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The Dreirosen Bridge over the Rhine at Basel

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Summary

The basic concept is to utilize efficiently the height difference for the structure given by traffic at two levels. The idea of having twin bridges offers favourable economic conditions for the structure itself, the constructional work, the operation and maintenance. The bridge superstructure consists of two-storey composite constructions, whose decks are connected on the outside by continuous steel trusses of transparent form.

1. Basic Concept

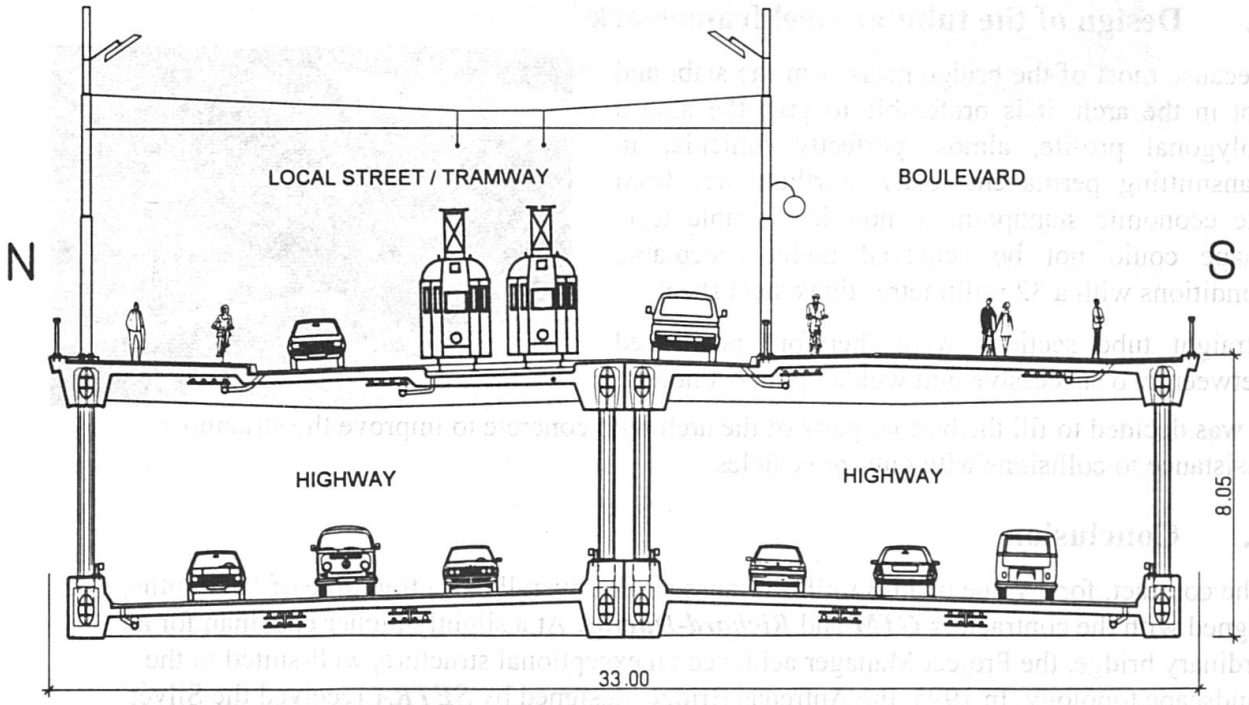

Fig. 1 Cross-section of bridge with the traffic areas

From the point of view of urban construction the rather simple three span structure is impressive visually on account of its delicate truss work providing sufficient transparency to allow viewing both into and through the structure. Two parallel concrete chords, which carry the steel trusses,

emphasize the spanning of the River Rhine. The main elements of the bridge are continued harmoniously into the shore area of Kleinbasel.
The choice of an equal width of the upper and lower levels for constructional and noise protection reasons and a shift of the traffic lanes on the upper level to the northern side leaves on the southern side some considerable space for an attractive boulevard.

2. Structure

2.1 Bridge Superstructure

By keeping the existing pier axes the spans amount to 77, 105 and 84 m. The total height of 8.05 m and the constructional height between the axes of the upper and lower chords of 6.50 m can thus be kept to a minimum. The slenderness ratio (h_k : 1) is 1:16. In order to ensure transparency and throughviewing the truss diagonals were selected to consist of slender concrete-filled steel tubes, which together with the concrete chords form the bridge truss. The dimensions of the concrete chords were chosen such that the joints of the steel truss are perfectly and permanently encased in concrete. The bridge decks comprise longitudinally and transversely prestressed ribbed slabs with a rib spacing of 7.0 m and a span of 14.95 m. The total width of the superstructure is 33.0 m.

2.2 Piers and Abutments

The massive piers for the new bridge (40 x 4 m) were constructed at the same place as those for the existing bridge. Only the upper parts of the old piers will be removed. The pier shafts and the caissons will be integrated in the new pier foundations (constructed using bored piles) and the new piers. Both abutments are built up of three parts. They consist of two external and one massive internal pier.

2.3 Approach Structures

The approach structures consist of frame structures supported on shallow foundations, of 126 m length on the Grossbasel side and 132 m on the Kleinbasel side.

2.4 Constructional Work

The constructional work is based on a division into two independent parts. In a first phase the existing Dreirosen bridge, moved a distance of 15 m upstream, takes the whole of the traffic. In this way one can proceed with the construction of the one half of the bridge at its permanent place. Afterwards the traffic will pass over the new half of the bridge and the second upstream half of the bridge will be constructed in a slightly shifted position after the demolition of the existing bridge. Finally, the new upstream half of the bridge will be manoeuvred hydraulically in to an adjacent position next to the new downstream half of the bridge.

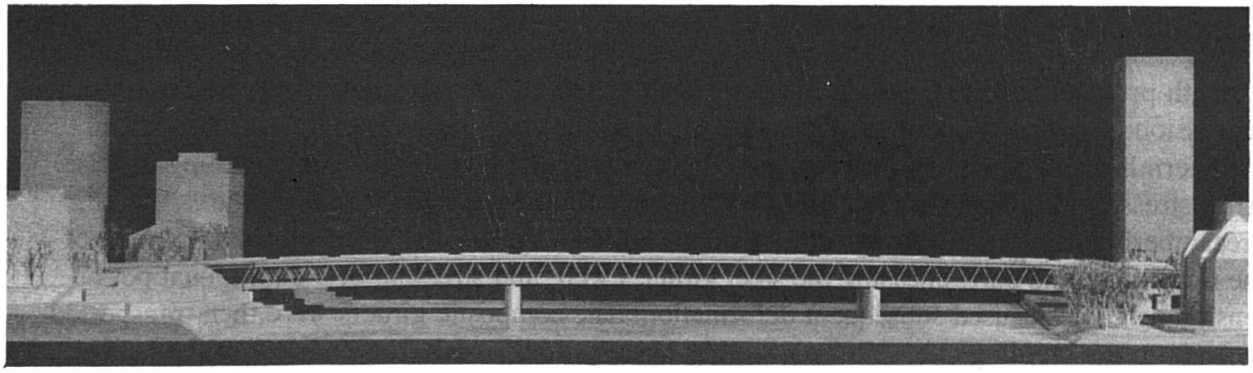

Fig. 2 Photo of Model