GEOLOGI DAN ANALISIS KESTABILAN LERENG PADA TAMBANG BATULEMPUNG DI DESA KAJAR DAN SEKITARNYA, KECAMATAN GUNEM, REMBANG, JAWA TENGAH

Abstrak

Ryoga Rizky Ramadhan
111160097

Lokasi penelitian terletak di Desa Kajar dan sekitarnya, Kecamatan Gunem, Kabupaten Rembang, Provinsi Jawa Tengah. Secara geografis daerah penelitian terletak pada koordinat 49S WGS 1984 551236 mE – 555228 mE dan 9239849 mN – 9241407 mN. Pada dasarnya kondisi geologi suatu wilayah dapat mempengaruhi stabilitas suatu lereng karena akan berpengaruh terhadap sifat fisik dan sifat mekanik batuan tersebut. Pengontrolan dan perhitungan kestabilan lereng tambang sangat penting dilakukan untuk perencanaan eksploitasi dan meminimalkan resiko kecelakaan. Namun, pengontrolan dan perhitungan stabilitas lereng target pada tambang batulempung di daerah penelitian belum dilakukan. Penelitian ini bertujuan untuk mengetahui kondisi geologi daerah penelitian dan mengetahui kestabilan lereng target dengan ketiga metode kesetimbangan batas (fellenius, *janbu simplified*, dan spencer) yang optimal dan sesuai jika diterapkan pada daerah penelitian, dengan data uji *triaxial test* dan *direct shear test* yang kemudian diolah pada *software* Slide 6.0.

Metode yang dilakukan dalam penelitian ini terdiri dari studi pustaka, interpretasi pola pengaliran dan geomorfologi, pemetaan geologi permukaan, profil singkapan, pengukuran stratigrafi terukur, pengamatan dan pengukuran data geoteknik, analisis petrografi, analisis stereografis, analisis mikrofosil, dan analisis kestabilan lereng.

Pola pengaliran di daerah penelitian berupa pola pengaliran ubahan subdendritik. Satuan bentuklahan di daerah penelitian terdiri atas dataran bergelombang, lembah terdenudasi, gawir garis sesar, dan perbukitan karst. Stratigrafi di daerah penelitian tersusun dari empat satuan batuan tak resmi, dari tua ke muda yaitu: satuan batupasir Ngrayong berumur Miosen Tengah (N.13–N.14) pada lingkungan neritik tengah, satuan batulempung Ngrayong berumur Miosen Tengah (N.14) pada lingkungan neritik tengah, satuan batugamping-kalkarenit Bulu berumur Miosen Tengah (T.f1–T.f2) pada lingkungan *deep shelf margin*, dan satuan batugamping terumbu Paciran berumur Pliosen Awal (N.19) pada lingkungan *organic build-up*. Terdapat struktur geologi di daerah penelitian berupa sesar yang masuk dalam klasifikasi sesar mendatar kiri naik dan dua kekar. Berdasarkan analisis sesar dan kekar, tegasan utama di daerah penelitian berarah timur laut–barat daya (NE–SW) dan timur–barat (E–W).

Analisis kestabilan lereng pada lereng aktual HW 1 dan HW 2 menghasilkan nilai FK sebagai berikut: pada lereng HW 1 FK fellenius 1,340 (aman) dan 1,228 (kritis), *janbu simplified* 1,262 dan 1,137 (kritis), serta spencer 1,374 (aman) dan 1,232 (kritis), kemudian pada lereng HW 2 FK fellenius 1,226 dan 1,113 (kritis), *janbu simplified* 1,136 dan 1,005 (kritis), serta spencer 1,262 dan 1,121 (kritis). Perbedaan asumsi pada ketiga metode mendasari adanya perbedaan nilai FK yang dihasilkan dari analisis kestabilan lereng.

Kata kunci: Ngrayong, Bulu, Paciran, Faktor Keamanan, Kesetimbangan batas.

GEOLOGY AND SLOPE STABILITY ANALYSIS ON CLAYSTONE MINE IN KAJAR VILLAGE AND ITS SURROUNDINGS, GUNEM DISTRICT, REMBANG, JAWA TENGAH

Abstract

Ryoga Rizky Ramadhan
111160097

The research area is located in Kajar Village and its surroundings, Gunem District, Rembang Regency, Central Java Province. Geographically, the research area is located at the 49S coordinates of WGS 1984 551236 mE – 555228 mE and 9239849 mN – 9241407 mN. Basically, the geological conditions of an area can affect the stability of a slope because it will affect the physical and mechanical properties of the rock. Controlling and calculating stability of the mine slope is important for exploitation planning and minimizing risk of accidents. However, the control and calculation of slope stability at the claystone mine in the research area has not been carried out. The research aims to determine the geological condition of the research area and determine the stability of the target slope with three limit equilibrium methods (fellenius, simplified janbu, and spencer) which are optimal and suitable when applied to the research area, then with triaxial test and direct shear test which are processed on Slide 6.0 software.

The method consists of literature study, interpretation of drainage patterns and geomorphology, surface geological mapping, outcrop profiles, measured section of stratigraphic, observations and measurements of geotechnical data, petrographic analysis, stereographic analysis, microfossil analysis, and slope stability analysis.

Drainage patterns in the research area is subdendritik. Unit landforms in the research area consists of undulating terrain, denuded valley, escarpment of fault line, and karst hills. The stratigraphy in the research area is composed of four unofficial rock units, from old to young, namely: Ngrayong sandstone units in age of Middle Miocene (N.13–N.14) in the middle neritic environment, Ngrayong claystone units in age of Middle Miocene (N.14) in the middle neritic environment, Bulu limestone-calcarenite units in age of Middle Miocene (T.f1–T.f2) in the deep shelf margin environment, and Paciran reef limestone units in age of Early Pliocene (N.19) in the Organic build-up environment. There is a geological structure in the research area in form of a fault that is classified as a thrust left slip fault and two joints. Based on the geological structure analysis, the main stresses in the research area were northeast – southwest (NE – SW) and east – west (E – W).

Analysis of slope stability on actual slopes of HW 1 and HW 2 resulted in the following FoS values: FoS of slopes of HW 1 fellenius 1,340 (safe) and 1,228 (critical), janbu simplified 1,262 and 1,137 (critical), and spencer 1,374 (safe) and 1,232 (critical), then FoS of slopes of HW 2 fellenius 1,226 and 1,113 (critical), janbu simplified 1,136 and 1,005 (critical), and spencer 1,262 and 1,121 (critical). The different assumptions among three methods underlie differences result in FoS values from the slope stability analysis.

Keyword: Ngrayong, Bulu, Paciran, Factor of Safety, Limit equilibrium method