

## INTISARI

Jaringan irigasi kanan D.I Air Alas direncanakan di bangun di Desa Rantau Panjang, Kecamatan Semidang Alas, Kabupaten Seluma. Pembangunan jaringan irigasi tersebut belum dibangun dikarenakan memerlukan perencanaan khusus tentang terowongan yang akan menghubungkan intake di bendung dengan saluran yang akan menuju lahan irigasi. Penelitian ini ditujukan untuk memahami kondisi geologi teknik daerah penelitian, menentukan kemiringan lereng di atas portal terowongan, menentukan metode ekskavasi dan sistem penyangga terowongan yang tepat.

Metode yang digunakan dalam penelitian ini meliputi pekerjaan lapangan berupa pemetaan geologi, pengukuran nilai Geological Strength Index (GSI) batuan permukaan dan bawah permukaan, pekerjaan laboratorium terkait sifat keteknikan batuan dan tanah, petrografi, xrd, paleontologi, analisis metode ekskavasi bukaan terowongan menggunakan grafik penilaian ekskavabilitas (Pettifier dan Fookes, 1994) serta analisis metode numerik menggunakan Slope/W (GeoStudio) untuk analisis lereng dan RS2 (Rocscience, Inc) untuk analisis kestabilan terowongan.

Hasil penelitian menunjukkan daerah penelitian secara stratigrafi terusun atas perselingan batupasir tufan karbonatan dengan batulempung tufan karbonatan dan endapan fluvial kerakalan. Struktur geologi yang ditemukan berupa kekar, sesar turun, sesar naik, sesar geser dekstral, sesar geser sinistral (diperkirakan). Satuan karakteristik geologi teknik yang menyusun daerah penelitian didominasi oleh satuan perselingan batupasir tufan karbonatan dengan batulempung tufan karbonatan lapuk tinggi. Kemiringan lereng yang aman pada portal terowongan bagian inlet direncanakan sebesar  $45^0$  ( $fs=1,741$ ) dan outlet sebesar  $70^0$  ( $fs=3,327$ ). Metode ekskavasi bukaan terowongan yang tepat dilakukan dengan hard digging tipe peralatan CAT 245, backhoe atau face shovel. Sistem penyangga terowongan yang disarankan berupa gabungan rockbolt, steel arch dan invert dan gabungan rockbolt, shotcrete dan invert dengan prosentase pengurangan nilai total displacement antara 10,19% - 75,19% dibandingkan terowongan tanpa penyangga.

Kata kunci : ekskavasi, Geological Strength Index, lereng, sistem penyangga, terowongan.

## ABSTRACT

*The right irrigation network D.I Air Alas has been planned to be constructed in Rantau Panjang Village, Semidang Alas District, Seluma Regency. Nonetheless, the construction of this irrigation network has not been started yet since it requires a special planning on tunnel that will connect between the intakes in the dam and the channel towards the irrigation area. Therefore, this study is conducted to figure out the technical geological condition in the area abovementioned, to determine the tilt degree of the slope on the tunneling portal as well as to determine the excavation method and the proper tunnel support system.*

*The methods used in this research include field works in the form of geological mapping, measuring the value of Geological Strength Index (GSI) on surface and subsurface rocks, laboratory works related to engineering properties of rocks and soil, petrography, XRD, paleontology, analysis of excavation methods of tunneling aperture using excavatability valuation charts (Pettifier and Fookes, 1994) as well as analysis of numeric method using Slope/W (GeoStudio) for slope analysis and RS2 (Rocscience, Inc) for tunnel stability analysis.*

*The result of this study shows that in a stratigraphic manner, the research area is composed of the interbedded of calcareous tuffaceous sandstones with calcareous tuffaceous mudstone and pebble fluvial deposits. The geological structures are found in the form of joints, normal fault, thrust fault, dextral shear faults and sinistral shear fault (estimated). The characteristics of engineering geology composing the research area are dominated by interbedded calcareous tuffaceous sandstones with calcareous tuffaceous mudstone highly weathered. The secure level of tilt on the inlet part of the tunneling portal is planned in the level of  $45^{\circ}$  (FS-1,741) and in the outlet part in the level of  $70^{\circ}$  (FS-3,327). The proper method of aperture tunnel excavation is performed by hard digging by means of the following equipment: CAT 245, backhoe or face shovel. The recommended tunnel support system is either a combination of rockbolt, steel arch and invert or an amalgamation of rockbolt, shotcrete and invert with the reduction percentage of total displacement value is between 10.19% -75.19% compared to unbounded tunnels.*

**Keyword:** excavation, Geological Strength Index, slope, support system, tunnel.