

# Slip Surface Estimation at Landslide Zone by Geodetic Method

## Study Area: Landslide Zone at Ciloto-Puncak, West Java

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### ABSTRACT

Slip surface to separate between stable soil and unstable soil in the slope. In limit equilibrium method, slip surface is used as reference for safety factor calculation. Landslides phenomenon can be observed by GPS satellite technology to purpose disaster mitigation and monitoring soil displacement. For that purpose, GPS measurement is done to estimate characteristic, type and slip surface position at Ciloto landslide zone by GPS survey.

First, an estimate of the slip surface is done by dividing the slope into sections based on the general direction of horizontal displacement of monitoring points. The similarity direction of horizontal displacement at several monitoring points indicates that the monitoring point can be located at the same slip surface. Second, the function of the maximum-minimum geodetic methods and polynomial approaches, including graphical methods to plot the trend line at each velocity the monitoring point to find the position of the point at sliding. The ideal planar slip surface is determined by the infinite slope analysis and circular slip surface is determined by circle arc analysis. The intersection of two velocity trend line of monitoring point, it can provide the estimation of slip surface location. Geodetic approach could give estimation of scarp position also. Locations of scarp in vertical section to ensure compatibility with result of geology research at same study area.

Ciloto landslide zone is classified to very slow velocity landslide ( $5 \times 10^{-5}$  -  $5 \times 10^{-7}$  mm/second). The characteristic of horizontal displacement has diversity directions. Those characteristic gives indications that landslide zone have many slip surfaces. From this research, the landslide type at Ciloto zone is multiple compound (rotational and translational) debris slides.

Key words: Geodetic, GPS, landslide, characteristic, slipsurface