

Steel Viaduct Refurbishment Inspired by the Original Structure and Its History—The Best Solution with Regard to Structural, Economical and Heritage Requirements

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Introduction

The preservation and strengthening of bridges protected by conservation orders is a structural engineering field that is likely to cause conflicts. The cultural significance of these edifices imposes an obligation to fulfill heritage requirements. However, load-bearing capacity, fatigue resistance and cost effectiveness still need to be ensured. The extensive refurbishment of the elevated viaduct for Berlin's metro line No. 2, built from 1909 onward, is an impressive example of the efficiency of the principle of "intervention close to the original". This approach philosophy is inspired by the original structure and develops the structural design of an intervention from a comprehensive understanding of the history of the structure and aims for a solution that systematically picks up on the strengths of the original fabric.

History and Significance

The 1.7 km long viaduct carrying today's metro line No. 2 in the Prenzlauer Berg district of Berlin was built in two phases, the first beginning in 1909. Trains started running on this section in 1913 (*Fig. 1*), and an extension to Pankow, the end of the line at that time, followed in 1927–1930. The concept, design and layout of the viaduct and stations were the result of an intensive collaboration between engineer and architect, which, even then, was hailed as exemplary in contemporary publications. For example, "a form in which the technical has become aesthetic ..., a simplicity that has bearing ..." was how Karl Scheffler described it in 1914,² and in 1922, Paul Wittig wrote "engineered structures with a modern expression ... in which it is hardly possible to tell where the activities of the engineer end and those of the architect begin".¹ The chief engineer was Johannes Bousset (1865–1945), and the architect was Alfred Grenander (1863–1931) from Sweden, who was responsible for the architecture of Berlin's railways above and below ground for 30 years and who knew how to give them dignity and significance. Protected by a preservation order since 1978, today, the viaduct is an artery in and an emblem of Prenzlauer Berg.