

## INTISARI

Pada tahun 2018 telah dilakukan perencanaan awal pembangunan Bendungan Bodri oleh Balai Besar Wilayah Sungai Pemali Juana. Desain Bendungan Bodri terdapat saluran pengelak dan pelimpah berupa terowongan. Pada perencanaan awal tersebut belum menjelaskan untuk metode penggalian, sistem penyangga terowongan, kestabilan lereng portal terowongan. Tujuan penelitian ini untuk mengetahui kondisi geologi teknik daerah penelitian, menentukan metode penggalian dan sistem penyangga yang tepat berdasarkan klasifikasi massa batuan dan mengetahui kestabilan lereng portal. Metode penelitian yang digunakan adalah melakukan pemetaan geologi teknik di sekitar area trase terowongan, deskripsi batuan inti (*core*) hasil pengeboran dan melakukan analisis kestabilan lereng portal terowongan. Hasil dari penelitian menunjukkan lokasi penelitian memiliki 2 satuan morfologi yaitu perbukitan homoklin Singorojo dan lembah sungai Bodri. Litologi pada lokasi penelitian memiliki 2 satuan yaitu perselingan batupasir tufan dan breksi andesit, batulempung sisipan batupasir. Kualitas massa batuan berdasarkan klasifikasi massa batuan *rock mass rating* dan *geological strength index* memiliki 2 jenis yaitu batuan sedang dan batuan buruk, sedangkan berdasarkan klasifikasi massa batuan sistem Q memiliki 2 jenis yaitu batuan buruk dan batuan sangat buruk. Berdasarkan grafik ekskvabilitas metode penggalian pada lokasi penelitian yaitu *hard digging* dan *easy ripping*. Berdasarkan *rock mass rating* metode penggalian pada lokasi penelitian yaitu *top heading* dan *bench*. 10,5 m ke depan pada *top heading*, pemasangan perkuatan bersamaan dengan penggalian 10 m dari *face*. Berdasarkan *rock mass rating* sistem penyangga pada lokasi penelitian yaitu *shotcrete*  $t=10-15$  cm di atap, 10 cm di dinding, baut batuan ( $D=20$  mm), panjang 4-5 m, spasi 1-1,5 m pada atap dan dinding, wiremesh, *steel seats*, *ribs* ringan sampai dengan sedang dengan spasi 1,5 m. Berdasarkan sistem Q yaitu *fibre reinforced sprayed concrete*  $t=20$  cm baut batuan Panjang 2,5 m dengan spasi 0,8 m. Hasil analisis kinematika pada daerah lereng *inlet* dan *outlet* memiliki potensi longsoran berupa *direct toppling*. Sedangkan hasil analisis dari *slope mass rating* (SMR) *slope* lereng dibuat antara  $45^{\circ}$ - $55^{\circ}$  dan berdasarkan pemodelan menggunakan metode kesetimbangan batas lereng telah memenuhi standar SNI 8460:2017 (2017).

**Kata Kunci** : Geologi teknik, metode penggalian, sistem panyangga, kestabilan lereng.

## **ABSTRACT**

*In 2018, the initial planning for the construction of the Bodri Dam was carried out by the Pemali Juana River Basin Center. The design of the Bodri Dam has a diversion channel and spillway in the form of a tunnel. The initial planning did not explain the excavation method, tunnel support system, and stability of the tunnel portal slope. The purpose of this study was to determine the engineering geological conditions of the research area, determine the appropriate excavation method and support system based on the rock mass classification and determine the stability of the portal slope. The research method used was to conduct engineering geological mapping around the tunnel trace area, describe the core rocks from drilling and analyze the stability of the tunnel portal slope. The results of the study show that the research location has 2 morphological units, namely the Singorojo homoclinal hills and the Bodri river valley. The lithology at the research location has 2 units, namely alternating tufane sandstone and andesite breccia, sandstone insert mudstone. The quality of the rock mass based on the rock mass rating and geological strength index classification has 2 types, namely medium rock and poor rock, while based on the Q system rock mass classification it has 2 types, namely poor rock and very poor rock. Based on the excavability graph the excavation methods at the research location are hard digging and easy ripping. Based on the rock mass rating the excavation methods at the research location are top heading and bench. 10 1.5 m forward on the top heading, installation of reinforcement together with excavation 10 m from the face. Based on the rock mass rating the support system at the research location is shortcrete  $t = 10-15$  cm on the roof, 10 cm on the wall, rock bolts ( $D = 20$  mm), 4-5 m long, 1-1.5 m spacing on the roof and walls, wiremesh, steel seats, light to medium ribs with 1.5 m spacing. Based on the Q system, namely fiber reinforced sprayed concrete  $t = 20$  cm rock bolts 2.5 m long with 0.8 m spacing. The results of the kinematic analysis in the inlet and outlet slope areas have the potential for landslides in the form of direct toppling. While the results of the slope mass rating (SMR) slope analysis are made between  $45^{\circ}$ - $55^{\circ}$  and based on modeling using the slope limit equilibrium method, it has met the SNI 8460:2017 (2017) standard.*

**Keywords :** *Engineering geology, excavation methods, support systems, slope stability.*