

Road Connections in the new Las Tablas area linking with the M-40 ring road motorway

These works allow the connection of a new area called Las Tablas, in the North of Madrid, with the M-40 ring road motorway and the centre of the city. The project includes ten structures, the most outstanding being the Viaduct over the N-I motorway.

The latter mentioned structure is greatly conditioned by clearance heights as it must cross over the N-I motorway and under a viaduct which connects the N-I motorway southbound with the M-40 ring road motorway eastbound. Moreover, this viaduct is a very visible and important structure with a noteworthy span. Therefore, the maximum depth of the structure is limited to 0.70m when it crosses over the service lanes of the N-I motorway. On the other hand, the existence of a tunnel under the N-I motorway, makes it impossible to place a supporting pier on the central reserve of the N-I motorway. This means that the new structure will need a span of at least 45.00 m to overcome this obstacle.

The designed structure has a composite steel-concrete deck of eleven spans and a width of 15.00m. The deck consists of a 0.20m deep concrete slab supported by two longitudinal steel box girders. The spans measured along the layout axis are 30-45-3 27-2 30-45-27-30-21m for the left girder and

28-45-29-2 27-2 30-45-27-30-21m for the right girder. The different span lengths at the beginning of the viaduct are due to the large skew of the intersection between the layout project of the new structure and the connection of the M-40 ring road motorway with the N-I motorway.

The 45.00m spans are solved employing a parabolic weathered-steel (COR-TEN®) structure of variable depth. In this case, the depth over piers is 2.00 m (L/22.5) and the depth at span centre is 1.00 m (L/45). The remaining spans are supported by two weathered steel girders with a concrete upper deck of a total depth of 0.70m (L/43). In addition, the depth at the cross sections of the piers is increased with pre-cast concrete elements. This final solution fulfils the aforementioned conditions imposed by the layout and the already existing structures in an elegant way, concealing all functionally imposed differences in depth. At the same time, the concrete elements used to increase depth at piers are fully integrated in the surrounding environment, due to the fact that this solution had already been employed in the existing structures in the area. The maximum depth of the deck at these depth-increased piers is 1.35 m (L/22).



Spain /2004 Project data

Structural type:
One composite viaduct and nine concrete structures

Location:
Service lanes of the M-40 ring road motorway between the Colmenar and the N-I motorways. Madrid

Completion date:
September 2004

Layout project:
Vigiconsult

Proprietor:
Madrid Town Hall

Scope of Works:
Construction Project (ten structures)