Zeitschrift: IABSE structures = Constructions AIPC = IVBH Bauwerke

Band: 5 (1981)

Heft: C-16: Structures in Great Britain

Artikel: Byker Viaduct, Newcastle (Great Britain)

Autor: Smyth, W.

DOI: https://doi.org/10.5169/seals-16966

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Mehr erfahren

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. En savoir plus

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. Find out more

Download PDF: 25.12.2025

ETH-Bibliothek Zürich, E-Periodica, https://www.e-periodica.ch

5. Byker Viaduct, Newcastle (Great Britain)

Owner: Tyne & Wear Passenger Transport Executive
Engineer: Ove Arup & Partners
Consulting Architect: Renton Howard Wood Levin Partnership
Contractor: John Mowlem & Company Limited
Works duration: 30 months
Service date: 1980

The site

Byker Viaduct carries two tracks of the new Metro in Tyne & Wear, north-eastern England. It is about 800 m long, an S-bend in plan and the vertical alignment also contains curves. The site consists of two distinct parts. At the west end there is the Ouse Burn Valley, about 30 m below the viaduct with very steep side slopes covered with loose fill. Outside the valley the viaduct alignment is about 6 m above a gently sloping hillside.

Design

The valley section had very different conditions for construction from the rest of the viaduct. The valley was awkward to get to and to work in, construction was at a considerable height and foundation conditions were difficult, with coal mine workings near the surface; whereas the other section was much more straightforward. However it was necessary to find an overall concept for economy in construction and for appearance.

The best and most economical scheme was a continuous prestressed concrete box girder (Fig. 1), the valley section having 69 m spans fixed to the columns, and elsewhere sitting on bearings on top of the columns with spans of 50 m and 36 m. This scheme had concrete way beams to support the track rather than ballast.

The deck was designed to be constructed from precast concrete segments with epoxy resin joints and to be erected using a simple hoist sitting on the nose of the cantilever.

Across the valley there are four balanced cantilevers from the four double piers. These piers were designed to be built up to the top of the deck so that the hoist could sit on top and lift up the first deck units (Fig. 2).

