

ABSTRACT

Central Java is one of provinces in Java Island which has high landslides level. One of the factors is high soil thickness with low strength material caused by the process of alteration in geothermal area like Gedongsongo Temple. The aim of this study are to know the influence of type and intensity of alteration towards the engineering properties of rock mass and to know the influence of hydrothermal alteration towards the rock slope stability in Gedongsongo Temple.

The study uses mapping method, collecting samples, samples tested using petrographic test, X-Ray Diffraction, X-ray Fluorescence, and engineering properties, and slope stability analysis.

From petrographic test, it is obtained that there is one geological unit that is andesite breccia and five alteration intensities; they are very low to very high intensity. From XRD test, it is obtained one type of alteration that is advanced argillic. From XRF it is known that very high intensity have 85.38% of CIA, high intensity have 71.51% of CIA, and very low intensity have 67.67% of CIA. From the engineering properties data, it is noted that engineering properties of rock based on type of alteration is influenced by the exist of clay mineral. Compare with low altered rock, advance argilic type of rock have higher plasticity index, water content, porosity, fine grains, and permeability, and lower unit weight, specific gravity, friction angle and cohesion. While the higher of the alteration intensity, the percentage of fine grains mineral presence, water content, porosity, and permeability will increase and dry density and dry unit weight will decrease. Besides, the highest plasticity index values and degree of saturation are owned by high alteration intensity, while total density values, total specific weight, and cohesion do not show particular tendency. The value of slope safety factor controlled by slope geometry, shear strength formed by cohesion and the friction angle, and total unit weight. Alteration intensity not have a direct influences to the result of safety factor where all the parameter used for analysis were all random.

Keywords: *hydrothermal alteration, Gedongsongo Temple, engineering properties, slope stability analysis*

SARI

Salah satu faktor yang menyebabkan terjadinya tanah longsor adalah tingkat ketebalan tanah tinggi dengan kekuatan antar material rendah yang diantaranya dipicu oleh proses alterasi pada daerah panas bumi seperti di Candi Gedongsongo. Tujuan dari penelitian ini adalah mengetahui pengaruh alterasi hidrotermal terhadap sifat keteknikan batuan serta mengetahui pengaruh alterasi hidrotermal terhadap kestabilan lereng batuan di Candi Gedongsongo.

Penelitian dilakukan dengan melakukan pemetaan, pengambilan sampel, uji laboratorium berupa uji petrografi, *X-Ray Diffraction*, *X-ray Fluorescence* dan sifat keteknikan batuan, dan analisis kestabilan lereng.

Dari uji petrografi diperoleh satu satuan geologi yaitu breksi andesit dan lima intensitas alterasi yaitu intensitas sangat rendah hingga sangat tinggi. Dari uji XRD diperoleh satu tipe alterasi yaitu argilik lanjut. Berdasarkan data XRF diperoleh nilai CIA intensitas intensif adalah 85,38%, intensitas tinggi 71,51%, dan intensitas sangat rendah 67,67%. Berdasarkan data sifat keteknikan batuan, diketahui bahwa sifat keteknikan berdasarkan tipe alterasi dipengaruhi oleh kehadiran mineral lempung. Dibandingkan dengan batuan teralterasi rendah, batuan tipe argilik lanjut memiliki nilai indeks plastisitas, kandungan air, porositas, material ukuran halus, dan permeabilitas yang lebih besar, serta berat jenis, *specific gravity*, sudut geser dalam, dan kohesi yang lebih kecil. Sementara semakin tinggi intensitas alterasi, terjadi peningkatan persentase kehadiran mineral berukuran halus, kandungan air, porositas, permeabilitas dan penurunan nilai berat jenis kering. Selain itu nilai indeks plastisitas dan derajat kejenuhan paling tinggi dimiliki oleh intensitas alterasi tinggi, sementara nilai densitas total, berat jenis total, dan kohesi tidak menunjukkan kecenderungan tertentu. Nilai faktor keamanan lereng dikontrol oleh parameter geometri lereng, kuat geser tanah berupa kohesi dan sudut geser dalam, serta berat jenis total. Intensitas alterasi berdasarkan penelitian ini diketahui tidak berpengaruh secara langsung terhadap faktor keamanan lereng dimana hasil uji kuat geser batuan alterasi dan berat jenis total yang menjadi parameter analisis tidak menunjukkan kecenderungan nilai tertentu.

Kata kunci : alterasi hidrotermal, Candi Gedongsongo, sifat keteknikan, analisis kestabilan lereng