



Val Varuna Tunnel I (CH) Renovation

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| Country | Switzerland |
| Type | Rehabilitation, Rail Tunnel |
| Client | Rhätische Bahn AG |
| Main Contractor | Walo Bertschinger AG, Zizers |
| Execution of the work | Renesco AG |
| Designer/ Engineering | Amberg Engineering AG, Lombardi AG |
| Construction Period | 2022 |

Project Description

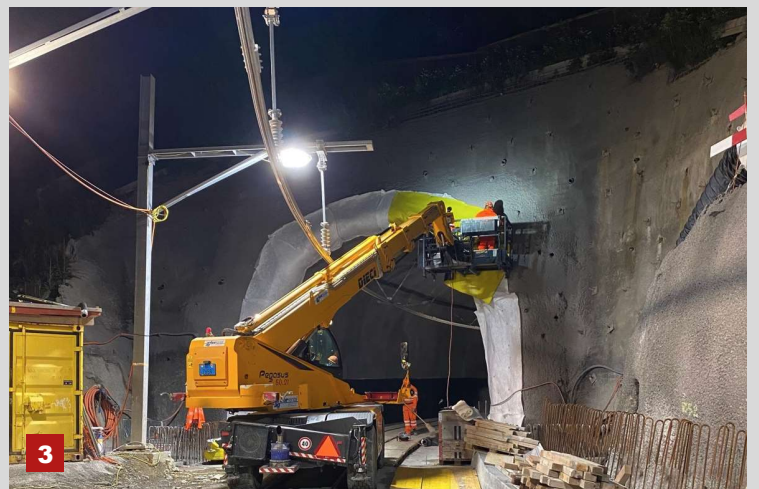
The Val Varuna Tunnel I of the Rhaetian Railway, which went into operation in 1908, is located on the St. Moritz – Tirano route, about 2.7 km after the Cavaglia station at an altitude of approximately 1,355 metres above sea level and extends over a length of 148 metres on the Bernina line between St. Moritz and Poschiavo in the canton of Graubünden. Due to its many years of use, comprehensive rehabilitation in conjunction with widening is necessary.

The standard section consists of a horseshoe profile with a total height of 4.62 m. The newly developed "Standard Construction Tunnel BA" stipulates that the existing tunnel portals are dismantled, the tunnel is expanded, and a new tunnel is reconstructed on the same route during night breaks. For logistical reasons, the "Standard Construction Tunnel BA" refrains from the application of prefabricated concrete elements for the lining, using a reinforced shotcrete inner vault with a waterproofing membrane instead. The existing natural stone vault of the tunnel will be completely demolished and widened by means of pipe umbrella tunnelling while maintaining the same alignment.

Scope of Service

Rehabilitation of the structural waterproofing via supply & install of a geomembrane system, a) of the tunnel via drained system and b) of the cut & cover structure north and south.

- Protection & drainage geocomposite (drainage capacity, plane at 200 kN/m^2 and gradient $i = 1.0 \cdot \text{m}^2/\text{s} \cdot 15 \cdot 10^{-4}$) with a geotextile based on polypropylene (PP) with a weight of 800 g/m^2 .
- Sheet Waterproofing membrane, PVC-P with a thickness of 3 mm according to SIA 272 (Swiss standard)
- Protection sheet membrane, PVC-P with 3mm thickness
- Plastic drainage profile
- Termination via adhesive tape
- Termination via steel flange construction
- Pipe penetrations.



1. Reinforced Shotcrete Inner Vault
2. Panorama view
3. North Portal