

BRENNER BASISTUNNEL

GALLERIA DI BASE DEL BRENNERO



Construction lots for railway equipment at the
Brenner Base Tunnel

Michele Ianeselli
Matthias Hofmann
07. November 2025

Outline

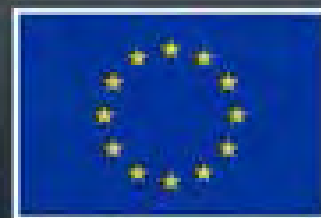
- Brenner Base Tunnel project
- Railway equipment phase
- Track systems in the BBT

Brenner Base Tunnel project

Full video on
youtube
→ BBTclips

THE BRENNER BASE TUNNEL

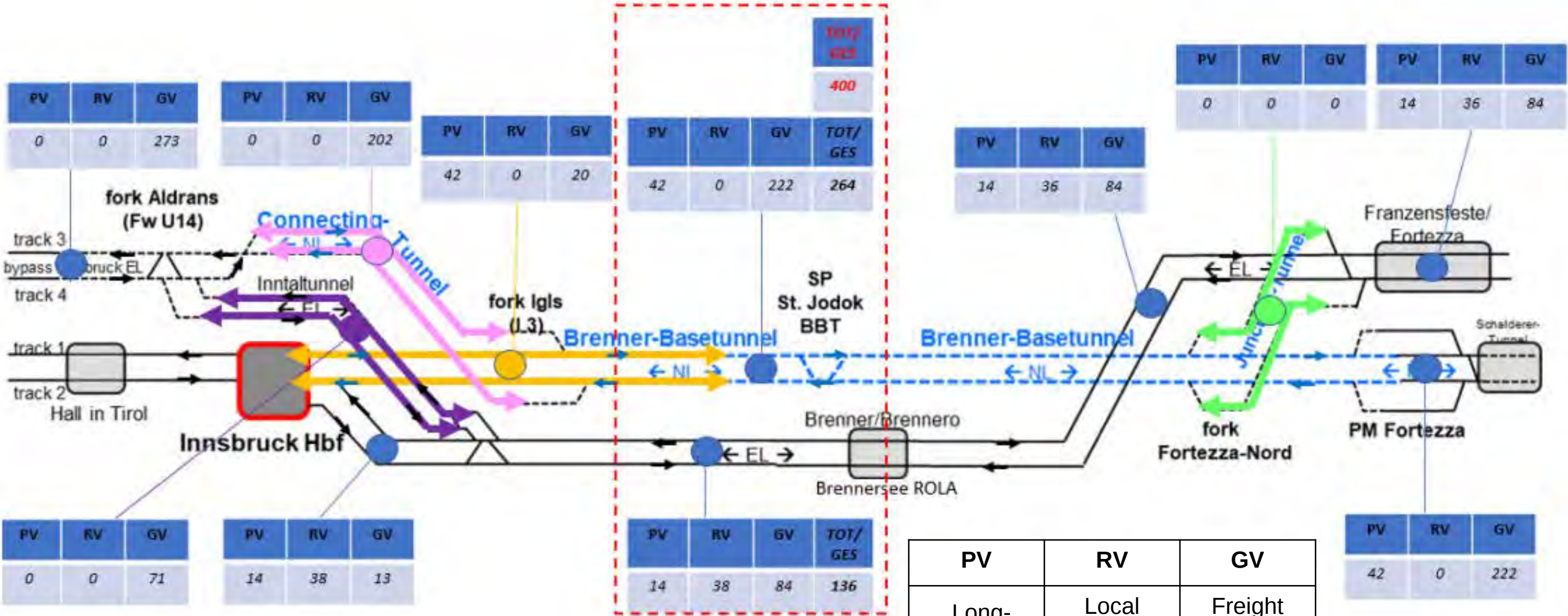
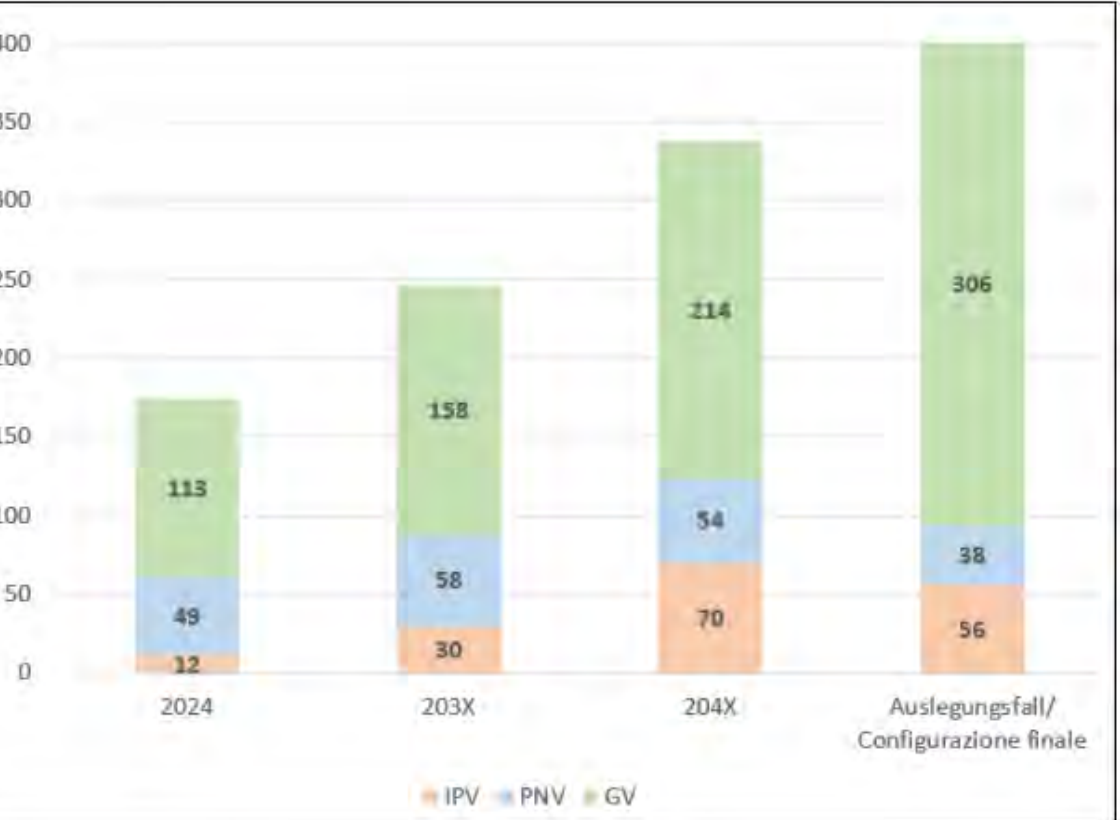
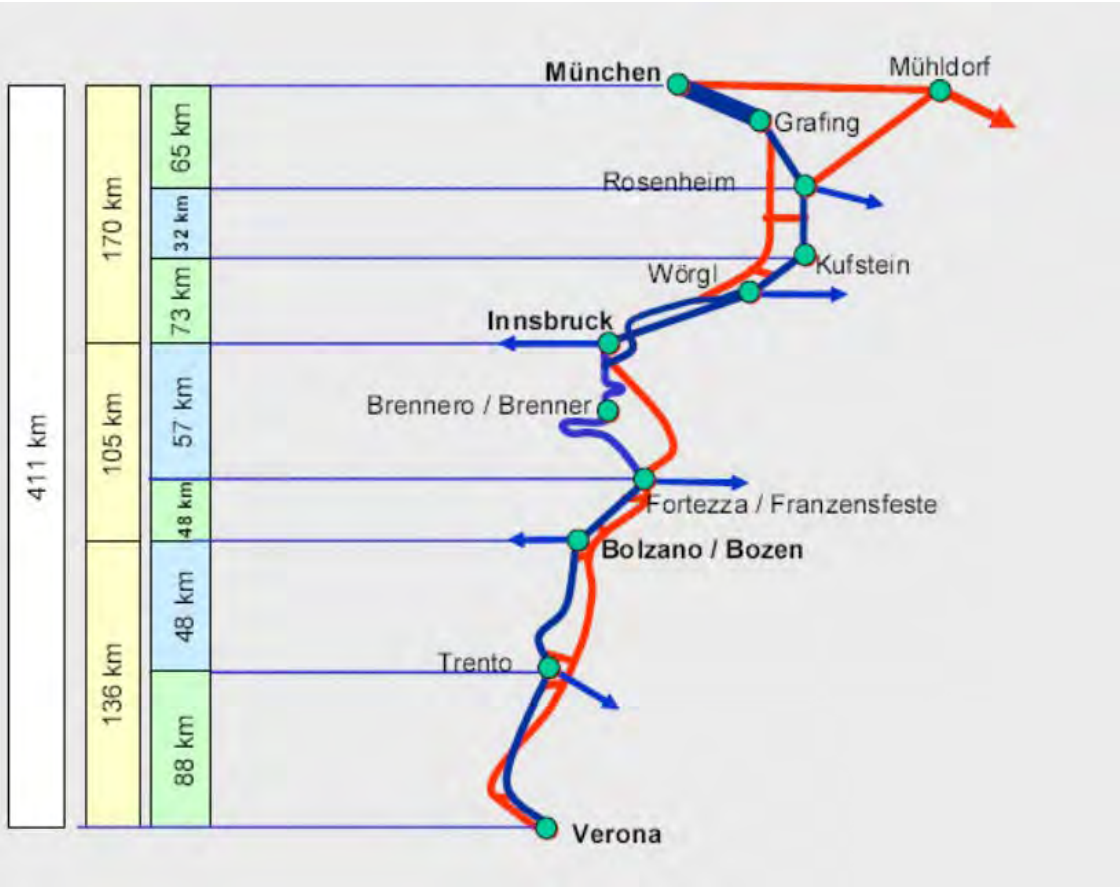
A NEW WAY THROUGH THE ALPS



