



Frankfurt a. M.

Extension of the U5 Europaviertel metro line

Data and facts

Company	PORR GmbH & Co. KGaA, PORR Spezialtiefbau GmbH
Type	Tunneling, Alles aus einer Hand, Rail and road tunnels, Turnkey construction pits, Tunneling
Principal	SBEV – Stadtbahn Entwicklung und Verkehrsinfrastrukturprojekte Frankfurt GmbH

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New underground link for the Europaviertel

The Europaviertel stretches to the west of Frankfurt city centre on the site of the former main freight station. In recent years, residential, office and commercial buildings, as well as public open spaces, have been developed along Europa-Allee. The extension of the U5 line connects the quarter to Frankfurt's existing light rail network. From Platz der Republik, the line initially runs underground to Güterplatz station. It then reaches the surface via tunnel sections constructed using the cut-and-cover method and a ramp structure. Even before the platforms, access points and track layout became visible, the tunnel tubes and construction pits for the new section were created deep beneath Frankfurt's streets.

With EVA beneath the Europaviertel

For the enclosed tunnel section, two parallel tunnel tubes were constructed using shield tunnelling. The southern tube is 827 m long, whilst the northern tube is 842 m long. The EVA tunnel boring machine, weighing around 580 t and measuring approximately 80 m in length, was used. Its name stands for 'Connecting the Europaviertel'. The machine was adapted to the geological conditions along the route. Excavation of the southern tunnel tube took place between September 2019 and September 2020. EVA was then retrofitted for the second excavation. From January to May 2021, the tunnel boring machine constructed the parallel northern tunnel tube. A total of 8,358 tunnel segments were installed during the excavation. The prefabricated concrete segments, assembled in a ring-shaped configuration, form the inner lining of both tunnel tubes.

The final metres to the existing tunnel

The connection to the existing underground tunnel at Platz der Republik was completed by July 2022 using conventional tunnelling methods. Around 11 metres of tunnel were excavated in the southern tube, with a further 3 metres in the northern tube. Due to the groundwater conditions, the work was carried out under pressurised air conditions. Pressurised air locks equalised the air pressure between the working area and the surrounding environment. Workers accessed the respective working areas and returned via pressurised chambers. The work was carried out in shifts, each lasting six hours. A further one and a half hours was required for entering and exiting the chambers. The personnel involved underwent occupational health examinations in accordance with the project-specific guidelines. Metre by metre, the connection between the new tunnel tubes and the existing U5 line was thus created.

Ramp structure along Europa-Allee

In parallel with the mechanised tunnel boring, the tunnel sections along Europa-Allee were constructed using the open-cut method, as well as the adjoining ramp structure. The light rail line is guided from the underground section to the surface via the approximately 306-metre-long ramp. The floor, walls and ceiling elements were constructed in sections and connected to the tunnel structures that had already been built. The ramp structure thus forms the transition between the tunnel beneath the Europaviertel and the above-ground light rail route along Europa-Allee.

Construction pit for the Güterplatz station

In the heart of Frankfurt, the construction pit for the new Güterplatz underground station was created. It is approximately 170 m long, up to 30 m wide and reaches a depth of up to 24 m. Around 170,000 tonnes of soil were excavated and removed to create the pit. The excavation was carried out in sections and was co-ordinated with the work on the excavation enclosure, the bracing levels as well as the existing tunnel tubes.

In the area of the future station, the tunnel segments previously installed by the tunnel boring machine were dismantled in sections. Once the final depth had been reached, the concrete base and the station floor were constructed. Since 2024, the reinforced concrete structures of the station have been under construction within the construction pit.

