

# HS2 HighSpeed Railway

Fhecor participated, together with Ineco and Capita, in the Tender Design of the segments C2, C3 and N2 of the High Speed Railway between London and Birmingham (HS2) for the Joint Venture formed by Dragados, Hochtief and Galliford Try. The tender process proposed by HS2 was unusual, as it only requested the detailed analysis of one small section for each segment.

The scope of works undertaken by Fhecor included the design of the viaducts included on each segment, which could be divided in two main groups: low level regular viaducts and special viaducts.

Several alternatives were proposed for every viaduct and they were compared using a multi-criteria assessment to determine the optimum solution taking into consideration the client's requirements focused on minimising the maintenance and the impact to the environment during service and construction and the preferences of the construction team together with the aesthetic aspects.

For the low level viaducts, the alternatives selected consisted on continuous decks with precast U-girders to minimise the depth and maximise the vertical clearance, as these viaducts were quite close to the ground.

The analysis of the special viaducts were focused on the case studies included in the reference sections: Small Dean viaduct and the viaduct over the M42 and the Fazeley Canal. These viaducts presented similar constraints: very skewed crossings over existing roadways with heavy traffic and the railway profile quite close to the ground level. The first one was also crossing over an existing railway and the second one over a navigable canal; both of them quite skewed. The structural solutions proposed in these cases were semi-through launched steel bridges to minimise the impact to the existing traffic while maximising the vertical clearance. The use of a structural solution with the longitudinal resistant elements are placed at the edges of the deck provides additional allowance to place the piers, which is important in a viaduct crossing over very skewed obstacles.

In the particular case of the M42 viaduct, the base solution proposed by HS2 included a pergola over the M42 followed by a concrete box girder for the crossing over the canal. This solution was not aesthetically pleasant and presented some issues from the construction point of view that the team considered that have to be addressed. For these reasons, the solution proposed by the design team was a single structure to pass over the motorway and the canal which significantly improved the construction sequence and the aesthetic result.

Due to the skew angle of the crossings and their width, the resulting span lengths were 75m approximately, so the semi-through solution was combined with tension elements over the deck in a kind of extradosed bridge in the crossing over the M42 and compression struts/inclined columns below the deck for the crossing over the canal. With this proposal the crossing over the M42 and the canal presented a symmetric configuration with respect of the railway alignment, which produces an interesting effect.



## United Kingdom /2016

Project data



Location:  
London-Birmingham, UK  
Owner:  
HS2  
Client:  
Ineco  
Constructor:  
UTE Dragados, Hochtief y Galliford Try  
Scope:  
tender design