Bridge over Birs river

Laufen, Switzerland / 2021

Client	Stadt Laufen - Hochwasserschutz Birs
Scope	tender design

The proposal for the new bridge over the Birs River in the Swiss town of Laufen was a finalist in the international competition held in 2020.

The widening of the Birs River channel required the replacement of an existing 30-meter-span bridge with a new 66-meter-span structure, whose main objective was to improve the river's drainage capacity. In addition, the width of the new bridge had to be adapted to the planned road layout in the new urban development area, which called for a central roadway 11.50 meters wide and pedestrian sidewalks 2.00 meters wide on each side. The resulting total width of the new bridge was 15.50 meters, significantly more than the 10 meters of the existing bridge.

CONTEXT
The project presented several challenges:

* First, the structure had to span a much greater distance than the existing bridge while allowing for the maximum flood flow, with a clearance of 0.70 meters under the bridge;
* Second, the new structure had to be built while maintaining traffic on the existing bridge to avoid paralyzing city mobility during construction;
* Finally, the new bridge needed to integrate aesthetically with the overall urban redevelopment project, all within a reasonable budget.

DESIGN
The proposal consisted of two lateral trusses between which a system of transverse beams spaced 3.00 meters apart was placed, supporting a concrete slab that would bear the pavement and live loads. This structural solution allowed for a minimal depth beneath the street level, enabled phased construction, and offered what we considered a compelling formal expression.

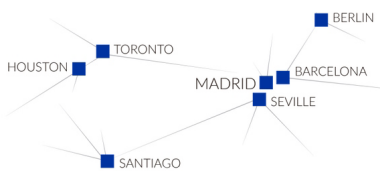
The proposed structure had a depth below pavement level of 1.00 meter at mid-span, giving a clearance of 0.80 meters to the flood level—slightly above the 0.70 meters required in the competition brief.

The two lateral trusses were made of steel. Each included a parabolic upper chord in compression with variable height and width, a constant-depth lower chord measuring 0.85 meters, and a diagonal mesh (diagrid) that transferred vertical loads from the deck to the compressed chord and also helped resist overall shear forces. The density of the diagrid increased near the supports, where shear forces are greatest.

The area of the compressed chord was approximately constant, with a wider cross-section at mid-span to improve lateral buckling resistance. This allowed us to avoid installing bracing between the two trusses, which would have compromised the formal, functional, and constructional clarity of the design.

The proposed construction process began with building the eastern parts of the abutments on both banks. Then the eastern truss (prefabricated in advance) was installed. Next, the eastern half of the transverse beams was placed, supported on one side by the truss and on the other by a distribution beam resting on the existing bridge. The upper slab was then poured over these beams, and traffic was diverted to the eastern half of the new bridge. Afterward, the western sidewalk of the existing bridge was locally demolished, and the western parts of the abutments were built. The western truss and its transverse beams were then installed, completing the upper slab and final bridge finishes.

EPITOME
The bridge is a reinterpretation of the canonical truss, designed as a structure that combines necessary functional and economic efficiency with a contemporary visual expression.



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