

ON BRIDGE DESIGN

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Summary

This paper is a critical review of bridge design, particularly signature bridge design. Understanding the prevailing circumstances requires analysing the historic circumstances that led to the schism that divided the building arts and the emergence of civil engineering, particularly structural design, as an independent field. It is argued that the discipline imposed by efficiency and performance generates beauty in the hands of gifted designers and that structural design must be regarded as an art. Owners of signature bridges should promote structural instead of architectonic forms. Structural designers, on the other hand, must understand that safety and codes are not the goals, but the bare fundamentals of their activity.

Keywords: bridge design, structural art.

1. Introduction

By being relatively small and due to the size effect, pedestrian bridges tolerate complex flow of forces; by being approached and crossed by pedestrians and not by fast vehicles, they are prone to observation; by being relatively small, they represent a modest investment for wealthy countries regardless of their unit price. These facts help explain why pedestrian bridges have become a privileged field of designers and owners for formal experimentation and political ostentation.

There is a general tendency among the public, followed and promoted by ambitious owners, to lump together buildings and bridges, particularly signature bridges, under the shelter of architecture. Owners are willing to entrust architects with the design of such bridges and architects are bold enough not to turn their backs on the challenge. However, bridges are a discipline of their own, subjected to specific and complex relationships. In a way, bridge design is more related to airplane design than to building design. It is a discipline that deals with equilibrium, stability, efficiency and performance and achieves beauty through the skilful manipulation of universal laws expressed in scientific terms. The appertaining knowledge is the core of structural design.

Structural design is by no means a new activity. It was the fundamental discipline behind such developments as the Roman arch or the Gothic buttress. By then, however, it belonged to architecture and had no identity of its own. Today, structural design is practiced by civil engineers. Consequently, it is them who possess the adequate background and tools for designing bridges. Unfortunately, they tend to overlook the fact that bridges are cultural assertions and structural design an art. They focus on content but tend to overlook form. Until they correct this deficit, owners will feel tempted to invest public money in bridges that may have form but certainly lack content.

2. Building Arts

The genesis of the construction activity is associated with the need for shelter and hunt of the higher living species. With the raise of awareness and the demand for increased protection, this architecture of instinct evolved towards an architecture of consciousness. With the advent of agglomerations and social cohesion, it gained an ornamental and symbolic dimension and became art. Architecture was no ordinary art. It congregated and correlated all handcrafts and