

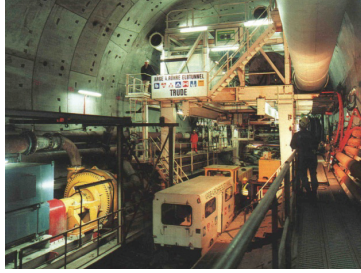
Fourth Elbe Tunnel, Hamburg, Germany



When the Elbe tunnel in Hamburg was opened to traffic in 1975 it was frequented by approximately 56,000 cars per day. At that time nobody anticipated a rapid increase in traffic in excess of twice as many vehicles during peak traffic hours. To ease this bottleneck the construction of the Fourth Elbe Tunnel became a matter of urgency and construction work on the 2.6 km road tunnel connecting the districts of Othmarschen and Waltershof commenced in 1995.

At that time the tunnel with an internal diameter of 12.35 m was excavated by a slurry TBM of 14.20 m diameter, the biggest of its kind in the world.

The tunnel was successfully completed and officially inaugurated on 28th October 2002.



General Data

Client:	Federal Republic of Germany represented by Auftragsverwaltung der Freien und Hansestadt Hamburg, Behörde für Bau und Verkehr
Contractor:	Joint Venture "4. Röhre Elbtunnel" consisting of the companies: Ways & Freytag Ingenieurbau AG, Bilfinger Berger AG, E. Heitkamp GmbH, Hochtief Construction AG, Ph. Holzmann AG, Walter Bau AG, Ed. Züblin AG
Design:	Stadt Hamburg
Construction Time:	1995 - 2003
Contract Value:	€ 277million
Contract Type:	B.o.Q. remeasured

Technical Data, Tunnel

Type of tunnel:	Road tunnel
Length of tunnel:	2,560 m
Inner diameter:	12.35 m
Outer diameter:	13.75 m
Min. radius:	913 m
Min. cover:	7 m
Max. cover:	39 m
Cross-passages:	3 nos.

Segment Design

Number of rings:	1,280 nos.
Ring split:	8 + 1 keystone
Segment width:	2.00 m
Segment thickness:	0,70 m

TBM

TBM manufacturer:	Herrenknecht
Type:	Slurry shield
Diameter:	14.20 m
Length of TBM:	60 m (incl. backup)
Total weight of TBM:	2,600 t
Weight TBM/Backup:	2,000/600 t
Thrust cylinders:	2 x 32 nos.
Thrust force:	120,000 kN
Rotation speed:	0 - 2.5 rpm
Max. torque:	26,000 kNm
Max. operating pressure:	5.5 bar
Installed electr. power:	3,200 kW
Logistics:	Rail transport
Material handling:	Slurry circuit (2,400 m ³ /h)



Geology

Geotechnical features:	Sand fill, glacial fill, water clays, marl till
Max. hydrostatic pressure:	5 bar

