

General Aspects of Tunneling in Japan

Trend of Construction Investment in Tunnels and Underground Spaces

The total amount of construction investment in tunnels and underground spaces in Japan increased rapidly until 1995, but since 1995 it has been on the downturn due to the continuing government curbs on public investments. However, from 2011 it had been flat because of reconstruction demands after the Great East Japan Earthquake, and in 2014 it tended to increase drastically again due to improvement projects of the transportation network for the coming 2020 Tokyo Olympic Games. Fig. 1 shows trends in volume of work under construction, divided according to the purposes of tunnels and underground spaces in Japan.

Fig. 2 shows the makeup of contracted amounts of different project purposes in 2016. The largest was road at 59%, followed by waterways at 10%, railways at 11% and others at 20%.

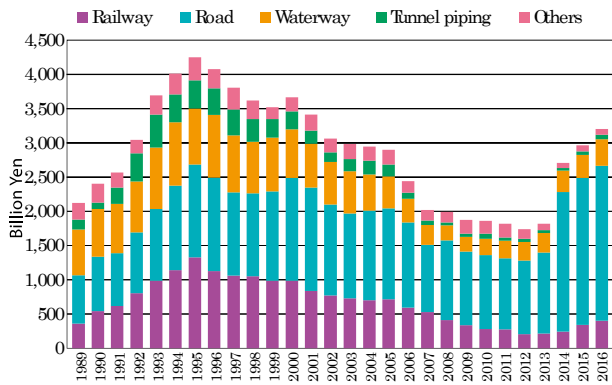


Fig. 1 Trend of construction investment in tunnels and underground space

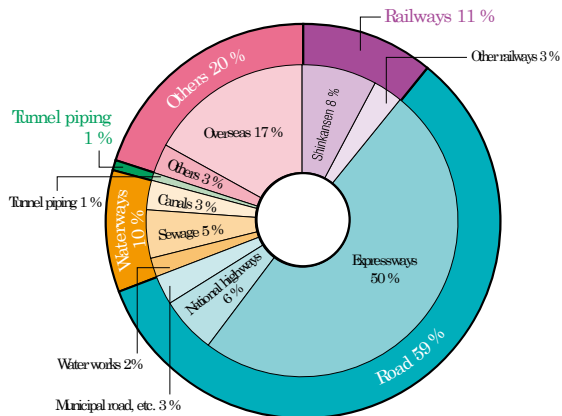


Fig. 2 Ratio of contractual amount by project purpose

Trends of Tunneling Method

Fig. 3 shows trends in the number of tunnel construction sections by tunneling method (conventional/NATM, shield method, etc.) and changes in their proportion. The ratio of the conventional method is the highest, accounting for 30% to 60% of the total and still increasing, followed by the shield method, leveling off in the range 20% to 30%. The ratio of pipe jacking projects has dipped, accounting for 9%, and the cut-and-cover has leveled off at around 5%.

The increase of ratio of projects by the conventional method is attributable to widened range of application of this method

because of technological development such as various auxiliary methods.

Fig. 4 illustrates the percentages of different construction methods and those of excavation methods. The conventional method accounts for 61% of the total, for which blasting is most frequent 60%. The shield method is 49%, which is subdivided into 25% for slurry shield and 72% for high-density slurry shield and 1% for earth pressure balanced shield.

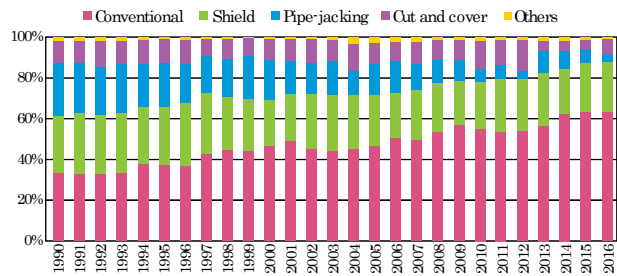


Fig. 3 Ratio of tunnel numbers by excavation method

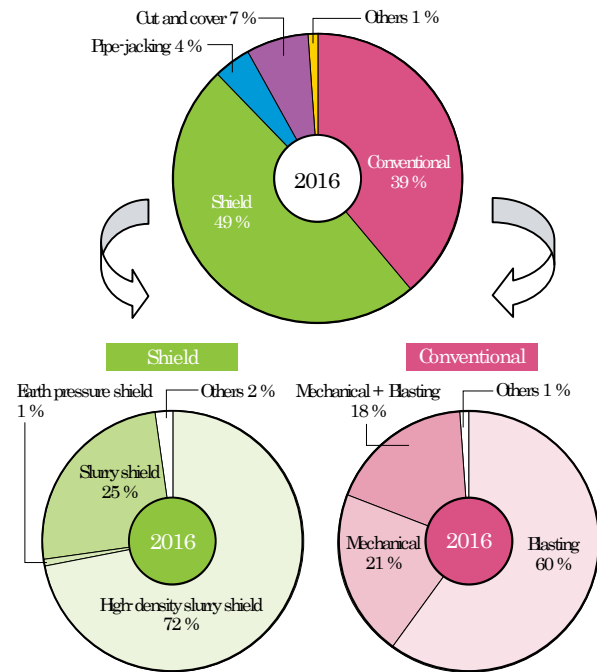


Fig. 4 Breakdown of construction and excavation methods

Domestic and Overseas Tunnel Construction by Japanese Contractors

Fig. 5 shows the contract amounts of domestic overseas tunnel construction projects by JTA member contractors.

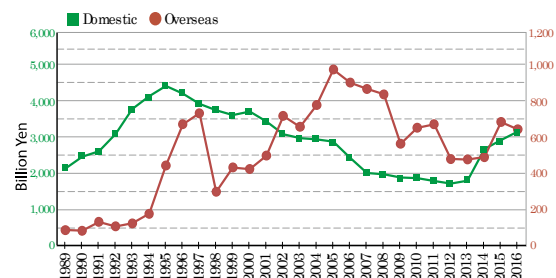


Fig. 5 Domestic and overseas tunnel construction by Japanese contractors