



REFERENCES

Company: GeoEngineering
Name: **Hubert KIRSCHNER, M.Sc.**
Nationality: Austrian
Date of Birth: 10.04.1960
Profession: Senior Engineering Geologist
Position in firm: Graduated Consulting Engineer for Geology / Owner
Years with firm: Since 2011

Key Qualification:

28 years of experience in geology, engineering geology, hydrogeology and geotechnical engineering:

- Engineering geologist for tunnelling/shaft (NATM, RMR-Q Sys.) and mass-movement (rockfall, landslide).
- Geological consultant (investigation, analysis and prediction).
- Geotechnical instrumentation and monitoring.
- Supervision for tunnel/cavern (excavation, support measures & permanent lining structures).
- Software: Geotechnical, ACAD, ArcGIS, QGIS

Selected References:

Since 2011 Office: **GEOENGINEERING** / Chartered Engineering Consultant for Geology planning, tendering, investigations, supervision

Tunnelling in Urban Area

07/2014 – 09/2016 **Confederation Line, Ottawa Light Rail Transit (OLRT)**, Ontario, Canada
2.5 km long twin-track running tunnel including three light-rail stations, diameter 19 m in hard rock and soft ground. Hard rock excavation is carried out by road-header, and soft ground excavation by the excavator.
Position: Chief Geotechnical Engineer

05/2013 – 04/2014 **MTR South Island Line (East), Admiralty Integrated Station and SCL Enabling Works, Contract C901**, Hong Kong SAR
KIER – LAING O'ROURKE – KADEN Joint Venture, Hong Kong SAR
Contract Partner: KIER Infrastructure and Overseas Ltd.
Client: MTR Corporation Ltd
Geological-geotechnical documentation and monitoring in ADM Cavern, Platform Tunnels, Adits and Underpinning in Station Box. Q - Rock mass classification and rock support determination, investigations, testing and prediction; NATM method.
Position: Engineering Geologist

Supervision

2023 – 2024 **DB Project "2. S-Bahn Stammstrecke (VE41-Marienhof)"**, Munich, Germany
Contract partner: GEOCONSULT Germany
Client: German Railway, DB Info
Consulting on the geotechnical monitoring and supervision for the new station

“Marienhof”.

Position: Geological-Geotechnical Consultant

04/2011 – 03/2013 **New Hefei–Fuzhou High-Speed Railway Passenger Dedicated Line P.D.L / Mingan Section L3**, Jianyang (Office), PC 354300, Fujian Province, P.R.China
 Client: MoR, Ministry of Railway, China
 Speed 350 km/h – ballast-less track, length 810 km
 Supervision Consulting: Professional Supervision Engineer (PSE) for tunnel and subgrade in Lot V; length 52 km, 24 tunnels and subgrades.
 Tunnel length total: 18.380,0 m; 24 tunnels between 178,0 m to 2.591,0 m length; X-section approx. 170 m²
 Position: Professional Tunnel Expert

Cavern

12/2017 – 07/2021 **ADNOC, M-Project, Al Fujairah, UAE (confidential)**. The construction of three (3) units of the underground crude oil storage facility. One unit includes four caverns with a dimension of 20m x 25m x 1350m each, 7m and 5m D-shaped water tunnels, water curtain boreholes, access tunnels, compressor units, and access roads. Storage capability 42Mbbbl; investment 1.2bn USD; world's single biggest U/G oil storage facility. The excavation method is drill and blast.
 Position: Sr. Chief Geologist on-site; consulting for South Korea's SK E&C (EPC Contractor).

04/2017 **ADNOC M-Project, Storage of Crude Oil**, Al Fujairah, UAE
 Preparation of Tender Documents: Geological – Geotechnical Assessment
 Geological Consultant

01/2012 – 03/2012 **Strategic Storage of Crude Oil Project**, Visakhapatnam, India
 Client: Indian Strategic Petroleum Reserves Ltd. (ISPRL)
 Underground construction: Restoration work for Wedge Failure Area (approx. 3.000 m³ Volume Wedge Failure)
 Position: Sr. Geologist

12/2009 – 02/2011 **Strategic Storage of Crude Oil Project**, Padur, India
 Indian Strategic Petroleum Reserves Ltd. (ISPRL)
 Underground oil storage caverns, Unit A
 Four caverns 700m x 20m x 30m (LWH) with a capacity of 1,25 million metric tons, one access tunnel, two water curtain tunnels, two pump shafts, two inlet shafts, total capacity of units A & B: 2,5 million metric tons
 Geotechnical consultation and engineering geological documentation using KRONOS from Geodata of tunnels, shafts and caverns including recommending the rock support systems using the Q-System (Barton et al., 1978)
 Senior-Geologist on-site

