Half-Day Seminar on 'Landslide and Debris Flow Risk Management – Hong Kong Experience'

by **Engr. Yee Yew Weng,** MIEM, P. Eng.

ON 1 November 2008, a half-day Seminar on 'Landslide and Debris Flow Risk Management – Hong Kong Experience' was organised at the IEM Conference Hall, Bangunan Ingenieur at 8.30 a.m. Four speakers from the Hong Kong Institution of Engineers, namely, Albert Ho, Cheung CT, Stuart Millis and Don Sum shared their experience during the seminar. The seminar was attended by 66 participants.

Ho spoke on the topic of 'Landslide Risk Management and Sustainable Slope Greening Approach in Hong Kong'. He explained that the Hong Kong Government Agency, GEO, was setup in 1977 after a series of landslide resulted in the loss of 470 lives. Steps were taken to reduce the risk of landslide using a three-prong approach (Figure 1):

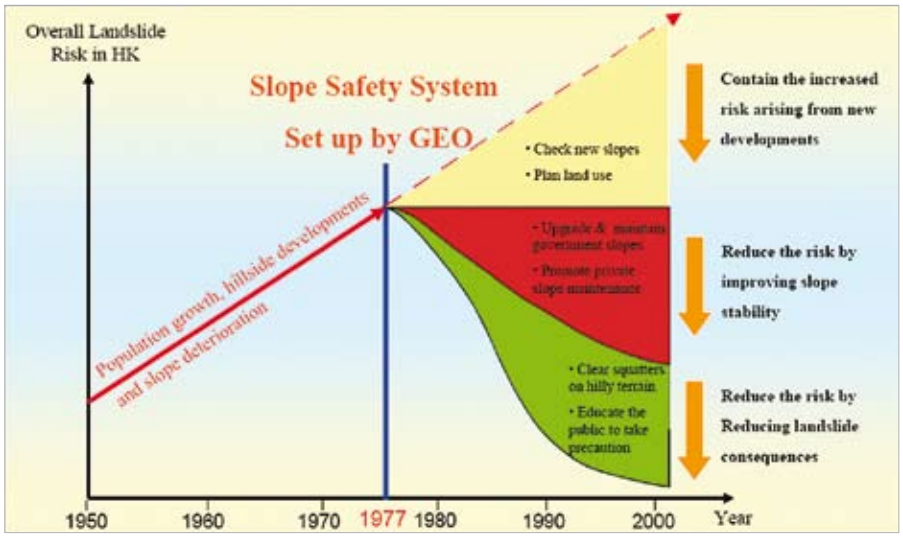

Figure 1: Risk reduction approaches

(i) Reducing landslide consequences
- Clear the squatters from hilly terrain
- Educate the public to take precaution

(ii) Improving slope stability
- Upgrad and maintain public slopes
- Promote private slope maintenance

(iii) Containing the increased risk arising from new developments
- Check new slopes
- Plan land use

The target of the Government by 2010 is to reduce landslide risk to less than 25% of that in 1977.

Ho explained that the public demand not only safe slopes but also 'green' slopes. Hong Kong has started using Continuous Fibre-Reinforced Soil (CFRS) to 'green' the slopes after engineering treatment. This is a form of sustainable concept in slope treatment (Figure 2).

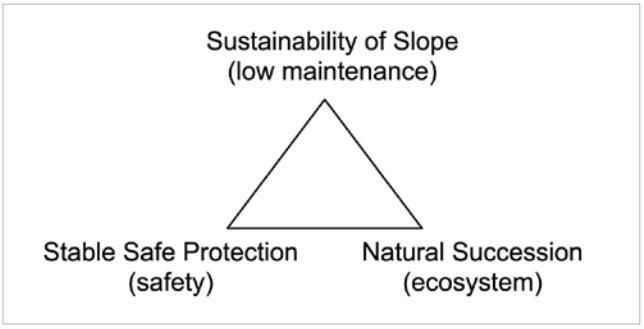

Figure 2: The sustainable concept in slope treatment

Ho said that slope engineering in Hong Kong has improved from a highly empirical form in the 1970s to a more controlled risk landslide management model. In this respect, he gave examples of improvements in GIS, digital photogrammetry, airborne LIDAR, real-time field instrumentation and data transmission, 3D terrain modelling, *etc*.

