LAMPIRAN I
HASIL KALIBRASI ERLENMEYER

Nama Instansi : Universitas Kristen Maranatha

Nama Proyek : Praktikum Tugas Akhir

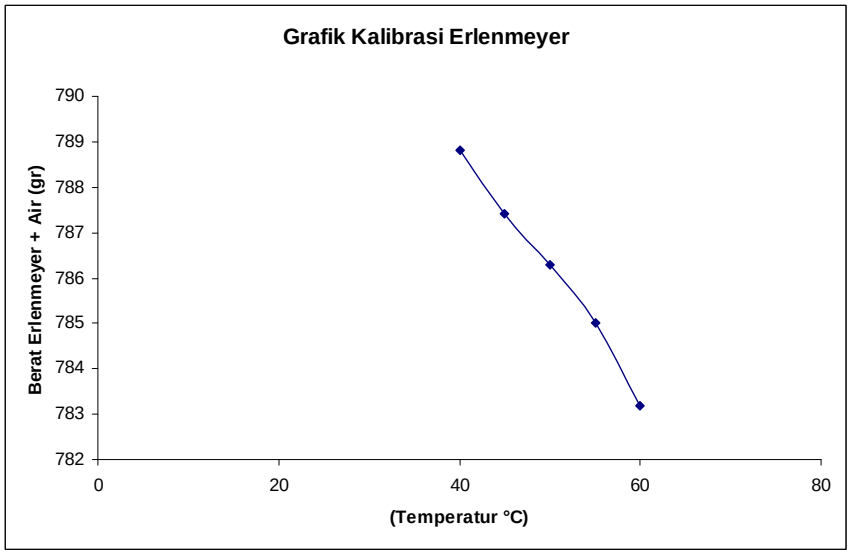
Lokasi Proyek :

Deskripsi Tanah : Pasir

Nama Operator : Yanward M R K

Tabel L1.1 Hasil Hasil Percobaan Kalibrasi Erlenmeyer

No	Temperatur (°C)	Berat Erlenmeyer + Air ;W_2 (gr)
1	60	783,2
2	55	785
3	50	786,3
4	45	787,4
5	40	788,8



Gambar L1.1 Grafik Kalibrasi Erlenmeyer

Gambar L1.2 Ilustrasi Kalibrasi Erlenmeyer

LAMPIRAN II

HASIL BERAT JENIS TANAH

Nama Instansi : Universitas Kristen Maranatha

Nama Proyek : Praktikum Tugas Akhir

Lokasi Proyek :

Deskripsi Tanah : Pasir

Nama Operator : Yanward M R K

Tabel L2.1 Hasil Percobaan G_s 1

No	1	2	3	4	5
Berat Erlenmeyer + Air + Tanah ; W_1 (gr)	841,4	843,2	844,5	845,9	847,1
Temeperatur ; T (°C)	60	55	50	45	40
Berat Erlenmeyer + Air ; W_2 (gr)	783,2	785	786,3	787,4	788,8
G_t	0,9832	0,9857	0,9881	0,9902	0,9922
G_s	2,68	2,65	2,66	2,69	2,68

Tabel L2.2 Hasil Percobaan G_s 2

Berat Wadah + Tanah Kering (gr)	296,8
Berat Wadah (gr)	204,6
Berat Tanah Kering ;W_s (gr)	92,6

$$G_s = \frac{G_t \times W_s}{W_2 - W_1 + W_s}$$

G_s rata-rata = 2,67

Gambar L2.1 Ilustrasi Berat Jenis Tanah

LAMPIRAN III
HASIL BERAT ISI TANAH

Nama Instansi : Universitas Kristen Maranatha

Nama Proyek : Praktikum Tugas Akhir

Lokasi Proyek :

Deskripsi Tanah : Pasir

Nama Operator : Yanward M R K

Tabel L3.1 Spesifikasi Mold

Berat Mold	(gr)	4207
Tinggi Mold	(cm)	11,5
Diameter Mold	(cm)	10,1
Volume Mold	(cm^3)	921,362

Tabel L3.2 Hasil Pengujian γ_{min}

No		1	2	3
Berat Mold + Pasir	(gr)	5231	5230	5233
Berat Pasir	(gr)	1024	1023	1026
γ_{min}	(gr/cm^3)	1,11135	1,11022	1,11352

$$\gamma_{\min} = \frac{W_{pasir}}{V_{mold}}(gr/cm^3)$$

γ_{min} rata-rata = 1111,69 kg/m^3

Tabel L3.3 Hasil Pengujian γ_{max}

No		1	2	3
Berat Mold + Pasir	(gr)	5577	5581	5579
Berat Pasir	(gr)	1370	1374	1372
γ_{max}	(gr/cm^3)	1,48687	1,49121	1,48904

$$\gamma_{\max} = \frac{W_{pasir}}{V_{mold}}(gr/cm^3)$$

γ_{max} rata-rata = 1,489,04 kg/m^3

Gambar L3.1 Ilustrasi Berat Isi Tanah 1

Gambar L3.2 Ilustrasi Berat Isi Tanah 2

LAMPIRAN IV
HASIL UJI KUAT GESER LANGSUNG

Nama Instansi : Universitas Kristen Maranatha

Nama Proyek : Praktikum Tugas Akhir

Lokasi Proyek :

Deskripsi Tanah : Pasir

Nama Operator : Yanward M R K

Tanggal : 17 Juni 2009

PENGUKURAN AWAL

Soil Sample

Pasir Lolos #20

D_r 30%

Shear Box

Diameter ,d = 6,3 cm

Tinggi, h = 2 cm

Luas = 31,17 cm^2

Volume = 62,35 cm^3

Tabel L4.1 Data Hasil Uji Direct Shear D_r 30% Normal Stress 0,1 kg/cm^2

NORMAL STRESS : 0,1 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	3	0.403175	0.390	0.012512
20	6	0.806349	0.780	0.025024
30	9	1.209524	1.170	0.037536
40	13	1.612698	1.690	0.054219
50	15	2.015873	1.950	0.062560
60	15	2.419048	1.950	0.062560
70	13	2.822222	1.690	0.054219
80	12	3.225397	1.560	0.050048
90	10	3.628571	1.300	0.041707
100	8	4.031746	1.040	0.033365

