Strengthening large concrete box-girder bridge on shear

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Summary

In the Rijkswaterstaat Programme “Widening of the Roads”, the road capacity on the bridges across the Low-Rhine has to be increased. Because of the resulting increase on traffic loads the bridges had to be structural assessed. At the same time a large amount of diagonal cracks in the webs of the twin box-girders were discovered. These shear-like cracks are located near almost every pier of the approach spans. The conclusion of a roughly recalculation was that the capacity on bending and shear was very much insufficient. To prevent brittle collapse of the cantilever at the expansion joints, temporarily piers were situated at these positions. Furthermore extensive in depth structural assessments were performed close before and partly parallel to the contracting process for the strengthening. In a very short period a design for strengthening of the bridges on shear was made. Coming year the bridges are strengthened and the road capacity on the deck is increased.

Keywords: Shear, strengthening, box-girder, assessment, recalculation, large concrete bridge.

1. Introduction

The bridges across the Low-Rhine were constructed between 1968 and 1971 and are situated in the motorway A50 in the Netherlands. The almost 17 meter wide bridge decks, one for each direction, consist of post-tensioned twin box girders. The main span over the river Low-Rhine spans 120 meter. This span and the adjacent side spans are constructed by the balanced cantilever method. At the North side eleven approach spans are present. (fig. 1) These approach spans with a constant construction height of 2.75 m are constructed with the span by span method to a continuous girder. The construction joints are made at about a quarter of the span. Two expansion joints are present in the approach spans next to pier 5 and 10. They are located at the position of a construction joint, and divide the total length of 974 m in almost three equal parts. In the design (fig. 2) a main carriageway with two lanes and hard shoulder and a parallel road for cycle and farm traffic was

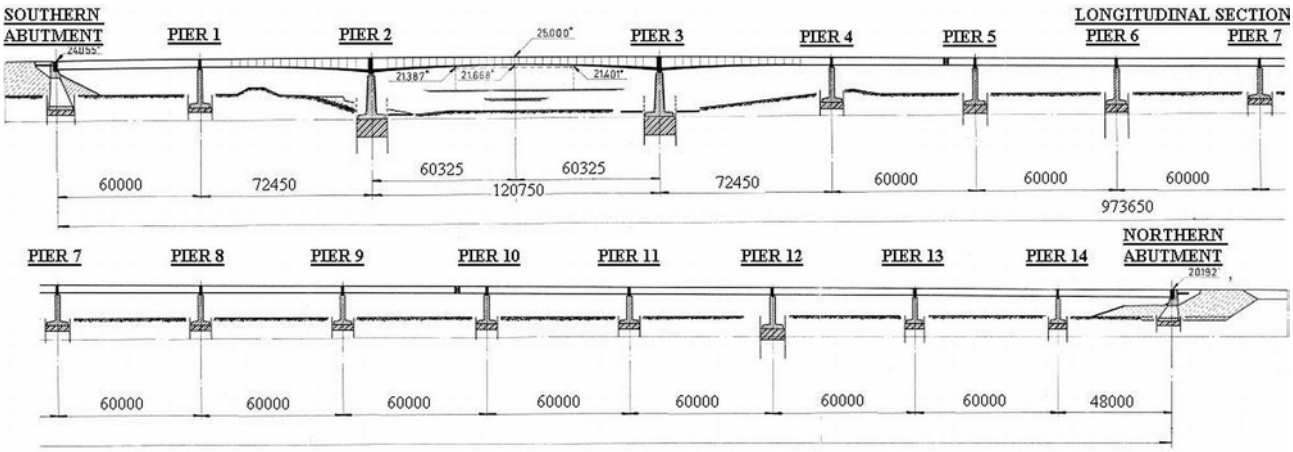

Fig. 1: Longitudinal section of the bridges across the Low-Rhine.

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