Zeitschrift: IABSE structures = Constructions AIPC = IVBH Bauwerke

Band: 2 (1978)

Heft: C-5: Structures

Artikel: Hamana Bridge (Japan)

Autor: Kodan, Nihon Doro

DOI: https://doi.org/10.5169/seals-15120

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften. 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. Siehe Rechtliche Hinweise.

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. Voir Informations légales.

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. See Legal notice.

Download PDF: 02.02.2025

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

4. Hamana Bridge (Japan)

Owner: Japan Highway Public Corp.
Engineer: Kajima Corporation
Contractor: Kajima Corporation, Sumitomo Construction Co.

Dimensions:

Bridge length: 631.8 m
Span length: 55 + 140 + 240 + 140 + 55 m
Bridge width: 2 x 10.2 m (two way, two lane)
Super structure: Five spanned rigid frame structure with a hinge at the center of midspan
Substructure: Pneumatic caisson

Quantities of materials:

Super structure
Concrete: 19300 m3
Re-bar: 1500 t
Prestressing steel bar: 1900 t
Substructure
Concrete: 32400 m3
Re-bar: 3000 t
Excavation for caisson: 50400 m3

Work's duration: 39 months

Service date: 1978

Introduction

The Hamana By-path, the total length of which is 13 km, forms a by-path for the National Route No. 1 from Hamamatsu to Arai. The increase of traffic congestion necessitated the construction of the By-path. The Hamana bridge is located in the midway of the Hamana By-path, and had been constructed at the mouth of Lake Hamana, a seawater inlet separated from the Pacific Ocean. In consideration of construction safety, construction cost and maintenance cost, pneumatic caisson was adopted for foundation, and prestressed concrete rigid frame structure with center span of 240 m was to be erected by cantilever erection method.

Design

In the main bridge of five spanned rigid frame structure, prestressed concrete box girder of the mid span is rigidly connected with piers (P3, P4) at the both ends of the span, while slidable shoes were installed on piers P1, P2, P5, P6. Design of the bridge was conducted in view of the following items:

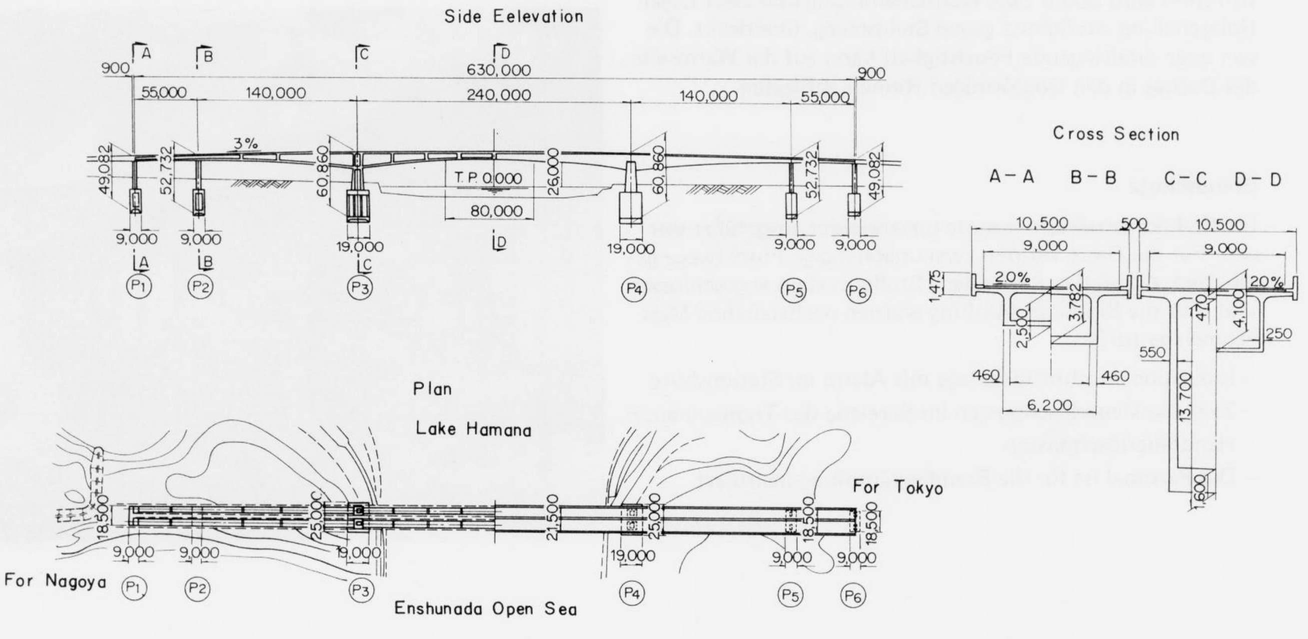

Fig. 1 General profile

1) In the long spanned concrete girder, the dominating factor is the dead load. Therefore dead loads must be reduced as far as possible
2) In case unbalanced moments act on piers P3, P4 on the way of erection of main girders, these may cause unequal settlement of foundations. Much care must be paid to get a balance of girders during construction
3) Because construction site is located on the shoreline, use of temporary support or scaffolding must be avoided as far as possible.

Through comparison of types of bridges which have different span length, from the standpoint of construction cost, seismic resistivity and stability during erection, the bridge type shown in Fig. 1 was adopted.

