

Plank Lane Bridge

Counterweight Failure

A component failure on a British Waterways' lift bridge has resulted in a 22 tonne counterweight falling some 5.0m onto a public highway. The road was not open to traffic at the time and there were no injuries. The incident was, nevertheless, serious and was followed by the closure of all British Waterways lift bridges of similar type until they were checked by Engineers and the risk of similar occurrences either ruled out or removed.

The lift bridge is of the dutch style with an overhead counterweighted frame. It carries Plank Lane, an unclassified road, over the Leigh Branch of the Leeds – Liverpool Canal. The failed component was the connection between the counterweight and one of the longitudinal arms of the overhead frame. This was a bolted connection with eight bolts passing through the arms of the frame into threaded holes in each endplate of the counterweight. Only the bolt heads were visible and it was not possible to ascertain the bolt condition through normal inspection procedures.



Bridge before failure



After failure with counterweight across carriageway

One of the principal connections failed as the bridge deck was going through its normal closing cycle. Initial investigations indicate that the bolts in this connection yielded in shear. The actual cause of the failure is yet to be confirmed but sequential shear failure due to uneven distribution of load between bolts, fatigue due to cyclic loading and even accidental or dynamic impact loading are all possibilities.

Once this connection gave up the other principal connection followed suit in a twisting manner with a number of its bolts yielding in tension. The secondary cross bracing connections failed at the same time and the counterweight fell to the ground.

The road had been closed to vehicular and canal traffic under a weekend closure for maintenance on the bridge deck by British Waterways' contractors. No work had been done on the counterweight or its frame.

British Waterways subsequent actions were to close all of its structures of a similar type and check them for hidden and inaccessible connections. Where these were found further investigations followed to ascertain the condition of the connections. In a couple of cases, where connections could not be immediately exposed, the bridges were kept out of service or alternative supports provided until the condition of the structures was assured.

A full review of the maintenance and inspection regime for these structures will be undertaken in due course.