06/2008 – 03/2009 **Strategic Crude Oil Project in Underground Rock Caverns**, Visakhapatnam, India
 Indian Strategic Petroleum Reserve Limited (ISPRL), Contractor: Hindustan Construction Company (HCC)
 Underground oil caverns: 3 A-caverns 840 m x 20m x 30m (LWH); 2 B-caverns 320m x 20m x 30m (LWH); total capacity of oil storage caverns: 1,33 million metric tons; total length of access and cross tunnels 1400 m; total length of water curtain tunnels 1140 m; 5 shafts up to circa 75 m depth;
 Geotechnical consultation and engineering geological documentation of slopes, tunnels, shafts and caverns including recommending the rock support systems in metamorphic

rocks using the Q-System (Barton et al., 1978)
Geologist on-site

Tunnelling

- 2022 **ÖBB Route 3021/10104 State Border Wörgl, Wörgl - Innsbruck
Schaftenau – Radfeld-Junction, Four-Track Expansion**
Geological-geotechnical document review and tender for submission and construction.
Position: Consulting Engineer, Geology
- 2017 **Koralp Railway Project, TU Stein, Graz-Klagenfurt, Austria**
Position: Engineering Consultant for Geology
- 09/2010 – 10/2010 **Hydroelectric Dam Project Kühtai – Pilot Tunnel, Tyrol, Austria**
TIWAG, Innsbruck
Pilot tunnel (length 750 m) and execution 1100 m of core drillings to explore the area of the underground structures of the hydroelectric dam project, Kühtai, Tyrol, Austria
Engineering geological tunnel and core drilling documentation
Geologist on-site
- 07/2010 **New Railway Ebensfeld-Erfurt, Construction Lot Silberberg Tunnel, Ilm Kreis, Thüringen, Germany**
Deutsche Bahn ProjektBau GmbH – Ingenieurbüro Vössing GmbH
Circa 7,4 km long railway tunnel, parallel pilot tunnel/emergency tunnel and 8 emergency exits with total length of 4,4 km, maximum gradient 10%, conventional tunnel driving (NATM), cross-sectional area circa 180 m², maximum overburden 120 m
Construction supervision and engineering geological documentation
Geologist on-site
- 07/2010 **New Railway Ebensfeld-Erfurt, Construction Lot Brandkopf Tunnel, Ilm Kreis, Thüringen, Germany**
Deutsche Bahn Projekt Bau GmbH – Ingenieurbüro Vössing GmbH
Double-track railway tunnel of 193 m length, conventional tunnel driving (NATM), cross-sectional area circa 100 m² (max. 180 m²), maximum overburden 120 m
Construction supervision and engineering geological documentation
Geologist on-site
- 06/2007 – 05/2008 **Railway Project Munich-Verona, Inn Valley Corridor, Lot H4-3, Feeder Radfeld - Baumkirchen, Tyrol, Austria**
Brenner Eisenbahn GmbH (BEG), Innsbruck
New railway network with construction of civil works using traditional and specialized tunnelling and building methods; total lot length 2,6 km; length of rehabilitated and shifted line 2,0 km; maximum depth of the open cuts 17,5 m; circa 750 m of pressure tunnelling using extensive jet grouting enclosure in soft ground (fluvial deposits), cross-sectional area circa 127 m²; tunnelling under existing infrastructures; very shallow overburden (to 3 m below surface); groundwater level 2 m under the surface
Engineering geological documentation and consultancy during the pressure tunnel drive
Senior-Geologist on-site
- 1999 – 2000 **Munich-Verona Railway Axis, feeder line North/Lower Inn valley, Austria (Brenner Eisenbahn GmbH)**
Access tunnel (approx. 100 m)
Brixlegg East reconnaissance tunnel (approx. 2500 m)
Vomp East reconnaissance tunnel (approx. 4000 m)
Vomp West reconnaissance tunnel (approx. 1500 m)

Engineering geology consultancy services and tunnel documentation
Geologist

- 1998 **Munich-Verona Railway Axis, feeder line North/Lower Inn valley**, Austria (Brenner Eisenbahn GmbH)
Geological, hydrogeological and geotechnical tunnel prediction for the preparation of tender documents for
Vomp East reconnaissance tunnel (approx. 4000 m)
Vomp West reconnaissance tunnel (approx. 500 m)
Project geologist

