



Thame Valley Viaduct: carbon efficient DfMA viaduct for HS2

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Abstract

Located outside Aylesbury (UK), Thame Valley Viaduct is one of the highest-profile viaducts in the entire HS2 route and the longest structure in the C2-C3 section with a total length of 880m. COWI worked closely with the client, architect, contractor and the supply chain to deliver an elegant and efficient structural design.

The design follows Design for Manufacture and Assembly (DfMA) principles to increase the proportion of prefabrication to reduce construction times, reduce the amount of work on site, increase quality of construction and reduce construction risks. In addition, the final design reduces the embodied CO₂ by 60% relative to the reference design. Thame Valley Viaduct has been showcased by HS2 as an example of design excellence.

This paper aims at showing the design of this viaduct, while explaining what DfMA principles have been introduced and the challenges involved.

Keywords: DfMA; high-speed railway; precast; post-tensioning; modular construction.

1 Introduction

High Speed 2 (HS2) is Great Britain's new high-speed railway. Phase 1 of HS2, once operational, it will connect the cities of London and Birmingham—UK's two largest cities—by bullet trains that will provide zero-carbon journeys. Phase 2, which would connect Birmingham with cities further North, is currently on hold.

The project comprises 230 km of track, four new stations, two depots, over 50 km of tunnels and 130 bridges. The railway is planned to be open between 2029 and 2033.

HS2 Ltd is the company responsible for developing and promoting HS2 and is funded by grant-in-aid from the government. It is an executive non-departmental public body sponsored by the Department for Transport from the UK

Government. HS2 Ltd has awarded different contracts covering the procurement of the civil infrastructure, train stations, track installation and rolling stock, among others. The main civil engineering works were divided into four main contracts, and Thame Valley Viaduct is located in one of them: C2-C3 in the Central area, which runs from the North Portal of the Chiltern Tunnels to the South Portal of Long Itchington Wood Green Tunnel.

The C2-C3 contract was awarded as a Design-and-Build project to the EKFB Joint Venture (JV), comprising Eiffage Genie Civil, Kier Infrastructure and Overseas Limited, Ferrovial Agroman and BAM Nuttall—initially Carillion was part of the JV until it went bankrupt and Ferrovial and BAM joined the team. EKFB awarded ASC JV (Arcadis, Setec and COWI) the design work, and ASC has worked with