REHABILITATION AND RECONSTRUCTION OF THREE HISTORICAL TIMBER STRUCTURES IN SERBIA

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1. RECONSTRUCTION OF MEDIEVAL TOWER IN BAČ

Medieval fortress Bač with its suburb is located in the southwestern part of Bačka, about 14 km from the most important European river Danube. It was built near the town with the same name on the river Mostonoga, 1329.

Within the ramparts of the fortress, the most dominant and only freestanding structure is the keep tower (the watchtower).
The tower has almost a square base (10,26 x 10,16 m) and is oriented with diagonals to the sides of the world with a spiral staircase in the northwest facade and a potable water riser on the northeast facade. The tower has a height of 34.33 m, and it has a ground floor (basement), three floors and an attic overhanged on cantilevers.

Structural plan and the cross-section of the watchtower
The watchtower has been repaired and reconstructed on several occasions in its history, but due to lack of maintenance, its decay has occurred. The biggest damages occurred after the fire in 1993.

Fire damaged timber floor joists and damages the roof structure
Reconstruction of the tower, and above all the roof, was done so that the damaged roof structure was completely replaced by the new one. All visible connections of timber members were constructed with wrought iron, which contributed to the authentic appeal of the structure.

Final works on roof reconstruction
2. RECONSTRUCTION OF THE BRIDGE OVER THE RIVER MILEŠEVKA NEAR MILEŠEVA MONASTERY

In the immediate surroundings of monastery complex Mileševo, beside the monastery water mill, there was once an old timber bridge. The exact time of its construction is unknown, but according to some historical data it is assumed that it was constructed in the middle of the 19th century. This bridge was destroyed after enormous floods which struck the Monastery and its surroundings at the end of 19th century.

Old photograph of the water mill and the former bridge

Provisory structure used for crossing the river before the new bridge construction
Bridge in erection stage
Completed bridge from the downstream side

Completed bridge from the upstream side
3. RECONSTRUCTION OF THE ROOF STRUCTURE OF THE CARMEL MONASTERY CHURCH IN SOMBOR

The Church of the Carmel Monastery in the centre of Sombor is also known as the Church with Two Towers. Construction of the church began in 1860 and was completed in 1904. Its base dimensions are 58x25 m, where in structural terms the church is a masonry structure with a timber roof structure.
Above the masonry structure a timber roof structure was constructed. It is a very complex structure which is a combination of queen post roof truss and a roof with a hanger in the middle of the span.
• Visually-macroscopic examination results

In addition to the roof cladding damages, the examination revealed following damages to the roof structure:
- rot, which is present in many places;
- a wormhole, in a very large number of timber elements;
- loosening of some connections;
- deformations (deflections) of structural elements;
- cracks in timber;
- fractures of a certain number of timber elements.
Considering all the problems observed in the existing roof structure, two solutions were considered:

1. Repair of the existing structure,
2. Completely new, modern glulam roof structure.

After considering in detail all the advantages and disadvantages of both, the second solution was adopted, which, among other things, guarantees the functionality, serviceability and durability of the structure over a period of time that could be measured in hundreds of years.
The new roof structure layout

Longitudinal section of the new roof structure

Cross sections of the new roof structure
Main roof trusses construction

Part of the completed roof structure from the inside
Works on the roof part above the church alter
View of finishing works and completed roof