

Tunnel Disaster Prevention Facilities in Tokyo Metropolitan Expressway

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The Metropolitan Expressway is an urban expressway in the Tokyo metropolitan area. The expressway is 327.2km long and carries one million vehicles per day. It is one of the major arteries in the area. Yamate tunnel, of which the last section opened in 2015, is the world's longest expressway tunnel with a length of 18.2km. The tunnel is equipped with cutting edge technology to prevent tunnel disasters. This paper will introduce the traffic operation facilities among the six tunnel disaster prevention principles (operating emergency facilities, traffic operation, collaboration with relevant parties, PR/enlightenment, installing emergency facilities, fireproof structures).

1. Detection of Accidents at Early Stages

In addition to emergency telephones, push alert devices, and fire detectors, the Traffic Incident Detection System which uses CCTV images to detect events such as vehicle stoppages and fires at an early stage, is installed and alerts traffic control operators to accidents by flashing lights.



Fig. 1 CCTV image

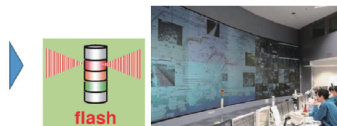


Fig. 2 Traffic control Room

2. Informing drivers

When an accident occurs, warning signs and variable message signboards are used at the entrance of tunnels to warn drivers not to enter. Inside, the system warns drivers to evacuate the tunnel. In addition, loudspeakers equipped with echo cancellation technology encourage drivers to evacuate their vehicles in an easy-to-hear voice.



Fig. 3 Variable Message Signboard



Fig. 4 Echo Cancellation Technology for Loudspeaker

3. Tunnel Closure by Traffic Patrol

In addition to the traffic patrol vehicles, patrol members on motorcycle arrive at the tunnel scene within three minutes to close the tunnel. Warning signs with flashing light at the tunnel entrance will intuitively alert drivers that an accident has happened, and the tunnel is closed.



Fig. 5 Dispatch of motorcycle patrol

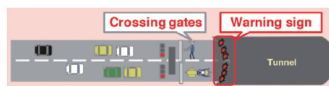


Fig. 6 Prompt Tunnel Closure by manual barriers

Reference:

<https://www.shutoko.co.jp/en/index/driving/emergency/>
https://www.its-jp.org/english/files/2021/11/its2021_shuto_kosoku_210824_x1a.pdf