

ABSTRAK

Dicky Djohari (00000014454)

STABILISASI TANAH EKSPANSIF DENGAN MENGGUNAKAN BAKTERI *Bacillus megaterium* dan LIMBAH CANGKANG KERANG Skripsi, Fakultas Sains dan Teknologi (2019)

(xx + 144 halaman; 77 gambar; 73 tabel; 2 lampiran)

Penelitian ini dilakukan untuk menstabilisasi tanah ekspansif yang memiliki nilai *swelling potential* yang tinggi dengan metode *biogrouting*. *Biogrouting* ini menggunakan bakteri *Bacillus megaterium* yang ditumbuh kembangkan dalam medium kultur B4 dengan sumber kalsium yang berasal dari limbah cangkang kerang yang dibakar. Dalam penelitian ini, medium kultur cair bakteri dipelihara pada sampel uji tanah selama 30, 60, dan 90 hari untuk diuji kekuatannya dan dipelihara selama 120 hari untuk pengujian *free swell index*. Kekuatan tanah tersebut diuji dengan uji *direct shear*, *triaxial unconsolidated undrained*, dan *unconfined compression*. Hasil pengujian tersebut menunjukkan peningkatan nilai kohesi tanah pada masa pemeliharaan selama 30 hari sebesar 23,07% pada pengujian *direct shear* dan kuat tekan bebas mengalami peningkatan sebesar 35,20%. Selain itu, terjadi penurunan nilai kohesi sebesar 31,02% pada pengujian *triaxial unconsolidated undrained* yang disebabkan oleh kondisi sampel uji yang masih basah akibat penyiraman kultur cair bakteri dua kali lipat daripada sampel uji *direct shear*. Pada masa pemeliharaan selama 60 hari, terjadi peningkatan nilai kohesi sebesar 269,23% pada pengujian *direct shear* dan 243,20% pada pengujian *triaxial unconsolidated undrained*. Lalu, kuat tekan bebas mengalami peningkatan sebesar 182,20% dan 72,73% untuk nilai kohesi efektif pengujian *triaxial consolidated undrained*. Pada masa pemeliharaan selama 90 hari, nilai kohesi tanah meningkat sebesar 384,62% pada pengujian *direct shear* dan 247,59% pada pengujian *triaxial unconsolidated undrained*. Kuat tekan bebas juga mengalami peningkatan sebesar 203,73%. Pada masa pemeliharaan selama 120 hari, nilai *free swell index* menurun sebesar 22,22% sehingga *degree of expansion* tanah menurun dari *high* ke *medium*.

Kata Kunci : tanah ekspansif, *biogrouting*, cangkang kerang, nilai kohesi, *free swell index*

Referensi : 20 (1995 – 2019)

ABSTRACT

Dicky Djohari (000000014454)

EXPANSIVE SOIL STABILITATION USING BACTERIA *Bacillus megaterium* AND SEASHELL WASTE

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(xx + 144 pages: 77 figures; 73 table; 2 appendixes)

This research aimed to stabilize high swelling expansive soil by biogrouting method. This biogrouting used *Bacillus megaterium* bacteria and was grown in B4 culture medium and the source of calcium used in the medium was seashells waste that had been burned. Bacterial liquid culture was cured in soil samples for strength test in 30, 60, and 90 days, also it was cured in 120 days for free swell index test. The strength of the soil was tested by direct shear test, triaxial unconsolidated undrained, also unconfined compression. The results showed an increase in soil cohesion after the 30-day curing period, which was 23.07% in direct shear test and an increase in unconfined compression strength value by 35.20%. On the other hand, the cohesion value decreased of 31.02% in the unconsolidated triaxial test undrained due to the moisture of the sample was high after the two times additional of bacterial liquid culture than the direct shear test soil sample. After the curing period of 60 days, the cohesion value increased 269.23% in direct shear test and 243.20% in the triaxial unconsolidated undrained test. In addition, unconfined compression strength value increased by 182.20% and effective cohesion value increased by 72.73 % for triaxial consolidated undrained test. On the 90-days curing period, the soil cohesion value increased by 384.62% in direct shear test and 247.59% in the triaxial unconsolidated undrained test. The unconfined compression strength value also increased by 203.73%. After the curing period of 120 days, the free swell index value decreased by 22.22% and the degree of expansion of the soil decreased from high to medium.

Keywords : expansive soil, biogrouting, seashells, cohesion value, free swell index

References : 20 (1995 – 2019)