

Bill Boley

“Controlled Hydraulic Movement”

in action

Successful outcome for Bill Boley Ltd on the banks of the River Severn



Successful outcome for hydraulic movement specialist on the banks of the River Severn

Hydraulic movement specialists Bill Boley Ltd have completed a complex quadruple hydraulic lifting, jacking, weighing and tensioning project during the construction and installation of the



new 87 metre concrete foot bridge over the picturesque river Severn in Shropshire. The new foot bridge is replacing the existing tired concrete bridge (shown in the foreground left) built around 1930. The bridge, which is part of the national cycle route, forms an important link between the two communities of Highley and Alveley as well as providing access for ramblers in

this quiet beauty spot midway between Bridgnorth and Bewdley. Throughout the project, Bill Boley have worked closely with the project consultants Arup Partners, main contractors Carillion and structural framework specialists Kwikform.

After lengthy public consultation Shropshire County Council decided to renew the bridge with a slender concrete structure, built alongside the old bridge. Access to the site is somewhat limited and the river course could not be restricted in anyway during construction. As a result Arup advised that the most efficient way would be to precast the 28 metre centre section of the new bridge on the riverbank and then lift it into place once the main ends of the bridge had been constructed.

Bill Boley's involvement started with the weighing of the pre-cast section prior to lifting to ensure the actual weight corresponded with the theoretical value. A series of eight 30 tonne calibrated jacks were placed under the structure and these were used to carefully lift the 80 tonne section slightly off the concrete former. Linear variable displacement transducers (LVDTs) were used to identify when the structure was clear of its support. Calculations from the jacks and hydraulic pressures allowed Bill Boley to provide an accurate measurement of weight.



Lifting the middle section into place between to the two abutments presented a number of challenges. Although the section only weighed around 80 tonnes, the combination of



surrounding vegetation and the distance it needed to be lifted required the use of a massive 1000 tonne mobile crane operated at full stretch. In order to ensure the section was lifted evenly, Bill Boley installed six special hydraulic cylinders, one at each lifting point at the ends and centre. By combining the readings from the LVDTs and the hydraulic pressures from the

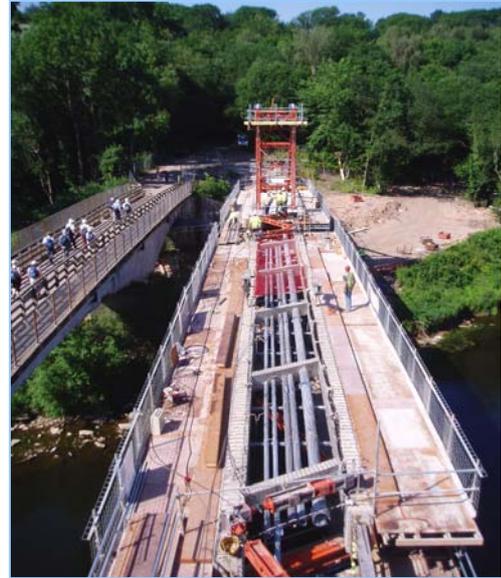
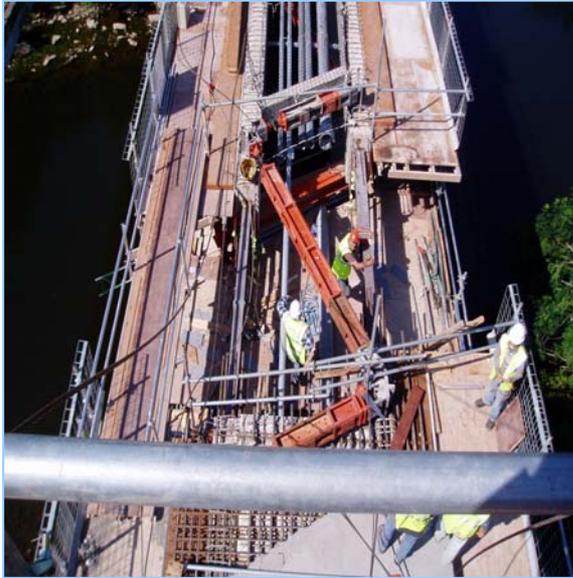
cylinders, Bill Boley personnel were able to finely adjust the tension in each lifting strap to ensure a perfect lift. Such was the confined space that the crane had to partially rotate and then collect more counter-balance weights. The section was then swung over the tree tops and old bridge before being gently lowered into position. The ends of the section were supported on frames that could be lifted up or down with sets of jacks, allowing accurate levelling.

When freely supported at each end, the 28 metre span has a natural sag of around 100 mm. In order to pretension the section whilst it is being 'stitched' into each end of the bridge, Bill

Boley have used four strand jacks together with sets of steel ropes to lift the middle by approximately 140 mm. The strand jacks are secured to 5.5 metre high gantries at each side of the bridge, with the steel ropes secured to pivoted steel anchor points in the middle. Strand jacks, which are designed to 'ratchet' the cables through their core, were adjusted in



unison to apply the required pre-determined upward force of 470 kN. This arrangement, with the cables tensioned, remained until August 2006 when the concreting the infill had been completed and sufficiently cured.



As Bill Boley's Managing Director concludes: *"This project involved a range of hydraulic movement techniques and the successful outcome required the close cooperation of a number of different parties as well as a large amount of patience."*

Footnote: When work on the new bridge has been completed, the old bridge will be demolished, requiring the return of the 1000 tonne crane, this time to remove the centre section.

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