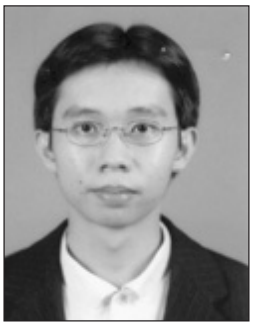

SLOPE STABILITY AND FINANCIAL PLANNING

By: Sdr. Chow Chee Meng

Being a young engineer with no major financial commitment aside from the regular maintenance which I need to spend on my darling (car) definitely has its benefits. Naturally, I have managed to save some hard-earned cash hoping to practice the age-old saying of "money makes money". Therefore, I have been indulging myself on all the books by those financial planning gurus such as Azizi Ali, Robert Kiyosaki, etc., hoping to surpass Warren Buffet's achievement in the stock market. Well, initially I had been rather "successful", that is, until the recent blip in the stock market. Well, just like another age-old saying: "easy come easy go". Anyway, with my spare cash wiped off, I have now more time to continue my reading on financial planning and also not forgetting my true love, geotechnical engineering. Having gone through some of the books and articles on financial planning and slope stability, I can't help but notice similarities between the two. Some of the common features between them are summarised below:

a) Successful financial planning depends on **long-term** investment. Stability of slopes depends on **long-term** strength.
b) **Short-term** gains in financial wealth cannot be maintained. **Short-term** strength in slope stability cannot be maintained.
c) **Long-term losses** are usually more than the initial **short-term gains** if there are no proper long-term investment plans. **Slope repair costs** are usually more than the initial savings if the slopes are not designed using long-term strength.
d) **Performance of the stock market** depends on **internal factors** such as the strength of the economy and excess liquidity and also external factors such as unrest in the Middle-East. **Stability of slopes** depends on internal factors such as soil strength and groundwater level and also external factors such as destabilising forces on the slope (loadings).

Then one day, while carrying out slope stability analysis in the office, I had a Eureka moment. The slope which I was analysing was simply too steep and was not safe. Therefore, I had to design the slope to a gentler gradient. Then it occurred to me that the slope of the recent climb of the composite index touching the 900 points level may be just too steep and is not safe for the long term. Naturally it had to "fail" (economists terms it "consolidation") to form a gentler slope which is safer for the long term. Therefore, next time when I invest in the stock market, I will exercise extra caution when the slope of the climb is very steep and remind myself not to be greedy.

Anyway, I shall not dwell further on the aspects of financial planning as my recent performance has indicated that I have much to learn. My main intention in this article is to share with my fellow engineers the importance of long-term consideration in the stability of slopes.

I shall attempt to explain the phenomenon of long-term stability of slopes by referring to how a pump works. First, you pull up the lever of the pump and this will create suction which suck in the air. This is similar to the process of cutting a slope. Just like the pump, when we pull up the lever, the volume inside the pump increases and air is sucked in. When we remove the soil on top of a slope, we are removing loads on the slope and the voids in the soil will expand and thus the volume of the voids increases and this will create suction. Now, imagine placing a piece of paper in front of the pump when you pull the lever. The paper would get stuck and it would appear that the suction is holding the paper securely. This is similar to the soil particles in a cut slope. The soil particles are being held by the suction created when the slope is being cut. However, just like the pump, we know that the suction that is holding the paper cannot be maintained unless the paper together with the contact between the paper and the pump is 100% airtight. This is similar to slopes. With time, the suction will decrease, resulting in slope failure if the slope relied solely on suction for stability. This explains why some slopes which have stood for some time fail suddenly. Of course, not all slope failures are attributed to loss of suction; some are due to improper design, construction and/or lack of maintenance. However, it is important to bear in mind the possibility.

What I am trying to do here is to share my experience with my fellow young engineers and hope to learn from all of you. Anyway, I had only one intention in this article. When it comes to stability of cut slopes, **THINK LONG TERM**!!!

This article is written in memory of Sir Alec Wesley Skempton, a famous geotechnical engineer who had made significant advances in the understanding of slope stability. Sir Alec Wesley Skempton passed away on 9 August 2001 at the age of 87 after producing more than 100 papers on civil engineering especially soil mechanics. Sir Alec also started the first postgraduate course in soil mechanics in UK in 1950 at Imperial College, London. ■