W&F

WAYSS & FREYTAG
INGENIEURBAU

Tunnels

Connections for Life

Tunnel

Connections for Life

Creative engineering is our main focus. We understand design, conception and execution to be individually developed solutions in response to the tasks set by our clients.

As an internationally renowned construction company, we design environments, establish permanent connections between people and places and thus achieve perceptible improvements for both clients and users. In short: We create quality of life for the world of tomorrow.

Customer-oriented thinking and responsible actions form the basis of our business. After all, the success of each and every construction project is always closely linked to the quality of cooperation with our clients.

At Wayss & Freytag Ingenieurbau AG more than 145 years of experience and the technological expertise of today converge. A lean structure ensures the optimum realization of our clients' projects. In our competence centres created just for this purpose specialist groups of our best staff work in close cooperation to find the most appropriate solution for every technological challenge.

Wayss & Freytag Ingenieurbau AG is active worldwide in the field of tunnelling. On the international market, the company carries out projects in which it distinguishes itself by its special know-how and excellent performance.

The scope of our activities ranges from mechanized and conventional tunnelling, the construction of sewage treatment plants and power plants, railway, bridge and stadium construction and industrial construction to environmental technology. Engineering consulting, location analyses, utilization concepts and feasibility studies complete our range of services.

Mechanized Tunnelling

In the past Wayss & Freytag was significantly involved in the development of mechanized tunnelling techniques. For example, they initiated the support of the tunnel face by means of a bentonite suspension and air-cushion. With the so-called "slurry shield" this technique was brought to operational maturity. Wayss & Freytag is a pioneer of this technique and has in the meantime driven more than 210 km of tunnel using slurry shields. In addition, more than 99 km of tunnel were driven using earth pressure balance shields and 44 km using hard rock TBMs. Examples of prominent projects in mechanized tunnelling are Westerschelde Tunnel (Netherlands) as well as Katzenberg Tunnel and Finne Tunnel, the longest railway tunnels built in Germany.

Conventional Tunnelling

The construction of tunnels using conventional construction methods has always been a challenge to every engineer. Here, the engineer's most important task is the evaluation of the geology and the selection of the right means of securing the excavation face until final completion of the inner lining. Wayss & Freytag already rose to this challenge in 1905 when building a railway tunnel using the conventional tunnelling method in Wasserburg/Inn in gompholite (Nagelfluh) and gravel.

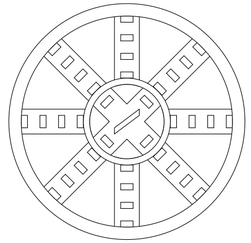
The range of conventional tunnelling reaches from soft rock tunnelling (e. g. a metro tunnel in Munich gravel) and tunnelling in compressed air (e. g. Ostbahnhof metro station in Munich in Tertiary formations below groundwater) to classic Drill and blast drives (e. g. Rennsteig Tunnel on the A 71 motorway, which, with a length of 8 km, is the longest motorway tunnel in Germany).

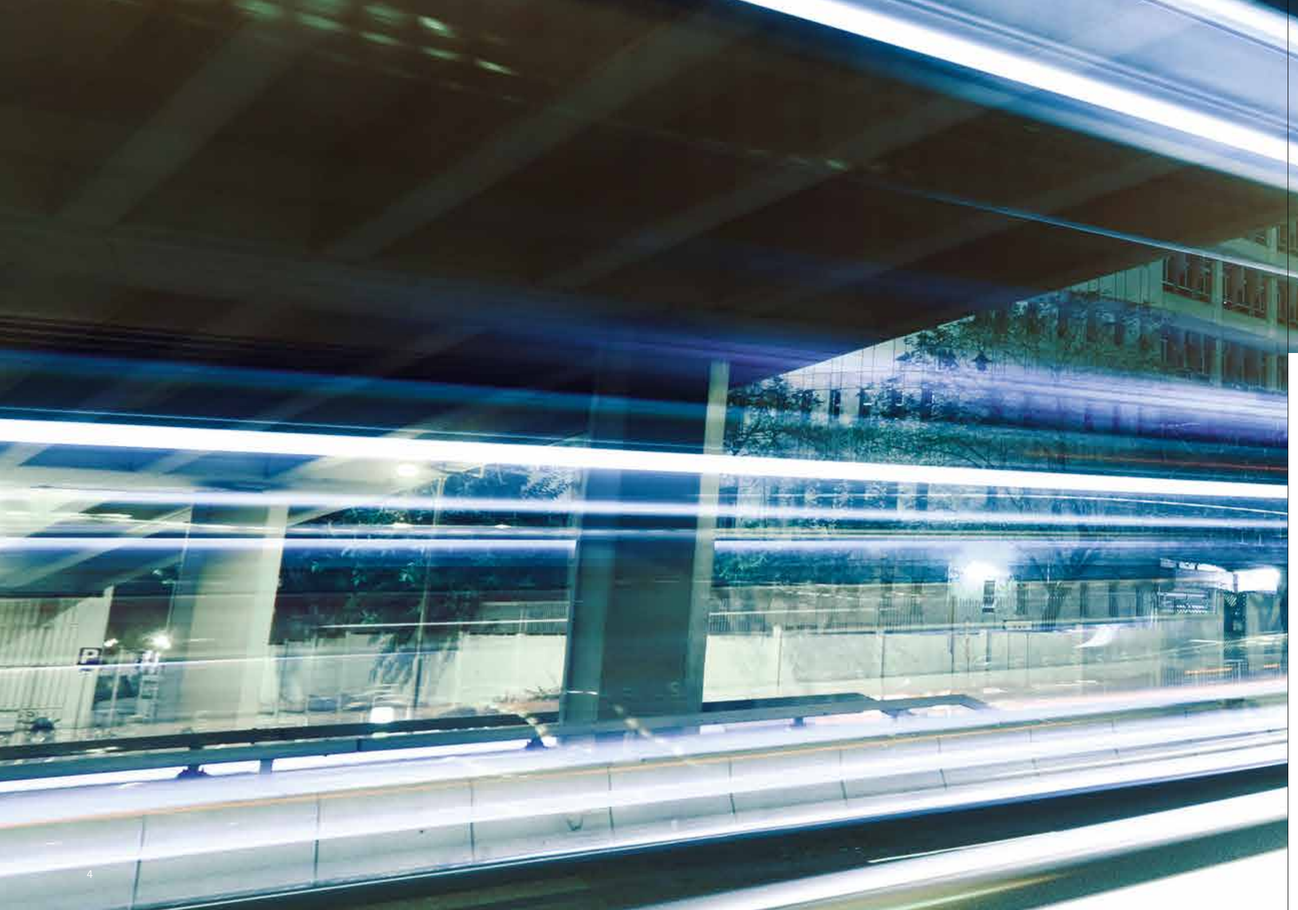
Total Driven Tunnel Length (km) (Status Oct. 30. 2021)

