On-the-job training at the Geotechnical Engineering Office, Hong Kong

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Laporan (Report)

Chow Weng Sum, of the Geological Survey Department, gave the above talk on the 16 June, 1995 at the Geology Department, University of Malaya.

Mr. Chow punctuated his informative talk with slides of the many geotechnical engineering problems encountered during his stay in Hong Kong.

We are thankful to Mr. Chow for sharing his experiences with us and we should be aware of remedial and early warning systems in our country in the light of heavy rainfall and frequent landslides.

Abstrak (Abstract)

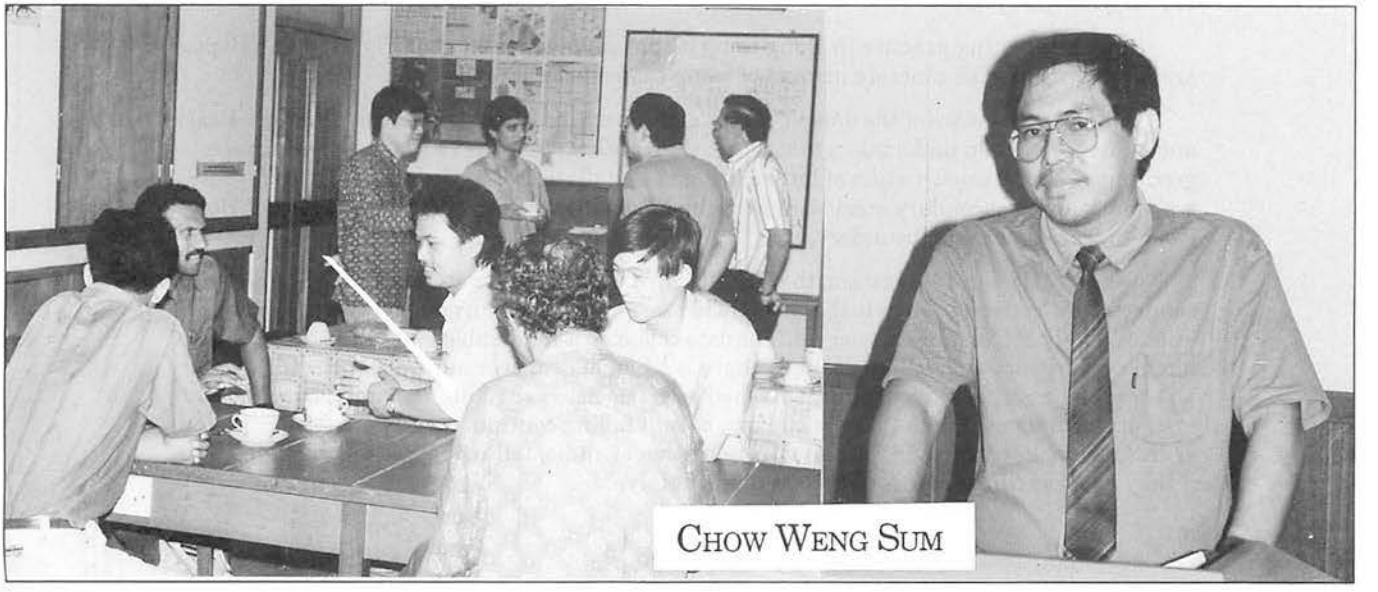
In the summer of 1972, after a period of heavy rain, a road embankment at Sau Mau Ping failed, and the resulting mud avalanche killed 71 people. Four years later, another slope in the same area failed in heavy rain and the mud avalanche killed 18 people. Following these two disasters, the Geotechnical Engineering Office (initially known as the Geotechnical Control Office) was established in July 1977. The Office was created with the main objective of preventing landslide disasters, but it is now also responsible for a wide range of geotechnical activities related to the slope and economic utilisation and development of land in Hong Kong.

The Geotechnical Engineering Office (GEO) has a professional staff of 143 and is divided into three branches, viz, the Island Branch, Mainland Branch and Development Branch. Each branch has nine operational units called Divisions. Each Division has typically, four sections.

Some of the projects implemented which are of interest are as follows:-

(i) Ranking of cut/fill slopes

GEO had conducted an exercise to rank the cut/fill slopes in the whole of Hong Kong. The ranking is based on the total score, where the higher it is, the more urgent it will be to carry out a detailed check of the slope.



Total score = Instability score + Consequence score

To calculate the instability and consequence score, weightages are given to the type of features or structures. For example, a soilslope with an angle of about 90° is given 25 points; for 70°, 20 points; for 45°, 10 points, and for soil slopes less than 5°, 0 point.

Other features of interest include angle of slope above, associated walls, slope condition, condition of walls, geology and water seepages on the slopes.

For the consequence score the proximity of buildings above and below a slope, and the type of property at risk (e.g. a hospital, factory or private road, etc.) are considered.

(ii) Landslip preventive measures programme

Details investigations are carried out on slopes and retaining structures to identify the need for preventive works. The programe is divided into two stages. Stage 1 calls for an initial study to ascertain the need for detailed investigations. In this respect, the height of the slope, the type of structure at the top and bottom of the slope and their distances from the slope are studied.

Should there be a need for further action, Stage II is carried out where detailed investigation involves drilling, Standard Penetration Tests, laboratory testing for the geotechnical properties of the soil and modelling to determine the factor of safety of the slope.

Should the results classify the slope as dangerous, remedial measures will be taken to strengthen the slope.

(iii) Systematic identification of the features in the territory

GEO is presently conducting an exercise to reidentify all the slopes in Hong Kong. In this project, aerial photographs are used. GEO has since 1972, taken aerial photographs of Hong Kong annually.

(iv) Terrain Mapping

Work has been carried out to map the terrain of Hong Kong based on the gradient of the slope, the type of slope (that is whether it is a concave side slope, or crest, or foot slope, etc.) and the intensity and type of erosion on the slope.

From the Terrain Map, other derivative maps are produced. They include Landform Map, Erosion Map, Physical Constraints Map, Engineering Geology Map, Geotechnical Landuse Map, Engineering Appraisal Map and Physical Constraints Map.

As an early warning system, the GEO has installed 48 automatic rain gauges which are connected by a telephone line to the GEO Headquarters.

(v) Other projects

One interesting practice in Hong Kong is that soil nails are popularly used and slopes are now sprayed with concrete instead of being sealed with chunam.

GEO is also aware of the danger of rock slides from loose rock blocks near Victoria Peak and efforts have been undertaken to stabilise these rock blocks. Preventive measures include grouting of joints, construction of buttresses and installation of anchors. Other than these, a primary and a secondary steel-wire fence had been installed in the Mid-Reaches of Hong Kong to trap any falling bounders.

As an early warning system, the GEO has installed 48 automatic rain gauges which are connected by a telephone line to the GEO Headquarters. These rain gauges record the rainfall automatically at five minute interval. The data collected is invaluable for studies of landslides and for emergency surveillance. When there is 5 mm of rain over any part of Hong Kong for a period of 1 hour, a 'red-warning' is flashed over television or radio, warning people in that area of the danger. When there is 100 mm of rain falling continuously over a 2-hour period or less, a 'black-warning' is flashed over television or radio, telling people to stay indoors or if they are travelling, look for shelters immediately.

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