

Kabupaten Pekalongan merupakan daerah rawan bencana gempa bumi, berdasarkan jaraknya <10 km dari sesar aktif terdekat. Dengan kejadian yang mendadak, gempa bumi mengancam jatuhnya korban jiwa dan kerugian materi. Oleh karena itu, perlu dilakukan mitigasi dan pencegahan berupa evaluasi bangunan untuk mengetahui kelayakan dan ketahanan akibat gempa berdasarkan level kinerja sesuai lokasi bangunan.

Bangunan yang dievaluasi merupakan gedung *workshop* 5 lantai berlokasi di Pekalongan, dilakukan dengan kala ulang gempa 72, 475, serta 2475 tahun berdasarkan standar ASCE 41-17. Evaluasi struktur dilakukan pada dua tahap, yaitu evaluasi *Tier 1 (screening)* dan *Tier 2 (deficiency-based evaluation)*. Dilakukan juga analisis perilaku tiang bor dengan pengecekan kapasitas dukung aksial, lateral, dan penurunan segera akibat deformasi beban gempa *time history* dengan periode 0,2 detik. Pada pelaksanaannya, konstruksi struktur atas dievaluasi menggunakan metode *lean six sigma*. Metode ini meliputi *define* dan *measure* terkait alasan keterlambatan, *analysis* faktor dan proses penyebab keterlambatan, *improve* untuk memperbaiki metode dengan memasukkan prinsip *lean construction*, serta *control* untuk mengetahui dampak pada keseluruhan jadwal konstruksi.

Hasil evaluasi struktur atas dan lokasi situs, yaitu pengecekan *strength and stiffness*, level performa *immediate occupancy*, *basic configuration building*, dan pengecekan menggunakan metode *linear dynamic* beberapa poin tidak memenuhi. Pada pengecekan *strength and stiffness*, dari 3 poin perhitungan untuk pengecekan tiap arah x dan y serta tiap level, hanya 40% yang memenuhi. Pada pengecekan level performa *immediate occupancy*, 11,76% tidak diaplikasikan serta 17,65% tidak memenuhi dari total 17 poin. Pengecekan konfigurasi bangunan didapatkan 7,69% tidak diaplikasikan serta 23,08% tidak memenuhi dari total 13 poin. Sementara pada pengecekan semua elemen balok dan kolom memenuhi untuk pengecekan momen lentur, geser, dan aksial. Pada pengecekan perilaku fondasi tiang bor tiang tunggal, fondasi tiang bor mampu menahan beban aksial dengan kontrol kapasitas dukung izin, beban lateral arah x dan y dengan kontrol 40 mm, serta penurunan segera akibat deformasi. Pada evaluasi keterlambatan, diketahui pekerjaan struktur atas gedung *workshop* mengalami keterlambatan selama 28 hari. Setelah dilakukan perbaikan, bisa dilakukan efisiensi hingga 20% dari proses keterlambatan serta pengaruhnya pada pekerjaan struktur atas gedung *workshop* menghemat total hingga 4 pekan.

**Kata kunci:** Evaluasi, Gempa, Struktural, Fondasi, ASCE 41-17

## ABSTRACT

*Pekalongan Regency is prone to earthquakes, based on its distance of <10 km from the nearest active fault. With sudden occurrences, earthquakes threaten casualties and material losses. Therefore, mitigation and prevention are necessary in the form of building evaluation to determine the feasibility and resilience due to earthquakes based on performance levels according to the location of the building.*

*The evaluated building is a 5-storey workshop building located in Pekalongan, conducted with earthquake return times of 72, 475, and 2475 years based on the ASCE 41-17 standard. The structural evaluation was conducted in two stages, namely Tier 1 (screening) and Tier 2 (deficiency-based evaluation). Behavioral analysis of the bored piles was also conducted by checking the axial bearing capacity, lateral bearing capacity, and immediate settlement due to the deformation of time history earthquake loads with a period of 0.2 seconds. In practice, the superstructure construction was evaluated using the lean six sigma method. This method includes define and measure related to the reasons for delays, analyze the factors and processes causing delays, improve to improve the method by incorporating lean construction principles, and control to determine the impact on the overall construction schedule.*

*The results of the evaluation of the upper structure and site location, namely checking strength and stiffness, immediate occupancy performance level, basic configuration building, and checking using the linear dynamic method, some points do not meet. In checking strength and stiffness, of the 3 calculation points for checking each x and y direction and each level, only 40% were met. In checking the immediate occupancy performance level, 11.76% was not applied and 17.65% did not fulfill from a total of 17 points. Checking the building configuration, 7.69% were not applied and 23.08% were not complied with out of a total of 13 points. While in checking all beam and column elements, the bending, shear, and axial moments were met. In checking the behavior of the single-pile bored pile foundation, the bored pile foundation is able to withstand axial loads with a bearing capacity control permit, lateral loads in the x and y directions with 40 mm control, and immediate settlement due to deformation. In the delay evaluation, it is known that the work of the upper structure of the workshop building is delayed for 28 days. After improvement, up to 20% efficiency can be made from the delay process and its effect on the work of the upper structure of the workshop building saves a total up to 4 weeks.*

**Keywords:** *Evaluation, Earthquake, Structural, Foundation, ASCE 41-17*