

Karlatornet, Gothenburg

Bored piles for the tallest building of the Nordic countries



AARSLEFF

In Gothenburg in Sweden, Aarsleff carries out the ground engineering work for the 245-metre skyscraper Karlatornet – the tallest building of the Nordic countries once complete. The contract with Serneke Group comprises the execution of 57 bored piles: 1 test pile and 56 production piles. The piles are installed by drilling a casing pipe down to the rock and from there drilling an additional seven metres into the rock. The project is carried out in cooperation between ground engineering specialists from Aarsleff in Sweden and in Denmark.

Karlatornet will have 593 flats on 73 storeys. In addition to Karlatornet, eight to ten other buildings will be constructed, and three of them will be more than 100 metres tall. Karlastaden, which is the name of the new district, covers 33,000 square metres and will consist of more than 2,000 flats as well as businesses, schools and kindergartens.

Early contractor involvement

Aarsleff was involved in the project at the beginning of 2015 when we were contacted by the project group. They wanted to find out if it was possible to support a building of such height at one of Gothenburg's most difficult places in terms of geotechnical conditions. From the bot-

tom of Karlatornet, there is approx. 55-75 metres down to bedrock; and in between, the underground consists mainly of Gothenburg clay characterised by a very low strength and a high sensitivity during execution. In addition, there is a layer of frictional materials above the rock and a general risk of encountering large stones.

Execution

The 57 bored piles of a diameter of DN2000 millimetres are carried out by means of the Kelly method. The piles are led down to and into the rock until there is full contact to protect against leaks and inflow of materials. Then we replace the drilling tool and drill up to seven metres into the rock, depending on the location and function of the pile. The casing pipe is constantly filled with water to protect against heave in the pile during production.

After completion of the drilling work, the hole is cleaned by means of airlifting, and the reinforcement is lowered down into the casing pipe. To optimise the installation, the reinforcement is mounted in advance in three installation pipes driven 30 metres into the ground. For the concreting process, a concreting pipe is led down to the bottom of the pipe and withdrawn together with the casing pipe.

High quality requirements

Initially, a test pile was installed to document compliance with the strict quality requirements of the tender documents. According to the requirements, a maximum of two millimetres of unwanted material was allowed in the transition between rock and concrete casting at the bottom of the pile. Also, we had to document that the method used for verification of the concrete curing, Thermal Integrity Profiling (TIP), worked and that the pile had the required profile. The test pile was approved after supplementary injections into the transition between rock and concrete.

Special challenges

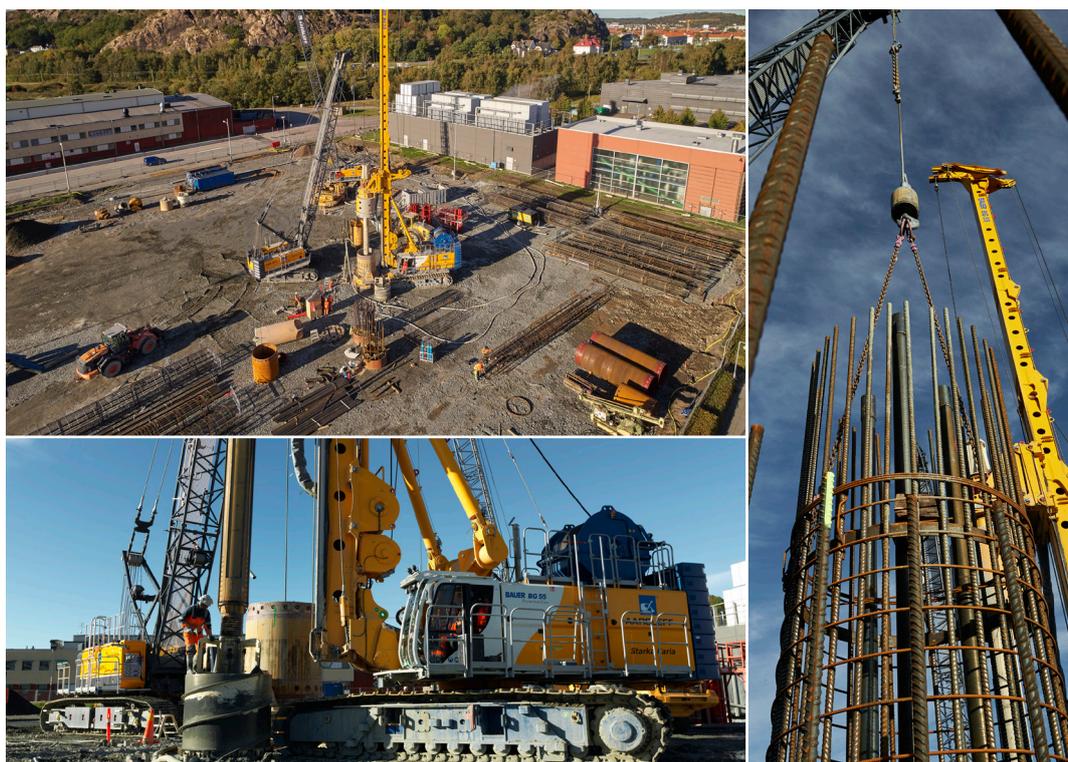
To avoid that the casing pipe did not get stuck in the clay, we decided not to leave it in the clay for more than a maximum of 24 hours. It turned out, however, that it was possible to leave the casing pipe in the clay for up to 13 days without problems. Also, our large casing oscillators contributed to a good and stable working process.

As the rock was extremely hard, we tested different tools to increase the production.

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Data

- 57 DN2000 bored piles
- 11,000 m³ of concrete
- 800 tons of reinforcement

Client

Serneke Group AB

Contractor

Joint venture between Aarsleff Grundläggning AB and Per Aarsleff A/S

Type of contract

Main contract

Consultants

VBK and Norconsult

Construction period

Ground engineering work July 2017-July 2018

Contract value

SEK 117,500,000 SEK + incentive pool of SEK 10,000,000

Aarsleff Ground Engineering is one of Europe's leading piling contractors, and we undertake a wide variety of piling, drilling and foundation projects in Denmark and abroad. We have offices in Poland, Sweden, Germany and the UK.

Our fleet covers fully hydraulic piling and drilling rigs as well as cranes and vibrators.

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