

# BRUSSEL METRO NORTH



## Brussel Metro North, Belgium

The project includes the extension of the Brussels metro network between Gare du Nord and Bordet station (Brussels North).

The planned line is the first step towards extending the existing metro network along the major north-south axis in Brussels.

### Scope

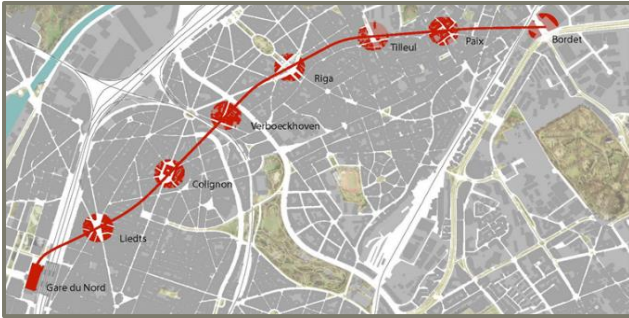
- Single-tube Tunnel, length 4.5 km
- 7 stations (cut-and-cover method or mined under frost protection)
- Maintenance centre and railway depot
- Connection to the existing line under the Gare du Nord station cooling system

### Challenges

- Inner-city location with very dense buildings
- Very high requirements for minimizing settlement of the existing structure during construction work
- Extension of an existing stop to connect two lines and conversion into a fully automatic passenger transport system.
- Many interfaces to railway and tram networks.
- high safety requirements resulting from the establishment and expansion of the infrastructure and operation of an automated metro system

### Amberg Services

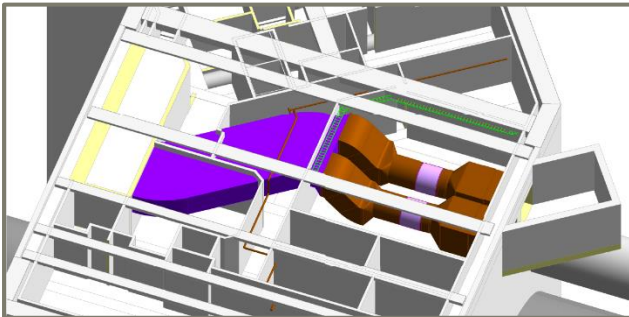
- Overall planning of the tunnel: Feasibility study / preliminary design / final design / preparation and participation in awarding contracts / supervision of work
- Overall fire protection study: Configuration of ventilation and fire protection systems / CFD simulations / Development of safety measures / Safety analysis and documentation for the tendering procedure



- BMN – Line with 7 stations



- Digital representation of the Metro wagons



- 3D drawing of the smoke extraction system

## AMBERG FACTS

### Contracted value JV

- Total 20 Mio. € (according contract)

### Contracted value Amberg

- Total 2.2 Mio. € (according contract)

### Project Phases & Duration

- Feasibility study 2013 – 2014
- Preliminary design 2015 – 2016
- Regulatory approval design 2017
- Final design 2017 – today
- Awarding 2020
- execution 2022 - 2030

### Project details

#### Tunnel

- double-track tunnel in shield tunnelling
- inner diameter 8.90 m
- total length of the tunnel: 4.5 km

#### Stations

- 7 underground stations in urban area
- Individual architectural design for each design due to external restrictions (existing buildings)
- Cut-and-cover method and/or freezing process
- High passenger frequency during rush hours

#### Design task of safety and ventilation

- Planning of tunnel and stations for the forecasted performance
- Implementation of emergency exits in the stations
- Tunnel ventilation with jet fans
- Smoke extraction with shafts and axial fans in stations
- Detailed analysis of smoke in the tunnel and on the surface (recirculation)

## CLIENT FACTS

### Overall costs

- Total 850 Mio. €

### Overview project

- Extension of the existing metro line in the north of Brussels
- 7 new stations along a 4.5 km long tunnel
- 1 maintenance centre
- Transport of 60'000 people during rush-hours
- Automatic metro
- Construction start in 2021
- Commissioning in 2030

### Project-specific features

- Connection to existing infrastructure at North Station: The North Station is one of the most important stations in the country and the project work will take place under the 14 existing railway tracks. No traffic obstruction is allowed.
- The tunnel will be excavated with a tunnel boring machine (TBM).
- Use of complex techniques for station construction (freezing methods, driving under protection of artificially constructed caverns, etc.) to meet the very high requirements for minimising subsidence during execution.
- Strong security awareness and high demands on intervention possibilities in case of terrorist attacks in existing metro stations

### Geology

- 30% in sand
- 70% in sandy clay and clayey sand

### Contact Person

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