LEGCO PANEL ON PLANNING, LANDS & WORKS

INFORMATION PAPER ON SLOPE SAFETY

INTRODUCTION

1. This is the seventh in a series of reports to inform Members of slope safety initiatives and obtain Members' views on further improvements. The last report was submitted to the Panel in March 1999 and discussed at the Panel meeting on 10 June 1999.

BACKGROUND

2. The 1999 Policy Objective "Slope Safety for All" reiterated the Government's 1998 commitment to meet Hong Kong's need for the highest standards of slope safety. In this year's Policy Objective Booklet, we have reported progress in the six Key Result Areas. We have achieved satisfactory progress towards all of the targets set out in previous years. With the completion of the 5-year Accelerated Landslip Preventive Measures (LPM) Programme in 2000, we will have reduced the landslide risk arising from old substandard man-made slopes to less than 50% of the risk that existed in 1977.

3. We have committed to a 10-year Expanded LPM Programme from 2000 to 2010. With our continued efforts in LPM, geotechnical control on new developments, proper maintenance, squatter clearance, promoting public awareness and response in slope safety through public education, publicity, information services and public warnings, we estimate that the landslide risk will be further reduced to less than 25% of the 1977 level by the year 2010.

RECTIFYING SUBSTANDARD SLOPES

4. We have completed preparatory work for the 10-year Expanded LPM Programme to commence in 2000. Throughout the next ten years, we intend to

increase the current average annual LPM output by over 40%, i.e. by upgrading 250 large and complex man-made government slopes per year.

5. Maintenance departments are actively maintaining the slopes allocated to them. As part of their maintenance programme, they are also improving the stability of the smaller slopes not covered by the LPM Programme using prescriptive engineering measures.

6. Under the 10-year Expanded LPM Programme, we will continue to carry out safety-screening of 300 private man-made slopes per year. Where prima facie evidence of a dangerous situation is established for a slope, the Buildings Department will issue a Dangerous Hillside Order (DHO) to private owners under Section 27A of the Buildings Ordinance to require them to investigate and upgrade their substandard slopes. The service and enforcement of DHOs is now undertaken by the Slope Safety Section of the Buildings Department headed by a Chief Building Surveyor who is occupying a supernumerary post which is due to lapse on 31 March 2000. To ensure continued directorate support to the DHO statutory work, we will submit a proposal to the Establishment Sub-committee (ESC) on 12 January 2000 to convert this supernumerary post to a permanent post.

7. Project departments and private developers also play an important role by upgrading substandard slopes as part of new developments. Where appropriate, upgrading of substandard slopes outside of the project boundary but which could affect the development will be required as part of the project.

CHECKING NEW SLOPES

8. The Geotechnical Engineering Office (GEO) exercises geotechnical control on new slopes and developments in both the private and public sectors. The GEO is maintaining their quality management system for geotechnical control through compliance with the international standard of ISO 9001.

9. Consultation is currently being undertaken with the official advisory bodies of

the building industry on the proposal to require geotechnical elements of private building works to be undertaken by Registered Geotechnical Engineers. The necessary legislative amendments will be submitted to LegCo on conclusion of the consultation exercise.

SLOPE MAINTENANCE

10. Identification of the maintenance responsibility of all the 54 000 man-made slopes in the Slope Catalogue has been completed under the project – Systematic Identification of Maintenance Responsibility of Slopes (SIMAR) by the Lands Department. Disclosure of the SIMAR register to the public will take place near the end of this month. A bilingual computerized Slope Maintenance Responsibility Information System is being prepared for access by the public on the INTERNET by end of 2000.

11. About 37 000 government slopes have been assigned to 7 major slope maintenance departments for maintenance, viz Agriculture and Fisheries Department (A&FD), Architectural Services Department (ArchSD), Drainage Services Department (DSD), Housing Department (HD), Highways Department (HyD), Lands Department (LandsD) and Water Supplies Department (WSD). These departments are actively arranging for the first Engineer Inspection (i.e. comprehensive inspection by professional engineer) of the slopes assigned to them. We aim to complete the first Engineer Inspection for all the government slopes in the next 3 years.

12. Based on the SIMAR results, Lands Department has been identified as the biggest slope owner responsible for some 14 000 government slopes. The Slope Maintenance Unit in the Lands Department is currently headed by a Chief Geotechnical Engineer who is occupying a supernumerary post which is due to lapse on 31 March 2000. To ensure continued directorate support to plan and implement the maintenance works for the 14 000 man-made government slopes, we will submit a proposal to the ESC on 12 January 2000 to convert this supernumerary post to a permanent post.

13. The GEO is auditing maintenance departments on their slope maintenance work to assist them to improve their performance in discharging their slope maintenance responsibility. As one of the initiatives to enhance the understanding of slope maintenance requirements, the GEO will shortly be completing a training video on slope maintenance for use by maintenance department staff.

BURIED WATER-CARRYING SERVICES AFFECTING SLOPES

14. Consultants and contractors have been commissioned to carry out the systematic inspection and repair of all underground government drains, sewers and water pipes which may affect the stability of adjacent slopes. Leakage detection of all buried water carrying services adjacent to slopes within public housing estates has been completed by the Housing Department and necessary repair works are in progress. Similar work is also being undertaken by ArchSD, DSD, HyD and WSD. On the private side, the Buildings Department is continuing the enforcement of Section 27C of the Buildings Ordinance to require owners to inspect and repair private underground services which may affect the stability of adjacent slopes. Over 1044 slopes have been screened and 52 Section 27C Orders served on the private owners.