Tabel L4.2 Data Hasil Uji Direct Shear D_r 30% Normal Stress 0,2 kg/cm^2

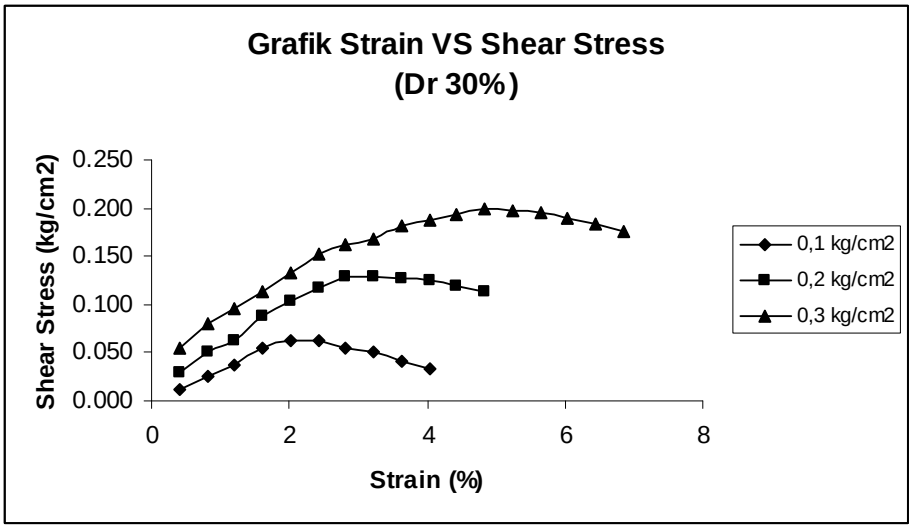
NORMAL STRESS : 0,2 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	7	0.403175	0.91	0.029194739
20	12	0.806349	1.56	0.050048123
30	15	1.209524	1.95	0.062560154
40	21	1.612698	2.73	0.087584216
50	25	2.015873	3.25	0.104266923
60	28	2.419048	3.64	0.116778954
70	31	2.822222	4.03	0.129290985
80	31	3.225397	4.03	0.129290985
90	30.5	3.628571	3.965	0.127205646
100	30	4.031746	3.9	0.125120308
110	28.5	4.434921	3.705	0.118864293
120	27	4.838095	3.51	0.112608277

Tabel L4.3 Data Hasil Uji Direct Shear D_r 30% Normal Stress 0,3 kg/cm^2

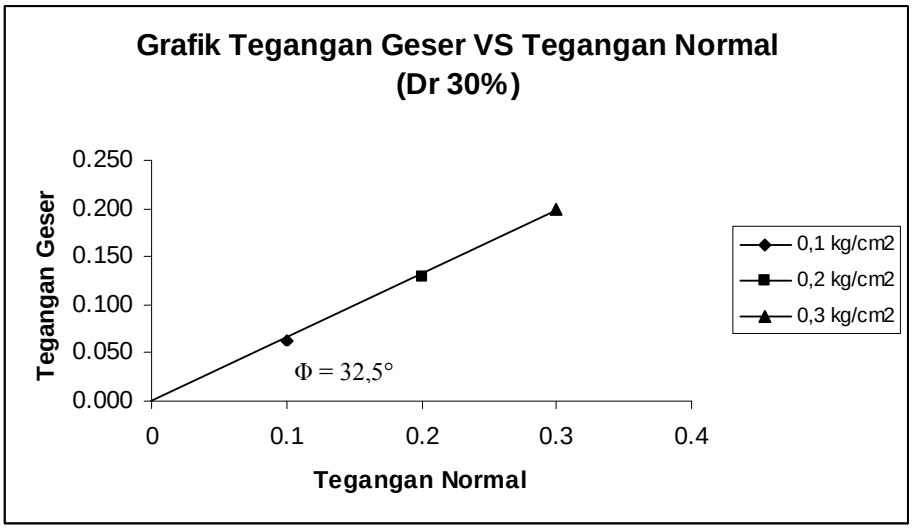
NORMAL STRESS : 0,3 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	13	0.403175	1.690	0.054219
20	19	0.806349	2.470	0.079243
30	23	1.209524	2.990	0.095926
40	27	1.612698	3.510	0.112608
50	32	2.015873	4.160	0.133462
60	36.5	2.419048	4.745	0.152230
70	39	2.822222	5.070	0.162656
80	40.5	3.225397	5.265	0.168912
90	43.5	3.628571	5.655	0.181424
100	45	4.031746	5.850	0.187680
110	46.5	4.434921	6.045	0.193936
120	48	4.838095	6.240	0.200192
130	47.5	5.241270	6.175	0.198107
140	47	5.644444	6.110	0.196022
150	45.5	6.047619	5.915	0.189766
160	44	6.450794	5.720	0.183510
170	42	6.853968	5.460	0.175168



Gambar L4.1 Grafik Strain VS Shear Stress D_r 30%

Dari puncak grafik tiap tegangan normal diatas dapat digambarkan grafik tegangan vs tegangan normal seperti dibawah ini



Gambar L4.2 Grafik Tegangan Geser VS Tegangan Normal *Dr* 30%

Tabel L4.4 Data Hasil Uji Direct Shear D_r 50% Normal Stress 0,1 kg/cm^2

NORMAL STRESS : 0,1 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	4	0.403175	0.520	0.016683
20	7	0.806349	0.910	0.029195
30	9	1.209524	1.170	0.037536
40	12	1.612698	1.560	0.050048
50	15	2.015873	1.950	0.062560
60	16.4	2.419048	2.132	0.068399
70	16.4	2.822222	2.132	0.068399
80	16	3.225397	2.080	0.066731
90	15.5	3.628571	2.015	0.064645
100	15.2	4.031746	1.976	0.063394
110	14	4.434921	1.820	0.058389
120	13	4.838095	1.690	0.054219

Tabel L4.5 Data Hasil Uji Direct Shear D_r 50% Normal Stress 0,2 kg/cm^2

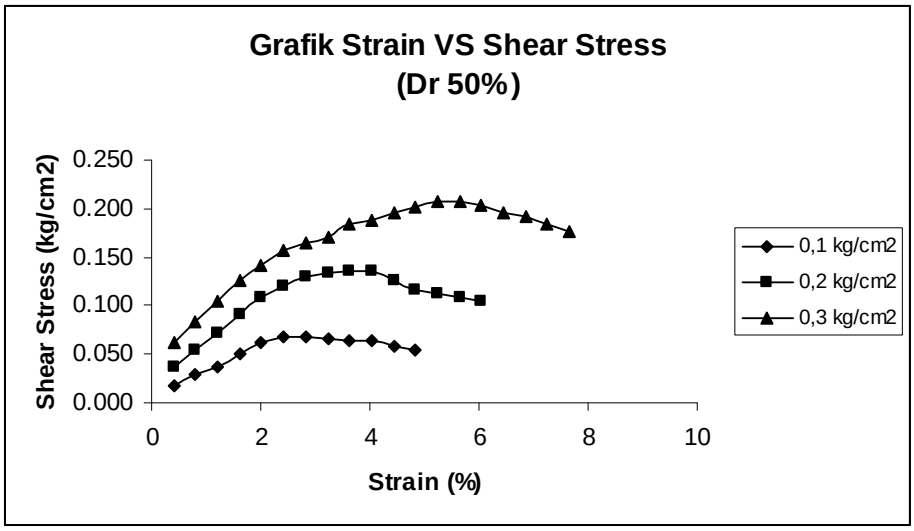
NORMAL STRESS : 0,2 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	9	0.403175	1.17	0.03753609
20	13	0.806349	1.69	0.0542188
30	17	1.209524	2.21	0.07090151
40	22	1.612698	2.86	0.09175489
50	26	2.015873	3.38	0.1084376
60	29	2.419048	3.77	0.12094963
70	31	2.822222	4.03	0.12929098
80	32	3.225397	4.16	0.13346166
90	32.5	3.628571	4.225	0.135547
100	32.5	4.031746	4.225	0.135547
110	30	4.434921	3.9	0.12512031
120	28	4.838095	3.64	0.11677895
130	27	5.24127	3.51	0.11260828
140	26	5.644444	3.38	0.1084376
150	25	6.047619	3.25	0.10426692

