

ABSTRAK

Bencana alam terjadi di Kabupaten Trenggalek, salah satu daerah di Provinsi Jawa Timur, yang menyebabkan akses jalur utama Trenggalek – Ponorogo tertimbun longsor material batuan dan mengakibatkan arus lalu lintas di jalur tersebut sempat tersendat. Perbaikan-perbaikan kerusakan jalan sudah sering dilakukan namun masih terdapat longsor tersebut. Perlunya penelitian mengenai evaluasi kestabilan konstruksi jalan di Kabupaten Trenggalek terkait kondisi geologi teknik, terutama pengaruh alterasi hidrotermal yang mengurangi kekuatan massa batuan.

Metode yang digunakan dalam penelitian ini meliputi pekerjaan di lapangan berupa pemetaan geologi, pengukuran nilai *geological strength index (GSI)* pada batuan permukaan, pekerjaan laboratorium tanah dan batuan *indeks properties*, petrografi batuan, XRD dan *point load test*, analisis kestabilan lereng dan perkuatan lereng dengan metode elemen hingga menggunakan RS2 (*Rocscience*).

Hasil penelitian geologi di permukaan menunjukkan kondisi morfologi didominasi satuan perbukitan zona sesar mencakup 65% daerah penelitian, satuan lembah zona sesar mencakup 15% daerah penelitian dan satuan perbukitan intrusi mencakup 20% daerah penelitian, dengan kelerengan curam hingga sangat curam, jenis batuan di daerah penelitian adalah batuan lava andesit, batuan breksi andesit dan intrusi diorite yang dipengaruhi adanya alterasi argilik dan propilitik intensitas sedang hingga tinggi sehingga menyebabkan tingkat pelapukan sedang hingga sangat tinggi. Struktur geologi yang ditemukan lapangan berupa sesar turun. Arah kelurusan pada daerah penelitian dominan pola kelurusan berarah timur laut - barat daya. Kualitas massa batuan permukaan berdasarkan klasifikasi GSI didominasi oleh kualitas batuan buruk (*poor rock*) kemudian kualitas batuan sangat buruk (*very poor*).

Analisis kestabilan lereng dilakukan di 4 lokasi longsoran yaitu di KM 16+200, KM17+850, KM 22+000, KM 23+000, diperoleh lokasi yang terindikasi longsor memiliki nilai *Strength Reduction Factor (SRF)* lereng sebesar $< 1,5$. Setelah dilakukan perbaikan dengan perkuatan dinding penahan diperoleh *Strength Reduction Factor (SRF)* lereng sebesar $> 1,5$. Pengaruh beban lalu lintas dan beban gempa di dalam analisis memberi dampak penurunan SRF pada masing-masing lokasi, namun yang terdampak kurang aman ada pada KM 17+850 dimana hasil

output SRF kurang dari yang disyaratkan sebesar 1,27 akibat pengaruh beban lalu lintas dan 0,99 akibat pengaruh beban gempa, sehingga dilakukan penanganan tambahan berupa penguatan grouting. Diperoleh hasil analisis untuk SRF pada KM 17+800 akibat beban lalu lintas $1,7 > \text{SRF}$ yang disyaratkan sebesar 1,5 dan SRF sebesar 1,24 akibat beban gempa $>$ dari SRF gempa $> 1,1$.

Kata kunci : Longsor, *geological strength index*, geologi teknik, alterasi.

ABSTRACT

Natural disasters occurred in Trenggalek, one area in East Java Province, which caused access to the main route of Trenggalek-Ponorogo buried by landslides of rock material and resulted long traffic jam. Repairing road damage have often been carried out but still have landslides. The research is needed to evaluate the stability of road construction in Trenggalek Regency related engineering geological conditions, especially the alteration effects of hydrothermal which reduce the strength of rock mass.

The methods used in this study include geological mapping, measurement of geological strength index (GSI) values on surface rocks, laboratory work of soil and rock index properties, petrographic rocks, XRD and point load test, analysis of slope stability and slope reinforcement with the finite element method uses RS2 (Rocscience).

The results of geological research on the surface show that the morphological conditions dominated by fault zone hilly units cover 65% of the study area, the fault zone valleys unit includes 15% of the study area and intrusive hill units cover 20% of the study area, with steep slopes to very steep, the types of rocks in the study area are andesitic lava, andesite breccia and diorite intrusions which which are influenced by moderate to high argillic and propylitic alterations that cause medium to very high weathering rates. The geological structure found in the research area in the form of normal fault. The liniment of the research area is dominantly northeast-southwest. The morphological aspects of the study area have slightly steep to steep slopes. The quality of surface rock mass based on the GSI classification is dominated by poor rock quality (poor rock) then the quality of the rock is very poor (very poor).

Slope stability analysis was conducted in 4 landslide locations, there are in KM 16+200, KM 17+850, KM 22+000, KM 23+000, and the location that had the landslide indicated had a slope Strength Reduction Factor (SRF) of $<1,5$. After repaired with retaining walls, the Strength Reduction Factor (SRF) increase to $>1,5$. The effect of traffic load and earthquake load in the analysis has an impact on the decrease in SRF in each location, but which is less safe at KM 17 + 850 where SRF output is less than required which is equal to 1,27 due to the influence of traffic load

and 0,99 due to the influence of earthquake loads, so that additional mitigation is carried out in the form of reinforcing grouting. Obtained analysis results for SRF at KM 17 + 800 due to traffic load is 1,7 which is this value bigger than it required that is 1,5 and SRF due to seismic load is 1,24 which is this value bigger than it required that is 1,1.

Keyword : Landslides, geological strength index, geological techniques, alteration.