

Contribution to Early Restoration of the Road Bridge Damaged by the Kumamoto Earthquake with Comprehensive Technical Capability

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1. Introduction

The Kumamoto Earthquake caused enormous damage to the bridge on the prefectural road Kumamoto-Takamori Line, connecting the city of Kumamoto and Aso Region. Since restoration from the damage would need advanced technology and require urgency, the State is advancing the disaster recovery project as a proxy project under the Act on Reconstruction after Large-scale Disaster in response to the request of Kumamoto Prefecture.

This paper introduces technologies incorporated for restoration and activities of technical support by Kumamoto Earthquake Recovery Division in connection with the Kuwazuru Bridge on the prefectural road Kumamoto-Takamori Line, which resumed service in July 2018.

2. Structure of Kuwazuru Bridge and outline of the disaster

Kuwazuru Bridge is a two-span continuous cable-stayed steel bridge, 160 m in length, with a curved girder hanging, of which span is different by 40 cm at the starting point and ending point from X-type main tower. As shown in Fig. 1, the girder end at the bridge end floated up about 60 cm due to damage to the bearing caused by the Kumamoto Earthquake and the entire girder moved about 90 cm to the valley.¹⁾ In addition, tension of the cable was lost in part and the cable got twisted.¹⁾

3. Support for "Build Back Better" restoration

For restoration of the Kuwazuru Bridge, proposal for "Build Back Better (better restoration)" was made based on disaster situation and maintenance after restoration and with various technical considerations. Specifically, we proposed the countermeasure technology for preventing floating-up of the girder against the earthquake exceeding the size expected by design, monitoring method in construction stage for rectifying the uncertainty of restoration design, multiple considerations for preventing water permeation into the cable fixing part, etc., which were all adopted.²⁾

In addition, since maintenance of this bridge is succeeded by Kumamoto Prefecture, we provided technical support in planning for obtaining, in construction stage, data contributing to maintenance of the Kuwazuru Bridge after restoration.²⁾



Fig.1: Main damage to the Kuwazuru Bridge



Fig. 2: Local presentation meeting about the restored Kuwazuru Bridge

Further, in order for the aforementioned technologies for restoration measures and intention of the data obtained in construction stage to be properly succeeded, a local presentation meeting was held for the personnel of Kumamoto Prefecture before resuming service jointly with Kumamoto Earthquake Recovery Division and Kumamoto Restoration Division of Kyushu Regional Development Bureau, MLIT.³⁾ (Fig. 2). Some personnel of Kumamoto Prefecture who joined the meeting gave comments to the effect that "We'd like to utilize the restoration measure technology for maintenance of the Kuwazuru Bridge considering its intention."

4. Conclusion

Proxy projects are going on at Tawarayama Bridge and Okirihata Bridge on the prefectural road Kumamoto-Takamori Line and Aso Bridge on National Highway No. 325. Kumamoto Earthquake Recovery Division continues to work for support with advanced technologies to achieve early realization of "Build Back Better" recovery from the Kumamoto earthquake.

See the following for details.

- 1) Technical Note of NILIM, No. 967, pp. 269-272, 2018
- 2) Civil Engineering Journal, vol. 60, No. 10 pp. 24-27, 2018
- 3) Civil Engineering Journal, vol. 60, No. 9 pp. 42-43, 2018