The Project
Brenner Base Tunnel with a length of approx. 56 km is the main feature of the rail axis Munich – Verona. This section is part of the transeuropean traffic connection for high speed rail and for combined transportation north to south axis from Berlin to Palermo. The Brenner Base Tunnel system consists of two single track tunnel tubes. Both tunnels will be connected with cross adits every 333 m. Further, the tunnel system will include a pilot tunnel, which will be used as drainage and service tunnel. This tunnel will run between the two tubes in a lower level. Further, single track junction tunnels are foreseen to link the new system with the existing bypass Innsbruck and the portal area of Franzensfeste. Three multipurpose facilities, one with overtaking tracks will also be part of the tunnel system. The multipurpose facilities will include emergency halts to evacuate passengers of faulty trains and maintenance facilities. These facilities will be accessible by passable access tunnels west of the alignment. North of Innsbruck multipurpose facility two single track junction tunnels will branch of to the consisting bypass tunnel Innsbruck. This route will be used for freight trains. A flyover building will connect the junction tunnels with the bypass tunnel. Due to this construction a chance of tracks (left to right track and reverse) without crossing area will be possible. The junction tunnels will be connected by safety reasons with cross adits. Both tunnel tubes will have a regular wheel-base of 70 m. In the area of Franzensfeste and north of Innsbruck multipurpose facility as well as in geotechnical stable areas it will be 40 m. Further, the project will include the integration of the consisting railway stations of Innsbruck in the north and Franzensfest in the south.

Alignment and regular cross sections
National and international directives and compatibility criterias were the basis for the alignment planning. Further, geological and hydrogeological conditions, operation processes as well as safety and economical reasons were taken into consideration for alignment planning. The integration of the railway stations Innsbruck and Franzensfeste, the freight railway station and the bypass tunnel Innsbruck were optimized. The vertex of Brenner Base Tunnel will be situated at the border between Austria and Italy, this will cause a max. inclination of approx. 7.4 ‰ at north section and approx. 5.0 ‰ at south section. The design velocity for the alignment amount to 250 km/h. The excavation cross section of single track main tunnel tube is between 62 m² and 75 m². The optimized inner radius for the single track regular cross section (theoretical inner verge of inner lining) is 3.85 m.

Geology
The Brenner Base Railway Tunnel is planned to penetrate the central zone of the Eastern Alps which includes the Tauern Window. Furthermore it crosses the boundary between the Eastern and Southern Alps including a 7 km long section of the Southern Alpine Brixierr Granite. The main lithologies are schists and phyllites (~63%), gneisses and granites (~33%), and carbonates (~4%). The overburden has a maximum of 1850 m and an average of 870 m. Due to the occurrence of geotechnically difficult rocks (phyllite, schists and anhydrite) and the probability of high pressure water inflows the construction of the Brenner Base tunnel will be very problematic in some sections.

Construction
Main focus of Brenner Basis Tunnel construction is the excavation concept. The performance should be executed (after granting of permissions) in two phases:
Construction phase 1 – ground works: Excavation of access tunnels and intermediate accesses and the excavation of exploratory tunnel (drainage tunnel).
Construction phase 2 – main works: Simultaneous excavation of main tun-
PROJECT: BRENNER BASE TUNNEL
TYPE OF PROJECT: Railway tunnel
LOCATION: Innsbruck / Austria – Franzensfeste / Italy
PROJECT DATA:
Two single track tunnel tubes, rescue tunnel, multipurpose facilities, access tunnel and drainage tunnel;
Total length: approx. 64.3 km incl. bypass tunnel (main tunnel: 55.6 km);
Mined tunnel section (cyclic excavation with NATM, continuous excavation with TMB) and several sections with cut and cover method.
PERIOD OF SERVICES: 12/2004 – middle of 2008

ESTIMATED CONSTRUCTION COSTS:
5 bill. Euro
CLIENT: Brenner Basistunnel BBT SE

Geoconsult’s Services
- General project management of environmental impact assessment planning and technical treatment for the performances of public authority proceedings in Austria and Italy
- Construction design (main tunnel incl. two single track tubes, access tunnel, multipurpose facilities, drainage tunnel)
- Maintenance concepts at Austrian tunnel section
- SIGE planning
- Geology at Innsbruck area

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Cross sections of

EXPLORATORY TUNNEL
(DRAINAGE TUNNEL)
double lining, machine made