Co-funded by
the European Union

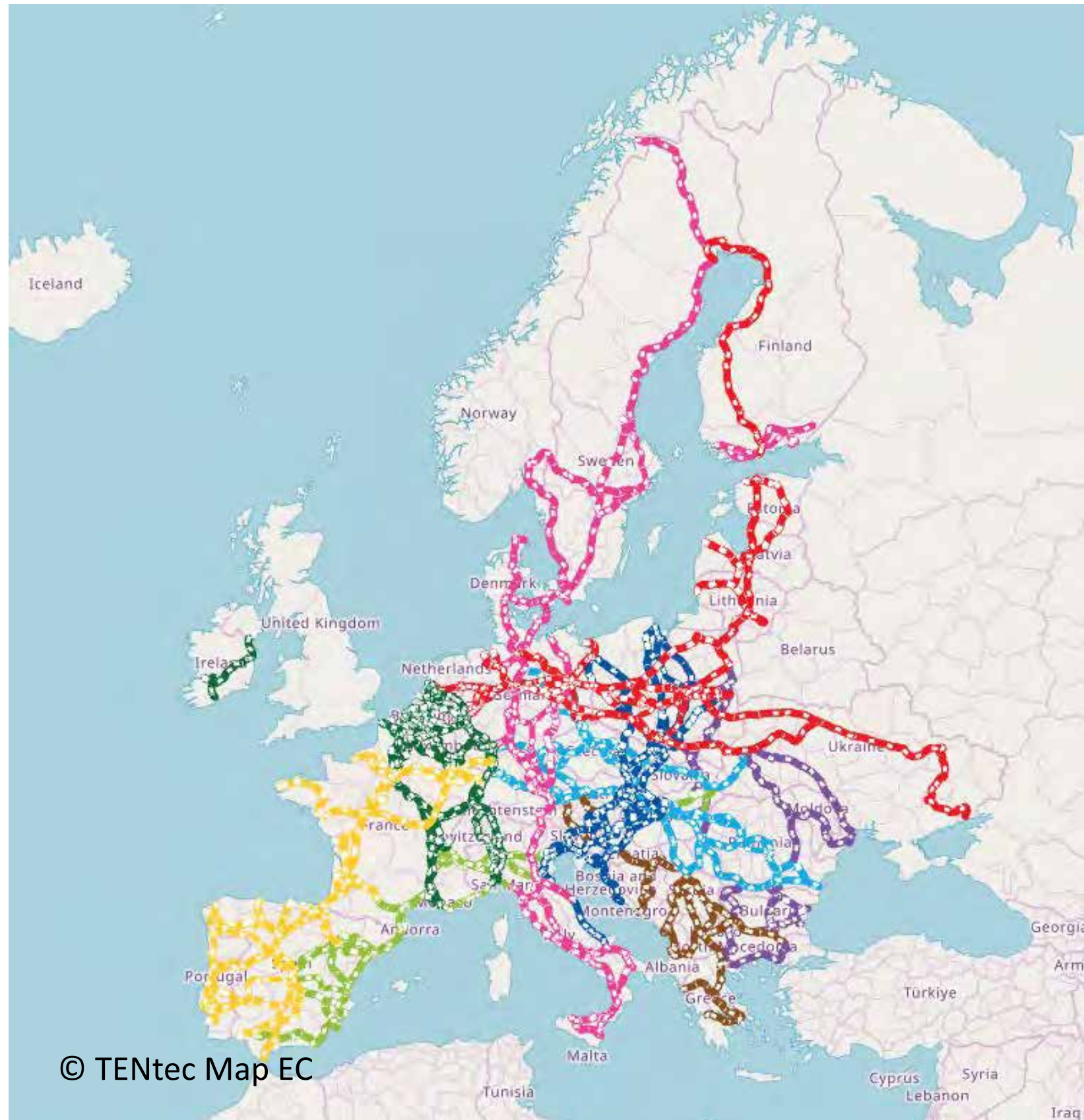


Railway Traffic



PV	RV	GV
Long-distance passenger traffic	Local passenger traffic	Freight traffic
Number of trains in both directions		

TEN-T Corridor

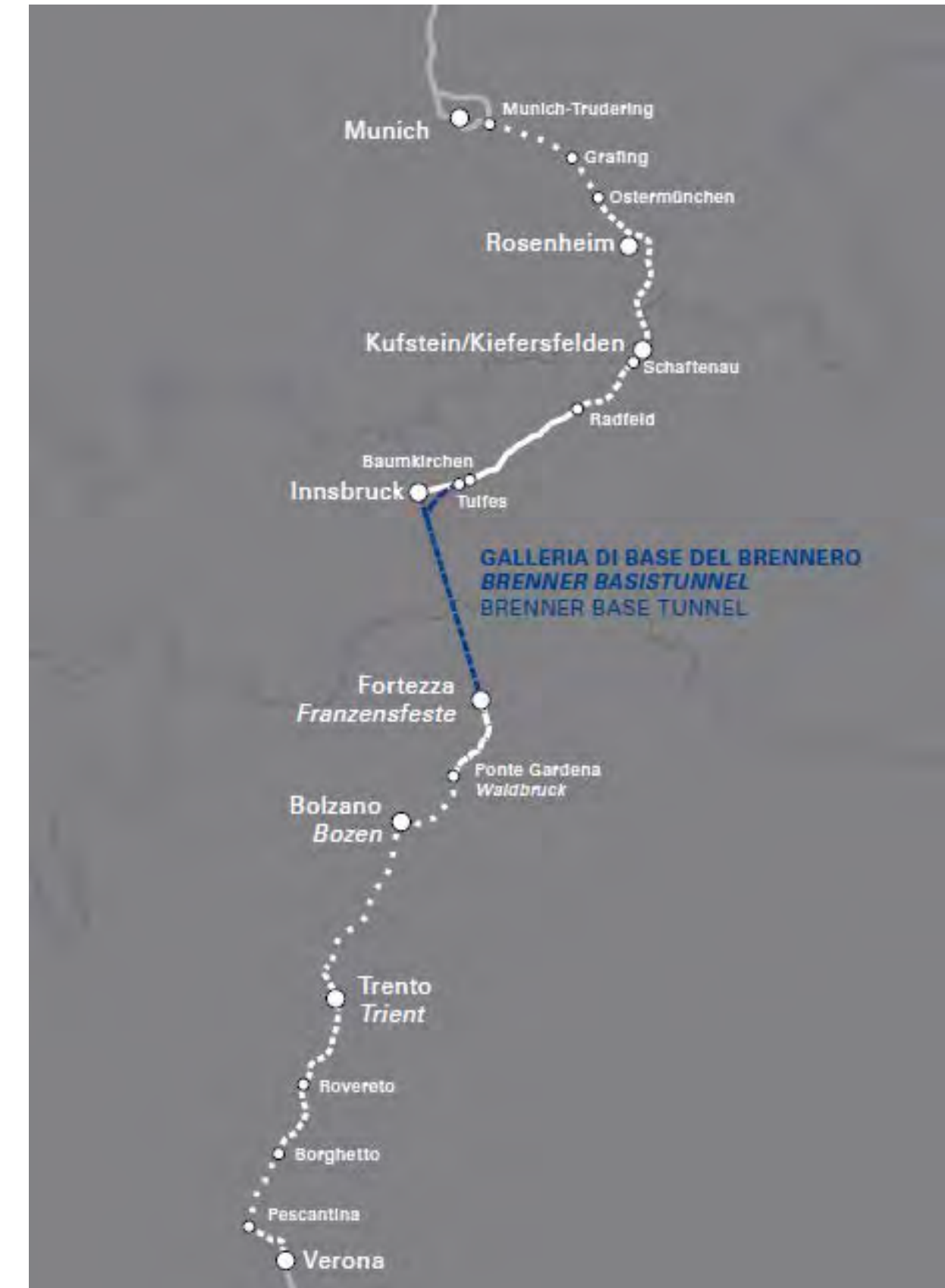


Trans-European-Network Transport:

