

**Name:** Zare, Shokrollah  
**Languages:** Persian, English, Norwegian (Basic)  
**Address:** Faculty of Mining, Petroleum and Geophysics Engineering,  
 Shahrood University of Technology, Shahrood, Iran

**E-mail:** [zare@shahroodut.ac.ir](mailto:zare@shahroodut.ac.ir)  
**Phone:** +98 9199242042

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### Education

2007 PhD, Civil Engineering-Tunnelling, Norwegian University of Science and Technology, Trondheim, Norway.  
 1999 MSc in Mining Engineering-Rock Mechanics, Tarbiat Modares University, Tehran, Iran.  
 1995 BSc in Mining Engineering, Amirkabir University of Technology, Tehran, Iran.

### Professional Experience

Over 20 years' experience in the field of Tunnelling, Underground Space and Rock Mechanics.

2009- Present Shahrood University of Technology, Shahrood, Iran.  
 Associate Professor, Faculty of Mining, Petroleum and Geophysics Engineering  
 Courses Taught:

- Tunnelling (MSc, Rock Mechanics)
- Rock slope engineering (MSc, Rock Mechanics)
- Tunnel and shaft excavation (BSc, Mining Engineering)
- Advanced tunnel and shaft excavation (MSc, Mining Engineering)
- Conventional tunnelling (MSc, Tunnel & Underground Space Engineering)
- Mechanised tunnelling (MSc, Tunnel & Underground Space Engineering)
- Design and construction of underground spaces (MSc, Rock Mechanics)

2019- Present Shahrood University of Technology, Shahrood, Iran.  
 Member of "Center of Excellence of Mining Engineering"

2015-2019 Tehran Shomal Freeway Company, Tehran, Iran.  
 Overseeing and technical review of detailed design of Alborz Road Tunnel awarded to Geodata Consulting Company, Italy

2015- 2015 Tose-e Consulting Engineers, Tehran, Iran.  
 Senior consultant, detailed design of Shiraz Metro Line2

2012-2015 Petro Sahel Persian Gulf Development Company, Tehran, Iran.  
 Research and Development Manager, pre-feasibility study for underground copper mining, underground oil and gas storages and application of DAT in TBM tunnel.  
 Responsible and contact person of foreign consulting companies in the above projects

2012- 2012 ICE Company, Tehran, Iran.  
 Senior consultant, detailed design of Kanisib Water Conveyance Tunnel

- 2011- 2012 Mabna Consulting Engineers, Tehran, Iran.  
Stability analysis and slope design of road trenches in Talegan
- 2010- 2012 SCE Company, Tehran, Iran.  
Senior consultant, basic design of Qom Metro Line A  
Research and development projects: comparison of cut and cover and NATM tunnels in urban areas, excavation methods for small size and long tunnels in hard rocks  
Coordination of the foreign consultancy services for basic design of metro system and preparation of tender documents awarded to SYSTRA Company, France, for Qom Metro Line A
- 2008- 2010 SCE Company, Tehran, Iran.  
Head of Tunnelling and Rock Mechanics Division, preparation of the related design documents were the main responsibility of the division. The main projects were as follows:
- Detailed design of Azmar road tunnel, length 2.5 km, D&B method, design of ventilation and lightning during operation
  - Detailed design of Zagros Water Conveyance Tunnel (lot 1a), length 13 km, hard rock TBM tunnel
  - Detailed design of Karaj Water Conveyance Tunnel (lot 2), , length 14 km, hard rock TBM tunnel
  - Detailed design of Tehran Metro Line 7 (East-west tunnel), length 12 km, mechanised tunnel in urban areas
  - Detailed design of Tehran-Tabriz railway tunnel, length 6 km, Cut and cover tunnel in urban areas
  - Feasibility and basic design of Qom Metro Line A, length 14 km
- 2007- 2008 SCE Company, Tehran, Iran.  
Quality control and review of design documents of tunnel projects such as Zagros Water Conveyance Tunnel (14 km).  
Research and development projects e.g. Soft ground TBM selection, Overbreak control, Shotcrete as a permanent lining, Settlement control and prediction in soft ground tunnelling.
- 2003-2007 NTNU, Norwegian University of Science and Technology, Department of Civil and Transport Engineering, PhD research project.  
PhD passed courses: Rock drilling, Drill and blast tunnelling and TBM tunnelling.
- 1997-2003 SCE Company, Tehran, Iran.  
Rock mechanics engineer and project manager at underground projects department.  
Work on feasibility study, basic and detailed design of more than seven underground projects and road tunnels in the following subjects:
- Site investigation and field studies
  - Rock mechanics laboratory tests
  - Rock slope stability analysis
  - Stability analysis and support design of underground excavation
  - Numerical modelling using FLAC and UDEC
  - Monitoring and instrumentation and numerical back analysis
  - Time scheduling and cost estimation

