Loureiro Bridge

LOCATION
A 10 Bucelas - Carregado Motorway, Portugal

CLIENT
Brisa

CONTRACTOR
Teixeira Duarte

INSTALLATION
2002 - 2003

• Type of structure
Prefabricated post-tensioned box girder viaduct with 2 separate carriageways

• Overall length
1050 m (16 spans)

• Bearings
  - type and quantity →
    N. 28 guided reinforced elastomeric bearings
    N.  8 reinforced elastomeric bearings
    N.  8 free sliding pot bearings
  - characteristics →
    Maximum vertical load from 9000 to 12000 kN for the reinforced elastomeric bearings
    Maximum vertical load 4500 kN for the pot type bearings

• Rigid connection
  - type and quantity →
    N.  4 unidirectional guides
  - characteristics →
    Maximum horizontal force 1500 kN
    Maximum sliding movement 600 mm

• Anti-seismic devices
  - type and quantity →
    N.  8 viscous dampers
  - characteristics →
    Maximum force 4000 kN
    Displacement ± 275 mm
The Loureiro Viaduct is a prestressed concrete box girder structure and comprises two 16 continuous spans alongside decks. The total length of the Viaduct is 1050 meters with 15 piers and 2 abutments. Five piers (P2 to P7) are built-in with the upper deck and therefore there are no bearings on them. The other piers have elastomeric bearings, or steel - PTFE bearings and longitudinal guide devices. The Viaduct is located in a seismic area and is designed to withstand the seismic events by means of special devices, viscous dampers, installed at both abutments, 2 for each carriageway, for a total of 8 devices acting in parallel.

The energy dissipation system provided is able to limit the longitudinal movements of the deck during the specific earthquake, while dissipating part of the seismic energy entering the structure. The Viaduct is designed to withstand such a seismic event through an energy dissipation system that connects the deck to each abutment and limits the longitudinal movement of the deck during the specified earthquake, while dissipating the seismic energy. A test campaign has been carried out on the viscous dampers, both in FIP Laboratories and in San Diego, University of California shaking table, to evaluate their performance characteristics. These tests have confirmed the Force vs Velocity constitutive law of the dampers with exponent 0.15, thus ensuring a very high dissipation efficiency within a wide range of velocities.

The cyclic behaviour has proved very stable at all velocities within the whole range of temperatures.

References