# Mined hot-water supply tunnels

Another example where underground structures are used as modern solutions to public utilities are those tunnels carrying heat pipelines whereby excess heat from remote heat power plants is utilised as a source of heating residential zones.

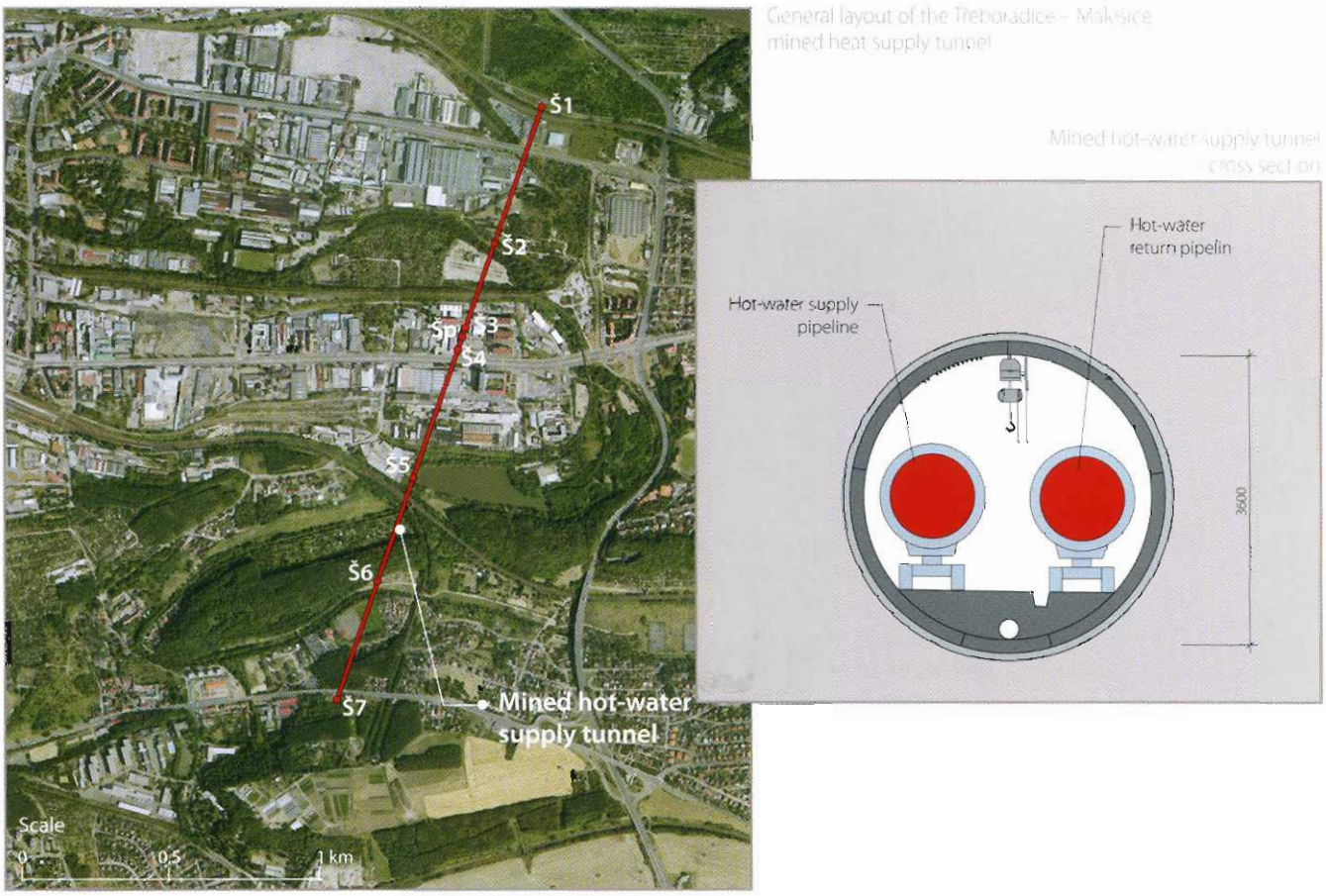
Worth mentioning is the example of the utilisation of excessive heat produced from the power generation process in the Mělník power plant and used for heating purposes in Prague. The heat pipeline from the Mělník power plant to Prague terminates in the Třeboradice heating plant, which supplies the entire Northern Satellite Town in Prague. Another completed project comprised the connection between the Třeboradice and Malešice heating plants.

## The mined hot-water supply tunnel Třeboradice – Malešice

A major part of the nearly 50km-long hot-water pipeline from the Mělník power plant to Prague runs on the surface. Because it is within the Prague metropolitan area, the pipeline route had to be designed in a more thoughtful manner in order to protect the environment. The mined route met the requirements best of all.

