【Tunnel construction methods】：

There are five main methods based on excavation techniques.

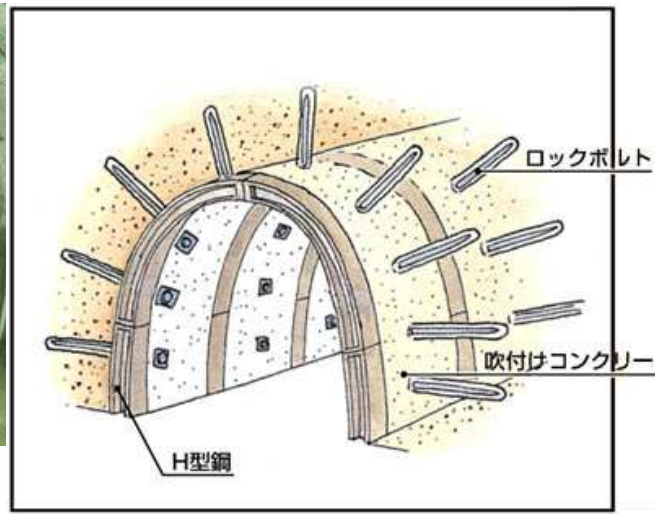
1) Traditional construction method ：

This is a traditional tunnel excavation method that was used in mines and similar settings. The method involves excavating the natural ground using manual labor or drilling machines, and installing support structures or wooden boards to support the excavated ground.

2） NATM Method

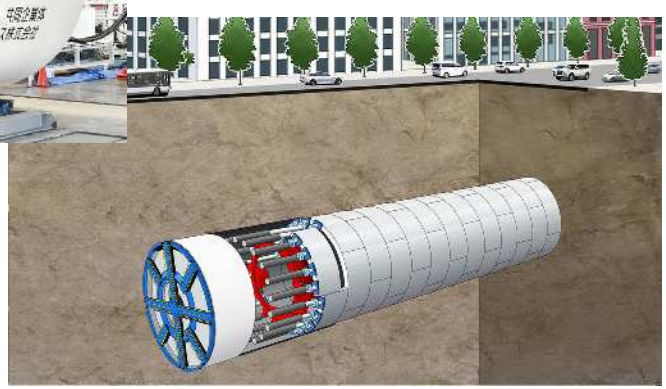
（**N**ew **A**ustrian **T**unneling **M**ethod） ：

It is one of the tunnel construction methods mainly used in mountainous areas. Concrete is sprayed onto the excavated section to quickly harden it, rock bolts are driven deep into the rock to secure the rock and concrete, and the theory and practical method involve using the inherent strength of the surrounding rock to support the tunnel.



3）Shield Construction Method：

It is a method of excavating a circular tunnel using a machine called a 'shield machine' at the tunnel's forefront, while digging through the soil. The shield machine excavates the soil and, immediately behind it, assembles concrete segments that support the tunnel.



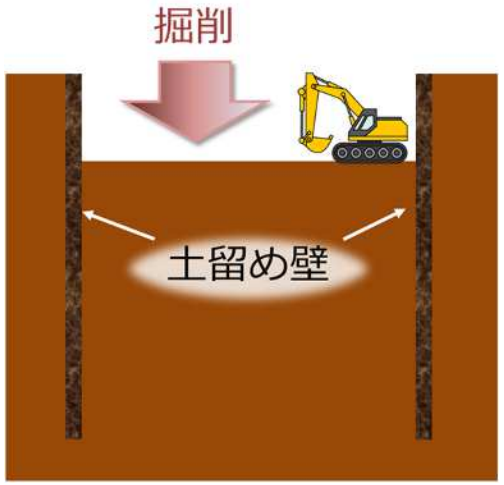
4）TBM工法（Tunnel Boring Machine Method）：

The TBM method is a technique for efficiently excavating hard rock and is particularly suitable for tunnel excavation in mountainous areas. In the TBM method, the cutting head rotates to advance through the ground, and after excavation, a lining that matches the tunnel cross-section is installed to form the tunnel walls.

5） The cut-and-cover method ：

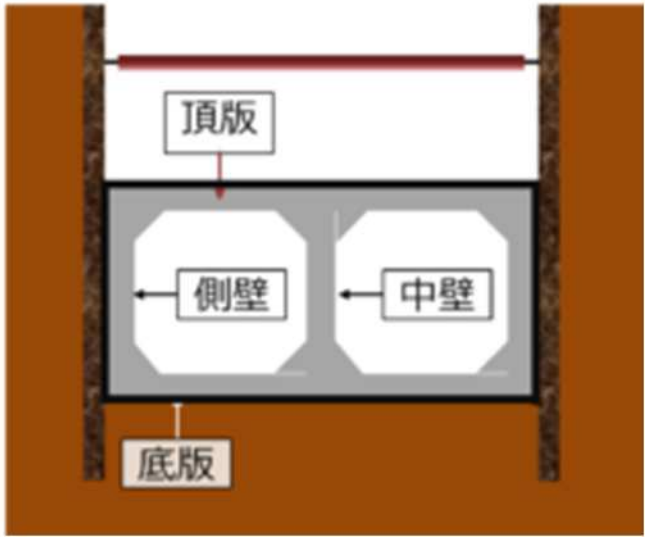
The cut-and-cover method is a technique in which a tunnel is constructed by digging deeply from the surface and then backfilling afterward.

①Construction of retaining walls and excavation



②Internal excavation and support installation

③Construction of box culvert



④Backfilling of the ground