



ENGINEERING  
EXCELLENCE



## Tunnels and Caverns



Powerhouse Cavern of Limmern Power Plant, Switzerland

# Tunnels and Caverns



Niagara Tunnel, Canada



Pfänder Tunnel, Austria



Base Tunnel at Gotthard, Switzerland

## Fields of Expertise

- Road tunnels
- Railway tunnels
- Utility tunnels
- Water tunnels (hydropower plants, water supply and wastewater disposal systems)
- Adits
- Caverns
- Shafts

## Highlights

- Construction methods in soft ground and hard rock (sequential excavation, TBM excavation with gripper TBM, shield TBM, hydro-shield TBM, EPB TBM; micro tunnelling)
- 1,000+ km of tunnels
- 57 km - one of the world's longest tunnels (Gotthard Base Tunnel, Switzerland)
- 55 km - one of the world's longest tunnels (Brenner Base Tunnel, Austria / Italy)
- 14.4 m diameter TBM - the world's largest hard-rock TBM (Niagara Tunnel, Canada)
- All disciplines covered in-house (rock and soil mechanics, geotechnics, structural engineering, aerodynamics, ventilation, safety, risk assessment, supervision)

## Selected References

- Gotthard Base Tunnel (SEM / TBM, 57 km), Switzerland
- Brenner Base Tunnel (SEM / TBM, 55 km), Austria / Italy
- New Ebensfeld-Erfurt Railway Line (SEM, 37.8 km of tunnels), Germany
- Perschling Tunnels (TBM, 7.44 km of tunnels), Austria
- Pfänder Tunnel, 2<sup>nd</sup> Tube (TBM, 6.6 km), Austria
- Niagara Tunnel Project, Water Diversion Tunnel (TBM, 10.4 km, 500 m<sup>3</sup>/s), Canada
- Limberg II Pumped Storage Plant, Tunnels and Shafts, Kaprun HEPP (SEM / TBM), Austria

- Channel Tunnel, Undersea Crossover Cavern (SEM, span: 21.2 m), United Kingdom

## ILF Services

ILF provides all services required for the successful implementation of tunnel and cavern projects.

Principal services:

- Feasibility study
- Conceptual design
- Permit application design
- Detailed design
- Preparation of tender documents
- Construction design
- Construction supervision
- As built design

Supplementary services:

- Collection of geological and hydrogeological data
- Geological and hydrogeological investigation programmes incl. evaluation
- Geotechnical and geomechanical modelling
- Numerical modelling and stability analyses
- Solutions for special problems such as karst, swelling and squeezing rock; compensation of settlements, minimisation of calcification, reduction of vibrations
- Aerodynamics
- Safety concepts, safety analyses
- Evacuation simulations
- Fire protection measures
- Emergency ventilation, air-conditioning
- Noise protection for portal areas
- Design of doors, gates and shutters
- Interoperability reviews (TSI)
- Construction management
- Claim management



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