# INTISARI

Apartemen Samesta Mahata Margonda yang memadukan antara hunian dengan Stasiun Pondok Cina mengusung konsep *Transit Oriented Development*. Untuk mendukung konsep tersebut, Stasiun Pondok Cina direnovasi menjadi dua lantai dengan struktur baja berupa *Pre-Engineered Building* yang terdapat *joist beam* dengan menggunakan *knee bracing* di kedua ujungnya. Dalam pemodelan ETABS yang dilakukan oleh Kirby, vendor struktur baja stasiun, sambungan *joist beam* dimodelkan sebagai sendi perlu dievaluasi lebih lanjut karena keberadaan *knee bracing*. Oleh karena itu, perlu dianalisis mengenai kesesuaian pemodelan dari *joist beam*.

Analisis *joist beam* dilakukan dengan metode elemen hingga 3D, dibantu *software* Abaqus, untuk mengetahui momen lentur di bentang tengah dan klasifikasi jenis sambungan berdasarkan tahanan momen. Nilai momen lentur tersebut digunakan untuk menghitung panjang efektif dari *joist beam*. Penyesuaian pemodelan *joist beam* dalam bentuk panjang efektif dimodelkan pada struktur stasiun secara keseluruhan dengan membandingkan struktur stasiun tanpa menggunakan panjang efektif *joist beam* (model 1) dan struktur stasiun menggunakan panjang efektif *joist beam* (model 2) yang dimodelkan dengan SAP2000. Selanjutnya, frekuensi alami model 1 dan 2 dibandingkan dengan frekuensi jalan rel ketika kereta melintas.

Hasil analisis menunjukkan bahwa penggunaan *bracing* tidak memengaruhi nilai kekangan momen pada sambungan karena memiliki rasio kekangan momen kurang dari 20%, yaitu sebesar 10,735%, sehingga sambungan diklasifikasikan sebagai sendi. Namun, penggunaan *bracing* berpengaruh dalam penambahan kekakuan pada *joist beam* dalam bentuk panjang efektif *joist beam* sebesar 5,864125 m. *Demand-Capacity Ratio* (DCR) aksial-momen dan DCR geser dari *joist beam* pada model 2 turun 61,01% dan 53,49% dibandingkan dengan model 1. Simpangan lantai pada model 1 dan 2 pada sumbu Y akibat beban angin dan gempa relatif sama, sedangkan simpangan lantai pada model 2 pada sumbu X akibat beban angin dan gempa, masing-masing lebih kecil 28,770% dan 40,859% dibandingkan model 1. Resonansi pada model 2 tidak terjadi karena frekuensi jalan rel ketika kereta melintas lebih kecil dari frekuensi alami model 2, sedangkan model 1 mungkin terjadi resonansi karena memiliki frekuensi natural yang berdekatan.

**Kata kunci:** *Pre-Engineered Building*, *knee bracing*, panjang efektif, Abaqus, SAP2000

# *ABSTRACT*

*Samesta Mahata Margonda Apartment which combines residential with Pondok Cina Station carries the concept of Transit Oriented Development. To support the concept, Pondok Cina Station was renovated into two floors with steel structure in the form of Pre-Engineered Building which consist of joist beam that uses knee bracing at both ends. On ETABS modeling conducted by Kirby, the vendor of the steel structure of the station, the connection on the joist beam is modeled as a pinned, which need to be evaluated due to the presence of knee bracing. Hence, it needs to be analyzed about the suitability of modeling of the joist beam.*

*The analysis of the joist beams is done by finite element method, assisted by Abaqus software, to know the bending moment in the middle span and classification of connection type based on moment resistance. The bending moment value is used in calculating the effective length of the joist beam. The adjustment of the joist beam in the form of effective length is modelled on overall station structure by comparing the station structure without using the effective length of the joist beam (model 1) and the station structure using the effective length of the joist beam (model 2) modeled with SAP2000. Furthermore, the natural frequency of model 1 and 2 compared with the natural frequency of railroad while the train pass.*

*The results showed that the use of bracing does not affect the value of moment resistance in the connection, because it has moment resistance ratio less than 20% which is 10,735%, so the connection is classified as a pinned. However, the use of bracing had an affect in adding stiffness to the joist beam in the form of an effective length joist beam of 5,864125 m. The axial-moment and shear Demand-Capacity Ratio (DCR) obtained from the joist beam on model 2 decreased 61,01% and 53,49% compared to model 1. The story drift on model 1 and 2 on the Y axis due to wind and earthquake load is relatively the same, while the story drift on model 2 on the X axis due to wind load and earthquake load is 28.796% and 47.051% respectively compared to model 1. The resonance of model 2 does not occur due to the natural frequency of the rail when the train pass is less than the natural frequency of model 2. Meanwhile, the resonance of model 1 may occur due to the adjacent natural frequency value.*

***Keywords:*** *Pre-Engineered Building, knee bracing, effective length, Abaqus, SAP2000*