

Continuous Flight Auger Piling & Ground Anchors

Piccadilly Place, Manchester

United Kingdom



Foundation work for a 3 level basement in Central Manchester

Introduction

In 2005 Bachy Soletanche Limited were awarded a contract for 100 lin. m. of contiguous piled retaining wall and bearing piles for a hotel and car park development in the heart of Manchester, adjacent to Piccadilly Station.

Ground Conditions

The ground conditions were suited to the cost effective continuous flight auger method of piling. The strata profile was made ground to 4.5m with firm to stiff sandy gravelly clay to a depth of 9.5m overlying weak to moderately weak sandstone.

Design

The aim of the design was to produce a structure with retaining walls up to 10.5m deep and leave the excavated area free of any propping to allow the basement construction. Together with the location of the site bounded by busy roads and a tram line on one side, a solution comprising a contiguous piled retaining wall supported by one row of rock anchors along the perimeter of the wall was designed.



CLIENT: Argent Estates Limited

MAIN CONTRACTOR: Carillion Building

CONSULTING ENGINEER: Deakin Walton

DURATION OF WORKS: Piling—8 weeks, Anchors—2 weeks

WORKS QUANTITIES

114 no. 600mm diameter CFA piles

443no. 750mm diameter CFA piles

60 no. temporary ground anchors



To ensure an economic retaining wall solution the levels of the rock anchors were varied to suit the increasing excavated depth.

A number of challenges emerged during the wall and anchor installation. The area was congested with underground services including abandoned culvert of Shooters Brook just below the excavation level. The retaining wall and anchor design for various sections of the wall had to be modified during works as new obstructions were encountered.



Installation of ground anchors utilising a Casagrande M6 track mounted drill

Piling Works

The works were completed in 2 visits commencing with the installation of the bearing piles on the North side of the Metro line. 114 no. piles 600mm diameter with a capacity of 2000kN, were constructed with the continuous flight auger method. The piles formed the foundation to a hotel, a footbridge and 2 no. tower cranes. On the South side of the Metro line 443no. 750mm diameter CFA piles were drilled to between depths of 7.5m and 14.5m forming a contiguous piled retaining wall for the multi-storey car park.

Ground Anchors

In order to provide temporary support to the piled contiguous wall a number of temporary ground anchors were installed at intervals around the retaining wall. The anchor holes were drilled by positioning the drilling rig over a pre-marked bore location and the inclination of the mast was adjusted hydraulically using slewing rams. Anchors were then constructed through reservation tubes installed

within a capping beam at the top of the pile wall with the anchor entry point at approximately 0.5m above platform level. The holes were drilled using 178mm casing using both augering and a down the hole hammer.

On reaching the design depth the drill string is withdrawn in preparation of anchor installation. The anchor is installed to the specified depth with approximately 1.5m protruding

beyond the capping beam to enable later anchor head assembly and stressing/testing of the tendon. A cement grout was then pumped through a semi-rigid tremie pipe installed to the base of the bore. Once grouting is complete the temporary casing is removed and the grout topped up as necessary. The temporary ground anchors were tensioned up to working load 28 days after construction.



Installation of ground anchors into exposed contiguous piled wall