

## ABSTRAK

Pengaruh gempa bumi terhadap gedung menyebabkan gedung berpeluang runtuh namun diwajibkan bagi struktur bangunan yaitu kolom & balok harus daktail/kokoh. Tujuan proyek akhir ini adalah mengevaluasi kinerja seismik gedung Perpustakaan UIII (Universitas Islam Internasional Indonesia) 8 lantai untuk mengetahui *performance level* bangunan pasca gempa. *Performance level* adalah batas elastis hingga inelastis karena analisis non-linier. *Performance level* terdiri dari *Immediate Occupancy*, *Life Safety*, *Collapse Prevention*, *Structural Stability*. Umumnya bahwa perilaku runtuhnya bangunan berperilaku inelastik, maka dibutuhkan metode untuk memperkirakan perilaku inelastik akibat gempa untuk menjamin kinerja bangunan. Berdasarkan peraturan ATC-40 terdapat metode yang disebut PBSE (*Performance Based Seismic Evaluation*) untuk menghitung analisis struktur tahan gempa yaitu dengan analisis non-linier *pushover*.

Analisis *pushover* yang dimodelkan secara 3D dan di *running* nonlinier *static*. Sederhananya, analisis *pushover* adalah prosedur analisis non-linier untuk memperkirakan kapasitas kekuatan suatu struktur di luar batas elastisnya (keadaan batas) hingga kekuatan puncaknya dalam rentang pasca-elastis. *Output drift/displacement* dari hasil *performance point* minimal lebih kecil dari *displacement limit*. Hasil nilai total *drift ratio* dapat menentukan *performance level* dengan tabel di ATC-40.

Hasil dari penelitian menunjukkan bahwa gaya geser dari evaluasi analisis *pushover* pada arah x = 7018,227 ton dan arah y = 5593,94 ton. Gaya geser dasar tersebut lebih besar dari gaya rencana yaitu 1274,17 ton. Maksimum total *drift ratio* adalah x = 0,00469 m & y = 0,0003 m, sehingga *performance level* gedung perpustakaan UIII termasuk dalam *immediate occupancy* (IO) artinya gedung pasca gempa mampu menahan gempa dengan kerusakan ringan dan kelayakan gedung baik untuk digunakan kembali. Nilai *displacement limit* berdasarkan SNI 1726-2019 yaitu 0,755 m jadi gedung aman terhadap gempa rencana.

Kata kunci: gempa bumi, analisis *pushover*, *performance level*.

## **ABSTRACT**

*The effect of an earthquake on the building causes the building to collapse but it is obligatory for the building structure, namely that columns & beams must be ductile / sturdy. The purpose of this final project is to evaluate the seismic performance of the 8 floors & roofs of the UIII Library building to determine the post-earthquake level performance of the building. Performance level consists of Immediate Occupancy, Life Safety, Collapse Prevention, Structural Stability. Generally, building collapse behavior behaves inelastically, so a method is needed to estimate the inelastic behavior due to earthquakes to ensure building performance. Based on the ATC-40 regulations there is a method called PBSE (Performance Based Seismic Evaluation) to calculate earthquake resistant structure analysis, namely non-linear pushover analysis.*

*Pushover analysis that is modeled in 3D and running nonlinear statically. Simply put, pushover analysis is a non-linear analysis procedure for estimating the strength capacity of a structure beyond its elastic limit (boundary state) to its peak strength in the post-elastic range. The output drift / displacement of the resulting performance point is at least smaller than the displacement limit. The results of the total drift ratio value can determine the performance level with the table on the ATC-40.*

*The results of the study indicate that the shear force from the evaluation of pushover analysis is in the  $x = 7018,227$  tonnes and the  $y$  directions =  $5593,94$  tonnes. The basic shear force is greater than the design force which is  $1274,17$  tons. The maximum total drift ratio is  $x = 0,00469$  m &  $y = 0,0003$  m, so the performance level of the UIII library building is included in immediate occupancy (IO), meaning that the post-earthquake building is able to withstand earthquakes with minor damage and the building's feasibility is good for reuse. The displacement limit value based on SNI 1726-2019 is  $0.755$  m so the building is safe against planned earthquakes.*

**Keywords :** *earthquake, pushover analysis, performance level.*