

## Emergency jacking to replace bearing

Ely Southern Bypass Rail Bridge

### Client

Cambridgeshire County Council

### Contractor

Volker Fitzpatrick

### Engineer

Tony Gee & Partners

### Works Completed

October 2018



The Rail Bridge is a two-span structure which carries the new Ely Southern Bypass over the railway where it branches into the Cambridge to Ely mainline and the Soham Branch line. Both spans are 50m and the deck is 16m wide. The central pier has two bearings, one fixed and one transversely guided.

During construction the fixed bearing had become damaged and it was necessary to jack the bridge and replace it with a new one. As the opening date of the whole bypass scheme was at risk until this problem was solved it put this activity on an urgent programme.

The fixed bearing provided the longitudinal and transverse restraint for the bridge deck which presented two issues; the risk of locked-in forces being suddenly released when the bearing fixings were undone, and how to replicate this fixity during the period when the bearing was disconnected.

To overcome the risk of locked-in horizontal forces being present it was proposed to release the bearing gradually by hydrodemolition of the corners of the concrete plinth that the bearing sat on. This would allow safe and gradual release of such forces. There is no lateral adjustment in the relative position of the upper and lower fixing bolts in a fixed bearing, and in the event of slight mis-alignment, the hydrodemolished pockets would allow the lower fixings to be re-concreted into the reconstituted bearing plinth in their new position of rest.

Eight 185 tonne jacks were needed to lift the bridge, four on each side of the bearing. The deck was jacked by 3mm to release the precompression in the elastomer. The grout beneath the bearing was removed by hydrodemolition, without damaging the concrete plinth, at the same time as removing concrete from the corners of the plinth to disengage the fixings.

As the lateral stability of the deck would be temporarily lost as the bearing was disengaged, a pair of steel brackets were installed on top of the pier and resting against the inner face of the bottom flange of each main girder. Sufficient longitudinal resistance remained in the guided bearing that additional measures were not necessary.

The bearing was a 1400 tonne fixed pot bearing of 800mm diameter, 130mm height and 400kg weight. It was lifted to pier top with a telehandler equipped with a sliding-lifting table which aided moving the bearing into position on its plinth.

From erecting the scaffold to de-jacking the bridge took just 18 days. De-jacking was done on 29th October meaning the bridge was able to be fully opened to traffic on the Grand Opening date of 31st October, much to the relief of the project team.

The scope Freyssinet provided was as follows:

- Supply and installation of scaffolding incorporating Haki staircases, edge protection, encapsulation and decking for hydrodemolition works including a water collection bund.
- Removal and reinstatement of pigeon mesh.
- Hydrodemolition of bearing shelf including Silbuster to decontaminate water prior to disposal.
- Jacking and de-jacking of bridge including provision of taper plates beneath jacks.
- Removal and replacement of bearing.
- Reconcreting bearing plinth with rapid set material.
- Design and installation of temporary works restraint brackets on top of pier.