



## Stability Analysis of Active Landslide Region in Gerze (Sinop), NW Turkey

S. Çellek and F. Bulut

(cellek@ktu.edu.tr) Karadeniz Technical University, Trabzon, Turkey.

Landslides occurring in Turkey causes loss of life and property like many countries of the world. In Turkey, especially Black sea region, landslides are investigated in scale of village, province and city. In this study, Gerze town of Sinop located in Western Black sea was chosen as study area. The study area has some sensitive regions to landslides because of geology, geomorphology and climate conditions. Landslides occur due to heavy rains happen and snow melts in spring time. Recent, landslides occurring in costal areas have effected on choosing the Gerze area.

In order to determine the landslides occurring in Gerze, field and laboratory studies have been carried out. 30 sample location was choose as 5 sample per each km<sup>2</sup>. After determining landslide areas, distributed and undistributed samples were taken for laboratory experiments and clay content.

Based on field studies and laboratory experiment, five landslides were determined, called Deniz Feneri, Zenginler Sitesi, Bedre, Mezbahane and Ucuk. These landslides are still active, and their slopes are unstable. So, tension crakes are still seen behind of landslide main mirrors. Of them, The Uçuk landslide has two different secondary slope surfaces and is also reactive landslide. Springs are observed in both slope surface of the Uçuk landslide. The Mezbahane landslide has circular slope plane and tongue shape. The Deniz Feneri and Zenginler Sitesi landslides show different types of, activity and water content so they maybe classified as complex structure. The Deniz Feneri landslide has some tension crack, between 60 cm and 80 cm in depth. The Bedre landslide has half moon shape. GPS measurements in The Deniz Feneri and The Uçuk landslides were calculated to find out safety factors stable5 program according to Janbu and Bishop methods. The safety factors of the Deniz Feneri and The Uçuk landslides are between 0.489 -0.418 and 0.635-0.608, respectively. Since these landslides were affected negatively by Samsun-Sinop highway, load and brook, these negative effects were eliminated and safety factors recalculated. The recalculated safety factors between 0.855-0.889 and 0.976-0.905, respectively. It was determined that water content and loads have effected negatively to these landslides.

The study area consists of sedimentary rocks. Most of landslides in study area occurred in weathered soil. Geotechnical properties of the soil samples collected; the specific unit weight 2.60 and 2.80 gr/cm<sup>3</sup>, water content 15% and 33%, natural unit weight 2.610 and 2.09 gr/cm<sup>3</sup>, dry unit weight, 1.28 and 1.86 gr/cm<sup>3</sup>, porosity 29% and 61%. The soil samples contain 27.49% clay, 29.92% silt, 11.08% sand, and 11.33% gravel based on grain size distribution. Soil samples have liquid limit values between 36% and 75% and plasticity index values, between 13% and 45%. The Soil samples for the study area show high and very high plasticity, called solid and very solid. According to USCS most of the soil samples were determined unctuous clay. Clays can be classified normal and non-active and their swelling potential medium-high. Cohesion of soils the samples are between 0.027 and 0.579 kg/cm<sup>2</sup>, internal friction angels are between 29.5 and 7.53, free compressive strength are between 1.89 and 5.5 kg/ cm<sup>2</sup>.