Assessment of as-built load carrying capacity of the existing flyover at Peliyagoda for proposed Colombo - Katunayaka expressway

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The existing flyover at Peliyagoda was constructed in late 60's by the State Engineering Corporation of Sri Lanka and has not been in service since construction. As the flyover was exposed to tropical weathering for more than 30 years, the existing load carrying capacity of the flyover is in question with the present deteriorated conditions. At present, authorities are exploring the possibilities of using this flyover for Colombo -Katunayake expressway, which is now under construction.

The overall length of the flyover is 26.84 m and the width at deck level is 24.40 m. The deck slab is provided with a duel carriageway, each carriageway width being 8.2 m. Reinforced concrete deck slab spanning between supporting columns and post-tensioned in longitudinal direction. The substructure consists of two rows of inclined external columns fixed at the base and propping the continuing portion of the deck slab at the free end. Two rows of internal columns are pinned at base and cast monolithically with the deck slab.

The structural analysis of the flyover was performed by developing a 3D finite element model, using a general purpose computer package called SAP 2000, with appropriate boundary conditions. The plate elements were used to model the deck slab while the frame elements were used to model the columns and beams. Since the deck slab was pre-stressed, this effect was included to the model. The 3D finite element model was validated against the results of a load test carried out by the Japan Bridge & Structure Institute in 1991. The load combinations considered for the analysis was dead and live loads acting together with appropriate load factors as specified in BS 5400 : Part 2 : 1978. The types of live loads considered were HA only, HA in combined with HB and longitudinal force resulting from traction or braking.

The results indicate that the deck slab of the flyover is unable to carry HA+HB 45 loading in both flexure and shear but satisfies for HA+HB 40. As far as the exact rating is concerned, it can be seen that the capacity of the structure is about HA+HB41.

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