

U5 BERLIN METRO

Metro, Line U5, Berlin, Germany

Two 1.6 km long single-track subway tunnels and 3 subway stations in the centre of Berlin. The line U5 serves as the gap closure between the existing lines U5 / U55 and the stations Alexanderplatz / Brandenburger Tor.

Scope

- 2 single-track subway tunnels, single shell lining
- 3 stations in cut and cover method
- Thereof heading of platform area of 1 Station with freezing method

Challenges

- Downtown urban area very densely built over with historical buildings, minimal overburden approx. 5.5 m.
- Under passing of the river Spree and the Spree channel
- Crossing with existing tunnels, minimal distance approx. 4.0 m
- Heading in groundwater and in difficult geological conditions, sand-and gravel sediments with boulders.
- Cutting through historic woodpile foundations, pile walls and other foundations.

Amberg Services

- Conceptual- and tendering design
- Client support for awarding of construction works
- Implementation planning as in-process planning





■ Starting shaft for TBM



■ Starting ring for the HDS TBM



■ Cut and cover excavation of a station

AMBERG FACTS

Contracted value JV

- Total 7 Mio. €

Contracted value Amberg

- Total 1 Mio. €

Project Phases & Duration

- Conceptual/tendering design 2010 – 2011
- Awarding of construction works 2012
- Implementation planning 2012 – 2017
- Construction works 2012 – 2020
- Commissioning 2020

Project Details

Tunnel

- Excavation diameter 6.65 m
- Inner diameter after completion 5.70 m
- Shield drive with fluid supported heading face, bentonite with High Density Slurry Method (HDSM)
- Segment lining, single shell

Cut and cover of stations

- Excavation from surface
- Diaphragm wall for max. depth to 35 m
- Maximum depth of excavation 22 m

Heading of station under Spree channel

- TBM drive and following mechanical extension under protection of a freezing body and shotcrete reinforcement
- Temporary reinforcement with segments, shotcrete and built up of a freezing body
Reinforcement at final state with shotcrete outer lining and cast in place inner lining

CLIENT FACTS

Overall cost

- Total 525 Mio. €

Overview project

Subway tunnels

- Total length 2 x 1620 m (2 parallel tubes)
- Excavation diameter 6.65 m

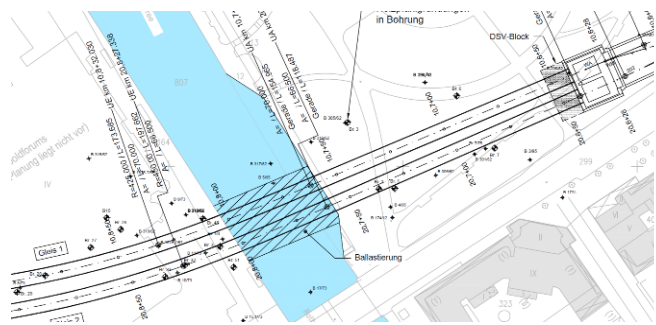
Stations

- 3 new stations
- 2 stations with cut and cover method
- 1 Station with heading under protection of a freezing body.
- Length of the stations between 135 m and max. 176 m, width 25 m
- Depth approx. 22 m

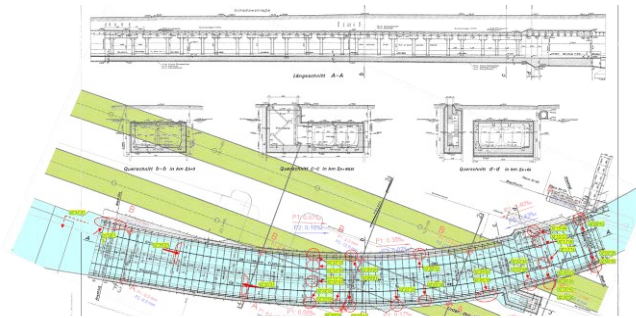
Geology

- Difficult geological conditions in groundwater
- Sand-and gravel sediments with boulders.

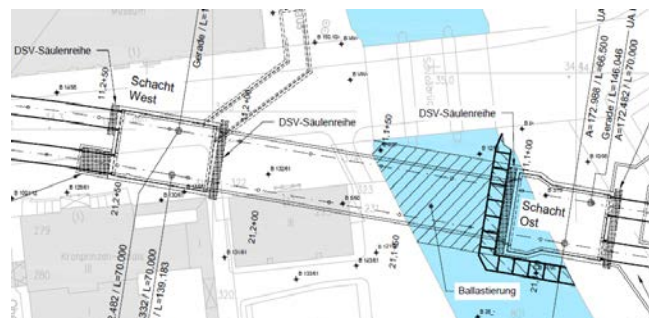
Challenges



- Under passing of the river Spree, low coverage

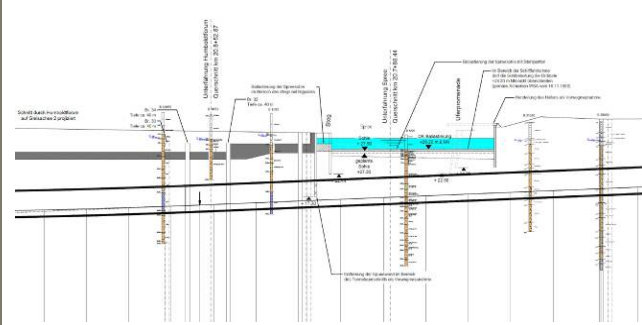


- Crossing with an existing railway station

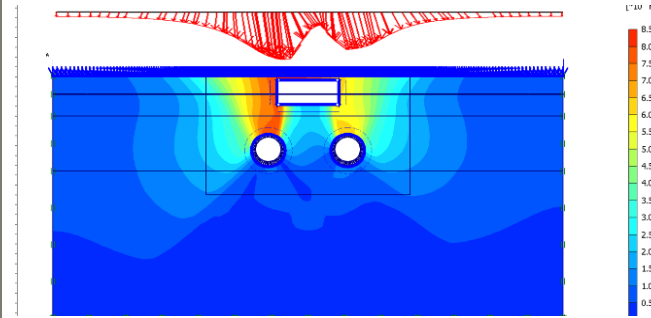


- Heading of the station under the river Spree

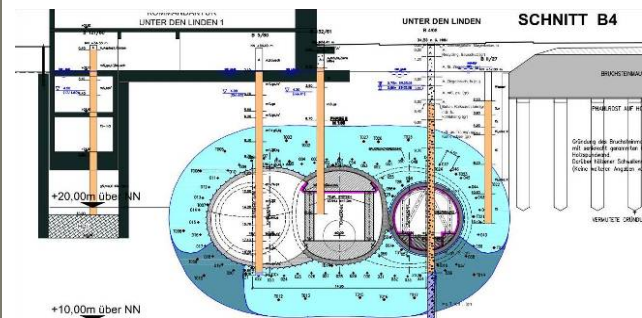
Technical procedure



- Detailed analysis of the formation pressure at face



- Numerical analysis of ground setting



- Heading in the freezing body

Technical solutions



- Situation at start with High Density Slurry TBM



- Online monitoring at existing railway station



- Equipment for freezing excavation method