The New Wiesbaden-Schierstein Bridge – 50 Years of Steel Construction

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Summary

The bridge spans the river Rhine and connects the state capitals of Mainz and Wiesbaden, Germany. The existing bridge was at its turning point from a static to a production-oriented engineering structure. The paper gives an insight into the deficits and damage of the existing bridge and explains the consequential requirement for a new design.

Keywords: major projects, bridge, steel, composite, aesthetics, sustainability, environmental protection

1. The existing Schierstein Rhine Bridge

When the planning for the existing Wiesbaden-Schierstein Rhine bridge began in 1955, the volume of traffic crossing the Rhine was estimated at 7,100 cars/day and max. 23,000 cars/24 hours. Today, more than 80,000 vehicles use the structure, of which 8% are trucks. The volume of traffic will continue to rise to around 97,000 cars/24 hours with an over-proportionally growing share of heavy duty vehicles.

The Wiesbaden-Schierstein Rhine Bridge (Fig. 1), taken into operation in 1962, is divided into a 1280m long bridge structure consisting of two river bridges and three flood bridges. One of the flood bridges is located on the "Rettbergsaue" island in the middle of the river. The two river openings with spanning widths of 205m and 170m were made of vouted steel, the two flood bridges spanning between 50m and 70m as well as the island bridge were made as parallel booms of composite steel. Steel and steel composite bridges together form an open, double-webbed continuum cross section (Fig. 4) with load-distributing grid made of trussed cross girders and three load-distributing trussed longitudinal girders. The top boom of the steel bridges forms an orthotropic deck made of a 12m thick plate with V-formed longitudinal and traverse ribs. The pedestrian and cycle lane consist of expansion-jointed reinforced concrete plates resting on steel riveted consoles. The deck of the composite steel bridges is prestressed longitudinally and laterally and was also prestressed before assembly. Neoprene intermediary layers guarantee an elastic join above the columns. At the end abutments, at the same time longitudinal fixed point, composite steel

Fig. 1: Existing Rhine Bridge, 1952-1962

https://doi.org/10.2749/222137814814068652
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