

Contiguous Wall and Bearing Piles,
Rotary Cased Piles, Site Investigation
and Ground Movement Analysis

Long Lane, Hackney, London

Project Description

The construction of new student accommodation in East London for main contractor HG Construction required Central Piling to carry out complex foundation analysis to demonstrate the safety for nearby infrastructure prior to starting piling.

The redevelopment is located on Long Street in Hackney and comprises 221 student apartments over eight floors and is due to complete in 2019. The development will fill all of the 55m x 35m site which is bounded by roads as well as other construction work and a rail line.

Central Piling installed a total of 241 piles at the site – 13 rotary 750mm diameter piles for the sewer, a further four for the tower crane, 111 600mm diameter continuous flight auger (CFA) to 14m with full-length cages for the contiguous piled wall, and the remainder were 450mm diameter CFA load bearing piles to 18m and 23m.

Challenges

Delivering the foundations was challenging as well as being surrounded by roads and other developments, the western boundary is formed by a brick-built rail viaduct and a Thames Water sewer passes north to south across the site.

The site's location meant that impact assessments with both Transport for London and Thames Water were required and called for significant design and planning before the project could commence.

Due to the site's small dimensions (the finished development will be 15m within the boundary), filling the entire plot, using three different pile sizes and two techniques, along with the sequencing created by the permissions, also made the scheme particularly challenging.

Due to a tight build programme piling work had to start while Central Piling was still working with TfL to secure the Basic Asset Protection Agreement (BAPA) that would allow it to work on the western half of the site.

The Thames Water sewer, a brick-built Victorian structure located at 10m depth with an access chamber 1.4m wide, stepped out from the line of the tunnel and within the site but records were unclear about how the chamber extended to depth and connected with the tunnel, so surveys were carried out before starting work on site and further surveys will be needed once the work is completed to ensure there has been no movement.



Main contractor

HG Construction

Structural engineer:

Cundall

Scope of works

- Ground investigation work, Ground movement Analysis, piling
- 241 piles, 17 rotary 750mm diameter piles, 111 600mm diameter continuous flight auger (CFA) to 14m with full-length cages for the contiguous piled wall, 450mm diameter CFA load bearing piles to 18m and 23m

Plant

- Soilmec SF50

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Central Piling used 750mm diameter rotary piles to take high loads and bridge them over the sewer. The piles are sleeved using slip-coated tubing over the top 12m with the annulus backfilled with pea shingle to prevent them from putting any load onto the sewer.

The initial design was for 40m deep piles with drilling fluid to support the bore during construction but with limited space on site this was an expensive solution. Central Piling worked with consulting engineers Cundall to optimise safety and carried out pile testing to prove the design.

In addition, Central Piling carried out ground investigation work and drilled a 40m deep borehole to look closely at the ground conditions to ensure the alternative design was viable. The specialist also drilled another borehole to 10m to understand the groundwater regime in the Terrace Gravels, to guide the design of the contiguous piled wall. The site is underlain by Terrace Gravels to 8m and then there is London Clay below. The Lambeth Group comes in at approximately 26m.

Drilling fluid would have been needed for deep piles as there was concern over whether the bore would stay open due to water in the Lambeth Group. Due to the cost and logistical issues of using drilling fluid, Central Piling and Cundall developed a pile design that could end at 26m.

Before they started the pile testing, Central Piling carried out extensive finite element analysis using Plaxis 3D to prove the design and the effect on the sewer. In total, 13 750mm diameter piles were installed around the sewer. The original design called for six but to 40m depth.

Central Piling started installing the load bearing piles closest to the road in mid-February as the BAPA was not yet in place to allow work nearer to the rail line. The BAPA also required finite element analysis of the basement excavation to prove that it would not impact on the viaduct and it was also carried out on the ground beam design to prove it would not affect TfL structures or other services.

Central Piling also had to model every single pile which the company says is part of a trend towards greater demand for in-depth analysis.

With the BAPA in place by mid-March, Central Piling started piling on the second half of the site and completed the work in mid-April 2017.



A Soilmec SF50 was used to carry out the piling works