



Two new pedestrian and cycle bridges between Rapperswil and Auenstein, Switzerland

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1 Introduction

The existing road bridges over the Aare and the underwater canal have unfavorably narrow space conditions for cyclists and pedestrians. New pedestrian and bicycle bridges shall create an attractive and safe connection for non-motorized traffic.



Figure 1: Bridge B, three-span girder next to the existing road bridge [Roger Frei, Zurich]

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The two wooden bridges have lengths of 90.50 and 98.50 meters and a usable width of 3.50 m. They are arranged parallel at the downstream end to the existing bridges. The substructure is designed as a timber structure composed of longitudinal main girders made of glulam. The roadway consists of transversely arranged wooden beams, a three-layer slab and a mastic asphalt road surface. A 1.30 m high steel railing with a wooden handrail serves as fall protection. The abutments and the bridge piers are made of reinforced concrete and founded on bored piles.



Figure 2: Bridge A, five-span girder [Roger Frei, Zurich]

2 Design description

The pedestrian and cycle bridges consist of continuous 3- or 5-span wooden girders. The spans are in accordance with the existing road bridges.

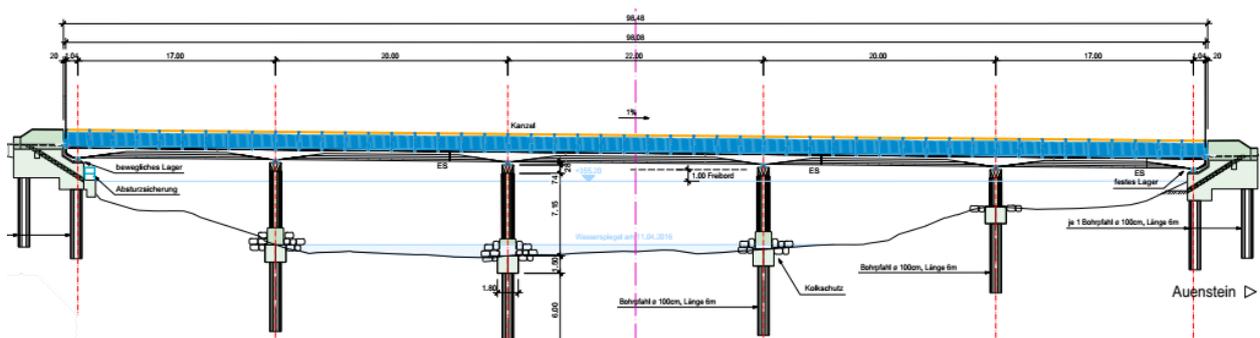


Figure 3: Longitudinal view of Bridge A, five-span girder



The main girders consist of a collection of individual glulam beams (figure 1, 4). The maximum length of glulam is around 40 meters in terms of production and transport. Therefore, the girders had to be transported to the construction site as divided individual parts by truck.

