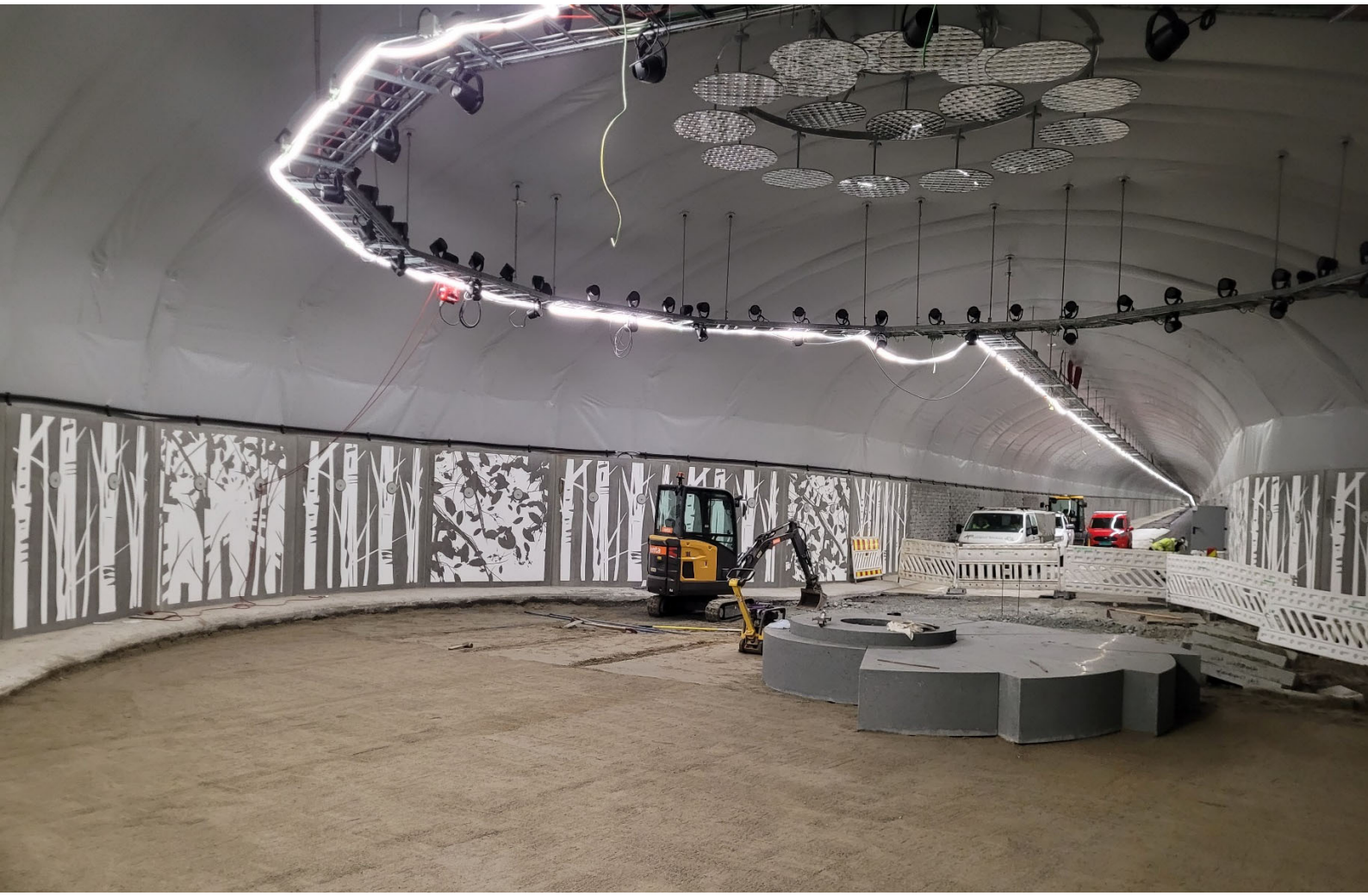


GS - Løvstakktunnel (NO)
Tunnel Sealing - Water & Frost Protection Tunnelduk

Country	Norway
Type	Bicycle and Pedestrian Tunnel
Client	Bybanen / Statens Vegvesen
Main Contractor	Marti AS, Marti Tunnel AG
Execution of the work	Renesco GmbH - NUF
Designer/ Engineering	Sweco
Construction Period	2022

Renesco Group, Seedorffeldstrasse 21, CH-3302 Moosseedorf, Phone: +41 (0)31 388 74 20
info@renesco.com, www.renesco.com

Project Description

The Løvstakktunnel project, construction lot D15, as part of the extension of Bergen's tramway network, comprises the excavation of a 3 km long tramway tunnel using traditional drilling and blasting methods with a parallel pedestrian (Gang) & cycle (Sykkel) tunnel (GS), which serves also as an evacuation, 5 cross-passages, 2 x 150m long caverns as a railway depot, a rock cut for access buildings to the depot as well as extensive outdoor concrete work such as a cut & cover portal structure and numerous retaining wall structures. With its nearly 3,000 meters, the GS tunnel will be the world's second longest, and Europe's longest cycle and pedestrian tunnel.

Scope of Service

Supply & install of the water & frost protection system using a 0.6 mm thick reinforced PVC-coated polyester fabric lining with a high tear and tensile strength. The lining is fastened to a steel wire arched frame which is bolted into the rock and forms the theoretical profile. All fabrics are jointed together by hot air welding to guarantee a waterproof seal and stretched by PE ropes to give an aesthetical visual appearance.

- Tunnel cloth/ fabric (RTM 700-RP) is self-extinguishing and cannot be ignited. It complies with ISO 9705 tunnel classes A/B in accordance with the Norwegian Public Roads Administration's requirements in manual N500/ Table 4.4.
- Behind the wall elements: 1.15 mm thick PE-LLD sheet membrane
- Installation of anchor bolts M16 for the membrane system & wall elements, technical bolts M20 for cable ladders and M24 for jet fans, all hot dip galvanized (HDG)/ epoxy coated (PC).
- Drilling by fully automatized rig (AMV 236T) via Trimble navigation, Bever Control System and Leica system to allow a precise anchoring/ navigation with an accuracy less than 10mm. All controlled by a surveyor team.
- Data transfer from BIM to CAD to design the construction frames and to set the anchor bolts
- Protection Pipes Ø 25mm,50mm & 75mm







1. Bicycle and Pedestrian Tunnel
2. Side wall-element & Tunnelduk system
3. Technical Niche