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FOOTBRIDGE IN THE OLD CENTRE OF LJUBLJANA OR HOW THIN CAN BRIDGE BE

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Summary

The greatest modernist influence on the historical centre of Ljubljana gave the famous Slovenian architect Jože Plečnik. When arranging banks of the River Ljubljanica he even leave an opening in the masonry for a future footbridge. For some period, there was a temporary wooden structure (1991-2014), which was no longer useful. Therefore, the city of Ljubljana in 2012 announced a public design competition for a new footbridge. This article describes the winning solution of the new footbridge that was built and open in 2014.

Design is based on the principle of minimalism, with an extremely slim structure, thin as possible. The concept of minimalism in its limitation raises the question of how far we can go with slenderness ratio and keep the structure still suitable for use in the city centre with heavy pedestrian traffic. The paper presents a great engineering effort to fulfil the simple minimalistic statement.

The steel deck resembles a shallow ‘’V’’ box cross section, the deck clear span measures 25 meters in length and 3.4 meters in width, with structural height of only 50 centimetres. Towards the outer edges, the deck narrows to just 25 centimetres, which gives it a very elegant slender shape.

Keywords: footbridge; cultural heritage; minimalism; steel structure; concept; dynamics; damping; TMD

1. Architectural Debate

When preparing the design at the competition stage, out of the respect for the great master Jože Plečnik, we pondered the visual characteristics of the footbridge. Plečnik already determined its width with his arrangement of the riverside, while the river determines its length. Taking into consideration the formal language of the neighboring bridges, which are designed in a “Neo-Renaissance” manner of plasticity, we can assume that Plečnik’s footbridge would have been formally rich and prominent. The question arose, how to realize Plečnik's idea. Should one design a pronounced stylistic project prominently emphasized in the river space, or, quite contrary, create a silent, discreet architecture that resides above the river as an almost intangible idea of a bridge. Both are possible and legitimate.

If we are looking for a solution in the new spatial and program formats, then the possibilities are countless; and vice-versa, if we want to emphasize simplicity and discretion, all solutions are pointing toward a single final solution. In our opinion, the footbridge was certainly necessary on this location, but the area is already very much saturated with Plečnik’s own legacy, therefore it seemed reasonable not to compete with the master in the formal domain. Therefore, our design suggested placing an elegant, transparent, minimalist footbridge over the river, such that would allow unobstructed views along the river but at the same time connect both banks as a wide viewing platform over the river. Our aim was to design a bridge with construction as thin as possible, and bridge railing as transparent as possible (Figure 3).

2. Structural Answer

To maximise its slenderness, the structure was fastened or continued over the existing retaining wall with an additional span and tensile pile support on the right bank. Fastening was, however, not possible on the left bank, where the Café Makalonca is located. As such, the structure was simply supported on the bearings, thus creating an asymmetrical semi-integral structure with a longitudinal section illustrated in Figure 1.

The main span of 25 m in length is a slender steel deck that continues, on the right bank, into a concrete pile cap with two tensile piles of 1.20 m in diameter. The cross-section of the steel deck is trapezoid-shaped of a structural height of 25 cm at the edges and 50 cm in the centre of the cross-section (Figure 2), resulting in a high slenderness ratio. The transition from the steel to the concrete part is created by an intermediate composite part, where shear studs transmit forces. Extremely slim deck structure requires additional TMD device.

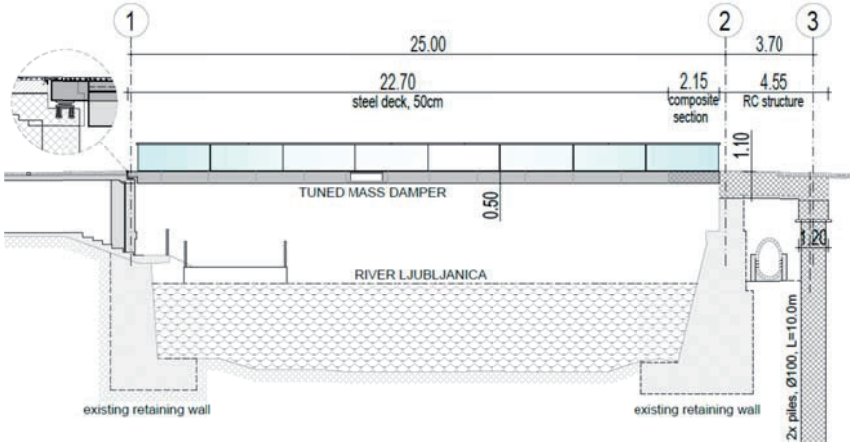

Figure 1: Asymmetrical footbridge structure - longitudinal section

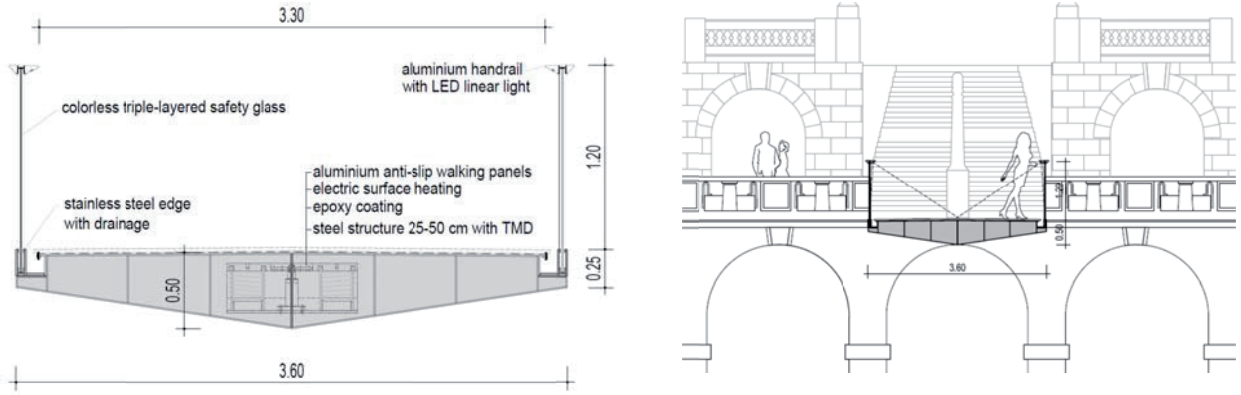

Figure 2: Footbridge characteristic cross section and historical environment

Figure 3: New footbridge in the centre of Ljubljana