

Rapid replacement work on the Nishi-Meihan Expressway Miyuki Bridge

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More than 40 years have passed since the Miyuki Bridge on the Nishi-Meihan Expressway began service in 1969. In recent years, serious damage such as pot holes and cracks with efflorescence has progressed in the reinforced concrete slab, and the project to replace the deteriorated reinforced concrete slab with a steel plate-concrete composite slab was undertaken as a radical improvement. At the same time, upper flange plates of the main girder were also replaced to change composite girder into non-composite girder. In order to replace the bridge deck during only five days of one-lane opening for traffic at daytime and full closing for the exchanging works at nighttime, a precast type composite deck was chosen. In this paper, durability of the precast composite deck was confirmed by wheel load running tests and outlines of the rapid replacing work are reported.

Key Words: replacing of reinforced concrete slab, rapid work, precast composite deck

1. Introduction

Approximately 40 years have passed since the Miyuki Bridge, located between Horyuji IC and Koriyama IC on the Nishi-Meihan Expressway began service in 1969 (East bound lane) and 1972 (West bound lane).

This bridge has been the subject of a wide range of measures such as the construction of additional stringers, slab top surface thickness enhancement, girder consolidation, joint repair, and underside sound insulation plate construction, etc. as a result of noise and vibration problems starting from around 1979. However, pot holes have frequently occurred in the pavement surface due to re-damage to the thickened top surface slab from around 2006 becoming a new source of noise and vibration and emergent RC slab repairs were carried out. Furthermore, as damage to the old slab has begun to worsen again recently in addition to the pavement surface and thickened top surface slab damage, installation of an extension slab at the bridge end and replacement with a durable slab was planned. The some spans with particularly significant slab damage were chosen for the slab replacement by installment work of three years (Stage I-III construction work). An overview of Miyuki Bridge and the construction work plan can be seen in Figure 1.

Generally long-term closure at traffic is required to carry out slab replacement, but because in the Miyuki Bridge the annual average cross-sectional traffic volume of the section of road is approximately 60,000 vehicles per day, such a long-term closure at traffic was judged to be impossible due to the enormous social damage. Therefore, slab replacement in all Stages I-III of construction work was carried out with only temporary closure to traffic at night while leaving one lane of traffic open during the day. Essentially, the slab replacement had to be carried out in the limited night time hours (approximately eight hours). Although there have been report of this type of construction work on general roads, this was the first time attempt on an expressway.