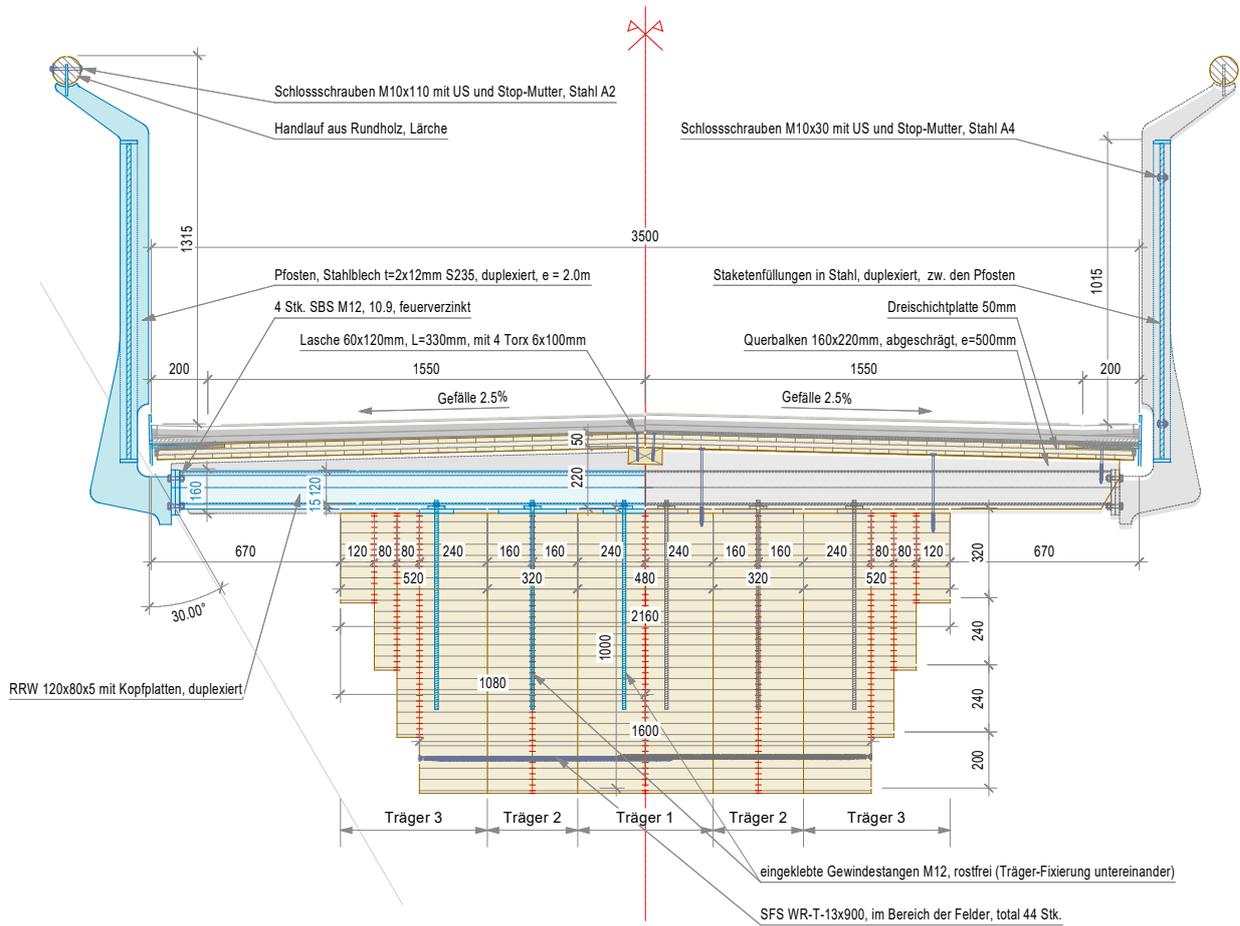


Figure 5: Cross section in the bridge field area

From the existing bridge, they were lifted onto the piers just in time via pendulum lift using two large truck-mounted cranes (figure 6). Thanks to an ingenious arrangement of the joints of the individual girders and multifunctional connecting components in the superstructure, the system is configured to function statically as a continuous girder.

The outermost beams are cove shaped. They have full cross-section at the piers and abutments, tapering off toward the field sections (figure 5). From a structural point of view, this is feasible and brings advantages in terms of structural wood preservation. On the main girder, transversely arranged secondary beams and sloped three-layer slabs form the basis for waterproofing and two-layer mastic asphalt. A monitoring system controls the condition of the waterproofing. The lateral cantilevers of the carriageway serve to protect the main girders. The railing structure is decoupled from the carriageway by connecting the posts to the steel beams running parallel to the secondary beams. The steel beams also serve as static cross connectors between the individual beams to form the main girder as continuous system as described.