Tabel L4.6 Data Hasil Uji Direct Shear D_r 50% Normal Stress 0,3 kg/cm^2

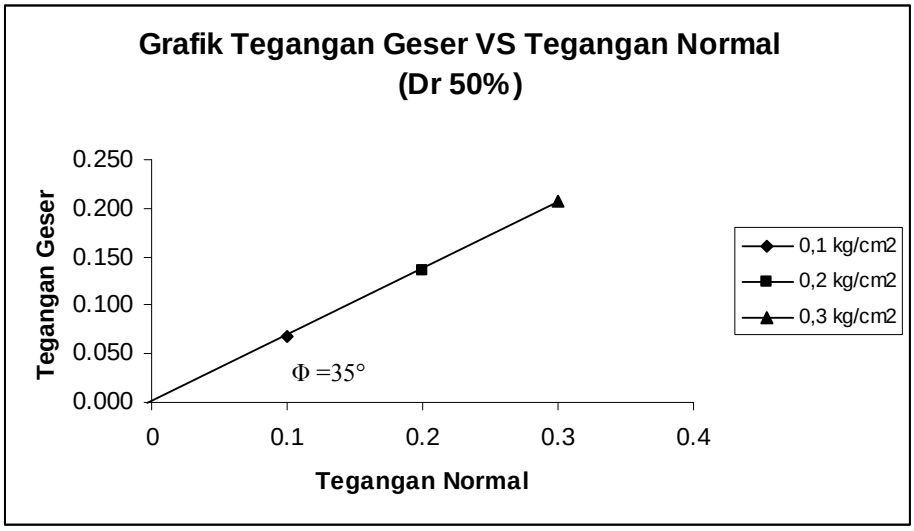
NORMAL STRESS : 0,3 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	15	0.403175	1.950	0.062560
20	20	0.806349	2.600	0.083414
30	25	1.209524	3.250	0.104267
40	30	1.612698	3.900	0.125120
50	34	2.015873	4.420	0.141803
60	37.5	2.419048	4.875	0.156400
70	39.5	2.822222	5.135	0.164742
80	41	3.225397	5.330	0.170998
90	44	3.628571	5.720	0.183510
100	45	4.031746	5.850	0.187680
110	47	4.434921	6.110	0.196022
120	48.5	4.838095	6.305	0.202278
130	49.7	5.24127	6.461	0.207283
140	49.7	5.644444	6.461	0.207283
150	49	6.047619	6.370	0.204363
160	47	6.450794	6.110	0.196022
170	46	6.853968	5.980	0.191851
180	44	7.257143	5.720	0.183510
190	42.5	7.660317	5.525	0.177254



Gambar L4.3 Grafik Strain VS Shear Stress D_r 50%

Dari puncak grafik tiap tegangan normal diatas dapat digambarkan grafik tegangan vs tegangan normal seperti dibawah ini



Gambar L4.4 Grafik Tegangan Geser VS Tegangan Normal *Dr* 50%

Tabel L4.7 Data Hasil Uji Direct Shear D_r 70% Normal Stress 0,1 kg/cm^2

NORMAL STRESS : 0,1 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	6	0.403175	0.780	0.025024
20	8	0.806349	1.040	0.033365
30	10	1.209524	1.300	0.041707
40	12	1.612698	1.560	0.050048
50	13.5	2.015873	1.755	0.056304
60	15	2.419048	1.950	0.062560
70	15.5	2.822222	2.015	0.064645
80	16	3.225397	2.080	0.066731
90	17	3.628571	2.210	0.070902
100	17.5	4.031746	2.275	0.072987
110	18	4.434921	2.340	0.075072
120	17.5	4.838095	2.275	0.072987
130	16	5.241270	2.080	0.066731
140	14	5.644444	1.820	0.058389
150	12	6.047619	1.560	0.050048
160	10	6.450794	1.300	0.041707

Tabel L4.8 Data Hasil Uji Direct Shear D_r 70% Normal Stress 0,2 kg/cm^2

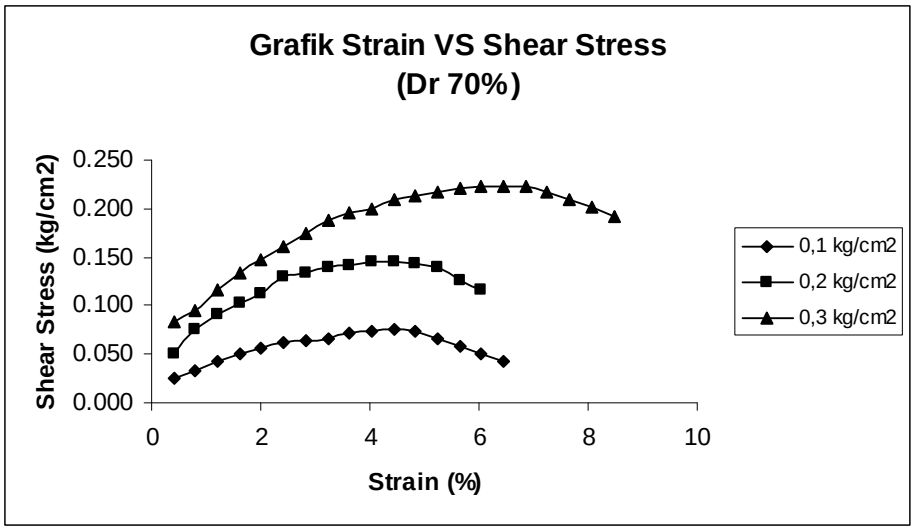
NORMAL STRESS : 0,2 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	12	0.403175	1.56	0.050048
20	18	0.806349	2.34	0.075072
30	22	1.209524	2.86	0.091755
40	24.5	1.612698	3.185	0.102182
50	27	2.015873	3.51	0.112608
60	31	2.419048	4.03	0.129291
70	32	2.822222	4.16	0.133462
80	33.5	3.225397	4.355	0.139718
90	34	3.628571	4.42	0.141803
100	35	4.031746	4.55	0.145974
110	35	4.434921	4.55	0.145974
120	34.5	4.838095	4.485	0.143888
130	33.5	5.241270	4.355	0.139718
140	30	5.644444	3.9	0.125120
150	28	6.047619	3.64	0.116779

Tabel L4.9 Data Hasil Uji Direct Shear D_r 70% Normal Stress 0,3 kg/cm^2

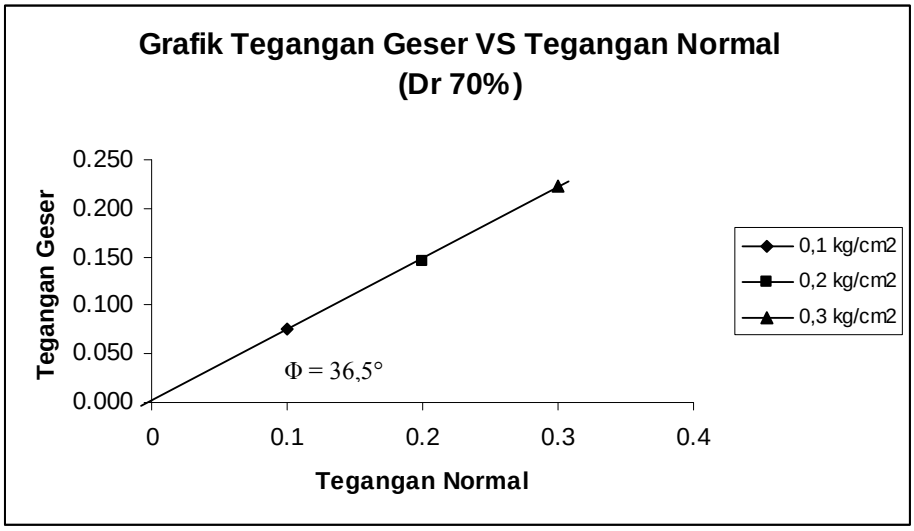
NORMAL STRESS : 0,3 kg/cm2 RING CONSTANT : 0,13 kg/div