Construction site of the Hamana bridge is located in the "Zone A" of seismic zoning where the most severe earthquake is expected and the bridge has an extraordinary long span for a prestressed concrete girder bridge. In the design of super structure as well as substructure, dynamic response characteristics during earthquake were taken into consideration.

Construction of superstructure

After completion of portions at the top of the piers using ordinary suspended scaffolds, the main girder was constructed by cantilever erection method using big travelling scaffolds.
Sequence of construction is shown in Fig. 2.

(Nihon Doro Kodan)

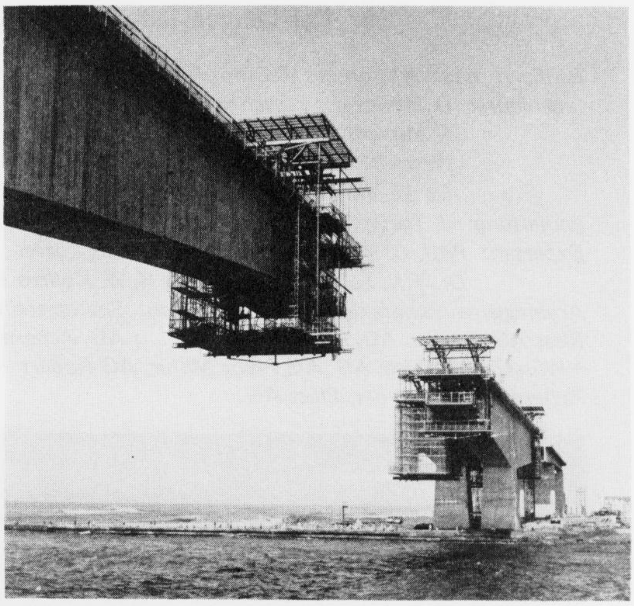

Photo 2 Hamana bridge during cantilever erection

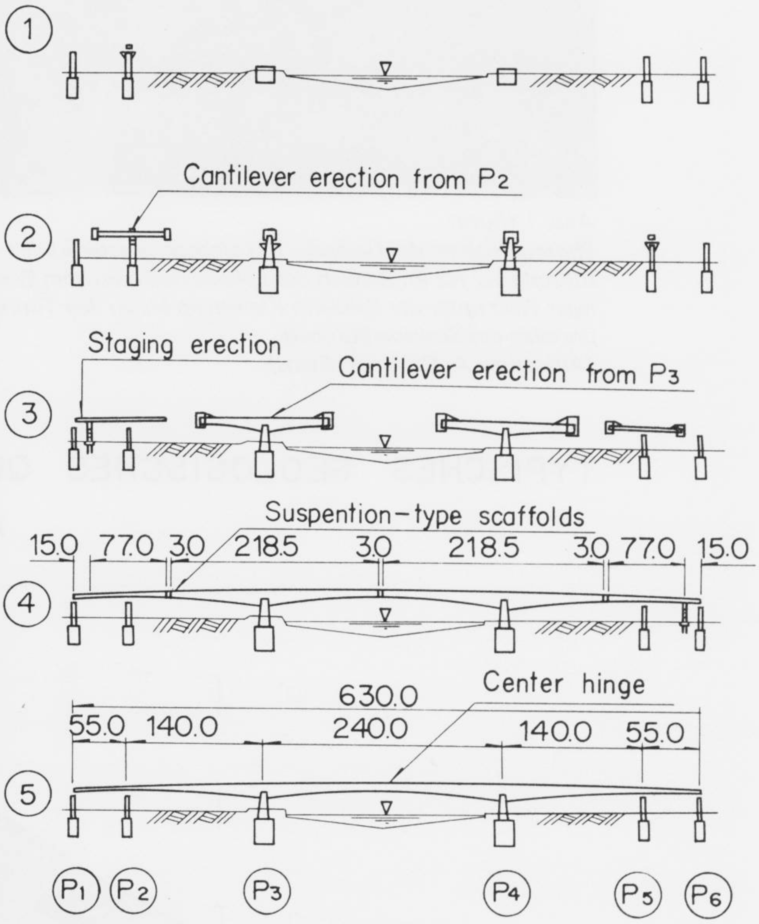

Fig. 2 Sequence of construction

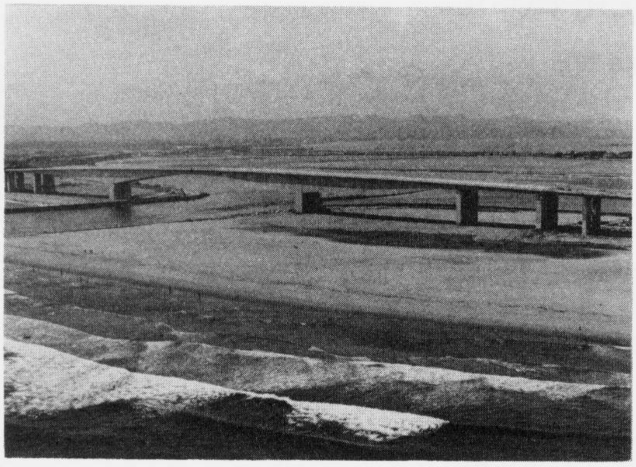

Photo 1 Hamana bridge