

The assessment, strengthening and widening of Thames Bray Bridge

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Abstract

The original Thames Bray Bridge was constructed between 1939 and 1961. It consists of a 112m long 82m span bridge. It was one of the UK's first welded, stiffened, profiled plate girder bridge with a concrete deck connected with shear connectors. The bridge has undergone a number of inspections, assessments, strengthening and stiffening over the years. In 2015 planning for the upgrading of the highway to Smart Motorway status began. At Thames Bray Bridge there are no hard shoulders and so widening of the bridge was required. This paper outlines the strength assessment of the bridge, the assessment of resilience from failure of ties and of increased river flows due to climate change. It outlines the additional refined assessments carried out to more realistically estimate the capacity of the bridge. The paper outlines the local strengthening and the new asymmetric widening design that visually followed closely the original bridge.

Keywords: Welded girder; composite bridge; widening; strengthening.

1 Introduction

Construction of the Thames Bridge at Bray for the Maidenhead Bypass road was originally proposed as a 112m long, 32m wide, 82m span multiple riveted box structure, with pendel type tiedowns at abutments. However, its construction was halted in 1939 by the start of war, with only the abutment and some ties built. After a long delay there was then a proposal for one of the UK's first welded, stiffened, profiled plate girder bridge with a concrete deck connected with Tee and hoop shear connectors to be constructed in cantilever over the river [1, 2]. The bridge was finally completed in 1961. The structure was subsequently incorporated into the London to Wales M4 motorway.

The bridge is unusual as in addition to the motorway it also carries a footpath over the river connecting the villages of Bray and Dorney. Figure 1 shows the bridge main span over the river, the

short 11m back span is visible with the tiedowns hidden within the abutment (see Figure 2).



Figure 1. Elevation of Thames Bray Bridge

2 Girder Stiffening

The bridge has undergone a number of inspections, assessments, strengthening and stiffening over the years. The parapets and deck onto which they are anchored have been upgraded and strengthened. Transverse beams supporting the deck slab adjacent to the supports and the welded bracing were added in the 1970's.