

ABSTRAK

Peningkatan pembangunan infrastruktur di Indonesia menuntut kualitas tanah dasar yang stabil dan kuat, khususnya pada proyek strategis seperti Jalan Tol Serang–Panimbang. Salah satu tantangan utama yang dihadapi adalah karakteristik tanah clayshale yang memiliki daya dukung tinggi saat kering, namun rentan mengalami degradasi signifikan saat terkena air atau siklus basah-kering. Penelitian ini bertujuan untuk mengetahui pengaruh penambahan kapur terhadap nilai pengembangan bebas (free swelling) pada tanah clayshale, serta menentukan proporsi kapur yang paling optimal untuk meningkatkan kestabilan tanah di lokasi penelitian. Metode yang digunakan meliputi pengujian laboratorium terhadap tanah clayshale asli dan tanah yang telah distabilisasi dengan campuran kapur sebanyak 10%, 20%, dan 30%. Pengujian dilakukan di UPTD Laboratorium Bahan Konstruksi, mencakup uji kepadatan (Proctor A), uji konsolidasi swelling, serta uji CBR rendaman. Hasil penelitian menunjukkan bahwa penambahan kapur mampu mengurangi nilai pengembangan bebas tanah clayshale secara signifikan. Campuran kapur 20% merupakan proporsi paling optimal dalam menurunkan nilai swelling dan meningkatkan daya dukung tanah tanpa menyebabkan efisiensi yang menurun secara teknis maupun ekonomis. Penelitian ini memberikan rekomendasi teknis dalam pemilihan metode stabilisasi tanah bermasalah seperti clayshale, serta memberikan kontribusi terhadap pengembangan teknologi perbaikan tanah di proyek-proyek infrastruktur nasional.

Kata Kunci : tanah clayshale, stabilisasi tanah, kapur, pengembangan bebas, ruas tol Serang–Panimbang.

ABSTRACT

The increase in infrastructure development in Indonesia requires stable and strong subgrade soil quality, especially in strategic projects such as the Serang–Panimbang Toll Road. One of the main challenges faced is the characteristic of clayshale soil, which has high bearing capacity when dry but is prone to significant degradation when exposed to water or wet-dry cycles. This study aims to determine the effect of lime addition on the free swelling value of clayshale soil, as well as to identify the optimal lime proportion for enhancing soil stability at the study site. The methods employed include laboratory testing of native clayshale soil and stabilized soil mixed with lime at concentrations of 10%, 20%, and 30%. Testing was conducted at the UPTD Construction Materials Laboratory, including density testing (Proctor A), swelling consolidation testing, and CBR soaking testing. The results indicate that lime addition significantly improves 30% lime mixtures. Testing was conducted at the UPTD Construction Materials Laboratory, including density tests (Proctor A), consolidation swelling tests, and CBR immersion tests. The results showed that lime addition significantly reduced the free swelling value of clayshale soil. A 20% lime mixture is the most optimal proportion for reducing swelling values and enhancing soil bearing capacity without causing technical or economic inefficiencies. This study provides technical recommendations for selecting stabilization methods for problematic soils like clayshale, as well as contributing to the development of soil improvement technology in national infrastructure projects.

Keywords: clayshale soil, soil stabilization, lime, free expansion, Serang–Panimbang toll road section.