



Questions to be responded to by the firm submitting the application

Why do you think this project should receive an award? How does it demonstrate:

- innovation, quality, and professional excellence
- transparency and integrity in the management and project implementation
- sustainability and respect for the environment

Chongming-Qidong Yangtze River Highway Bridge (hereinafter “Chongqi Bridge”) has a length of 6.84km. It was scheduled to be completed by April, 2012, but eventually opened to traffic on December 24th, 2011. By now it has been in operation for 3 years and 4 months. The client is Jiangsu Province Chongqi Bridge Construction Headquarters. The main bridge of Chongqi Bridge is a six-span continuous steel box girder bridge with span arrangement of 102m + 4 × 185m + 102m = 944m. The bridge deck structure is formed by double haunched continuous steel box girders with vertical webs. The width of single girder is 16.1m. The girder depth varies in parabolic, 3.5m at the ends of side spans, 4.8m at the mid span and 9.0m at main piers. The girders were erected span by span with one single segment in each span without any stitching segment between them. The approach bridge over water is 50m prestressed concrete continuous box girder bridge, and was constructed by segmental method. The approach on land is 30m prestressed concrete continuous box girder bridge cast in-situ with full scaffolding.

Main innovations of Chongqi Bridge are as follows:

1. Chongqi Bridge is the first haunched steel box girder structure in large span continuous girder bridges in China, which gained valuable design and construction experiences for steel box continuous girder bridges in China.
2. The girders were erected span by span with one span as one single segment and without any stitching segment, which simplified the erection procedures and shortened construction duration.
3. Low frequent Tuned Mass Damper (TMD) was developed to efficiently control



vortex-induced vibration of large span steel box continuous girder bridge as a blunt body.

4. Distortional warping stress for haunched steel box continuous girder bridge under eccentric loads, was precisely calculated with the analogy of elastically supported continuous girder method, and the method for proper distance between diaphragms of haunched steel box continuous girder bridge was proposed.

5. Numerical simulation of overall and local interactive buckling of stiffened plate in steel box girder, with fabrication error, weld residual stress and material nonlinearity considered was proposed to give proper parameters and to successfully solve stability of high web of haunched steel box girder.

6. Criteria for fabrication error and erection error of large span haunched steel box continuous girder is proposed.

7. Synchronous dual crane lifting, four points support in water transportation, reaction active control, and fabrication alignment geometric control were developed in the erection of large span haunched steel box continuous girder.

8. The approach of 50m span massively applied the prestressed concrete continuous segmental box girder assembled span by span in China. It expanded applications of precast concrete bridge and improved externally prestressing dominant prestressed concrete girder bridge (external prestressing is over 70% of total stress). It is a new construction method for precast concrete bridges after cantilever erected segmental bridge in the 70m-span approach in Sutong bridge and single span erection of 50m and 70m girders in Hangzhou bay bridge.

Innovations of Chongqi Bridge has a great contribution to China, pushed forward Chinese highway bridge technical progress, broke technical barriers, upgraded the industry from hand made and in-situ made to industrialization, promoted Chinese highway bridge industry, and showed good social and economic benefits.

Design of Chongqi Bridge abundantly considered the demands of maintenance. The general alignment was determined based on comfortability of driving, drainage arrangement and maintenance requirement. Accesses were taken into account with no blind zones, and provided convenience for future maintenance. TMD system was arranged in box girder and in good condition during operation. An applicable and reliable health monitoring system was developed with good understanding of bridge structure characteristics, and is operating perfectly. Chongqi Bridge was awarded the first prize of excellent design of China Association for Highway Prospect and Design in 2014.

No defects have been reported after 3 years of operation. The quality is experiencing the test of time and natural disasters. Environmental friendly and keeping sustainable development were the most important factors during the construction of Chongqi Bridge.



In the design phase, proper alignment and technical solution were chosen for less environment impact. In the construction phase, effective measures were conducted to produce less emission to atmosphere, water, sound and the ecology community. In the operation phase, maintenance is enhanced and sound screen is installed on approaches to reduce impact to local community. Energy saving analysis shows the project will save equivalent gasoline 910.61 million liters till 2031, which is very effective in energy saving.

In the pre-construction phase, risk investigation and evaluation was conducted for potential social risks with participation from the public. All sub projects were determined by tendering openly and transparently. The object was set during the construction to achieve high quality, probity, and safe funds, and to satisfy the public. No corruption was found during the construction of Chongqi Bridge.

Chongqi Bridge, in the consulting and procurement during the whole project management process, dozens of consultants, institutes and contractors were effectively coordinated following FIDIC contract. The contract was administrated openly and transparently in modes of contract management and quality management, assured the objects of quality, progress and investment, and trained professionals in consultation and management.

Chongming-Qidong Yangtze River Highway Bridge, initiated large span haunched continuous steel box girder bridge in China, and recorded the latest level of large span steel continuous beam bridge. The approach of 50m span massively applied the prestressed concrete continuous girder in precast segmental bridge erected span by span in China. The design, construction and operation of the bridge followed the idea of sustainable development and environmental friendly, and demonstrated the concepts of large segments, industrialization, assembly and standardization.

What services did the member firm provide to the project? Please describe briefly.

CCCC Highway Consultants Co., Ltd. began preliminary design and detail design of Chongming-Qidong Yangtze River Highway Bridge in January 2008, and completed the design in July 2009.

The main span and the length of Chongqi Bridge is ranked the first of similar bridges in China. The design was deliberately conducted to international advance technological level, emphasized on harmonic consistency, aesthetics, environment and innovation design. Design documents were submitted as promised quality and time in the contract, passed all examinations and were proved by authorities to assure the construction.



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During the construction, excellent designers were assigned to provide technical support at site, offering crucial solution to 185m long segments transportation, erection and control and paid great contribution to the construction, especially four points reaction active control, 185m long segment erection without stitching, zero stress control, and delicate reports.

Because of technical innovation and supports in the whole progress, most of construction of superstructure were moved from over water to on land, risks were reduced, construction time was shortened, and quality, safety, efficiency and precision was assured.

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