

## DESIGN WITH AND WITHOUT ARCHITECTS – TWO FOOTBRIDGES AT GUADALAJARA

**Peter TANNER**

Civil Engineer  
CESMA Ingenieros  
Madrid, Spain

**Juan Luis BELLOD**

Civil Engineer  
CESMA Ingenieros  
Madrid, Spain

**Summary**

Public opinion in many communities is contributing to the growing demand for structures that are more than just utilitarian. Possibly because public authorities believe that only architects can deliver attractive designs, in recent years more and more of these professionals have become involved in public works in general and footbridges in particular. Bridges, however, are a product of engineering in no need whatsoever of adornments or inefficient members to enhance their elegance. On the occasion of the nearly simultaneous design and construction of two footbridges at the same location, one with and the other without a participating architect, this paper analyzes and compares the differences between the two in terms of the relative importance of the design goals and the procedures followed to reach them. The authors sustain that good form follows function design yields solutions that meet even the most exacting aesthetic standards, provided that the designer observes a few basic rules about structural form, bridge integration in the landscape, transparency, slenderness and harmony. Where architects are involved, the engineer's main challenge consists in translating geometrical requirements into a structural concept in which the artistic design must go hand-in-hand with the efficient use of materials. In such cases, close cooperation between architect and engineer is vital to a satisfactory final product.

**Keywords:** Site constraints; conceptual design; safety; serviceability; economy; elegance; creativity; engineer; architect; cooperation.

**1. Introduction**

The fundamental objectives of bridge design are structural safety, service performance, economy and elegance. All four goals must be attained, although their relative importance varies from case to case depending on the consequences of failing to do so [1]. Structural safety is clearly the most important of the four, since unsafe bridges may lead to a loss of life or property. By definition, structural safety and serviceability are achieved through the correct application of codes and standards. Consequently, the achievement of these objectives depends chiefly on the engineer's analytical skills. Economy and elegance, by contrast, are not subject to hard-and-fast rules. Although some guidelines for improving bridge cost-effectiveness and aesthetics exist, fortunately such criteria cannot be standardized. Economy and elegance in bridge design therefore depend mainly on the designer's creative talent.

In recent years, increasing importance is being given by the public to the aesthetic aspects of bridges and other types of infrastructure. Perhaps for this reason, decision makers appear to have subscribed to the general belief that architects should be involved in bridge design. The concurrent design and construction of two footbridges in Guadalajara, respectively with and without an architect's participation, form the backdrop for a discussion of the engineer's role under the two circumstances. The fundamental objectives of design being the same in all bridges, namely the successful translation of the many constraints that govern a project into a structure, is primarily a question of a consistent conceptual design. The relative importance of the aforementioned design goals may vary, however, particularly as regards aesthetics and economy, depending on whether or not an architect participates as an additional stakeholder. The main aspects taken into account in conceptual bridge design, as well as the chief differences between individual designs, are described in Section 2 below. Since the stakeholders are not the same, one of the major differences between the two is related to design procedures (Section 3). Finally, the two bridges at Guadalajara serve to illustrate the differences identified in the design criteria and procedures (Sections 4 and 5).