

Pemanfaatan Material Lokal Tanah Kapur Yang Distabilisasi Semen Sebagai Pondasi Jalan Diwilayah Sorong Selatan - Kambuaya Provinsi Papua Barat Daya

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ABSTRAK

Pembangunan infrastruktur jalan di Kabupaten Sorong Selatan masih menghadapi kendala keterbatasan material agregat berkualitas sesuai Spesifikasi Umum Bina Marga 2018 Revisi 2. Tanah kapur lokal yang tersedia melimpah memiliki karakteristik granular non plastis dengan daya dukung alami relatif rendah sehingga belum memenuhi syarat sebagai lapis pondasi jalan tanpa stabilisasi. Oleh karena itu, diperlukan upaya peningkatan kualitas material melalui metode stabilisasi semen (soil-cement).

Penelitian ini bertujuan untuk: (1) mengetahui karakteristik fisik dan mekanik tanah kapur lokal Sorong Selatan – Kambuaya, (2) menganalisis pengaruh penambahan semen tipe PCC dengan variasi kadar 3%, 5%, 6%, dan 7% terhadap peningkatan nilai California Bearing Ratio (CBR) dan kuat tekan bebas (UCS), serta (3) menilai kelayakan tanah kapur yang distabilisasi semen sebagai alternatif material lapis pondasi jalan sesuai Spesifikasi Umum Bina Marga 2018 Revisi 2.

Metode penelitian yang digunakan adalah eksperimen laboratorium dengan pengujian analisa saringan, berat jenis, pemadatan (Standard Proctor), CBR, dan UCS. Hasil penelitian menunjukkan bahwa tanah kapur memiliki persen lolos saringan No.200 sebesar 4,31% (granular bersih) dengan berat jenis 2,37. Tanah asli memiliki OMC sebesar 7,48% dan MDD sebesar 1,779 gr/cm³. Penambahan semen meningkatkan nilai CBR secara signifikan, yaitu 80% (3%), 125% (5%), 155% (6%), dan 185% (7%). Nilai UCS juga meningkat dari 17,85 kg/cm² (3%) menjadi 32,45 kg/cm² (7%).

Berdasarkan hasil tersebut, campuran tanah kapur dengan kadar semen 6% dinyatakan paling efektif dan layak digunakan sebagai lapis pondasi soil-cement, karena memenuhi persyaratan nilai CBR (100–200%) dan UCS (20–30 kg/cm²) sesuai spesifikasi teknis yang berlaku.

Kata Kunci: Tanah kapur, soil-cement, CBR, UCS, stabilisasi semen, lapis pondasi jalan.

Utilization of Local Limestone Soil Stabilized with Cement as a Road Foundation Layer in the Sorong Selatan–Kambuaya Area, Southwest Papua Province

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ABSTRACT

Road infrastructure development in South Sorong Regency faces limitations in obtaining high-quality aggregate materials that comply with the 2018 Revised 2 General Specifications of Bina Marga. Locally available calcareous soil is predominantly non-plastic granular material with relatively low natural bearing capacity, making it unsuitable for use as a base course without stabilization. Therefore, soil improvement through cement stabilization (soil-cement) is required. This study aims to: (1) determine the physical and mechanical characteristics of local calcareous soil from Sorong Selatan – Kambuaya, (2) analyze the effect of Portland Composite Cement (PCC) addition at 3%, 5%, 6%, and 7% on the improvement of California Bearing Ratio (CBR) and Unconfined Compressive Strength (UCS), and (3) evaluate the feasibility of cement-stabilized calcareous soil as an alternative base course material in accordance with the 2018 Revised 2 Bina Marga Specifications.

The research employed laboratory experimental methods including sieve analysis, specific gravity test, Standard Proctor compaction test, CBR test, and UCS test. The results indicate that the calcareous soil has 4.31% passing No.200 sieve (clean granular material) with a specific gravity of 2.37. The natural soil exhibited an optimum moisture content (OMC) of 7.48% and maximum dry density (MDD) of 1.779 g/cm³. Cement addition significantly increased the CBR values to 80% (3%), 125% (5%), 155% (6%), and 185% (7%). The UCS values also improved from 17.85 kg/cm² (3%) to 32.45 kg/cm² (7%).

Based on these findings, the 6% cement mixture is considered the most effective and technically feasible composition for soil-cement base course applications, as it satisfies the required CBR (100–200%) and UCS (20–30 kg/cm²) criteria according to applicable technical standards.

Keywords: Calcareous soil, soil-cement, CBR, UCS, cement stabilization, road base course.