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LAMPIRAN 1. Dokumentasi pengujian sampel dilaboratorium



Penjemuran contoh sampel



Penimbangan komposisi contoh sampel tanah lempung



Penimbangan komposisi contoh sampel batu kapur



Contoh sampel tanah lempung yang sudah dicampur dengan batu kapur



Pemberian kadar air



Uji kompaksi



Uji CBR laboratorium



Perendaman sampel uji didalam air



Uji LL



Mengulat tanah buat uji PL



Mencuci sampel buat analisa ayakan



Mengayak sampel setelah dicuci



Menimbang GS/ uji GS



Menimbang kadar air PL



LAMPIRAN 2. Data hasil uji laboratorium

COMPACTION TEST & CBR TEST

Proyek : Tanah lempung Cagar
 Tanggal : 09-02-2023
 Metode : Modified
 Material : subgrade

Asli

| GS | |
|------------|-------|
| Wp | 76.10 |
| Wp + t | 30.50 |
| Wp + t + a | 82.62 |
| wp + a | 76.34 |

| No. Pengujian | Min | Min - Opt | 10x | 25x | 45x | 65x | Opt - Max | Max |
|----------------------------|-------|-----------|-------|-------|-------|-------|-----------|-------|
| No. Cawan | 12 | 51 | 11 | 10 | 17 | 12 | 15 | 94 |
| Berat Cawan | 803 | 805 | 803 | 800 | 809 | 804 | 850 | 800 |
| Berat Cawan + tanah basah | 3018 | 3062 | 3020 | 3020 | 3096 | 3016 | 3020 | 3098 |
| Berat Cawan + tanah kering | 3212 | 3060 | 3043 | 3028 | 3091 | 3065 | 3067 | 3251 |
| Berat Mold + tanah | 11864 | 11815 | 11835 | 11855 | 12207 | 11535 | 11430 | 12023 |
| Berat Mold | 9350 | 8983 | 8945 | 8976 | 9137 | 8924 | 8363 | 8973 |

Kadar Air Setelah Direndam 3 Hari

| No. Cawan | 1 | 2 | 3 |
|----------------------------|-------|-------|-------|
| Berat Cawan | 3018 | 3093 | 3017 |
| Berat Cawan + tanah basah | 3202 | 3202 | 3015 |
| Berat Cawan + tanah kering | 3220 | 3230 | 3070 |
| Berat Mold + tanah | 11050 | 11050 | 11050 |
| Berat Mold | 8345 | 8345 | 8424 |

| Analisa Ayakan | |
|----------------|--------|
| No. Ayakan | Berat |
| 1.5" | - |
| 1.0" | - |
| 3/4" | - |
| 3/8" | - |
| 4" | 2.02 |
| 10" | 2.54 |
| 16" | 6.58 |
| 30" | 9.05 |
| 40" | 11.12 |
| 100" | 10.83 |
| 200" | 14.11 |
| Par | 436.95 |

CBR Laboratorium

Penetration Proving Ring : 2000

| Waktu (menit) | Penetrasi (Inch) | Bacaan Dial | 1 | 2 | 3 | 4 | 5 | 6 |
|---------------|------------------|-------------|---|---|-----|-----|-----|-----|
| 0 | 0 | 0 | | | 115 | 115 | 115 | 115 |
| 0.25 | 0.0125 | 32 | | | 115 | 115 | 115 | 115 |
| 0.50 | 0.0250 | 64 | | | 115 | 115 | 115 | 115 |
| 1.00 | 0.0500 | 127 | | | 115 | 115 | 115 | 115 |
| 1.50 | 0.0750 | 191 | | | 115 | 115 | 115 | 115 |
| 2.00 | 0.1000 | 254 | | | 115 | 115 | 115 | 115 |
| 3.00 | 0.1500 | 381 | | | 115 | 115 | 115 | 115 |
| 4.00 | 0.2000 | 508 | | | 115 | 115 | 115 | 115 |
| 6.00 | 0.3000 | 762 | | | 115 | 115 | 115 | 115 |
| 8.00 | 0.4000 | 1016 | | | 115 | 115 | 115 | 115 |
| 10.00 | 0.5000 | 1216 | | | 115 | 115 | 115 | 115 |

SWELLING

| Tanggal | 1 | 2 | 3 |
|------------|------|------|------|
| 09-02-2023 | 0.00 | 0.00 | 0.00 |
| 10-02-2023 | 1.05 | 0.70 | 0.52 |
| 11-02-2023 | 1.09 | 0.69 | 0.64 |
| 12-02-2023 | 1.12 | 0.66 | 0.70 |
| 13-02-2023 | 1.13 | 0.91 | 0.74 |

