

The cable-stayed footbridge in Prague - Radotín

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Abstract

The original, seriously damaged concrete footbridge across the Berounka River, which was in a state of disrepair, was replaced by an asymmetric 110 m long steel-cable-stayed footbridge using the adapted existing substructure. The 24 m high pylon consists of one tube asymmetrically pinned to the upper chord of the triangular lattice structure above the bearing sliding on the pillar. Another interesting solution is the termination of the ropes by sockets with a threaded bar and tendon, with a turnbuckle and a socket with pin which enable their convenient adjustment. The composite deck of the footbridge is a suitable alternative to timber or steel orthotropic one.

Keywords

Asymmetric cable-stayed footbridge, pre-stressing of the stay, tuned mass damper, strain gauge, composite deck, rope, socket, turnbuckle

1 Introduction

The original cable-stayed footbridge built in 1994 was a pre-stressed concrete structure with a timber deck 2,5 m wide. This structure was after 15 years of service seriously damaged and, in state of disrepair, was supported in the river by two temporary supports (Fig. 1). The new cable-stayed footbridge is positioned on the existing substructure adapted for the new structure, thus preserving the original valuable urban and contour design (Fig. 2). Additionally, the deck width was extended from 2,5m into 4 m (Fig. 14).



Figure 1 Original concrete footbridge



Figure 2 New triangular lattice cable-stayed footbridge

2 Disposition and structural solution

The bridge load-bearing structure 110 m in length is designed as an all-welded triangular tubular lattice structure of width 3,6 m and varying structural height. The footbridge with a straight axis in the plan leads from abutment O1 on the left bank across the Berounka River to pillar P2 and finally to abutment O3 on the right bank (Fig. 3). As per the architect's intent, the footbridge is stayed on a 24 m high pylon which consists of one eccentrically positioned tube pinned to the upper chord of the main girder (Fig. 4). The pylon is perpendicular to the bridge from the lateral view. Top of the pylon is inclined 2 m in the direction of the river flow. The structure is divided by the pylon into two spans. The main span above the river from Radotin abutment (O1) to pillar P2, spanning 80,5 m, is supported from the top of the pylon by two twins stays of $\varnothing$ 36 mm anchored directly to the top chord of the bridge girder (Fig. 8) or to the 1,4 m cantilever on waterward side, to afford sufficient height for the pedestrians and cyclists (Fig. 9). The top of the pylon is supported by two stays of $\varnothing$ 48 mm and $\varnothing$ 40 mm anchored to Zbraslav abutment (O3) (Fig. 5).

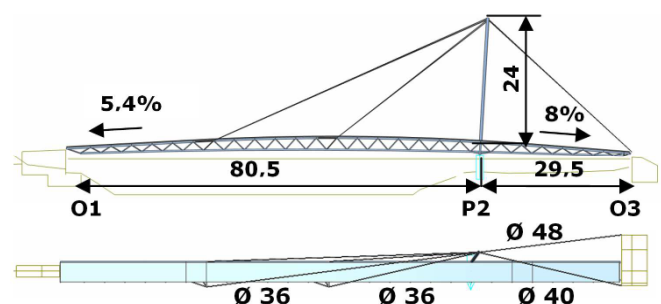


Figure 3 Disposition of the footbridge in Radotín