Webinar Talk on Mechanical and Electrical (M&E) Design Consideration for Tunnel (Railway & Road)

by Ir. Frankie Cheah

Ir. Frankie Cheah is currently the Secretary/Treasurer of TUSTD of the Institution of Engineers Malaysia (IEM).

The webinar on "Mechanical and Electrical (M&E) Design Consideration for Tunnel (Railway & Road)" was organized by the Tunneling & Underground Space Technical Division (TUSTD) of The Institution of Engineers, Malaysia (IEM) on 3rd of March 2022 from 4:00 pm – 6:00 pm. It was presented by two prominent persons in railway and road tunnel design from the AECOM Hong Kong office, namely, Mr. Tony Koo and Mr. Sam Chung. A total of 76 participants attended the webinar talk which was moderated by Ir. Frankie Cheah, the Secretary/Treasurer of TUSTD.

Mr Tony Koo started the webinar with the key considerations and challenges for tunnel design construction. He briefly mentioned that the major considerations are fire safety, health, and safety together with the requirements from both international and local codes of practice. He used the Tsuen Mun to Chek Lap Kok (TM-CLK) Subsea Tunnel project and Tseung Kwan to Lam Tin (TKO-LT) Tunnel project in Hong Kong as the case studies for the audience to gain a better understanding and appreciation of the issues at hand.

Fire safety is one of the key considerations in E&M engineering. The parameters to be considered are fire size, evacuation route, evacuation time, and fire risk. The main goal with all these key parameters is to allow all users to safely exit the road tunnel in the event of a fire. In fire size, the feasibility consideration are Ventilation and Smoke Control Strategy while the consideration for evacuation shall be Available Safe Escape Time (ASET) and Required Safe Escape Time (RSET). The measuring criteria for the ratio of ASET over RSET shall be 1.2 for the TMCLK project. Further enhancements for fire protection systems and passive protection for tunnel structures comprise various suppression system such as sprinkler, water mist and deluge system. In Tony's project, thermal barriers were also adopted in order to provide protection and ensure structural integrity under sub-sea environment.

The next speaker, Mr. Sam Chung informed that on the electrical design aspect will be the tunnel power schematic and lighting consideration. The tunnel's entrances and exits are the main accident-prone zones. Thus, the design of tunnel lighting requires these areas to be always well illuminated, comfortable and with fail-proof power supply.

In order to ensure all these design elements to achieved, Sam informed that the important parameter including the:

1) Tunnel lengths with the consideration of daytime lighting
2) Stopping distance and,
3) Back-up power supply for emergencies

Mr. Tony emphasized the use of advanced engineering techniques and innovative solutions that always ensured a high level of safety during construction and throughout the tunnel's service life.

The webinar ended at 6:00 pm with exchange of fruitful Question & Answer (Q&A) session. The moderator thanked Mr. Tony Koo and Mr. Sam Chung for their time to deliver this valuable webinar talk to the participants and members of IEM TUSTD who have attended this webinar talk.

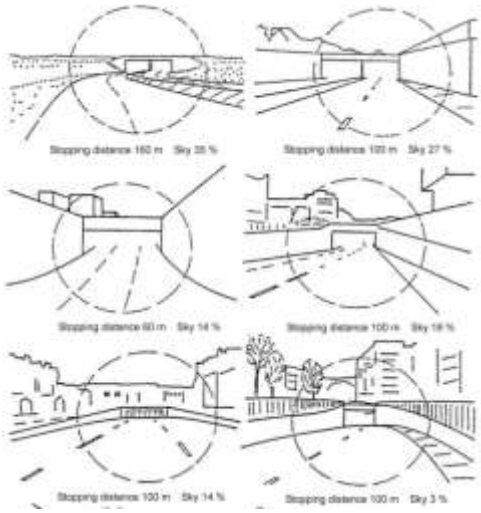

Figure 1: L20 method for stopping distance