

Rational Reinforcement utilizing Post-tensioning Anchorage Devices in Horizontal Force Adjustment for Closure Pour

Shuhei ONO, Hideaki MATSUNAGA, Tatsuaki TOSHINAMI

Shimizu Corporation, Tokyo, Japan

Contact: ono@shimz.co.jp

Abstract

One of the solutions for constructing the rigid structure of the multi-span prestressed concrete (PC) continuous box girder bridge with low-height piers is the horizontal force adjustment for closure pour that can improve the stress at the base of side piers. However, in order to apply a large horizontal force to the thin member of cross section, there is a problem that it requires much time to reinforce the force application part and jacking force application work. Therefore, the author devised a rational reinforcement of the force application part in concrete structure by using post-tensioning anchorage devices which were embedded as reinforcement materials. This newly proposed method was adopted in the construction of the Onahama Marine Bridge. In this paper, the rationalization of the force application and construction in the horizontal force adjustment for closure pour of this bridge is presented.

Keywords: horizontal force adjustment for closure pour; extradosed prestressed concrete bridge; post-tensioning anchorage device.

1 Introduction

The Onahama Marine Bridge was completed in March 2017 with the length of 510 m and the maximum span of 120m. The bridge is located in the city of Iwaki, Fukushima, Japan, and was constructed as a part of the road crossing the Onahama port. The structure type of this bridge was selected as a 5 span continuous PC extradosed bridge as a result of consideration of both cost performance and landscape. In addition, this bridge was designed as multi-span rigid frame bridge for the purpose of enhancing earthquake resistance and maintainability.

Because this bridge is a rigid frame structure with low piers compared to the fixed span length, it is necessary to improve the stress at the base of side piers caused by the deformation of superstructure.

As a solution to this, the horizontal force adjustment for closure pour is adopted. However,

there were several problems to be improved in this method.

Through solving the problems in this construction, the author devised a rational reinforcement of the force application part by utilizing post-tensioning anchorage devices.

In this paper, the rationalization of the force application and construction in the horizontal force adjustment for closure pour in the Onahama Marine Bridge is presented.

2 Bridge Outline

The outline of the Onahama Marine Bridge is shown in Table 1, and the general view of this bridge is shown in Figure 1.

The characteristic cross section is shown in Figure 2. Box girder section have two rooms, exterior web is slanted and relatively thick (540mm). And the anchorages of stay cable were located in the box girder for appearance.