ATTERBERG LIMIT

| No. Cawan | LL | | PL | |
|----------------------|------|------|------|------|
| | 1 | 2 | 1 | 2 |
| No. Can | 129 | 199 | 26 | 123 |
| Wt of wet soil + can | 3317 | 3050 | 3140 | 3217 |
| Wt of dry soil + can | 2220 | 2016 | 2555 | 1126 |
| Wt of can | 799 | 765 | 760 | 805 |
| N | 5 | 3 | 2 | 105 |

COMPACTION TEST & CBR TEST

royek : Tanah lempung cangar
 lokasi : 09-03-2023
 metode : Modified
 Material : Subgrade + batugamping 20% MIX

| GS | |
|------------|-------|
| Wp | 21,23 |
| Wp + t | 31,61 |
| Wp + t + a | 77,26 |
| wp + a | 76,80 |

| No. Pengujian | Min | Min - Opt | 10x | 25x | 0,86x | 65x | Opt - Max | Max |
|----------------------------|-------|-----------|-------|-------|-------|-------|-----------|-------|
| No. Cawan | 777 | 34 | 126 | 54 | 26 | 11 | 75 | 120 |
| Berat Cawan | 7,87 | 7,85 | 7,76 | 7,83 | 7,92 | 7,87 | 7,87 | 7,79 |
| Berat Cawan + tanah basah | 39,14 | 39,79 | 39,32 | 39,87 | 39,05 | 39,65 | 39,68 | 39,15 |
| Berat Cawan + tanah kering | 31,65 | 31,02 | 30,22 | 30,48 | 30,65 | 30,36 | 29,75 | 29,45 |
| Berat Mold + tanah | 11450 | 11723 | 11712 | 12180 | 12758 | 11910 | 11978 | 11740 |
| Berat Mold | 8345 | 8315 | 8335 | 8707 | 9157 | 8059 | 8345 | 8120 |

Kadar Air Setelah Direndam 24 Hari

| No. Cawan | B1 | N | B2 |
|----------------------------|-------|-------|-------|
| Berat Cawan | 8,05 | 8,09 | 8,08 |
| Berat Cawan + tanah basah | 32,18 | 32,33 | 29,26 |
| Berat Cawan + tanah kering | 25,85 | 26,77 | 28,23 |
| Berat Mold + tanah | 12000 | 12374 | 11906 |
| Berat Mold | 8535 | 8707 | 8056 |

| Analisa Ayakan | |
|----------------|--------|
| No. Ayakan | Berat |
| 1.5" | - |
| 1.0" | - |
| 3/4" | - |
| 3/8" | 18,05 |
| 4" | 19,01 |
| 10" | 32,84 |
| 16" | 16,68 |
| 30" | 20,42 |
| 40" | 11,97 |
| 100" | 24,26 |
| 200" | 14,58 |
| Pan | 339,49 |

CBR Laboratorium

Penetration Proving Ring : 2000 = Sama

| Waktu (ment) | Penetrasi (inch) | Beban Dial | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------|------------------|------------|---|---|-----|----|-----|-----|
| 0 | 0 | 0 | | | 45 | 5 | 45 | 5 |
| 0.25 | 0.0125 | 32 | | | 5 | 25 | 6 | 7 |
| 0.50 | 0.0250 | 64 | | | 10 | 5 | 12 | 7 |
| 1.00 | 0.0500 | 127 | | | 19 | 9 | 24 | 15 |
| 1.50 | 0.0750 | 191 | | | 29 | 15 | 34 | 25 |
| 2.00 | 0.1000 | 254 | | | 36 | 21 | 46 | 30 |
| 3.00 | 0.1500 | 381 | | | 50 | 34 | 68 | 64 |
| 4.00 | 0.2000 | 508 | | | 67 | 45 | 94 | 82 |
| 5.00 | 0.3000 | 762 | | | 88 | 58 | 140 | 132 |
| 8.00 | 0.4000 | 1016 | | | 108 | 72 | 192 | 189 |
| 10.00 | 0.5000 | 1216 | | | 120 | 81 | | |

SWELLING

| Tanggal | 1 | 2 | 3 |
|------------|------|------|------|
| 19-03-2023 | 0.00 | 0.00 | 0.00 |
| 20-03-2023 | 0.27 | 0.29 | 0.29 |
| 21-03-2023 | 0.60 | 0.45 | 0.31 |
| 22-03-2023 | 0.93 | 0.47 | 0.37 |
| 23-03-2023 | 0.81 | 0.48 | 0.33 |

ATTERBERG LIMIT

| No. Cawan | LL | | | PL | |
|----------------------|-------|-------|-------|-------|-------|
| | B1 | L11 | 19 | 124 | |
| Wt of wet soil + can | 31,40 | 30,87 | 30,00 | 17,95 | 12,15 |
| Wt of dry soil + can | 23,25 | 22,62 | 22,01 | 11,85 | 11,10 |
| Wt of can | 7,165 | 7,160 | 7,93 | 6,09 | 7,87 |
| N | 7 | 5 | 3 | | |

