

Foundations for railway bridge, Minnevika

Driving of tubular steel piles for a new railway bridge



AARSLEFF

Per Aarsleff A/S executes piling work for the foundations for a new railway bridge at Minnesund north of Oslo. The bridge is part of the development of the Norwegian railway infrastructure on the Dovrebannen line between Oslo and Hamar. The project comprises approx. 4.5 kilometres of railway from Eidsvoll Nord to Langset.

The Minnevika railway bridge will be 836 metres long, and we perform the piling work, temporary cofferdams as well as water regulation in the cofferdams. Our work is carried out as a subcontract for PNC Norge.

Everything transported by road

The work is carried out on a lake, so it is not possible to sail materials, machines or equipment to the construction site. One of the major challenges of the project is logistics, as all materials and heavy equipment must be transported to the site by road and then mounted or welded together on the site.

To be able to work from the water side, we transported small barges to the construction site and assembled them to one big pontoon to carry the heavy equipment. Due to the size of the piling rig,

we built the pontoon as a jack up with four hydraulic cylinder legs. For the sheet piling and forging work, we assembled a pontoon with two wire legs.

Inclined piles up to 58 metres long

The bridge is founded on 20 foundations with a total of 268 inclined piles of a dimension of DN1016 millimetres and lengths of up to 58 metres. The piles are designed as friction piles, which means that the piles only have a reduced end bearing impact, as the surfaces of the piles carry the bridge load. At 17 of the 20 bridge foundations, we establish up to 15-metre-deep cofferdams of up to 20x24 metres, in order to carry out the concrete work in a dry place. The cofferdams are installed with a bracing frame and a concrete base slab to ensure stability and to keep the cofferdam dry.

The long steel piles are produced in Turkey and sailed to Oslo in 40-foot containers. Subsequently, they are driven to the site and welded together on a local welding site with robotic submerged arc welding. After welding and 100% welding inspection, we install balloons in the pipes and transport them floating across the river Vorma to the piling rig.

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The long heavy tubular steel piles are driven with a Liebherr LRH600, one of the largest piling rigs in Europe. The piling rig is built with a Junttan HHK18S hammer with a total weight of 35.5 tons and a drop weight of 18 tons. The piles' placement, direction and inclination up to 5:1 are ensured by using Aarsleff's machine control system and electronic pile driving log.

On this project, we use hammer sizes of 12, 14 and 18 tons. The tubular piles are installed in 2-3 sections, as the piling rig can handle a maximum of 36 metres of pile when mounted with a hammer with a total weight of 35.5 tons. To ensure optimum reuse of the overlenghts of the piles, we cut the piles by water-jet cutting, after having emptied the piles using a crane grab.

Data

- 11,900 lm of DN1080 mm piles
- 2,409 tons of sheet piles
- 379 tons of reinforcement
- 100% welding inspection of EXC3 (ultrasound and magnaflux test).

Client

Bane NOR SF

Client

PNC Norge

Contractor

Per Aarsleff A/S

Type of contract

Subcontract

Consulting engineer

Aas Jacobsen

Construction period

May 2019-August 2021

Contract value

DKK 202 million

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, Norway, Germany and the UK.

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

Contact

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