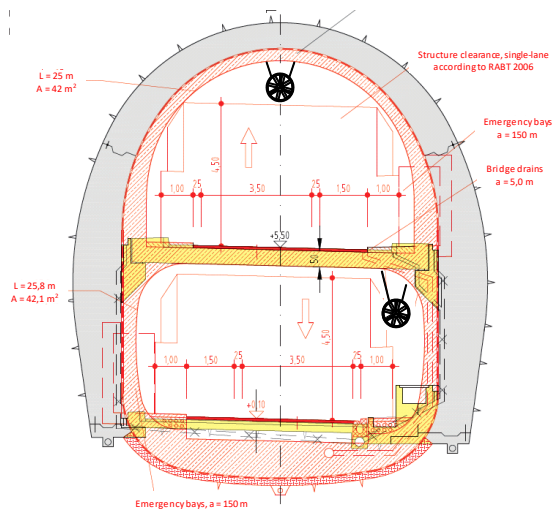




Eastern tunnel portal into the lower tube



Jet fan layout in normal tunnel profile with additional inner lining



Western tunnel portal with two traffic tubes in vertical arrangement

## Description

The Kiesberg Tunnel has a length of 1.043 m. It is part of the state road L70 between Wuppertal and Sonnborn. The two tunnel tubes are designed for uni-directional traffic. The westbound carriageway is built on top of the eastbound carriageway. Due to cracks in the concrete construction and lack of steel reinforcement or a tunnel membrane the ceiling started to leak causing concerns about tunnel safety. Following the general refurbishment, the tunnel will include a reinforced concrete lining. Due to the construction, the cross-section will be reduced, so the tunnel can be operated only with a single traffic lane in each tube. In the refurbishment project, the safety installations will be upgraded. Both tunnels will be equipped with longitudinal ventilation consisting of five jet fans.

For egress in case of a tunnel fire, the tunnel system includes an egress staircase connecting the two tubes. Egress is possible through the stairs or through the tunnel portals. In order to improve safety and to comply with the RABT-2006 requirements, two additional staircases will be built. The egress passages will include a pressurisation system with two axial fans each.

Because of the longitudinal tunnel gradient of up to 3.25 %, a detailed quantitative risk analysis had to be performed for the lower tunnel. Following the German code, the evaluation lead to the decision, that a more detailed investigation is not required.

## Services

- Concept and detailed design of tunnel ventilation and egress pressurisation system
- General evaluation of safety requirements according to the German design code