

INTISARI

Pembangunan infrastruktur merupakan program prioritas pemerintah Indonesia yang ditujukan untuk menunjang pembangunan ekonomi nasional. Proyek Jalan Tol Akses Patimban merupakan salah satu program strategis nasional yang dirancang untuk meningkatkan konektivitas antar daerah terutama dari dan menuju Pelabuhan Patimban, Subang. Studi ini difokuskan pada perancangan ulang jembatan no.17 pada Proyek Tol Patimban Paket 3 yang terletak pada STA 30+700 dengan desain awal berupa *PCU Girder*. Desain alternatif dilakukan dengan *single span prestressed concrete box girder* karena keunggulannya dalam efisiensi material, durasi konstruksi, dan ketahanan torsi.

Penelitian ini ditujukan untuk mendesain ulang struktur atas jembatan dengan *concrete box girder*, mendesain ulang struktur *abutment* dan fondasi, serta membandingkan hasil redesain dengan desain eksisting. Metode perancangan dilakukan menggunakan data sekunder dari kontraktor proyek. Pemodelan dan analisis gaya dalam struktur atas dilakukan dengan *software* CSi Bridge, sementara analisis kekuatan struktur dilakukan dengan Microsoft Excel sesuai dengan standar SNI dan AASHTO LRFD 9th Edition.

Hasil perancangan ulang menghasilkan struktur atas jembatan dengan tiga bentang masing-masing sepanjang 40,5 meter; 40 meter; dan 40,5 meter. Penampang didesain dengan tinggi 2100 mm dan membutuhkan 16 tendon baja prategang VSL tipe 5-37. Struktur *abutment* didesain untuk ditopang *bored pile* berkonfigurasi 5 x 3 dengan kedalaman 22 meter. Seluruh hasil desain telah memenuhi syarat batas SNI untuk Perencanaan Batas Layan (PBL) dan Perencanaan Batas Kekuatan Terfaktor (PBKT). Selain itu, struktur *abutment* telah memenuhi syarat kontrol stabilitas guling dan geser sedangkan fondasi *bored pile* telah memenuhi syarat daya dukung aksial dan lateral. Hasil perbandingan menunjukkan desain alternatif *box girder* lebih efisien 9,80% dalam penggunaan volume beton dan 18,82% dalam volume *bored pile*, serta memiliki *cycle time erection* 42,88% lebih cepat, meskipun kebutuhan *strand* prategang meningkat sebesar 54,17%.

Kata kunci: Perancangan ulang, Jembatan *box girder*, beton prategang, *abutment*, Tol Patimban.

ABSTRACT

Infrastructure development is a priority program of the Indonesian government aimed at supporting national economic development. The Patimban Access Toll Road project is one of the national strategic programs intended to improve regional connectivity, particularly to and from the Port of Patimban, Subang. This study focuses on the redesign of bridge no. 17 in the Patimban Toll Road Project Package 3, located at STA 30+700, which was initially designed with PCU Girder. An alternative design is proposed using a single span prestressed concrete box girder due to its advantages in material efficiency, construction duration, and torsional resistance.

This research aims to redesign the bridge superstructure using a concrete box girder, redesign the abutment and foundation structures, and compare the results of the redesign with the existing design. The design method was carried out using secondary data from the project contractor. Modeling and internal force analysis of the superstructure were performed using CSi Bridge software, while the structural strength analysis was conducted with Microsoft Excel in accordance with SNI standards and the AASHTO LRFD 9th Edition.

The redesign resulted in a bridge superstructure with three spans measuring 40.5 meters, 40 meters, and 40.5 meters, respectively. The cross-section was designed with a height of 2100 mm and requires 16 VSL type 5-37 prestressing steel tendons. The abutment structure was designed to be supported by a 5 x 3 configuration of bored piles with a depth of 22 meters. All design results have met the SNI limit state requirements for the Serviceability Limit State (SLS) and Ultimate Limit State (ULS). Furthermore, the abutment structure has satisfied the requirements for overturning and sliding stability control, while the bored pile foundation has met the criteria for axial and lateral bearing capacity. The comparison shows that the alternative box girder design is 9.80% more efficient in concrete volume and 18.82% in bored pile volume, and has a 42.88% faster erection cycle time, although the need for prestressing strands increased by 54.17%.

Keywords: *Redesign, Box girder bridge, prestressed concrete, abutment, Patimban Toll Road.*