ABSTRACT

The uncertainty about the determining and causing factors of the debris flow is the main motivation of this geotechnic study. Another motivation is the danger of this type of phenomenon so energetic and so little predictable. The main goal of this report is to solve the uncertainties that involve the debris flow studying one that happened in the barranc de Tordó, a first order basin placed in the north side of the Port del Comte.

The most important factors that influence the formation of this phenomenon are geomechanic parameters, the zone's morphology and the rain, characterized in this report as a water table. In particular, this study tries to find out how the factors influence to that debris flow.

A series of laboratory tests, with some samples of soil picked up of the landslide surface of the debris flow, are carried out for characterizing it and finding the intrinsic properties of the material. Through the granulometry, sedimentation and plasticity test it has been arrived that it's a question of a heterogeneous mixture of subangular gravels and sands badly graduated with 20% of not plastic fines, basically formed by silt, of torrential origin without internal structure *in situ* (GP-SP).

The soil geomechanics properties have been found through direct shear tests (CD), with saturated samples and non saturated samples, and ring shear tests (CD), to find the peak resistance and the residual resistance respectively. The peak resistance has to answer us to the question of which resistance had to be won to become the debris flow. The second should indicate us the resistance that, nowadays, exists on the breaking surface of a rotational landslide of considerable dimensions that occurred in the barranc de Tordó. The material mobilized by the landslide is the source area of the debris flow. The results of the tests give us φ'_{peak} that fluctuate between 29º and 30º with c' between 49 kPa and 61 kPa. With the ring shear tests φ'_{res} found is of 24º with c'≈0.

The stability calculations have been carried out with the method of the equilibrium limit (LEM), based on the soil breaking conditions exclusively in an surface (line in 2D) along which the slide glides. Through this method of calculation the factor of security is found like the relationship between forces in favour of the landslide and the disposable total resistance opposing to the movement in this line. The calculation has been carried out using specialized software, particularly the *PCSTABL 5M*.

Initially the *FS* have been calculated with the data obtained from the laboratory. These *FS* hasn't been found satisfactory for the stability. In consequence an analysis of sensitivity towards the geomechanic parameters and towards the water table has been carried out. It has been checked out that, for water table in height of topographic surface, it is not stable in any case. It is concluded that the rotational landslide is stable with regard to the reactivation for water table between 10 and 30 m. depth, with φ' between 35º and 36º and c' of the order of 30 to 50 kPa. The back-analysis carried out at the debris flow determines that the stability is precarious for saturated soil with φ'_{peak} to 35º and c' to 30 kPa.

In conclusion, to become a phenomenon like debris flow is necessary that rains with high intensity, so it saturates the 2 or 3 first meters from the topographic surface. However, to reactivate the rotacional landslide it must rain in prolonged time conditions, to get the water table higher.