211,42 km
Hydroshield

99,042 km
EPB shield

44,094 km
Hard Rock TBM





Content

Second Main Line of Munich Suburban Railway
Germany

General Data:

Project: Second Main Line of Munich Suburban Railway, Germany
Client: DB NETZE
DB Netz AG
DB Station & Service AG
DB Energie GmbH
Contractor: „ARGE Tunnel Hauptbahnhof" Joint Venture
„ARGE Oberirdisch West" Joint Venture
Wayss & Freytag Ingenieurbau AG, Ed. Züblin AG,
Max Bögl Group, BAUER Spezialtiefbau GmbH
Construction period: 2019 to 2027
Construction costs: Overall project costs € 865 million

Technical Data:

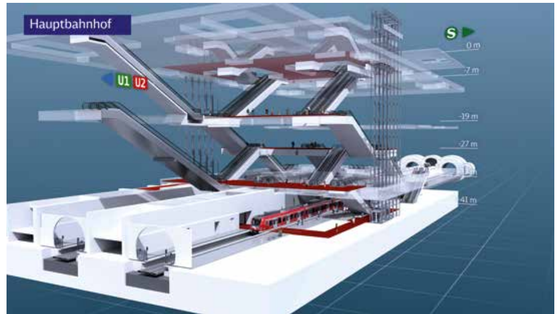
Scope of works

Contract VE 10: **Western Above-Ground Section**
Extensive dismantling and new construction of track systems and switches
New construction of two flyover structures and a double-track tied-arch bridge
New construction of a noise barrier bridge and further noise barriers
New construction of retaining structures and a tunnel for pedestrians, bicyclists, public-transport buses and the tram) in Laim
Complete renewal of Laim Passenger Station, electrical work on low-voltage and medium-voltage systems, underground cable work

Contract VE 30: **Main Station Tunnel**
Construction of the approximately 40 m deep access structure using the top-down method with diaphragm walls
Platform tunnels constructed using the mining method under compressed air in the track area of the main station
New construction of the ramp structure in the western cut-and-cover section
Excavation of two suburban railway tunnels with an external diameter of approximately 8.50 m from Donnersberger Bridge to Marienhof Station using
two slurry TBMs, with single-pass segmental lining
Four city-centre rescue shafts with connecting structures
Extensive special foundation engineering and dewatering measures

Construction method: Mining method
Geology: Silty sand, silt and clay

Utilisation	Infrastructure
Type	Suburban railway tunnel
Length	2 x 3 km
Construction Method	Slurry TBM and New Austrian Tunnelling Method under compressed air



Landsberger Straße Sewer System Rehabilitation, Section 2, Munich
Germany

General Data:

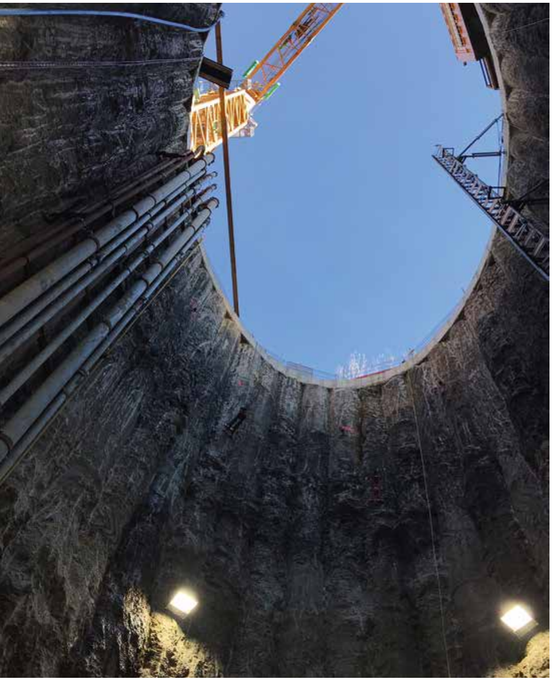
Project:	Landsberger Straße Sewer System Rehabilitation, Section 2, Munich, Germany
Client:	Münchner Stadtentwässerung
Contractor:	Wayss & Freytag Ingenieurbau AG
Construction period:	2018 to 2021
Net construction costs:	€ 19 million

Technical Data:

Scope of works:	Construction of sewerage tunnel; length: 980 m + 1,200 m Internal diameter: 3.00 m External diameter: 3.58 m Min. radius: 1,000 m Min. cover: 3.75 m Max. cover: 5.00 m
Jacking pipes:	Type: DN 3000 reinforced concrete Number: 735 pieces Length: 3.00 m Wall thickness: 0.29 m
Construction method:	Pipe jacking using an AVND 3000 machine
Geology:	Quaternary gravel