Geological-Hydrogeological Field- and Underground Investigation

- 05/2010 – 06/2010 **Patnitop Road Tunnel**, Jammu & Kashmir, India
JV Gammon and Marti for the National Highway Authority
Double tube Road tunnel with emergency galleries, Length 2 x 9 km
Geological mapping and consulting during tendering for the contractor
Geologist on-site
- 06/2009 – 04/2010 **Hydroelectric Dam Project, Kaunertal Expansion, Environmental Impact Report**
Tyrol, Austria
TIWAG, Innsbruck
Hydropower plant expansion, construction of: earth dam with height of 121 m, reservoir with working capacity of 42 million m³, a pump-storage plant (upper stage power plant, extension capacity circa 400 MW), circa 23km of diversion tunnels and 4 stream barrages, a circa 13 km long headrace tunnel, and lower stage power plant (extension capacity circa 500 MW)
Hydrogeological mapping in alpine country of up to 3500 m (area circa 180 km²); establishment of a water-rights monitoring programme; data management and interpretation; compiling of environmental impact reports, maps and sections in the field of groundwater; GIS organisation and management
Hydrogeologist on-site
- 2002 – 2003 **Linz western ring (A26), 4th Danube crossing, Nordspange**, Upper Austria
(Provincial Government of Upper Austria)
Total length: 8.5 km; 2 motorway-tunnels (two-lines each) with 3.2 and 2.8 km, numerous access galleries, Danube River crossing; preliminary design
Elaboration of the 2nd phase II soil survey, coordination of drilling works and tests, geological analysis of soil survey, Completion of authority procedures
Project Manager for underground investigations
- Express road S-69, section Wegierska Gorka**, Milowka/Poland
Tunnel prediction, geological, hydrogeological and geotechnical soil investigations for 4.5 km (two-line) tunnel
Project Manager for underground investigations.
- 2002 **City Express road in Katowice/Poland**
Tunnel prediction, geological, hydrogeological and geotechnical soil investigations for several open cut tunnels in an urban area
Project Manager for underground investigations.
- National Highway NH1A**, Jammu-Srinagar, India
National Highway Authority, Delhi

- Geological field mapping, evaluation and presentation, including the data for the study of alternatives and feasibility 2nd phase.
Geologist
- 2001 **SS 508 Sarntal valley road – competition project for the straightening of the Sarntal valley road**, Italy
(Autonomous Province of Bolzano, South Tyrol)
Basic geological mapping for the design competition
Geologist
- Paso Ancho Hydropower Plants**, Rio Chiriqui, Panama
(Andes Telecoms Consulting GmbH)
Basic geological mapping for conceptual study
Geologist
- 2000 – 2001 **Westring Linz-Westspange, 4th Danube river bridge, Nordspange**, Austria
(Provincial Government of Upper Austria)
Study of alternatives 2001,
Elaboration of tender documents for Phase 1 Soil Survey, coordination of drilling works and tests, geological analysis of soil survey
project manager for underground investigations
Geologist
- 2000 **National Highway NH1A**, Jammu-Srinagar, India
National Highway Authority, Delhi
Basic geological field investigation carried out for the study of alternatives and feasibility — 1st phase.
Geologist
- 1999 **Rheintal motorway A14 – Amberg Tunnel**, Austria
(Provincial Government of Vorarlberg)
Geological detail mapping
Geological, hydrogeological and geotechnical prediction for construction of second tunnel tube (approx. 3,000 m)
Project geologist
- 1998 **Arlberg expressway S16 - Strengen tunnel**, Austria
(ASG)
Geological detail mapping and
Geological, hydrogeological and geotechnical prediction for two-bore motorway tunnel construction (each approx. 5,700 m)
Project geologist
- 1998 **BAB A71 federal motorway – Rennsteig tunnel**, Germany
(DEGES)
Brandleite tunnel overpass: reconnaissance and test coordination, on-site data evaluation, geological-geotechnical prognosis
- 1998 **Soil/Site exploration for bedload retention basin at Wörgler Bach creek**, Austrian
Forestral Service for Torrent and Avalanche Control.
- 1997 – 1998 **Leutasch WWTP**
Technical-economic site assessment prepared for the wastewater treatment plant.
Engineering Geologist

