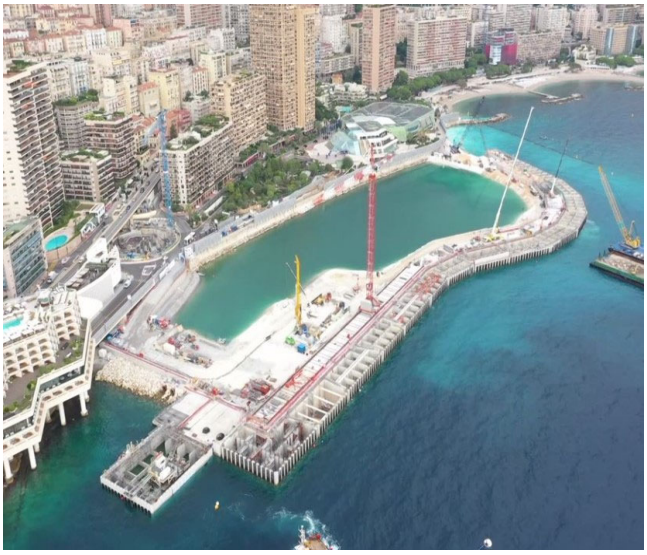
FUGRO Anse du Portier, Mónaco

Fugro have performed O-cell tests for a new expansion project of Anse du Portier in Monaco.

Client: SOGEFON
Period: 2020
Location: Monaco

PROJECT SUMMARY

When completed, the reclamation project will be cover 6 hectares and house 3400 luxury apartments, underground car park and retail spaces on the new coast line of Monaco. In order to verify and improve the design of the project's foundations, numerous preliminary test piles were requested by client Sogefon. The ground conditions at the base of the piles was known but the exact elevation of the rock strata varied considerably across the site.



The site area constraints made the Osterberg method of loading the idea static load solution, using the pile itself to provide the reaction for the test within the pile shaft, and negating the requirement for anchor piles. One of the unique features of bidirectional testing is that the load can be applied directly within the rock socket, without the need to load the overburden soils. An additional requirement was to assess the skin friction along the pile shaft as the material consisted mainly of backfill, used to reclaim the site form the sea.

The two initial 1500 mm diameter bored test piles were constructed with a single level assembly comprising of two 620 mm O-cells, allowing for a potential 54 MN gross loading to be applied.

CASE STUDY

Multiple strain gauge levels were placed along the 50-55 m shaft on both piles in order to assess the load distribution mobilized during the tests and to assess the skin friction, both within the rock socket and within the granular fill above.

TEST RESULTS

The test revealed both the upwards behaviour of the skin friction above the O-cell assembly, and the downward skin friction and end bearing characteristics under loading.

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, together with Cemset® a prediction of the pile head load / settlement was made.

CONCLUSIONS

Despite a very congested and restricted site, full-scale static load testing was able to be carried out to loads exceeding conventional test capacities using O-cell methodology. The O-cell testing program was able to safely mobilise the underlying rock, revealing the geotechnical behaviour of the piles. These results were critical for the projects foundation designers and demonstrated the actual in-situ behaviour exceeded design expectations.

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

Testing underway with a very small test area footprint

Assembly lowered into final position

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