Bridges in Venice - Architectural and Structural Engineering aspects

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Summary

With its hundreds of bridges built over the course of centuries, most of which are still in use today, Venice probably has more bridges than any other city in the world.
It is also a city where the culture of bridges and bridge-building is closely linked to the culture of the town.
From an engineering point of view, it is of particular interest to study certain aspects of Venetian Bridges, specifically the problems that Venetian artisans, artists, engineers and architects encountered over the centuries, and how they overcame these problems.
The aim of this paper, together with its companion paper on the historical background, is to illustrate and discuss certain engineering and structural aspects of the traditional Venice Bridge.

Keywords: arch bridges; stone bridges; construction history.

1. Introduction

Over the centuries, many different building techniques and materials have been used in the construction of Venice's bridges, and it is interesting to study how these techniques came about and developed over time, following a sort of "natural selection", both from an engineering and architectural point of view. This natural selection process has left us today with a heritage of over 400 bridges [1], all of which are well integrated into their urban context, and are often both elegant and suggestive.

The aim of this paper is to look at the interaction between the design and construction techniques employed in the building of these bridges, and their formal characteristics, i.e. the relationship between structural engineering requirements and Architectural considerations, with specific reference to the bridges of Venice.
We begin with an analysis of the "boundary conditions" in which the Venetian engineers worked, i.e. soil conditions and the urban context. We will then look at the main structural types employed, typical dimensions, materials used and construction techniques.
Lastly, we shall consider how the master builders, engineers and architects of Venice tackled and resolved the theme of interaction between technical and engineering constraints and formal-architectural requirements.

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