H.dial (div)	P.Ring (div)	strain (%)	shear force (kg)	shear stress (kg/cm2)
10	20	0.403175	2.600	0.083414
20	23	0.806349	2.990	0.095926
30	28	1.209524	3.640	0.116779
40	32	1.612698	4.160	0.133462
50	35.5	2.015873	4.615	0.148059
60	38.5	2.419048	5.005	0.160571
70	42	2.822222	5.460	0.175168
80	45	3.225397	5.850	0.187680
90	47	3.628571	6.110	0.196022
100	48	4.031746	6.240	0.200192
110	50	4.434921	6.500	0.208534
120	51	4.838095	6.630	0.212705
130	52	5.241270	6.760	0.216875
140	53	5.644444	6.890	0.221046
150	53.5	6.047619	6.955	0.223131
160	53.5	6.450794	6.955	0.223131
170	53.5	6.853968	6.955	0.223131
180	52	7.257143	6.760	0.216875
190	50	7.660317	6.500	0.208534
200	48.5	8.063492	6.305	0.202278
210	46	8.466667	5.980	0.191851



Gambar L4.5 Grafik Strain VS Shear Stress D_r 70%

Dari puncak grafik tiap tegangan normal diatas dapat digambarkan grafik tegangan vs tegangan normal seperti dibawah ini



Gambar L4.6 Grafik Tegangan Geser VS Tegangan Normal *Dr* 70%

Gambar L4.7 Ilustrasi Uji Kuat Geser Langsung

LAMPIRAN V
HASIL JUMLAH PUKULAN

Nama Instansi : Universitas Kristen Maranatha

Nama Proyek : Praktikum Tugas Akhir

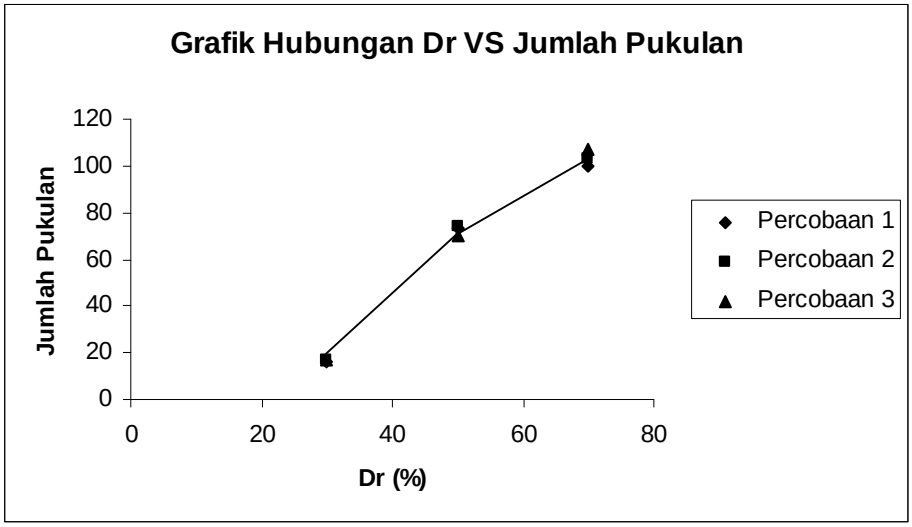
Lokasi Proyek :

Deskripsi Tanah : Pasir

Nama Operator : Yanward M R K

Tabel L5.1 Data Hasil Hasil Jumlah Pukulan

Dr	Percobaan		
(%)	1	2	3
30	16	17	19
50	73	74	70
70	100	103	107



Gambar L5.1 Grafik Hubungan D_r VS Jumlah Pukulan

LAMPIRAN VI
HASIL TINGGI SUMBAT

Nama Instansi : Universitas Kristen Maranatha

Nama Proyek : Praktikum Tugas Akhir

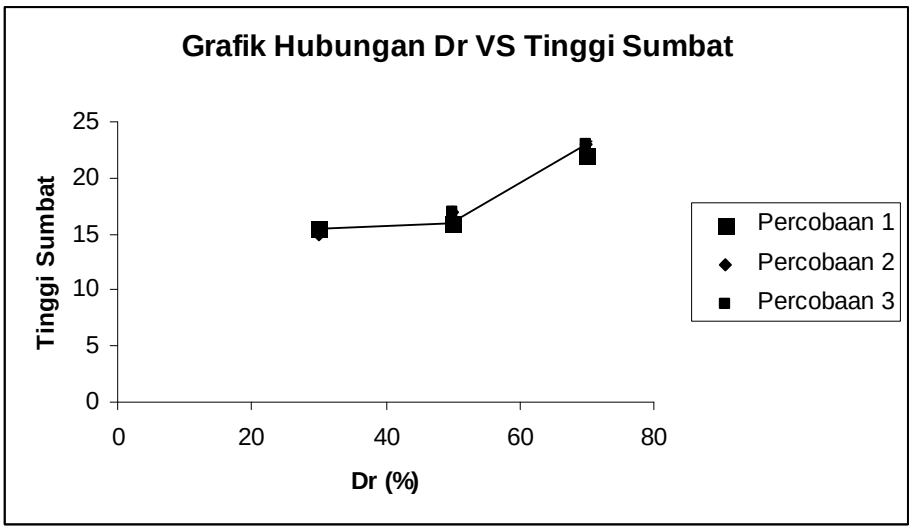
Lokasi Proyek :

