Engineering Structures for Life

TRANSPORTS - BRIDGES & VIADUCTS

Viaducts on the A25 Motorway

ABOUT

GEG's intervention in the rehabilitation of the former IP5 motorway, currently A25 motorway, included the development of 4 viaducts in the section between Mangualde and Guarda, divided into 2 parcels (6 and 7).

The Parcel 6 (section Mangualde-Fornos de Algodres) includes the viaduct V5, the largest of the set, with a total length of 444 m and double deck. The Parcel 7 (section Fornos de Algodres – Ratoeira Nascente) includes the viaducts V1, V2, and V3, with lengths between 74 and 122 m, but only one deck corresponding to the duplication of the roadway track and existing structures.

The focus of this set of structures goes to the viaduct V5, the longest and the one with the more complex construction sequence.

The length of the viaduct, between abutments' axes is 444 m (27 + 13×30 + 27). The roadway platform consists of two carriageways, one on each separate deck. The decks have a width of 14,50 m and 13,00 m, respectively, on the left and right sides. Each carriageway includes the respective traffic lanes, shoulders and service walkways.

FACTS

Year: 2002-2004
Client: Luso Scut Beiras Litoral e Alta
Services: Detailed design, Structural Engineering, Foundations design, Geological and geotechnical studies, Consulting and on-site technical support

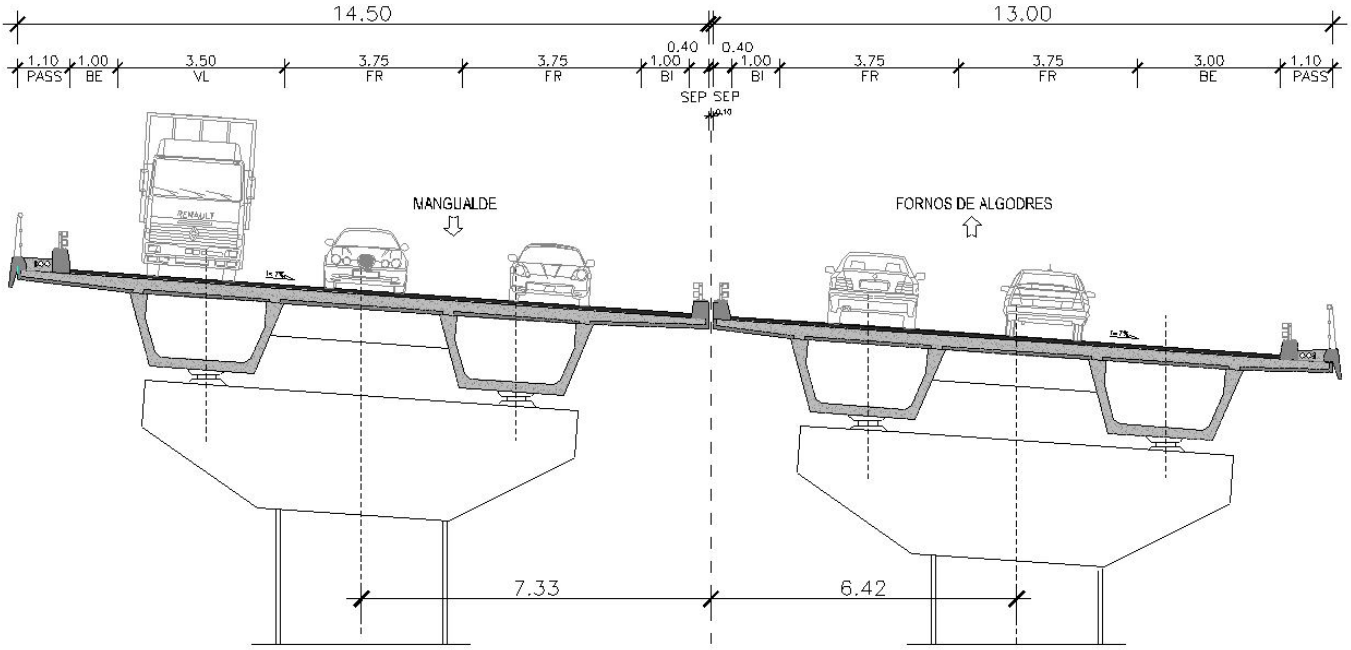
TEAM

LOCATION

Mangualde-Guarda, Portugal

Structural solution

Below we present the deck´s cross section:



The structural solution adopted was developed taking into account the contractor's request to use a prefabricated deck solution, with spans not exceeding 30 m, so as not to excessively complicating the transport of the beams to the work site.

Each deck is composed of two MAPREL C-150 beams, connected by intermediate slabs with 0,30 m of thickness, including pre-slab. The cantilevers, lateral to the beams, have a thickness, including the pre-slab, which varies linearly from 20 cm, at the end, up to 30 cm, next to the beam.

The column consists of a hollow polygonal section with almost rectangular shape, with slight chamfers. Its dimensions are 2,20 m x 3,60 m and thickness of 30 cm.

The configuration at the top of the columns was conditioned by the structural system used for the deck in the construction process. Thus, the columns have at their top a 2,20 m wide capital with the adequate dimensions to hold the temporary support devices that bear and stabilise the beams, in addition to the definitive bearings.

The columns' capital is a reinforced and prestressed concrete unit. The post-tensioning system applied was defined to be given in a single phase, before loading the deck.

The foundations are materialised by individual footing for each column.

The E1 abutment is situated, on the right-hand side, very close to the EN-16 roadway. This fact forces to partially close the abutment at that extremity so that the embankments do not interfere with the road. For the abutment foundation, footings were used with three different levels to face the sinking of the footing near the roadway, avoiding interference with the excavation slopes of the EN-16 road in that area.

The E2 abutment is an open type solution with counterforts applied in its entire length. Its foundations are footings with only a 1,25 m step on the left side, to better adapt to the natural terrain and thus decrease the required excavation volume.

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