

LOADTEST

O-Cell® Technology on Neubau Rheinbrücke, Wesel, Germany



Project: Rhine Bridge

Location: Wesel, Germany

Client: Bundersrepublik Deutschland

Geotechnical engineers: ARCADIS Consult GmbH

Loadtest office Germany: Scanrock GmbH

Piling Contractor: Bilfinger Berger AG

Project Description: The previous Rhine road bridge in Wesel was built in 1952 using the original pier foundations of the earlier 1916 bridge. This bridge has now been replaced by a new and exciting cable stay design that carries the Bundesstrasse B58 into the town of Wesel, Westphalia, Germany. The new bridge for the B58 at Wesel consists of a cable stayed semi-fan arrangement with an asymmetric inverted Y pylon. The bridge is 775 m in total length with a central span of 334 m. The height of the pylon is 130 m. It allows four lanes of traffic to flow along the Bundesstrasse B52 and gives clearance to the very high flow of shipping traffic along the Rhine. The bridge was completed in 2009.



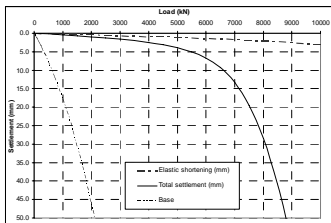
Pile cage assembly built in a workshop and later transported to site for installation



Test pile construction showing the previous bridge over the Rhine



Bi-directional test in progress. Nitrogen gas is used to 'set' the A9 extensometer string



Cemset® prediction of pile head load-movement behaviour for one of the piles



Source: Wikipedia

Bi-directional load test arrangement:

The nature of the soils, mainly terrace gravels and sands, and the physical length of the project of over ¾ km, required four tests to be carried out at various positions along the planned route of the bridge.

Each pile required one O-cell to be installed within the pile shaft, size of cell and location within the shaft dependant upon the load required and the expected soil strengths.

The pile cages with O-cells were assembled off-site in a workshop and then transported to site for installation in the 1200 mm diameter cable and grab bored shafts. The pile loads achieved during testing ranged from 5.5 MN to 12.4 MN and movements of over 140 mm were recorded for some tests.

As with many preliminary load testing projects, the aim of the testing programme was to confirm the design which was based on site investigation and soil parameters. The final design could be optimised as a result of the tests performed.

The use of an A9 strain extensometer string from Geokon above the O-cell level, model 4911 sister bar strain gauges below the O-cell level and direct measurement of toe movement with telltales allowed load distribution along the pile shaft to be determined and unit skin friction to be assessed.

Cemsolve® analyses were performed to the upward and downward settlements of the elements of the pile against applied load. The interpreted skin friction and end bearing components were then recombined to provide a Cemset® prediction of pile head load-settlement behaviour.

By using this analytical approach it has been possible to distinguish components for end bearing and skin friction to allow confirmation of the pile design.

