

CONCERNING LANDSLIDES IN THE WEST OF ALGERIA: PRESENTATION OF SEVERAL CASE STUDIES

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Abstract

The North of Algeria is known for its various mountains and hill slopes of which internal (tectonic, seismicity) and external (escarped and fragile fields, contrasted climate) geodynamic factors constantly maintain the relief active where movements of slopes belong to the natural process and count among the more frequent risks. Such risk keeps on growing because of a population explosion and an increasing urbanization which encourage the building on zones of strong slopes, formerly forsaken, and deforesting those slopes; thus a need for facing this phenomenon which affects the living conditions and the economy of Algerian regions.

This article deals with the vulnerability of some sites prone to complex problems of instability of slopes, located in the west of Algeria. We wish to report five cases of movement slopes, which emerged in the Algerian West under the influence of several factors that intervened in the affected environment sites (rainfall, geology, human factor, etc...).

The analysis is made on the basing on the results obtained from investigations and geotechnical tests as well as on site visits and testimonies collected from the neighboring region. Work consisted in initially making a fine geological recognition in order to better know the stratigraphy of the environments, and to identify the various horizons.

Modeling was subsequently carried out using the Plaxis software, which is based on

the finite element method. This allowed for a well-determination and treatment of the mechanical behavior for each studied case. The analyses of stability (constraints, deformations and safety coefficients) obtained from numerical modeling and from the systems of adequate reinforcements will be presented.

Case 01 Landslide at the national road n°05 i.e. at the East side town limit of Ouled Mimoun – Tlemcen, Algeria



The site is made of greenish, very thin marls, running on surface and including sandstone intercalations in the form of thin benches and allotted stratigraphically to Miocene. This unit is pressed on the Jurassic massif. It is surmounted by formed loose embankments made of marls and heterogeneous blocks, such as plio-quadernary pudding stones and travertines, earlier deposited by water sources.

It is a small landslide that may be described as being plane and partially rotational. It

occurred precisely as two small bands quite distinct from the roadway n°05 and its east downstream verge. This slide is generally established on a road linear that approximates 50.0m.

Case 02 Landslide of the new university center in Mansourah-Tlemcen, Algeria



The landslide zone located at the North-west limit of Tlemcen perimeter is characterized by formations allotted stratigraphically to Miocene and represented by a powerful greenish layer of marl with thin detrital intercalations (sandstone and sand). The whole is completed by embankments (marls, clays, rocky fragments, construction waste, etc...) of irregular thickness, vertical cracks and presents itself sometimes in stairs (effect of the slide).

The analysis established according to the made observations from apparent aspects of geomorphological and mechanical type, allowed for slide positioning in "rotational type" (or circular) having affected the altered superficial layers. Consequently, an escarpment was generated at the slope highest point with traction cracks carrying the slipping mass on the side with a roll in foot which reversed the existing fence.

Case 03 Landslide slope of the site «Les amandiers» located in Arzew town – Oran, Algeria



On the geomorphological level, the studied area is located on the southern slope of Djebel Dar Amara which corresponds to an important basin, very spread out to collect rain water during winter. The fallen rain water was channeled by several rivers that flow on Oued EL Mohgan.

At the "Les amandiers" quarter, water flow was modified by the presence of constructions (buildings and road works). Consequently, rain water was diverged to the middle of the city slope, by sapping the poured embankments at the edge of the slope and coming from surplus clearings of the existing buildings.

Case 04 Landslide of the local road linking the national road n° 11 to the "Plateaux district – Mostaganem, Algeria



From a paleo-geographical point of view, the site is integrated in the neogen basin of the low Chélif which presents geological formations that vary in age and lithological

facies. It is characterized by a cliffy morphology of practically vertical profile, approximately 30 m height and with heterogeneous geological composition. Falls of sandy blocks and sand collapses were noticeable on site. These two phenomena correspond to degradation processes of which origin depends on a certain number of factors, and particularly of the morphology (subvertical slope), geological structure (facies type) and sandstones deterioration and cracking, caused by climatic (rain fall) and anthropic (blocked gutter) conditions.

Case 05 Landslide at the north of the city of Ténès–Chlef, Algeria



The site is a 30 m height slope, skirting the sea on a 100 m distance. In the past, it has been subjected to civil engineering work, such as road and buildings construction and the installation of embankments. This has simply affected the original relief.

The study of the geological map allowed for the classification of the site on gypseous trias which is the first period of the secondary era marked by the deposit of two types of grounds, generally corresponding to the clusters of gypsum and iridescent clays.

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