

Malmö Citytunnel Group

Infrastructure in Malmö



Data

- 4,650 m of tunnel boring from Holma to Malmö C
- 48 reinfiltration wells. 1,400 m in 12" dimension
- 59 pump borings. Approx. 1,200 m in 10" dimension
- 36 monitoring wells at the construction pits. Approx.
 900 m in 8" dimension
- 24 monitoring wells at control perimeter. Approx. 300 m in 4" and 6" dimension
- 6 bleedings wells
- Approx. 4,700 m of pressure pipe for water transportation in Holma

- Approx. 3,5000 m of pressure pipe for water transportation in Triangeln
 Contractor Aarsleff, Con Piling
- 12 control wells core and geotechnical borings
 8 control wells
- CONTROL WEILS
- 1,760 running metres of sheet piles in lengths of up to 15 m, approx. 2,400 tons.

Client

CTP Citytunneln Project Banverket

Type of contract Turnkey contract

Contractor Aarsleff, Construction and

Piling

Cooperative partners Bilfinger Berger AG Pihl & Søn

Construction period April 2005-May 2010

Contract price DKK 2.6 billion

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As members of the joint venture Malmö Citytunnel Group, Aarsleff, Pihl & Søn and Bilfinger Berger AG take part in one of Sweden's largest infrastructure projects – the construction of Malmö's underground railway, Citytunneln. In 2004, the joint venture signed a contract with the Citytunnel project which links the largest Swedish railway tracks to

the Öresund Bridge. The contract awarded to Malmö Citytunnel Group comprises establishment of two bored tunnels from Holma to Malmö C, excavation for and construction of an underground station area at Triangeln Station and a 700-metre-long ramp at Holma. AARSLEFF



Comprehensive control and testing

The two parallel 4,650-metre-long railway tunnels were bored at a depth of 20-25 metres and have an outside diameter of almost nine metres. The tunnel tubes are connected by 13 cross tunnels of a width of 4.5 metres spaced at almost 350 metres. In addition, the tunnel tubes have two evacuation tunnels. Platforms, electricity and conduits were prepared long before the boring work, and consequently our boring required much precision. Therefore, we carried out comprehensive tests and thousands of control measurements during the boring.

Triangeln Station

In addition, we built an underground construction pit 25 metres below surface at Triangeln Station of the dimensions: 250 metres long, 28 metres wide and 12 metres tall. The construction pit at Triangeln Station as well as the one in Holma where we drilled down to a depth of 20-25 metres comprised sheet pile work, earthworks and cable work as well as groundwater lowering. Also, we carried out secant pile walls at Triangeln as the requirements to allowed deflection were very strict due to the location of the St. Johannes Church close to the station. We installed close to 1,760 running metres of sheet piles in lengths of 5 to 15 metres.

Strict environmental requirements to groundwater lowering

For the large excavations in the areas Holma and Triangeln, we carried out groundwater lowering. The groundwater projects of each of the areas were approximately of similar size. At Holma, where the two tunnel boring machines started boring towards the centre of Malmö, we carried out a 500-metrelong and up to 20-metre-deep excavation. At least 80 per cent of the groundwater that was abstracted from the limestone



subsoil was recharged into the limestone without adding oxygen. As a consequence, deep pumping wells all the way around the large construction pits were required.

12 metres a day

The tunnel boring machines, TBMs, which we used are 120 metres long. They bored and installed tunnel segments and transported about 600,000 cubic metres of bored material away. They bored an average of 12 metres a day, and the excavated material was used for backfilling at Norra Harbour, and we also moved 2,600,000 tons of soil to this location.

Ramp at Holma

We also established an almost 700-metre-long ramp at Holma in southern Malmö. The upper 340 metres of the ramp is designed as an open construction. Then the ramp continues underneath a portal structure for technical installations. The last 320 metres are cast on site in an open construction pit, also called a cut and cover tunnel, which has an excavation depth of up to approx. 27 metres. We completed our work in the spring of 2010, and the Citytunnel was test run for the first time in October 2010 and finally taken into use in December the same year.