

BRIDGES IN URBAN SCENERY IN JAPAN

Ewa Czernichowska, MSc. Eng. Architect
Graduate Student, Department of Civil Engineering, University of Tokyo

Summary

Bridge design, as much as architectural design of a building, has the most inevitable influence on the whole character of a city scenery. Nowadays, trends in bridge design tend to emphasize the relationship between the engineering structure and the environment, in direction to maintain sustainable development, to create an urban complex for the future generations.

Specific natural scenery, diverse terrain conditions, and an intensive expansion of communication requirements, colliding with major lack of space, mean that Japanese cities already contain numerous bridge constructions, showing an accelerated demand for many more in future. Those aspects, together with a definite impact of cultural heritage and nowadays tendencies in architecture, reflected in engineering designs, showing despite of the sense of a space - a sense of a place, display some characteristic features of bridge - environment relations, are discussed in this paper.

1. Introduction

A bridge represents one of the most spontaneous construction accompanying the human genus from its very beginning. Conformity with the nature of the primitive beam, arches, suspension bridges, together with the inborn character of their structural substance, formed a perfect bridge - environment unity and, therefore, satisfied the requirements of the environmental consistency. Despite the meaning of the word "bridge", in Japanese "hashi", which also denotes the edge of something, a bridge may also symbolize a mental and spiritual values: separation and continuity, which emphasize its spatial significance and human context.

However within ages, because of an unconcerned activity of a men, bridge construction became less innate, more and more formally unjust, thus injuring the natural harmony of the "genius loci". Nevertheless, gradually a return to structural simplicity, resulting in a more consonant bridge project, was felt necessary. The first half of this century became crucial for bridge design, when emerging the problem of bridge aesthetics and environmental fitness became important factor of bridge design. It has been reflected in publications and discussions on conferences in Vienna (1980), Madison (1976), London (1987, 1988), Petersburg (1991), Yokohama (1991), Delhi (1992).

2. General Statement

Bridge construction which was in 19 century influenced by the western technologies, developed in Japan rapidly after the W.W.II, parallel to the country's outstanding achievements in the technical civilization. Despite the demand for communication between the four main islands, resulting in construction of connecting bridges and tunnels accommodating highway and railway, a vigorous growth of the metropolises, basically Tokyo Metropolitan area has been observed.

The demand for new architecture resulted in the development of the contemporary Japanese architecture with the diversity of styles. The way from the Modern Architecture which had conquered the major metropolises of the world led to the Regionalism which questioned the Modernist's ideal of unifying the world under one system of values. The unique architectural traditions of Japan became relevant in further development not only by incorporating a traditional stylistic details or forms, but showing a new context: a sense of place, which means understanding or appreciation for the nature of a certain place. These tendencies, as well as in architecture, are also reflected in bridge design.

The first impression of the landscape of Tokyo which has an essential impact on any sort of urban infrastructure, is major lack of space resulted in congestion of different shaped buildings and communication facilities in an old city center. The network of multilevel intersection of expressway, railway, pedestrian overpasses and bridges, have been caused by rapid and unrestrained at previous stage formation of the urban space, and no much understanding for aesthetical arguments. But even though, in that center there are certain spaces along the Sumida River, where the attempts to solve the environmental problems were made long time ago. The

largest river in downtown of Tokyo with the sequence of bridges different structurally but unified stylistically creates a gentle atmosphere similar to those in some European cities. Historical bridges in Tokyo and Osaka might be compared with those in Paris across the Seine river. Bridges with promenades and plazas along the river accommodates the recreation zone for people and reinforced the traditional importance of idea of a street, in Japanese cities, as a public space. Occasionally held events, such as fireworks on Sumida River with the beautiful bridges on the background, bring an unforgettable impressions.

A new feature, having presently much influence on the appearance of Japanese metropolises, mostly maritime, is their stepping into the sea, by building artificial islands and suitable bridge routes, such in Tokyo, Yokohama, Osaka, Nagoya. Some bridge structures, which are dominant in the landscape, are becoming a symbol of a city, such as Yokohama Bay Bridge, Rainbow Bridge in Tokyo port. Bridges, such as Minato Bridge, Aji Gawa Bridge, Hokko Bridge and other bridges located in Osaka, have been designed with contextual approach, they express an art of engineering because of their impressive concept of the sense of place.

This contextual approach in contemporary bridge design has been particularly reflected in expressway and pedestrian bridge designs. Some modern expressways conform with local tradition of the spot by accommodating different functions below, such as shops, restaurants, parking lots, parks, plazas, pedestrian footways, watercourses. River bridges for pedestrians located under the expressway in Yokohama organize the pedestrian traffic with special care for aesthetics and environmental fitness, by incorporating an architectural details from the architectural context of neighborhood.

In contradiction to previous designs, which were more functional oriented, nowadays pedestrian bridges are characterized by more unique projects which combine an environmental influence, spatial conditions, historical meaning of the place, structural play and architectural forms. The total approach to bridge design is more complex and more human oriented, involved into overall urban design. This is very characteristic for the circulation system in planning new towns, such as Tsukuba, where the Sakura Bridge has been designed by A.Isozaki in post modern style. The experience achieved in new towns had reevaluated the pedestrian space in big cities and pedestrian decks became popular.

In Osaka, the contextual approach was similar to that, applied in Tokyo after the Great Kanto Earthquake. In 1980 s, when the rehabilitation of historical structures became important in urban projects, newly designed bridges tried to possess the same distinctive features of historical architecture. Bridges, such as Osaka Castle New Bridge represent this trend, which takes into consideration historical values of the place, the "sense of place". This contextual approach in bridge design uses not only historical features of the environment but also architectural, social, functional, aesthetical, structural.

3. Conclusion

Present bridge design in Japan, urban in particular, is effectively controlled by the demands of aesthetics and environmental consistency and the consciousness of the "sense of place". In 1980 s, after the period of rapid economic growth, aesthetical values in engineering design became more popular because of increased possibilities of their realization. Studies conducted by the Honshu-Shikoku Bridge Authority, surveys and research, proposals and manuals [1,2,3] are parallel to growing attention devoted to the environment, which has been formulated by the vice-president of IABSE [4]. Appropriate cooperation of bridge engineers and environmental designers is very much successful. Symbiosis of old national culture and high standards of bridge science and technology is characteristic feature of Japanese achievements in that field.

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