

Architectural engineering applied to the design of urban bridges. New paradigms for the use of classic typologies in urban areas.

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Summary

This paper analyses how urban bridges respond to a different set of rules from road bridges when choosing its bridge type, and developing its design. While road bridges adopt one or other bridge type only based on technical restraints, cost, function and structural efficiency, with limited resulting span scopes suitable for each bridge typology. Urban bridges and footbridges can adopt these designs out of its strict span scope, as no structural predetermination exists, responding to different new factors as: aesthetics, architectural scale, landscape integration, users' perception, urban planning flexibility, landmark or symbol creation.

Examples of urban bridges design are used, including recent arch and cable stayed bridges by Arenas & Asociados. Conclusions attempt to create some simple rules for urban bridge design, as result of local conditions and architectural restraints.

Keywords: Conceptual design, Ethics and aesthetics values in design, The aesthetics of infrastructures. Urban bridges. Bridge typologies. Urban and Landscape integration.

1. Introduction

When designing a road or railway bridge the factors that will decide its typology and dimensions are very few and clear: technical restraints, cost, function, structural efficiency and method of erection. Urban bridges are different from this point of view: while cost and function and obviously still basic to determine the bridge needed, technical restraints, structural efficiency and method of erection become less determinant as the size and difficulty of the bridge is reduced, at the same time new determining factors appear and become important. These factors are summarized as follows:

- Aesthetic design. In a way its formal configuration is pleasing and expressive
- Scale. Design should be in accordance with architectural scale of the surrounding built environment and the human scale of users. The use of smaller depths and section dimensions improves its perception by users and viewers.
- Landscape integration. Depending on the characteristics of the existing landscape and its intrinsic value, different characteristics should be fostered in the structure, for example: transparency, slenderness, volume, strength, dynamism, and so on.
- Symbolic function. Some times in addition to its primary function, the structure adopts the symbolic function of landmark or icon creation. Cities build their personality on these landmarks and often request for signature or designer bridges to increase their tourist appeal.
- Urban planning flexibility. Cities are constantly changing and bridges should be flexible enough to adapt to these changes and foresee them, as they are often the key element of the