

Bridge across Vistula River in Plock (Poland) – Project Realization

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Summary

The paper presents the project realization of the Roadway Bridge across Vistula River in Plock (Poland) as it was designed, built and finalized. The bridge, having width of 27,5 m and total length of 1.200 m, consists of two parts: main bridge part (length of 615 m) over the Vistula riverbed and access bridge part (length of 585 m) over the inundation. The main bridge structure is steel cable-stayed bridge consisting of: continuous bridge girder with orthotropic deck (main span of 375 m and side spans of 2x60 m each), cable stays in the single plane and two obelisk-type pylons fixed in the deck. The bridge, as the part of modern bypass, is well incorporated in the environment - plain terrain on the left bank and hilly landscape on the right bank featuring Plock town.

Keywords: cable-stayed bridge; bridge design; bridge construction; steel structure.

1. Introduction

The international competition for design of the Roadway bridge across the Vistula River in Plock was carried out by Polish society of bridge engineers in two parts. The first round, was an open anonymous competition for conceptual design (1996). After the second round - further design stage with the appropriate technical-economical analysis (1997), the design team (authors - main designers: Nikola Hajdin & Bratislav Stipanic, with design engineers: A. Bojovic, S. Dunica & M. Lazovic), with Budoplan Plock as Polish design partner, was promoted as the winner of the competition. The winning design was proceeded to the client for the realization. Design office Budoplan Plock signed the contract (design for tender, final design and author's supervision) with the Province directorate for roads from Warsaw in 1998. Budoplan delivered the final design in 1999. After the design verification, the permit for building was issued in 2000. The tender for building was launched in the spring 2002. The winning contractor was the Polish consortium Mosty-Lodz & Mosty-Plock. The adopting of workshop drawings and the erection plan, according to the building technology of the contractor, was made by Pontprojekt Gdansk. The building works of the bridge started in July 2002. The completed bridge was tested by trial loading in October 2005. The bridge was open for traffic in October 2007, after the completion of access roads.

2. Basic Data of the Bridge

The bridge has the remarkable dimensions, conditioned by Vistula River at Plock (120 km north-west from Warsaw) that has to be over-passed. At the middle water level the maximal river depth is around 6 m with 540 m riverbed width. At high water level the riverbed width amounts 1.170 m. The entire bridge (Fig. 1), having total length of 1.200 m, consists of two different parts:

- Main bridge part over the Vistula riverbed, length of 615 m: steel cable-stayed bridge with two pylons, having central span of 375 m and side spans of 2 x 60 m each;
- Access bridge part over the inundation of the left bank, total length of 585 m: two composite (steel-concrete) continuous beam structures, spanning 5 x 58,5 m each.

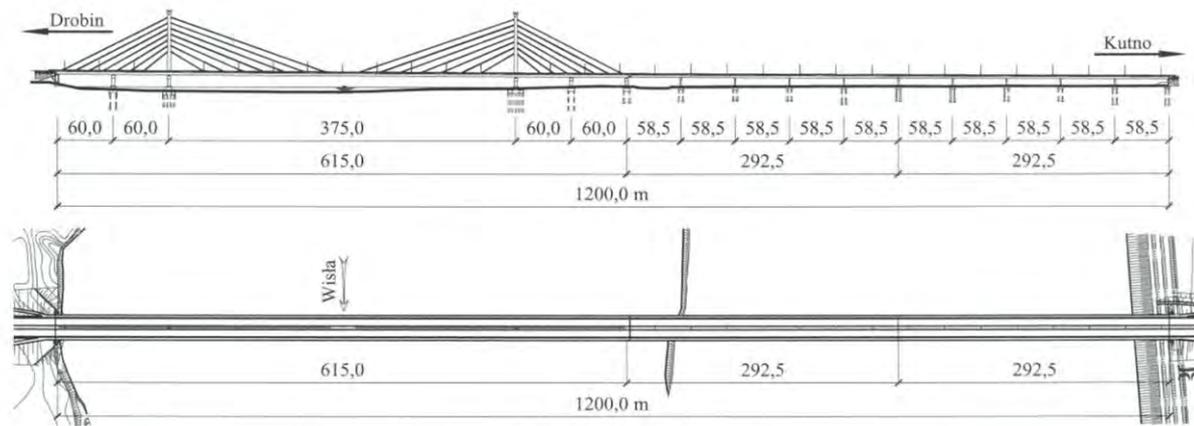


Fig. 1: Side View and Plan View of the Bridge

The main span of 375 m belongs to the largest ones for the cable-stayed bridges with the cables in a single plane, and it is the largest span applied for the type of cable-stayed bridge with the column-type pylons fixed to the girder. It is the bridge with the longest span built up to now in Poland.

The total width of the bridge is 27,5 m, consisting of: two separated carriageway areas, one-sided footway or cycle track alternatively and the central reservation area.



Fig. 2: View of the Bridge from below

3. Bridge Aesthetic Assessment

The bridge is in the beautiful scenery of the large Vistula River at the Plock town, built for vehicles, pedestrians and cycles; therefore the aesthetics played significant role in bridge design and build.

The stays are formed by pair of cables, placed in the middle plane of the bridge. The view from the bridge, either from roadway either from footway or cycle track, is external-sided free without any cable obstacles. The pylons are shaped in obelisk form, that improves the aesthetic appearance of the bridge from roadway, footway, cycle track and from the river banks as well. The main span of the cable-stayed bridge, side spans and pylon height, as the rhythm of cable stays are in aesthetically suitable relations. The piers are formed as aesthetically favourable ones; the shapes are rounded and the pier parts (body, head and base) are clearly distinguished. The colours of the bridge are: white-gray colour for the vertical bridge elements (piers and pylons) and „Turkish“ green colour for the girder and stays.

4. Conclusion

The bridge as the part of modern by-pass, on the route of state roadway connecting central Poland to north-west, contributed significantly to the sustainable development of Plock and this Polish region, having: environmental quality, resource efficiency, economic vitality and public safety.

It enables to lead away the transit and heavy traffic from city centre, avoiding the previous traffic jams in the town because of old roadway-railway bridge across Vistula River; largely decreasing the pollution and traffic accidents in the city. The bridge is well incorporated in the environment - plain terrain on the left bank and hilly landscape on the right bank featuring Plock town. It enables the new routes for the recreation walks and bike rides as well. The bridge was successfully constructed by Polish contractor, having modest price of around 1200 euros/m² only, as it was estimated by the designer before lunching the tender in summer 2002.