



# Balaidos Stadium roof structure reinforcement study

Vigo, Spain / 2017-

Structural type  
Characteristics  
Client  
Constructor  
Scope

reinforced concrete structure for changing the existent roof by a lighten one  
feasibility study for different solutions which could resist Balaidos Stadium roof change  
COPASA  
COPASA  
detailed design and construction support



Balaídos stadium (Vigo, Spain) was built in 1960. In this year, three grandstands were executed (grandstand "Goal", grandstand "Scoreboard" and grandstand "North"). Subsequently, and on the occasion of celebration of the World Cup, the grandstand "River" was built in 1981 to complete the stadium. The structure built at the beginning of the 60s consisted of reinforced concrete frames every 5.65m and the roof consisted of reinforced concrete shells. The cantilever span of the roof is 17.00m and the distant between support point on the frames is 4.50m. The grandstand "River" built later consists of reinforced concrete frames (columns and beams) every 8.40m of greater importance. Roof consists of a light 3D steel structure formed by spherical joints and tubes. Roof cantilever span is 22.40m and the distance between supports on the frames is 11.20m.

A remodeling of the stadium has been proposed in different phases. The first phase of the remodeling focused on the grandstand "North". The remodeling consisted in the extension of the grandstands towards the playing field and the replacement of the concrete cover roof a new high steel roof up to 25.80m cantilever in order to cover the entire extension of the new stands. The new roof supports a new architectural skin that also extends in continuity with the façade, which changes from being a wind-permeable roof to a closed structure. This radical modification of the roof totally modifies the reactions on the concrete frames since the wind exposure is much more conditioning.

Fhecor Ingenieros Consultores was hired by COPASA, to evaluate the need to reinforce the concrete frames and foundations. After the evaluation of the existing structure, a reinforcement of the frames is proposed, consisting of an external post-tensioning of the upper lintel and the columns. This is an innovative solution that allows to increase the bending capacity of the frames. To materialize this solution, strands are arranged on each side of the frame.

After the success remodelling of the grandstand "North", the remodeling of the grandstand "River" is proceeded. In this case, the 3D steel structure is poorly conserved, so the remodelling project proposes its replacement. As in the grandstand "North", the new roof supports the architectural skin that extends through the façade. Although the dimensions of the new roof and the points of support in the concrete frames are similar to those of the existing roof, the fact of closing the roof modifies the wind exposure.

Fhecor Ingenieros Consultores is hired again by COPASA, to evaluate the need to reinforce the frames. In this case the solution consists of steel plates in those areas in which the bending reinforcement of the frames is insufficient. The anchoring plates for the support of the new roof are also detailed.

Both remodels have been carried out. The development of the grandstand "Goal" and grandstand "Scoreboard" which will complete the integral reform of the stadium are pending.



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