

Planning and Design of a Two-story Arch Bridge with Solid-spandrel Upper Arches Built with CFRP Reinforced Concrete

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Abstract

The Bridge designed is a two-story arch bridge with total length of 552m and width of 29m. A 7-span continuous concrete arch structure was selected for the lower story with the longest span of 84 m. The upper arches consist of 46-span continuous reinforced concrete arches with 12m long span length. Precast elements were adopted for the upper arches to shorten the construction period and improve the as-built quality of concrete. Further, to improve durability, solid-spandrel arches without expansion devices and bearings were selected for the upper structures, which enabled use of the pavement structure designed for soil embankment on the bridge surface. To minimize the deterioration due to the penetration water from the road surface of the bridge, CFRP (carbon fiber reinforced plastics) bars of excellent corrosion resistance were employed to replace steel reinforcement in the upper arches.

Keywords: concrete arch; two-story arch; precast element; solid-spandrel arch; carbon fiber reinforced plastics bar.



Figure 1. Photomontage of the Bridge

1 Introduction

The Bridge designed is located between Ootsu JCT and Ujidawara IC on Shin-meishin Expressway.

Figure 1 shows the expected completion of this bridge. There are many heritage structures in the area around the bridge. Consideration of the special site conditions was requested for the