

Sustainability design strategies for cable-stayed bridges

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1 Abstract

Sustainability design considerations play a relevant role in long span bridges. In addition to the social and economic benefits to communities, a good design must be respectfully integrated into the environment and implement other sustainability strategies: prioritizing the use of local materials and labour, and design for durability to extend its lifetime. Minimization of the amount of materials, even with solutions that require more labour, is also an unrecognized strategy to reduce the carbon print.

The paper presents the sustainability strategies utilized in the design of two cable-stayed bridges recently completed in Colombia: The Higsaura Bridge and the Magdalena River crossing at Honda. The design of both bridges has been driven by a combination of various factors, all aligned with sustainability practices, such as minimum impact on the natural environment, use of light-weight structures to minimize consumption of materials, use of local materials and labor, along with constructability and cost considerations.

The Higsaura bridge is a concrete cable-stayed structure with a main span of 330 m and 148 m tall pylons that is one of the tallest bridges in Latin-America. The Honda bridge is a similar structure with a main span of 247 m over the longest river in Colombia.

Keywords: Bridge; Sustainability; Cable-Stayed Bridge.

2 Sustainability Considerations for Bridge Design

Sustainable development is a matter of major concern due to the excesses of our consumer societies and the throw-away culture that has led to the global warming and climate change along with the loss of biodiversity. Our lifestyle should be adapted, and many people are greening in different ways their lives. Bridges, which are key to connect communities and maintain the economy, should not be an exception.

Sustainable bridge design should balance an economic, efficient and elegant structure without compromising the needs of future generations. Sustainability strategies must also balance the conventional construction requirements, mostly related with cost-efficiency, and ease of construction and maintenance, with awareness of the bridge context. Environmentally friendly designs using high strength and durable materials are likely the best approach to achieve the goals of a sustainable development [1].

Potential ways to design sustainable bridges are, but not limited, the following: