Bridge over the River Genil. Granada

The structure of the project consists of a composite deck, a steel arch with a single span of 31.00m between supports, five closed galvanized steel cables and load-supporting reinforced concrete abutments. The total width of the structure is 14.00m, divided into a central 9.0m wide area for road traffic and two 2.50m wide lateral areas for pedestrian usage.

The longitudinal load-bearing mechanism of the deck is composed of a central steel core 9.00m in width, which is the result of the connection of two trapezoidal sections with a maximum 0.42m depth. The thickness of the steel plates varies between 15mm and 20mm. The upper concrete slab which tops this box is 0.18m thick, so that the total maximum depth at the centre of the structure amounts to 0.60m.

In order to complement this longitudinal mechanism which directly takes on the loads coming from road traffic, (the 9.0m width coinciding with the one attributed to road surface with a variable separation ranging from 1.81 to 2.43 m) ribs with a triangular cross-section and 2.50m in length in respect to the exterior limits of the box have been projected. This transversal mechanism takes on the eccentric pedestrian load and transfers it to the central box. Thus, the resulting transversal section is optimal as it minimizes the dead loads of the deck, above all in the outer areas of the axis of the structure (hanger plane), being especially efficient to resist combined axial, shear and torsion forces.

The steel arch has a variable cross-section, including a circular shape and a square transversal section. Its 5.10m rise offers a rise/span ratio of 1/6. At the springs where the bending moment is the heaviest load, the dimensions of the diagonals are 0.37m x 1.35m whereas at the crown, where the axial force is predominant, these dimensions are 0.83m x 0.35m. The transition between both sections is practically linear, so the total area of the section remains practically invariable, too. The thickness of this structural element is 30mm at the springs and 25mm around the crown area.

A single central plane of five 7mm and 60mm diameter hangers has been placed. These are closed triple-Z cables which are placed 4.85m apart.

The reinforced concrete abutments have been designed to be set behind the existing cannel walling. Each of these elements shall be founded on 2 robust 1.25 diameter circular piles, which shall be strongly reinforced due to the high levels of horizontal seismic loading which correspond to the elevated basic acceleration which exists in the area of Granada.

Spain /2007

Project data

Structural Type:
Arch bridge 31.00m in span with composite deck and steel arch
Location:
Over the River Genil in Granada
Opening Date:
2007
Proprietor:
Granada Town Hall.
Metal Workshop:
GRUPO SALMERÓN.
Construction:
SALVADOR RUS LÓPEZ CONSTRUCCIONES.
Scope of Works:
Construction Project and Supervision