Deskripsi Tanah : Pasir

Nama Operator : Yanward M R K

Tabel L6.1 Data Hasil Tinggi Sumbat

Dr (%)	Percobaan		
	1	2	3
30	15.5	15	15.5
50	16	17	17
70	22	23	23

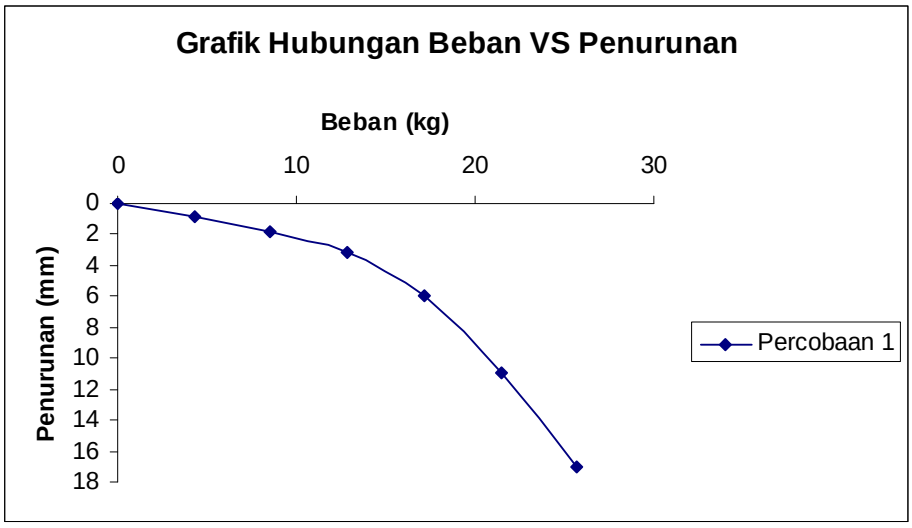


Gambar L6.2 Grafik Hubungan D_r VS Tinggi Sumbat

LAMPIRAN VII
HASIL UJI PEMBEBANAN

Tabel L7.1 Data Hasil uji pembebanan D_r 30% Percobaan 1

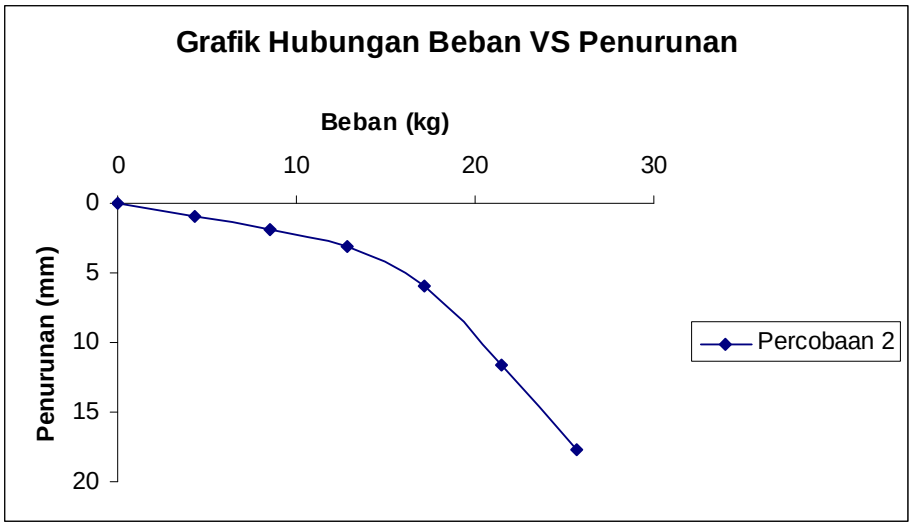
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	82	0.82
6	8.572	187	1.87
9	12.858	312	3.12
12	17.144	600	6
15	21.43	1100	11
18	25.716	1700	17



Gambar L7.1 Grafik Hubungan Beban VS Penurunan D_r 30% Percobaan 1

Tabel L7.2 Data Hasil uji pembebanan D_r 30% Percobaan 2

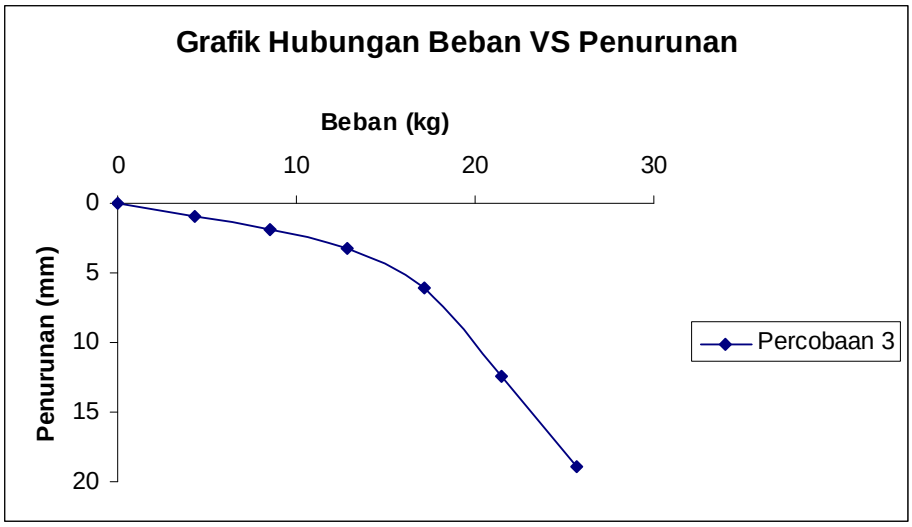
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	94	0.94
6	8.572	194	1.94
9	12.858	314	3.14
12	17.144	594	5.94
15	21.43	1157	11.57
18	25.716	1769	17.69



Gambar L7.2 Grafik Hubungan Beban VS Penurunan D_r 30% Percobaan 2

Tabel L7.3 Data Hasil uji pembebanan D_r 30% Percobaan 3

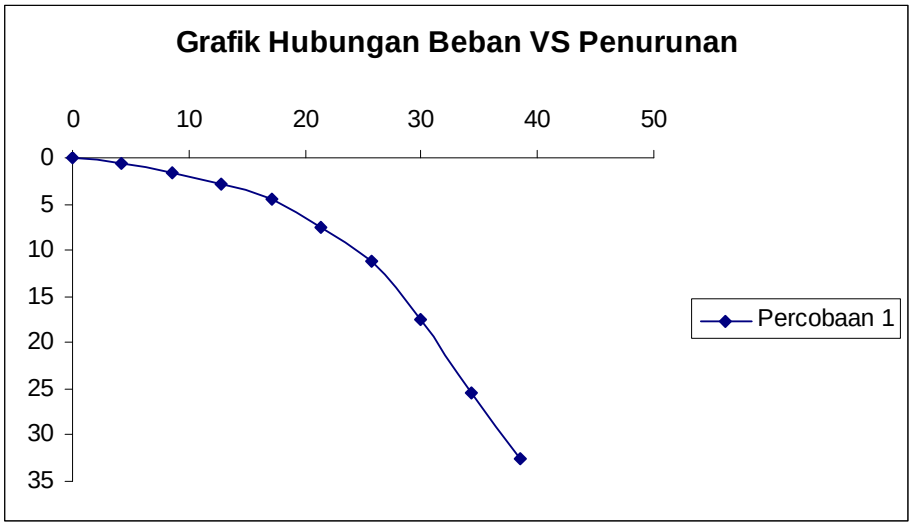
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	89	0.89
6	8.572	189	1.89
9	12.858	325	3.25
12	17.144	612	6.12
15	21.43	1241	12.41
18	25.716	1894	18.94