2002- 2002 ITOK Consulting Co., Tehran, Iran.  
Stability analysis and design of Jajarm Mine

### Awards

1994 Amirkabir University of Technology for excellent students  
2021 Shahrood University of Technology for best researchers

### Professional Affiliations

Member of Iranian Tunnelling Association, Iranian Rock Mechanics Association and Iranian Petroleum Geomechanics Association. Head of WG 21 of Iranian Tunnelling Association since May 2014. Member of “Center of Excellence of Mining Engineering” since March 2019.

### Research Interests

Tunnelling, Probabilistic Analysis, Soft computing, Rock slope engineering, Numerical modelling.

### Publications (Selected)

- Mazraehli, M., Zare, S., 2022, Application of different stochastic numerical procedures in rock tunnel lining design. *Arabian Journal of Geosciences*, 15:1490.
- Mazraehli, M., Zare, S., 2022, Probabilistic Estimation of Rock Load Acting on Tunnels Considering Uncertainty in Peak and Post-peak Strength Parameters. *Geotech Geol Eng.*
- Karami, M., Zare, S., Rostami, J., 2022, Real-Rcale Numerical Analyzing Dynamic Process of TBM Boring in Jointed Rock; a Case Study: Kerman Water Conveyance Tunnel in Iran, *Journal of Mining and Environment*, Vol.13, No. 3.
- Nikakhtar, L., Zare, S., Mirzaei, H., 2022, Intelligent identification of soil and operation parameters in mechanised tunnelling by a hybrid model of artificial neural network-genetic algorithm (case study: Tabriz Metro Line 2), *Civil engineering and environmental systems*, Volume 39, No.1.
- Khosravi, M., Ramezanzadeh, A., Zare, S., 2022, A new approach on punch penetration test for prediction of boreability of jointed rock mass at northern section of Kerman water conveyance tunnel”, *Arabian Journal of Geosciences*, 15:20.
- Mirzaeiabdolyousefi, M., Nikkha, M., Zare, S., 2022, Assessment of time-dependent behaviour of rocks on concrete lining in a large cross-section tunnel, *Geomechanics and Engineering*, Vol. 29, No.1.
- Daraei, A., Hama Ali, H., Diyar Nasih Q., Zare, S., 2022, Seismic retrofitting of rubble masonry tunnel: evaluation of steel fiber shotcrete or inner concrete lining alternatives, *Arabian Journal of Geosciences*.
- Akbarzadeh, M., Haghshenas, S.S., Jalali, M.E., Zare, S., Mikaeil, R., 2022, Developing the Rule of Thumb for Evaluating Penetration Rate of TBM Using Binary Classification, *Geotech Geol Eng.*
- Mazraehli, M., Zare, S., Idris, M.A., 2021, Stochastic Stability Analysis of Tunnels Considering Randomness of Rock Mass Properties, *Journal of Mining and Environment*, Vol. 12, No. 4.
- Shahverdiloo, M., Zare, S., 2021, Studying the normal stress influential factor on rock joint stiffness using CNL direct shear test, *Arabian Journal of Geosciences*, 14:20.
- Karami, M., Zare, S., Rostami, J., 2021, Introducing an empirical model for prediction of disc cutter life for TBM application in jointed rocks: case study, Kerman water conveyance tunnel, *Bulletin of Engineering Geology and the Environment*, Vol. 80/5.
- Nikakhtar, L., Zare, S., 2021, Dynamic and Static Analysis of Circular Tunnel with Special Focus on the Hydro-Mechanical Coupling Behavior of Soil, *Numerical Methods in Civil Engineering*, Volume 6, No.1.
- Shahverdiloo, M.R., Zare, S., 2021, A New Correlation to Predict Rock Mass Deformability Modulus Considering Loading Level of Dilatometer Tests. *Geotech Geol Eng.*
- Shahverdiloo, M.R., Zare, S., 2021, Challenges for In-Situ Stress Measurement in Rock Caverns by Hydraulic Fracturing and HTPF Tests-Case Study: Azad Project, *Journal of Mining and Environment*, Volume 12.

