8. Strengthening of Bridge Slab at Kami-Imasu Bridge (Japan)

Owner: *Japan Highway Public Corporation*
Engineer: *Japan Highway Public Corporation*
Daete of Construction: *1964*
Date of Repair: *1976*

Introduction

The maintenance of floor slabs of steel bridges has been a serious problem in Japan Highway Public Corporation since the mid'60s. In 1974, the specifications for Highway Bridges of Japan Road Association were revised, so that the thickness of slab should be increased by 4 to 5 cm. The floor slabs which were constructed according to the new specifications have scarcely been damaged.

However, the damage of the floor slabs of the bridges constructed before 1974 is still discovered and requires repair or strengthening. As method of repair and strengthening, addition of stringers and steel plating have often been adopted. The Kami-Imasu Bridge is an example where stringers were added.

Repair Work

The Kami-Imasu Bridge is a two-span continuous steel girder, which was designed based on the 1966 specifications. The bridge length and width are 99.0 m and 10.7 m, respectively. The slab is 16 cm thick and covered by 7.5 cm thick asphalt concrete pavement.

After ten years of service, cracks in the slab increased to such an extent that it had to be repaired and strengthened. Finally it was decided to install stringers in between the original main box girders and the original central stringers as shown in Fig. 1. The reasons for the adoption of this method are as follows:

1) The traffic volume was so large that it was difficult to conduct the repair work on the upper side of te slab.
2) It was expected to be sufficiently effective on decrease of the bending moment of the slab.

