Construction of the New Rail Link through the Alps (NRLA)
PORR SUISSE AG project

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Introduction

With the construction of the new Rail Link through the Alps (NRLA), a fast and effective railway connection is established at the Saint-Gotthard-Massif. The two base tunnels at Gotthard and Ceneri form its centre pieces. With a minimum of gradients and bends, they run from Altdorf all the way to Lugano.

NRLA at Gotthard represents a quantum leap for passengers. Journey time between Zurich and Milan is reduced to less than three hours.

The Gotthard base tunnel features two 57 km long single track tunnels. These are connected to one another every 325 m via cross passages. If one also counts all connection and access tunnels and shafts, the entire system has a length of more than 152 km.

Two multi-functional areas in Faido and Sedrun divide the two tunnels into three sections of roughly equal length. Emergency stop stations and two lane change possibilities each are located at these multi-functional spaces. These allow trains to change from the one tunnel to the other. The air extraction system and numerous technical operation systems, too, are located there.

Via the overground access routes to the north and south of the two portals in Erstfeld and Bodio, the base tunnel is connected to the existing SBB (Swiss Railway Services) core line.

Division of tunnel sections

For planning purposes and construction, the Gotthard base tunnel was divided into four sections:

- Northern Gotthard overground route (4.4 km): PORR SUISSE AG was awarded contracts for work in this area.
- Tunnel segments: Erstfeld (7.8 km), Amsteg (11.3 km), Sedrun (8.5 km), Faido (13.5 km), Bodio (15.9 km)
- Southern Gotthard overground route (7.8 km):

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PORR Suisse AG's contract sections pertain to the areas of the northern overground route. This overground route between Altdorf and the northern portal connects the new Gotthard railway to the existing SBB core line. Apart from the new railway route, several engineering structures, drainage installations, emergency stop stations and systems for maintenance and operation are being built.

PORR SUISSE AG contract sections:

- Section 012: Rynäch railway route construction with more than 3.6 km
- Section 028: Erstfeld undercrossing
- Section 105: Water treatment plant and dismantling of installation structures
- Section 052: Renaturation

Rynäch railway route construction – contract section 012

This section no. 012 includes comprehensive work such as ballasting, utility lines and sewers as well as a barrier layer for NRLA's access to the tunnel portal in Erstfeld. The work was performed by a joint-venture in which PORR SUISSE AG was in charge of management and technical supervision. A submissions phase in June 2006 was followed by a long time of offer negotiations with the client which ended.
with the awarding of the contract in summer 2007. The order volume was approx. CHF 45.38 million.

Installation work began in September 2007. After a construction period of 7 years, work was completed by late September 2014.

The construction site was 3.6 km long and divided into eleven segments. Work first started at the construction site’s northern area. After the first ballasting, the conveying systems to the different installation points were installed on the left and right of the Gotthard railway’s core line. At the same time, comprehensive seepage systems, utility lines and drains were constructed.

Also part of the contract was the construction of footpaths, game crossings, valve structures and pressure lines. Prior to the installation of the barrier layer, all mast and signal foundations needed to be built. Finally, comprehensive fence systems were installed.

Mechanical heading of the two tunnels from Erstfeld to Amsteg was carried out by the tunnel construction company from 2008 to 2010. Excavated material from these two 7,700 m long tunnel sections was used for preparing the concrete for the interior finish work and the ballast required for the railway bed in front of the northern portal.
Route running southwards – in the background: the municipality of Erstfeld; the rails leading towards both tunnel entrances are laid. Equipping the tunnels with rails and railway technology is running at full speed; renaturation work on the sides of the railway bed is already being performed.

Image: A. Wildbolz, Alptransit Nord, July 2014

Material used

The following amounts of material were used at section 012:

- 4.5 million tons of ballast
- 30,000 m of cable conduit DN 80 to 200 mm
- 12,500 m of sewer pipes DN 300 to 1,200 mm
- 4,000 m³ of concrete for engineering work
- 22,000 t of asphalt

and additional numbers of channels, shafts, riprap etc.

Conclusion

All deadlines and specifications stipulated by AlpTransit Gotthard AG were kept and implemented by the joint-venture under the supervision of PORR SUISSE AG. All eleven segments of section 012 could be handed over to the succeeding company without any essential faults.

Further services performed by PORR SUISSE AG for AlpTransit Gotthard AG

Apart from the railway bed section 012 (in a joint-venture), PORR SUISSE also executed the following building sections:

**Undercrossing Erstfeld (section 028)**

Here, too, AlpTransit Gotthard AG was the client. However, PORR SUISSE constructed the undercrossing in Erstfeld (building section 028) as a sole proprietor. All core services could be covered using in-house personnel. PORR SUISSE AG was awarded this contract with a total volume of CHF 4.677 million on the 31st of May 2012. In the construction period lasting from August 2012 to September 2014, the following work was carried out:

- Construction of the undercrossing for rails 100 and 200 including a ramp for the maintenance road
- Construction of the Wijrltahch debris collector with corresponding screen and intake structure
- Separation device and seepage structures
- Construction of a 450 m canton road with utility lines, sewers, riprap and asphalt.
- Finishing work on the surroundings as well as installation of fences on the structures

In early September 2013, the canton road which runs through the new Erstfeld undercrossing could be opened for traffic.

Work was completed on the 31st of September 2014 and was accepted without defects by the client.

Image: PORR AG

Water treatment plant and dismantling of installation structures (section 105)

Once again, AlpTransit Gotthard AG functioned as the client. Section 105, too, was executed by PORR SUISSE AG as a single entity. Again, all core services were performed using in-house personnel.
The contract was awarded to PORR SUISSE on the 16th of August 2012 with a construction sum of CHF 3.634 million. In the construction period lasting from September 2012 to 2014, the following work was carried out:

- Construction of the construction pits for the two pipe basements
- Construction of the pipe basement with superstructures
- Reconstruction of the existing treatment basins
- Finishing work on the surroundings as well as installation of fences on the structures
- Dismantling of AlpTransit's installations

**Renaturation (section 052)**

This contract with a construction sum of CHF 1.438 million was awarded to PORR SUISSE by AlpTransit Gotthard AG on the 10th of April 2014. In the construction period lasting from May 2014 to summer 2016, the following work was carried out:

- Renaturation of areas on the sides of the newly constructed railway bed
- Dismantling of temporary storages and restitution to the farmers
- Sowing and plantations and their preservation
- Repair of meliorations

Those interested can view comprehensive information on the AlpTransit construction site at www.alptransit.ch.