

# Rheinbrücke Köln- Rodenkirchen Suspension Bridge, Cologne

For: Bundesrepublik  
Deutschland



**Architect:**  
Rheinisches Autobahnamt

**Structural Engineers:**  
Rendel Palmer & Tritton Ltd  
and Landschaftsverband  
Rheinland

**Steelwork Contractors:**  
Cleveland Structural  
Engineering Ltd and Thyssen  
Engineering GmbH

**Main Contractors:**  
ARGE Rheinbrücke  
Rodenkirchen



The widening and reconstruction of the Rodenkirchen suspension bridge has been a unique 8000t steel project. This is the first time a suspension bridge has been doubled in width by adding a third suspension cable.

The suspension bridge, carrying the A4 Autobahn across the river Rhine at Rodenkirchen approximately 5 km south of Cologne, was originally constructed between 1938-40 and, at the time of its construction, was the longest suspension bridge in Europe.

The bridge is a conventional three span suspension bridge with a centre span of 378m. The bridge deck is suspended by 60mm diameter hangers from main cables each made up of 61 locked coil ropes. The main longitudinal girders, each 3.3m deep, support plate girder cross beams at 2.635m centres which, in turn, support longitudinal stringer beams which act compositely with a reinforced concrete deck slab.

Despite extensive maintenance the concrete and reinforcement of the deck slab

was showing evidence of breakdown and reconstruction of the deck was therefore considered essential, together with a scheme to provide additional traffic capacity to cater for the ever increasing volume of traffic on this busy Autobahn.

Several alternatives were investigated by the Client (Landschaftsverband Rheinland/Rheinische Autobahnamt Cologne). These included reconstruction of the existing deck retaining its present dimensions and providing the increased traffic

flows by either an adjacent immersed tube tunnel, a cable stayed bridge or a second identical suspension bridge. The provision of an upper deck to the existing bridge was also considered.

All these options proved to be unsatisfactory for either structural, operational, alignment or land requirement reasons - until LVR arrived upon the novel solution of providing a third suspension cable, thereby doubling the width of the bridge whilst retaining the aesthetic appearance.

This scheme had two major advantages over the others considered in that it minimised Autobahn alignment changes which reduced land-take requirement to a minimum and it preserved the outline and general appearance of the bridge, which is an important local landmark.

During the construction phase the new bridge was connected to the old bridge by a pinned connection. This articulation joint allowed the new bridge to rotate and thereby avoided unacceptable transverse gradients on the existing bridge which continued to have full traffic flows. It catered for large slope changes which was further complicated as the centre cable was already carrying the weight of the existing bridge



whilst the new cable was initially unloaded.

The new cable anchorages were fabricated as large steel grillages which could be jacked back at the end of the construction. The existing cable anchorages were not capable of adjustment, therefore all adjustment to the alignment of the widened bridge was undertaken by jacking the new anchorage grillages.

A fundamental requirement of the Client was that the bridge remained open to traffic throughout the widening and reconstruction work. The work was therefore carried out in two main phases, namely the construction of the new bridge and its connection to the existing structure and then the reconstruction of the existing bridge. On 9 December 1994 the widened bridge was officially opened to 6 lanes of traffic.



### Judges' Comments:

*Design ingenuity and construction expertise overcame prodigious logistical and structural problems to create an engineering tour de force.*