# Sweden

**Name:** Swedish Rock Engineering Association
**Type of Structure:** Non profit, open association
**Number of Members:** 91 corporate members from public and private clients, contractors, suppliers, mining companies, consulting firms, institutions and research organizations

## ASSOCIATION ACTIVITIES DURING 2020 AND TO DATE

Four permanent working groups constitutes the backbone of the Swedish Rock Engineering Association (Svenska Bergteknikföreningen). These working groups are Yearly Congress, Young Members, International, and Competence Development. The association works towards the sustainable use and development of Swedish underground space. The main activity of the association is the annual Swedish congress where a significant part of the swedish industry gathers. Due to the pandemic the physical event had to be cancelled and the presentations were instead held online. Young Member's mentor program DevelopYM, that was launched in 2018 continues with great success. International have been working towards an increased Swedish participation in ITA activities. Competence Development is since November the group within the Swedish Rock Engineering Association that is responsible for accreditations of educators and certification of grout-, bolt- and shotcrete workers.

fig. 1

## CURRENT TUNNELLING ACTIVITIES

### E4 Förbifarten, Stockholm (Stockholm By-pass)

This project includes an 18 km long road tunnel with an excavation volume of 6 500 000m$^3$. The tunnel is now 72% completed, current excavation speed is approximately 900 m/month. When ready this tunnel will be one of the longest highway tunnels in the world. (fig.1).

### Västlänken, Gothenburg (West Link)

This is a large railway project in the center of Gothenburg in order to convert the present terminus into a through station for commuter trains. The project is built in a condense urban environment with complex geotechnical conditions with a mix of loose clay and hard rock. Tunnel length will be 6 km. During 2020 construction of service tunnels and main tunnel has been ongoing. (fig.2)

### Extensions of the subway in Stockholm

The extension of the Stockholm subway is a large tunnelling project (approx. 4 million m$^3$), that will be ongoing in different parts of the city for the following 8-10 years. It will result in 18 new stations and 20 km new tunnels by 2030. During 2020 three service tunnels have been finished and four have started.

### Reconstruction of Slussen Stockholm incl new underground bus terminal

Slussen is a central area by the lock between lake Mälaren and the Baltic Sea. This is an important hub in Stockholm and a large underground bus station is under construction in the area. The construction works were ongoing during 2020. (fig.3)

### Varberg railroad tunnel

The West coast link is getting upgraded with double tracks through the city of Varberg. 3 km of rock tunnel and 300 m concrete tunnel will be built. The tunneling started during 2020. (fig.4)

### Sewage tunnel under Stockholm

Due to decommissioning of a treatment plant in the western part of Stockholm, wastewater will be conveyed to the extended Henriksdal plant in a new 14 km tunnel blasted in the rock under Stockholm. Construction works were ongoing during 2020.

fig. 2


fig. 3


fig. 4

### Henriksdal sewage plant

This is a wastewater project in Stockholm were an existing plant, Henriksdal, is extended to double the treatment capacity to serve 1.6 million people. The expansion includes a new underground facility for pre-treatment and a complete upgrade of the existing plant. The project includes several complicated rock constructions, and blasting must be carefully controlled to ensure continuous operation of the treatment process and minimize disturbance to surrounding infrastructure and housing.

### City Link tunnel

A tunnel project with a length of 13.4 km and a diameter of 5 m approximately 50-100 meters below central parts of Stockholm started during 2020. The purpose of the project is to connect northern and southern parts of Stockholm with a new electricity supply. The project includes 6 ventilation shafts, elevator systems and construction of technical buildings for electrical equipment. A 100 m sunk shaft was finished during 2020. From this shaft a 250 m long tunnel will run under the Stockholms ström lake, the TBM tunnelling works started in 2020.

## FUTURE TUNNELLING ACTIVITIES

### Ostlänken, the East Link high speed rail

New high-speed rail south of Stockholm. Design and planning ongoing. The project includes 12 single rail tunnels and 15 double rail tunnels. The longest tunnel will be 6 km and the shortest will be 100 m long. Construction is planned to start in 2024

### SKB Forsmark, final repository nuclear fuel

Planning is continuing regarding Sweden's final repository for spent nuclear fuel. Getting the necessary permits is ongoing. The construction is ready to start as soon as permission is granted.

### Hydrogen storage in Gällivare

Large lined rock cavern project in northern Sweden. Pilot plant for testing underground storage of hydrogen. Cavern construction 30 m underground, 10m high and width 5m. Construction will start during 2021.

## STATISTICS

**1. Length or volume excavated - % mechanized / % conventional during 2020:**
Volume excavated 2020 is approximately 1,500,000m$^3$ with 100% conventional.

**2. List of tunnels completed**
Marieholmstunneln, Gothenburg – 500m long immersed beton tunnel under the river Göta Älv

**3. List of tunnels under construction**
Stockholm By-pass; West link – Gothenburg; Extended Stockholm subway; New bus terminal at Slussen Stockholm; Varberg railro

## EDUCATION ON TUNNELLING IN THE COUNTRY

Bergsskolan – Polytechnical education (3 yrs) with Engineering Mining and construction technology / Rock engineering Mining and construction industry Civil Engineering 3 yrs (BSc) or 5 yrs (MSc) as well as PhD studies is offered at several technical Universities. Courses are e.g. engineering geology, site investigation, rock mechanics, hydrogeology and risk analysis: Chalmers University of Technology (Gothenburg), KTH (Stockholm), Luleå University of Technology, (Luleå), and Lund University (Lund). At Uppsala University (Uppsala) courses are focused on geology, engineering geology and geophysical investigations.