- Khosravi, M., Ramezanzadeh, A., Zare, S., 2021, Effects of joint orientation and spacing on the boreability of jointed rock mass using tunnel boring machines, *Arabian Journal of Geosciences*, Vol. 14.
- Khosravi, M., Ramezanzadeh, A., Zare, S., 2021, Evaluation of Disc Cutter Performance in Rock Cutting Process Using 3D Finite Element Method, *Numerical Methods in Civil Engineering*, Vol. 5/3.
- Khosravi, M., Ramezanzadeh, A., Zare, S., 2021, Effect of Rock Joint on Boreability of TBM at Northern Section of Kerman Water Conveyance Tunnel, *International Journal of Mining and Geo-Engineering*, Vol.55.
- Karami, M., Zare, S., Rostami, J., 2021, Study of common wear prediction models for hard rock TBM disc cutters and comparison with field observation in Kerman water conveyance tunnel, *Bulletin of Engineering Geology and the Environment*, Vol. 80.
- Karami, M., Zare, S., Rostami, J., 2021, Tracking of disc cutter wear in TBM tunneling: a case study of Kerman water conveyance tunnel, *Bulletin of Engineering Geology and the Environment*, Vol. 80.
- Akhbari, S., Zare, S., Chakeri, H., Mirzaei-Nasirabad, H., 2020, A 3D finite-difference analysis of the interaction between a newly driven large tunnel with the twin tunnels in urban areas, *Journal of Mining and Environment*, Volume 11.
- Nikakhtar, I., Zare, S., Mirzaei, H., Ferdosi, B., 2020, Application of ANN-PSO algorithm based on FDM numerical modelling for back analysis of EPB TBM tunneling parameters, *Journal of Mining and Environment*, Vol. 11/1.
- Nikakhtar, I., Zare, S., Mirzaei, H., 2020, Numerical Modelling of Backfill Grouting Approaches in EPB Tunneling, *Journal of Mining and Environment*, Vol. 11/1.
- Mazrahehi, M., Zare, S., 2020, An application of uncertainty analysis to rock mass properties characterization at porphyry copper mines, *Bulletin of Engineering Geology and the Environment*, Vol. 79/7.
- Taghi-zadeh, H., Zare, S., Mazrahehi, M., 2020, Analysis of Rock Load for Tunnel Lining Design, *Geotech Geol Eng*, Vol. 38/3.
- Daraei, A., Zare, S., 2019, A new multi-graph approach for selecting the sequential excavation method of civil tunnels, *Journal of Tunnelling and Underground Space Technology*, Vol. 91.
- Daraei, A., Zare, S., 2019, Modifying Tunnel's Hazard Warning Levels based on the Laboratory Studies on Different Rock Types, *KSCE Journal of Civil Engineering*, Vol. 23/5.
- Daraei, A., Zare, S., 2018, A new strain-based criterion for evaluating tunnel stability, *Geomechanics and Engineering*, Vol. 16/2.
- Daraei, A., Zare, S., 2018, Modified criterion for prediction of tunnel deformation in non-squeezing ground condition, *Journal of Modern Transportation*, Vol.26.
- Mousavi, S., Nikkhah, M., Zare, S., 2018, Comparative study of two meta-heuristic algorithms in optimizing cost of reinforced concrete segmental lining, *Journal of Mining and Environment*, DOI: 10.22044/jme.2018.7159.1566.
- Daraei, A., Zare, S., 2018, Determination of critical saturation degree in rocks based on maximum loss of uniaxial compression strength and deformation modulus, *Geomechanics and Geophysics for Geo-Energy and Geo-Resources*, Vol.4/4.
- Daraei, A., Zare, S., 2018, Effect of Water Content Variations on Critical and Failure Strains of Rock, *KSCE Journal of Civil Engineering*, Vol. 22/9.
- Karami, M., Zare, S., 2018, Numerical Study of the Effects of Segmental Joints and Grouting Pressure on the Behavior of Tunnel Segmental Lining, *Amirkabir Journal of Civil Engineering*, Vol.50/1.
- Daraei, A., Zare, S., 2018, Prediction of overbreak depth in Ghalaje road tunnel, *International Journal of Mining Science and Technology*, Vol.28/4.
- Khorasani, E., Zare-Naghadehi, M., Jimenez, R., Tarigh-Azali, S., Jalal, E., Zare, S., 2018, Performance analysis of tunnel boring machine by probabilistic systems approach, *Proceedings of the Institution of Civil Engineers-Geotechnical Engineering*, ICE, Vol. 171/5.
- Daraei, A., Herki, B., Sherwani, A., Zare, S., 2018, Rehabilitation of Portal Subsidence of Heybat Sultan Twin Tunnels: Selection of Shotcrete or Geogrid Alternatives, *International Journal of Geosynthetics and Ground Engineering*, Vol.4/15.

