CASE STUDY

*Artist's rendering of Okavango River Bridge (https://www.grassl-ing.de/en/construction-visualisation/details/p/show/okavango-river-bridge-in-mohembo-village/#imagecycle)*

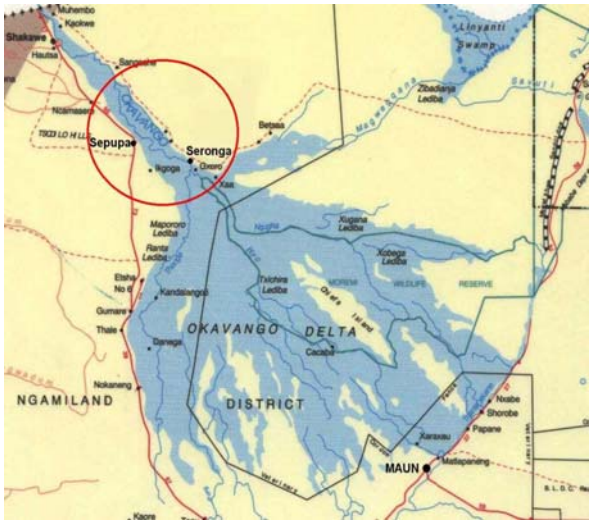
# **FUGRO** Okavango River Bridge, Botswana

**Fugro have performed O-cell tests for Okavango River Bridge Project, a cable stayed bridge located in Mohembo, Botswana featuring the only crossing of the Okavango River for several hundred kilometres.**

**Client: ITINERA S.p.A.**
**Period: 2018 - 2019**
**Location: Mohembo, Botswana**

## PROJECT SUMMARY

Upon completion by Italian joint venture companies of ITINERA S.p.A., a civil engineering contractor, and CIMOLAI S.p.A, a major steel manufacturer specialised in heavy structures, the bridge is expected to boost tourism in the area and provide reliable access to health and education. It's been designed as a 1,161 metre long and 12.4 metre wide cable stay bridge with a 400 metre long mid span over the main channel and incrementally landed pre-stressed concrete box girder bridge featuring 55 metre high pylons shaped like elephant tusks. The project also entails the construction of 3 kilometres of tarred approach roads, associated storm water drainage works, electrical installations and street lighting along the network of approach roads.




( https://deepstravelogue.com/2018/03/10/exploring-the-okavango-delta/ )

In order to verify and improve the design of the project's foundations, numerous preliminary test piles were requested by client ITINERA S.p.A. The sub-surface stratigraphy at the general location of the test piles is reported to consist primarily of silty sandy alluvial deposits underlain by schist rock.

The O-cell method, using the pile itself to provide the reaction for the test, allows the load to be applied directly within the rock socket, without the need to load the overburden soils.

22 number, nominal Ø1,200 mm, rock-socketed preliminary test piles with their depths ranging from approximately 28 metres to 50 metres were commissioned for being load tested via O-cell methodology. Depending on the required test loads which were ranging from 6.5 MN to 14.0 MN a single level, O-cell bi-directional loading arrangement was utilised for each test pile, comprising one Ø330 mm O-cell or two Ø330 mm O-cells.

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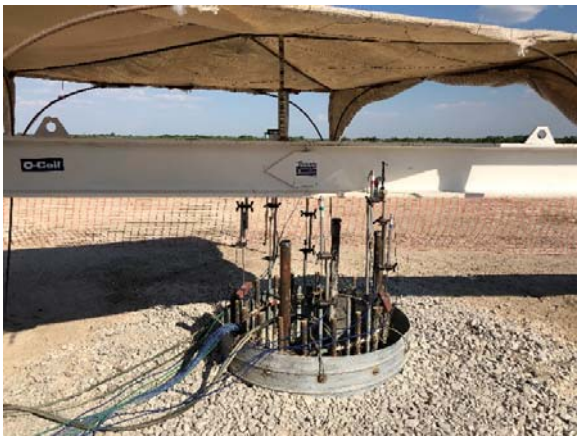
Sister bar strain gauges were placed at multiple levels along the shaft on each pile in order to assess the load distribution mobilized during the testing.

## TEST RESULTS

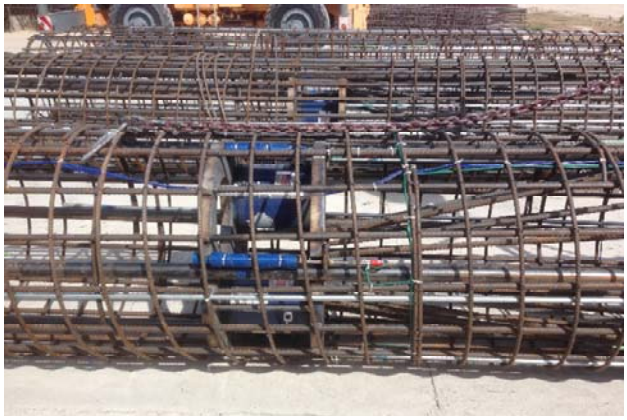
O-cell technology proved a perfect solution for static load testing of these test piles since the level of the load bearing rock strata was ranging from 23 metres to 45 metres below the platform level.

## CONCLUSIONS

Full-scale static load testing was able to be carried out using O-cell methodology without the need to provide multiple rock anchors or large and potentially unsafe, reaction frame, 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.




*Testing underway*



*O-cell cage ready for installation into the pile bore*

*O-cell cage lifting into place ready for installation into the pile bore*


*Assembly being lowered into the pile bore*



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