Geologische Probleme beim Bau eines Abwasserstollens im Oberen Muschelkalk in Stuttgart

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Mit 13 Abbildungen

Abstract

The 2700 m long Zuckerberg sewer tunnel was excavated in the strata of the Upper Muschelkalk (Triassic) by a full-face TBM with a diameter of 3.4 m. It has an overburden of between 25 and 80 m. Extensive geological, hydro-geological, geophysical and petrological investigations were carried out ahead of tunneling. The results of these investigations suggested that conventional NATM as well as TBM excavation seem to be possible in principle. Accordingly, both methods were specified in the tender documents. Due to the submission results the contract was finally awarded based on the TBM excavation method.

In line with the geologic forecast, tunnel driving was almost entirely without any problems. Unexpected difficulties, however, were experienced at some locations in which fossil sinkholes were met by the tunnel. Geologically, these structures are mainly related to subrosion of the evaporates of the Middle Muschelkalk epoch a couple of decameters below the tunnel. The disturbed zones required a ground support which was not specified in the tender documents. For maintaining safe working conditions and for securing on-going TBM operations, the relevant tunnel sections had to be supported by bolted steel liner-plates. In a particularly heavily disturbed section the upper of the tunnel face had to be pre-consolidated by steel bars, System IBO, ahead of excavation. Due to the unexpected geological difficulties additional investigations by drilling and geophysics were carried out from both the surface and from within the tunnel.

Neither the seismic profiling nor two additional boreholes did directly reveal any further geological difficulties. In subsequent tunneling, however, the ground which was additionally investigated continued to be sporadically problematic with the need for liner-plates to be installed as ground support. The Zuckerberg sewer tunnel has demonstrated that an exact delineation of the tunneling ground still is