- Daraei, A., Herki, B., Sherwani, A. Zare, S., 2018, Slope Stability in Swelling Soils Using Cement Grout: A Case Study, *International Journal of Geosynthetics and Ground Engineering*, Vol.4/10.
- Mahmodzadeh, A., Zare, S., Darai, R., 2017, Providing the Innovative Model to Estimate Time and Cost of Tunnel and Updating with the Data Acquired During Excavation, *Journal of Rock Mechanics*, Vol. 1/1. (Persian)
- Daraei, A., Zare, S., 2017, Influence of Water Content on Hazard Warning Levels in The Tunnels Excavated in Weak Rock, *Electronic Journal of Geotechnical Engineering*, Vol.22/1.
- Mousavi, S., Nikkhah, M., Zare, S., Khademhosseini, O., 2017, Evaluation of the structural analysis of tunnel segmental lining using Beam-Spring method and Force-Method, *Journal of Mining and Environment*, Vol. 8/1.
- Soltani, S., Zare, S., Nikkhah, M., Ghanavati, M., 2017, Determination of Geomechanical Parameters and Allowable Bearing Capacity of the Rock Foundations of Surface Crude Oil Tanks in Khark Island, *Jornal of Rock Mechanics*, Vol. 1/2. (Persian)
- Mahmodzadeh, A., Zare, S., Darai, R., 2017, Reducing the Time and Cost Uncertainty of Tunnelling Projects Using DAT Method, *Journal of Sharif Civil Engineering*, Vol. 33/3. (Persian)
- Zare, S., Bruland, A., Rostami, 2016, Evaluating D&B and TBM tunnelling using NTNU prediction models, *Journal of Tunnelling and Underground Space Technology*, Vol. 59.
- Akbari, S., Zare, S., Mirzaei, H., 2016, Assessment of the Effect of Depth on Interaction between Single and Double-Tube Tunnels in Urban Areas using 3D Numerical Modeling, *Journal of Transportation Infrastructure Engineering*, Vol. 1/4. (Persian)
- Mahmodzadeh, A., Zare, S., 2016, Probabilistic prediction of expected ground condition and construction time and costs in road tunnels, *Journal of Rock mechanics and Geotechnical Engineering*, Vol. 8/5.
- Eshraghi, A., Zare, S., 2015, Face Stability Evaluation of a TBM-Driven Tunnel in Heterogeneous Soil Using a Probabilistic Approach, *International Journal of Geomechanics*, Vol.15/6.
- Akbari, S., Zare, S., Mirzaei, H., 2015, Stability comparison of twin and single tube tunnels in urban areas, *Journal of Mining Resources Engineering*, Vol 1/2. (Persian)
- Zare, S., Shamsi, G., Sattari, G., Khorasani, E., Zolfaghari, D., 2015, Review of Tunneling Science and Technology in Iran, 11<sup>th</sup> Iranian Tunnelling Conference, Tehran, Iran. (Persian)
