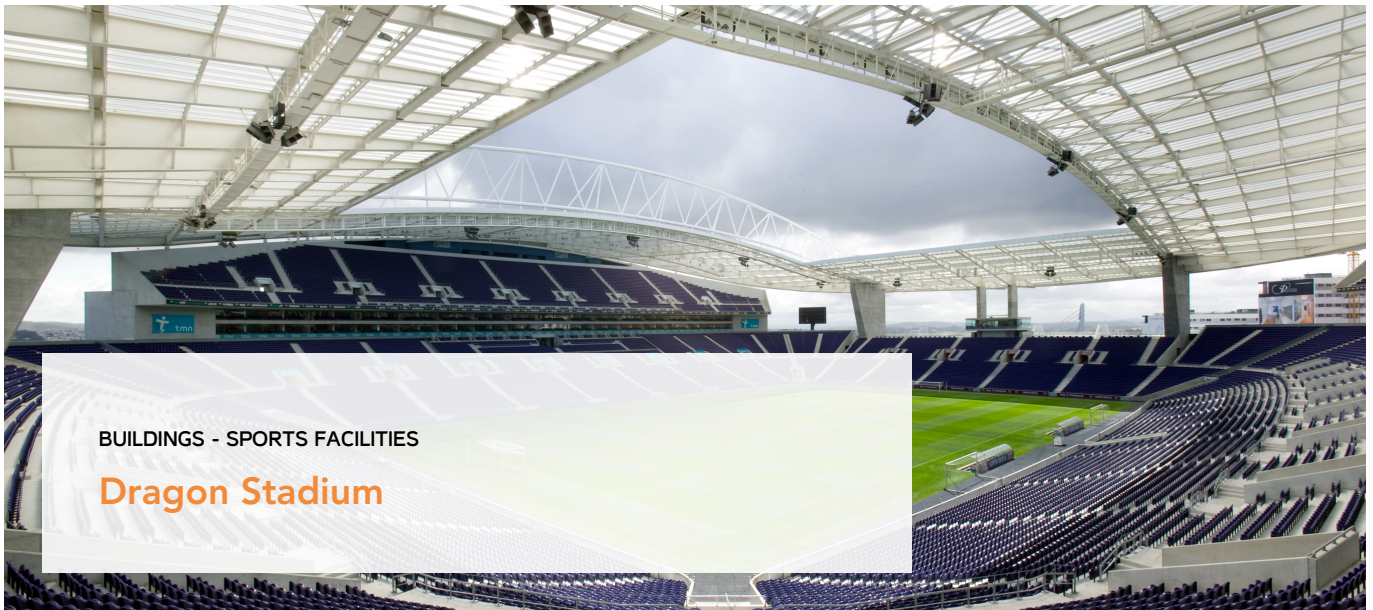




Engineering Structures for Life



BUILDINGS - SPORTS FACILITIES

Dragão Stadium

ABOUT

The Dragão Stadium is an essential piece in the urban plan of the Antas district in Porto designed by Architect Manuel Salgado, and suites to a new concept of sporting, entertainment, recreational and commercial equipment. It is not only a sport venue used periodically for football games but also an equipment of daily use capable of attracting a wide range of population and supplying a great diversity of activities in the very best conditions. The stadium is a multipurpose building with a clinic, a health club, a bingo hall, offices and commerce.

The stadium has a capacity for 50.948 spectators in a 34.000 m² area of covered tiers and with 1.177 parking spaces. During its construction, that took 2 years, were employed 89.055 m³ volume of concrete, 11.745 tonnes of reinforcing steel, 9.749 tonnes of high strength steel, 9.600 m of concrete piles, 106.400 m² of precast slabs and 34.900 m of precast concrete terrace units.

Structural solution

The stadium is a building with 6 floors above the Square level and 4 underground floors. The [concrete structures](#) of the stadium are essentially constituted by 84 main radial frames that are connected among them by horizontal circumferential beams, at the pavement level, contributing equally to the pavements support. The terrace units that form the tiers are in precast concrete. These elements are supported by raker beams integrated into radial frames. The floor structure consists of a concrete two-way slab integrating a precast and prestressed slab of reduced thickness upon which was cast a complementary concrete layer to complete the final 24 cm slab. The stadium is divided into 12 independent structures separated by expansion joints.

FACTS

Year: 2001-2003

Client: Somague / Futebol Clube do Porto

Services: Detailed design, Structural Engineering, Foundations design, Geological and geotechnical studies, Coordination of the engineering disciplines, Consulting and on-site technical support

TEAM

António Campos e Matos
Paulo Pimenta

LOCATION

Porto, Portugal

Geotechnical solution

The steep morphology of the stadium location area compelled an enormous excavation volume (1.350.000 m³), most of it in rock, at both North and West Stands location, while in the East and South Stands area, it was necessary to create landfill platforms. In a significant part of the stadium the rock strength allowed footing, but at the East and South Stands location, the poor rock mass characteristics obligate the execution of piles, some of them reaching 20m long.

Conclusion

The construction of large [sports venues](#) is always a complex task whose success depends very much on the design and construction decisions taken in the preliminary phases of the structural design. In the present case of the Dragon Stadium, we used structural systems that were optimised bearing in mind the vast number of repetitions. This allowed us to think of solutions that, in other cases, would not be feasible.

The Dragon Stadium was intensively used immediately after its inauguration and with a very high occupation of the stands. The performed observations and the installed [monitoring](#) proved the excellent behaviour of the adopted solutions.

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