

Zeitschrift: IABSE structures = Constructions AIPC = IVBH Bauwerke
Band: 3 (1979)
Heft: C-8: The structures of new railway line in Japan

Artikel: Large-scale bridges
Autor: Structure Design Office, Japanese National Railways
DOI: <https://doi.org/10.5169/seals-15794>

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: 14.04.2026

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



2. Large-scale Bridges

The following are examples of large-scale bridges for the Tohoku and Joetsu Shinkansens.

The 2nd Abukumagawa Bridge

This bridge, constructed 5 km south of Koriyama Station, is a prestressed concrete bridge for the Tohoku Shinkansen.

As shown in Fig. 1, Fig. 3 and Photo 1, it is a 5-span continuous bridge of one-cell-box type supporting a double track.

Each span is 105 m long which is among the longest in railway prestressed concrete bridges. Its total length is 526.5 m and it was erected by Dywidag Method (cantilever method).

The seismic effect of the super-structure on the substructure is so large that special devices, so-called "Stoppers", are installed at the tops of the piers and abutments in order to distribute the seismic force evenly to each of them (see Fig. 2).

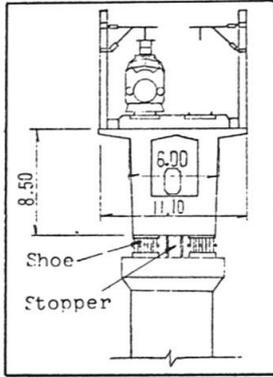


Fig. 1
Cross section

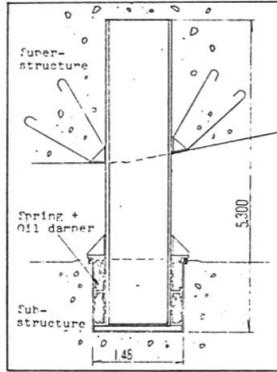


Fig. 2 Stopper

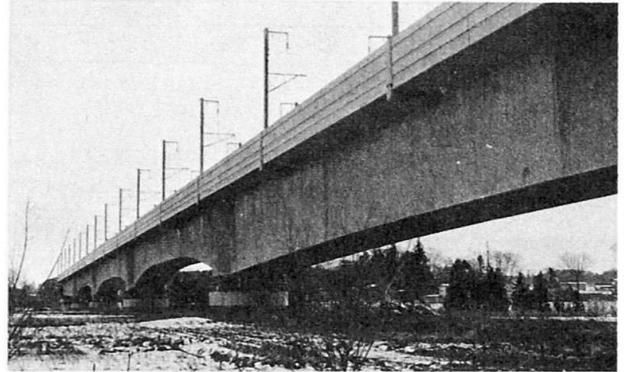


Photo 1 2nd Abukumagawa Bridge

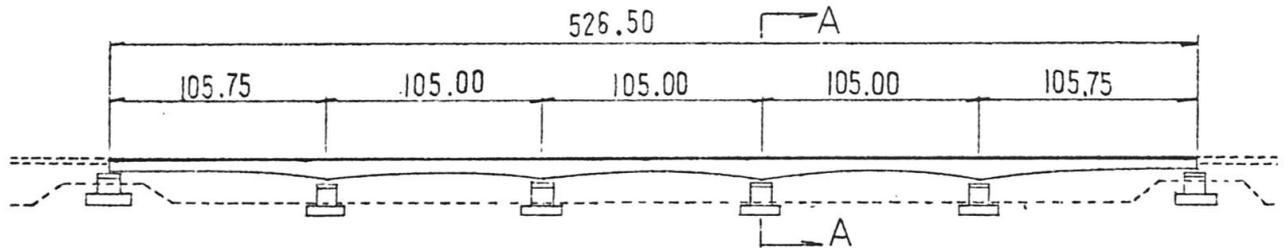


Fig. 3 Side view

The 2nd Okazato Viaduct

It is a prestressed concrete through-bridge for the Tohoku Shinkansen near Oyama Station. Its span is 61.4 m, which is the longest span of the prestressed concrete through-type railway bridges. As shown in Fig. 4 and 5, it is a simply supported structure with two main girders for a double track.