Utilisation	Water/Sewerage
Type	Sewerage tunnel
Length	980 and 1,200 m
Construction Method	Pipe jacking using an AVND 3000 machine

Überruhr Pipeline Tunnel, Essen
Germany



General Data:

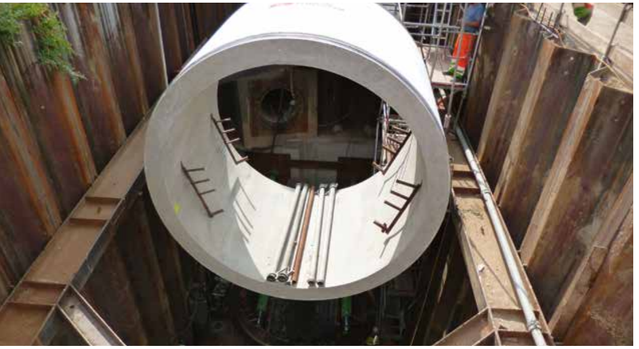
Project:	Überruhr Pipeline Tunnel, Essen, Germany
Client:	Entwässerung Essen GmbH
Contractor:	Wayss & Freytag Ingenieurbau AG
Construction period:	2018 to 2019
Net construction costs:	€ 8 million

Technical Data:

Scope of works:	Construction of pipeline tunnel; length: 612 m Internal diameter: 1.80 m; External diameter: 2.30 m Min. radius: 430 m Min. cover: 8.00 m Max. cover: 25.00 m Jacking pipes: Type: DN 1800 reinforced concrete Number: 167 pieces Length: 3.00/4.00 m Wall thickness: 0.25 m
Construction method:	Pipe jacking using a slurry shield
Geology:	Marl, clay, sandstone

Utilisation	Water/Sewerage
Type	Sewerage tunnel
Length	612 m
Construction Method	Pipe jacking using a slurry shield

Mauerpark Storage Sewer, Berlin
Germany



General Data:

Project:	Mauerpark Storage Sewer, Berlin, Germany
Client:	Berliner Wasserbetriebe (BWB)
Contractor:	Wayss& Freytag Ingenieurbau AG as technical leader of a joint venture
Construction period:	2017 to 2019
Net construction costs:	€ 12 million

Technical Data:

Scope of works:	Construction of a storage sewer tunnel, length: 654 m Internal diameter: 3.85 m External diameter: 4.50 m Min. radius: 0.0 m Min. cover: 3.00 m Max. cover: 6.80 m Jacking pipes: Type: DN 3850 concrete Number: 218 pieces Length: 3.00 m Thickness: 0.35 m
Construction method:	Pipe jacking using an EPB shield
Geology:	Boulder clay, medium sand

Utilisation	Water/Sewerage
Type	Storage sewer tunnel
Length	654 m
Construction Method	Pipe jacking – EPB shield

Gateway Gardens
Germany

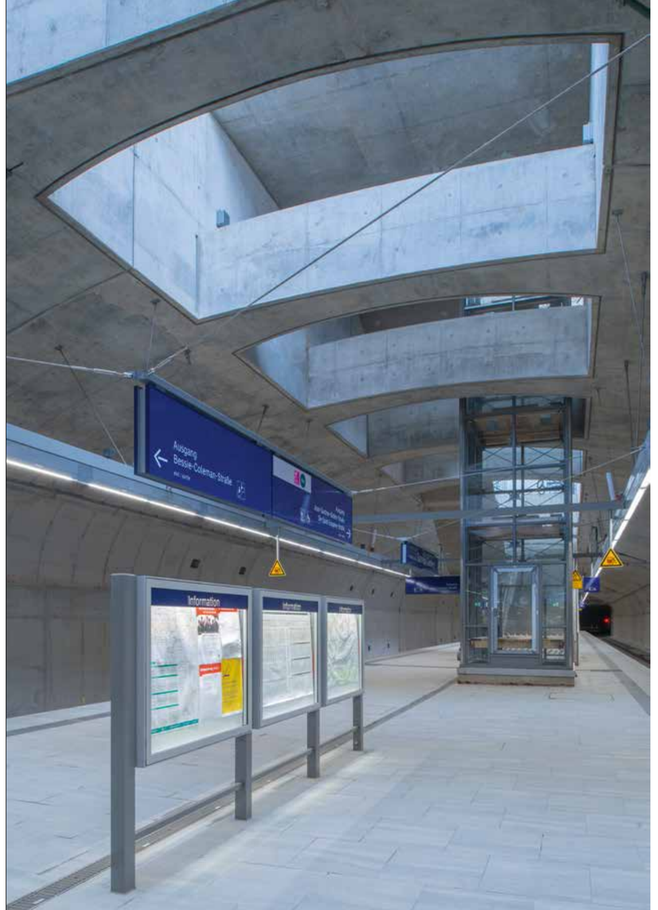
General Data:

Project:	Tunnel Gateway Gardens, Lot 2
Client:	Deutsche Bahn AG
Contractor:	ARGE Tunnel Gateway Gardens, Lot 2, Wayss & Freytag Ingenieurbau AG as technical leader of a joint venture
Construction period:	February 2016 to December 2019
Net construction costs:	€ 120 million

Technical Data:

Scope of works:	Construction of light railway station Gateway Gardens including 2.2 km light railway tunnel
Construction method:	Cut and cover method
Geology:	Soft rock sections, Quartenary sedimentary rocks, cohesive Tertiary layers

Utilisation	Infrastructure
Type	Railway tunnel, double-track
Length	2,000 m
Construction Method	Cut and cover method



Bad Cannstatt Tunnel
Germany

General Data:

