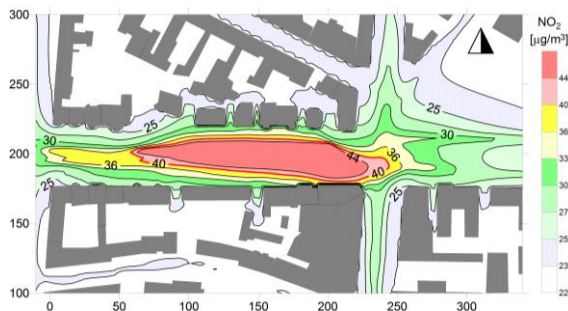
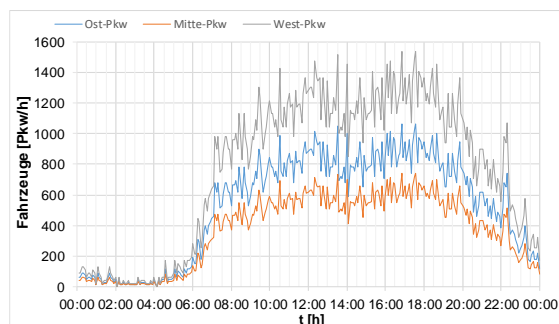


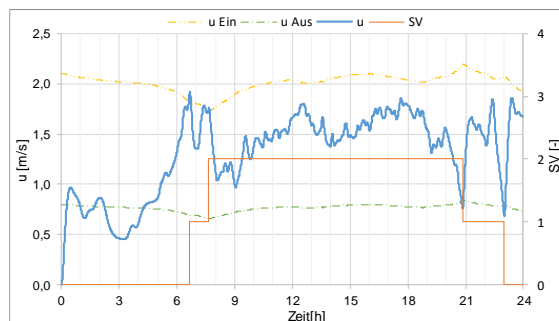
Route and position arrangement of jet fans and airflow measuring points



Load map, west portal project, NO_2 [$\mu\text{g}/\text{m}^3$] pollutant emissions with optimized ventilation concept



Daily passenger car hydrograph for the north tube



Control of the jet fans via enable and disable limit values

Description

The Kriegsstrasse road tunnel currently in planning, which measures 1,400 meters in length and features several entrance and exit points, was designed to reduce above-ground inner-city traffic.

To assess air pollution levels throughout the tunnel, micro-scale examinations of the tunnel portals were carried out using the MISKAM numerical computation method. The annual average limit value for nitrogen dioxide in the west portal was forecast to be exceeded.

A portal-based exhaust air extraction facility is typically used when a defined limit value threshold is exceeded and works by suctioning out a large portion of the air containing with pollutant emissions. To avoid the high costs associated with this system, an alternative solution integrating longitudinal ventilation was developed, which was possible thanks to the positional arrangement of the exit in the north tube.

The Ettlenger Tor exit is located approximately at the tunnel midsection in the north tube. To reduce air pollution in the west portal, half of the volumetric flow in the exit area of tunnel midsection is diverted through the north portal by jet fans that spin opposite to the direction of travel. This ensures that the limit values defined for the west and north portals are adhered to without having to use an extraction facility.

The longitudinal ventilation system developed integrates a ventilation control facility optimized for low energy costs. Based on traffic flows, operation of the 17 jet fans fitted in the north tunnel was limited to peak times only, and the runtimes and switching operations of the jet fans were optimized accordingly.

Services

HBI Haerter Consulting Engineers rendered the following services:

- Preparation of emissions reports for assessing pollutant emissions levels
- Development of an energy-optimized ventilation control system