

## SARI

Penelitian ini dilatarbelakangi oleh kerusakan jalan di ruas Jalan Raya Gemolong – Karanggede, khususnya di daerah perbatasan antara Kecamatan Andong dan Kecamatan Gemolong, yang disebabkan oleh tanah dasar yang bersifat ekspansif. Penelitian ini bertujuan untuk menganalisis karakteristik dan potensi pengembangan tanah ekspansif di Kecamatan Andong, Kabupaten Boyolali, Jawa Tengah serta upaya stabilisasinya. Karakterisasi tanah ekspansif di daerah penelitian dilakukan dengan cara melakukan analisis yang meliputi sifat fisik tanah berupa batas cair, batas plastis, indeks plastisitas, dan potensi pengembangan yang dilakukan dengan uji Atterberg Limit dan uji pengembangan bebas serta identifikasi mineralogi yang dilakukan dengan pengamatan petrografi dan XRD (*X-Ray Diffraction*). Pada penelitian ini, upaya stabilisasi dilakukan dengan cara menambahkan kapur pada sampel tanah kering dengan kadar yang bervariasi, yaitu 0%, 2,5%, 5%, dan 7,5% dari berat sampel tanah kering tersebut. Pengaruh penambahan kapur pada tanah ekspansif ditunjukkan berdasarkan hasil uji plastisitas dan uji pengembangan bebas. Analisis XRD menunjukkan bahwa tanah di daerah penelitian didominasi oleh mineral lempung montmorillonit, yang menyebabkan tanah memiliki sifat ekspansif tinggi. Uji distribusi ukuran butir, indeks plastisitas, dan nilai *free swelling index* (FSI) menunjukkan bahwa tanah di daerah penelitian memiliki derajat pengembangan tinggi hingga sangat tinggi. Hasil penelitian juga menunjukkan bahwa penambahan kapur dapat menurunkan nilai FSI dan indeks plastisitas, yang mengakibatkan penurunan derajat pengembangan tanah menjadi rendah. Penurunan FSI dan indeks plastisitas paling signifikan terjadi pada sampel dengan penambahan kapur 7,5%. Hal ini menunjukkan bahwa kapur dapat efektif dalam mengurangi sifat ekspansif tanah.

Kata kunci: tanah ekspansif, mineral lempung, stabilisasi, kapur, dan indeks plastisitas.

## ABSTRACT

*This research is motivated by road damage on the Gemolong – Karanggede Highway, particularly in the border area between Andong Subdistrict and Gemolong Subdistrict, caused by expansive subgrade soil. The study aims to analyze the characteristics and expansion potential of expansive soil in Andong Subdistrict, Boyolali Regency, Central Java, as well as its stabilization efforts. The characterization of expansive soil in the study area was conducted through analyses that include physical properties of the soil such as liquid limit, plastic limit, plasticity index, and expansion potential, performed using Atterberg Limit tests and free swell tests, as well as mineralogical identification conducted through petrographic observation and X-Ray Diffraction (XRD). In this study, stabilization efforts were carried out by adding lime to dry soil samples at varying percentages, namely 0%, 2.5%, 5%, and 7.5% of the dry soil sample weight. Effect of lime addition on expansive soil is shown by the results of plasticity tests and free swell tests. XRD analyses showed that the soil in the study area is dominated by montmorillonite clay minerals, which cause the soil to have high expansive properties. Grain size distribution tests, plasticity index, and free swelling index (FSI) values indicated that the soil in the study area has a high to very high degree of expansion. The results also showed that the addition of lime can reduce FSI and plasticity index values, resulting in a reduction of the soil's expansion degree to low. The most significant reduction in FSI and plasticity index occurred in samples with 7.5% lime addition. This indicates that lime can be effective in reducing the expansive properties of the soil.*

*Keywords: expansive soils, clay minerals, stabilization, lime, and plasticity index.*