

Zeitschrift: IABSE reports = Rapports AIPC = IVBH Berichte
Band: 60 (1990)

Artikel: Innovative method concrete arch construction
Autor: Sato, Yasushi / Tohyama, Ryuichiro
DOI: <https://doi.org/10.5169/seals-46528>

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Innovative Method Concrete Arch Construction

Méthode innovatrice de construction d'un arc en béton

Neuartige Baumethode für Stahlbetonbögen

Yasushi SATO

Chief Engineer
Niigata Prefectural Office
Niigata, Japan

Ryuichiro TOHYAMA

Chief Civil Engineer
P.S. Concrete Co. Ltd
Tokyo, Japan

Introduction

The "CLCA method"--a new method of construction for arch bridges, was developed in Japan. In this method the steel and concrete composite column structure is applied to the arch rib construction. CLCA stands for Concrete Lapping method with pre-erected Composite Arch.

The common feature of the method presented can be summarized as following:

- * Using the steel tube, the equipment required for erection is light, simple, and economical.
- * Filling concrete in the tubes at the early stage of construction, the tubes become very rigid arch components and it is very effective for safety during construction and have many merits for wind force, earthquake and accuracy of dimension.

From the cost of Joushi bridge by this method, the total cost can be predicted to fall within 90% of other methods (such as centre or Melan), making steel weight about 1/2 - 1/3 of them.

This method is useful for the arch bridges of 50m to 150m span.

Brief Description of Arch Construction

Fig.1 shows the construction sequence of concrete arch bridges by CLCA method.

1. After construction of abutment, the steel tubes are assembled in vertical direction and then tubes are lowered and connected in arch axis.
2. Steel tubes are concreted and then arch rib is concreted by form travellers from each springings.
3. Piers and superstructure are completed.

Fig.2 show the dimensions of Joushi bridge constructed by this methods, and Table-1 shows the design load of Joushi bridge.

Table-1 Design Load

		In service	Under construction
Live load		TL-20	
Snow load		100kg/m ²	
Shrinkage		15x10 ⁻⁵	
Support movement	Horizontal	5mm	
	Vertical	3mm	
Temperature change	Arch rib	±10℃	±10℃
	Slab girder	±15℃	
	Steel tube		±30℃
Wind load		55m/s	25m/s
Seismic coefficient	In plane	0.15	0.1
	Out of plane	0.15	0.1
Traveller weight	Traveller		25t
	Form		15t
Lateral pressure of conc.			ACI standard
Tolerance of axial line		±5cm	

