Project identification

ShenZhong Link

Type of project

International Design Competition

Client

Advanced Work Office for the Shen-Zhong Link Project

In co-operation with

Guangdong Highway Reconnaissance Planning Design Institute (GDDI) and Information Based Architecture (IBA)

Project assignment

Development of a State-of-the-Art solutions for the Bridges, Tunnels and Islands

Country

Peoples Republic of China

Location

Guangzhou, Shenzhen, Zhongshan

Project duration

2015-2016

Project phase

Preliminary design

Construction cost

EUR 4.150.000.000

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Project description

The People's Government of the Guangdong Province plans to build a sea-crossing link between Shenzhen and Shongshan. This Shen-Zhong Link is located about 30 km to the south of the Humen Bridge in Guangzhou and about 38 km to the north of the Hong Kong-Zhuhai-Macao Bridge Link.

The new link will shorten the commuting distance of two economic circles sitting on the east and west shores of the Pearl River. The link is not only a corridor for Shenzhen and Zhongshan, but is also for strategic importance to the Nansha, Qianhai, Cuiheng and Hengqin areas of the city of Guangzhou, Shenzhen, Zhongshan and Zhuhai respectively. Upon completion of the link, the travel time from Shenzhen to Zhongshan will be significantly reduced, from more than two hours to twenty minutes in clear traffic.
The connection has a length of 24 km, has 4 lanes in both directions and starts at a new artificial island south of the Shenzhen airport where the link is connected with the Guangzhou-Shenzhen Riverside Expressway. From there it passes underneath the Dachan waterway, the Airport Secondary Fairway and the Fanshi Waterway with a tunnel. At the West Artificial Island the tunnel switches to a bridge crossing the Lingdin West Fairway and the Hengmen East Waterway with a suspension bridge, approach bridges and a cable stayed bridge. At the Hengmen Interchange the link is connected with the Zhongshan-Kaiping Highway.

The immersed tunnel possesses 2 traffic tubes and a central gallery with a total width of 46 m and a length of 5.25 km. For the deep sections, reaching water depths of 35 m, full steel sandwich elements turned out to be most economical. For the less deep and wider sections single shell elements were proposed. As this will be the first full steel tunnel in China the cross-sections were developed in detail. An overall construction schema was set up and a casting basin for production of the tunnel elements on the Shenzhen side of the river was selected. The geology along the alignment was analysed from which the dredging methods for the trench were selected. For a number of hard spots along the alignment soil treatment like sand compaction piles and soil replacement were advised.

Besides being a transition between the tunnel and the bridge also recreational functions were assigned to the island and the entrance to the tunnel was turned into a landmark. For land formation of the main body of the artificial islands large diameter steel cylinders with rock revetment in front are proposed. Settlement and stability is controlled through soil replacement, vertical drainage and dewatering of the main island body and through sand compaction piling underneath landscaped rock revetment.

Scope of work

TEC, in combination with the Guangdong Highway Reconnaissance Planning Design Institute and Information Based Architecture, prepared a set of design documents covering all aspects of the tunnels, islands and bridges.

The TEC, GDDI and IBA joint venture ended second in the competition. The client amongst others valued the technical depth of the study and the practical knowledge and experience brought in from other large tunnelling projects.

The TEC scope of services covered the integral design of the immersed tunnel and the artificial islands. The following items were prepared by TEC and were included in the competition documents:

- Architectural design and landscaping
- Structural safety and foundation design
- Mechanical and electrical installations
- Life safety
- Construction methodology and schedule
- Construction cost estimate