Light rail bridge in railway cutting in Aarhus

125-metre-long bridge across seven railway tracks



AARSLEFF

In the summer of 2013, Aarsleff Bane & Anlæg JV I/S commenced the construction of Aarhus Light Rail Transit, contract E01, in the railway cutting west of Aarhus Central Station. The contract comprises the construction of a 125-metre-long and up to 8-metre-high bridge where the light rail is to cross over seven railway tracks. In the area southwest of the new bridge, a light rail maintenance centre is to be built.

The contract is carried out in joint venture between Per Aarsleff A/S and Aarsleff Rail A/S. The contract has involved many of the Aarsleff Group's specialist skills such as construction work, CIPP lining of pipes and horizontal directional drilling. The main part of the contract was handed over to the client, Aarhus Letbane I/S, in April 2015, and the remaining part is expected to be completed in the autumn of 2016.

The concrete ramps leading up to the bridge are 80 metres long on the eastern side and 340 metres long on the western side. The ramps are filled with soil and completed with base course gravel and railway ballast stone. Also, we have carried out drainage work in the ramps and in the track areas.

Besides the bridge and ramp work, we carried out 1,500 metres of track work on tracks in operation. Track work comprised handling of all interlocking and lighting work.

In addition, we have carried out 1,100 metres of bypass tracks to the Danish State Railway's workshop site, involving drainage, subgrade as well as crossings, and at the bridge columns we have installed narrowing tracks to protect the bridge from collision damage.

Poor soil conditions

The soil conditions in the railway cutting are very poor, so all structures are pile-supported. A total of 12,550 metres of 40x40 centimetre-large concrete piles and 2,000 square metres of sheet piles have been installed.

Complicated concrete work

The bridge consists of two abutments, one towards the east and one towards the west. The bridge curves horizontally and vertically from abutment to abutment. The bridge decks are supported by two narrow, long pillars between the existing railway tracks. The curved course of the bridge was complicated to carry out, so there were heavy demands to design, setting out and execution.

The casting of the bridge required 850 cubic metres of concrete and took 20 hours. The superstructure with bridge deck and edge beams was cast in one working process. In each edge beam, we have placed eight through-going ducts for post-tensioning cables. The formwork is carried out in timber.

Working along tracks in operation

The contract was carried out in a busy railway area with tracks in operation each day. Aarsleff Rail A/S, who has specialist expertise within railway work, has carried out all excavation and pipe work and has handled the existing electrical and signalling installations and the reinstatement of these. In our daily work, we have had a close working relationship with Banedanmark and the Danish State Railways about the coordination of operation and execution of the light rail transit, as we constantly had to close and reopen tracks in operation. All employees involved in the light rail project were trained and thus had all the certifications required to work on and at railway areas.





Data

- 25,000 m³ of excavation and disposal of soil
- 9,800 m³ of excavation and incorporation of soil
- 4,000 m of pipe work, drains
- 500 m of pipe work, carrier drain pipes
- 100 manholes
- 2,400 m of subgrade
- 5,500 tons of supply and placing of ballast stone
- 1,100 m of supply and installation of tracks
- 4 installations of turnouts
- 2 Strail crossings
- 320 m of subbase gravel, base course gravel and asphalt for access road

- 20 installations of lattice towers with foundations
- 12,550 m of installation of 40x40 cm concrete piles
- 2,000 m² supply and installation of sheet piles
- 9,600 m² of formwork for bridge and ramps
- 690 tons of reinforcement
- 4,750 m³ of concrete
- 2,000 metres of post-tensioning cables
- 860 m of railings.

Client

Aarhus Letbane I/S

Contractor Aarsleff Bane & Anlæg JV I/S **Collaborative partner** Per Aarsleff A/S Aarsleff Rail A/S

Type of contract Main contract

Consulting engineer COWI A/S

Construction period

Phase 1: August 2013-April 2015 Phase 2: August 2016-October 2017

Contract value DKK 90 million

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