

Expressway Construction - 2 Tunnel

고속도로 건설-2 터널

Long Distance Expressway Tunnel in Urban Area

Yamate Tunnel – The Japan’s Longest Expressway Tunnel Beneath Urban Area (completed in March 2015)

The Yamate Tunnel, a 18.2-km long underground tunnel, is part of the Central Circular Route (C2 Route) in the Metropolitan Expressway. This tunnel comprises of two sections, Shinjuku Route (L=10.0km) and Shinagawa Route (L=8.2km). The final section (Shinagawa Route) was completed in March 2015, thus completing the entire length of C2 Route (L=47km) and making the first of the “Three Circular Expressways in Greater Tokyo Area” open to traffic.



Central Circular Route (C2 Route), Metropolitan Expressway



Underground Tunnel in Urbanized Area

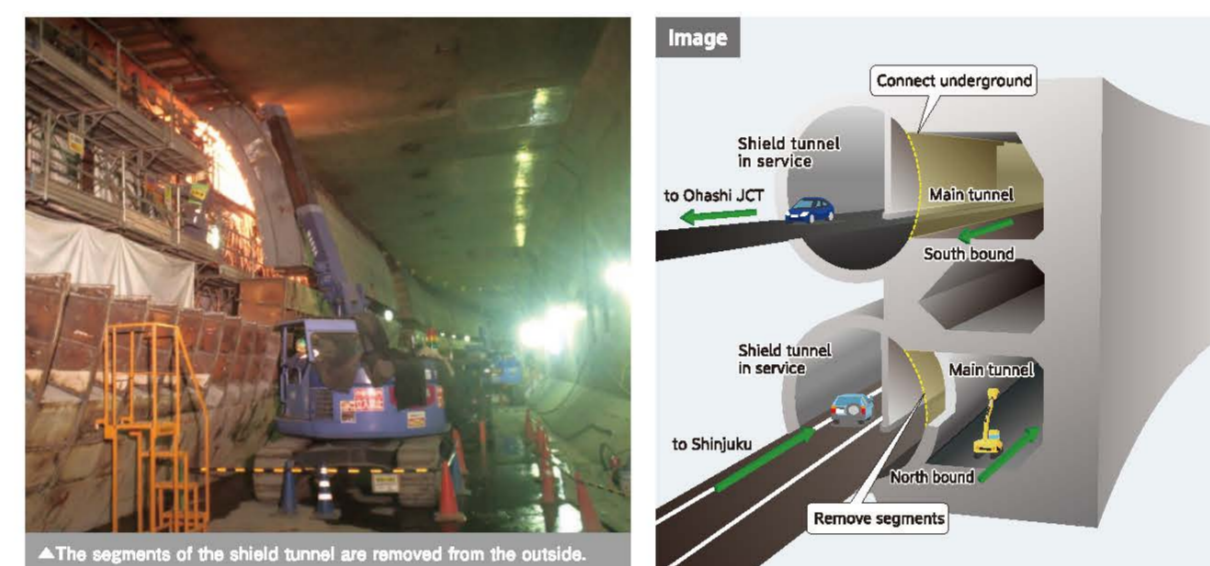


Ranking of Expressway Tunnel by length in Japan

Construction Engineering Features

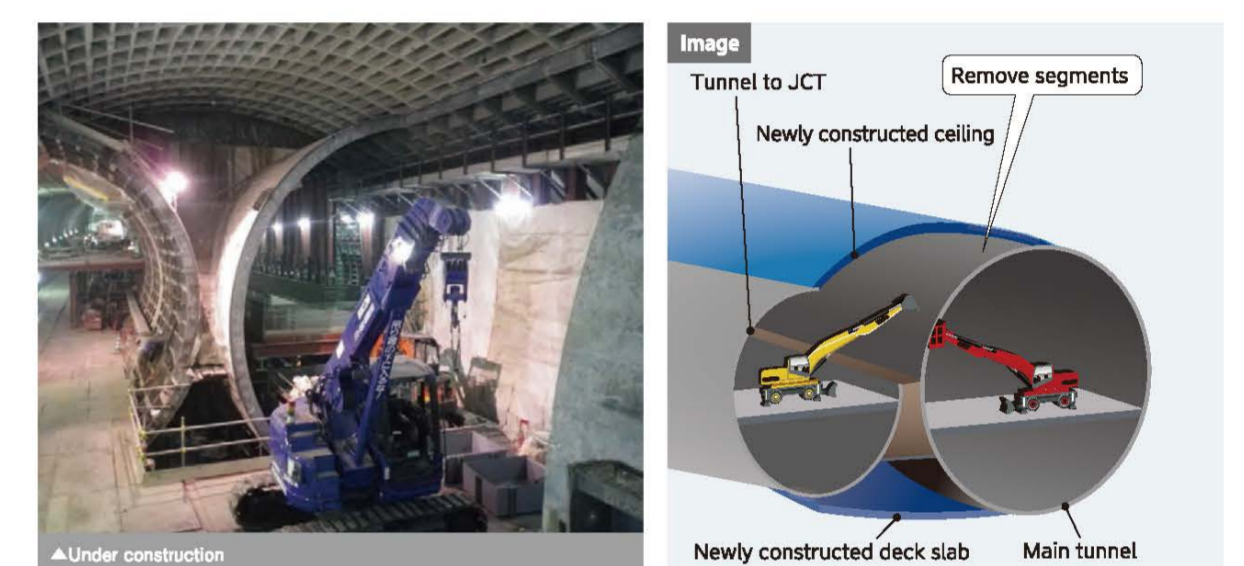
1 Connection with in-service Tunnel