Concrete of ultimate design strength of 450 kg/cm² was applied for reduction of its dead weight. The dimensions of the piers were so severely restricted that concrete structures reinforced by steel-frames were adopted for them.

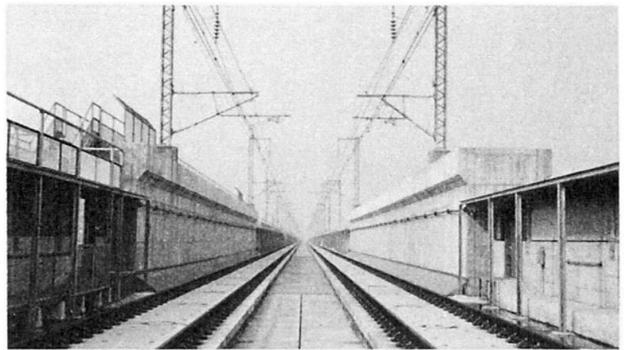


Photo 2 2nd Okazato Bridge

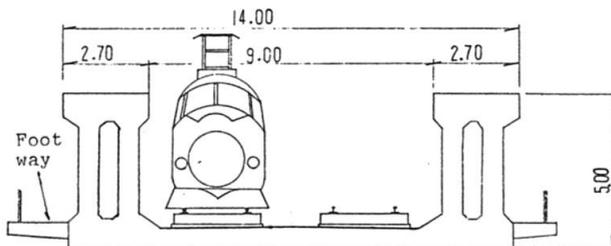


Fig. 4 Cross section

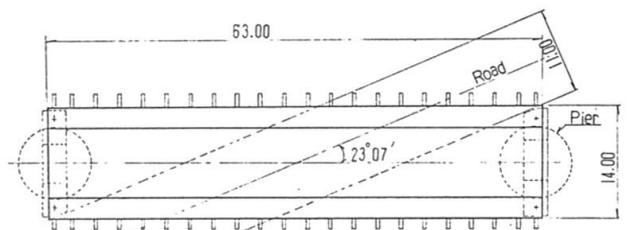


Fig. 5 Plan

The Yamazaki Bridge

Steel-concrete composite girder bridges are used these days as low-noise railway bridges in preference to steel bridges. They are economical structures, too, in such cases where bridges are to be erected over existing railways or highways with heavy traffic and to be constructed on weak ground.

The Yamazaki Bridge, for the Tohoku Shinkansen, 76.0 meters long, is the longest composite girder bridge in J.N.R. A large span length and high piers were required, because it crosses another bridge for an express highway at an acute skew angle of 27 degrees.

The section of the bridge consists of one-box-cell for a double track use as shown in Fig. 6, and the steel to be used is SM 58 (its tensile strength is 58 kg/mm²). The steel plates are treated for damping of vibration as explained in chapter 12.