- 9 corridors

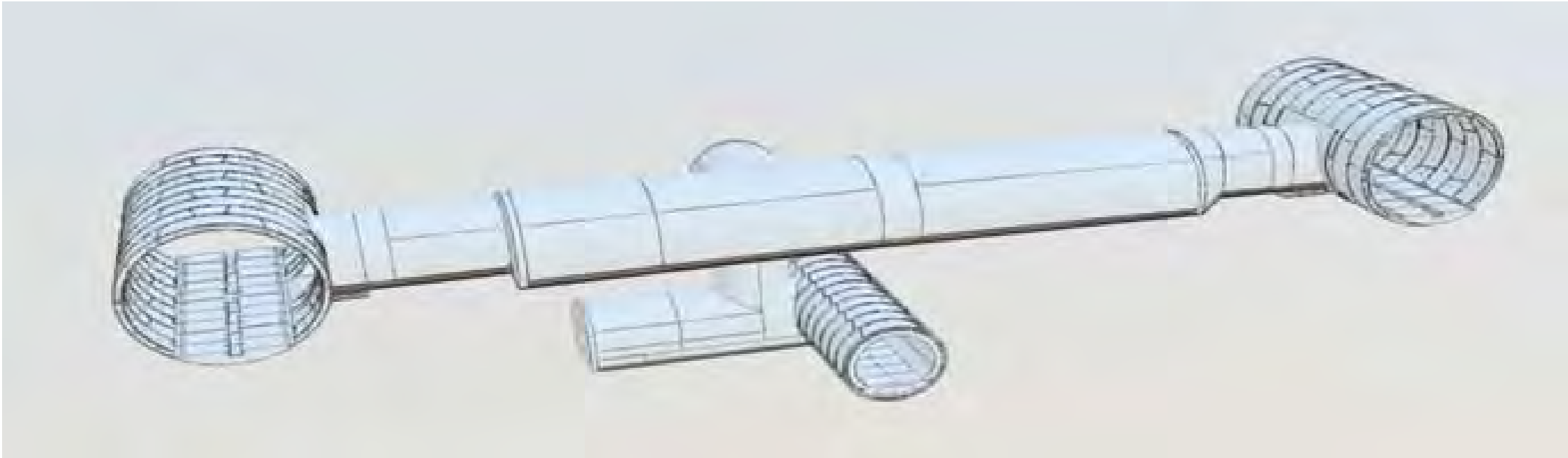
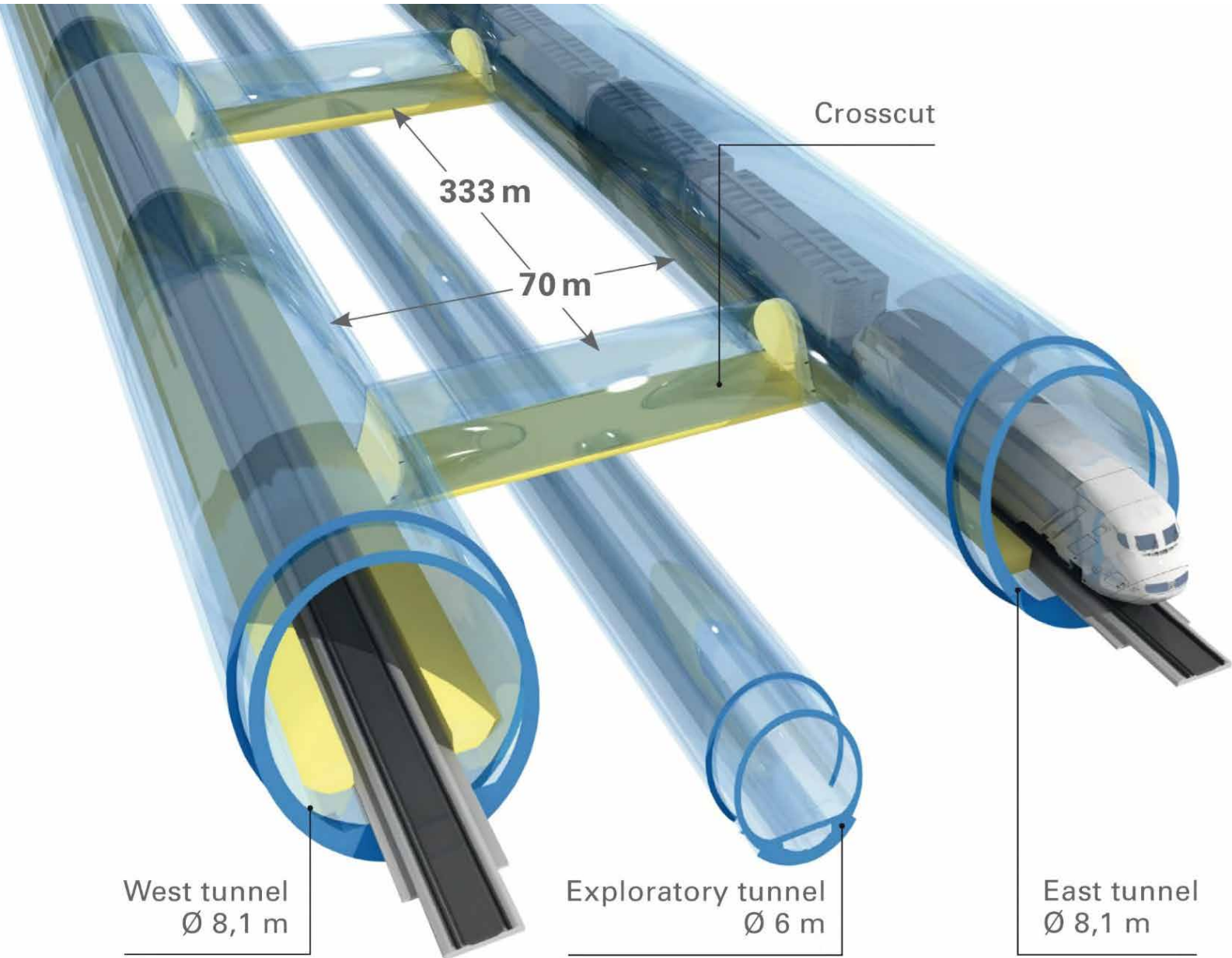
Scan Med corridor

- The longest corridor
- Approx. 9,400 km railway line
- 7 countries
- 110 million people
- BBT as the centrepiece (cross-border project)



