LOADTEST
O-Cell® Technology in Tripoli, Libya

Project:	**69 Storey Tower**
Location:	Tripoli, Libya
Client:	Trevi SPA
Consultants:	Dar Al-Handasah
Main Contractor	MAN Enterprise
Project Description:	Tripoli is the capital and largest city in Libya. The city derived its name from the Greek for 3 cities, Tarabulus (the original cities being Sabrata, Ouia and Liptes) and is situated on the southern coast of the Mediterranean on the North West edge of the Sahara desert. Tripoli has enjoyed resurgence into the international community and is now a thriving commercial port. It is said that the area around Tripoli has more Roman archaeological sites than Rome itself but with insufficient hotel space to encourage tourism the need for development has become a city wide priority.

Post test grouting of a working pile

Testing in progress – pile head and reference beam

Installation of one of the preliminary test piles

Project Summary:

One major landmark project, the 69 Storey Tower brought Loadtest to Tripoli for the first bi-directional load test performed in Libya. When construction is completed the tower will stand some 210 m above the skyline of Tripoli and offer superb views across the coast and the city from the revolving rooftop restaurant. The multiuse building will also offer a health club and offices and provide much needed car parking space for 1088 vehicles.

The piling contractor Trevi SpA was requested to perform several tests on this site by consultants Dar Al Handasah since the ground conditions and pile design across the project was so varied and the loads would be higher than previously considered in these soils.

Since the slurry wall surrounding the site would not be finished until after the piling works had been completed, the concrete in the test piles was cast up to 20 m below the piling platform level. One advantage of the bi-directional testing method is concrete need not be brought to ground level thus enabling the test to be performed on the exact pile length prior to excavation of the basement car park levels.

Test Results:

Preliminary pile testing was required on one 1200 mm pile to a gross loading in excess of 34 MN and three 1000 mm piles to a range loading between 10 MN and 17 MN depending upon working load requirements. The results were then analyzed using Cemsolve® and the Cemset® pile settlement prediction analysis program to allow verification of the design of the piles in both compression and tension. Placement of strain gauges within the pile shaft allowed the mobilised unit skin friction to be assessed in the various soil layers consisting of calcarenite, weakly cemented silty sands overlaying claystone.

During the installation program of the working piles, 13 test piles were installed to provide both compression and tension proof load testing. The compression and tension behaviour of the test piles were derived from the upward and downward load movement characteristics measured during the bi-directional tests and adjusted for additional elastic behaviour. Post test grouting of the working test piles allowed them to be integrated into the structure.

Conclusions:

The testing program allowed the geotechnical design characteristics to be determined with preliminary testing and verified on several working test piles, both in compression and tension within a short timeframe and prior to excavation to basement level.