



Sustainability and Beauty in Bridge Design

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Abstract

Bridge designers have a great responsibility to the planet and future generations. When designing bridges, we must contribute to addressing the current climate and biodiversity emergency and to the industry's awareness of our dual role in causing and addressing this crisis. Bridge designers also have a great responsibility to the users and perceivers of these crossings, as their scale, exposure, and long life make them have a tremendous visual and social impact. The bridges we design must also be functional, appropriately respond to every constraint, meet every technical criterion, and have a cost appropriate for their scale and complexity. This is an article on holistic bridge design, specifically focusing on how to harmonise, when designing bridges, efficiency from a carbon footprint perspective with beauty, so the design of such emotive, prominent, and enduring constructions improves the quality of the built world in multiple ways.

Keywords: holistic bridge design; responsibilities of bridge designers; sustainability; functionality; beauty; aesthetics; perception; emotion.

1 Introduction

Bridge designers have a great responsibility to the planet and future generations. When designing bridges, we must contribute to addressing the current climate and biodiversity emergency. It is part of the designer's responsibility to help achieve zero-emission status in their work as soon as possible. Also, to contribute to the industry's awareness of our dual role in causing and addressing this crisis.

Bridge designers also have a great responsibility to the users and perceivers of these crossings. Bridges have a tremendous visual and social impact because of their scale, exposure, and long life. They are crossed and perceived by countless people, whose experience will be determined by the quality of the work done in their design and construction. Designing something that transforms the territory for centuries must be aesthetically

appealing, reflect emotional and cultural values, and raise experiences and feelings.

The bridges we design need to be functional, appropriately respond to every constraint, meet every technical criterion, and have a cost appropriate for their scale and complexity.

Is this an either-or exercise? Is it necessary to drop some of these project aspirations for a bridge to be delivered? The author believes that with a good team that follows an appropriate project methodology, a good client, an appropriate procurement route, and a budget and time allocation suitable to the characteristics of the crossing problem, it is possible to systematically design bridges that respond satisfactorily and simultaneously to all aspects relevant to the project and not only to some of them.

This article focuses, with a more qualitative than quantitative approach, on holistic bridge design, specifically on how to harmonise, when designing