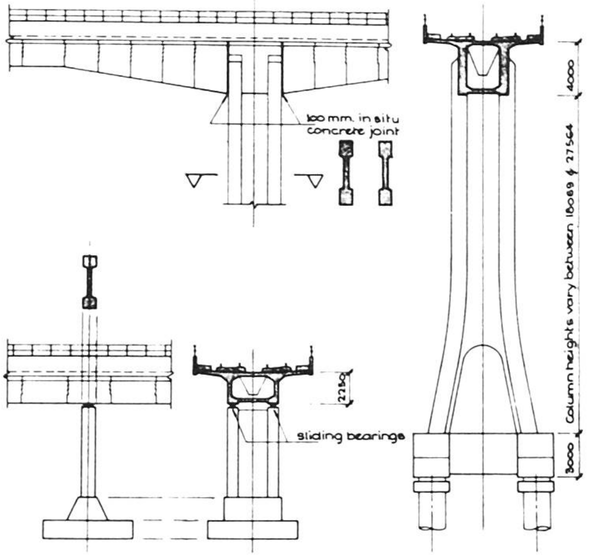

Fig. 2 Typical columns

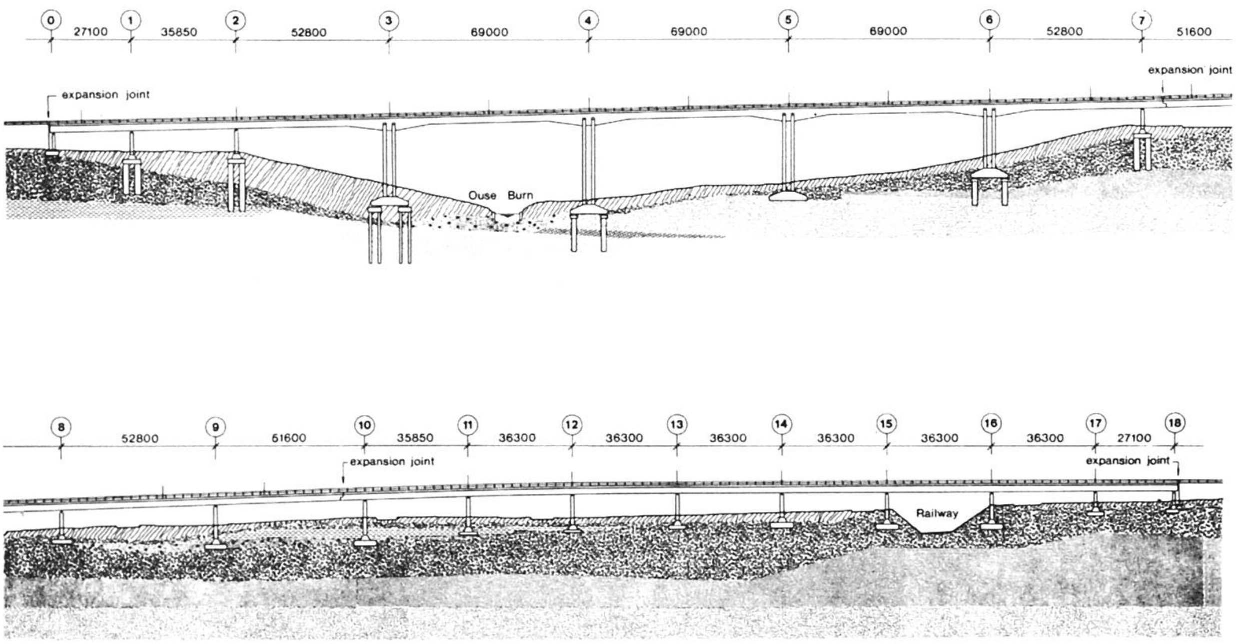

Fig. 1 Developped elevation of viaduct

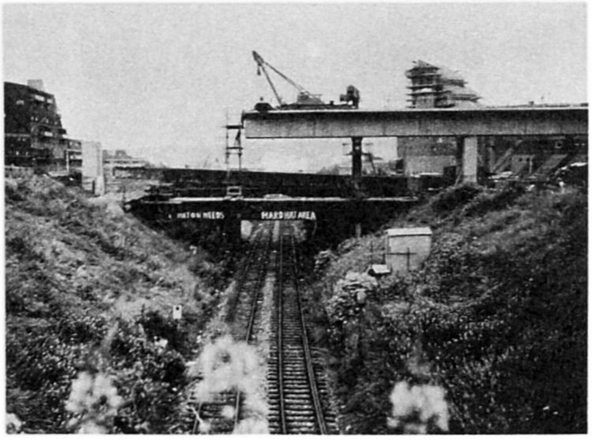

Fig. 3 Erection by continuous cantilevering with temporary props

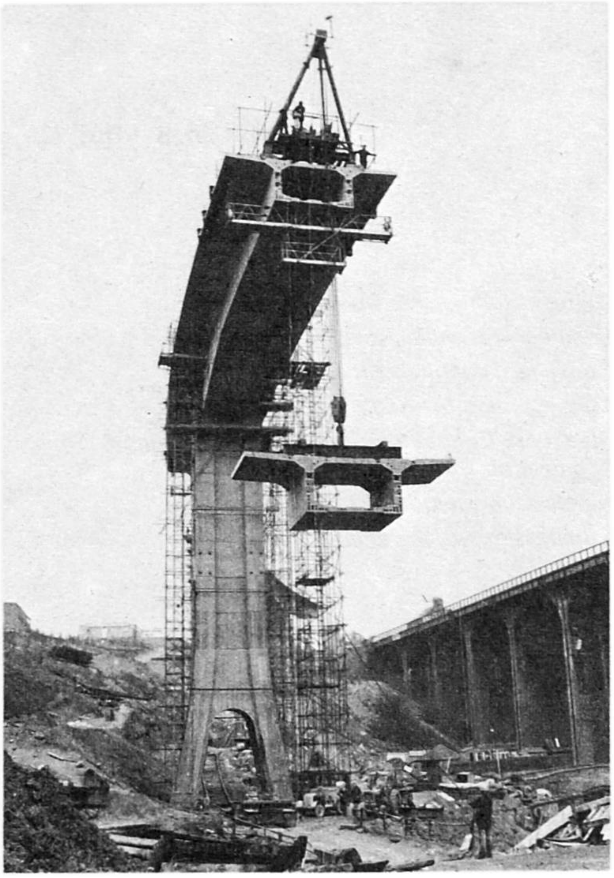

Fig. 4 Erection by balanced free cantilevering

The other spans were designed to be built as continuous cantilevers using temporary props (Fig. 3). Erection of the longest part was to start at pier 14 and proceed in both directions as far as the expansion joints near piers 10 and 18 (Fig. 1), giving casting runs of about 2×150 m.

There are two prestressing systems. Bars which were coupled at each joint were used to clamp successive segments together and also provide part of the permanent prestressing force. Multi-strand cables threaded through ducts in a number of segments provide the greater part of the prestress.

There are four expansion joints, two at the abutments, and two others which are halved joints cast in situ.

Construction

