



Great Demand and Great Challenge

Chinese Major Bridges under Construction for Improving Traffic Infrastructure Nationwide

Yao Jun GE

Professor
Department of Bridge
Engineering
Tongji University
Shanghai, 200092, China
yaojunge@mail.tongji.edu.cn

Yao Jun Ge, born 1958, received his PhD degree in bridge engineering from Tongji University. He is the chairman of Department of Bridge Engineering.



Hai Fan XIANG

Emeritus Professor
College of Civil
Engineering
Tongji University
Shanghai, 200092, China
hfxiang@mail.tongji.edu.cn

Hai Fan Xiang, born 1935, received his MSc degree in bridge engineering from Tongji University. He is the consulting dean of College of Civil Engineering.



Summary

Under the background of high annual growth rates of GDP, China has experienced with the ever-growing demand in improving traffic infrastructure nationwide for about three decades, which results in intensive investment in traffic infrastructure development, in particular highway transportation construction. Two ground plans, the National Trunk Highway System and the National Expressway Network, have been launched successively, and thousands of highway bridges have been built for each year. In order to meet with the great demand in highway bridge development, Chinese bridge community is facing several challenges in the design and analysis of major bridges, especially of super long-span bridges. Aerodynamic challenge of suspension bridges was introduced by three typical examples including a single-box-girder with a central stabilizer, a twin-box-girder and a trial design with the combination of stabilizers and central slotted decks. Bridging capacity challenge was explained by three cable-stayed bridges with about 1000 m main span and a record-breaking span-length arch bridge. The other technical challenge was focused on the rational design and analysis of a double main span suspension bridge and a twin parallel deck cable-stayed bridge.

Keywords: Traffic infrastructure development; major bridge construction; aerodynamic challenge; bridging capacity challenge; double main span bridge; twin parallel deck bridge.

1. Introduction

As a developing country, China has an ancient history that goes back about 5,000 years. The Chinese have built thousands of bridges, which form an important part of China's culture. For example, Zhaozhou Stone Arch Bridge served for more than 1400 years and iron chain suspension bridges built in ancient time play an important role in the world history of bridge development. Unfortunately, in the era of modern bridge construction beginning with the 19th century, China gradually fell behind the western countries for about 200 years.

It was not until the 1980's, with the rapid increase of China's economy, that bridge engineering in China entered a golden period. Under the continued growth of the national Gross Domestic Product (GDP) and the constant increase of investment in traffic infrastructure, the National Trunk Highway System has been almost completed, and thousands of highway bridges have been built for each year. Up to the end of 2005, the total number of highway bridges has reached 336,600 with a total length of 14,700 linear kilometers, among which there are 38 major bridges with a main span over 400. In order to meet with great demand in traffic infrastructure, the National Expressway Network Plan has launched, and numerous highway bridges including 26 major bridges are currently under design and construction. Chinese bridge engineers are facing various challenges in suspension bridge aerodynamics, bridging capacity of cable-stayed bridges and arch bridges and the technical challenge on bridging longer water body or providing wider traffic passageway.