

Rotary Displacement Piling Screwsol

BAe Broughton Fire Station

CHESHIRE, UK



CFA Rotary Displacement Piling for Structural Foundations

The aim of Rotary Displacement Piling Systems is to provide a reduction in overall foundation costs by reducing pile lengths and diameters. This is possible as the technique improves soil strength and provides an improved load transfer to the surrounding ground. As the boring tool penetrates granular soils, they are displaced, resulting in a localised increased relative density and strength around the pile. Limited improvement is achieved where SPT values are less than 10, the soil grains are crushable or undrained soil behaviour prevails.

Improved load transfer to the surrounding ground is achieved through an enhanced shaft capacity of the constructed pile. Thick concrete threads are created in the construction process that facilitate the load transfer from pile core to soil. This is achieved through the creation of an increased

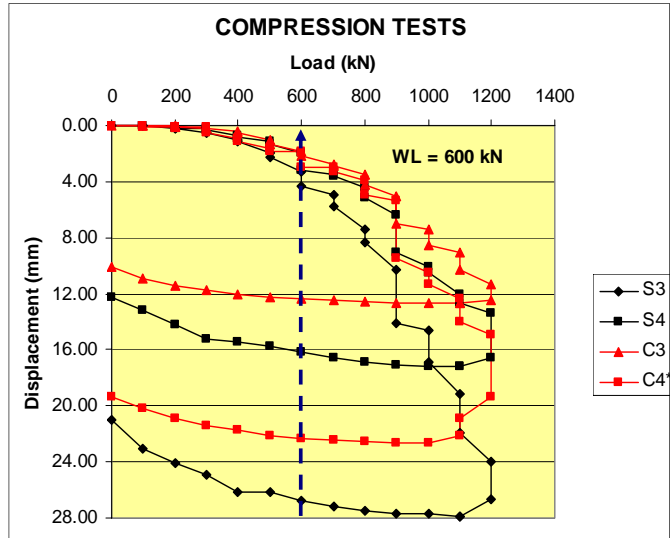
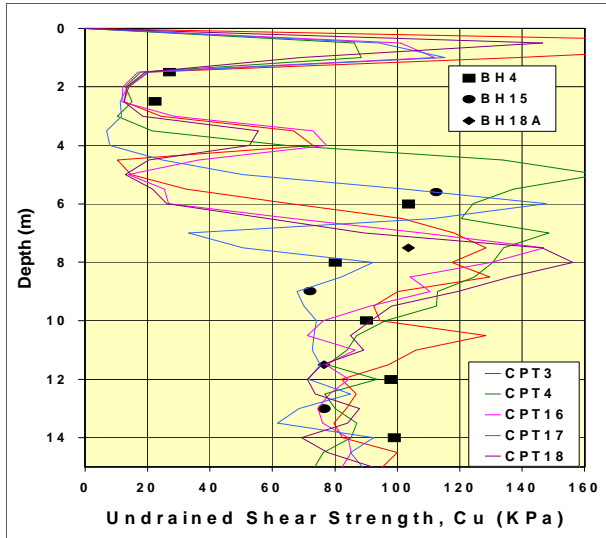


CLIENT:	Bae Systems
MAIN CONTRACTOR:	Jimsul Construction Ltd
CONSULTING ENGINEER:	Haltec
DURATION OF WORKS:	3 weeks, May-June 2002

WORKS QUANTITIES

183 No. 330mm/500mm 12m depth





diameter / surface area and the end bearing effect of the thick threads formed. The advantages of such a piling system are that enhanced shaft friction can be obtained, the diameter and pitch of the concrete threads are variable, the auger can be extracted without rotation over the upper part of the pile so that no threads are formed through fill material, and that reduced material quantities are produced with clear economic and environmental benefits.

In the construction of Rotary Displacement piles at the Broughton site standard CFA equipment was utilised. The auger was able to pull itself into the ground requiring no "pull - down" capability from the rig.

The clockwise rotation of the auger during extraction ensured that no soil was left behind in the bore to contaminate the concrete and that the core of the pile was the full diameter of the auger flights. No spoil was produced during boring and very little during extraction - approx.15% of the CFA pile volume. This resulted in a

Screwsol Auger Section



reduced volume of concrete being used in construction when compared with the equivalent CFA pile volume.

The ground conditions at the Broughton site comprise a firm sandy Clay layer that is underlain at the shallow depth by Peat and soft organic Clay extending down to 5.5m. Below the Alluvial deposits, the pile founding strata was encountered, a stiff becoming firm to stiff Glacial Till. The figure above illustrates the variation of in situ shear strength with depth, based upon triaxial test results Cone Penetration Tests (CPT).

A number of preliminary test piles were constructed using both conventional CFA and Rotary Displacement Techniques (Screwsol), in order that the most economical piling solution could be selected for the subsequent works. Two 330/500mm diameter Screwsol piles and two 500mm diameter CFA piles, 12m deep, were load tested in tension and compression to compare their relative characteristics. The results for the compression testing are shown above. For the required Working Load of 600 KN the recorded settlements were similar for each of the piles constructed.



Extracted Screwsol Pile

On the basis of this testing 330/500mm diameter Screwsol piles were selected as the preferred foundation solution for the prevailing soil types at the Broughton site. Adopting the Screwsol system resulted in a significant saving for the overall scheme, as reduced concrete volumes were used and no spoil from pile construction required disposal from site.