

LOADTEST O-Cell® Technology in Baku, Azerbaijan



Baku, Azerbaijan



The Seal of Baku



Flame Towers Artists Impression



Pile Test Set-up Flame Towers



Baku Hilton Artists Impression
(courtesy of Koray)



Crescent Project Artists Impression
(courtesy of AECOM)

Situated on the border between Eastern Europe and Western Asia lies the country of Azerbaijan. A member of the European Council since 2001, and a CIS member country, the former Soviet state is delicately balanced between Russian interests to the North and European interests to the West.

On the Eastern coast of the Caspian Sea lies Baku, the capital and largest city of Azerbaijan. The name Baku (or Baky) is thought to come from the Persian meaning 'Wind Pounded City'. The strength of this wind is indeed legendary and the city is renowned for its harsh winter storms, strong northern Khazri winds and the southern Gilavar winds. The city and surrounding region has been long famed for its oil springs and natural gas, when in ancient times, Zoroastrians, for whom fire is an important symbol, erected temples around the burning gas vents in the ground. In recent times, the construction of an oil pipeline to export the Caspian Sea reserves has led to massive investment pouring into the city, with many new projects planned or under construction. Fugro Loadtest has been involved in several projects in this exciting capital city.

Flame Towers: On the hill overlooking the city a major new and exciting construction project is being undertaken. The design of this initiative project, The Flame Towers, is based upon the seal of Baku. The seal depicts three flames representing oil wells over the sea. The towers to be constructed, one as a hotel, one for offices and one as residential properties, are a representation of these flames. Building such a project on the hills above this city presents a huge problem with wind loading and construction difficulties for Project Managers DIA Holdings.

The towers will be founded on piles of up to 1200 mm diameter, bored into the underlying hard silt strata. The geotechnical properties of the soils in this area are not well known since no project of this proportion has been undertaken at this location previously. In order to prove the foundation design, bi-directional load testing was requested by the geotechnical consultants Enar. Two 405 mm diameter O-cells were installed in the first preliminary 45 m long, 1200 mm diameter test pile. The O-cells provided a minimum gross loading of 25.2 MN, 12.6 MN in each direction. Two further similar test piles followed, one test for each of the Towers.

Baku Hilton: As the city of Baku expands, so does the need for hotel accommodation. As a result, Hilton Hotels required the construction of a new 5 star hotel in the heart of Baku on Azadlyg Square. Fugro Loadtest was commissioned by ISR Koray to provide bi-directional testing on three preliminary test piles, 890 mm diameter, approximately 37.5 to 40 metres deep, installed by piling contractor Azerkörpu. To provide the necessary loading up to 5.4 MN in each direction, 3 number 230 mm O-cells were used, allowing a 220 mm tremie pipe to pass through the centre of the pile.

Vibrating wire strain gauges were used to evaluate the mobilized skin friction values along the pile shafts to finalise the pile design parameters for the working piles.

Crescent Project: The Crescent project consists of a mixed use tower complex grouped around a retail podium and linked to a 5 star hotel located on the shore of the Caspian Sea as the gateway to Baku. This exciting and interesting design required innovative testing techniques on three 1500 mm diameter and on two 2000mm diameter test piles. The semi-hard Clay forming the foundation strata required test loads of 50 MN that would not be possible with conventional top down static load testing. An arrangement of 2 x 670 mm O-cells would provide the bi-directional loading on the 56 m and 75m long piles.

