

## Second Vivekananda Bridge, Kolkata, India

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## Summary

A need for capacity augmentation for the Vivekananda Bridge across River Hooghly connecting the twin city of Kolkata and Howrah, in the vicinity of Dakshineswar, near Kolkata, was felt and the initiative started with a techno-economic feasibility study. The initiative further developed into the largest BOT project in the bridge sector in India which promoted by an international consortium. In this process, the designs were carried out accommodating various concerns, both technical, like river regime and constructability and non-technical, like environmental issues, land acquisition and resource mobilization. It was taken on concession for a period of thirty years, including three years for construction. The facility was thrown open to public on July 4th 2007, within the time frame and cost. The paper describes the process of conceptualization all through to implementation, realization and operation and maintenance.

**Keywords:** Technological innovation, Cable-stayed extradosed Bridge, Prestress, Precast Segments

## 1. Introduction

Second Vivekananda Bridge, located 50m downstream (Fig. 1) of the existing rail-cum-road Vivekananda Bridge (Bali Bridge) built in 1931, is a landmark project for providing a new road link between the twin cities, namely Howrah and Kolkata, across the river Hooghly in West Bengal, India. It is six lane tollway project 6.1km long comprising the main bridge across the river and Howrah and Kolkata approaches and is the largest bridge project in India executed on public-private partnership mode, Build Operate Transfer (BOT) format

Cable-stayed extradosed concept is used in the super structure for the first time in India. The strength of the bridge lies in the fact that it is being made with cable-stay profiles matching the profile of the existing bridge.

The short pylons that do not impose on the spires of the venerable Dakshineswar Temple are in tune with the environs of the heritage area and do not cast a shadow on the sacred ambience. The bridge has slender profile, leading to lower formation level, facilitating the approaches and reducing land acquisition. Fig. 2 shows a sectional profile.

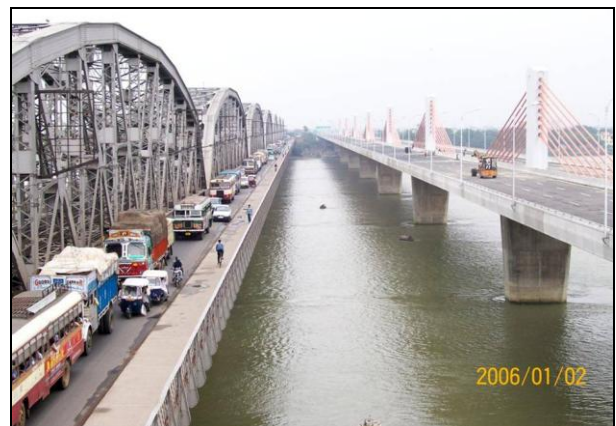


Fig. 1: Second Vivekananda Bridge - 50m downstream of Bali Bridge



This land mark project connects NH-2/NH-6 and NH-34/NH-35. It was executed within scheduled time and within cost and was thrown open to traffic in July 2007.

## 2. The Project Alignment

Fig. 3 shows the project alignment. The project starts from near the Dankuni interchange (NH-2 & NH-6 junction) system at the western bank of the river with six lane toll way, two lane toll-free road at the north and single lane service road in the south of the main alignment. The toll way is flared to 20-lane at the semi-automated toll plaza with 16 toll booths. It will be converted to fully automatic toll plaza system as the traffic increases. The alignment passes through one 8-lane ROB on Howrah side and 2.5 Km long approach viaducts for multi-directional connectivity at Kolkata side through 6 elevated ramps.

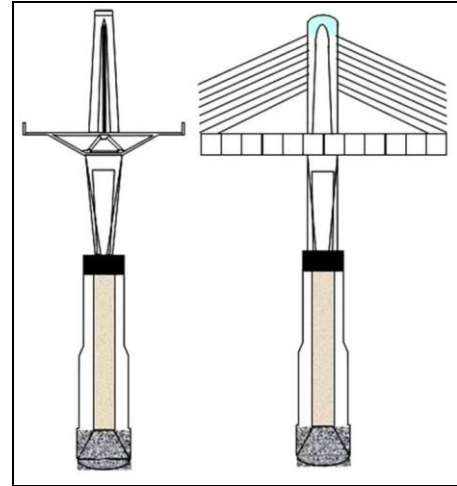


Fig.2 Second Vivekananda Bridge-Sectional Profile

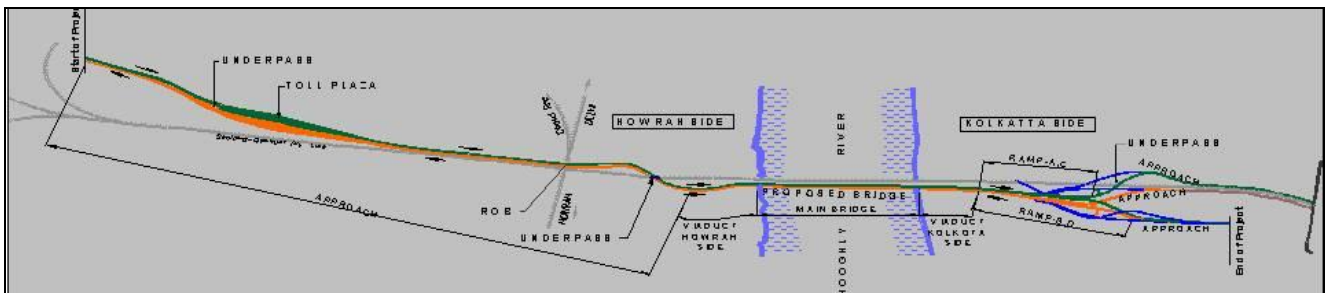


Fig.3: Project Alignment

## 3. The Project Features

The main elements of the bridge are given in the table:

Sl. No	Description	Howrah Side	Kolkata Side
1	At Grade	3304 m	600 m
2	Viaduct	724 m	2240 m
3	Main Bridge	880 m	

The main bridge sports a single plane of cable stays supporting the six-lane deck, single cell precast prestressed segments weighing between 136 – 150 t, and the harp system for the cable profile. The bridge is a paradigm for elegance. It is an engineering marvel for achieving sleekness of form, be in the main bridge or in the approach viaducts.

## 4. Conclusion

The design and implementation of this project had a number of innovative approaches like flushing of well cap at the bed level, design of expansion joint, hybrid pier head, box type retaining wall besides the design of main bridge.

This extradosed single profile cable-stayed bridge holding up the 880 metre bridge along the central median built with most modern design supporting more than 29 m wide precast segments with multiple spans was perhaps built for the first time in the world and it received the most innovative bridge design under the foreign category in 2007 awarded by the American Segmental Bridge Institute (ASBI) – Fig. 4



Fig. 4 Second Vivekananda Bridge team receiving the award