Roza Martín footbridge

Majadahonda, Spain / 2017

Structural type	suspension footbridge
Characteristics	140 m span long footbridge, curved deck in plan with eccentric suspension system only from outer side
Owner	Ayuntamiento de Majadahonda
Client	Ayuntamiento de Majadahonda
Scope	detailed design and construction monitoring

FHECOR Ingenieros Consultores was awarded the tender for the Project and Construction Management of this new footbridge in Majadahonda. The footbridge itself and the approaches has been carefully design given their location in the middle of an important junction of the town: above the two main roads M-503 and M-516. The structure becomes a delicate landmark both day and night.

The design of the footbridge is governed by factors such as functionality and comfort for the pedestrian, aesthetic impact, safety conditions for the traffic of the junction during both construction and service life, compatibility with existing utilities, etc.

It consists of a suspended footbridge with a deck formed by a steel box 4 m wide and 0.7 m deep.

The structure is composed of a continuous deck with a span length distribution of: 20 + 70 + 70 + 20 m. The plan layout consists of a curved alignment of 300 m radius with a length of 140 m, and two straight lines on both sides of the curve of 20 m in length each.

The mast is located outside of the curve and consists of a circular steel section of 800 mm in diameter. Its height over the ground is 26 m. Its foundation consists of a pile cap with 3 piles of 1 m in diameter.
The suspension system has two main cables and hangers that are arranged only on the edge of the deck at the outer side of the curve in plan. The main cables, located in an inclined plane, have a parabolic geometry following the antifunicular shape of the vertical loads. They are steel cables using locked coil strands with a nominal section ø100mm. The deck is connected to each main cable in ten points by means of suspension hangers.

Two tie downs consisting of steel cables with locked coil strands and nominal section ø100mm are also provided, in order to balance the mast against the horizontal loads transmitted by the asymmetric suspension system, besides providing additional stiffness for withstanding the live loads. These cables are anchored in a pile cap with three piles of 1 m in diameter. The mast and the tie down pile caps are connected to each other with tie beams to balance the horizontal loads.

The piers have two circular steel shafts of almost 300 mm in diameter to support and fix the deck for torsional moments. They are founded on a pile cap with micropiles.

The connection between the deck and the abutments, in the same way than between the deck and the piers, is fixed, without supports or expansion joints. The horizontal forces introduced by the main suspension cables are anchored in the abutments, which have been designed to be integrated into the ramps, reducing the visual impact to a minimum.

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