Tunnel Engineering Consultants

Project identification

Shanghai Outer Ring Tunnel

Type of project

Immersed tunnel

Client

Shanghai Tunnel Design Institute (STEDI)

In co-operation with

Project assignment

Specialist and independent consultancy services

Country

China

Location

Shanghai

Project duration

2019-ongoing

Project phase

Condition Assessment

Construction cost

(excl. VAT)

Consultancy fee

Approx. € 125.000,-
(excl. VAT)

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Project description

The Outer Ring Tunnel under the Hangpu River has been built as immersed tunnel. The tunnel stretch has a length of 1.860km and includes cast in-situ tunnels on both riverbanks and 7 monolithic tunnel elements, approx. 108m each, with a total length of 736, immersed in place to form the river section. The project construction commenced in December 1999 and the tunnel link is in operation since June 2003.

The immersed tunnel is experiencing significant settlements at one end of the section (Pudong side), issues with rubber seals (GINA and Omega) at some of the immersion joints and water leakages at various locations.

Scope of work

The Chinese Design Institute STEDI has requested TEC to provide specialist and independent consultancy services to assess the observed issues, provide potential explanations and prepare repair and mitigation measures.

1. Analyse (including back-analyses) the tunnel settlement behaviour, especially in longitudinal direction at various stages (years) including the current stage. This includes the assessment of the bearing capacity and durability of the immersed section.
2. Develop potential future settlement scenarios and assess the bearing capacity and durability of the immersed section.
3. Develop retrofitting options that can be utilized when overloading of the structures can be expected:
   - Structural strengthening options
   - Ground improvement options
   - Unloading options
4. With regard to the issues of GINA gaskets at some joints, analyse the possibility of installing an additional water stop; assess the element joint repairment scheme proposed by STEDI and provide suggestions.
5. A general assessment of the observed leakages of immersed section including potential repair methods (crack treatment for different kind of cracks).
6. Provision of other suggestions for the overhaul of the immersed section of the Shanghai Outer Ring Tunnel (focus on minimizing disruption to the tunnel operation → maximize availability of the very busy tunnel).