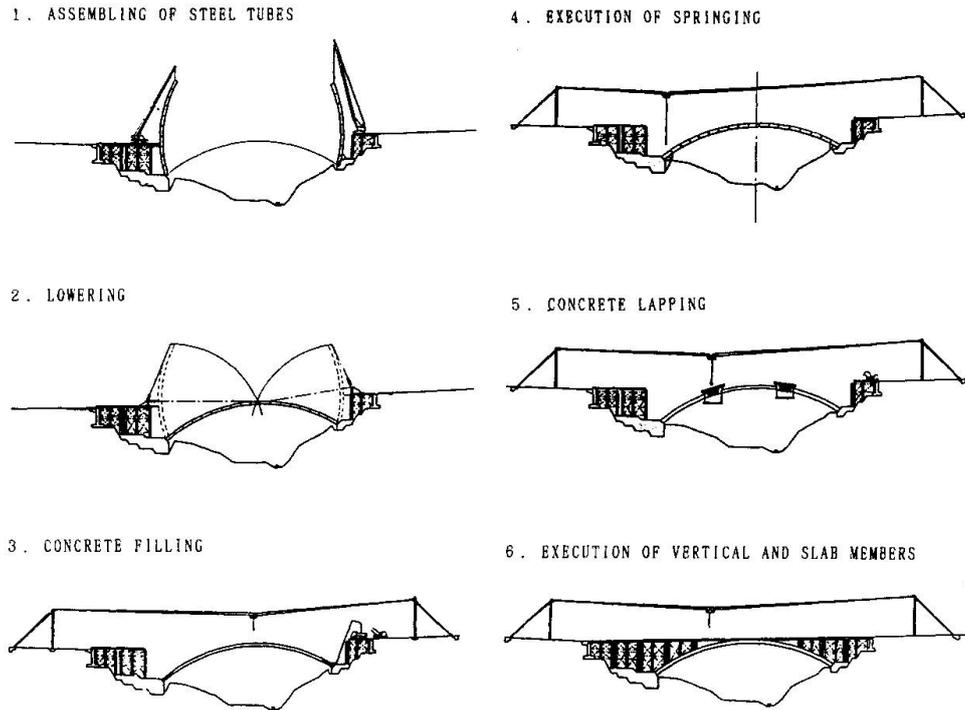


Fig.1 Construction Sequence of CLCA method

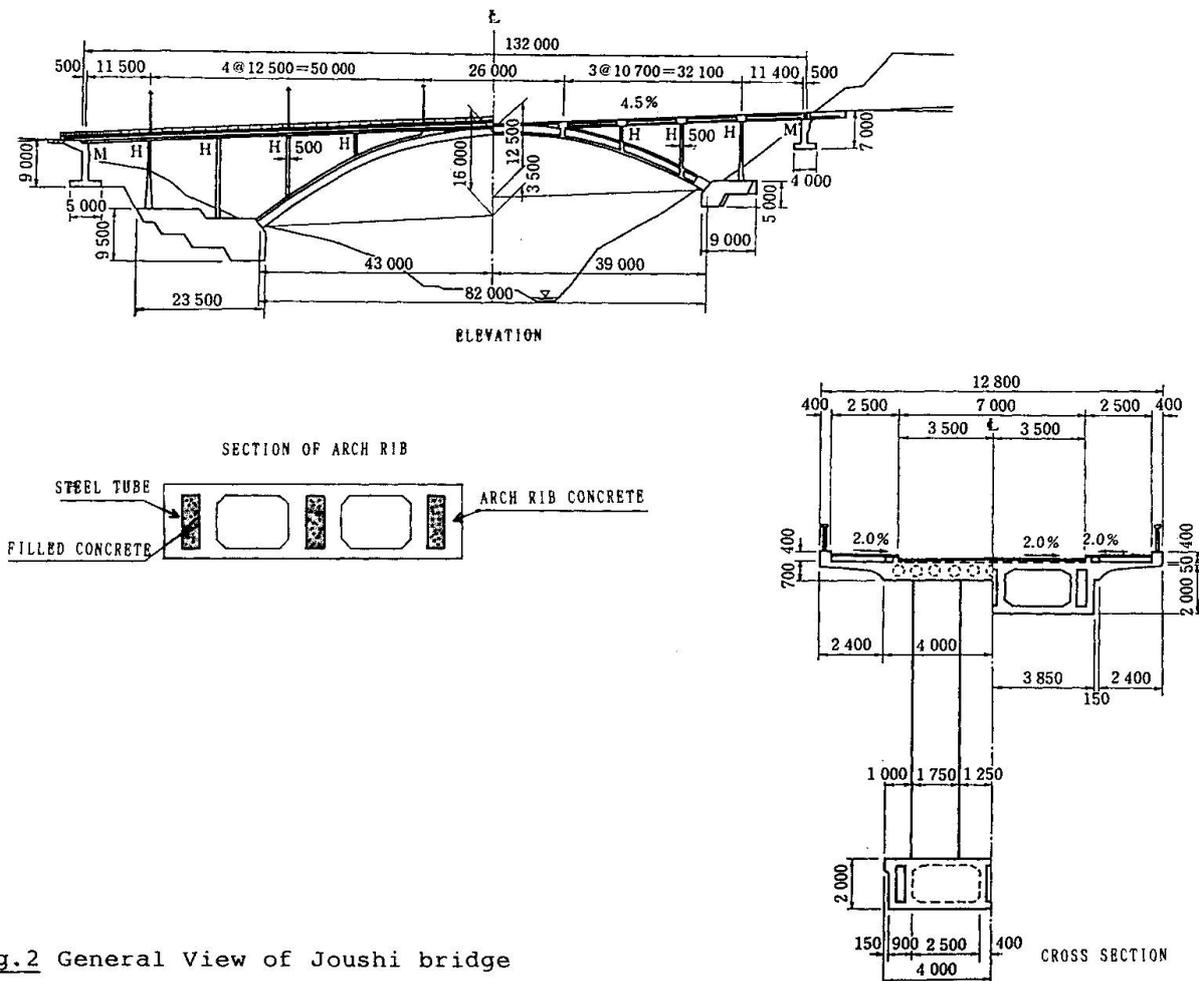


Fig.2 General View of Joushi bridge