IAEG Commission 16 - UNESCO World Heritage

Greece

SIMONOS PETRA MONASTERY IN MOUNT ATHOS

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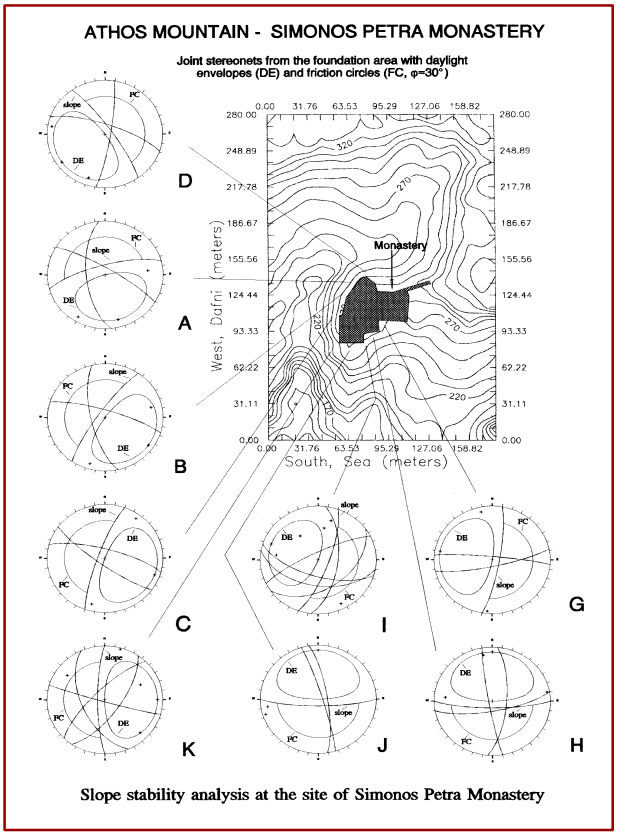
Engineering geological conditions and problem:

Mount Athos peninsula is located in Macedonia (N. Greece) and is administratively connected directly to the Patriarchate of Constantinople. It is a place of great historical and religious interest, where only Monasteries for men are built. The Monasteries are historical buildings of the 10th to 14th century. During the centuries they were destroyed and burned down several times, while they were rebuilt, enlarged and expanded including newly constructed buildings.

Simonos Petra Monastery was built around 1257 AD, on an isolated rock at the SW side of the peninsula. It was burned down several times and consequently only the lower parts of the construction, close to the rock base, are of that age. The western part of the present building was built in 1590 AD while the eastern part was built after the fire of 1891 AD.

The tectonic structures determined in the area cause unstable geotechnical conditions at the foundation rock mass. The presence of an important neotectonic fault of SW dip direction distinguishes two sections in the rock mass decreasing the stability of the Monastery. Furthermore, an important fault of E-W direction cuts through the site close to the building s western wall, creating fractures both to the building and the foundation rock.

A slope stability analysis was performed with the determination of important unstable wedge and planar failures and the calculation of their factors of safety, using both field measurements and laboratory test results. The rock mass quality was estimated at several representative sites and a geomechanical classification was performed. According to the results of the data elaboration, the rock mass quality in the southern and western slopes of the foundation area is low and of limited stability, causing damage to the monument. These instability phenomena are related to the neotectonic conditions of the broader area.



Slope stability analysis at the site of Simonos Petra Monastery

Proposed protective measures:

In order to protect the monument, a net bolts is necessary to be applied, in the sites where the approach is possible. Grouting could be used only in cases where the material is very broken and the discontinuites open. All the protection techniques have to respect the environment.

References on studies already performed:

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