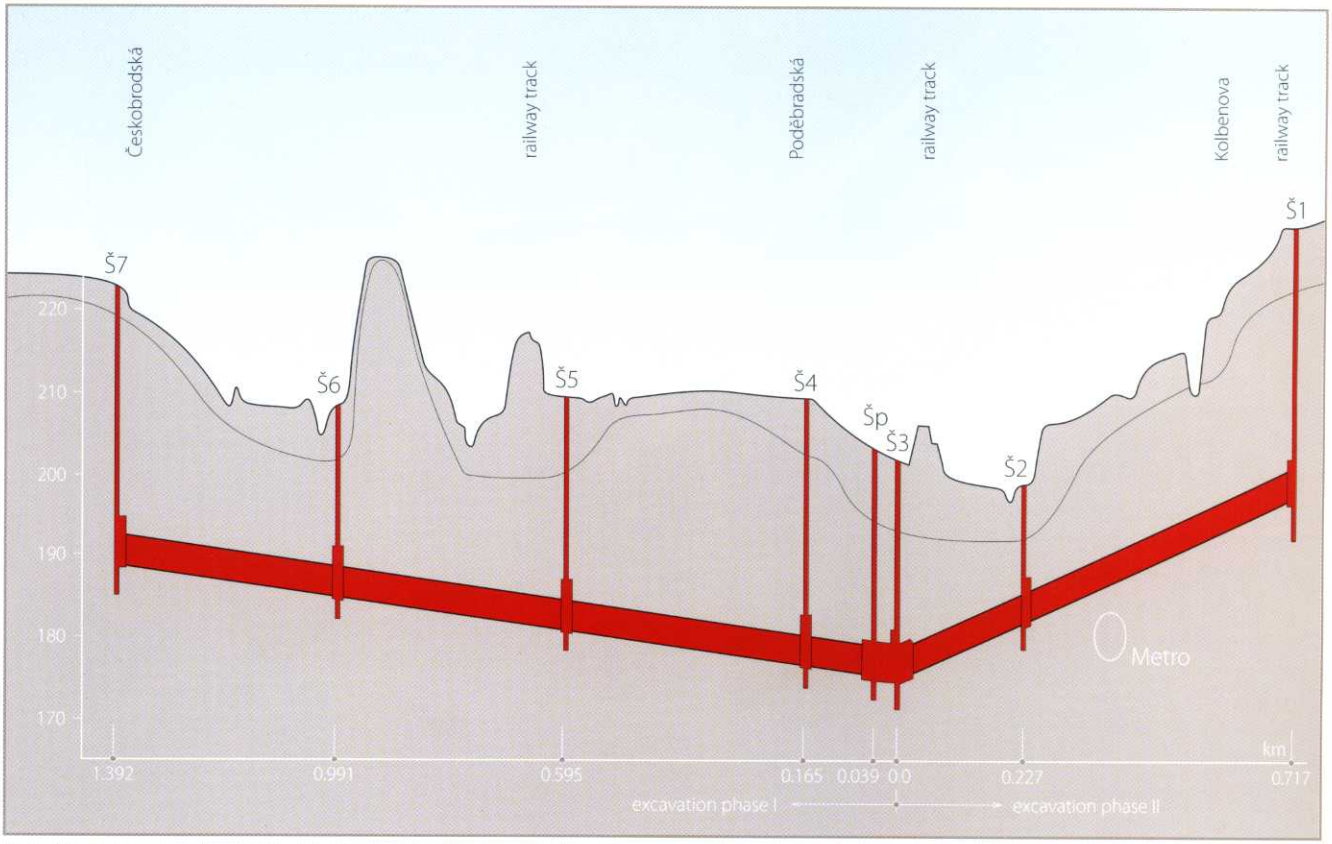
The 2.11km-long tunnel connects the heating plants in Třeboradice and Prague-Malešice. It was driven using an R.L. PRIESTLEY tunnel-boring machine which produced a final lining internal diameter of 3.6 m. The tunnel was driven on an uphill gradient, in both left/right and forward/back directions from each hoisting shaft. Apart from the end shafts, there were four intermediate inspection shafts along the tunnel route, which allowed those parts of the city in the vicinity of the tunnel to be supplied by heat. Regarding the depth, the tunnel was placed into unweathered Libeň, Bohdalec and Dobrotiva layers of the Prague Ordovician formation. The route passes under the Rokytka riverbed. Serious problems were encountered in this area due to water-bearing horizons and/or movable fluvial sediments difficult for the tunnel boring machine to manage. In addition, the route of the hot-water supply tunnel crosses the path of the Prague Metro's Line B.

The longitudinal gradient of the tunnel is 1 % in the northern part toward Třeboradice and 3 % in the southern part, toward Malešice. The steel hot-water pipeline 2 × DN 1.0 m was laid on pads in the tunnel. The pipeline was thermally insulated because the temperature inside




General layout of the Třeboradice – Malešice mined heat supply tunnel

Mined hot-water supply tunnel – cross section




Mined hot-water supply tunnel – longitudinal section through the route

the supply pipeline can get as hot as 150 °C. A separate problem was how to cope with the large stresses induced in the hot-water pipeline by the heat. Axial compensators were therefore installed along the route, as well as fixed points built in the intermediate shafts in the form of large concrete blocks tied with anchors to the bedrock under the tunnel bottom. The entire project was completed and inaugurated in 1991.

Other significant mined heat supply conduits built in the Czech Republic are:

## The heat supply pipeline to Most-North

This is a mined passage under Rýzl hill, a dominant feature of the city of Most, running from the Komořany power plant to a new part of the town. Its length amounts to 1.5 km.

## The heat supply pipeline to Úpice

The municipality of Úpice is supplied through a heat supply pipeline from Poříčí power plant in Trutnov. The total length of the three mined sections found along the route is 2 km. The length and cost of the heat supply pipeline were substantially reduced, thanks to the mined sections.

Other mined tunnels designed as single-purpose heat supply structures were built only to a small extent, in the form of pedestrian passages under roads, railways or intersections in towns. Also worth mentioning is the solution utilised in Brno, where they installed steam and hot-water pipelines in the primary utility tunnels. The pipelines are carried to consumers via short mined galleries, which were driven solely for this purpose. Galleries for heat supply pipelines have also been driven in Ostrava.