Gambar L7.3 Grafik Hubungan Beban VS Penurunan D_r 30% Percobaan 3

Tabel L7.4 Data Hasil uji pembebanan *Dr* 50% Percobaan 1

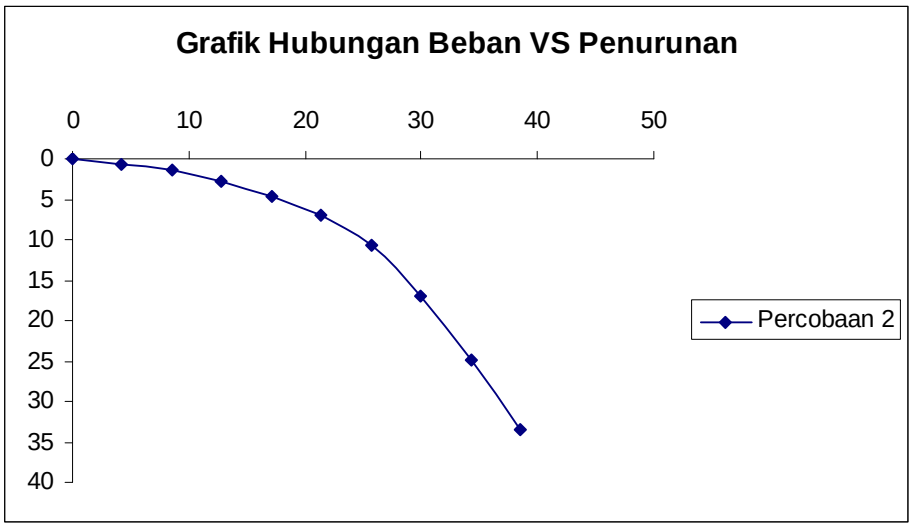
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	66	0.66
6	8.572	156	1.56
9	12.858	287	2.87
12	17.144	457	4.57
15	21.43	751	7.51
18	25.716	1124	11.24
21	30.002	1754	17.54
24	34.288	2547	25.47
27	38.574	3251	32.51



Gambar L7.4 Grafik Hubungan Beban VS Penurunan D_r 50% Percobaan 1

Tabel L7.5 Data Hasil uji pembebanan *Dr* 50% Percobaan 2

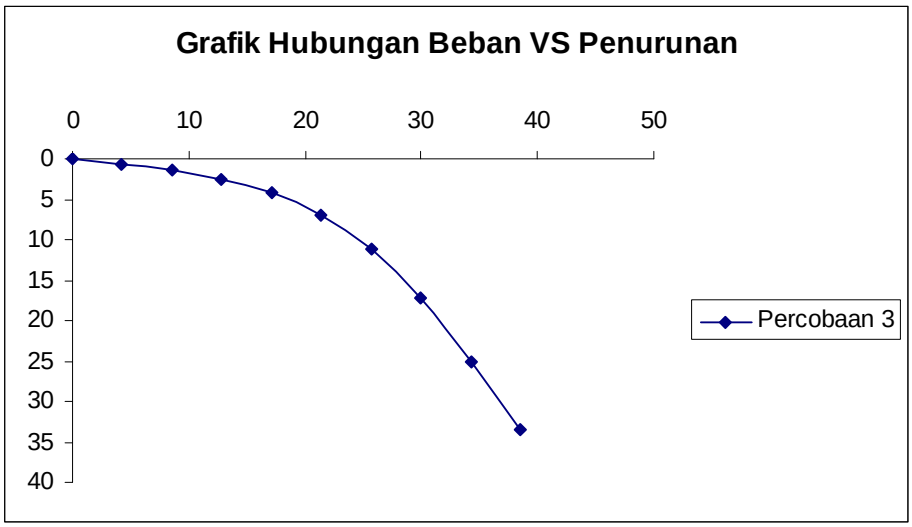
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	61	0.61
6	8.572	149	1.49
9	12.858	290	2.9
12	17.144	462	4.62
15	21.43	693	6.93
18	25.716	1076	10.76
21	30.002	1697	16.97
24	34.288	2497	24.97
27	38.574	3347	33.47



Gambar L7.5 Grafik Hubungan Beban VS Penurunan D_r 50% Percobaan 2

Tabel L7.6 Data Hasil uji pembebanan *Dr* 50% Percobaan 3

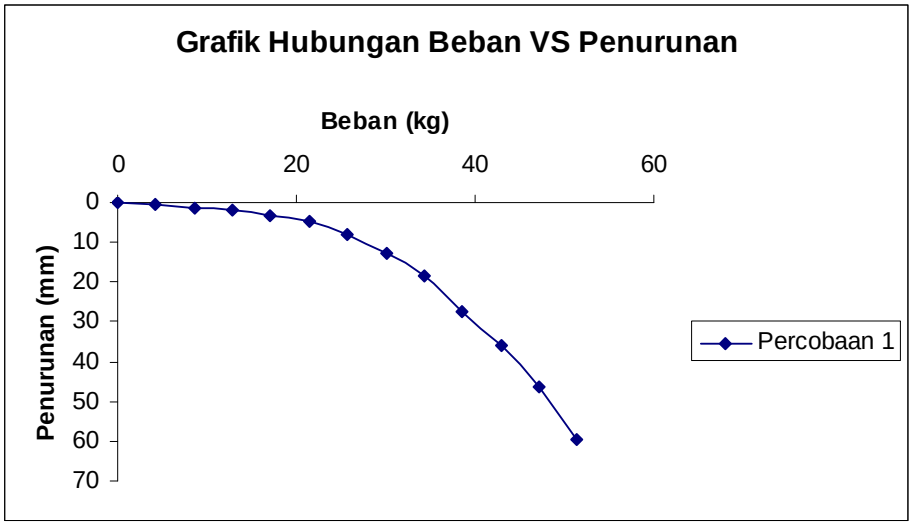
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	64	0.64
6	8.572	141	1.41
9	12.858	267	2.67
12	17.144	421	4.21
15	21.43	704	7.04
18	25.716	1121	11.21
21	30.002	1714	17.14
24	34.288	2516	25.16
27	38.574	3352	33.52



Gambar L7.6 Grafik Hubungan Beban VS Penurunan D_r 50% Percobaan 3

Tabel L7.7 Data Hasil uji pembebanan *Dr* 70% Percobaan 1

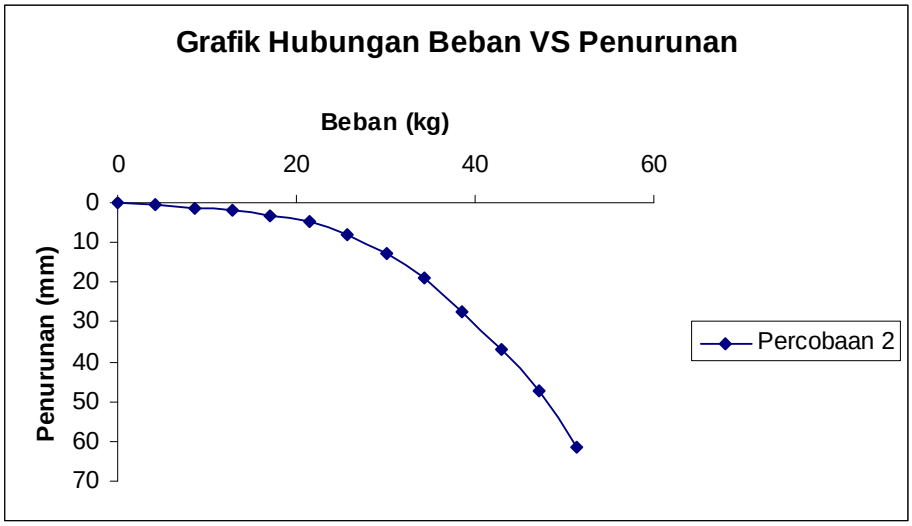
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	60	0.6
6	8.572	120	1.2
9	12.858	180	1.8
12	17.144	310	3.1
15	21.43	480	4.8
18	25.716	810	8.1
21	30.002	1270	12.7
24	34.288	1854	18.54
27	38.574	2749	27.49
30	42.86	3579	35.79
33	47.146	4651	46.51
36	51.432	5946	59.46



