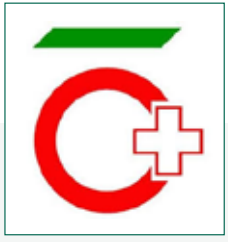
Switzerland



Name: Swiss Tunnelling Society (STS)
Type of Structure: Non profit, open association
Number of Members: 530 members, 92 corporate members

ASSOCIATION ACTIVITIES DURING 2020 AND TO DATE

- **August:** General Assembly in Aarau, Switzerland
- June: Swiss Tunnel Congress (STC) in Lucerne, Switzerland (digital)
- **2020:** European Underground & Tunnel Forum (EUTF) – 3 Board Meetings (digital)

Additionally, the STS young members (STSym) hosted the following events:

- **February:** Regional Event @CERN Geneva, Switzerland
- **July:** Field trip to the hydropower project Ritom, Ambri, Switzerland
- **September:** Field trip to the tunnel Gubrist, Autumn workshop, Zurich, Switzerland
- **December:** Took part in the young member digital celebrations of World Tunnel Day

CURRENT TUNNELLING ACTIVITIES

Ceneri Base Tunnel

"The Ceneri Base Tunnel is the southernmost portion of the new railway link through the Alps crossing the Swiss Alps from North to South. The works have been commissioned by AlpTransit Gotthard on behalf of the Swiss Confederation. The main tunnel is a 15.4km long twin-tube single railway track.

The construction works started in 1997 with the excavation of the geological exploratory tunnel, located approximately in the middle of the alignment. In 2008, a 2.3km long intermediate adit, running parallel to the exploratory tunnel, was excavated using a gripper TBM. The construction of the adit allowed the start of the mining activities of the main tunnels in 2010. The northern tunnel (approx. 8.3km long) and the southern tunnel (approx. 6.3km long) were excavated simultaneously using Drill and Blast . The excavation works were completed in January 2016 and the tunnel was put into commercial service in December 2020.

Bözberg tunnel for SBB's 4m North-South corridor

The new Bözberg tunnel is the largest single project for the Swiss Federal Railways (SBB) on its "4-metre corridor" between Basel and Chiasso. The project is situated on the northern approaches to the

Gotthard base tunnel, which was opened in 2016, and forms part of the scheme to transfer transalpine freight traffic from road to rail. The new Bözberg tunnel has been constructed as a new double-track tunnel under the Jura hills in parallel to the existing double-track tunnel. The existing tunnel, which dates back about 140 years, is being repurposed as a service and rescue tunnel linked to the new tunnel with lateral connector shafts. The new double-track tunnel came into operation on the date of the timetable change on 13th December 2020 together with the 4m freight corridor. Since then, it has been possible for all Europe-wide-compatible shipping containers requiring 4m headroom to transit the Gotthard route on the Swiss section of the Rhine-Alps freight corridor.

Second Gotthard Tunnel Tube

Located on the north-south axis of the A2 motorway, the Gotthard Tunnel connects the cantons of Ticino and Uri between Airolo and Göschenen. The existing two-lane motorway tunnel was opened in 1980. As part of the 'Gotthard conservation concept', efforts were made to identify and investigate different feasible options for conservation. The best option to ensures that the important north-south connection can remain open during the renovation of the existing tunnel tube was the construction of a second tunnel and subsequent renovation the first tunnel, and on 27 June 2012, the Swiss Federal Council decided in favour of this option. This solution significantly increases the level of safety in the Gotthard Tunnel and when the project is completed, both tubes will feature a single-lane operation with one standard lane and one service lane in each direction. The planned second tunnel tube through the Gotthard has a total length of 16,866m. It runs at a standard clearance of 70m from the existing tunnel and 40m from the service and infrastructure tunnel located east of the existing Gotthard Tunnel. After preparation works for securing the installations sites from avalanches and other natural hazards undertaken in 2020, the tunnelling construction work started in 2021 with the blasting of the new exits of the service and infrastructure tunnel, which at the moment are situated at the exit of the new tunnel. In order to reduce the risks and optimise the overall construction programme, the northern and southern fault zones (totaling approx. 570m) will be conventionally excavated and secured in advance. Once this has taken place, the two TBMs will be pushed through these areas. The fault zones will be reached via separate access tunnels approaching from the north

(approx. 4.4km) and the south (approx. 5km), which will start in 2021. These tunnels will be excavated using TBMs with a diameter of approximately 7m. The tender for the two main lots (with a 12.3m diameter TBM, each for the excavation of around 7km of tunnel) is due in summer 2021, their adjudication is planned in spring 2022.

Construction of new safety gallery at Kerenzerberg Tunnel

Located in the canton of Glarus on the west-east axis of the A3 motorway, the Kerenzerberg Tunnel serves an important function from both a local and trans-regional perspective. After 30 years of operation, Switzerland's fifth longest road tunnel is being refurbished up to 2026 and upgraded in terms of safety. A key component of the project of the Federal Roads Office (FEDRO/ASTRA) is the construction of a safety gallery. The new gallery is being built next to the road tunnel and will have a length of 5,504m. Approximately every 300m there will be a cross connection between the two tubes (emergency exits). In the upper section of the safety gallery, an exhaust duct will be built to extract the fumes in the event of a fire in the road tunnel. The excavation work began in summer 2020 from both portal sides, largely by blasting. In July 2021, a TBM will be in operation, excavating the main part of the gallery. The new safety gallery is expected to be completed in 2024.

