ABSTRACT

     Goa Watu Jonggol as a research location is a lorry road from the tunnel of a former manganese mine from the Dutch colonial era which has been abandoned for decades. The tunnel which is located in Ngruno Hamlet, Karangsari Village, Pengasih Sub-District, Kulon Progo Regency, Yogyakarta Special Region will be used as a geotourism location by the local government. In its implementation as a geotourism location, it is necessary to pay attention to the safety of the natural tunnel to maintain the original shape of the tunnel. To support the program of the local government tunnel location, it is necessary to analyze the stability of the tunnel to determine the strength of the rock mass in the tunnel against collapse.

     The method used in the analysis is the empirical method and the finite element method. The calculation results from the empirical method are safety factors, and the results of calculations from the finite element method are the strength factor and total displacement. Safety factors and strength factors indicate what level of security of a tunnel. While the total displacement shows whether or not a tunnel is stable. In this study the level of tunnel safety will be evaluated based on the dimensions of the tunnel and the presence of the highway above the tunnel surface.

     The conclusion obtained is that the highway affects the stability of the tunnel because it results in the value of the safety factor and strength factor. Overall, the safety factor value ≤ 1.0 and strength factor ≤ 1.1 so that it can be said to be unsafe to be a geotourism location and requires a buffer.

Keywords: tunnel, finite element method, safety factor, strength factor.