The viaduct segments were cast on site using the adjustable pallet technique. One mould with two pallets and two cores was used for 253 segments with a casting cycle of one unit per day.

The contractor designed a special hoist – shearlegs and winch – for erection, and a purpose-made rig on a low loader which was used for handling the units and moving them to and from their stored positions. Rail tracks were used to lower segments down the slopes of the valley (Fig. 4).

The epoxy joint was thickened with layers of fibreglass to correct the alignment during erection. Some difficulties were experienced due to "twisting" of the alignment on the longest casting runs of about 150 m, but these were successfully overcome.

Finishes

The climate of Newcastle is wet and dirty and the surfaces were carefully detailed for weathering. The columns and the parapets are the most exposed to weather and they have been given a vertically ribbed finish with the outer face tooled to expose the aggregate. The rails are fixed to concrete slabs which were constructed using a slip form paver. The deck is waterproofed with a thin trowelled membrane.

(W. Smyth)

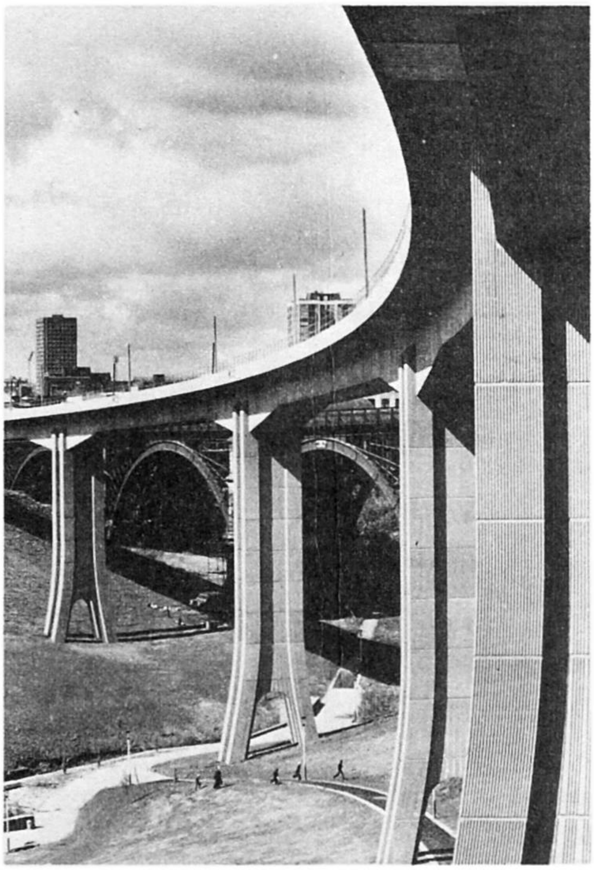

Fig. 5 The finished viaduct