Geologi dan Pengaruh Derajat Kejenuhan Air terhadap Sudut Gesek Dalam dan Kohesi pada Batugamping di Daerah Sendangsari, Kapanewon Pajangan, Kabupaten Bantul, Daerah Istimewa Yogyakarta

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ABSTRAK

Daerah penelitian berada di Kelurahan Sendangsari, Kapanewon Pajangan, Kabupaten Bantul, Daerah Istimewa Yogyakarta tepatnya pada koordinat (UTM 49S) 415600 mT – 420600 mT dan Y= 9127278 mS – 9132278 mS. Daerah ini tersusun oleh batugamping yang mudah larut oleh air. Hal itu menyebabkan terbentuknya rekahan atau pori dalam batugamping. Ketika pori-pori tersebut terisi air, maka derajat kejenuhan batuan semakin besar. Kandungan air akan mempengaruhi gaya kohesi dan sudut gesek dalam pada batuan. Penelitian ini bertujuan untuk memetakan dan mengkaji mengenai kondisi geologi daerah penelitian serta pengaruh derajat kejenuhan air terhadap nilai sudut gesek dalam juga kohesi pada batugamping di daerah penelitian. Metode penelitian yang digunakan adalah kualitatif berupa studi pustaka, pemetaan di daerah penelitian, dan analisis laboratorium, serta kuantitatif berupa perhitungan hasil analisis kuat geser batuan.

Stratigrafi daerah penelitian tersusun oleh tiga satuan batuan, dari yang tertua hingga termuda adalah Satuan batunapal Sentolo (Miosen Akhir, N17-N18), Satuan batugamping Sentolo (Miosen Akhir-Pliosen Awal, N18-N19), dan Satuan endapan aluvial (Holosen). Daerah penelitian memiliki struktur lipatan berupa sinklin.

Berdasarkan hasil pengujian derajat kejenuhan air yang dilakukan pada 3 sampel uji, didapatkan nilai porositas sampel 1 sebesar 81%, sampel 2 sebesar 28%, dan sampel 3 sebesar 0%. Hasil analisis sudut gesek dalam sampel 1 sebesar 11,54°; sampel 2 sebesar 23,27°; dan sampel 3 sebesar 29,90°. Hasil analisis kohesi sampel 1 adalah 11,94; sampel 2 adalah 18,36; dan sampel 3 adalah 20,77. Pengaruh derajat kejenuhan air terhadap sudut gesek dalam ditunjukkan oleh persamaan y = -24,176x + 29,784 dengan nilai koefisien determinasi R^2 = 0,9994, sedangkan pengaruh derajat kejenuhan air terhadap nilai kohesi ditunjukkan oleh persamaan y = -10,813x + 20,877 dengan nilai koefisien determinasi atau R^2 = 0,9917. Hal tersebut menunjukkan bahwa nilai derajat kejenuhan air berbanding terbalik dengan nilai sudut gesek dalam dan nilai kohesi.

Kata kunci: geologi, derajat kejenuhan air, sudut gesek dalam, kohesi

**Geology and the Influence of the Degree of Water Saturation
on Internal Friction Angles and Cohesion in Limestone
in Sendangsari, Kapanewon Pajangan, Bantul Regency,
Yogyakarta Special Region**

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ABSTRACT

The research area is in Sendangsari Village, Kapanewon Pajangan, Bantul Regency, Yogyakarta Special Region, precisely at coordinates (UTM 49S) 415600 mE – 420600 mE and Y= 9127278 mS – 9132278 mS. This area is composed of limestone which is easily dissolved by water. This causes the formation of cracks or pores in the limestone. When these pores are filled with water, the degree of rock saturation becomes wetness. The water content will affect the cohesive force and internal friction angle in the rock. This research aims to map and examine the geological conditions of the research area as well as the influence of the degree of water saturation on the values of internal friction angles and cohesion in limestone in the research area. The research method used is qualitative in the form of literature study, mapping in the research area, and laboratory analysis and quantitative in the form of calculating the results of rock shear strength analysis.

The stratigraphy of the research area is composed of three rock units, from oldest to youngest, namely the Sentolo marlstone unit (Late Miocene, N17-N18), the Sentolo limestone unit (Late Miocene-Early Pliocene, N18-N19), and the alluvial sediment unit (Holocene). The research area has a fold structure in the form of a syncline.

Based on the results of testing the degree of water saturation carried out on 3 test samples, the porosity value for sample 1 was 81%, sample 2 was 28%, and sample 3 was 0%. The results of the friction angle analysis in sample 1 were 11.54°; sample 2 was 23.27°; and sample 3 was 29.90°. The results of sample 1's cohesion analysis were 11.94; sample 2 is 18.36; and sample 3 is 20.77. The influence of the degree of water saturation on the internal friction angle is shown by the equation $y = -24.176x + 29.784$ with a coefficient of determination $R^2 = 0.9994$, while the influence of the degree of water saturation on the cohesion value is shown by the equation $y = -10.813x + 20.877$ with a coefficient of determination or $R^2 = 0.9917$. This shows that the value of the degree of water saturation is inversely proportional to the value of the angle of internal friction and the value of cohesion.

Key words: geology, water saturation, internal friction angle, cohesion