Composite Effects Between Steel Girder and Orthotropic Steel Deck Connected by Shear Force Transferring Members During Deck Replacement Work

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Abstract

To shorten the construction period, a novel deck replacement method, which does not need the removal of the entire existing reinforced concrete deck above the girder flanges, has been developed and applied to actual deck replacement work. This method is characterized by a load transfer between the girder and the deck using shear force transferring members (SFTMs). To verify this composite effect by installing SFTMs in accordance with the construction stage, field measurement and FEM analysis have been carried out. The obtained results indicate that the neutral axis in the cross section of the girder moves upward as the construction progress. If the index is defined as 100% for the fully composite state and 0% for a non-composite state, its value for the obtained state is approximately 70%, which indicates that SFTMs have sufficient functionality to enable the interaction between the girder and orthotropic steel deck effective.

Keywords: Composite steel girder; Orthotropic steel deck; Deck replacement; Field measurement.

1 Introduction

1.1 Objectives

As the deterioration of reinforced concrete (RC) decks of steel highway bridges due to heavy traffic has become apparent, deck replacement works have been implemented earnestly in Japan. These construction works are usually carried out while regulating traffic. In order to minimize the inconvenience to traffic, enabling construction in narrow spaces and shortening the construction period is desirable. To satisfy the requirements of RC deck renovation of existing composite steel girder bridges, a novel deck replacement technology employing an orthotropic steel deck

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