

## INTISARI

Tanah ekspansif memiliki potensi pengembangan dan penyusutan yang tinggi, akibatnya terjadi penurunan dan kenaikan tanah tidak seragam yang dapat menyebabkan kerusakan struktur jalan, oleh sebab itu perlu dilakukan stabilisasi. Salah satu metode stabilisasi adalah menggunakan kapur dan *spent catalyst* dengan tujuan memperbaiki karakteristik tanah yang mampu meningkatkan kapasitas dukung dan menurunkan potensi pengembangan, sehingga dapat memenuhi syarat sebagai tanah dasar (*subgrade*) perkerasan. *Spent catalyst* merupakan limbah dari pengolahan minyak bumi dan termasuk bahan *pozzolan* karena memiliki kandungan mineral silika dan alumina serta Fe lebih besar dari 70%.

Metode penelitian yang dilakukan adalah mencampur tanah dan bahan stabilisasi kapur dengan penambahan variasi kadar kapur 2%, 4%, 6% dan 8% terhadap berat kering tanah. Pencampuran tersebut bertujuan untuk mendapatkan kadar kapur optimum yang selanjutnya dipergunakan sebagai acuan pencampuran tanah dengan kapur dan *spent catalyst*, sedangkan variasi kadar *spent catalyst* yang ditambahkan adalah 3%, 6%, 9% dan 12% terhadap berat kering tanah. Pengujian dilakukan pada tanah asli maupun campuran tanah dengan bahan stabilisasi berupa uji batas konsistensi, uji distribusi ukuran butiran, uji *specific gravity* serta pengujian CBR *soaked*, CBR *unsoaked* dan *swelling*. Benda uji diperlakukan tanpa pemeraman dan pemeraman 7 hari.

Hasil pengujian menunjukkan bahwa tanah asli merupakan tanah ekspansif dengan indeks plastisitas sebesar 45,92% dan sebagian besar terdiri dari mineral *smectite* dengan nilai CBR *soaked* sebesar 2,01%. Kadar optimum kapur terdapat pada penambahan 6% kapur dengan nilai CBR *unsoaked* sebesar 29,34%. Campuran tanah dengan kapur optimum dan *spent catalyst* mampu merubah karakteristik tanah dan meningkatkan nilai CBR serta menurunkan *swelling*, perubahan tersebut seiring dengan penambahan kadar *spent catalyst*. Pengaruh maksimum terdapat pada penambahan 12% *spent catalyst* pemeraman 7 hari dengan nilai indeks plastisitas sebesar 11,97%, nilai CBR *unsoaked* sebesar 59,63% (meningkat 497,55%), CBR *soaked* sebesar 49,67% (meningkat 2.368,75%) dan *swelling* sebesar 0,15% (menurun 96,20%) terhadap tanah asli.

Kata kunci: CBR, *spent catalyst*, stabilisasi, *subgrade*, *swelling*

## ABSTRACT

The expansive soil has high swelling potential and shrinkage, resulting in a decrease and increments of uneven soil that may cause road structures damage, therefore stabilization is required. One of them is using lime and spent catalyst in order to improve soil characteristics that can increase the carrying capacity and reduce the swelling potential, so that it can be qualify as a pavement subgrade. Spent catalyst is a waste of petroleum processing and clasified as pozzolan because it has a silica, alumina and Fe mineral content greater than 70%.

The research method is conducting by mixing soil and lime stabilization material with the addition of lime content was 2%, 4%, 6% and 8% of dry weight of soil. The mixture was aimed to obtain optimum lime content, which was then used as the reference of soil mixing with lime and spent catalyst, while the addition of spent catalyst content was 3%, 6%, 9% and 12% of dry weight of soil. The test was carried out on the original soil as well as the soil mixture with stabilization materials in the form of consistency limit test, grain size distribution test, specific gravity test and unsoaked CBR test, soaked CBR and swelling. The test specimens wastreated without curing and 7 days curing time.

The test results showed that the original soil is expansive with plasticity index 45.92% and mainly consists of smectite minerals with soaked CBR value 2.01%. The optimum concentration of lime occurred in addition to 6% lime with unsoaked CBR value 29.34%. Soil mixture with optimum lime and spent catalyst able to change soil characteristics, increase the value of CBR and decrease swelling. The changes are in line with the addition of spent catalyst content. The maximum effect result was on the addition of 12% of spent catalyst in 7 days curing time with 11.97% of plasticity index value, unsoaked CBR value 59.63% (increased 497.55%), soaked CBR 49.67% (increased 2,368.75%) and swelling 0.15% (decreased 96.20%) campared to the original soil.

Keywords: CBR, spent catalyst, stabilization, subgrade, swelling