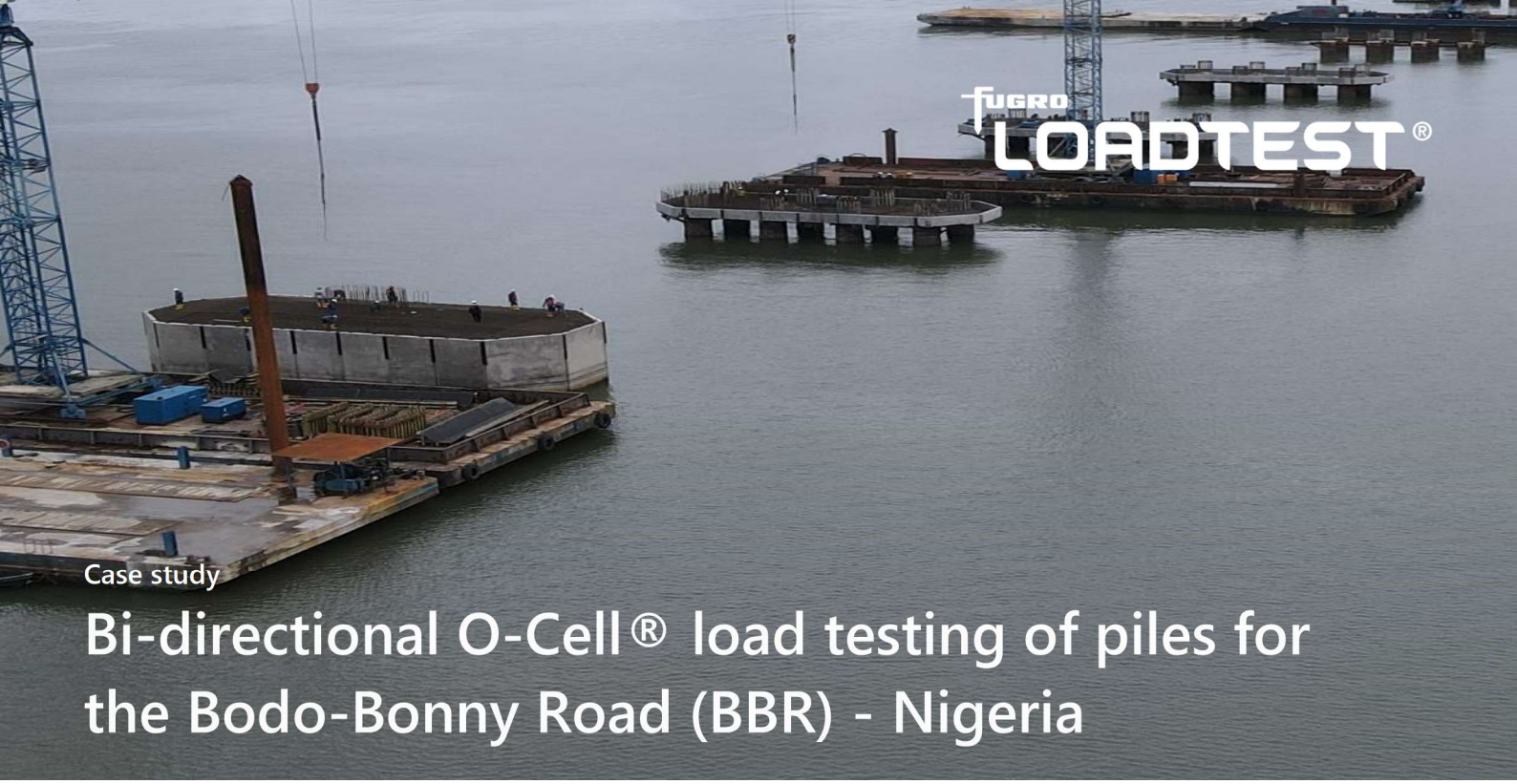

Case study

Bi-directional O-Cell® load testing of piles for the Bodo-Bonny Road (BBR) - Nigeria

Source: https://www.julius-berger.com/references/bodo-bonny-road-rivers-state

Project
Bodo-Bonny Road

Client:
Nigeria LNG Limited (NLNG) and The Government of Nigeria

Piling Company:
Julius Berger Nigeria PLC

Location
Rivers State - Nigeria

Period
2021 to 2022

Services
O-Cell® load tests

O-Cell® tests for BBR Nigeria

Fugro LOADTEST have performed a total of 13 pile tests using the Osterberg Cell® methodology for the BBR

Challenge

As the first road link between Bonny Island to the rest of Rivers State, the Bodo-Bonny road is a milestone infrastructure development project for the advancement of the Niger Delta and a catalyst for the continued success of Bonny Island - a key industrial area in Nigeria tied to the economic development and general wellbeing of the Nation as a whole.

Project construction underway

Technically, the road is a massive undertaking with many construction challenges due to the low lying marshy area, muddy and swampy soil conditions and considerable tidal movements. The scope comprises the construction of a 39 km long road, cross culverts and two mini bridges with a span of 23 m each as well as two creek bridges, Afa Creek Bridge of about 530 m length and Nanabie Creek Bridge of about 640 m length, in addition to the construction of a major river bridge of about 750 m length over the Opobo Channel.

With differing and difficult ground, and so many structures, proving the pile designs required a solution that could be easily implemented.

Solution

The Osterberg method of loading was chosen as the ideal static loading test. Having worked together in Nigeria on several previous projects, a joint effort between Fugro Loadtest and Julius Berger enabled a total of thirteen tests to be installed and completed.

Three major bridges, Afa Bridge, Opodo Bridge and Namabie Bridge all required pile tests as well as nine mini-bridges as the piling works progressed.

With so many structures, a Fugro team travelling to and from Nigeria at short notice would have been impractical (and costly). Training the local engineers and piling crew to construct and install the O-Cell equipment was the logical solution. Fugro Loadtest returned for the critical testing phases of the operations.

Materials were shipped as new locations and pile testing requirements were detailed, allowing the supply of only the materials needed for each phase to avoid long term local storage. A single O-Cell® was required in each pile test with diameters of 430 mm, 530 mm and 620 mm being selected depending on working load requirements.

Reinforcing cage, O-cell® and instrumentation prepared by Julius Berger Nigeria PLC

Conclusion

The tests revealed both the behaviour of the skin friction above and below the O-Cell® assemblies which, together with the end bearing characteristics under loading, enabled the design for each structure to be verified and approved by the government inspectors.

The use of the O-Cell® methodology solved the complicated challenges of the project, both in space terms, and the local soil stability issues, without the need to provide additional anchors in the soft soils, or for a traditional reaction system using potentially unsafe kentledge in the unstable ground, especially during the rainy season. Using a partnership approach using trained local staff from Julius Berger enabled the client to proceed with the construction activities, at a lower overall cost and without compromising production schedules.

O-Cell® test in progress.