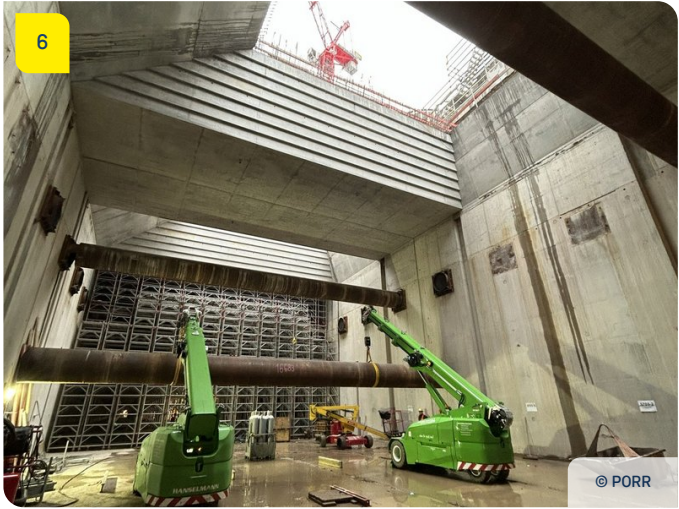
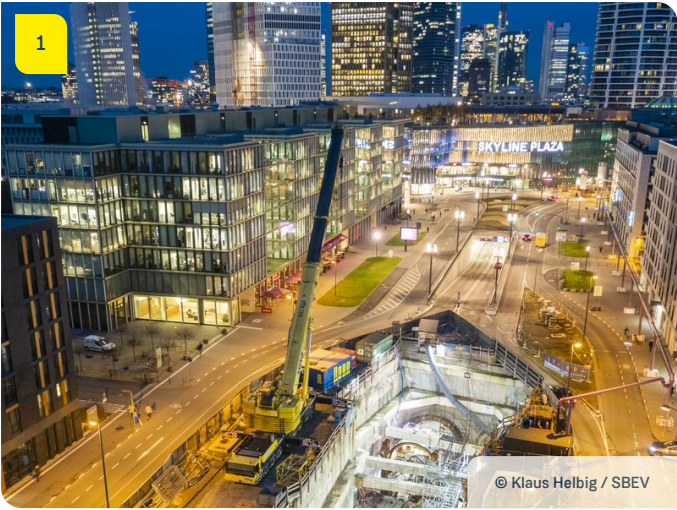
Construction between the city centre, the tunnel and the new route

The work took place in the vicinity of existing roads, buildings and technical infrastructure. Tunnel tunnelling, station construction, the construction pit, the ramp structure and the connection to existing infrastructure had to be co-ordinated within the overall project schedule. PORR's structural engineering, tunnelling and special civil engineering divisions were involved in various sections of the light rail extension. The project scope encompassed services ranging from mechanised and manual tunnel boring, through construction pits and structural work, to the construction of the above-ground connection. Step by step, the structural link to the Europaviertel was thus established between the existing underground network and the new route.

The basis for the extended U5

Where freight trains once reached Frankfurt's main freight station, the extended U5 light rail line will run in future. Beneath Europa-Allee, two tunnel tubes connect the existing line with Güterplatz station and the adjoining ramp structure. The construction of the tunnel tubes, the connection to the existing network, the station excavation pit and the open-cut tunnel sections formed the key structural elements of the new light rail link. The EVA tunnel boring machine, segment linings, compressed-air tunnelling and reinforced concrete construction characterise the history of a project that is taking shape deep beneath Frankfurt's new district.

Impressions



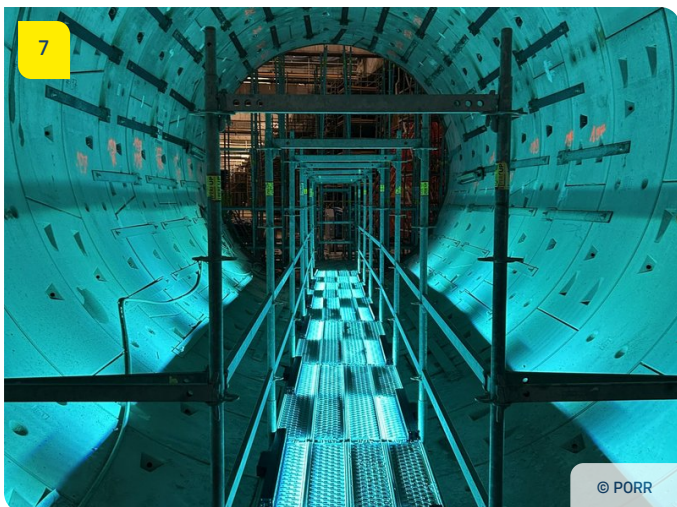


Image notes

1

Extension of the U5 Europaviertel metro line, Frankfurt am Main

Excavating one of the deepest construction pits in Frankfurt.

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Extension of the U5 Europaviertel metro line, Frankfurt am Main

The cutting wheel of the tunnel boring machine to extend the U5 underground line into the Europaviertel was lifted into the starting excavation pit on Europa-Allee on June 21, 2019.

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Extension of the U5 Europaviertel metro line, Frankfurt am Main

Wall production Güterplatz

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Extension of the U5 Europaviertel metro line, Frankfurt am Main

View of the Europaviertel Frankfurt with start building pit for TVM

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Tunnel tube

Tunnel tube with salt concrete

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Reinforcement level lining

Lining of the reinforcement level at Güterplatz station

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Tunnel tube leading to Güterplatz station

Walkway leading to Güterplatz station

Do you have questions about the project or would you like to learn more? Feel free to contact us for further information.

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