Case study

Bi-directional O-Cell® for safely and economically load testing piles over water

Project
Danube Bridge, Paks,

Contractor:
HBM Kft.

Piling Company:
HBM Kft.

Location
Paks-Kalocsa Danube
Hungary

Period
2021

Services
O-Cell® load test

Two O-Cell® test piles in the middle of the river Danube

Fugro Loadtest have performed O-Cell® tests for the Paks-Kalocsa Danube Bridge Project, a new bridge located in Hungary featuring a 1,133 m long mid span, the longest in the area.

Challenge

In order to verify and improve the design of the project's foundations, two preliminary test piles were requested by client HBM Kft. The sub-surface stratigraphy at the general location of the test piles is reported to consist mainly of grey sandy gravel and gravelly sand.

Two 1,500 mm nominal diameter preliminary test piles with depths of 30 m were constructed by HBM Kft in the river and fully load tested to reveal their in-situ performance.

Artist impression

Installation of O-Cell and reinforcing cage

Solution

A single level O-Cell® bi directional loading arrangement with one 530 mm diameter O-Cell® was utilised for each test pile, allowing for a potential 20 MN gross loading capacity to be applied.

O-Cell® technology proved a perfect solution for static load testing of these test piles as the top of the pile concrete was at the river bed elevation, 11 m below the pile construction level.

Sister bar strain gauges were placed at multiple elevations along the shaft on each pile in order to assess the load distribution mobilized during the testing.

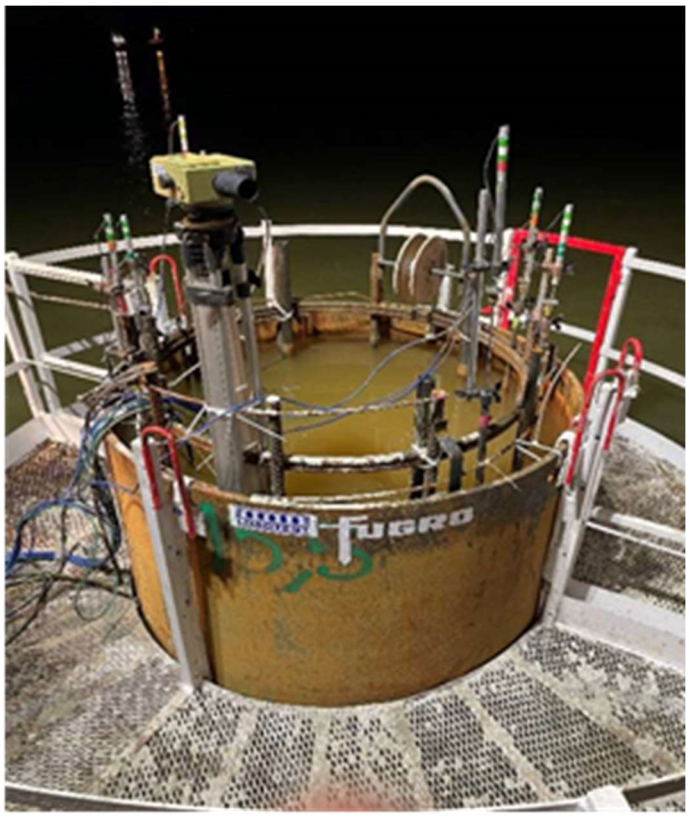
By use of Cemsolve® pile load movement analysis, the total ultimate pile skin friction capacity and ultimate end bearing load and stiffness could be determined, and by combining upward and downward models, a Cemset® prediction of the pile head load / settlement could be made.

Conclusion

Full-scale static load testing was able to be carried out using O-Cell® methodology without the need to provide potentially unsafe and very costly anchor piles over water, revealing the geotechnical behaviour of the base of the piles as well as the skin friction parameters along the pile shaft. These results were critical for the project foundation designers and demonstrated the actual in-situ behaviour exceeded design expectations.

Integrity testing of one of the piles.

Concrete wagons on a barge ready for their delivery into the pile in the middle of the river



O-Cell® test in progress.