



Crewe Green Link Road Underbridge - Tackling complex foundation analysis using first principles

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Abstract

The Underbridge is a key feature of the Crewe Green Link Road South, which lies approximately 2km south-east of Crewe in Cheshire. The road is a 1.1km long standard two lane dual carriageway running south to north from the A500 roundabout towards the A5020 roundabout. It passes underneath the Kidsgrove to Crewe South Railway line, which is supported on a 4m high embankment, hence the need for the bridge. Project challenges and site constraints led to an innovative solution for the design of both the bridge and its foundations. This paper shows how first principles were used to form a robust but flexible concept design that struck a good balance between innovation and project risk. The methodology adopted facilitated the collaboration between all project stakeholders and led to the successful conclusion of the project in December 2015.

Keywords: Steel bridges, Foundations, Soil-Structure Interaction, Creativity, Collaboration.

1 Introduction

Crewe Green Link Road South (CGLRS) is a 1.1km long standard two lane dual carriageway with a central reservation. From South to North the route starts at the existing northern spur, off the A500 Hough-Shavington bypass roundabout and passes to a four-arm roundabout constructed approximately half way along the route. The route then heads north towards the A5020 Weston Gate roundabout at the location of the existing spur to the south of the existing A5020 roundabout, as shown in Figure 1. Mott MacDonald (Designer) was employed by Morgan Sindall (Contractor) on behalf of Cheshire East Council (Promoter) to develop the concept from the initial planning

stages to outline and subsequently detailed design.

At approximately 140m before meeting the A5020 roundabout, the aforementioned road has to pass underneath the Kidsgrove to Crewe South Railway line, which is supported on a 4m high earth embankment. Therefore, there was a need to construct a railway Underbridge. From its conception, the project team realised that the design and construction of the Underbridge would be critical to the programme and the most expensive item on the whole project. Upon completion of the bridge, its ownership was transferred to Network Rail who became the Maintainer.