Project:	Stuttgart 21 PFA (section) 1.5, Lot 3 Long-distance route from Stuttgart Main Station to Bad Cannstatt
Client:	DB Netz AG, Frankfurt/Main represented by DB Projektbau Stuttgart – Ulm GmbH
Contractor:	Wayss & Freytag Ingenieurbau AG in a joint venture
Construction period:	2012 to 2021
Net construction costs:	€ 285 million

Technical Data:

Scope of works:	5050 m single-track and 1050m double-track long-distance railway tunnel; A = 70-220 m², 345m single-track and 575m double-track suburban railway tunnel, A = 50-100 m² 790m rescue tunnel; A = 20 – 40m² , approx. 60m deep smoke extraction structure, 1 rescue shaft depth = 20m
Construction method:	Drill and blast method and tunnel excavator, reinforced inner lining partly with foil sealing Bored pile lining, shotcrete shafts, elevation grouting
Geology:	Leached and non-leached gypsum Keuper, partly containing anhydrite

Utilisation	Infrastructure
Type	Railway tunnel
Length	5,050 m, 1,050 m
Construction Method	Drill and blast method and tunnel excavator

Vötting Tunnel
Germany

General Data:

Project: Tunnel Vötting
Client: Stadt Freising
Contractor: Wayss & Freytag Ingenieurbau AG as technical leader of a Joint Venture
Construction period: 2017 to 2021
Net construction costs: 58,84 Mio. € (total project)

Technical Data:

Scope of works:
95 m preliminary cut, preliminary cut approx. 35,000 m³
30 m north portal structure
462 m tunnel constructed by the mining method:
Top heading and bench/invert heading in Tertiary hilly terrain
Spile canopy support system approx. 300 m
"Dry" tunnelling due to a substantial lowering of the groundwater table
Tunnel route runs partly through built-up areas
12 m shaft construction:
2 tunnel blocks in open cut construction
Service building / South emergency exit
Bored pile excavation (pile lengths up to approx. 30 m)
Bracing at 4 levels and 2 excavation levels (tunnel / service building)
179 m top-down method using bored piles
Deviations in geology identified subsequently:
Impacts: Bored pile design / bracing / foundation of stream crossings / subsoil improvement in the Moosach area / additional time required / crossing of Moosach stream and construction of a diversion channel
192 m open cut construction method with south portal structure and trough structure (ramp): Unstable soil (peat), consolidation fill requiring a waiting time of over 6 months
Underwater excavation partly in peat
Underwater concrete base anchored with Gewi piles

Inner diameter: approx. 10.4 m
Max. cover: approx. 10 m
Excavation cross-section: approx. 100 m²

Construction method:
Conventional excavation after substantial lowering of the groundwater table, civil engineering structure constructed by the top-down method using bored piles, open-cut method and trough in bored pile excavations.

Geology:
Tunnelling using mining techniques in Tertiary hilly terrain north of Munich, top-down method and open cut construction in the transition area mainly in Quaternary soils, foundation lying on Tertiary soil

Utilisation	Infrastructure
Type	Road tunnel
Length	850 m
Construction Method	Tunnel excavator, top down method, open cut method

Mine Water Drainage Tunnel, Ibbenbüren
Germany

General Data:

Project: Mine Water Drainage Tunnel, Ibbenbüren, Germany
Client: RAG Aktiengesellschaft, Ibbenbüren, Germany
Contractor: Wayss & Freytag Ingenieurbau AG in Joint Venture
Construction period: November 2021 to May 2025

Technical Data:

Scope of works: Mine water drainage tunnel, total length: approx. 7,400 m, 2 drives: West 3,230 m and East 3,8700 m in length, internal diameter: 3.60 m, external diameter 4.50 m, bore diameter approx. 4.80 m, 230 m open cut tunnel section with retaining wall comprising bored piles and a 30 m long launching box for the TBM boring the west section up to a central shaft.
Central shaft, approx. 75 m deep, internal diameter approx. 32 m. The central shaft will be used as the reception shaft for the west section TBM and as the launching shaft for the TBM boring the east section up to the existing shaft "Schacht 1 Oeynhausen".
After TBM reception, this 100 m deep shaft will be strengthened.
The drainage tunnel will drain the mine through the segment lining into an invert precast channel, which transports the drained water towards the west, out of the mine into the sewage treatment plant Gravenhorst. The two drives will be bored partly with pea gravel sections, where mine water drainage is required, and partly with 2K-grout sections as segment lining backfill, where mine water drainage is not required.

Construction method: Parallel excavation of the tunnels from 2 access points using 2 Variable-Density-TBMs (VDS), diameter: 4.80 m, Tunnel lining using reinforced concrete segments, Construction of west launching box using secant piling and central shaft using anchors and sprayed concrete

Geology: Sand, gravel, sand-/lime-/mudstone, coal seams and adits

Utilisation	Water/Sewerage
Type	Mine water drainage tunnel
Length	Approx. 7,400 m
Construction Method	TBM tunnelling using two VD TBMs

Light Rail Line U 81
Germany

General Data:

Project: Light rail line U 81, lots 1 and 2
Client: City of Düsseldorf
Contractor: Wayss & Freytag Ingenieurbau AG in a joint venture
Construction period: May 2020 to 2023
Net construction costs: 113 million € total project

Construction method: Both lots include traffic routing and safety measures during all construction phases and intermediate states as well as the corresponding road construction and dewatering works. Cut-and-cover method
Geology: Lower Rhine River Terraces/ Gravel – Sand

Utilisation	Infrastructure
Type	Underground tunnel
Length	Lot 1 and Lot 2 approx. 1.7 km
Construction Method	Cut-and-cover method

Technical Data:

Scope of works: Connection of the Düsseldorf main railway station with the airport, the Düsseldorf trade fair centre and the Airport City business park, construction of an underground railway station at the airport terminal.

