

Humber Bridge side span rocker bearings replacement

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Abstract

Opened in 1981, the Humber Bridge (UK) is a suspension bridge carrying a dual carriageway and footpaths. It has a main span of 1410 m, and side spans of 280 m and 530 m. Ensuring that strategic bridge crossings remain safe for operation following unforeseen events is essential. Works to the side span bearings supporting the steel deck box at the concrete towers and anchorages provide a case study of such works. In February 2020, new cracks were identified around rocker bearing welds. Lane closures were implemented and repairs of welded steel plates around the cracks were installed. Subsequent investigations included structural health monitoring, inspections and non-destructive testing. While rocking of the A-frames was observed, stick-slip rotation of the pinned connections was present with flexure in the A-frames induced. These findings justified and helped inform parameters for the temporary replacement of the tower rockers in 2021 and 2022.

Keywords: suspension bridge; Humber Bridge; articulation; steelwork.

1 Introduction

1.1 The Humber Bridge

The Humber Bridge is an iconic landmark crossing the Humber Estuary, connecting Yorkshire and Lincolnshire in the UK (Figure 1). Opened by Queen Elizabeth II in 1981 it was the world's longest single span suspension bridge until 1997 and remains the longest in the UK at 1410 m. It has asymmetrical side spans of 280 m and 530 m (Figure 2). A Grade I listed structure, as designated by Historic England, the bridge plays a vital role in helping the Humber region reach its potential. It is owned, operated and maintained by the Humber Bridge Board (HBB), who collect tolls to finance the crossing. The bridge carries the A15 trunk road, north and south,

utilising four lanes with two additional walkways and passes over a main line railway, the A63 trunk road and two other minor roads. On average there are 33,000 crossings per day. Between June 2022 and June 2023 an estimated 120,864 pedestrians and 74,563 cyclists used the walkways.



Figure 1. The Humber Bridge, viewed from Hessle.