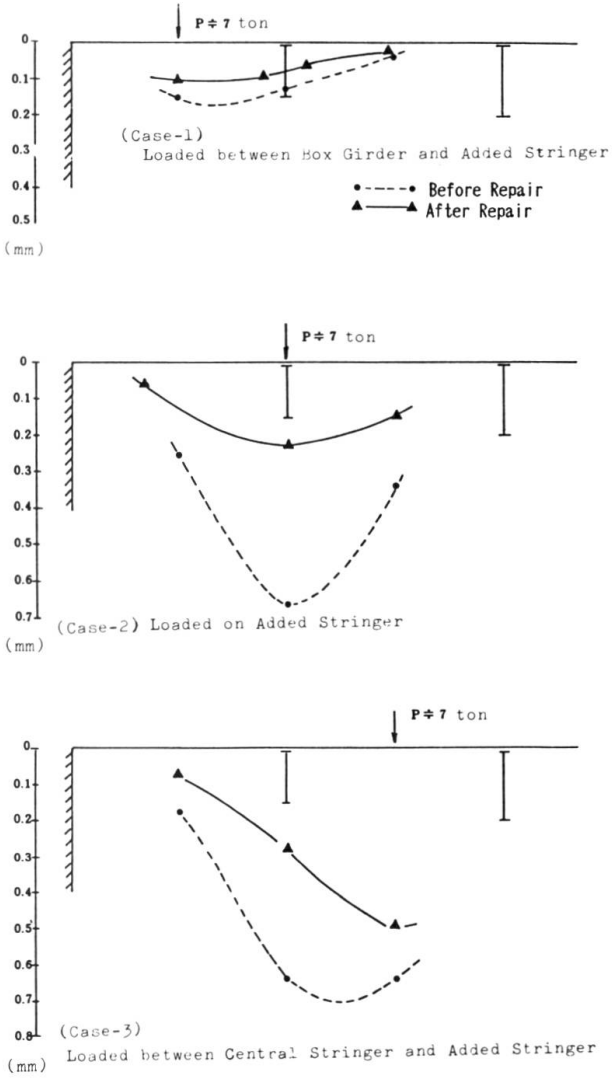

Fig. 2 Effect of Repair

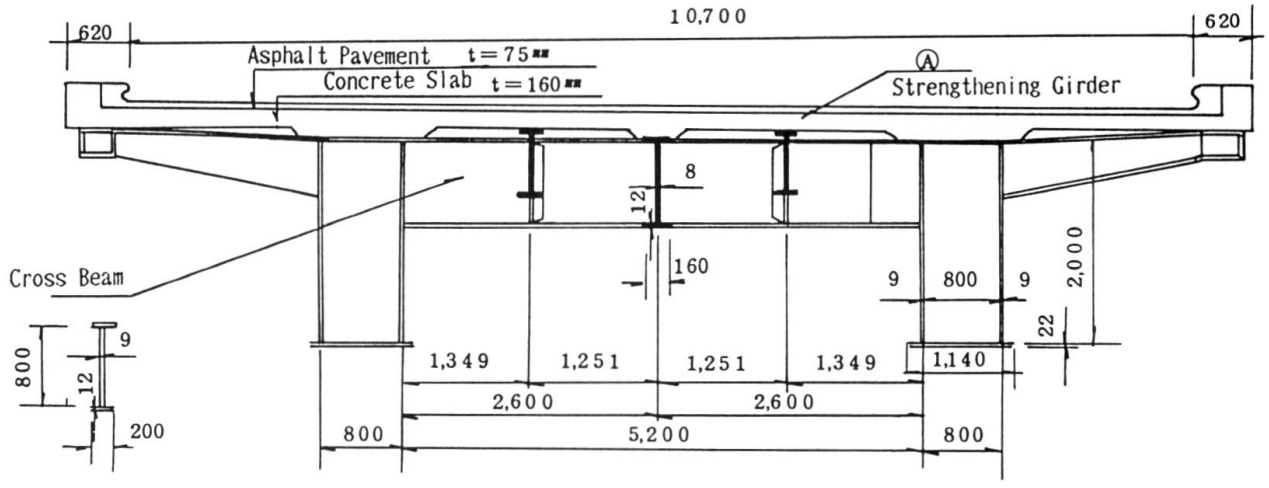

Fig. 1 Structure

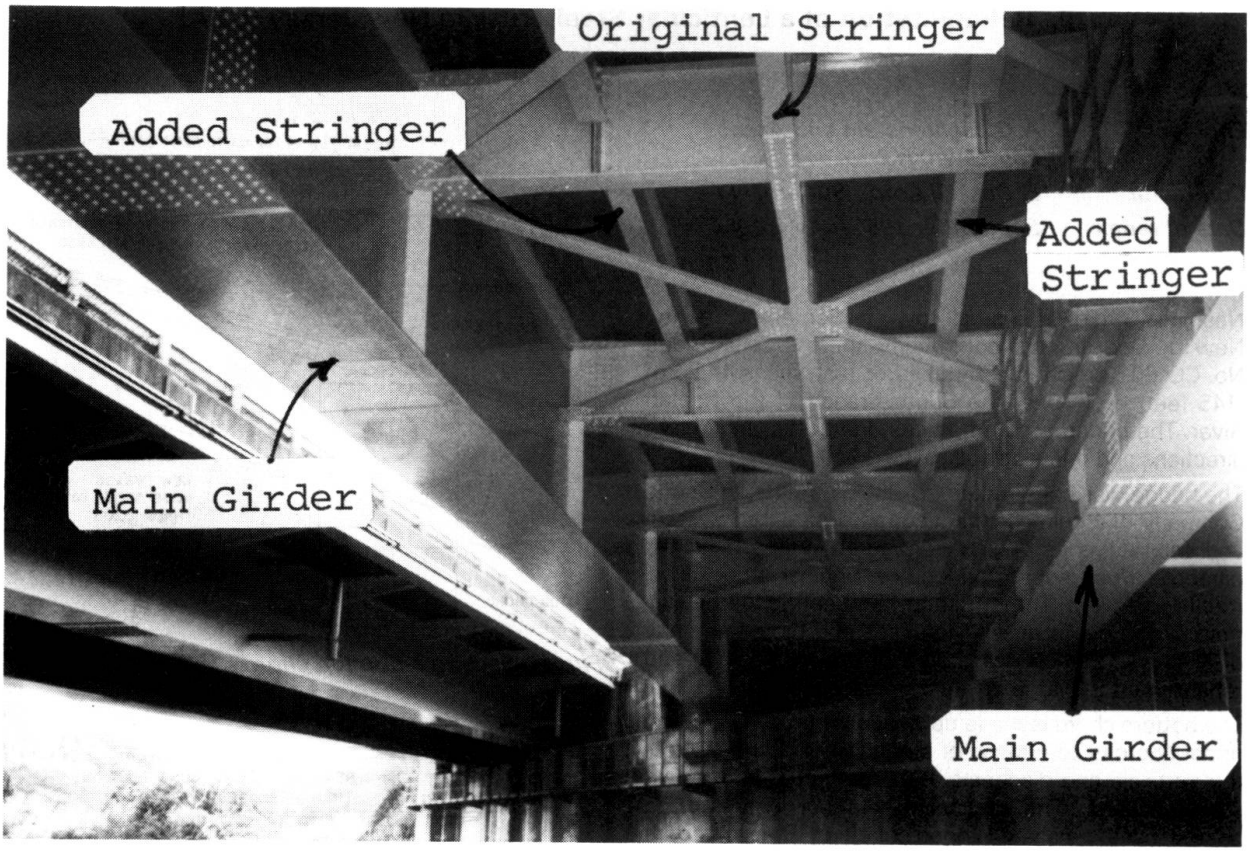

Photo 1 General View of Strengthening

Effect of Repair

A loading test was conducted, using a truck with a 7-ton rear wheel load in order to measure the difference of deflections before and after the strengthening. The result is shown in Fig. 2.

In cases where the wheel was located between the main box girder and the added stringer (Case-1), on the added stringer (Case-2) and between the original stringer and the added stringer (Case-3), the deflections at the loading points after repair were decreased to 60%, 66% and 78%, respectively. The repair work is, thus, estimated as successful.

(Yasuo Inokuma)

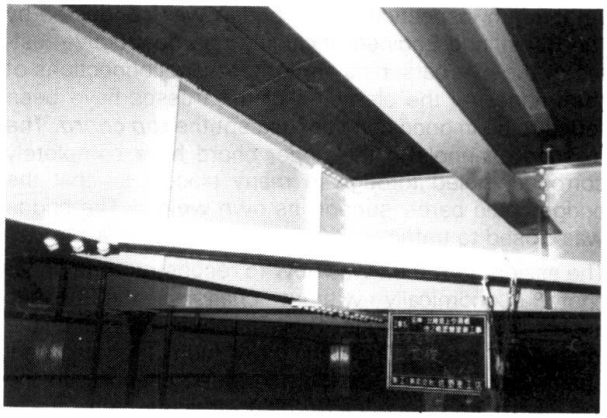

Photo 2 Detail of Added Stringer