Lot 1: Construction of several civil engineering structures: ramp structures, elevated trough section, bridge in the area of access gate 1 including the associated foundation work as well as construction of an arch-shaped steel bridge (6-span steel structure, approx. 480 m long, 12 m wide) using the incremental launching method

Track construction and overhead line work, construction of noise barriers

Lot 2: Construction of the excavation pit using anchored diaphragm walls and soldier pile shoring, excavation (partly as underwater excavation) and construction of the ramp structure (118 m long), tunnel structure and station using the cut-and-cover method (length of the underground station approx. 182 m).

Grootveldlaan Storage Sewer, Sint-Pieters-Woluwe
Belgium

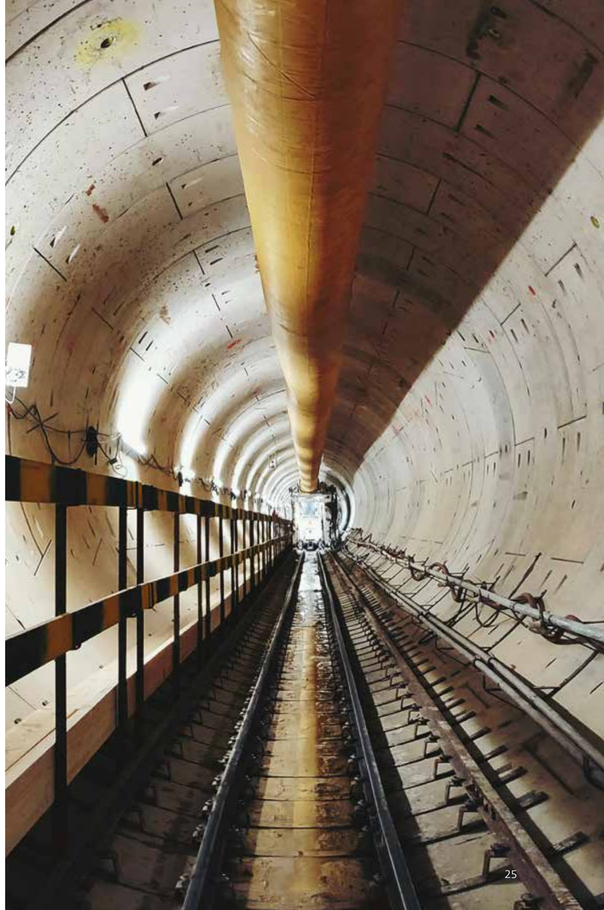
General Data:

Project:	Grootveldlaan Storage Sewer, Sint-Pieters-Woluwe, Belgium
Client:	Vivaqua, Brussels
Contractor:	Wayss & Freytag Ingenieurbau AG in a joint venture
Construction period:	2018 to 2020
Net construction costs:	€ 14 million

Technical Data:

Scope of works:	Construction of a storage sewer tunnel, length: 375 m Internal diameter: 5.20 m External diameter: 5.70 m Min. radius: ∞ m Min. cover: 5.50 m Max. cover: 14.00 m Segmental lining: Number of rings: 310 pieces Ring split: 5 + 1 Segment width: 1.20 m Segment thickness: 0.25 m
Construction method:	TBM tunnelling using an EPB shield
Geology:	Clay, clayey sands, Brussels sand

Utilisation	Water/Sewerage
Type	Storage sewer tunnel
Length	375 m
Construction Method	TBM tunnelling – EPB shield



Fehmarnbelt Tunnel
Denmark – Germany

General data:

Projekt: Fehmarnbelt Tunnel
Client: Femern A/S
Contractor: Femern Link Contractors (FLC) with partners VINCI Construction Grands Projets, Per Aarsleff, Royal BAM Group (with its group companies BAM Infra, BAM International and Wayss & Freytag Ingenieurbau), Solétanche-Bachy International, CFE and Max Bögl Stiftung & Co.
Construction period: 2021 to 2029

Utilisation	Infrastructure
Type	Underwater road and railway tunnel
Length	18 km
Construction Method	Immersed tunnel

Technical data:

Scope of works: The 18 km long Fehmarnbelt Tunnel will connect the Danish island Lolland with the German island Fehmarn (Schleswig-Holstein) and will be the world's longest immersed tunnel for road and rail. It will comprise a four lane motorway and two electrified rail tracks.

Construction of an 18 km long immersed tunnel, construction of the tunnel factory that will produce prefabricated tunnel elements, construction of the tunnel portals, toll stations, bridges and ramps.

Tunnel elements: 79 individual elements, each 217 metres long, weight 73,000 tonnes, 10 special elements with a lower floor for the use of the tunnel operation and maintenance equipment.

Construction method: Immersed tunnel

Thames Tideway Tunnel, Tideway West, London
United Kingdom

General Data:

Project: Thames Tideway Tunnel, Tideway West, London, UK
Client: Tideway (Bazalgette Tunnel Limited), London, United Kingdom
Contractor: BMB Joint Venture: BAM Nuttall Ltd (in cooperation with Wayss & Freytag Ingenieurbau AG), Morgan Sindall plc, Balfour Beatty Group Ltd
Construction period: 2015 to 2025
Net construction costs: GBP 416 million

Geologie: London Clay

Utilisation	Water/Sewerage
Type	Sewerage tunnel
Length	6,950 m and 1,100 m
Construction Method	TBM tunnelling using an EPB shield

Technical data:

Scope of works: Sewerage tunnel, length: 6,950 m, internal diameter 7.10 m, external diameter 7.80 m, tunnel lining: steel fibre reinforced concrete segments and steel fibre reinforced in-situ concrete secondary lining

4 nos. connection tunnels:
Frogmore: length 1,100 m, internal diameter 2.6 m, external diameter: 3.21 m, TBM tunnelling

