

## Preface

Stone arch bridges are special technical products in many aspects. Two of the most important aspects are their very long time of usage and their landscape changing capability. First, for more than two millennia, stone arch bridges have been part of the human infrastructure system, and some of them are still in use. Most of the stone arch bridges now in use are older than the first century. The only type of structures reaching the same duration of usage are tombs and other religious structures. However, in contrast to those, arch bridges are much more exposed to changes in usage conditions. There exist Roman bridges that were crossed not only by Roman legions but also by tanks in World War II. When most stone arch bridges were constructed, motorized individual car traffic was yet unknown. This load now has to be borne by these historical bridges. We should probably hold in high esteem the farsightedness and endeavour of our ancestors, which we often use nowadays without notice.

Or perhaps we only notice as some common attitudes indicate? In many children's books, landscapes often include stone arch bridges. And if people are asked whether arch bridges are disturbing or accepted, in most cases people consider arch bridges as part of our man-made landscape and not necessarily as human artefact. Painters such as Paul Cézanne have included arch bridges in their landscape paintings as early as the 19th century, which refutes the theory that arch bridges are now just accepted because they have been part of the landscape for centuries.

Stone arch bridges are considered beautiful because they apply some simple rules of aesthetics. First of all, they use building material from the vicinity and therefore are embedded in the landscape. Furthermore, the genius idea to arrange stones geometrically in such a way that the mechanical properties of stones are used in a nearly perfect way gives the impression of harmony, whereas beam bridges made of reinforced or prestressed concrete are often felt as strenuous.

Besides beauty, the bridges show in a very clear way one of the biggest conflicts of our human civilisation. In the untiring trial to rationally describe all elements of our world, we have seen the limits of this concept in the last decades. Even though arch bridges have been built and used for more than two millennia, we still face problems in numerically describing their behaviour. Only in the last decades have appropriate tools been

Au: Please check the clarity of the sentences "We should probably ..." and "Or perhaps we notice..."

Au: Please confirm that the word "strenuous" is right.

Au: Please check whether the changes made to the sentence "Even though arch bridges..."

provided. Such tools are presented in this book. However, the book embeds these procedures in an even wider concept. Not only are computation strategies and strengthening techniques for arch bridges given, but adaptations of today's loads to preserve the bridges are also presented.

However, strengthening of arch bridges is often not required: The major cause of the destruction of arch bridges is the insufficient width of the roadway, which means not the safety but the usability has limited the lifetime of the bridge. Perhaps we could live with this limitation and give respect to the arch bridges. They still provide us with the lowest maintenance costs of all bridge types.

Safety of historical stone arch bridges

Proske, D.; van Gelder, P.

2009, XII, 366 p., Hardcover

ISBN: 978-3-540-77616-1