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ABSTRACT

Sesimbra is a village located on the Portuguese West coastline 70 Km South of Lisbon.

It is a site of high cliffs, overlooking the sea, mainly formed by clays.

The rainwater that penetrates the soil through permeable layers originates the clays sliding.

Recent construction site in the area started with the execution of a retaining wall with counterforts.

Some time later after a long rainy period the soil sliding created a high earth pressure on the retaining wall that originated the separation between the wall and its counterforts.

The paper describes the pathology and its repair.

GEOLOGICAL ENVIRONMENT

The local geology consists of clay formations melted with sandy soil.

The geotechnical survey made on site was based on inspection pits excavated at a depth of about 5,0 m, solution that was not sufficient to characterize the local soil conditions in terms of resistance.

PATHOLOGY DESCRIPTION

On the site started, in the year 2000, the construction of several touristical apartments blocks, four stories high.

As the construction site was highly inclined the architecture design has foreseen two platforms, at different levels, to locate the blocks.

The construction started with the execution of the earth retaining wall needed to install the two platforms..

This retaining wall was made of reinforced concrete and had counterforts due to its height (about 6,0m).

The wall thickness 0,30 m and the distance between the counterforts axis was 5,0 m.

After finishing the retaining wall construction an earthfill on its back was executed.

On the following winter, due to a strong rainy period, it was noticed that the connection between some of the wall length and the respective counterforts broke. The wall displacement after the separation from the counterforts attained 10,0 cm.

This pathology was due to the fact that the rainwater coming from the higher level of the cliffs penetrated the soil through the pervious layers between the clays thus originating the sliding of the formations.

The wall could not resist the high earth pressure and got separated from the counterforts as these are more stiff.

ADOPTED SOLUTION OF REPAIR

After the described pathology happened we were invited to study the problem and to prepare the respective solutions.

The first measure was to start a new soil investigation based on boreholes attaining a depth of about 10,0 m below the bottom of the existing retaining wall. The respective SPT tests were made.

This made possible to draw profiles connecting the various boreholes along alignments parallel to the cliffs slopes and so to study the possible soil sliding curves.

It was verified that some of these curves intercepted the retaining wall foundations so proving the reason why the pathology occurred.

So it was confirmed that the existent retaining wall was not stable and a new solution had to be implemented.

Thus the soil on the back of the existing wall was excavated and the retaining wall was demolished.

A new retaining wall was designed and built. The adopted solution considered a vertical anchored curtain so that the anchors could penetrate the soil through the potential sliding curves and being fixed deep enough to be protected from the soil sliding action.

The anchors were designed to resist the earth pressures created by the potential sliding soil.

A drainage system was also implemented to avoid the percolation water action. Sub-horizontal geodrains were created and linked to the general rainwater net of the touristical plant.