Structural Characteristics of 3-Pylon Cable-Stayed Bridge Applying UHPC

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Summary

This paperhas been intended as an introduction to design example of 3-pylon cable-stayed bridge system applying Ultra High Performance Concrete (UHPC) with compressive strength of 180MPa and explanation of structural characteristics, benefits, and risksolutionscaused by applying UHPC.

Steel composite and concretecable-stayed bridges werecheckedin order to comparewith UHPC cable-stayed bridge through the construction cost evaluation.

The precast segmental method with launching truss was applied for activating the compressive strength of 180MPa. Stiffened girder needed various checks for ensured safety during construction.

Lastly various types of section weretested for solving vibration problemsof edge girder with low height. The aerodynamic stability had been satisfied after the fairing and baffle set up on external edge girder and in the middle of edge girder, respectively.

Keywords:UHPC, 3-pylon cable-stayed bridge, edge girder, launching truss, fairing, baffle

1. Introduction

In the long span cable bridges, superstructure with concrete section has been used toimprove economical efficiency. The most important thing in this case is toreducethe self weight. The stiffened girder applying UHPC made section smaller, so the weight of UHPC cable-stayed bridgewould be reduced to less than 60% compared to the normal concrete in the super structure.Therefore, the bridge applying UHPC would get a lot of economical efficiency as decreasing the sizes of cable, pylon and foundation simultaneously.

Fig. 1: Air view of cable-stayed bridge applying UHPC

The UHPC(180MPa) which has compressive strength of 4 times more than normalconcrete(40MPa) wasapplied to the design of cable-stayed bridge.The 3-pylon cable-stayed bridge, JobalBridge,applied UHPC has mainspan length of 200m and the total length of 600m. This UHPC cable-stayed bridge was the first attempt in the world except pedestrian cable-stayed bridge.

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