The segments of in-service shield tunnel were removed underground over a total length of 200 m, and the main line of Yamate Tunnel was merged into a 3-lane tunnel section (diverging and merging point).



2 Connection of Underground Tunnel

The main shield tunnel with an outer diameter of 12.3 m and the shield tunnel with an outer diameter of 9.5 m in the connection route are integrated into a three-lane tunnel, thus allowing vehicles to join or branch from the main road.



3 Tunnel Excavation of 8km by a single Shield Machine

A single shield machine was adopted to excavate approximately 8 km along the Yamate Tunnel, which is the longest excavation length of expressway tunnel in Japan (as of completion). By this method, the construction time and cost have been greatly reduced compared to the conventional method.



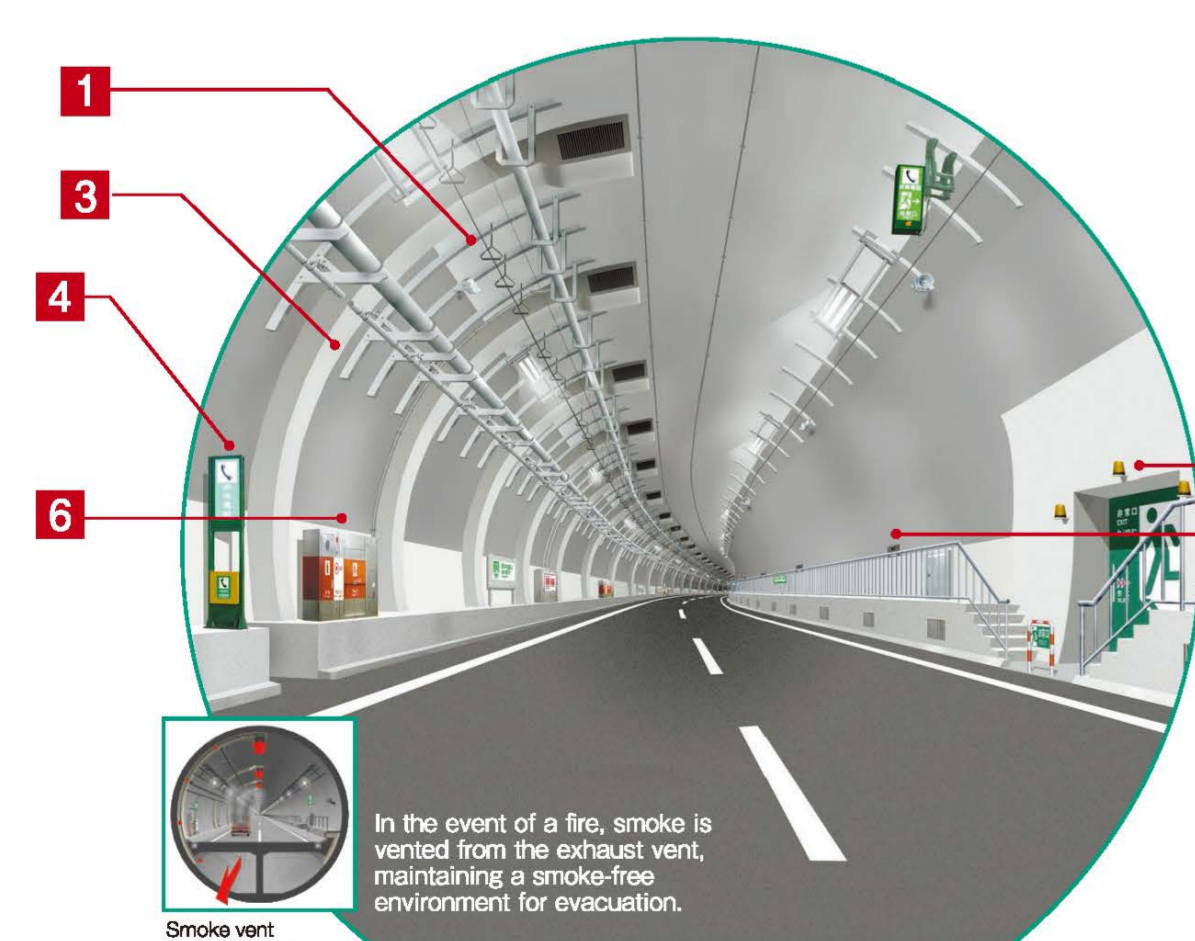
4 Shield Machine start and arrive at the ground surface

