



Manzanares Park Tennis Arena (Caja Mágica)

Madrid, Spain / 2009

Structural type
Owner
Client
Scope
Architect

prestressed concrete slabs
Madrid Espacios y Congresos | Ayuntamiento de Madrid
FCC Construcción
detailed design and construction support
Dominique Perrault



The Sports Center at Madrid's Manzanares Park is a 17-hectare sports complex primarily dedicated to tennis, where the standout feature is the structure of the three stadiums known as the Caja Mágica ("Magic Box"). It comprises two buildings: one for Stadium 1 (with a capacity of 12,500 spectators), and another for Stadiums 2 and 3 (1,900 and 2,900 spectators, respectively), separated by an expansion joint with shear continuity provided by Goujon-type connectors.

Stadium 1 has a rectangular floor plan measuring 159.90 x 102.30 m with no expansion joints, while Stadiums 2 and 3 measure 159.90 x 65.55 m. The different levels (up to four floors) are organized on an orthogonal grid with a primary spacing of 14.40 x 14.40 m between columns. The structural solution for the slabs consists of post-tensioned solid slabs, in one or two directions, with main spans of 14.40 m, a thickness of 40 cm (depth-to-span ratio of 1/36), supported by perimeter columns measuring 1.50 x 1.50 m, and interior columns of either 1.50 x 1.50 m or 0.40 x 1.50 m, in addition to concrete walls aligned with the two main structural directions of the buildings.

The stands are L-shaped precast elements supported by porticoes or walls located every 14.40 m. The role of the stand porticoes is to receive the loads from the stands and transfer them to the columns—directly in Stadium 1, and through the 571.20 elevation slab in Stadiums 2 and 3. The general configuration of the porticoes consists of parallel, evenly spaced type 1.1 porticoes, laid out perpendicular to the courts. The corners are resolved with type 1.2 post-tensioned porticoes, positioned along the bisector of the angle formed by the end porticoes of each row. The main beam or rib has an inclination of approximately 30°, a projection in plan of 27.6 m, and is supported at its lower end and by a pair of vertical supports.

In addition, the complex includes 16 outdoor training tennis courts (the Tennis Garden) and the Indoor Tennis Building, which houses 11 covered courts and office spaces.

FHECOR Ingenieros Consultores, commissioned by FCC Construcción, was responsible for preparing the Revised Structural Design of the Caja Mágica's concrete structure, optimizing various structural elements of the Indoor Tennis Building, and providing Technical Assistance during Construction for all buildings.



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