

Evacuation Awareness During Tunnel Fires

Research Background

During tunnel fires, visibility inside the tunnel deteriorates due to smoke, making it crucial to evacuate early before smoke fills the space. This study introduces methods considered effective for increasing public awareness and recognition of early evacuation.



Photo-1 Fire experiment inside tunnel (approx. 3 min after ignition)

Case Studies of Evacuation Behavior

Cases have been observed where people remained inside the tunnel or in their vehicles even as smoke filled the space. This is believed to be caused by people failing to recognize smoke as dangerous and by normalcy bias, where people assume they do not need to evacuate because those around them are not evacuating. However, in the vehicle fire that occurred in the Amako-yama Tunnel on the Sanyo Expressway (westbound) on September 5, 2023, a truck driver took the initiative to evacuate, prompting surrounding drivers to follow.

This action minimized casualties. In other words, early evacuation is the critical factor in tunnel fires.

Table-1 Tunnel Fire Incidents

Date	March 2016	April 2015
Tunnel Length	844 m	1,090 m
Cause	A truck rear-ended cars in a traffic jam, causing 5 vehicles to catch fire.	A passenger car caught fire behind a line of vehicles.
Damage	Approx. 70 people injured by fire and smoke. Vehicles remained inside the tunnel for an extended period.	18 people suffered burns. Vehicles remained inside the tunnel for an extended period.



Photo-2 Amako-yama Tunnel Fire Damage

Future Awareness Strategies

Although awareness campaigns using leaflets and videos have been conducted, surveys of expressway users revealed that recognition remains low.

As future awareness measures, we are considering simplifying access to awareness videos, adding QR codes to leaflets, creating mini posters, and displaying them in prominent locations such as restrooms and food court tables at rest areas.



Photo-3 Awareness Posters and Display Examples

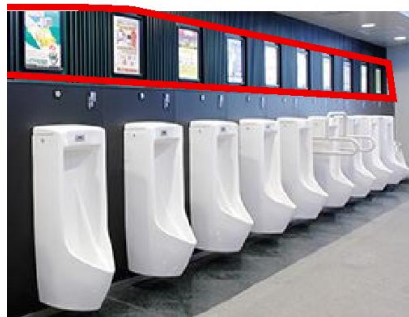


Photo-4 Food Court Table Advertisements