For excavation at Oi JCT, a shield machine with an outer diameter of 13.6 m was adopted by starting at the ground surface, turning around at the shaft and arriving back at the surface. This method can shorten construction time and the amount of excavated soil and CO2 emission can be reduced.



Other Engineering Features

5 Advanced Tunnel Disaster Prevention System

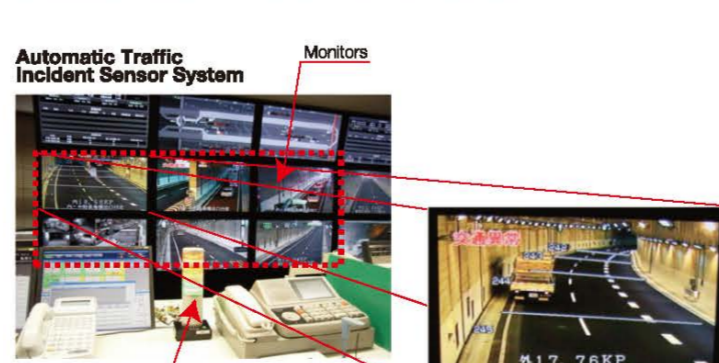


In the event of a fire, smoke is vented from the exhaust vent, maintaining a smoke-free environment for evacuation.

Real-time Emergency System for Tunnel

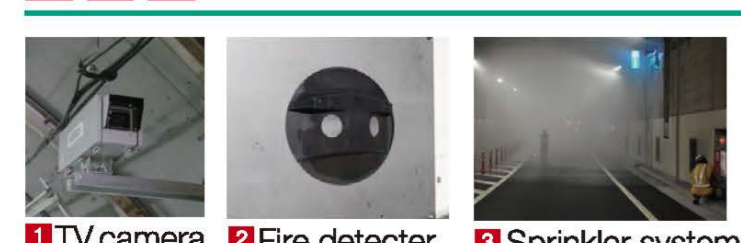


Exclusive console for the Yamate Tunnel



Automatic Traffic Incident Sensor System

1 2 3 “Eye” to watch over drivers around the clock



1 TV camera 2 Fire detector 3 Sprinkler system

4 5 6 “Emergency equipment” that drivers can easily use



4 Emergency phone 5 Emergency exit 6 Fire extinguisher, foam fire hydrant, and pushbutton fire alarm

6 Ventilation System

Exhaust gases from vehicles are attenuated by SPM (Suspended Particulate Matter) removal device and low-concentration denitration device at the ventilation station. The attenuated air in the tunnel is concentrated at the station and diffused by discharging at high altitude through the ventilation tower to minimize the effects on the surrounding environment.

