PERENCANAAN ULANG STRUKTUR ATAS JEMBATAN *CABLE STAYED* NGARAI SIANOK GELAGAR BOKS GIRDER BETON KANTILEVER BAJA *ORTHOTROPIC*

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Abstract

Jembatan Ngarai Sianok merupakan jembatan *cable stayed* dengan lokasi rencana konstruksi di kota Bukittinggi, Sumatera Barat, Indonesia. Struktur gelagar jembatan ini merupakan tipe dek beton komposit terdiri dari boks girder beton bertulang sentral, kantilever baja *crossbeam* dan baja *longitudinal stringer*. Penggunaan tipe dek ini bertujuan untuk menghindari penggunaan dek *full* beton bertulang dengan tujuan untuk mereduksi nilai momen di kaki pilar akibat bekerjanya beban seismik karena struktur pilar tunggal jembatan setinggi 123 m juga lokasi jembatan yang dekat dengan patahan aktif Sianok. Konsep dek beton kantilever baja *orthotropic* selanjutnya dipilih untuk desain ulang jembatan ini dengan tujuan untuk mereduksi berat sendiri dek. Perencanaan ulang dek menggunakan beberapa referensi desain dek jembatan diantaranya FHWA *Post Tensioned Box Girder Design Manual*, 2016 dan AASHTO LRFD *Bridge Design Specification* 2017. Hasil preliminari desain menunjukkan bahwa konsep dek boks beton bertulang dengan kantilever baja *orthotropic* dapat mereduksi berat sendiri dek sebesar 26%. Analisis longitudinal jembatan selanjutnya dilakukan dengan bantun program MIDAS Civil 2019. *Output* gaya gaya dalam pemodelan digunakan untuk mendesain kebutuhan penulangan boks girder beton dan pemeriksaan kembali kapasitas penampang kolom *pylon head* dan kolom komposit (*Concrete Filled Steel Tubular Column*) *pylon leg*. Hasil analisis menunjukkan bahwa pylon head dan pylon leg aman terhadap hasil desain ulang dek.

Keywords: **Desain-Ulang, *Cable-Stayed*, Boks-Girder, *Orthotropic***

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Abstract

The Ngarai Sianok bridge is a cable stayed bridge planned to be constructed in the city of Bukittinggi, West Sumatera, Indonesia. The deck structure of the bridge is a composite dek consists of central reinforced concrete box girder, steel cantilever crossbbeam and longitudinal steel stringer. The purpose to use this type of deck was to avoid the fully reinforced concrete box girder deck in order to reduce the moment magnitude at the pier base due to applied seismic loads since the bridge consists of very tall piers at the height of 123 m also its location around an active Sumatera's fault segment (sianok segment). The deck of reinforced concrete box girder with steel cantilever orthotropic was then selected for redesign to reduce deck selfweight. The redesign was conducted based on several design codes including FHWA *Post Tensioned Box Girder Design Manual*, 2016 and AASHTO LRFD *Bridge Design Specification* 2017. The preliminary design results shows that the orthotropic steel cantilever box girder deck contribute 26% lesser weight compare to the initial design of composite deck. The bridge longitudinal analysis was conducted using MIDAS Civil 2019. The modelling output results were used to design the amount of required box girder reinforcement and evaluate the pylon head and composite pylon leg (Concrete Filled Steel Tubular Column) sectional capacities. Based on the conducted analysis both pylon head and pylon leg are safe due to deck redesign condition.

Keywords: **Redesign, Cable-Stayed, Box-Girder, Orthotropic**