Visit to Cochrane MRT Station & Tunnel

MECHANICAL ENGINEERING TECHNICAL DIVISION

reported by
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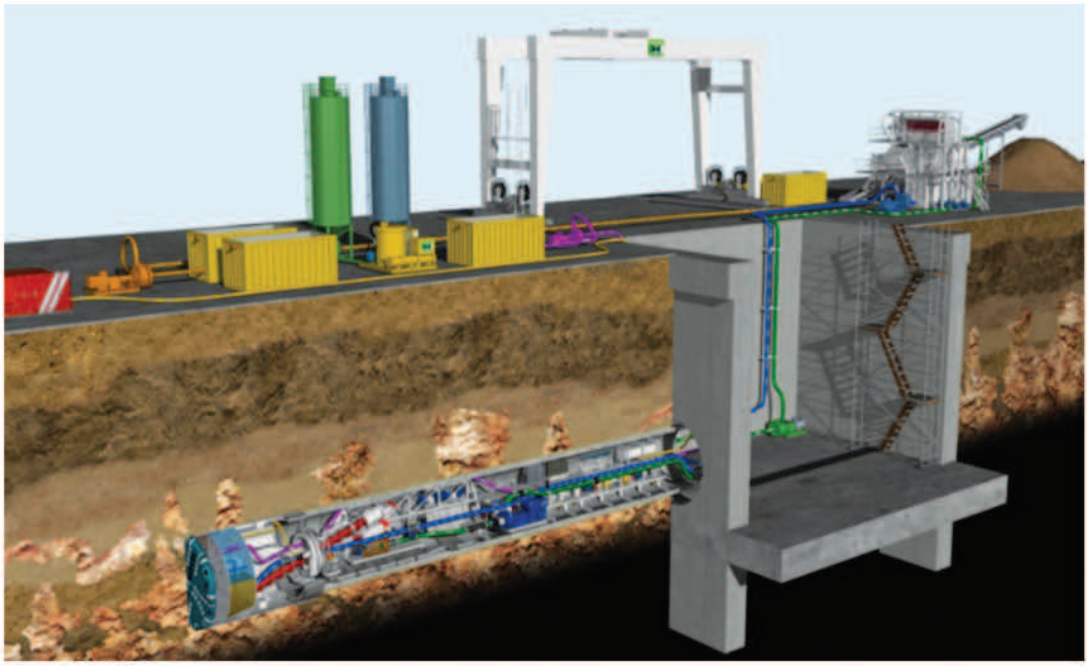


TBM machine operation (picture courtesy of underground space engineering)

The multi-million Ringgit Klang Valley Mass Rapid Transit (KVMRT) is expected to solve part of the traffic woes of the urbanites upon completion. To get an early glimpse into the project, IEM's Mechanical Technical Engineering Division (MTED) organised a visit to its underground station at Cochrane on 16 June 2015 for 16 engineers from various backgrounds.

PRE-TOUR BRIEFING

Before the visit started, an official of MMC-GAMUDA gave a presentation of the project – on the tunnelling process, the cutting edge advance technology used which had earned MMC-GAMUDA the Technical Innovation of the Year Award for the Variable Density Tunnel Boring Machine, the Electrical and Mechanical System, and the Railway Systems. The role of KVMRT in easing traffic congestion in the Klang Valley was explained.

Two types of construction methods were used for underground stations. The top-down method was meant for congested areas while bottom-up method was used where space was limited.

Participants listening to the presentation

All participants were given a safety briefing on the dos and don'ts in the underground station and tunnel before the start of the visit.

ELECTRICAL AND MECHANICAL SYSTEMS

The focus of the visit was on the design and installation of the electrical and mechanical systems (E & M Systems). The Railway System, though important, was beyond the scope of this report. Briefly as discussed herein the E & M systems cover principally the following works:

- Environment Control System
- Fire Detection and Protection System

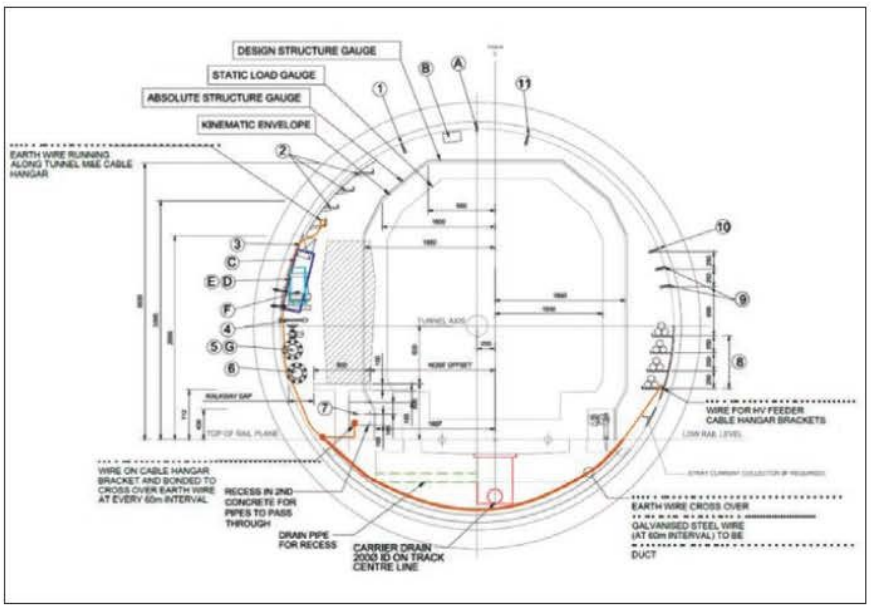
- Plumbing and Drainage Services
- Tunnel Ventilation System
- Electrical Services.

Environment Control System (ECS): ECS of an underground station shares the same design concept as that of an underground structure. In principle, ECS in underground stations are for human comfort and supported the operation of railway equipment. In particular, a smoke control system will be provided in stations for safe evacuation of all station occupants within the public areas in the event of emergency. It is designed according to the latest standards and best practices in the world, such as NFPA 130, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE), Chartered Institution of Building Services Engineers (CIBSE), Sheet Metal and Air Conditioning Contractors' National Association (SMACNA), Malaysia Standard MS1472: 1999 and Malaysia Standard MS1780: 2005 just to name a few.

The Fire Detection and Protection System: In the event of fire, the main objectives of this system are to protect passengers and staff as well as to minimise damage to equipment, buildings and structures. The system is able to detect the presence of smoke or fire and subsequently alert the staff of fire outbreak with minimum delay. The system allows a quick and controlled evacuation to take place without panic. As Uniform Building Bye-Law (UBBL) does not have fire safety provisions specifically for Mass Rapid Transit premises, firefighting equipment and fire safety installations have been proposed based on risk assessment in Fire Safety Design Philosophy which is approved by the Fire Services Department.

Plumbing and Drainage Services: This includes cold water supply, sanitary plumbing, dewatering and drainage pumping system. The dewatering pumping system has two functions. First, it is to dispose water from drainage discharge points to the public drainage system. Second, it will dispose waste and soil water from sewage discharge points to a public sewage system. At all times the system ensures a clean environment in the stations and the tunnels.

Tunnel Ventilation System: The system is used to maintain the tunnel and the track-way at an appropriate environmental condition for train operation and commuters. In the event of a tunnel fire, the system operates as a smoke extraction system to create a smoke-free path for the evacuation of passengers and to ease the operations of fire personnel. Ductworks comprise structural ducts, builders work ducts and heavy



Cross section of a bored tunnel with railway services

gauge fire-rated steel ductwork. Concrete and builders work ducts are treated to minimise corrosion and dust generation.

Electrical Services: The system provides power supply to each station via a 33kV network along the tunnels. Dual 33kV power supply will be stepped down to 415V power supply in power equipment room for distribution. As a reliable and safe power supply to stations and railway system equipment is vital, there are three types of power supply modes. First, the normal mode supply to all load equipment when all power supplies are healthy. Second, the essential mode supply to essential load equipment when one supply source fail. Third, the very essential mode (UPS) supply to critical load equipment when all power supplies fail.

IEM group picture in the tunnel

WORK-IN-PROGRESS

On the day of our visit, the underground structure works at Cochrane Station were mostly completed and ready for electrical and mechanical installations. The underground station was bustling with activities as workers were putting up the blockworks and installing cable ladders for the 33kV power supply at the under-platform level. Masonry ductworks for the overhead track exhaust system to dissipate heat generated by the air condition units of the electric trains had also been completed.

After inspecting the working progress, we were given a glimpse of the finished tunnel. Although the Tunnel Boring Machine (TBM) had completed the whole tunnel, there was much more to be done. We saw many E&M services and Railway systems installations in progress. These included drainage to cater to tunnel water seepage and water carried from outside by the trains, 33kV power cables that supply power to all underground stations, linear head detector (LHD) to detect any abnormality in the tunnel, communication cables, conductor rails to power up the trains, track-work installations, signaling cables, emergency walkways, tunnel lightings and switch socket outlets. Only the installation of cable brackets was fully installed on the day of our visit. ■