- 1997 **ALPECON WILHELMY Geosciences**
Exploration of sand and gravel resources in Eastern Tyrol; Site exploration in
Telfs/Stubaital valley, St. Ulrich/Pillersee, Austria

Geotechnics

- 04/2009 – 02/2010 **Railway Project Munich-Verona, Brenner Base Tunnel – Pilot Tunnel**, Tyrol, Austria
– South Tyrol, Italy
BBT-SE, Innsbruck
56 km long twin-tube railway tunnel, emergency tunnels, multi-function junctions, access
tunnels and water diversion tunnel
Taking accompanying geotechnical measurements (inclinometer) during the construction
of the pilot civil works & tunnel in the Innsbruck Gorge
Engineering Geologist on-site
- 08/2006 – 06/2007 **Pir Panjal Railway Tunnel**, Jammu & Kashmir, India
Ircon International Limited, Delhi
Railway tunnel of 11 km length in the Jammu & Kashmir region with complicated
geological behaviour (circa 2 km of soil, up to 1 km of overburden in the central area
along with large-scale karst difficulties)
Engineering geological consultancy and schooling of the on-site Indian geologists for the
geological-geotechnical documentation and prognosis during the tunnel driving
Geologist on-site

Mass-Movement and Landslide

- 2003 – 2006 **alpS – GmbH, Centre for natural hazard management**
PROJEKT A 2.3; Multi-disciplinary analysis of processes for monitoring and modelling of
unstable slopes in connection with (recent) tectonic-seismic events; investigations in
Austria. Estimation of geogenic hazard potentials as well as the collection of geogenic
risks in intensively used landscape parts with the development of a standardised manual
insensitive high-alpine areas.
Deputy Project Manager
- 1999 **Rockfall at the Eiblschrofen massif**, Austria
Intensive geotechnical monitoring;
Project manager of the data collection centre for geology/geotechnics.

Pipe Line

- 2001 **Burgas-Alexandroupolis Oil Pipeline Project**, Bulgaria/Greece
(BAPLINE I/V S.A. / Thraki S.A.)
Geological-geotechnical consultancy
Geologist

Research

- 2001 – 2003 **Environmental tectonics of the eastern Stubai Alps and the Wipptal Valley**, Austria
(Ministry of Education, Science and Culture, Provincial Government of the Tyrol)

A brittle tectonic study to evaluate hydrological and geogenic risks as well as water resource hazards - research project
Hydrological-hydrogeological analysis
Geologist

1986 – 1996

University of Innsbruck

Structural geological analyses on the exploitation of thermal water resources in the Ötztal valley, Tyrol, Austria
Geotechnical surveying and mapping of the “Lainbach” torrent in the region of Reutte, Tyrol, Austria
Stratigraphic and tectonic analysis in the mountains of Tannheim, Tyrol, Austria

Building Construction

1981 – 1986

Hanel Construction Management GmbH (Innsbruck)

Techno Design- Planning- & Construction GmbH (Salzburg)

D.I. Westhausser, Engineering Consultant (ZT) for Structural Design (Salzburg)

Preliminary design, tender design, BOQ, detail design for various projects of structural engineering nature

Publications and Lectures (2001 to 2017):

Geology

Hydrogeologische Modellentwicklung im Brenner-Gebiet.-

BURGER, U., KIRSCHNER, H. & MILLEN, B., 2003: Geol. B.-A., Arbeitstagung 2003; Bl. Brenner u. Sterzing, S 239-249, Wien. pdf

Umwelttektonik der östlichen Stubai Alpen und des Wipptales.-

ROCKENSCHAUB, M., BRANDNER, R., BURGER, U., DECKER, K., KIRSCHNER, H., MAURER, C., MILLEN, B., POSCHER, G., PRAGER, C. & REITER, F., 2004: Forschungsprojekt TC 12, 229. Pdf

Engineering Geology

Projektierung und Bauausführung von Verkehrswegeprojekten in instabilen Hangflanken.-

SAUSGRUBER, T., KIRSCHNER, H. & POSCHER, G., 2001: 13. Nat. Tag. Ing.-geologie: Kinematische Prozesse in der Ingenieurgeologie - Modelle und Wirklichkeit, Karlsruhe. Pdf

Bergbautätigkeit als stabilitätsrelevanter Faktor einer Hangflanke. Evaluierung mittels einer probabilistischen Analyse.-

HEISSEL, G., MATTLE, B., PÖTTLER, R. & KIRSCHNER, H., 2001: 13. Nat. Tag. Ing.-Geologie: Kinematische Prozesse in der Ingenieurgeologie - Modelle und Wirklichkeit, Karlsruhe.

