

# LOADTEST O-Cell® Technology in Tunisia



Project: **Radés-La Goulette Bridge**

Location: Tunis, Tunisia

Client: STFA Temel Pile Construction Co.

Geotechnical Consultants: Nippon Koei Co. Ltd.

Foundation Contractors: STFA Temel Pile Construction Co.

Developer: Taisei Corporation

## Project Description:

### Summary:

The need to connect the ports of Radés and La Goulette by bridge was essential to promoting the development of both North and South Tunis lake areas as well as enabling expansion of the two ports.

The soft nature of the alluvial soils on this project required a unique testing solution to evaluate the parameters for the pile design. A traditional top-down test was considered which would require substantial anchor piles or heavy kentledge that may be unstable on the soft ground. The test loads required would have proven very costly for these testing techniques. An economical alternative was a bi-directional test in which a specially constructed sacrificial jack (O-cell®) is cast within the pile itself.

### Project:

Perhaps one of the most important construction projects undertaken in Tunisia in modern times, the bridge markedly improves the existing route between the ports either by an ageing ferry for light vehicles or a long circuitous route for heavy traffic.

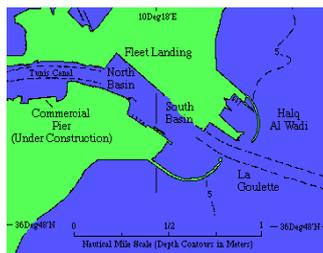
The soft soils at the bridge site left the designers with a problem regarding the pile length. Bore-holes showed that the bedrock was many hundreds of metres below ground level. Using the soft alluvium deposits as a founding material was the only alternative. A bi-directional test would allow assessment of these soil parameters and assist in the calculation of the pile lengths needed.

A specially designed O-cell was cast in the test pile at a depth where equal resistance can be found above and below the O-cell arrangement. When pressurised, one element of the pile is used as a reaction for the other; making surface reaction systems unnecessary.

The requirement for 16 MN total test capacity was a catalyst in choosing bi-directional testing. One O-cell of 540 mm diameter was installed in the test pile, located 21 m above the tip of the pile. It was assessed that large settlements could be present during the test. To accommodate these movements, an extended stroke O-cell with a 225 mm stroke was used. Conventional tell-tale arrangements were used to monitor O-cell expansion and pile toe movements. Strain gauges were placed at the pile toe to monitor the amount of load transferred to the base.

### Pile Test:

The load test was carried out mobilising the whole of the 225mm stroke available. Approximately 110 mm of upward movement and approximately 115 mm of downward movement were mobilised. One test was performed in a 1500 mm diameter test pile 63.5m deep. The test mobilised a total capacity of approximately 16 MN allowing valuable soil parameters to be evaluated for the pile design. The bridge, completed in 2009, spans 270 m over the canal at a height of 20 m.



O-cell and cage assembly ready for installation



Installation of reinforcing cage with O-cell



Bi-directional test in progress. The steel beam shown in the picture is being used as a reference frame against which pile movement was measured.



Source: skyscrapercity.com