Hammersmith: length 300 m, internal diameter 5 m and 4.1 m, SCL tunnelling
Barn Elms: length 215 m, internal diameter 2.2 m, ext. diameter 2.5 m, pipe jacking
Putney: length 135 m, internal diameter 2.2 m, external diameter 2.80 m, pipe jacking
7 shafts, diameters up to 25 m, depths up to 40 m

Construction method: TBM tunnelling using an EPB shield, shield diameter 8.13 m and 3.3 m, pipe jacking, SCL tunnelling. Tunnel lining with 8 trapezoid segments per ring, 350 mm thick, 1.70 m wide. Secondary lining: full-round secondary lining shutters, 6x 8.50 m length, PLC controlled, including hydraulic stop-ends, hydraulic spud-bars and automated concrete distribution, Construction of shafts using watertight sprayed concrete lining

Silvertown Tunnel, London
United Kingdom

General Data:

Project: Silvertown Tunnel, London, United Kingdom
Client: Transport for London (TfL), London, United Kingdom
Contractor: Wayss & Freytag Ingenieurbau AG in a joint venture
Construction period: 2019 to 2025
Net construction costs: GBP 945 million

Technical data:

Scope of works:
Twin-tube road tunnel under the River Thames, 2 x 1,400 m long, internal diameter 10.66 m, external diameter 11,46 m
Access ramps, 600 m in length
8 cross-passages
Service buildings at both tunnel portals
1 new footbridge
1 new overbridge for the southbound carriageway of the Blackwall Tunnel

Construction method:
TBM tunnelling using an EPB TBM, 2 x 1,120 m,
TBM diameter 11.8 m, with steel fibre reinforced segmental lining,Construction of cross-passages using ground freezing and sprayed concrete lining including rebar reinforced concrete secondary lining,300 m cut and cover tunnel

Geology: London Clay, dense sands of the Lambeth Group, dense gravels of the Harwich Formation, River Terrace Deposits

Utilisation	Infrastructure
Type	Road tunnel
Length	2,800 m
Construction Method	Tunnelling using an EPB TBM

Grand Paris Express, Line 17, Section 1, Bonneuil-en-France
France

General Data:

Project: Grand Paris Express, Line 17, Section 1, Bonneuil-en-France, France
Client: Société du Grand Paris
Contractor: Wayss & Freytag Ingenieurbau AG in joint venture
Construction period: January 2019 to August 2023
Net construction costs: € 439 million

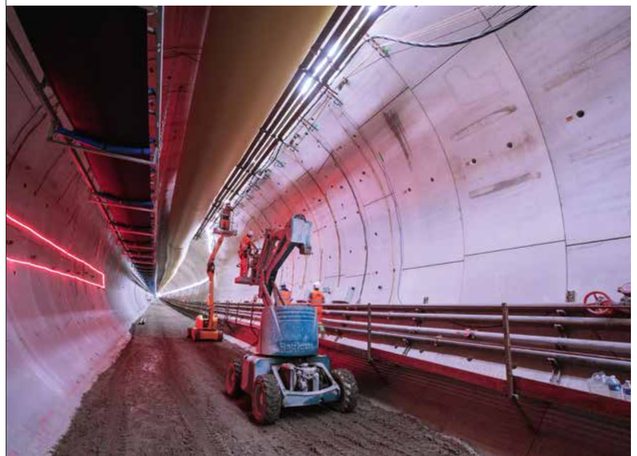
Geology: Sables de Beauchamps (sand with sandstone inclusions), marl, gravel

Utilisation	Infrastructure
Type	Metro tunnel
Length	6,000 m
Construction Method	TBM-tunnelling using an EPB shield

Technical data:

Scope of works:
Connection of the municipality of Le Bourget and Le Bourget Airport to the metro system of Paris, 2 TBM-driven metro tunnels, length 3.40 km and 2.60 km
Internal diameter: 8.70 m, external diameter: 9.46 m
2 new metro stations: "Le Bourget Aéroport" (underground) and "Triangle de Gonesse" (above ground)
742 m railway line
7 shafts (6 ventilation-/access shafts and 1 intermediate launching shaft)

Construction method:
TBM tunneling using an EPB shield, shield diameter: 9.87 m, with segmental tunnel lining
Construction of metro stations "Le Bourget Aéroport"; (diaphragm walls) and "Triangle de Gonesse" (cut and cover method)
Construction of railway line in using the top-down method (530 m) and open construction cut and cover method (212 m)
Shaft construction using a VSM (vertical shaft sinking machine) and diaphram walls



Rotterdamsebaan
The Netherlands

General Data:

Project: Rotterdamsebaan Den Haag, Victory Boogie Woogie Tunnel, double tube road tunnel passing under the City of The Hague

Client: City of The Hague, represented by the project organisation Rotterdamsebaan

Contractor: Combinatie Rotterdamsebaan, consisting of BAM Infra and Wayss & Freytag Ingenieurbau AG. The construction JV consists of BAM Infra, Wayss & Freytag Ingenieurbau and Volker Wessels.

