

INTISARI

Rekonstruksi rumah warga pasca bencana gempa bumi merupakan sebuah tugas yang harus dilakukan. Berbagai tantangan datang terkait bagaimana caranya agar warga dapat kembali ke rumah dengan cepat agar tidak berlama-lama berada di tenda pengungsian. Rumah rekonstruksi haruslah dibangun kembali dengan memperhatikan kaidah-kaidah rumah tahan gempa. RISBA (Rumah Instan Struktur Baja) merupakan desain rumah instan dengan struktur utama baja yang diperuntukkan sebagai rumah warga yang terdampak bencana gempa bumi yang bersifat permanen. Desain terbaru RISBA dengan dinding tembokan penuh diakomodasi karena adanya kecenderungan masyarakat Palu untuk lebih memilih rumah dengan dinding tembokan dengan berbagai alasan, salah satunya karena merasa lebih aman. RISBA dengan desain tembokan penuh dan perkuatan dengan pelat *strip* akan dianalisis secara nonlinier dengan statik *pushover* dan dinamik *time history*.

Permodelan RISBA secara 3D dan dianalisis secara numerik menggunakan bantuan program komputer SAP2000. Elemen struktur utama rangka baja didefinisikan secara nonlinier agar dapat diketahui perilakunya ketika menahan beban yang melampaui batas elastisnya. RISBA dengan dinding tembokan penuh ini juga akan dikaji performa dalam menahan beban seismiknya sesuai SNI 1726:2019 menggunakan metode statik *pushover* dan dinamik *time history*. Penentuan level kinerja struktur berdasarkan *performance based design* menurut FEMA 356-2000.

Hasil analisis modal didapatkan periode natural struktur untuk mode 1 adalah 0,056 detik. Partisipasi massa bekerja secara 90% untuk arah x dan y pada mode ke-20. Hasil analisis *pushover* menunjukkan elemen struktur RISBA mencapai plastis pada *drift ratio* 6,11% untuk deformasi arah x dan 4,18% untuk arah y. Level kinerja struktur hasil analisis statik *pushover* adalah *Life Safety*. Analisis nonlinier *time history* menghasilkan *drift ratio* yang < 2% yakni 0,002% untuk arah x dan 0,0007% arah y. Kondisi elemen struktural masih elastis sedangkan kondisi dinding bata hanya kemungkinan akan terjadi kerusakan minor yakni retak di lapisan mortar akibat tegangan tarik. Level kinerja struktur RISBA dari analisis nonlinier *time history* berdasarkan performa *drift ratio* adalah *Immediate Occupancy*, sedangkan bila ditinjau terhadap kondisi elemen nonstruktural yakni dinding level kinerja struktur adalah *Operational Level*.

Kata kunci: RISBA, SAP2000, *drift ratio*, *pushover*, *time history*

ABSTRACT

Reconstruction of residents' houses after the earthquake disaster is a task that must be done. Various challenges came related to how the residents could return to their homes quickly so they did not stay in the refugee camps for long. Reconstruction houses must be rebuilt by taking into account the rules of earthquake-resistant houses. RISBA (Rumah Instan Struktur Baja) is an instant house design with a steel main structure that is intended as a permanent house for residents affected by the earthquake. RISBA's latest design with fully walled walls is accommodated due to the tendency of the Palu community to prefer houses with walls for various reasons, one of which is because they feel safer. RISBA with full wall design and strip plate reinforcement will be analyzed nonlinearly with static pushover and dynamic time history.

Modeling of RISBA in 3D and analyzed numerically using the computer program SAP2000. The main structural elements of steel frames are defined nonlinearly in order to know their behavior when bearing loads that exceed their elastic limits. RISBA with full masonry walls will also be studied for its performance in resisting seismic loads according to SNI 1726:2019 using static pushover and dynamic time history method. Determination of structure performance level based on performance based design code FEMA 356-2000.

The results of the modal analysis show that the natural period of the structure for mode 1 is 0,056 seconds. The mass participation works at 90% for the x and y directions in the 20th mode. The results of the pushover analysis showed that the RISBA structural elements reached plastic at a drift ratio of 6,11% for the x-direction and 4,18% for the y-direction. The performance level of the structure as a result of the pushover static analysis is Life Safety. Nonlinear time history analysis resulted in a drift ratio of < 2%, defomation 0,002% for the x direction and 0,0007% for the y direction. The condition of the structural elements is still elastic, while the condition of the brick walls only likely to cause minor damage which cracks in the mortar layer due to tensile stress. The performance level of the RISBA structure from a nonlinear time history analysis based on the drift ratio performance is Immediate Occupancy, whereas when viewed from the condition of non-structural elements (wall), the structural performance level is Operational Level.

Keywords: RISBA, SAP2000, *drift ratio, pushover, time history*