ABSTRAK

Kajian fase prakonstruksi Terowongan Pengelak Bendungan Bener di Desa Guntur dan sekitarnya, Kecamatan Bener, Kabupaten Purworejo, Provinsi Jawa Tengah pada tahun 2019 belum dapat merepresentasikan kondisi geologi terowongan. Dengan laju penggalian 10 m, terdapat perubahan kondisi geologi yang tidak tergambarkan pada penelitian sebelumnya. Sehingga pada penelitian ini, diusulkan pemetaan muka galian terowongan untuk menjawab permasalahan tersebut. Kondisi geologi dirumuskan dalam penampang geologi terowongan dengan skala 10 m. Terowongan digambarkan dalam geologi teknik dan nilai kualitas massa batuan Rock Mass Rating (RMR). Metode ekskavasi, *stand-up time*, dan perkuatan terowongan dirumuskan berdasarkan kondisi geologi teknik dan RMR. Implikasi dari perubahan RMR dibandingkan dengan rumusan fase prakonstruksi. Geologi daerah penelitian terdiri dari Satuan Breksi Polimik, Satuan Breksi Monomik, dan Satuan Pasir Kerikilan. Terowongan pengelak sendiri memiliki litologi Breksi Monomik. Geologi teknik terowongan digambarkan ke dalam kondisi matriks dan fragmen berukuran berukuran >1 m. Pada penelitian ini ditemukan bahwa 90% terowongan memiliki kondisi geologi teknik berupa Breksi Monomik dengan fragmen <1 m, tanpa diskontinuitas. Pada inlet 140 – 180 m ditemukan Fragmen Andesit pada Breksi Monomik berukuran >1 m berkekar lembaran. Fragmen Tuff >1 m ditemukan secara setempat-setempat di sepanjang terowongan. Nilai RMR muka galian terowongan bernilai lebih tinggi dari RMR batu inti. Hal tersebut disebabkan oleh nilai RQD muka galian terowongan yang tidak terpengaruh oleh proses pengeboran sehingga memiliki nilai lebih tinggi. Nilai RMR terowongan dapat dibagi menjadi RMR (matriks) Breksi Monomik dengan nilai 78-92, (matriks) Breksi Polimik 72-92, Fragmen Andesit berkisar 52 – 62, dan Fragmen Tuff 57-92. Metode ekskavasi disarankan menggunakan *blasting*, kecuali Fragmen Tuff yang menggunakan *Drilling/ripping*. Perkuatan terowongan juga berubah menjadi jaring kawat dan beton semprot, kecuali pada Fragmen Andesit yang perlu ditambahkan *rock bolt* dan baja rusuk.

Kata kunci: Bendungan Bener, Geologi Teknik, Muka Galian Terowongan, Rock Mass Rating, Terowongan Pengelak.

ABSTRACT

The study of the pre-construction phase of the Diversion Tunnel of Bener Dam in 2019 has not been able to represent the geological conditions of the tunnel. With a digging rate of 10 m, there are several changes in geological conditions were not described in previous studies. Therefore, in this study, it is proposed to map the tunnel excavation face to answer this problem.The geological conditions for a digging rate of 10 m be formulated in the geological section of the tunnel at a scale of 10 m. The tunnel geology section describe the engineering geological conditions and rock mass quality values of the Rock Mass Rating (RMR). From the engineering geology and RMR conditions, excavation, excavation, and tunnel reinforcement methods can be formulated. The implications of RMR changes also be considered from the formulation of the pre-construction phase for the purpose of the effectiveness and efficiency of the tunnel construction method used. The geology of the study area consists of Polymic Breccia Units, Monomic Breccia Units, and Gravel Sand Units. Meanwhile, the tunnel is composed of Monomic Breccia lithology. The engineering geology of the tunnel describe the condition of the matrix and fragments > 1 m in size. In this study it was found that 90% of the tunnels had technical geological conditions in the form of monomic breccias with <1 m fragments, without discontinuities. At the inlet 140 – 180 m found Andesite Fragments in Monomic Breccia measuring > 1 m with sheet joints. Tuff fragments >1 m were found locally along the tunnel. The RMR value of the tunnel excavation face is higher than the core rock RMR. It is because the RQD value of the tunnel excavation face that is not affected by the drilling process, so it has a higher value. Tunnel RMR values can be divided into Monomic Breccia RMR (matrix) with values of 78-92, Polymic Breccia (matrix) 72-92, Andesite Fragments ranging from 52-62, and Tuff Fragments 57-92. The excavation method is recommended to use blasting, except for Tuff Fragments which use Drilling/ripping. Tunnel reinforcement is also changed to wire mesh and spray concrete, except for the Andesite Fragment which needs to be added rock bolts and steel ribs.

Keywords: Bener Dam, Diversion Tunel, Excavation Face Tunnel, Geology Engineering, Rock Mass Rating