Cheung presented on 'Landslides Preventive Works at Po Shan Road'. The Po Shan area is affected by high groundwater level and is prone to shallow landslides. The

existing landslide protection measures were by means of horizontal drains, but these have shown signs of deteriorating performance. The long term solution was to construct two tunnels measuring 3.5m in diameter and 200 sub vertical drains. Environmental restriction made it necessary to drill the tunnels using state-of-the-art 'Retractable' TBM (Figure 3).

Millis shared his experience on 'Instrumentation and Real Time Monitoring of Natural Terrain – Hillsides'. Selected problematic slopes were monitored using instruments such as surface monitoring (Figure 4), sub-surface movement, pore water pressure/ground water conditions, soil suction, rainfall, etc. He emphasised that data collection and management system must be practical and easy to operate.

In another presentation, Millis spoke on 'Debris Flow'. He explained that debris flow is a landslide in which the debris moves by the dominant mechanism of slurry flow. They are typically of high mobility and present greater hazard than debris slides. He gave five examples of destructive debris flow in Hong Kong from 1990 to 2008. Millis said that the current framework for investigation for Debris Flow Hazards is provided in GEO Report 138 'Guidelines for Natural Terrain Hazard Studies'. He then explained the state-of-the-art computer modelling used in hazard studies (Figure 5).

Don Sum shared several case studies of slope works in Hong Kong in his Lecture entitled 'Natural Terrain Hazard Mitigation Works at Various Sites in Hong Kong'. The mitigation works carried out include:

(i) tensioned steel mesh fences
(ii) rigid barriers
(iii) soil nailing
(iv) baffles
(v) retaining walls
(vi) boulder resisting wall (Figure 6)

He also highlighted the importance of involving the public in slope work; by encouraging the public to notify the authorities of possible landslide signs and to respond to them.

The seminar ended at 12.30 p.m. after several pointed question from the floor. Engr. Yee Yew Weng, Chairman of the Geotechnical Engineering Technical Division, presented certificates and tokens of appreciation to the speakers for their presentations. ■

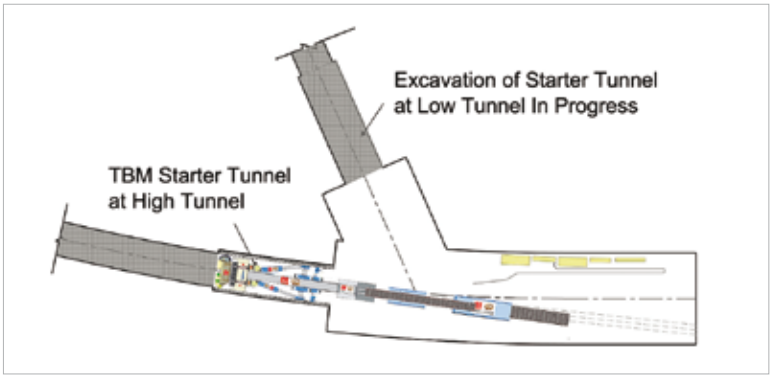

Figure 3: Boring using retractable TBM

Figure 4: Surface monitoring

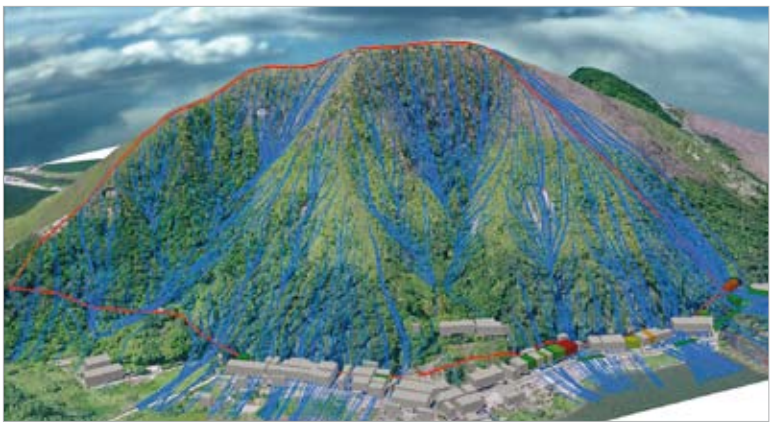

Figure 5: GIS Modelling of Debris Flow

Figure 6: Boulder resisting wall