ENHANCING PUBLIC INFORMATION, PUBLIC EDUCATION AND ADVISORY SERVICES

15. The Hong Kong Slope Safety Website (http://hkss.ced.gov.hk) has been providing free slope information to the public over the INTERNET. The website will be enhanced by the launch of the Chinese language version in March 2000.

16. The Community Advisory Service provided by the GEO since April 1999 has been receiving positive feedback from slope owners, Owners' Corporations, Mutual Aid Committees and property management agencies. Six seminars on slope safety have been organized for 460 private slope owners and property managers, and over 360 slope owners who have received Dangerous Hillside Orders (DHOs) have been

approached and offered advice. Five meet-the-public sessions have been conducted at popular shopping centres in conjunction with roving exhibitions on slope safety.

17. Slope safety has been included in the secondary school geography curriculum. The GEO is working in conjunction with the Chinese University of Hong Kong to prepare an educational toolkit on slope safety for use by secondary school students. The toolkit will be distributed to all secondary schools through the Education Department in early 2000. The GEO is also providing publishers with relevant slope safety materials to assist them to produce accurate and useful teaching materials on slope safety.

LANDSLIDES IN 1999

18. Up to December 1999, more than 2100 mm of rain were recorded at the Hong Kong Observatory (HKO) and over 450 landslide incidents had been reported to the GEO. The year 1999 was drier than average up to July, but August was the second wettest August on record (the wettest being in 1995). There were two significant rainstorm/landslide events during the 1999 wet season, viz. the event of 22-26 August (associated with Typhoon Sam and the unstable southerly air stream which followed it) and that of 16-17 September (associated with Typhoon York).

19. A total of 292 landslides was reported to the GEO as a result of Typhoon Sam, with 35 reported from Typhoon York. Typhoon Sam has been reported by the HKO as the wettest typhoon on record to affect Hong Kong. The maximum 24-hour rainfall during Typhoon Sam exceeded 500 mm, centred on Tai Mo Shan, with 200-400 mm recorded over the urban areas. In this event there was a fatality due to a debris flood at Sham Tseng, and major movement of a slope at Shek Kip Mei resulting in permanent closure of three public housing blocks. The maximum 24-hour rainfall during Typhoon York exceeded 300 mm, again centred on Tai Mo Shan, with 150-250 mm recorded over the urban areas. On both occasions the Landslip Warning was hoisted.

20. The new Landslip Warning criteria which have been developed based on recent research were evaluated during these rainstorms. The experience indicated that, using the rainfall forecast of HKO, the new criteria were effective in predicting the high occurrence of landslides in Hong Kong on both occasions. They were an improvement over the old criteria, in that the Warning was hoisted slightly earlier on both occasions, with fewer landslides occurring before the Warning was raised.

SLOPES ADJACENT TO PUBLIC HOUSING ESTATES

21. The movement of the slope in Shek Kip Mei on 25 August 1999 following Typhoon Sam required permanent evacuation of some 700 residents from 3 blocks of the Shek Kip Mei Estate. Forensic investigation of the causes of the movement is being carried out by an independent team led by Professor Burland of the Imperial College of Science & Technology, United Kingdom. The investigation report will be completed in February 2000 and will be made public. Urgent repair works to the distressed slope which consisted of sealing cracks, protecting the exposed slope face and installing raking underground drains have been completed. The slope will be upgraded under the LPM Programme by end 2000.

22. Housing Department has been maintaining slopes within public housing estates and has agreed to be the maintenance agent (with funds provided by government) for a few hundred slopes within unallocated government land but affecting their estates. They completed initial inspections of these slopes in September 1999 and are implementing the necessary maintenance works.

23. Housing Department is working closely with the GEO to identify those slopes which need stability improvement by the LPM Programme or prescriptive engineering measures. The highest priority is being given to the investigation and improvement works for about 200 slopes affecting public housing estates, and the target is to complete this by September 2001.

SQUATTER CLEARANCE ON SLOPE SAFETY GROUNDS

24. GEO continues to inspect squatter villages on steep terrain to identify huts at risk, recommend clearance and advise the occupants to seek safe shelter during heavy rain. The 1999 target is to have some 3800 squatter huts inspected by September 2000.

25. Following a debris flood from the natural hillside above Sham Tseng during Typhoon Sam in August 1999 which caused one fatality and destroyed several squatter huts in the village below, we strive to complete by the next wet season debris flow mitigation works and drainage improvement works to reduce the clearance extent and protect those people who remain in the area.

TECHNICAL STANDARDS

26. The GEO has completed a new guidance document aimed at extending the scope of application of prescriptive measures for use in enhanced maintenance of soil cut slopes.

27. The first draft of the Highway Slope Manual has been circulated for comments by Highways Department, academic and professional institutions and other interested bodies in Hong Kong. A revised draft is being prepared for a more extensive consultation including, overseas circulation, in mid-2000.

28. The research on various methods of site characterization has indicated that the natural gamma ray method is the most promising. Practicality of the technique will be site-verified and a decision will be made on suitability for routine usage by September 2000.

LESSONS LEARNT FROM LANDSLIDES IN 1997 & 1998

29. The GEO has been auditing the performance of the Hong Kong Slope Safety

System by investigating serious landslides and deriving post-mortem improvement measures. The Audit Report for 1997 & 1998 has been completed and recommendations made for improving the performance of the System. These include measures to reduce non-compliance with stipulated procedures and standards, adoption of more robust and reliable slope works, and enhancement of current slope engineering practice. The necessary follow-up actions are being implemented.

Works Bureau
5 January 2000