

Pembangunan Bendungan Krekeh di Provinsi Nusa Tenggara Barat memerlukan terowongan pengelak untuk pengalihan aliran sungai selama konstruksi. Kompleksitas kondisi geologi serta lokasi penelitian yang berada pada zona rawan gempa sedang hingga tinggi menuntut evaluasi geologi teknik yang menyeluruh. Penelitian ini bertujuan mengevaluasi kondisi geologi teknik, menentukan metode penggalian dan sistem penyangga terowongan, serta menganalisis kestabilan lereng portal *inlet*. Metode penelitian mencakup analisis geologi permukaan dan bawah permukaan, penilaian kualitas massa batuan, penentuan metode penggalian serta sistem penyangga terowongan, dan analisis kestabilan lereng. Kualitas massa batuan dievaluasi menggunakan klasifikasi *Rock Mass Rating* (RMR) dan *Q-System*, sedangkan kestabilan lereng dianalisis dengan metode kesetimbangan batas Morgenstern–Price pada kondisi statis dan pseudostatis. Hasil penelitian menunjukkan bahwa wilayah penelitian tersusun atas tiga satuan geomorfologi, yaitu punggung vulkanik berlereng curam, lembah struktural berlereng sangat landai–landai, serta punggung vulkanik berlereng agak curam–curam. Litologi sepanjang trase terowongan didominasi oleh tuf breksi dan batupasir tufan dengan sisipan batulanau dan tuf, dengan kualitas massa batuan berkisar sedang–buruk berdasarkan RMR dan buruk–sangat buruk berdasarkan *Q-System*. Struktur geologi yang berkembang meliputi sinklin (diperkirakan), sesar geser sinistral, sesar naik, dan kekar, dengan kondisi RQD permukaan relatif rendah di sekitar zona sinklin. Muka air tanah berada di atas elevasi terowongan sehingga massa batuan berada dalam kondisi lembab hingga basah. Koefisien seismik horizontal lokasi penelitian sebesar 0,16. Metode penggalian yang direkomendasikan adalah *top heading and bench* dengan variasi pengaturan yang berbeda. Sistem penyangga terowongan yang direkomendasikan berdasarkan RMR berupa kombinasi *rockbolt*, *wiremesh*, *shotcrete*, dan pada zona tertentu ditambah *steel ribs*. Rekomendasi sistem penyangga terowongan berdasarkan *Q-System* berupa kombinasi *rockbolts* dan *fibre-reinforced sprayed concrete*. Analisis kestabilan menunjukkan bahwa desain awal lereng portal *inlet* tidak memenuhi kriteria keamanan pada kondisi pseudostatis, namun modifikasi geometri lereng mampu meningkatkan faktor keamanan sehingga lereng dinyatakan stabil pada kondisi statis dan pseudostatis.

Kata kunci: Geologi Teknik, *Rock Mass Rating* (RMR), *Q-System*, Kestabilan Lereng, Metode Kesetimbangan Batas, Terowongan Pengelak, Bendungan Krekeh.

The construction of the Krekeh Dam in West Nusa Tenggara Province requires a diversion tunnel to redirect river flow during the construction phase. The complexity of the geological conditions and the location of the study area within a moderate-to-high seismic hazard zone necessitate a comprehensive engineering geological evaluation. This study aims to evaluate the engineering geological conditions, determine appropriate tunnel excavation methods and support systems, and analyze the stability of the inlet portal slope. The research methods include analyses of surface and subsurface geology, assessment of rock mass quality, determination of tunnel excavation methods and support systems, and slope stability analysis. Rock mass quality was evaluated using the Rock Mass Rating (RMR) and Q-System classifications, while slope stability was analyzed using the Morgenstern–Price limit equilibrium method under static and pseudostatic conditions. The results indicate that the study area consists of three geomorphological units, namely steep volcanic ridges, very gentle–gentle structural valleys, and moderately steep–steep volcanic ridges. The lithology along the tunnel alignment is dominated by breccia tuff and tuffaceous sandstone with interbeds of siltstone and tuff, with rock mass quality ranging from fair to poor based on RMR and from poor to very poor based on the Q-System. The developed geological structures include a presumed syncline, sinistral strike-slip faults, thrust faults, and joints, with relatively low surface RQD conditions around the synclinal zone. The groundwater table lies above the tunnel elevation, resulting in moist to wet rock mass conditions. The horizontal seismic coefficient at the study site is 0.16. The recommended excavation method is the top heading and bench method with varying excavation arrangements. The recommended tunnel support systems based on RMR consist of combinations of rock bolts, wire mesh, and shotcrete, with the addition of steel ribs in certain zones, while the Q-System recommends combinations of rock bolts and fibre-reinforced sprayed concrete. Slope stability analysis indicates that the initial inlet portal slope design does not meet safety criteria under pseudostatic conditions; however, slope geometry modification increases the factor of safety, resulting in stable slope conditions under both static and pseudostatic conditions.

Keywords: *Engineering Geology, Rock Mass Rating (RMR), Q-System, Slope Stability, Limit Equilibrium Method, Diversion Tunnel, Krekeh Dam*