

Composite Structures on the roundabout over the A-1 motorway

For each of the two structures (E-3 and E-4), the chosen structural layout includes a two-span-length, constant-depth continuous beam whose pier is set on the central reservation of the A1. The spans of the two bridges, as well as the typology of the foundations and the intermediate supports, are limited by the available space between carriageways.

The foundation of the piers are built employing column-piles which were chosen due to the essential condition of minimizing space requirements, in order to minimize the effect on traffic conditions.

The same reasoning to reduce traffic problems as far as possible throughout the construction process was applied to the project criteria in the case of both bridges. Therefore, their final design consists of a composite deck whose beam, divided in four parts, and was installed with temporary props, allowing its hoisting into place with cranes instead of employing scaffolding. Afterwards, the precast slabs were set in place and the upper concrete slab was cast.

Every single span in both bridge structures, E-3 and E-4, is 45.00m. The deck in each structure is 21.50m wide permitting four 3.5m wide lanes, a 5.0m hard shoulder area which includes sidewalks, barriers and protective railings. As the maximum headroom is limited, the total depth is 1.60m, divided between 1.25m for the steel box and 0.25m for the concrete slab. The cross section consists of three trapezoidal box girders 4.5m wide at the top and 3.0m at the bottom. The cantilevers of the concrete slab are 2.00m. The upper slab consists of reinforced precast concrete slabs.

The abutments of structure E-3 are built employing pile walls, with piles 1.80m in diameter separated 2.20m between axes, and a heavy lintel to support the decks. The reason for the choice of these walls lies again in the lack of excavation space, as the operating service lanes are very close to the upper roadway branches.

In structure E-4, abutment 1 is of the same pile wall type as in structure E-3, while abutment 2 (on the San Chinarro side) is a closed conventional one with wing-walls.



Spain /2004 Project data

Structural type:
2 Composite box bridges
Location:
Over the A-1 motorway, Madrid
Opening Date:
February, 2004
Proprietor:
Madrid Town Council
Construction:
Dragados
Scope of Works:
Construction Project and
Technical Assistance