- Akbari, S., Zare, S., Mirzaei, H., 2015, Evaluation of Interaction between Line 1 Twin Tunnels of Tabriz Metro Using 3D Numerical Modelling, *Journal of Analytical and Numerical Methods in Mining Engineering*, Vol. 4/8. (Persian)
- Zarrin, A., Zare, S., Jalali, S.E., 2015, Backfill grouting with two-component grout - Case study Tehran Metro line 7 east-west lot, *Word Tunnel Conference*, Dubrovnik, Croatia.
- Karimnia, H., Mirzaei, H., Zare, S., 2014, Prediction of Ground Settlement Influenced by Mechanised Tunneling in Urban Areas using Empirical, Analytical and Numerical Methods, *Journal of Transportation Engineering*, Vol.5/3. (Persian)
- Heidari, R., Zare, S., Mirzaei, H., Foroughi, M., 2013, Numerical Study of Face Pressure Effect on Surface Settlement in Soft Ground Mechanized Tunneling- Case Study: Tehran Metro Line 7, *Journal of Tunnelling and Underground Space Engineering*, Vol. 1. (Persian)
- Zare, S., Bruland, A., 2013, Applications of NTNU/SINTEF drillability indices in hard rock tunnelling, *Journal of Rock Mechanics and Rock Engineering*, Vol.46/1.
- Fasihi, E., Zare, S., 2011, Selection of suitable mechanized machine for Tehran Metro Line7 Project (East – West Tunnel), *Journal of Mining Engineering*. (Persian)
- Zare, S., 2007, Prediction model and simulation tool for time and cost of drill and blast tunnelling, PhD thesis, Department of Civil and Transport Engineering, NTNU, Trondheim.
- Zare, S., Bruland, A., 2007, Assessment of TBM and D&B based on excavation time and costs, 3<sup>rd</sup> Iranian Rock Mechanics Conference, Tehran.
- Zare, S., Bruland, A., 2007, Progress of D&B tunnelling efficiency with relation to excavation time and costs, *World Tunnel Congress 2007*, Prague.
- Zare, S., Bruland, A., 2006, Estimation model for advance rate in drill and blast tunnelling, *International symposium on Utilization of Underground Space in Urban Areas*, Egypt.
- Zare, S., Bruland, A., 2006, Comparison of tunnel blast design models, *Journal of Tunnelling and Underground Space Technology*, Vol., 21/5 pp 533-541.

Zare, S., 1999, Stability analysis and support design of underground excavation in Marlstone of Aghajari formation, MSc thesis, Faculty of Engineering, Tarbiat Modares University, Tehran, Iran. (Persian)

Zare, S., 1998, Monitoring and instrumentation in underground excavation, MSc seminar, Faculty of Engineering, Tarbiat Modares University, Tehran, Iran. (Persian)