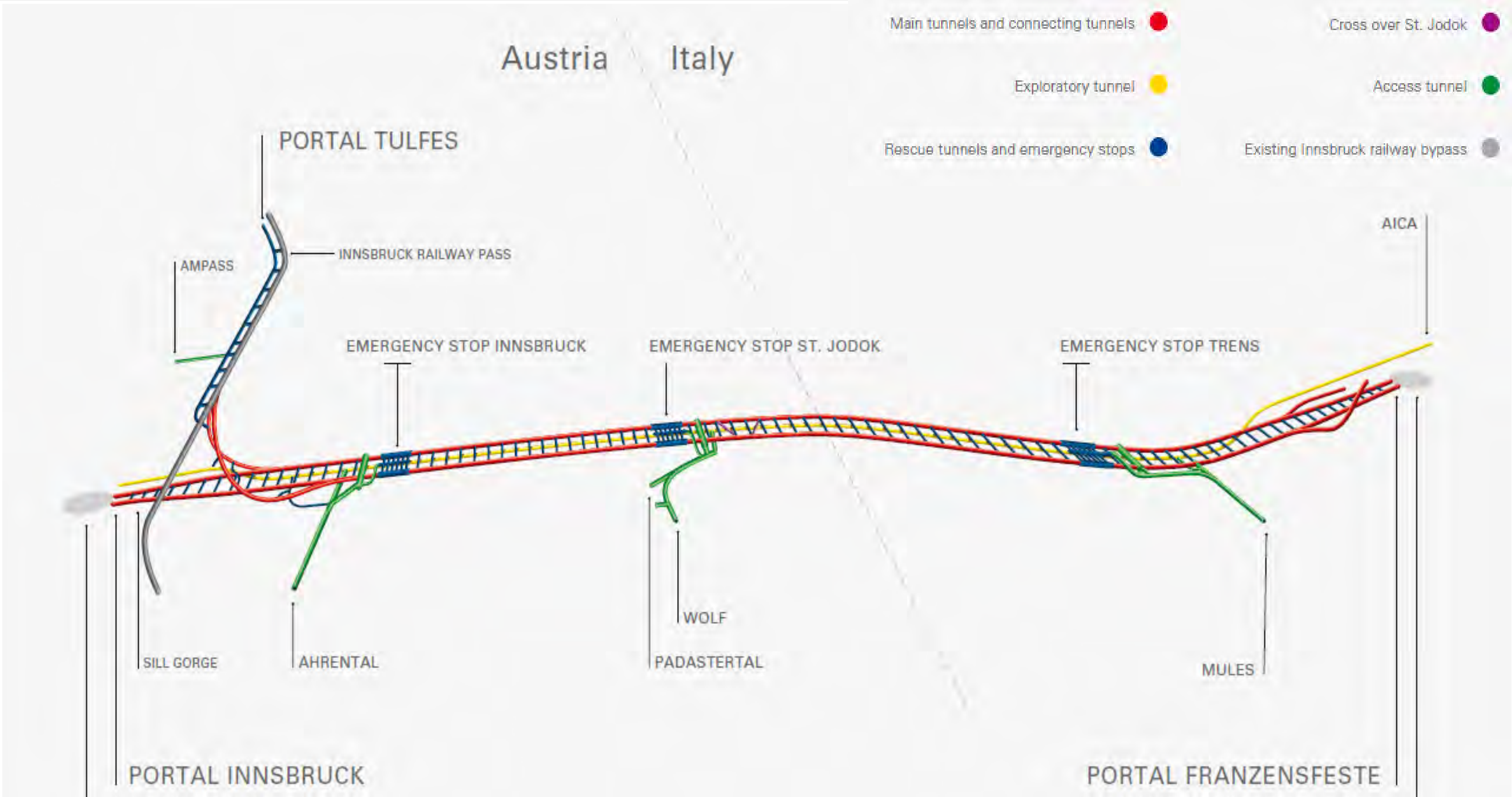


3 Tunnel Tubes



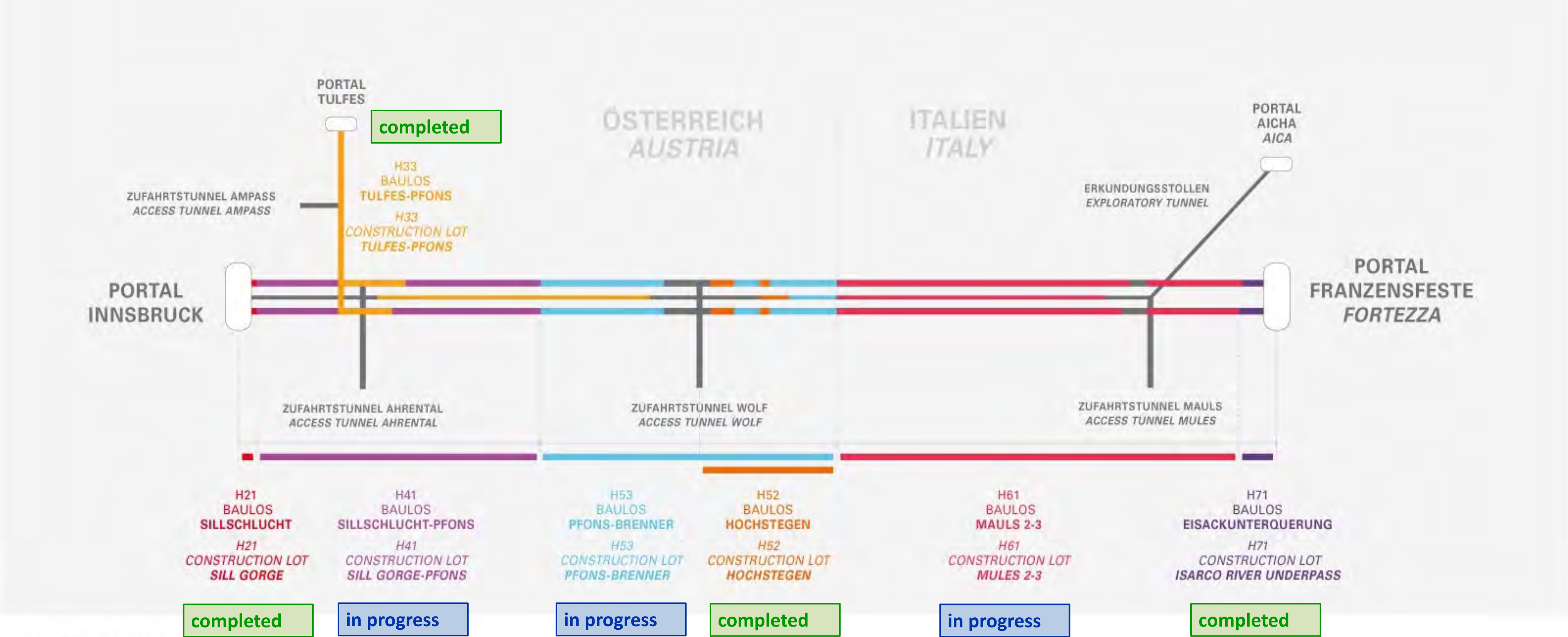


Tunnel layout





Overview of Construction Lots





Status of the works of the Brenner Base Tunnel

The BBT tunnel system includes about 230 km of tunnels.
206 km have already been excavated.

