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Mattias Sjölander

Geomechanical Engineer

Expertise	Rock Mechanics, Numerical Modeling
Education	M.Sc. Civil Engineering (Rock Mechanics and Geotechnical Engineering), 2019 Luleå University of Technology, Luleå, Sweden

Professional Experience

2021 – Present	*Itasca Consultants AB, Luleå, Sweden* *Geomechanical engineer*
2020 – 2021	*AFRY, Luleå, Sweden* *Geomechanical engineer*
2019 – 2019	*LKAB, Kiruna, Sweden* *Rock Mechanics engineer, seismicity*
2018 – 2018	*LKAB, Kiruna, Sweden* *Rock Mechanics engineer, seismicity*
2017 – 2017	*ÅF-infrastructure AB, Sundsvall, Sweden* *Internship, Geotechnical engineer*
2016 – 2016	*BDX-företagen, Luleå, Sweden* *Construction worker*
2015 – 2015	*Skanska Sverige AB, Östersund, Sweden* *Foreman*
2014 – 2014	*Skanska Sverige AB, Sundsvall, Sweden* *Foreman*
2011 – 2013	*Skanska Sverige AB, Sundsvall, Sweden* *Construction worker*

Project Experience

Infrastructure projects:
Three-dimensional continuum analysis (*FLAC3D*) for the new metro station "Sofia Station" in Stockholm. The aim of the study was to evaluate how a bypass tunnel would be affected by the excavation of the station and also how the bypass itself would affect the global stability of this complex facility.

Three-dimensional continuum analysis (*FLAC3D*) for pylon foundation and bridge cable foundation for the new Grenland bridge in Norway.

Three-dimensional continuum analysis (*FLAC3D*) and development of construction documents for tunnel underneath Lambarfjärden, Förbifart Stockholm. As part of the analysis, the planned excavation process, and the required reinforcement (bolts, lining, and spiling) were studied.

Calibration study with three-dimensional continuum models (*FLAC3D*) for an already excavated ramp tunnel with low rock coverage, subproject South, Förbifart Stockholm. The purpose of the study was to determine if installed reinforcement is efficient by performing a calibration study with the help of convergence measurements.

Three-dimensional continuum analysis (*FLAC3D*) and developing of construction documents for ramp tunnel with very low rock coverage in subproject Lovön, Förbifart Stockholm. The rock coverage in the area varies between 1.5–6 m and with help of the models, the required bolts, lining, spiling, excavation process, and monitoring were determined.

Three-dimensional continuum analysis (*FLAC3D*) and development of construction documents for Air Exchange Stations (AES) in subproject Lovön, Förbifart Stockholm. In total, eight AESes at depths between 50–100 m was studied. The AES-design includes large roof-spans up to 35 m, complex geometries, and a connected vertical shaft.

Three-dimensional continuum analysis (*FLAC3D*) and development of construction documents for vertical, 10 m diameter, shafts in subproject Lovön, Förbifart Stockholm. The height of the shafts varies between 50–100 m and are designed to carry a heavy concrete lining on rock shelves.

Three-dimensional continuum analysis (*FLAC3D*) for crossing between Kvarnberget and Götatunneln, Västlänken. The analysis studied widening of the existing Götatunnel together with new loads from the Kvarnberget concrete tunnel.

Design of reinforcement for train tunnels in the Ostlänken project. Early-stage project where Trafikverket wanted a preliminary reinforcement design to be able to estimate the costs for the construction of Ostlänken railway. The design process included a few basic two-dimensional continuum analyses in *FLAC*.

Hydropower projects:
Three dimensional discontinuum analysis (*3DEC*) in Master Thesis project for excavation of new access tunnel in Krångede hydropower station. The analysis studied the influence of the new tunnel on the stress field around the turbine hall.

Mining projects:
Three-dimensional discontinuum analysis using *3DEC* for the LKAB Malmberget Mine. The aim of the analysis was to study advantages and disadvantages of different types of analysis setups for reinforcement studies.

Coupled cave flow-mechanical analysis using *FLAC3D-CAVESIM*, including setting up, running, and analyzing a caving-model for the potential new orebody Evalina in the LKAB Malmberget Mine. The aim of the analysis was to investigate how the extraction of the ore in Evalina would affect the surrounding infrastructure and if it would increase the deformations on the ground surface above the orebody.

Three-dimensional continuum analysis (*FLAC3D*) for the LKAB Malmberget Mine. The aim of the analysis was to analyze how the seismicity in the orebody Fabian will change in the future as the mining continues deeper.

Coupled cave flow-mechanical analysis using *FLAC3D-CAVESIM*, including setting up, running, and analyzing a caving-model for the Hoppet orebody in the LKAB Malmberget Mine. The aim of the analysis was to simulate the extraction of the ore as realistic as possible and then analyze why this area of the mine has problems with seismicity.

Three-dimensional continuum analysis (*FLAC3D*) with global and local model for the LKAB Malmberget Mine. The aim of the analysis was to analyze local models of infrastructure where failure had occurred in the mine and find a criterium that could define “unsafe volumes” for future infrastructure.

Three-dimensional analysis with global *FLAC3D*-model and local *3DEC*-model for the LKAB Kiirunavaara Mine. The aim of the analysis was to evaluate the stability of different dimensions of footwall drifts for different depths and different distances from the orebody at different mining stages.

Coupled cave flow-mechanical analysis using *FLAC3D-CAVESIM*, including setting up, running, and analyzing mine sized caving-model for the LKAB Malmberget Mine, aimed at evaluate how future mining will affect the ground surface around the mine.

Evaluation of the monitoring network for subsidence on the footwall of the Kiirunavaara mine, to optimize and systematize their working methods.

Field work:
Measuring and evaluation of boreholes in Aitik, Boliden.

Inspection and control of loose rock in five winter sand silos, for Svevia.

Geophysical resistivity measurements for new spillway in Storjuktan.

Construction work:
Two summers of work as foreman at Skanska for different ground work projects.

Three years in total of experience as construction worker in different projects. Largest experience from water supply and sewerage projects but also from park construction, footpath and cycle tracks construction, and excavation for fiber cables.

Soil Engineering:
Geotechnical engineering of several soil engineering projects with design work for roads, small bridges, and railways. The work included assessment of field and laboratory results and documentation in geotechnical reports and analytical calculations of soil stability.

Seismicity:
Monitoring of the seismicity in LKAB mine in Kiruna for two summers.