

# Innovative Design for Qingshan Yangtze River Bridge

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## Abstract

Qingshan Yangtze River Bridge is a cable-stayed bridge with a main span of 938 m, which is the fifth largest cable-stayed bridge in the world. In order to cope with challenges such as long span, wide bridge deck and heavy load, the girder of the main span adopts integral steel box girders, while the side span adopts steel box-concrete composite girders. The interface of the two types of structure is located on the middle span, 18 m to the bridge tower. The main girder is 4.5 m in height and 48 m in width. The main tower is an A-shaped concrete tower with a height of 279.5 m. The stay cables are arranged in a fan shape. The main girder section near the tower is supported by No.0 cable instead of a lower beam to achieve an optimum architectural effect. The foundation of the main tower adopts a rotary bored concrete pile. The bridge adopts a fully floating structure system. A restraint system of viscous damper + limit block is adopted in the longitudinal direction, while a system of separated c-section steel dampers with shear clip tenon + vibration reduction and wind resistant supports are adopted as horizontal restraints.

**Keywords:** cable stayed bridge; steel box girder& steel box composite girder; main tower in a-shape; pile cap in dumbbell-shape; entirely floating system.

## 1 Overview

Qingshan Yangtze River Bridge is located in the northeast of Wuhan. The structure type of the 938 m span cable-stayed bridge has a double-tower and a double-cable plane, and is ranked fifth among the cable-stayed bridges already built in the world. The span arrangement of the main bridge is  $100+102+148+938+102+100=1638\text{m}$ . The main girder adopts an integral steel box and steel box combined beam. The stay cables are arranged as a fan. The bridge tower adopts an “A”-shaped

concrete tower without a lower beam. The layout of the bridge facade is as Fig.1:

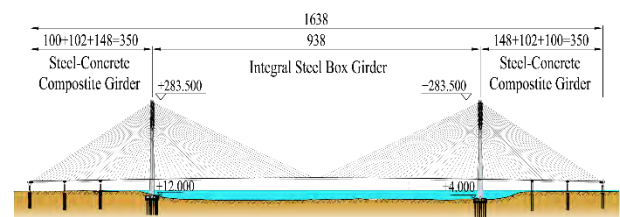


Fig. 1: Elevation of the main bridge (unit: m)