Progress of the works

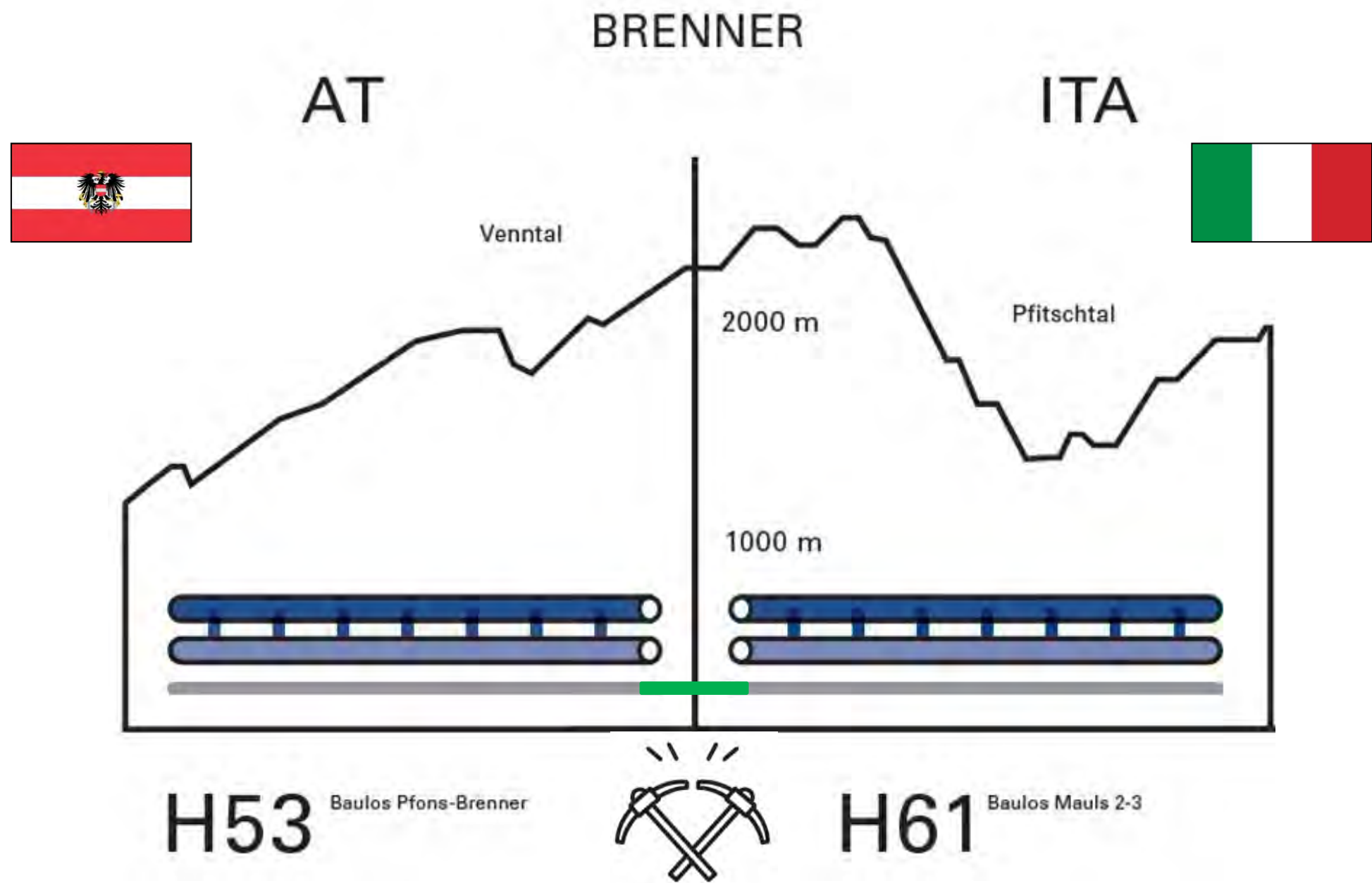
89 %



Railway tunnel	101 km	Exploratory tunnel	57 km	Other tunnels	48 km
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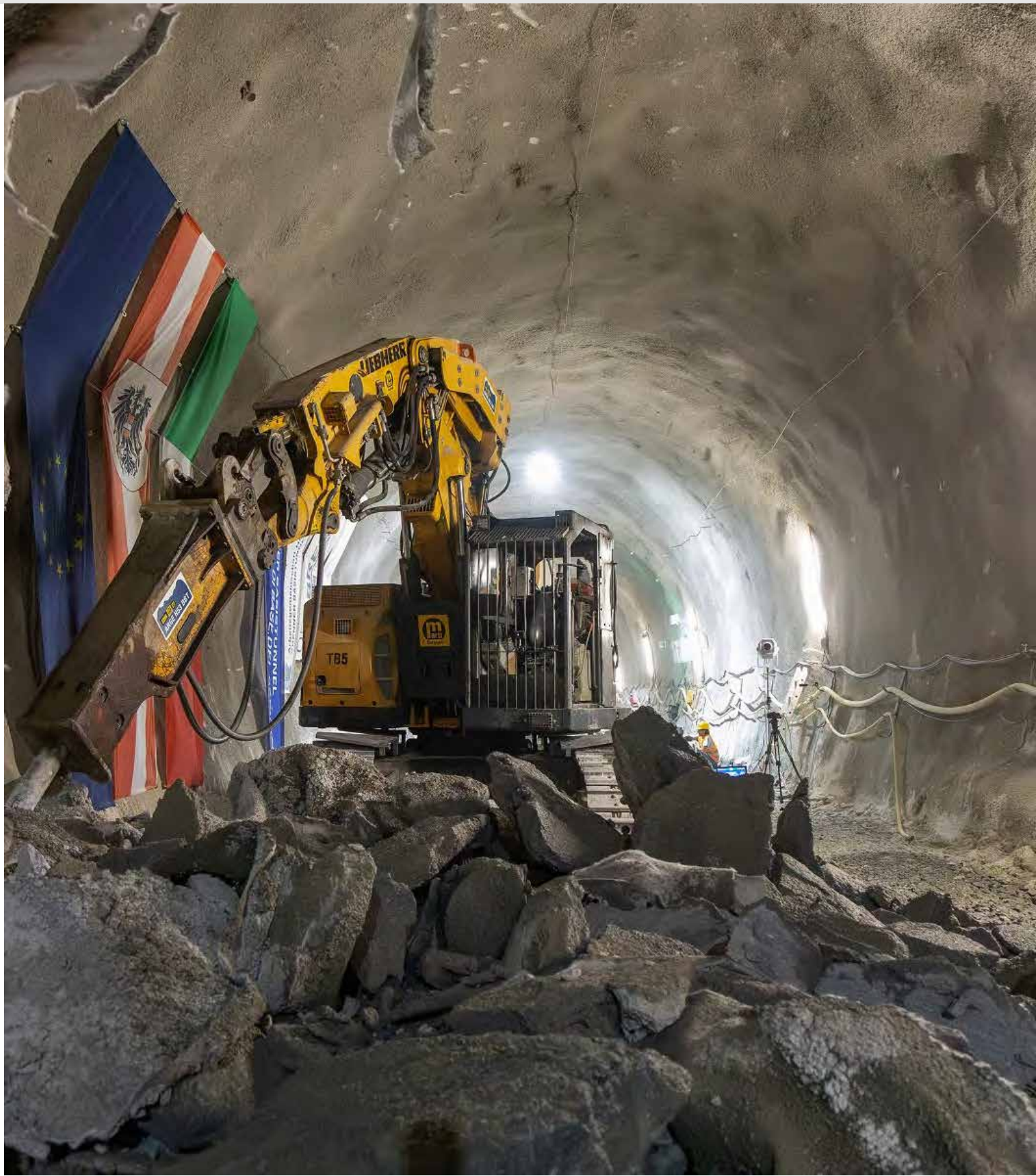


Historic milestone at the Brenner 18.09.2025



Breakthrough of the Exploratory tunnel

First BBT tunnel connection between Austria and Italy



Historic milestone at the Brenner 18.09.2025



Start of constructions

Exploratory tunnel

IT – 28.04.2008

AT – 04.12.2009

Depth of breakthrough

1.420 Meter

Outline

- Brenner Base Tunnel project
- **Railway equipment phase**
- Track systems in the BBT

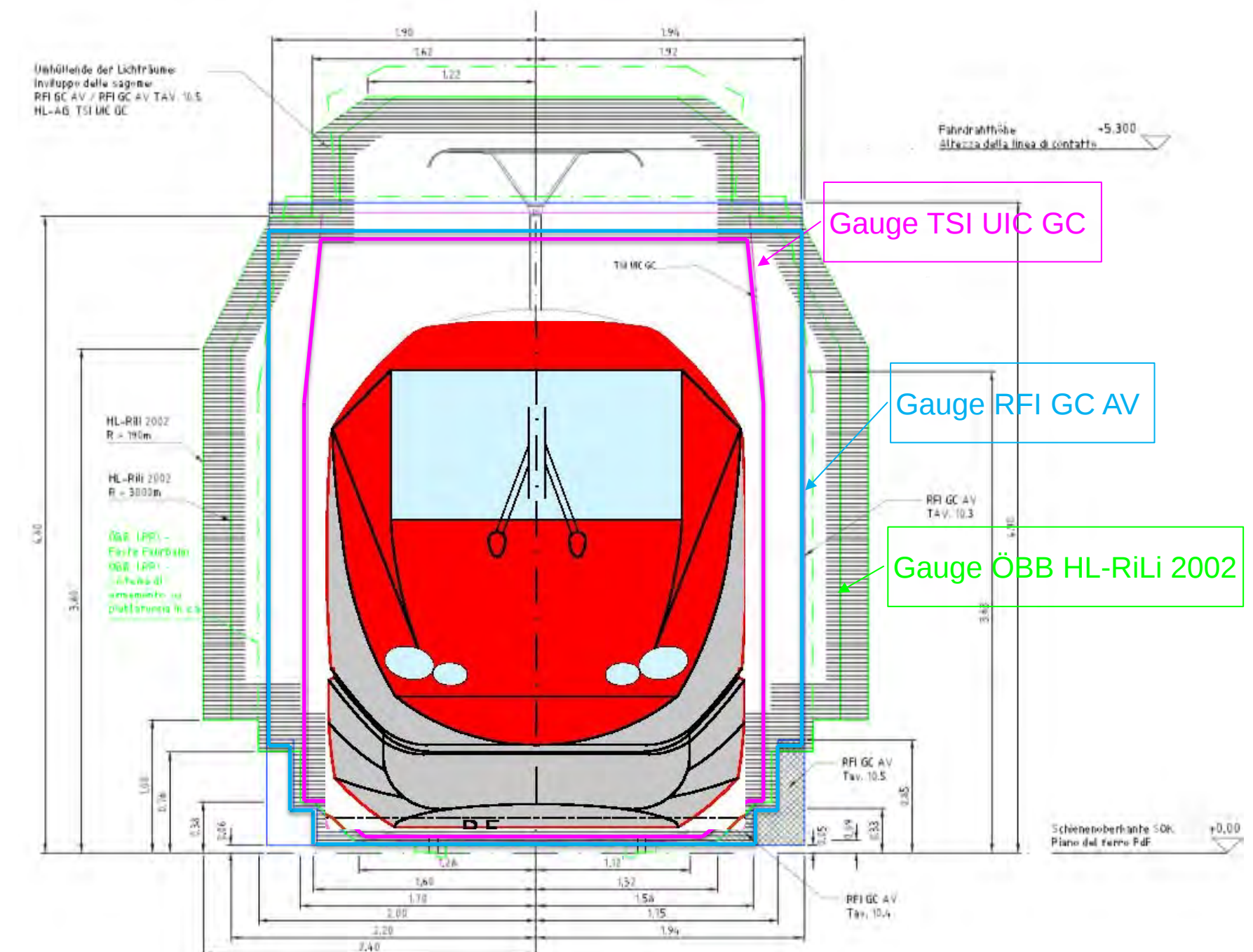
Technical data/specs

PROJECT SPEEDS

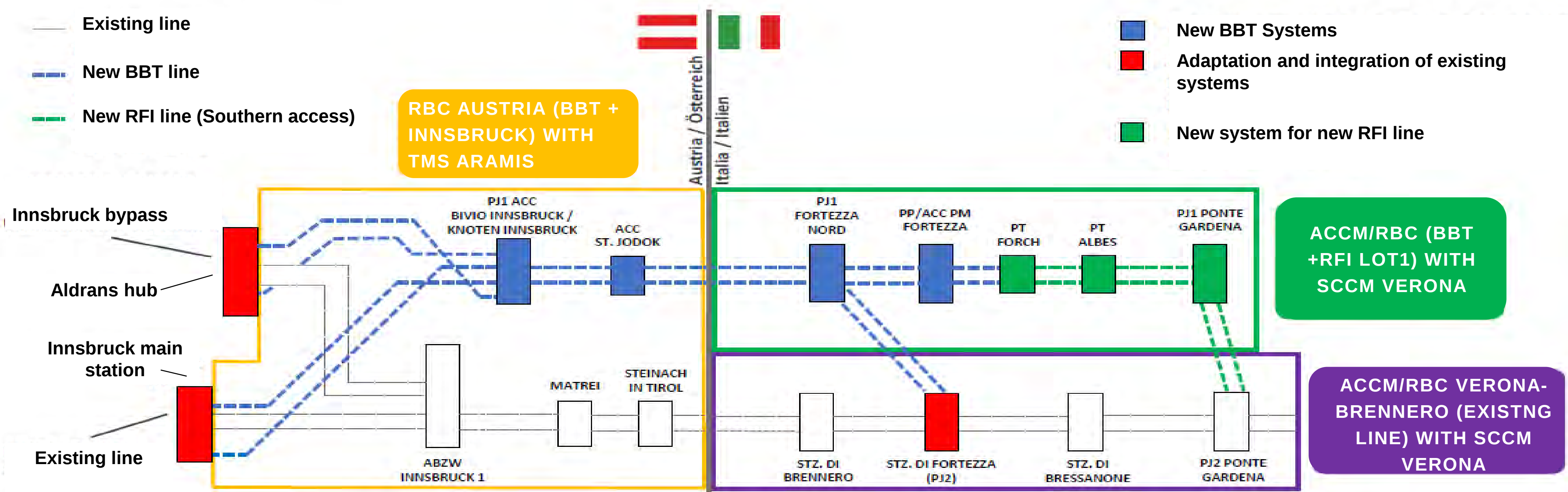
Passenger trains	max 250 km/h
Freight trains	160 km/h
Switches	100 km/h
Innsbruck Bypass	120 km/h

