

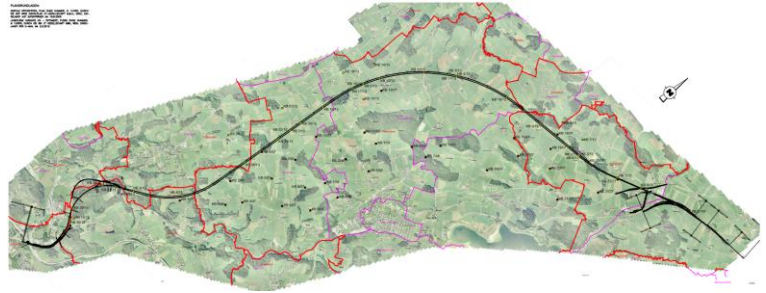
## PROJECT DESCRIPTION

The Flachgauertunnel, with a total length of 16,502 m, consist of two tunnels (Seekirchnertunnel, length: 14,502 m, Grafenholztunnel, length: 2,087.5 m). Both tunnels are connected by a tunnel-bridge crossing the river Fischach (length: 44.5 m).

The selected alignment (total length: approx. 21.08 km) diverts from the existing ÖBB-railway track at the Köstendorf curve, circumnavigates the villages Seekirchen and Elixhausen, crosses the river Fischach, underpasses the hill Grafenholz and joins the ÖBB-track again at Kasern, a northern suburb of the City of Salzburg.

The Flachgauertunnel is designed as a single-track double-tube tunnel. For tunnel construction different construction methods are required, such as cut & cover and concrete slab cover excavation, drill & blast well as TBM (EPB) excavation.

The tunnel has a continuous down slope gradient of 0.8% as a maximum from east-portal of Seekirchnertunnel to west-portal of Grafenholztunnel.



Alignment of the new railway line between Salzburg and Seekirchen

## GROUND CONDITIONS

The project is located northeast of Salzburg in the northern foothills of the Alps and lies within the geological unit of Flysch.

With respect to morphology the landscape in the south-western part consists of hills made up of Flysch rocks, which rise about 100 m above the valley bottom of the rivers *Salzach* and *Fischach*. The north-eastern part is characterized by ground moraines and drumlins. According to the direction of glacial advance (Würm-glacial-stage) the drumlins are orientated SW-NE.

The project area is widely covered by quaternary sediments (Pleistocene to Holocene). Mainly these are moraine sediments, fluvio-glacial sediments (soft rock and hard rock as conglomerate), fluvial and lacustrine

sediments as well as overburden by mainly weathered or transferred glacial sediments.

The basement below the quaternary sediments consists of Cretaceous to Paleocene alternating sequences of sandstone and clay-/siltstone with variable carbonate content and single intercalations of carbonatic rock. These rocks belong to the Rhenodanubic Flysch.

Two main fault systems, which include cataclastic rocks with dimensions up to several tens of meters, can be distinguished in the project area:

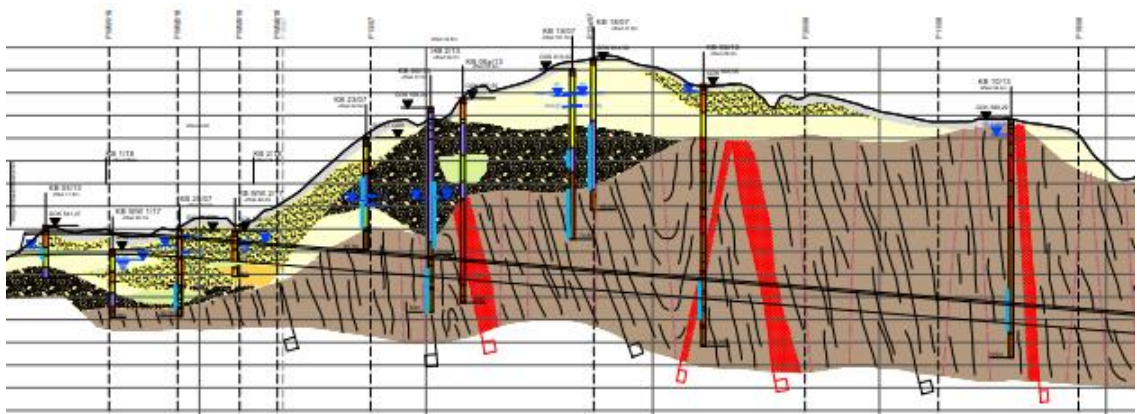
- WNW-ESE to W-E striking fault zones, dipping steep to the North or rather to the South;
- NE-SW to NNE-SSW striking fault zones again with steep dip angles.



Ground moraines – Drumlins



Drill cores (Flysch rock)



Seekirchner Tunnel, excerpt of the longitudinal section

### 3G TASKS

- Project management with respect to engineering geological tasks
- Design of the engineering geological investigation programs
- Engineering geological field mapping
- Supervision of the investigation works and core logging
- Statistical evaluation and analysis of structural data
- Engineering geological and geotechnical assessment for corridor and route selection
- Rock mass characterization
- Geological-geotechnical

modelling and prediction

- Investigation of disposal areas for tunnel muck
- BIM – geological ground modelling
- Report with respect to corridor and route selection process and environmental impact study (UVE in progress)

driven by NATM.

#### TYPE OF PROJECT:

Engineering geological and geotechnical planning and consulting services for corridor and route selection as well as environmental impact study

#### LOCATION:

Köstendorf – Kasern, Austria

#### PERIOD OF 3G TASKS:

Since 2005

#### CLIENT AND OWNER:

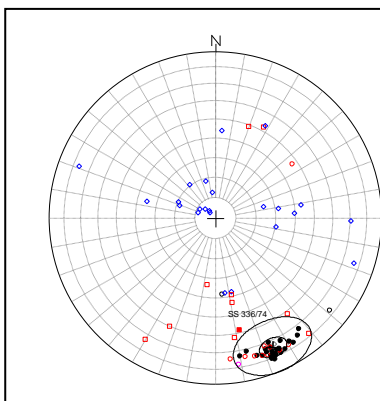
ÖBB – Infrastruktur AG (Austrian Federal Railways)

### KEY DATA

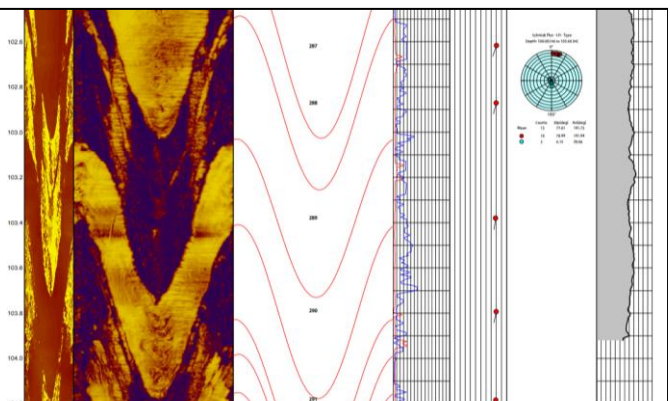
#### PROJECT:

Seekirchnertunnel: double tube – single track railway tunnel with a length of 14.37 km, about 13.33 km driven by TBM and NATM.

Grafenholztunnel: double tube – single track railway tunnel with a length of 2.09 km, about 1.14 km



Analysis of structural data



Results borehole geophysics (ABF, CAL, GR)