Zeitschrift: IABSE reports = Rapports AIPC = IVBH Berichte

Band: 999 (1997)

Artikel: Planning of steel truss web prestressed concrete bridge

Autor: Inokuma, Yasuo

DOI: https://doi.org/10.5169/seals-1101

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: 30.11.2025

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

Planning of Steel Truss Web Prestressed Concrete Bridge

Yasuo INOKUMA Chief Engineer Japan Highway Public Corporation Shizuoka, JAPAN

Summary

The Second Tomei Expressway is a new expressway with the length of 320 kilometers linking Tokyo and Nagoya. As one of the new bridge types, a steel truss web prestressed concrete bridge will be constructed. In this paper structural characteristics of this bridge is stated. Construction of the substructure will be starting from 1997.

1. Introduction

The Second Tomei Expressway is a new expressway with the length of 320 kilometers linking Tokyo and Nagoya. A section of the expressway in Shizuoka Prefecture, located about the center between Tokyo and Nagoya, runs through mountainous area. The section has the mainline length of 134 kilometers. About 33 % of the total section length, namely 44.3 kilometers, will be bridges and viaducts. As many bridges and viaducts should be constructed, various new structure will be adopted. One of new type of structures is a steel truss web prestressed concrete bridge.

2. Purpose

The purposes of adopting steel truss web prestressed concrete bridge is as follows:

- i) To have a rational composite structure by utilizing material properties of steel and concrete;
- ii) To have a rational combination of superstructure and substructure by decreasing weight of superstructure and width of bottom slab;
- iii) To have a structure type, even with noise barriers, that gives less impression of massiveness.

3. Structure

Two unit of the steel truss web prestressed concrete bridge will be constructed. One is named the Sarutagawa Bridge and the other is named the Tomoegawa Bridge. The Sarutagawa Bridge has the total length of 625 meters and the maximum span length of 110 meters. The Tomoegawa Bridge has the total length of 478 meters and the maximum span length of 119 meters. The highest piers of the both bridges are 72 meters and 69 meters, respectively. The effective width of the both bridges are 16.5 meters.

Main characteristics of this structure are as follows:

- i) The upper and bottom slabs are cast-situ concrete constructed by cantilever erection method;
- ii) Section of truss members and span of upper slab are decreased by adopting 4plane main truss structure;
- iii) Fabrication cost of truss members is decreased by using box shape steels;
- iv) Solid concrete section is adopted at supports;
- v) Prestress during cantilever erection is given by prestressing steel arranged in upper slab and prestress that is necessary after completion of the girder is given by outer cables;
- vi) Compared with a conventional 1-box prestressed concrete girder, weight of the girder and the total dead load become about 86% and 88% respectively.

Structural details of connecting panels are one of the important points of this structure. It is required that panels can be connected easily between concrete blocks. is also required that the panels absorb errors during cantilever erection. Various types of connecting panels were compared and the type with cast iron cones is proposed.

The upper slab is supported discretely by top ends of the truss members. This support mechanism is different from the ordinary slab that is supported continuously by solid webs. Finite element analyses were done using a finite element model and design

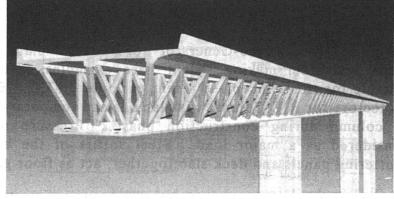


Fig. 1 Cross Section

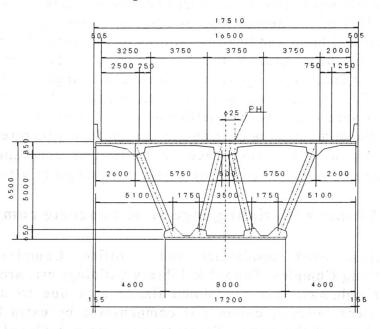


Fig. 2 Cross Section at the Pier

bending moments and shear forcesfor the upper slab were determined.

4. Conclusion

In this paper design concept of the steel truss web prestressed concrete bridge is introduced. Construction of the substructure will be starting from 1997 and construction of the superstructure will be starting from 1999.