SYSTEM DATA

Main tunnels	2 one-track tunnels
Gauge	UIC GC and STI-TAV gauges (P/C 80, UIC 2.660x2.600 class 1, 2 and 3, Container Iso-High-Cube 2.438x2.900)
Interval between cross-connecting tunnels	333 m
Multifunction areas (at maximum intervals of 20 km)	3
Lateral access tunnels	4
Train length	740 m
Command, control and signalling subsystem	ERTMS/ETCS level II
Electrical traction subsystem	15kV 16.7 Hz and 25kV 50 Hz



Railway equipment – Signalling (train protection system)

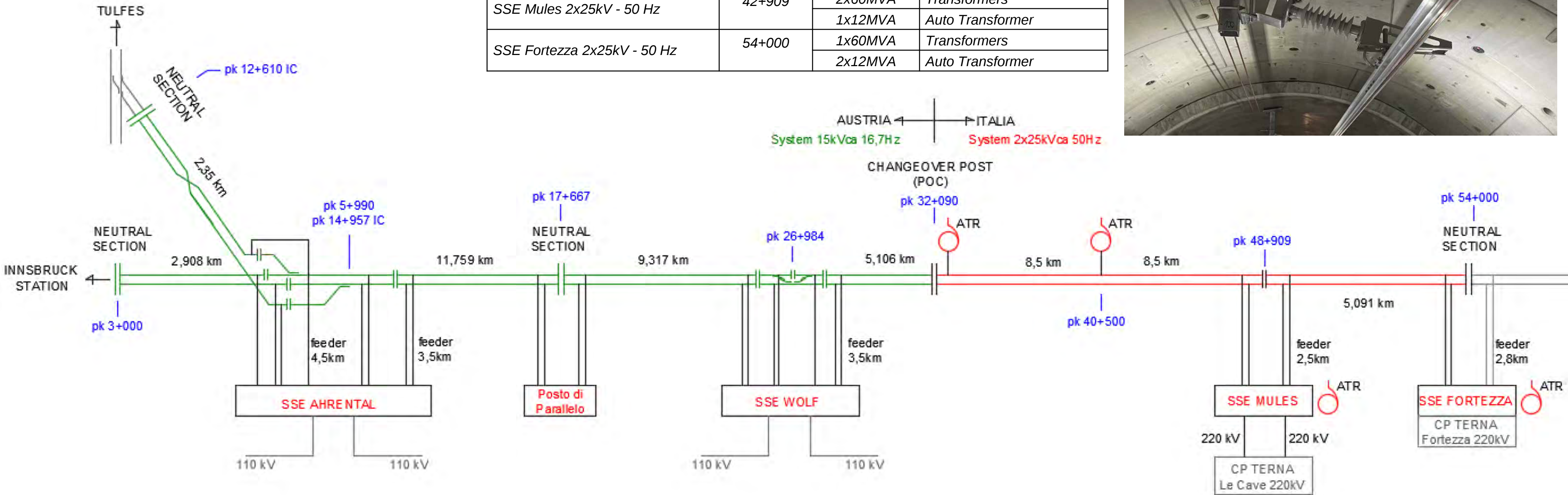




Railway equipment – Traction power

System	Catenary type	Cross section
Traction 15kV - 16,7 Hz	RIGID	Rigid 1226 mmq
		Contact line 120 mmq
Traction 2x25kV - 50 Hz	RIGID	Rigid 1226 mmq
		Contact line 160 mmq

Traction power facility	Location	Installed power	Type
SSE Ahrental 15kV - 16,7 Hz	5+990	3x18MVA	Transformers
SSE Wolf 15kV - 16,7 Hz	26+984	3x18MVA	Transformers
POC	32+090	2x12MVA	Auto Transformers
PPD	40+500	2x12MVA	Auto Transformers
SSE Mules 2x25kV - 50 Hz	42+909	2x60MVA	Transformers
		1x12MVA	Auto Transformer
SSE Fortezza 2x25kV - 50 Hz	54+000	1x60MVA	Transformers
		2x12MVA	Auto Transformer



Railway equipment

50Hz equipement

- 20kV (MV) / 400V (LV)
- Lighting
- UPS

TLC

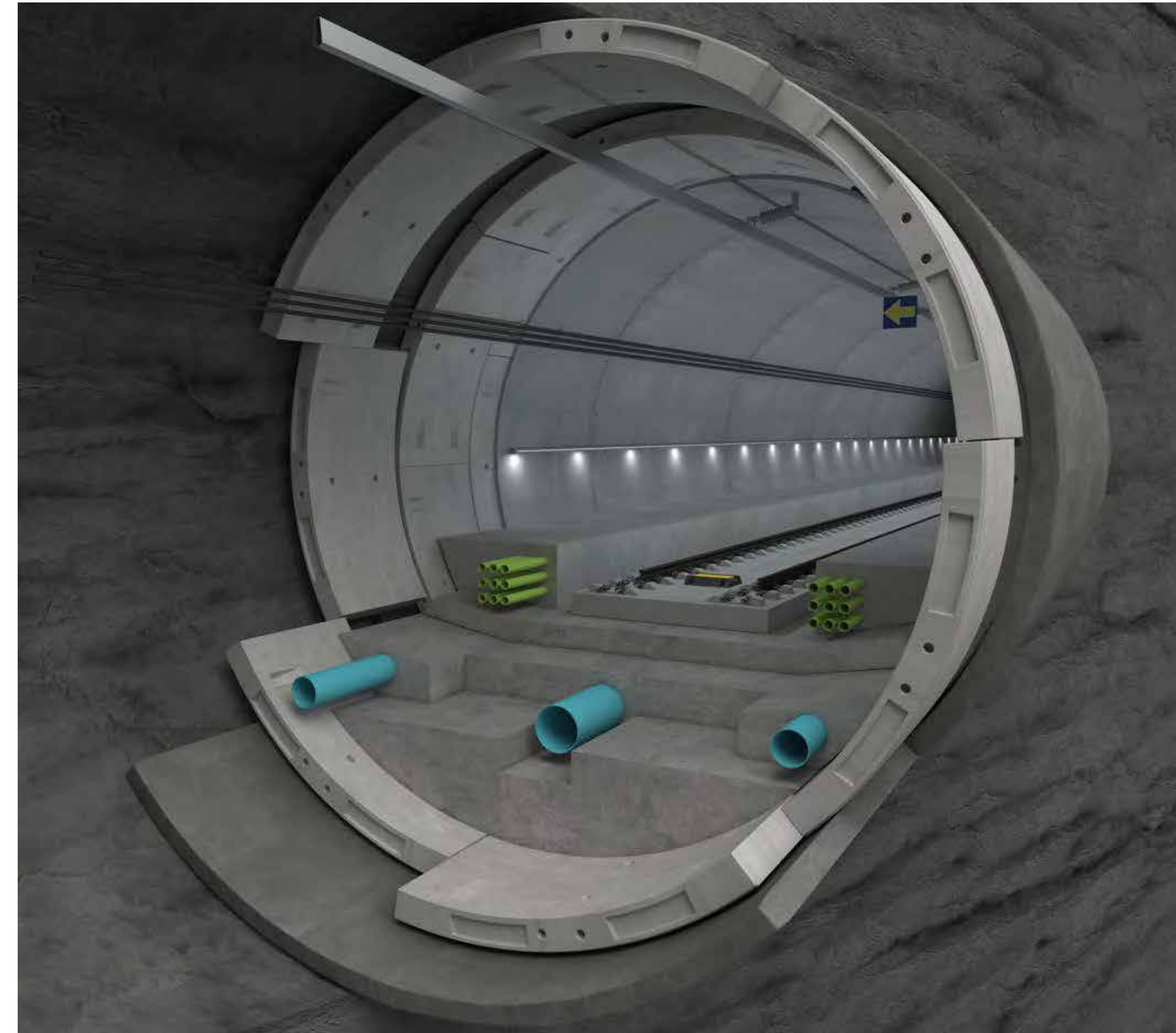
- Data transmission (IP-based, OTN)
- Radio technology (FRMCS, first responders' radio systems, public mobile communications)
- Loudspeakers in the emergency stops, emergency phones
- Fire detection and personal localisation systems