Construction period: December 2015 to July 2020

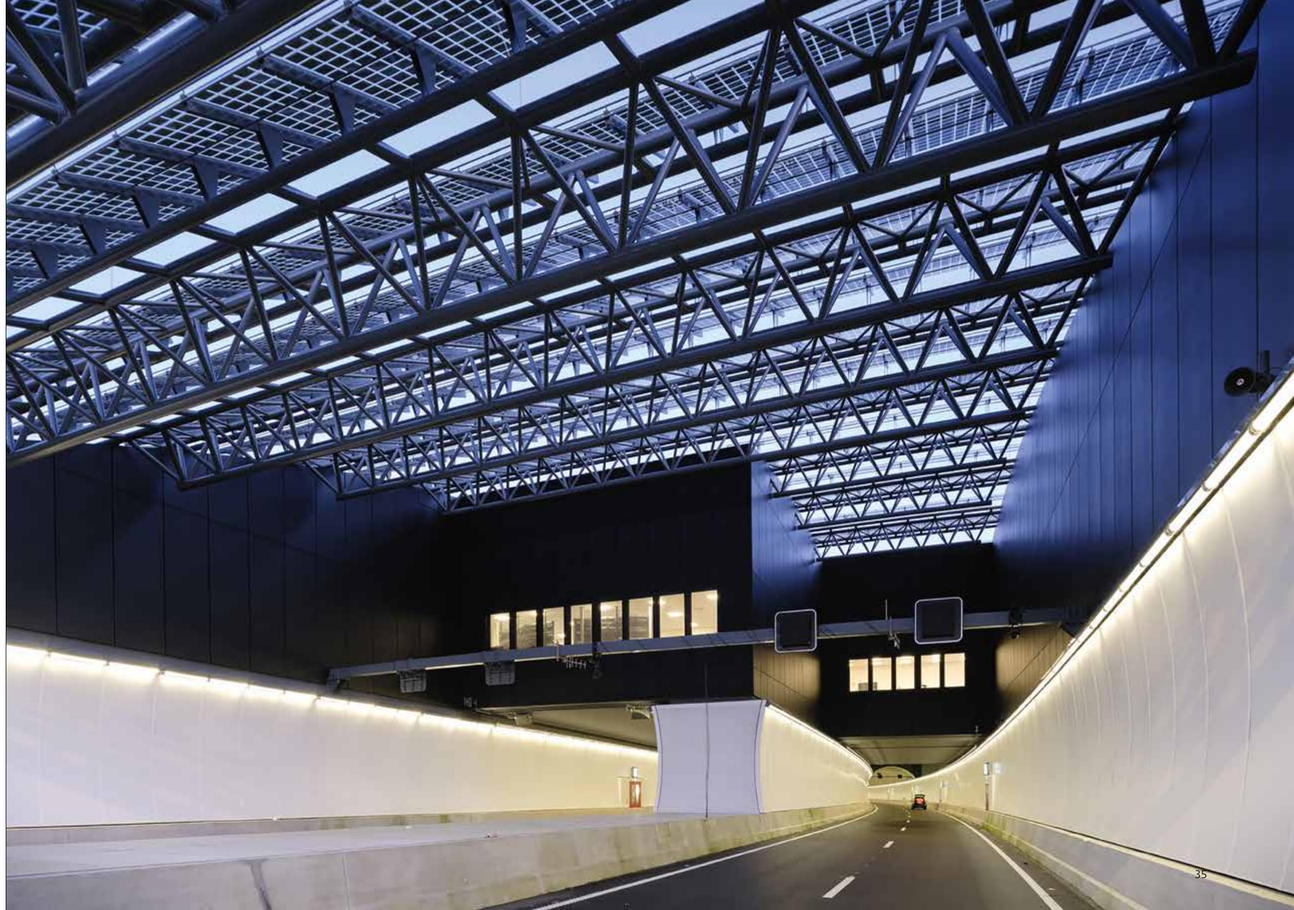
Net construction costs: € 301 million incl. 15 years maintenance

Technical data:

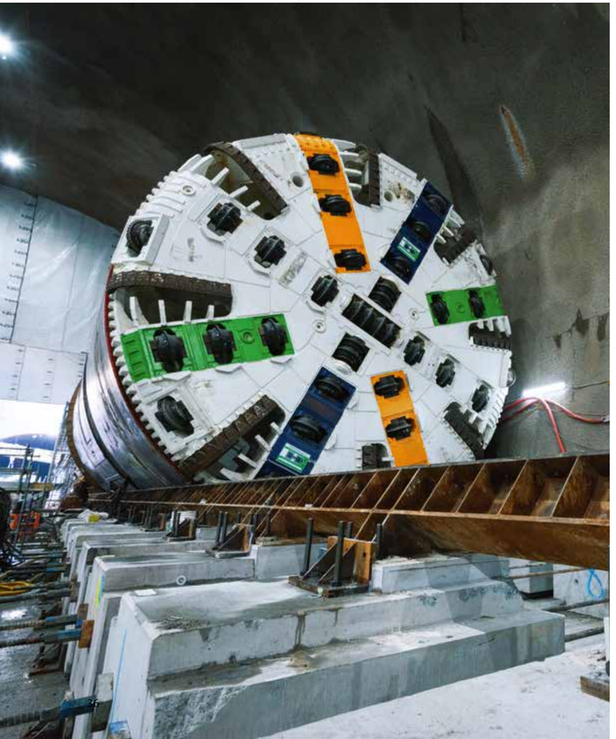
Scope of works: 2 parallel tunnel tubes with a length of 1.645 km each, inner diameter 10.15 m; 6 cross passages driven under the protection of ground freezing;2 access ramps, which at the same time function as start and target shafts, Passing under A4/A13 motorways incl. connection to existing infrastructure

Construction method: Single segmental lining, driven by slurry shield, shield diameter: 11.32; reinforced concrete segments with a thickness of 40cm

Geology: Quaternary fills of sands and coarse clays, interstratifications of peat and clay, Tertiary sands



