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DEJIMA FOOTBRIDGE, MAKING A CONNECTION IN THE 400 YEARS' HISTORY. A STUDY ON CULTURAL MEANING OF BUILDING CONTEMPORARY BRIDGE.

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Summary

Dejima is an artificial island built in 1636. During the isolation policy of the Edo Period, Dejima was one of the few places which connected Japan to the outside world. A single small masonry bridge was the only connection between the mainland and Dejima. Later in the Meiji Period, river conservation work widened the river from 5 meters to 30 meters and the old Dejima bridge was demolished. On the 27th February 2017, with great public interest, a modern footbridge was erected on the site of the original bridge and the link was re-established after 130 years of absence. The new Dejima Footbridge is a 38.5 meter long steel plate girder bridge with a timber deck. Its restrained design is influenced by its material context and the intention to build modestly in this place of historical importance. Public works tend to receive minor attention and sometimes even negative responses from the public. We designed this bridge with respect for its context and carefully planned the process of design and construction to take into account the history of Dejima and involve the local community. Over the many stages of the process, the project came to attract the attention and sympathy of the public. Finally, on the weekday morning on which it took place, more than 5000 people attended to watch the mounting of the bridge. Designing is a partly a process of communication. This article describes the importance of gentle gestures in historical contexts and a communication process for the successful integration of modern constructions in sensitive situations.

Keywords: historical; aesthetics; structural concepts; planning; counter-weight; participation; Dejima; communication; public relation; footbridge

1. Contemporary bridge in historical context

The construction of the new bridge took place in the National Historical Site. Firstly, the design had to avoid the destruction of buried historic remains on the Dejima side, thereby forbidding the placement of large foundations. Secondly, the bridge design should not be an imitation of the original 5-meter-long masonry arch bridge of the past, but rather it should be a design of our era. Two guiding principles were established to ensure respect of these requirements. The first was the choice of an appropriate scale for the structure. The design avoids having large structural elements above the deck level, respecting the landscape of the site. In addition, the repetitive pattern of small members lets the bridge fit in to the context of the historic buildings, giving the bridge a restrained moderate form. The second concept was to avoid the placement of the piers in the river. In the actual context of the river, the placement of one pier dividing the length into two spans of 15 meters would have been allowed, but this option was not chosen in consideration of the aspect of the landscape as well as river flow.

Dejima Footbridge is a 38.5 meters long steel plate girder bridge with a timber deck. Its restrained design is influenced by the material context and the intention to build modestly in this place of historical importance. Due to numerous small holes in the web and particle reflections of the special painting, the bridge merges

itself gently in the landscape. It is a hyperstatic steel bridge with two spans of each 33m and 5.2m. Since the size of the foundation is strictly limited on the Dejima side, the structure is clamped by two support points on the other side and balanced using the large foundation as a counterweight. Employing a cantilever structure allows to limit the reactions on the Dejima side. Furthermore, a pre-camber is applied during the construction in order to limit as a minimum the reactions from the permanent loads. In principle, the bridge works as a cantilever structure under the permanent load, becomes a hyperstatic bridge of two spans under live loads. In detail, the reaction due to the permanent load is limited approximately to 80kN for the prevention of negative reactions in case of uplift wind loads.

The shape of the two main girders reflects the combination of the bending moment diagrams of the two support arrangements. The level of the intermediate support is lowered by 1m on the park side. This reduces the visual volume of the bridge structure, opening clear views from the park side to the Dejima side. In addition, the lowered area of the bank indicates the position of the original masonry bank as well as hiding the guard rails of the bank. The bridge design is integrated with the park landscape.

The main structure is two 18 mm thick plate girders on each side, with longitudinal stiffeners to avoid buckling. These stiffeners are also the elements that gives a modest scale on the site. The main girders and railings are cut-out from one sheet of steel plate by plasma cutting. We also inserted numerous small holes which were dimensioned by reference to local stress values in main girders. Through these features the bridge merges in the landscape because you can see the landscape behind the bridge through the girders.

2. Social communication process

Public constructions tend to receive minor or even negative responses from the public. We carefully respected the context and planned the process of design and construction along the history of Dejima together with the local community. We tried to activate the value of Dejima, which is forgotten by the local by creating catch phrase 'Dejima Again'. During construction phase, we design construction fence graphically to put portrait and message of local people with social posing. It is named Dejima posing, sort of social gesture for taking portrait enjoying or giving support for project. We plan to transport 38.5 meters full length of bridge in one piece by shipping from the sea by following that history of Dejima, the only place which open to the world and coming new technology and culture over the sea. Through several steps of the process, the bridge came to attract attentions and sympathy from the public. Finally, more than 5000 people attended to watch the mounting in the morning of a weekday.

Modern public construction becomes solemn ceremony for the city by doing following three things. 1. Modern structure in modest gesture carefully respecting history, landscape and condition. 2. Communication process accompanied with designer face to face and which people become a fun of project by enjoying the process. 3. To give a story in transportation and mounting by following Dejima history. Designing is a part of process of communication. If we plan the integrated process for designing structure and communication with local people, public reaction for the project may become positive. During the process of communication and designing Dejima footbridge and by enjoying and sharing great moment of mounting the bridge with local people, we noticed that to design its process in social way is key to get positive reaction or admiration for new modern architecture. And this example of the social (emotional) communication process can be one of the way for sharing social value with public instead of taking normal participation procedure of consensus forming which is to get agreement.



Fig. 16. a)Dejima Footbridge rendering b) Mounting Dejima footbridge with great attention from the public