

Elevated structure memiliki resiko kegagalan konstruksi yang tinggi selama proses pelaksanaan pembangunan. Kegagalan konstruksi disebabkan antara lain oleh penyimpangan terhadap *safety factor* dalam instalasi perancah, material perancah yang tidak memenuhi spesifikasi, dan kurangnya pengawasan dari pihak konsultan pengawas. Metode pelaksanaan konstruksi harus dilakukan dengan tepat dan sesuai standar agar resiko kegagalan konstruksi dapat dihindari. Perancangan alternatif struktur *shoring* dengan menggunakan struktur *heavy duty scaffold* akan mempertimbangkan beberapa aspek seperti kekuatan yang memenuhi persyaratan, waktu pelaksanaan, dan biaya pekerjaan.

Perancangan diawali dengan pemodelan struktur dengan program SAP2000. Perhitungan pembebanan beserta faktor ketahanan struktur dengan menggunakan program Microsoft Excel. Perhitungan pembebanan mengacu pada beberapa standar seperti *American Concrete Institute 347R-14 (Guide to Formwork for Concrete)* dan SNI 1727:2020 tentang Beban Desain Minimum dan Kriteria Terkait untuk Bangunan Gedung dan Struktur Lain. Perhitungan faktor ketahanan struktur akan mengikuti SNI 1729:2020 dan dibandingkan dengan hasil *steel check design of structure* dari program SAP2000. Lendutan yang terjadi pada struktur juga dapat diperoleh dari program SAP2000 dan dibandingkan dengan batas defleksi dari standar *Federal Highway Administration (FHWA-RD-93-032)*.

Hasil *steel check design of structure* dari struktur *shoring* dan *heavy duty scaffold* menunjukkan nilai *demand-capacity ratio* yang kurang dari 1 sehingga dapat dikatakan bahwa struktur *shoring* dan struktur *heavy duty scaffold* aman. Dari hasil analisis lendutan yang terjadi pada kedua struktur juga berada dibawah batas lendutan dari standar *Federal Highway Administration (FHWA-RD-93-032)*. Pekerjaan struktur *shoring* dan *heavy duty scaffold* memiliki durasi waktu pelaksanaan yang sama yaitu 5 hari. Biaya pekerjaan alternatif struktur *heavy duty scaffold* lebih murah dibandingkan dengan biaya pekerjaan struktur *shoring* dengan selisih biaya pekerjaan sebesar Rp19.883.199.

Kata kunci: *Shoring, Heavy Duty Scaffold, Demand-Capacity Ratio, Biaya, Waktu*

Elevated structures pose significant risks of construction failure during the construction process. Such construction failures are attributed to several factors, including deviations from safety factors in scaffolding installation, scaffolding materials that do not meet specifications, and inadequate supervision by consulting supervisors. Proper construction methods must be implemented by established standards to mitigate the risk of construction failure. The alternative design of the shoring structure employing a heavy duty scaffold will consider various aspects, such as compliance with strength requirements, construction duration, and overall project cost.

The design began with structural modeling using SAP2000 software. Load calculations and structural resistance factors were computed using Microsoft Excel. Load calculations were referenced to several standards, including the American Concrete Institute 347R-14 (Guide to Formwork for Concrete) and SNI 1727:2020 regarding Minimum Design Loads and Associated Criteria for Buildings and Other Structures. Structural resistance factor calculations followed SNI 1729:2020 and were compared with the steel check design of structure results from SAP2000 software. Structural deflections were also obtained from SAP2000 software and compared with deflection limits from Federal Highway Administration standards (FHWA-RD-93-032).

The steel check design of structure results for both shoring and heavy duty scaffold structures display demand-capacity ratios less than 1, indicating that both shoring and heavy duty scaffold structures are safe. Deflection analysis results for both structures also remain below the deflection limits specified in Federal Highway Administration standards (FHWA-RD-93-032). Both shoring and heavy duty scaffold structural works require the same implementation duration of 5 days. The cost of the alternative heavy duty scaffold structure is lower compared to the shoring structure cost, with a cost difference of IDR 19,883,199.

Keywords: *Shoring, Heavy Duty Scaffold, Demand-Capacity Ratio, Costs, Duration*