Tunnelling

Risks and hazards caused by groundwater during tunnelling: geotechnical solutions used as demonstrated by recent examples from Tyrol, Austria.-

SCHWARZ, L., REICHL, I., KIRSCHNER, H. & ROBL, K.P., 2006: Environ. Geol., 49, 858-864. Pdf

Tunnelbau in einer Großrutschung – Wuyi Tunnel der Hochgeschwindigkeitsbahnstrecke Hefei-Fuzhou, China.-

STINGL V., NEUMANN, N. & KIRSCHNER, H., 2017: Bauingenieur, Band 29, TB. Pdf

Geotechnics and Georisk

- Structural influence on deformation mechanisms of slope instabilities in crystalline rock (Tyrol/Austria).
KIRSCHNER, H., ZANGERL, C. & BRANDNER, R., 2004: 32th IGC Florence, Abstract. Pdf
- Geodätisches Monitoring und Modellierung instabiler Hänge am Beispiel Niedergallmigg/Tirol.-KIRSCHNER, H. & GILLARDUZZI, K., 2005: In: Chesi, G. & Weinold, T. (Hrsg.), Obergurgl 2005, 193-198.
- Geology and 3D seismic structure of the Niedergallmigg – Matekopf mass-movement, Tyrol, Austria.-
CHWATAL, W., KIRSCHNER, H, BRÜCKL, E. & ZANGERL, C., 2005: EGU 2005, Wien, Geophys. Res. Abstract. Pdf
- Kinematics and Hazard of the Niedergallmigg-Matekopf mass movement.-
CHWATAL, W., KIRSCHNER, H, BRÜCKL, E. & ZANGERL, C., 2006: EGU 2006, Wien, Geophys. Res. Abstract. Pdf
- Hornbergl: Bericht zur geologisch-geotechnischen Untersuchung.-
KIRSCHNER, H., 2006: Unveröff. Kartierungsbericht im Auftrag des Forsttechnischen Dienstes für Wildbachund Lawinenverbauung, Geologische Stelle, Innsbruck.
- Process-based investigations and monitoring of deep-seated landslides.-
ZANGERL; C., PRAGER; C., CHWATAL; W., MERTL; S., RENK; D., SCHNEIDER-MUNTAU B., KIRSCHNER; H., BRANDNER; R., BRÜCKL; E., FELLIN; W., TENTSCHERT; E., EDER; S., POSCHER; G., SCHÖNLAUB; H., 2009: In: Veulliet, E., Stötter, J., Weck-Hannemann, H. (eds.), 2009: Sustainable Natural Hazard Management in Alpine Environments, 135-173, Springer Verlag. ISBN: 978-3-642-03228-8. Pdf
- Tiefgründige Massenbewegungen des Kristallins. Interdisziplinäre Untersuchungen an tiefgründigen Massenbewegungen in Gneisen und Schiefern des Ostalpins und Penninikums.-
KIRSCHNER, H., 2011: Südwestdeutscher Verlag f. Hochschulschriften (SVH), 138, ISBN: 978-3-8381-2262-5
- Kinematics and internal deformation of a slow deep-seated rock slide in metamorphic rock (Niedergallmigg, Austria).-
ZANGERL, C., PRAGER, C., CHWATAL W., BRÜCKL, E., KIRSCHNER, H & BRANDNER, R., 2012: In: Eberhardt, E., Froese, C., Turner, K., Lerouell, S.: Landslides and Engineered Slopes. Protecting Society through Improved Understanding. Taylor & Francis Group, 653-658, ISBN 978-0-415-62123-6. Pdf
- Formation processes, geomechanical characterization and buttressing effects at the toe of deep-seated rock slides in foliated metamorphic rock.-
ZANGERL, C., CHWATAL W., KIRSCHNER, H, 2015: Geomorphology, 243, p51-64. pdf

Lectures (Poster)

- 2004 International Geological Congress, Florenz/Italy
2004_Kirschner, Zangerl & Brandner_32IG-florenz_abstract pdf
- 2005 International Geodetic Congress, Obergurgl/Tirol
2005_Kirschner & Gillarduzzi_geodaetisches-monitorng pdf
- 2006 European Geosciences Union (EGU), General Assembly, Vienna pdf
2006_Chwatal, Kirschner, Brückl & Zangerl_Kinematics and Hazzard_abstract pdf