Mechanical systems

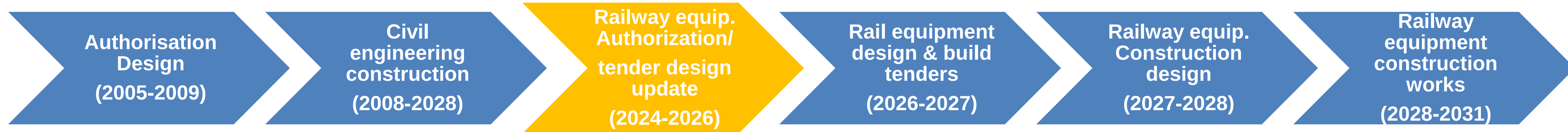
- Doors and gates
- Ventilation and climate control
- Firefighting water pipes or HDWNA
- (Illuminated) handrails

Remote control engineering & Command and control centres

- Remote control engineering for safe monitoring and control of all the tunnel systems
- Equipment for the technical command centres and the operational command and control centres



Railway equipment schedule



Goal of the design update:

- Update and optimize the original design of 2008 according to developments in railway technology and current regulations;
- Update the design according to the procurement plan of BBT;
- Take into account the new amended framework conditions and the new railway operational management.

Outline

- Brenner Base Tunnel project
- Railway equipment phase
- **Track systems in the BBT**

Track systems in the BBT

- Slab track systems
- Slab track with mass-spring-system
- Ballasted track
- Transition areas

Track systems in the BBT: slab track system

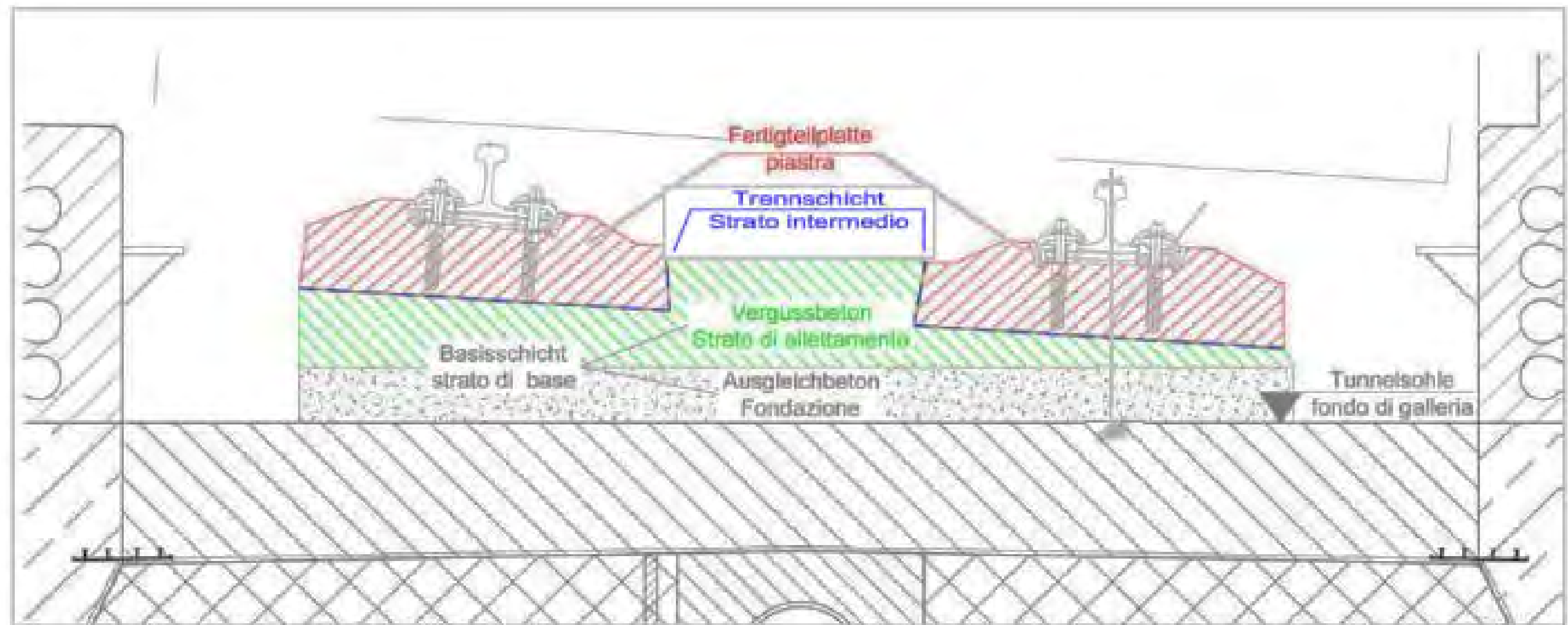
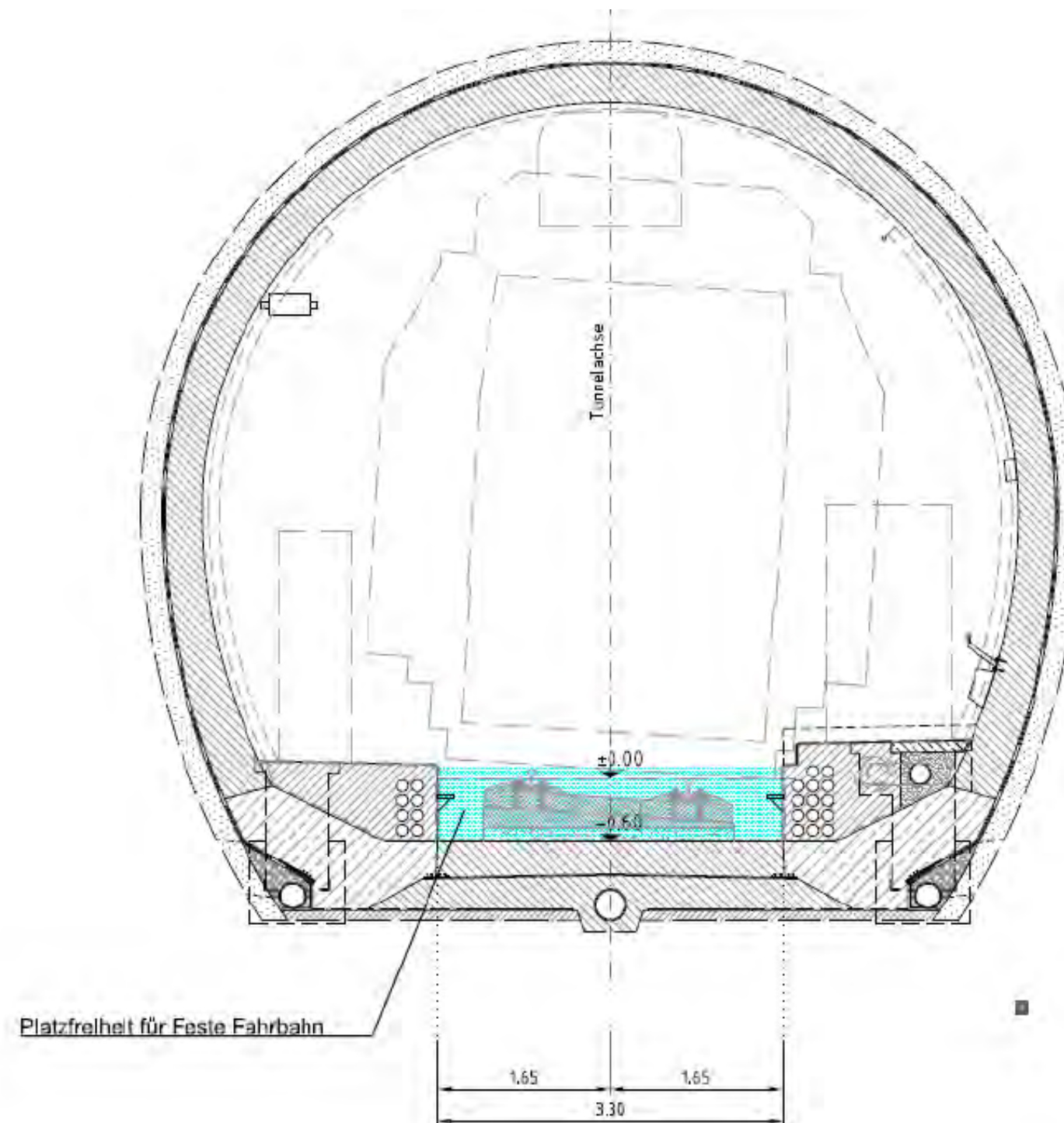
- The track construction must fulfil national requirements (Austria, Italy) and international guidelines (TSI)
- using **precast slabs**, which are laid on a base layer, possibly applying a separating layer.
 - Width: 240cm to 260cm
 - Thickness: 16cm to 25cm
- This corresponds to slab track systems that have largely been used in Italy and Austria to date
- The basic system of the slab track system must have passed in-service testing of at least 10 years in the European Union.

