Experimental Study on A GFRP Girder Reinforced with CFRP for Application to Extended Sidewalk

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Abstract

Although application of Fiber Reinforced Plastic (FRP) to bridge construction has been investigated, design guidelines have not been officially authorized. Thus, it is necessary to investigate the applicability of FRP materials as construction members in each case. In this study, a possibility of adopting a GFRP girder reinforced by CFRP to an extended sidewalk for existing bridges has been investigated. Four-point bending tests were conducted based on the experimental test results of material tests. For the bending test, a stuck of four layers of GFRP box section reinforced by a CFRP plate on bottom faces with a GFRP slab was fabricated based on trial design calculations. The strength of the girder was able to be estimated based on the results of material tests, and it was confirmed that deflection requirement was satisfied.

Keywords: GFRP girder; CFRP plate; bending strength; extended side-walk.

1 Introduction

Many existing bridges have been deteriorated by the natural environment effects, such as corrosion. As a new construction material intended to resolve these problems, in recent years the construction industry has turned its attention to fiber reinforced plastic (FRP) [1,2].

In addition, there are existing bridges to which a sidewalk must be added or expanded to deal with the change in traffic demand or with seasonal problems such as snow accumulation[3]. In such cases, the deck slab of the bridge must be widened, but in many cases, a member that supports the deck slab of the extended part is added to a major structural member such as an existing main girder.

For materials of an extended sidewalk, a light-weight material that is highly corrosion resistant is thought to be appropriate, considering the burden on the substructure of the existing bridge and the ease of its maintenance. Because FRP in particular

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