



Planning and design of Otagawa Ohashi Bridge in Hiroshima

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Summary

In 2009, an international bridge design competition was widely held in Japan. And, our proposal was selected as the implementation plan. Our design team was in charge of design work and design supervision. Otagawa Ohashi Bridge is a steel-concrete composite arch bridge across Otagawa River Flood Channel in Hiroshima City. The bridge was completed in March 2014, with the length of 412m and the maximum span of 116 m. One of special structural characteristics is that a pedestrian pathway is separated from the main bridge body midway, and hung from it by cables and steel struts due to the slope as shown in Fig.1.

We could achieve the two main features of this bridge as follows; 1) its profile silhouette creates a new hometown landscape, beautifully harmonizing the two arches with Itsukushima Island, 2) its pedestrian pathway gives dramatic views toward the sea, with the comfortable longitudinal slope.

Keywords: Aesthetic design; International design competition; Steel-concrete composite arch bridge; Continuous through arch; Bridge planning; Attached pedestrian bridge; Pier-abutment

1. Introduction

In designing for Otagawa Ohashi Bridge, our design team tried to create a bridge with elegant shape producing attractive scenery and with best spot making people's life story. This concept is also our reply to a question, "What are the necessary qualifications for modern bridges in fairly developed countries like Japan where infrastructures are already well enough? "

This bridge location is at the mouth of Otagawa River flood channel facing to calm and beautiful Seto Inland Sea where world heritage island of Itsukushima is set in. Taking the characteristics of the site into design consideration, our overall goal was to create a new landscape harmonizing sea and land with the new bridge. So, the design concepts are to enhance the area with the longed for memory of hometown landscape and to be remembered by people dearly when they use the bridge. In short, the bridge and pedestrian pathway have to be user-friendly and enjoyable when they pass.



Fig.1: Otagawa Ohashi Bridge (Panoramic view from the right bank downstream side)

2. Bridge planning and bridge design

In order to achieve the design concepts, further, following four characteristics were deeply discussed and examined; 1) Reconfiguration of vertical alignment by installing pier-abutments, 2) Bridge style and selection of span length to enhance Itsukushima Island, 3) Pedestrian pathway alignment from the user's viewpoint, 4) Continuity of Otagawa Ohashi Bridge and the west viaduct.

Basing on the examinations above, detailed studies of the bridge design were energetically carried out making use of 1/50 scale model, and 1/1 partial cross sectional model of arch structure, and wind tunnel tests to get final shapes of pedestrian pathway; 1) elegant lateral silhouettes and structural system, 2) the girder sectional form and pedestrian pathway structure, 3) arch main truss form, 4) pier form, 5) design of the west viaduct.

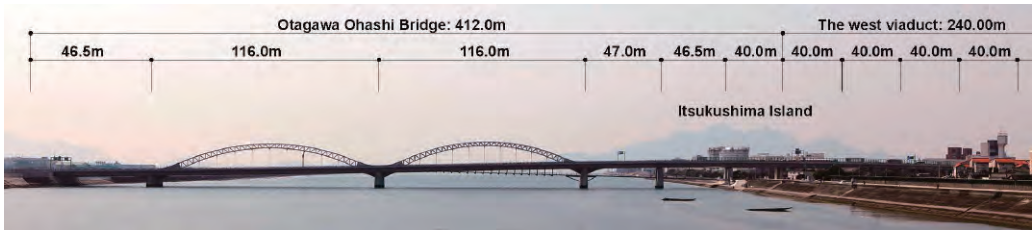


Fig.2: Otagawa Ohashi Bridge side view

3. Design of pedestrian space and bridgehead plaza

The core of our design was to make it the new bridge user-friendly for the local people, to make the pedestrian spaces and bridgehead plazas on either bank enjoyable to cross, and for both banks to function as one united place. Definitely, we tried to actualize high quality space alongside of pedestrian pathway.



Fig.3: Sequence views from the pedestrian pathway

4. Conclusion

The special features of Otagawa Ohashi Bridge are as follows.

- 1) In order to create a new memorable hometown landscape, we designed a total plan from design concept, to bridge plan, bridge design, and spatial design.
- 2) Otagawa Ohashi Bridge could come to create new landscape where the bridge and Itsukushima Island interact positively by taking asymmetrical bridge spans.
- 3) We achieved a universal design pathway that, by separating the main bridge and pathway, links the banks on both sides at the same time as proposing a spatial design for a bridgehead plaza where those banks function as one united place.
- 4) We made the west viaduct that not only ensure the continuity of Otagawa Ohashi Bridge but also allow for continuity in any future extension of the viaduct.

5. Reference

- [1] Akiyoshi NII et al., *The importance of bridge planning in bridge design- Case study on the South Road Ota-gawa River flood channel bridge*, 5th IASDR TOKYO, 2013, pp2079-2090.