Expansion of Bern RBS Station

The "Expansion of Bern RBS Station" (Switzerland) project involves building a new underground station as well as the railway line for accessing it. The new RBS Station consists of two 200–210m long, 26m wide and 17m high station caverns, which lie 12m underneath the existing railway tracks of the Bern Central Station. The 1.5km access railway line has different cross sections and runs both underground and above ground (open cut). Several milestones were achieved in 2020:

- The access tunnel (Ø = 7m) to the station caverns, which underpasses several tracks west to Bern Central Station was successfully excavated in water-bearing soil by means of ground freezing
- The settlement-reducing measures (among other things, two prestressed 23m and 26m long concrete beams were built underground) for the complex "Postparc" building were put in operation.
- The main construction works for the two station caverns and the access line were awarded without objection
- The excavation works (under cover) in the sector "Eilgut" (east to Bern Central Station) were continued successfully
- The existing RBS Schanzentunnel were uncovered under full operation (this is necessary in order to be able later to link the new access line with the existing RBS infrastructure).

Riedberg Tunnel

The Riedberg tunnel is located in the canton of Wallis and is part of the national highway network. The road tunnel consists of two tubes with a length of about 550m. The tunnel crosses the sliding slope Riedberg and is a technically very challenging project. After an initial excavation period in 2004-2005 and a revision of the project

due to increased slope movements, the excavation restarted in 2017. The excavation is conducted conventionally under the protection of a pipe umbrella with a rigid in-situ cast concrete support. The successful breakthrough of the northern tube was celebrated in October 2020 and the second breakthrough came in March 2021. The next step are additional measures due to deformations and project adjustments in the area excavated during the first construction period. The tunnel Riedberg will be put into service by 2025/2026.

FUTURE TUNNELLING ACTIVITIES

Rail Tunnels:
Lötschberg Basetunnel II (BLS, 35,000m), Stadelhofen Tunnel (SBB, 7,000m), Brüttener Tunnel (SBB, 11,000m), Zimmerberg Tunnel II (SBB, 11,000m), Crossrail – Lake Crossing Luzern (SBB, 5,500m), Geneve Station Expansion (SBB, 1,500m), Heitersberg Tunnel II (SBB, 5,000m), Grimsel Tunnel (SBB, 21,720m)

Road Tunnels:
Morschacher / Sisikoner Tunnel (Kt. SZ/UR, 8,037m), Vingelz Tunnel (Kt. BE, 2300m), City Tunnel (Kt. BE, 700m), Port Tunnel (Kt. BE, 1,800m), Weidteile Tunnel (Kt. BE, 1,400m), Safety Gallery Fäsenstaub Tunnel (ASTRA, 1,460m), Bypass Luzern (ASTRA, 3,450m), Bypass Bern Ost (ASTRA, 4,000m), Rosenberg Tunnel 3rd Tube (ASTRA, 1,435m), Safety Gallery Tunnel Gei and Brusei (ASTRA, 485m), Twann Tunnel (ASTRA, 1,700m), Nischenberg Tunnel (ASTRA, 1,640m), Rhein Tunnel (ASTRA, 4,500m), Tunnel Melide-Grancia (ASTRA, 1,800m), Tunnel Cargo Station St. Gallen (ASTRA 2,400m)

STATISTICS

1. **Length or volume excavated - % mechanized / % conventional during 2020:** 7,000m / 35% TBM
2. **Amount (USD or EUR) of tunnelling / underground space facilities awarded in 2020:** €670M
3. **List of tunnels completed:**
   Ceneri-Basistunnel (ATG AG, 15,400m), 5 Tunnel of CEVA (SBB/Kt. GE, 8,200m), Bözberg Tunnel II (SBB, 2,500m), Eppenberg Tunnel (SBB, 3,114m), Eyholz Tunnel (Kt. VS, 4,200m), Safety Gallery Ligerz Tunnel (ASTRA, 2,483m), Safety Gallery Sachseln Tunnel (ASTRA, 5,084m), Safety Gallery Bärenburg Tunnel (ASTRA, 1,028m), Bypass Küssnacht (Kt. SZ, 500m)
4. **List of tunnels under construction:**
   Rail Tunnels:
   Albula Tunnel (RhB, 5,860m), RBS Bern Station Expansion (RBS, 1,200m), Ligerz Tunnel (SBB, 2,119m), Wylerfeld Tunnel (SBB, 290m), LEB Tunnel Lausanne (LEB, 1,700m)

   Road Tunnels:
   Second Gotthard Tunnel Tube (ASTRA, 16,918m), Safety Gallery Leissigen Tunnel (ASTRA, 2,200m), Safety Gallery Cholfirst Tunnel (ASTRA, 1,250m), Safety Gallery Kerenzerberg Tunnel (ASTRA, 5,504m), Visp Tunnel 2nd Tube (Kt. VS, 2,600m), Rehabilitation Tunnel Belchen (ASTRA, 3,200m), Gubrist Tunnel 3rd Tube (ASTRA, 3,230m), Safety Gallery Crapteig Tunnel (ASTRA, 1,984m), Riedberg Tunnel (Kt. VS, S: 555m, N: 483m), Safety Gallery Rofla Tunnel (ASTRA, 1,018m), Tunnel de déviation des Evouettes (Kt. VS, 657m), Tunnel des Nations (Kt. GE, 870m), Gallery Schwamendingen and Schöneich Tunnel (ASTRA, 1,680m), Kaiserstuhl Tunnel (Kt. OW, 2,081m)

   Other Projects:
   Nant de Drance Pumped Storage Power Plant, Hydro Power Plant Ritom, CERN HILUMI LHC Project, Cargo Sous Terrain Zurich – Haerkingen (CST, 70,000m)

EDUCATION ON TUNNELLING IN THE COUNTRY

ETH Zurich, Department of Civil, Environmental and Geomatic Engineering
University of Applied Sciences, in various cities