itu, gaya geser dasar mengalami penurunan rata-rata sebesar 69% dibandingkan struktur eksisting, meskipun pada kondisi gempa tertentu terjadi peningkatan gaya geser hingga 52% akibat pengaruh karakteristik frekuensi dan arah dominan gempa. Dari sisi deformasi, sistem *base isolation* mampu mereduksi simpangan antar lantai secara signifikan, yaitu sebesar 75%–98% pada berbagai data gempa, sehingga secara umum penerapan *base isolation* efektif dalam meningkatkan kinerja dan keamanan seismik bangunan bertingkat.

**Kata kunci:** *Base isolation*, respon struktur, analisis riwayat waktu

## **ABSTRACT**

*Alvira Damayanti NIM 5213250045: The Influence of Seismic Base isolation System on the Structural Response of Multi-Story Buildings (Case Study: Sentraland Apartment Medan)*

*The rapid development of high-rise buildings in Indonesia requires structural designs that ensure building safety and comfort, particularly against seismic loads. The Sentraland Apartment in Medan is a 20-story building without a basement that employs a conventional reinforced concrete structural system (fixed-base) and is founded on soft soil conditions. High-rise buildings with fixed-base systems tend to experience significant dynamic responses during earthquakes, such as increased base shear forces, interstory drifts, and natural vibration periods. Therefore, a structural system capable of reducing seismic effects is required, one of which is the implementation of a seismic base isolation system using High Damping Rubber Bearings (HDRB), which functions to dissipate seismic energy and enhance the seismic performance of buildings.*

*This study aims to analyze the effect of implementing a seismic base isolation system using High Damping Rubber Bearings (HDRB) on the structural response of the Sentraland Apartment Building in Medan. The analysis was conducted by comparing the structural responses of the existing building and the building equipped with base isolation. The evaluated structural response parameters include the natural vibration period, base shear force, and interstory drift. Time history analysis was performed in accordance with the provisions of SNI 1726:2019 using structural analysis software. The results of this study are expected to demonstrate the effectiveness of base isolation in improving the seismic performance of high-rise buildings under earthquake loading.*

*Overall, the application of the High Damping Rubber Bearing (HDRB) seismic base isolation system significantly improves the seismic performance of the structure. The use of base isolation increases the average natural period of the structure by 90%, resulting in a more flexible structural response. In addition, the base shear force is reduced by an average of 69% compared to the existing structure, although under certain earthquake conditions, an increase in base shear of up to 52% occurs due to the influence of dominant frequency characteristics and earthquake direction. In terms of deformation, the base isolation system effectively reduces interstory drift by 75%–98% under various earthquake records, indicating that the application of base isolation is generally effective in enhancing the seismic performance and safety of high-rise buildings..*

**Keywords:** *base isolation, structural response, time history analysis*