Eidsvoll-Langset – Minnevika railway bridge

Execution of test piles and static load tests

AARSLEFF

Prior to the establishment of the new railway bridge across Mjøsa near Eidsvoll close to Oslo in Norway, Aarsleff has carried out static load tests and driving of tubular steel piles. At 836 metres, the new Minnevika bridge will be the longest railway bridge in Norway. The purpose of our work was to determine the load bearing capacity of the test piles. The results were subsequently used by the consulting engineer to optimise the dimensioning of the foundations for the future railway bridge.

We carried out the work in a subcontract for Aarsleff Rail A/S which is also a part of the Aarsleff Group.

Geotechnical investigations

Before installation of the tubular steel piles, we carried out additional geotechnical investigations – CPT tests with measurement of pore pressure – to get a well-defined geotechnical basis. The tests were carried out down to approx. 60 metres below ground level.

Test piles and reaction piles

We installed a total of eight piles distributed on two test piles and six reaction piles – all with a dimension of DN406.4, a wall thickness of 12.5 millimetres and a length of 44 metres. The reaction piles were to act as reaction for the test piles, meaning that when we applied load to the test piles, it was transferred to the reaction piles via a steel beam system. On one of the test piles, we carried out four load tests after 2 weeks, 1 month, 6 months and 1 year, respectively. On the other pile, we carried out the tests at the same time – 1 year after the installation. The purpose of this was to find out if the bearing capacity of this pile exceeded the bearing capacity of the pile which was tested up to 4 times. The test results were analysed by the Norwegian company Geovita and showed that the test pile which was tested 1 year after the installation had significantly fewer deformations than the test pile which was tested several times.

Initially, the load tests were carried out at 4,000 kN but after the first test the load was increased to 5,500 kN as the bearing capacity of the pile exceeded our expectations significantly. Finally, we carried out tensile tests on both test piles, applying a load of 5,500 kN. The increased bearing capacity of the test piles allowed the client to shorten all the piles below the bridge foundations, thereby saving more than 4,000 running metres of piles in the dimension DN1016 millimetres, corresponding to more than 30%.

Aarsleff has designed and dimensioned the test setups for both compression and tensile tests. Some of the setups were manufactured at Aarsleff's own workshop in Hasselager. In addition, we have carried out instrumentation and execution of the seven static load tests as well as reporting of the achieved results.

Data
- Supply and installation of 8 steel pipes, DN406.4 x 12.5 mm, length 44 metres
- 7 static load tests distributed on 5 compression tests and 2 tensile tests

Client
Bane NOR SF

Contractor
Aarsleff Rail A/S

Type of contract
Subcontract

Consulting engineer
Geovita AS

Construction period
June 2017-October 2018

Contract value
DKK 3.2 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, Germany and the UK.

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

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25.06.19-R92-rev1