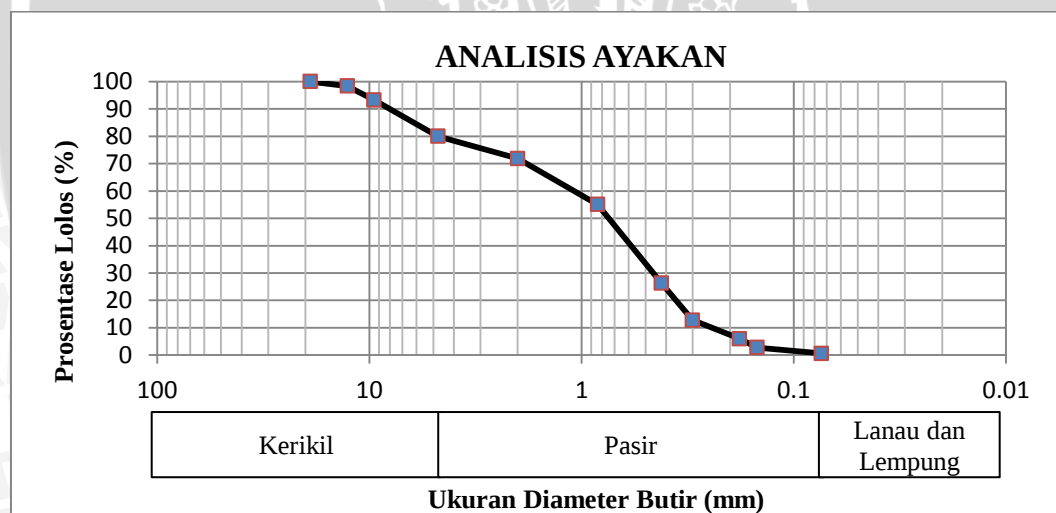


Lampiran 1

Hasil Analisis Ayakan

No. Ayakan	D mm	Berat Tertahan (gr)	Berat Kumulatif (gr)	Persen Tertahan %	Persen Lolos %
No. 3/4	19.0	0	0	0	100
No. 1/2	12.7	8,2	8,2	1,65	98,35
No. 3/8	9.52	25,1	33,3	6,70	93,30
No. 4	4.75	66,0	99,3	19,97	80,03
No. 10	2	40,6	139,9	28,13	71,87
No. 20	0.84	83,4	223,3	44,90	55,10
No. 40	0.42	143,2	366,5	73,70	26,30
No. 50	0.3	67,4	433,9	87,25	12,75
No. 80	0.18	33,7	467,6	94,03	5,97
No. 100	0.149	16,1	483,7	97,27	2,73
No. 200	0.074	10,7	494,4	99,42	0,58
PAN		2,9	497,3	100	0



Dari grafik analisis ayakan:

$$D_{10} = 0,28 \text{ mm}$$

$$D_{30} = 0,48 \text{ mm}$$

$$D_{60} = 1,1 \text{ mm}$$

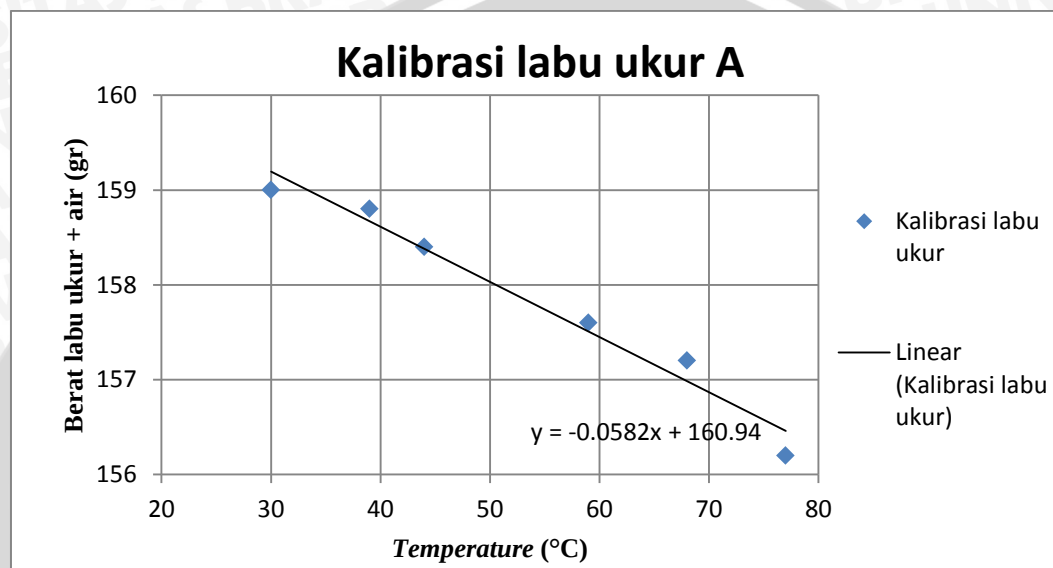
$$\text{Koefisien keseragaman (Cu)} = \frac{D_{60}}{D_{10}} = \frac{1,1}{0,28} = 3,93 \quad (\text{Cu} < 6)$$

$$\text{Koefisien gradasi (Cc)} = \frac{D_{30} \times D_{30}}{D_{10} \times D_{60}} = \frac{0,48 \times 0,48}{0,28 \times 1,1} = 0,75 \quad (\text{Cc} < 1)$$