LAMPIRAN 3. Kalibrasi alat CBR

PT. EASTERN PRO ENGINEERING
 THE AWANI RESIDENCE
 JL. AWANI 1 BLOK C-07A/B CIMAREME, KEC. NGAMPRAH
 BANDUNG BARAT - WEST JAVA,
 INDONESIA 40532
 Ph : +62 22 20688000, +62 22 87805988
 www.easternproengineering.com
 e-mail : service@easternproengineering.com

KAN
 Kemah Akademik Nasional
 LK - 112 - IDN

EASTERN
 PRO ENGINEERING

Calibration Certificate

Certificate Number
N0737-EPE-00.02.23

Page 1 of 1

Order Number : 194.02.23-1
 Received Date : February 17, 2023
 Customer : CV Testana Engineering
 Address : Jl. Opak 66, Surabaya 60241 Jawa Timur

Environment Condition of Calibration
 Temperature : (22.1 ± 0.8) °C
 Humidity : (56 ± 2.8) % RH
 Reference : EPE.03.02.01.05.01.03
 Calibration Date : February 20, 2023
 Calibration Location : Calibration Laboratory
 PT. Eastern Pro Engineering

Equipment Name : Proving Ring
 Manufacturer :
 Type : Analog
 Serial Number : 2000 180696
 Capacity : 2000 lbf

Spesification Dial Indicator
 Manufacturer : Mitutoyo
 Type : Analog
 Serial Number : LSM741
 Capacity : 10 mm
 Resolution : 0.01 mm

Calibration Report

| Standard Indication (lbf) | Unit Under Test (1 Div x 0.01 mm) | Calibration Factor (lbf / Div) | Repeatability (%) | Uncertainty (%) |
|--------------------------------|--|-------------------------------------|------------------------|----------------------|
| 0 | 0 | 0.00 | 0.00 | ± 0.29 |
| 200 | 21 | 9.56 | 0.75 | |
| 400 | 41 | 9.64 | 0.00 | |
| 600 | 63 | 9.49 | 0.00 | |
| 800 | 84 | 9.52 | 0.00 | |
| 1000 | 105 | 9.49 | 0.49 | |
| 1200 | 127 | 9.44 | 1.85 | |
| 1400 | 149 | 9.42 | 0.49 | |
| 1500 | 171 | 9.33 | 0.49 | |

Mean factor calibration proving ring 9.51 lbf / Div

The Uncertainty is taken at a Confidence Level 95 % For Coverage Factor (k) = 2

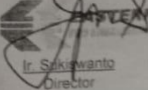
Chart of Force Correlation

Calibrator Name : 1 Load Cell
 Manufacturer : MK Cells
 Type : PT
 Serial Number : E2W4167

Traceable to SI Through
 SNSU - BSN

Calibrated By : ADK
 Typist : IR.

Date of Issued
 February 21, 2023




Ir. Sekiwanto
 Director

— End of Certificate —

This certificate applies only for the item specified above.

LAMPIRAN 4. Berita acara bimbingan



No Dokumen : FM/PTK.06.04
 Tgl. Terbit : 1 Oktober 2018
 Revisi : 00

BERITA ACARA BIMBINGAN TUGAS AKHIR/PENELITIAN

1. NAMA MAHASISWA : DIMAS SETIA HADI
2. NIM : 03119012
3. FAKULTAS : TEKNIK
4. PROGRAM STUDI : TEKNIK SIPIL
5. JUDUL TA : STABILITAS TANAH LEMPIUNG DENGAN BATU KAPUR
UNTUK MENINGKATKAN NILAI CBR (STUDI KASUS :
KAWASAN WISATA CANGAR)
6. TANGGAL PENGAJUAN : 22 September 2023
7. NAMA PEMBIMBING I : HENDRO SUTOWIJOYO S.T., M.T
8. URAIAN KONSULTASI :

| TANGGAL | PARAF PEMBIMBING | KETERANGAN |
|------------|------------------|--|
| 21/11/2023 | [Signature] | Beri penjelasan lengkap dan DS pabrasi. |
| 27/11/2023 | [Signature] | Penjelasan + perhitungan tabel. |
| 1/12/2023 | [Signature] | Sampuran tabel. |
| 20/12/2023 | [Signature] | lanjutan |
| 8/01/2024 | [Signature] | Perbaiki kesimpulan, saran & kesimpulan. |
| 8/01/2024 | [Signature] | PRO PATRIA |

9. TANGGAL SELESAI BIMBINGAN : 03-01-2024
10. TELAH DIEVALUASI DAN SIAP UNTUK DI UJI

DOSEN PEMBIMBING I

[Signature]

HENDRO SUTOWIJOYO S.T., M.T

SURABAYA, 03-01-2024

DEKAN

[Signature]

Dr. Ir. Adi Prawito, M.M., M.T.