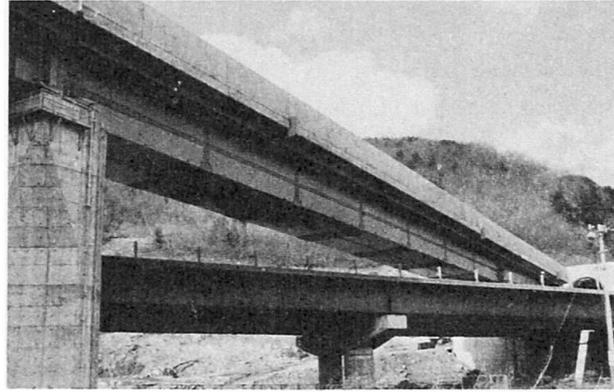


Photo 3 Yamazaki Bridge

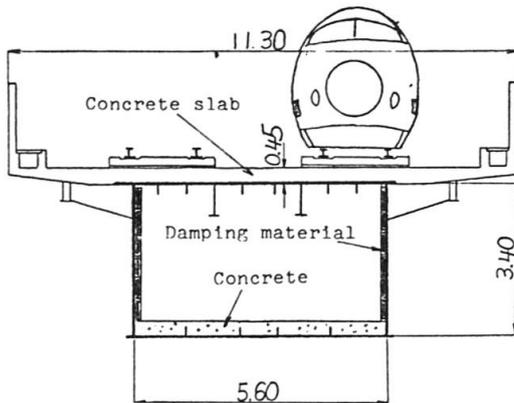


Fig. 6 Cross section

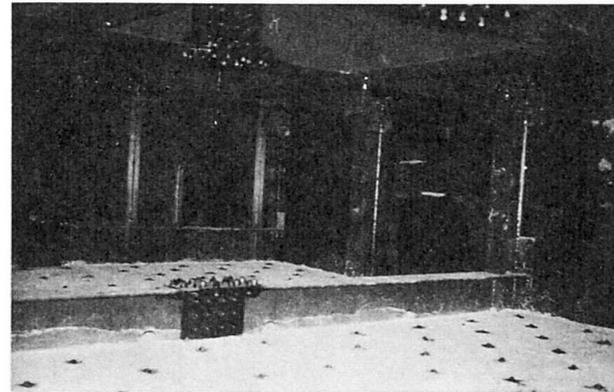


Photo 4 Inside of the box girder

The Akayagawa Bridge

The Akayagawa Bridge, consisting of 5 spans, was constructed for the Joetsu Shinkansen. As shown in Fig. 7, the total length is 298 m and the center span of 126 m is crossed by an arch structure which was erected by cantilevering from both sides. In this unique erection method a huge back stay composed of a prestressed concrete member which was stressed to as much as 4800 tons was installed diagonally between the top of the end pier of the arch and the bottom of the adjacent pier of the girder span. Then as the erection work progressed, high-strength steel bars were provided diagonally between the vertical members, forming a truss structure as shown in Photo 5. The control of tensioning these steel bars was very important and complicated. Finally the back stay and the steel bars were removed.

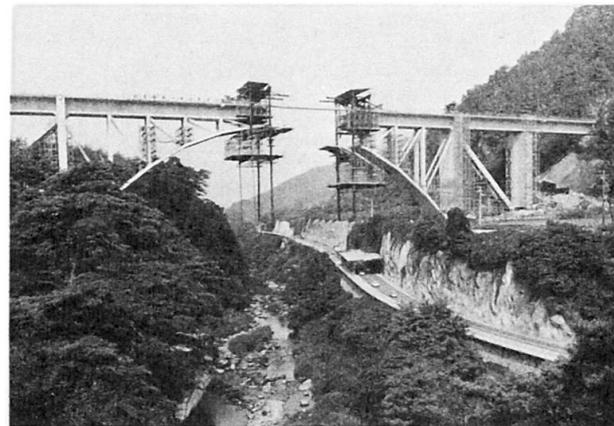


Photo 5 Akayagawa Bridge under construction

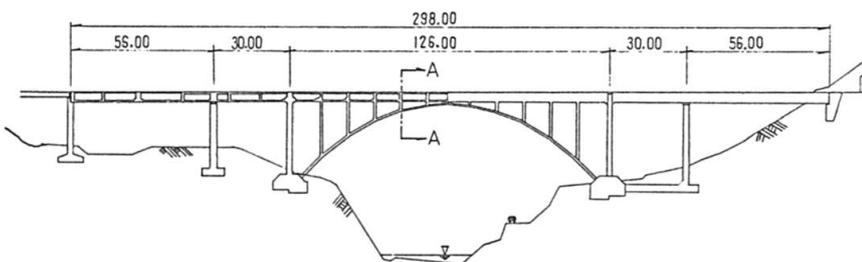


Fig. 7 Side view

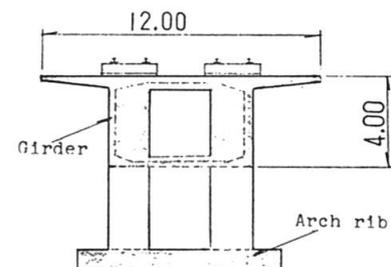


Fig. 8 Cross section (A-A)