Video 9: Traffic

Transportation is a crucial aspect of life, but it often falls short of meeting people's needs. The construction of transport infrastructure is both costly and time-consuming, partially due to challenging geological conditions at construction sites.

The Deep Underground concept cannot be applied to the construction of road and railway tunnels due to its first basic postulate, which mandates construction only in favorable geological conditions. Roads and railways typically require straight lines at the surface level, making it challenging to avoid tunnel construction in unfavorable geological conditions.

The second basic postulate, constructing small-sized underground structures, poses another challenge. Creating sufficient space for cars or trains to pass through a tunnel requires more significant dimensions.

Hence, the Deep Underground concept cannot be applied to underground construction for cars and high-speed railways. However, it can be employed in a different manner.

Let's explore how.

Ljubljana, a typical Central European city situated along a river with a castle hill, faces geographical challenges with shallow hills dividing the town area and more hills at the city boundaries.

The provided city map illustrates current traffic lines in green. The traffic system primarily relies on outer ring roads, inner ring roads, and seven main connection roads between the ring roads, avoiding hilly terrain.

Geologically, Ljubljana is partially positioned on weak clay and alluvial levels at a maximum depth of 100 m. Under the soft layers exist low- or medium-quality rock that penetrates the surface in the form of shallow hills in some locations.

Let’s try to make a transport system according to the Deep Underground concept.

The red lines represent the transport system line following the hilly terrain because the geology is better there. Cyan dots mark the location of construction shafts and stations at the top of the hills, generally spaced 1 km apart.

The general level of the red line should be less than 300 m below the ground, with approximately 15 points of attack covering the city area, considering the 1 km distance between points. As learned in a previous video, constructing all required shafts would take about a year.

Tunnel excavation can proceed on both sides from the bottom of each shaft, providing 30 attack points for tunnels and 500 m to be excavated from each point towards neighboring shafts.

Since tunnels can be excavated at a rate of 300 m a year according to the Deep Underground concept, tunnel construction should be completed in less than two years, resulting in the entire new line from one side of Ljubljana to the other side taking less than three years.

We already saw that. There are four shafts to construct to the desired level, which should be connected with tunnels. From that point, the tunnel construction to the neighbour attack point can start. Shafts and tunnels can be excavated to create an underground station.

This example illustrates how to address the challenge of the slower tunnel excavation rate in the Deep Underground concept. While traditional tunnel excavation has only two attack points, the Deep Underground concept offers 30 in this case, which is more than enough to match the speed of traditional tunnel construction. However, it requires a combined vertical/horizontal transport system.

It’s time to see which other technologies can be a good fit for the Deep Underground concept.