Gambar L7.7 Grafik Hubungan Beban VS Penurunan D_r 70% Percobaan 1

Tabel L7.8 Data Hasil uji pembebanan *Dr* 70% Percobaan 2

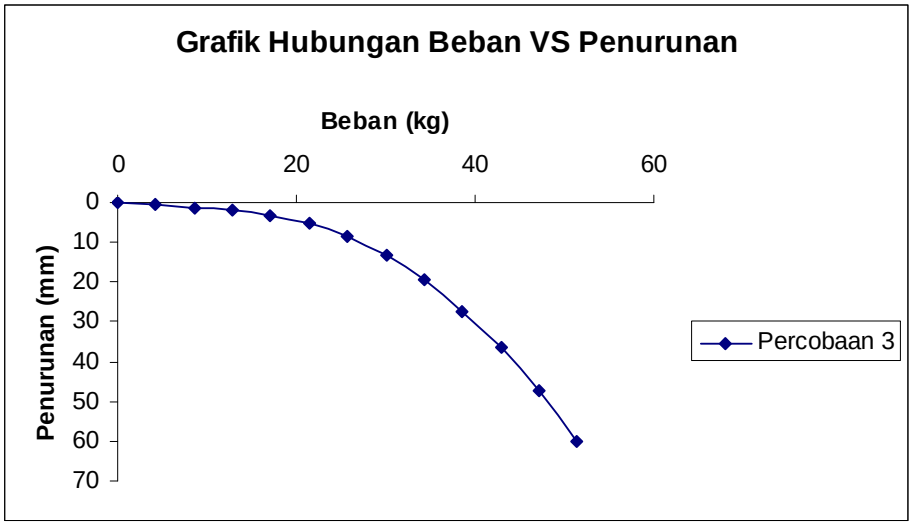
Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	64	0.64
6	8.572	129	1.29
9	12.858	187	1.87
12	17.144	312	3.12
15	21.43	491	4.91
18	25.716	827	8.27
21	30.002	1296	12.96
24	34.288	1912	19.12
27	38.574	2764	27.64
30	42.86	3672	36.72
33	47.146	4717	47.17
36	51.432	6157	61.57



Gambar L7.8 Grafik Hubungan Beban VS Penurunan D_r 70% Percobaan 2

Tabel L7.9 Data Hasil uji pembebanan *Dr* 70% Percobaan 3

Proving Ring Dial	Beban (kg)	Dial Gauge	Penurunan 0.01
0	0	0	0
3	4.286	59	0.59
6	8.572	126	1.26
9	12.858	190	1.9
12	17.144	331	3.31
15	21.43	514	5.14
18	25.716	834	8.34
21	30.002	1314	13.14
24	34.288	1947	19.47
27	38.574	2755	27.55
30	42.86	3658	36.58
33	47.146	4725	47.25
36	51.432	5997	59.97



Gambar L7.9 Grafik Hubungan Beban VS Penurunan D_r 70% Percobaan 3

Gambar L7.10 Ilustrasi Uji Pembebanan

LAMPIRAN VIII

PERHITUNGAN MANUAL

Dr 30%

Diketahui:

D_{luar} = 25,9 mm = 0,0259 m

ϕ = 32,5°

δ = 20°

ΔL = 30 cm = 0,3 m

γ = 1203,16 kg/m^3

Ditanya:

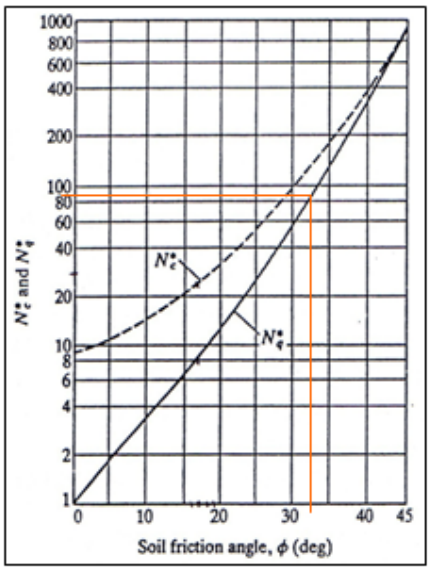
Daya dukung tiang $(Q_u = Q_p + \sum Q_s)$

Penyelesaian:

- Tahanan ujung (Q_p)

$A_p = 1/4.\pi.D = 1/4.\pi.0{,}0259^2 = 0{,}00053\ \text{m}^2$

$q' = \gamma.\Delta L = 1{,}20316.0{,}3 = 0{,}360948\ \text{ton/m}^2$



$N_q' = 90$

$Q_{p1} = A_p.q_p = A_p.q'.N_q'$

$Q_{p1} = 0{,}00053.0{,}360948.90 = 0{,}017106 ton = 17{,}106\,\text{kg} \longrightarrow$ dipakai

$Q_{p2} = A_p.q_1 = A_p.5.N_q'.\tan\phi = 0{,}00053.5.90.\tan 32{,}5 = 0{,}134174 ton = 134{,}174\,\text{kg}$

$60\%.Q_{p1} = 10{,}264\,\text{kg}$

- Tahanan gesek

$K_0 = 1 - \sin\phi = 1 - \sin 32{,}5 = 0{,}463$

$K = 1{,}5.K_0 = 1{,}5.0{,}463 = 0{,}695$

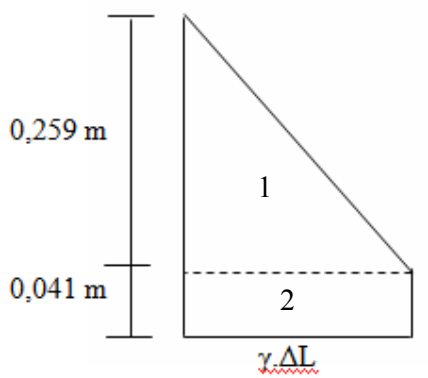
$f_s = K\,.\,\sigma_v^{'}\,.\tan\delta$

$A_s = \pi.D.\Delta L$

$Q_s = \sum\left(A_s\,.\,f_s\right)$

$Q_s = \sum(\pi.D.\Delta L.K.\sigma'_v.\tan\delta)$

$Q_s = \pi.D.K.\tan\delta(\sum.\Delta L..\sigma'_v.) \longrightarrow$ Luas diagram



Luas diagram 1 = 1/2.γ.ΔL.0,259 = 0,04674 ton/m

Luas diagram 2 = γ.ΔL.0,041 = 0,0148 ton/m

Luas total = 0,06154 ton/m

$Q_s = \pi.D.K.\tan\delta.luasdiagram$

$Q_s = \pi.0{,}0259.0{,}695.\tan 20.0{,}06154 = 0{,}001265 ton = 1{,}265\,\text{kg}$

$Q_u = Q_p + \sum Q_s$

$Q_u = 10{,}264 + 1{,}265 = 11{,}529\,\text{kg}$

Dr 50%

Diketahui:

D_{luar} = 25,9 mm = 0,0259 m

ϕ = 35°

δ = 20°

ΔL = 30 cm = 0,3 m

γ = 1272,99 kg/m

Ditanya:

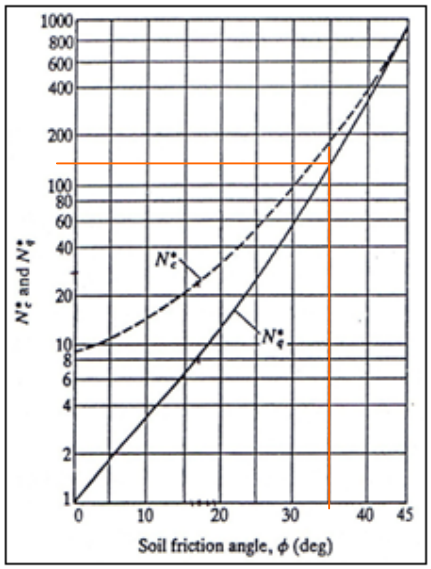
Daya dukung tiang $(Q_u = Q_p + \sum Q_s)$

Penyelesaian:

- Tahanan ujung (Q_p)

$A_p = 1/4.\pi.D = 1/4.\pi.0{,}0259^2 = 0{,}00053\ \text{m}^2$

$q' = \gamma.\Delta L = 1{,}27299.0{,}3 = 0{,}381897\ \text{ton/m}^2$



$N_q' = 145$

$Q_{p1} = A_p.q_p = A_p.q'.N_q'$

$Q_{p1} = 0{,}00053.0{,}381897.145 = 0{,}02916 ton = 29{,}160\ \text{kg} \longrightarrow$ dipakai

$Q_{p2} = A_p.q_1 = A_p.5.N_q'.\tan\phi = 0{,}00053.5.145.\tan 35 = 0{,}147444 ton = 147{,}444\ \text{kg}$

$60\%.Q_{p1} = 17{,}496\ \text{kg}$

- Tahanan gesek

$K_0 = 1 - \sin\phi = 1 - \sin 35 = 0{,}426$

$K = 1{,}5.K_0 = 1{,}5.0{,}426 = 0{,}639$

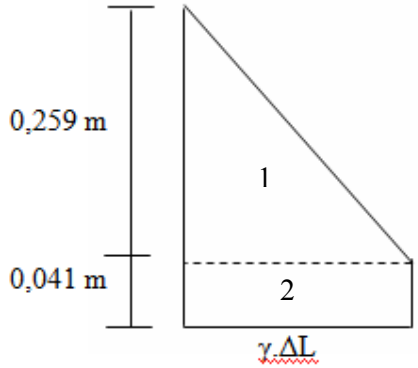
$f_s = K\,.\,\sigma_v^{'}\,.\tan\delta$

$A_s = \pi.D.\Delta L$

$Q_s = \sum\left(A_s\,.\,f_s\right)$

$Q_s = \sum(\pi.D.\Delta L.K.\sigma'_v.\tan\delta)$

$Q_s = \pi.D.K.\tan\delta(\sum.\Delta L..\sigma'_v.)$ ⟶ Luas diagram



Luas diagram 1 = 1/2.γ.ΔL.0,259 = 0,04946 ton/m

Luas diagram 2 = γ.ΔL.0,041 = 0,01566 kg/m

Luas total = 0,06511 kg/m

$Q_s = \pi.D.K.\tan\delta.luasdiagram$

$Q_s = \pi.0{,}0259.0{,}639.\tan 20.0{,}06511 = 0{,}001232 ton = 1{,}232\ \text{kg}$

$Q_u = Q_p + \sum Q_s$

$Q_u = 17{,}496 + 1{,}232 = 18{,}727\ \text{kg}$

Dr 70%

Diketahui:

D_{luar} = 25,9 mm = 0,0259 m

ϕ = 36,5°

δ = 20°

ΔL = 30 cm = 0,3 m

γ = 1351,42 kg/m

Ditanya:

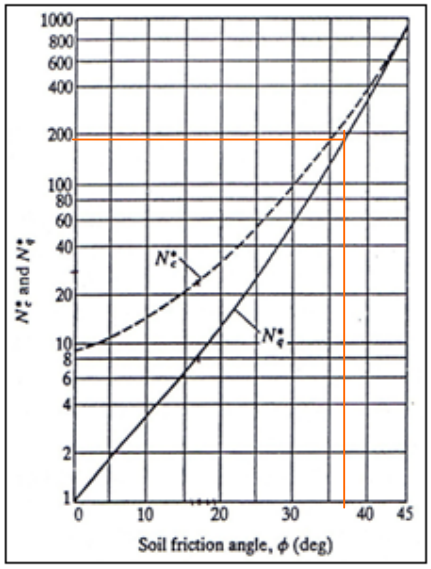
Daya dukung tiang ($Q_u = Q_p + \Sigma Q_s$)

Penyelesaian:

- Tahanan ujung (Q_p)

$A_p = 1/4.\pi.D = 1/4.\pi.0{,}0259^2 = 0{,}00053\,\text{m}^2$

$q' = \gamma.\Delta L = 1{,}35142.0{,}3 = 0{,}405426\,\text{ton/m}^2$



$N_q' = 190$

$Q_{p1} = A_p.q_p = A_p.q'.N_q'$

$Q_{p1} = 0{,}00053.0{,}405426.190 = 0{,}040826 ton = 40{,}826\,\text{kg} \longrightarrow$ dipakai

$Q_{p2} = A_p.q_1 = A_p.5.N_q'.\tan\phi = 0{,}00053.5.190.\tan 36{,}5 = 0{,}37257 ton = 372{,}57\,\text{kg}$

$60\%.Q_{p1} = 24{,}338\,\text{kg}$

- Tahanan gesek

$K_0 = 1 - \sin\phi = 1 - \sin 36{,}5 = 0{,}405$

$K = 1{,}5.K_0 = 1{,}5.0{,}405 = 0{,}608$

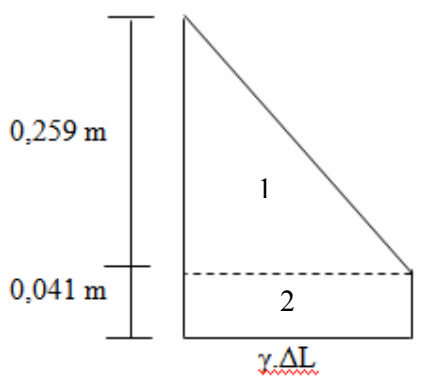
$f_s = K \,.\, \sigma_v^{'} \,.\, \tan\delta$

$A_s = \pi.D.\Delta L$

$Q_s = \sum\left(A_s \,.\, f_s\right)$

$Q_s = \sum(\pi.D.\Delta L.K.\sigma'_v.\tan\delta)$

$Q_s = \pi.D.K.\tan\delta(\sum.\Delta L..\sigma'_v.$ → Luas diagram



Luas diagram 1 = 1/2.γ.ΔL.0,259 = 0,0525 kg/m

Luas diagram 2 = γ.ΔL.0,041 = 0,01662 kg/m

Luas total =0,0 6913 kg/m

$Q_s = \pi.D.K.\tan\delta.luasdiagram$

$Q_s = \pi.0{,}0259.0{,}608.\tan 20.0{,}06913 = 0{,}001243 ton = 1{,}243\,\text{kg}$

$Q_u = Q_p + \sum Q_s$

$Q_u = 24{,}338 + 1{,}243 = 25{,}581\,\text{kg}$