RAIL - TRACK

- according to EN 13674-1
- The standard track gauge for the main track and points must be 1437 mm
- Fastenings must fulfil the requirements of EN 13481-5

Track systems at BBT: slab track system

CROSS-SECTION

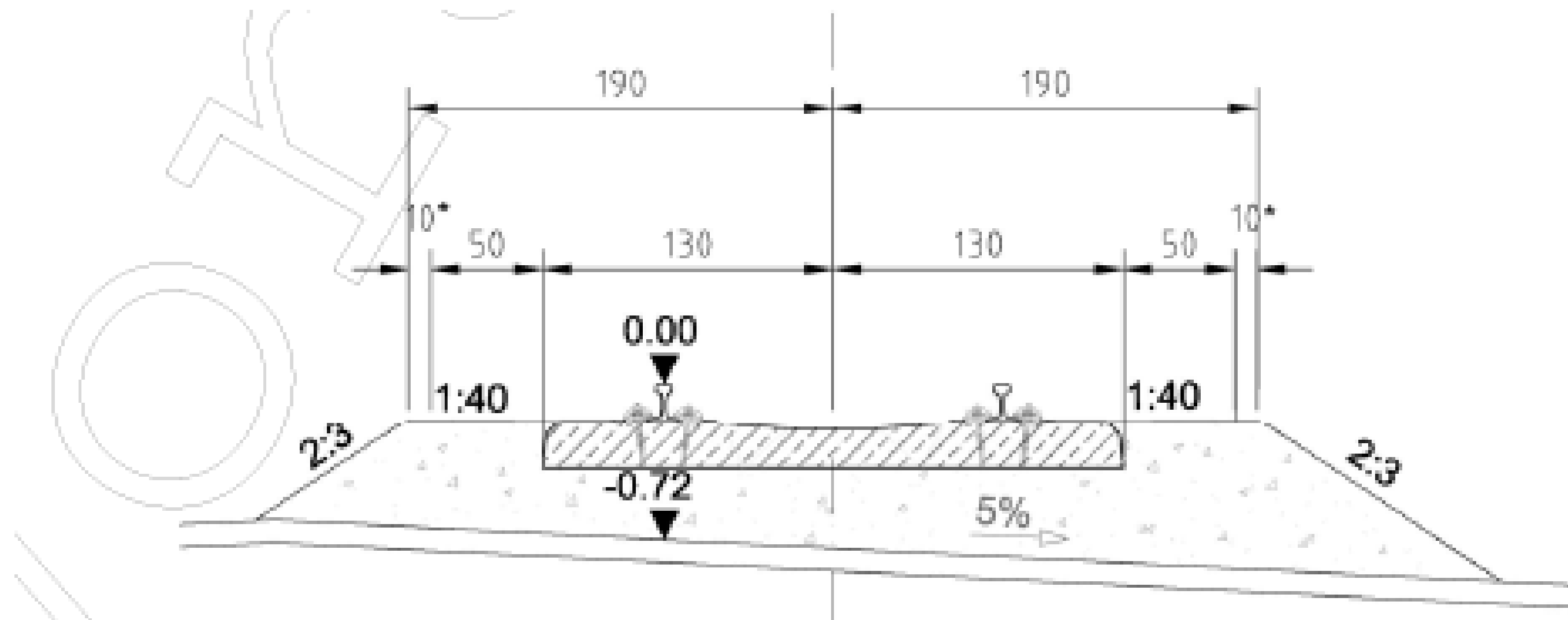


Track systems at BBT: Mass-Spring System

- Slab tracks must be adapted accordingly in sections with mass-spring systems
- Mass-spring systems are used wherever the dynamic forces of the trains travelling through the tunnel would cause unacceptable noise in houses above or nearby if this measure were not adopted.

Track systems at BBT: Ballasted track

- Outside the Brenner Base Tunnel a classic ballasted superstructure with seamlessly welded tracks
- A short section of ballast track is also used in the two tunnel tubes.



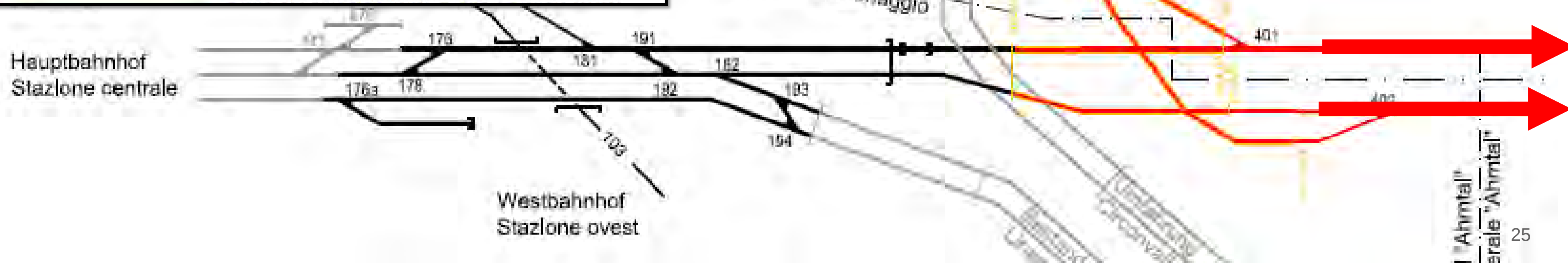
Track systems in the BBT: Transition areas

- The transition from slab track to ballasted track, with differing degrees of track stiffness, must be designed to provide a graduated transition in terms of stiffness
- The stiffness adjustment must be carried out over at least three sections.
- The vertical deflection difference under actual loads must not exceed 0.5 mm.

Track systems in the BBT: Area around Innsbruck

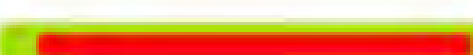
Legend Track systems

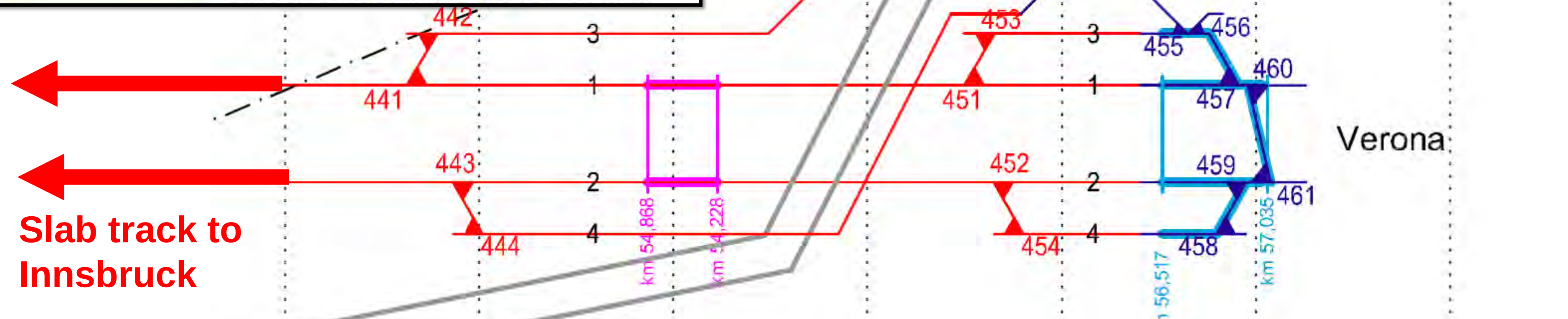
-  Slab track system
-  Mass-spring systems (3,9 to/m)
-  Mass-spring systems IV/III (4,9 to/m)
-  Mass-spring systems I (>7,7 to/m)
-  Ballasted track systems
-  Ballasted Track with Under-Ballast Mat



Track systems in the BBT: Area around Fortezza

Legend Track systems

-  Slab track system
-  Mass-spring systems (3,9 to/m)
-  Mass-spring systems IV/III (4,9 to/m)
-  Mass-spring systems I (>7,7 to/m)
-  Ballasted track systems
-  Ballasted Track with Under-Ballast Mat



Track systems at BBT: Summary

- Slab track systems: **ca. 100km**
- Slab track with mass-spring-system **ca. 10-20km**
- Ballasted track **< 5km**

BRENNER BASISTUNNEL

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BRENNER BASISTUNNEL BBT SE

Amraser Straße 8

A-6020 Innsbruck

T. + 43 512 4030

F. + 43 512 4030 110

bbt@bbt-se.com

www.bbt-se.com

GALLERIA DI BASE DEL BRENNERO

Piazza Stazione, 1

I-39100 Bolzano

T. + 39 0471 0622 10

F. + 39 0471 0622 11

bbt@bbt-se.com

www.bbt-se.com

Thank you



@bbt.se



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