Analysis and Assessment of Lishan Potential Landslide of China

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Authors	Yong Hong
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YONG Hong

School of Civil Engineering, Qingdao Technological University,

No.11 Fushun road, Qingdao, China

hongyong11@yahoo.com.cn

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Introduction

There are a large number of large-scale disastrous landslides in the Northwest China which is famous of deep Quaternary loess[1-3]. In most cases, the time effect plays an important role in the development process of these landslides even if the creep is slow.

Lishan Mountain is located at the famous Huaqing palace of Lintong county, Shanxi province. On the base of field investigation, the north slope of Lishan Mountain is regarded as in a dangerous stage to fail from various precursors including ground cracks, subsidence and small-scale slope failure. As Huaqing palace is a very famous resort and there are about seven hundred thousands people living at the toe of Lishan Mountain, some monitoring instruments, such as extensometers, borehole inclinometers have been installed on the north slope of Lishan Mountain to measure the deformation of slope body. Based on the monitoring data, it is necessary and important to reveal the mechanism of the landslide so as to reduce and mitigate the possible hazard.

Deformation on the Slope

The results showed that the movement of Lishan Mountain is in an active state. Fig. 1 presents the results of a long crack measured by the extensometer at the upper boundary of the sliding block and the cumulative precipitation. The width of the crack has been developing and increased up to 20mm since the beginning of the observation. The average speed of extension is about 0.4mm/month. The cumulative horizontal displacements at different places on the slope have been up to 38mm-48mm. The obvious deformation on the site is the visual indication of the movement of potential sliding body and the slope has been undergoing creep deformation.

Creep Tests on the Soil Samples

The shear tests and creep tests were performed on the soil samples of Tertiary deposit and Quaternary Loess that compose the sliding mass. In the creep tests, the shear strengths of Tertiary deposit and Quaternary Loess increase slowly and continuously with time, but the rate of creep attenuate with time. Under the condition of long term loading, it was found that the shear strength of Tertiary deposit and Loess decrease with time. Fig.2 gives the peak, residual and long term strength of soil samples. It can be seen that the peak shear strength and residual shear strength are greater than the long term strength of soil samples.