Figure 4: Abutment [Roger Frei, Zürich]



3 Photos of the assembly



Figure 6: left: pendulum lift; above: connection of the main girders; below: installation of crossbeams and railing frames

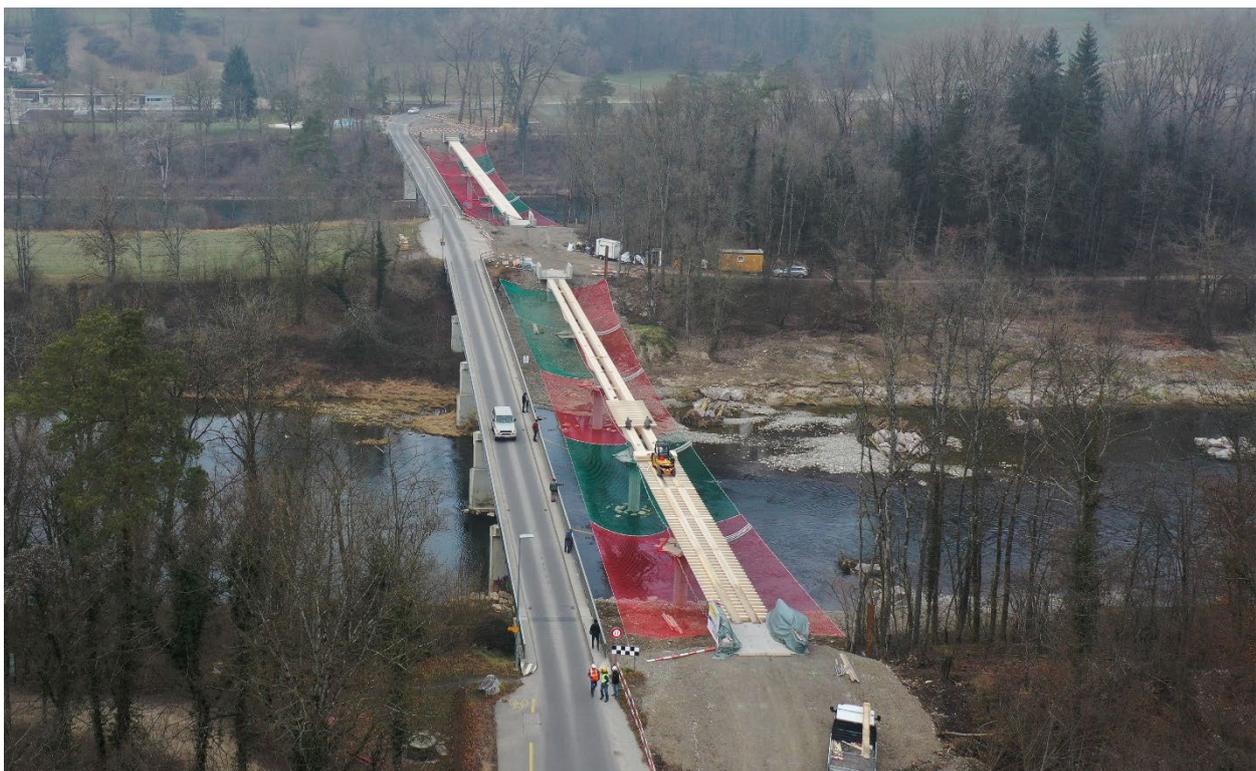


Figure 7: aerial view during construction



Figure 8: Bridge A, five-span girder [Roger Frei, Zurich]

4 Acknowledgement

The project authors of the impressive wooden bridges are the timber construction engineering office Makiol Wiederkehr AG and the civil engineering office Wilhelm+Wahlen Bauingenieure AG. In order to achieve the best design for the client (Canton of Aargau), the architectural office of Edelmann Krell was consulted. The design support of experienced architects has proven successful, as two remarkably attractive bridges have been created. We would like to thank all these involved for their excellent cooperation.

Photographs by Roger Frei, architectural photographer, Zurich