Cross River Rail Project, Brisbane
Australien



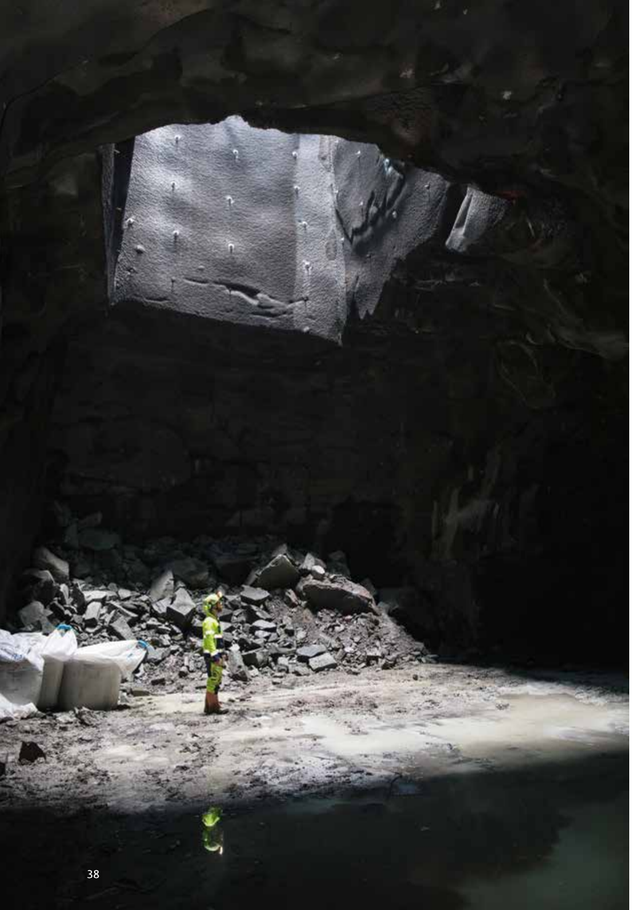
General Data:

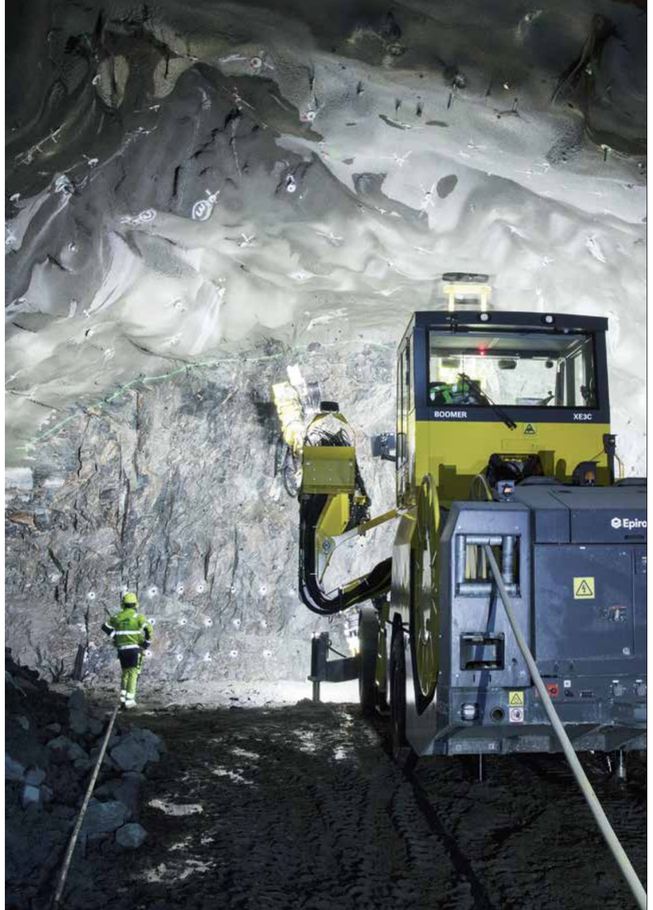
Project:	Cross River Rail Project, Brisbane, Australia
Client:	Cross River Rail Delivery Authority (CRRDA)
Contractor:	Wayss & Freytag in a joint venture
Construction period:	2019 to 2023
Net construction costs:	€ 3.4 billion (total project)

Technical Data:

Scope of works:	Design & construction of 5.90 km twin-tube railway tunnel, 4 new stations at Boggo Road, Woolloongabba, Albert Street and Roma Street, complete incl. architectural finishes, service facilities, TBM retrieval shafts at the tunnel portals, M&E systems, rail & communication systems within the tunnel
Construction method:	Tunnelling using 2 hard rock Gripper TBMs and 2 roadheaders
Geology:	Neranleigh-Fernvale Beds, Brisbane Tuff, Aspley Formation (siltstone), Quaternary Alluvium (sand, silty clay)

Utilisation	Infrastructure
Type	Railway tunnel, twin tubes
Length	5.90 km
Construction Method	Tunnelling using 2 hard rock Gripper TBMs and 2 roadheaders





West Link Project, Korsvägen Section, Gothenburg
Sweden

General Data:

Project:	West Link Project, Korsvägen Section, Gothenburg, Sweden Double track railway tunnel
Client:	Trafikverket (Schwedish Transportation Authority)
Contractor:	Wayss & Freytag Ingenieurbau AG in a joint venture
Construction period:	2018 to 2026
Net construction costs:	SEK 3.8 billion (approx. € 385 million)

Technical Data:

Scope of works:	Double track railway tunnel parallel service tunnel, underground station, caverns and access tunnel
Construction method:	Drill and blast: Length 5.60 km with an excavated volume of approx. 655.000 m³, Cross-sections: 80 m² (access tunnels) 130 m² (standard cross-section of double-track tunnel) up to 600 m² (widened tunnel in the area of Korsvägen Station East) Open construction: Korsvägen Station East excavation: 140 m long, up to 28 m deep, open construction Liseberg excavation: 260 m long, up to 22 m deep, top-down method Almedal trough structure and open construction section: 620 m long Civil works including several temporary bridges and a highway access ramp Building works of temporary and permanent buildings
Geology:	Drill and blast: granite, granodiorite, gneiss Open construction/top-down method: topsoil, sand, slit, (Lera-)clay, quick clay, moraine

Utilisation	Infrastructure
Type	Railway tunnel, double-track
Length	5.60 km
Construction Method	Drill and blast method, open construction/ top-down method with civil engineering works

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