

Development of Precast FRP-Concrete Composite Deck for Cable-Stayed Bridge

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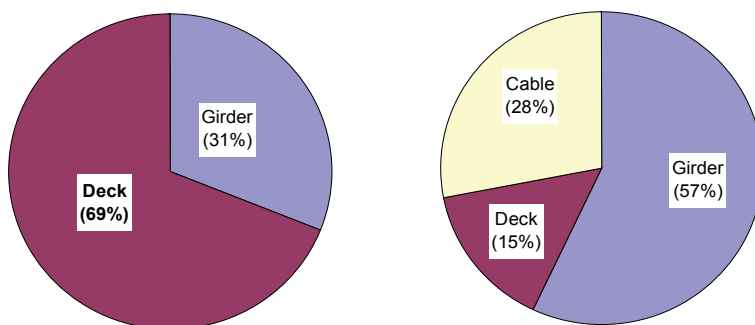
Summary

The precast FRP-concrete composite deck is proposed as one of the light-weight deck systems applicable to cable-stayed. This deck is developed by extending concrete parts at the both ends of deck, which brings the effect to reduce the effective deck span length. For it having span length of 4m the optimum design was carried out. As a result, the self-weight of deck is reduced to about 70% compared to the conventional precast concrete deck for cable-stayed bridges. Various tests were performed to verify its behavioral characteristics and to evaluate its structural performance. Especially, full-scale deck specimens were fabricated and subjected to static and fatigue tests including wheel loading test so as to evaluate its performance as a bridge deck. Test results verified that the proposed deck satisfies the relevant design codes.

Keywords: FRP, FRP-Concrete Composite, Bridge Deck, Cable-stayed bridge.

1. Introduction

The weight of the superstructure is a determinant factor in the design of long-span bridges such as cable-stayed bridges. Figure 1 compares the weight and construction costs of the superstructure of steel composite cable-stayed bridges built in Korea. The deck is responsible of 69% of the weight of the superstructure while occupies merely 15% of the whole construction cost [1]. In view of such observations, significant reduction of the weight of the deck by applying high performance materials would result in large reduction in the material quantities required for the other members and particularly the cables, and in turn, to effective reduction of the construction costs to a desirable level.



(a) Self-weight

(b) Construction costs

Fig. 1: Example of the contribution of the superstructure in the weight and construction cost of cable-stayed bridges.