

Balfour Beatty

Ground Engineering



THE SHARD, LONDON BRIDGE QUARTER

KEY DETAILS

// CLIENT

Mace Group

// JOB SPECIFICATION

To install a secant wall and load bearing piles, with plunge columns for skyscraper in central London

// STRUCTURAL ENGINEERS

WSP

Balfour Beatty Ground Engineering (BBGE) was contracted by Mace to install the foundations for one of London's most prestigious projects in recent times.

The project involved the construction of a secant wall and the installation of plunge columns piles and load bearing piles. In total the following were constructed:

- 388no 900mm secant piles
- 68no 1800mm plunge column piles
- 15no 900mm bearing piles
- 27no 1500mm bearing piles
- 19no 1800mm bearing piles



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Once the overall project is complete, it will comprise a hotel, office space and a leisure complex and form the first phase of the £2bn London Bridge Quarter regeneration project.

During the pre-construction phase of the project it was identified that following the demolition of the existing tower block, Southwark Towers, significant numbers of existing piles would be left on the line of the secant wall and in the location of the new bearing piles. BBGE's experienced in house design team initially developed alternative wall alignments to avoid the existing piles that clashed with the new secant wall and a "2 for 1" principal was adopted where new bearing piles clashed with existing pile shafts. In the main core area the underream bells of the existing piles could not be avoided and construction team deployed bespoke coring equipment to core through the bells and to maintain the high verticality tolerance of the bore during coring, long core barrels were developed.

In total, 388No. 900mm diameter secant piles were constructed to form the three level basement. Half of these were "firm" female piles that were constructed to a depth of 16m, the remaining piles were the structural male piles that were constructed to depths of between 25-50m. The male piles, apart from acting as the structural element of the retaining wall, were also designed to carry the vertical load from the structure and support sections of the complex floor slabs and the steel columns which form part of the super structure.

In order to reduce programme time the designers opted to insert plunge columns allowing for a top down construction sequence. This involved installing 54 number 20 - 25t plunge columns that were up to 25m long into 1800mm diameter piles that were up to 55m deep. Each of the plunged column piles is designed to carry a maximum working load of

24,000kN. To achieve the high construction tolerances that were specified, a bespoke hydraulic plunge column frame was developed to allow BBGE to install multiple sized plunge columns with external protrusions. The specified vertical tolerance was 1 in 400 and this was met on all piles, with an average tolerance of 1 in 800 being achieved.

The secant wall will form a 3-level basement for the plant room, car parking and maintenance and the plunge columns will support the ground floor slab and central core allowing for the top down construction.

FOR FURTHER INFORMATION CONTACT:

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