Lampiran 2

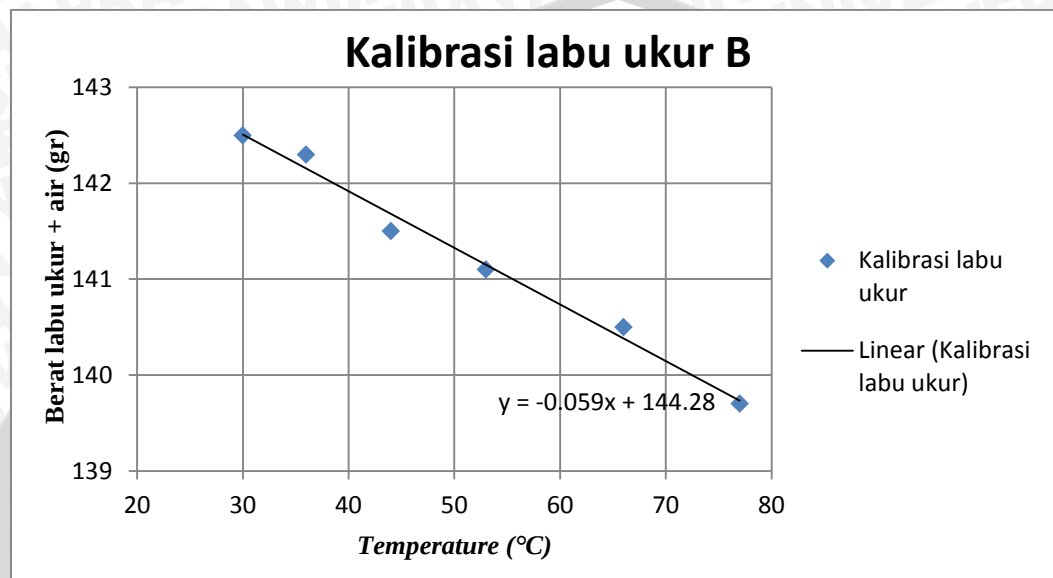
Hasil Analisis Pemeriksaan *Specific Gravity* Tanah

Labu Ukur	A					
No.	1	2	3	4	5	6
Berat Labu Ukur + Air	156,2	157,2	157,6	158,4	158,8	159,0
Temperatur	77	68	59	44	39	30



Labu Ukur		A					
Berat Labu Ukur	gr	55,8					
Berat Tanah Kering (Ws)	gr	20					
Berat Labu ukur+Air+Tanah (W1)	gr	170,0	170,6	171,2	171,7	172,0	171,8
Suhu	°C	72	60	48	39	33	30
Berat Labu Ukur + Air (W2)	gr	156,7	157,4	158,1	158,7	150,0	159,2
<i>Spesific Gravity</i> Air (Gt)	-	0,9737	0,9789	0,9838	0,9937	0,9947	0,9957
$G_s = (W_s * G_t) / (W_s - (W_1 - W_2))$	-	2,8852	2,8589	2,8325	2,8427	2,8282	2,6933
Gs Rata - Rata	-	2.8235					

Labu Ukur	B					
No.	1	2	3	4	5	6
Berat Labu Ukur + Air	139,7	140,5	141,1	141,5	142,3	142,5
Temperatur °C	77	66	53	44	36	30



Labu Ukur		B					
Berat Labu Ukur	gr	38.9					
Berat TanahKering (WS)	gr	20					
Berat Labu ukur+ Air+Tanah (W1)	gr	152,8	153,6	154,3	154,6	155,0	155,3
Suhu	°C	76	64	53	44	38	30
Berat Labu Ukur + Air (W2)	gr	139,8	140,5	141,2	141,7	142,0	142,5
Spesific Gravity Air (Gt)	-	0.9743	0.9811	0.9857	0.9907	0.9930	0.9957
$G_s = (W_s * G_t) / (W_s - (W_1 - W_2))$	-	2.7853	2.8421	2.8767	2.7970	2.8218	2.7620
Gs Rata - Rata	-	2.8141					

Lampiran 3

Hasil Uji Pemadatan Standar

Data:

Berat cetakan = 4260 gr

Diameter sampel = 10.16 cm

Tinggi sampel = 11.63 cm

Kadar Air

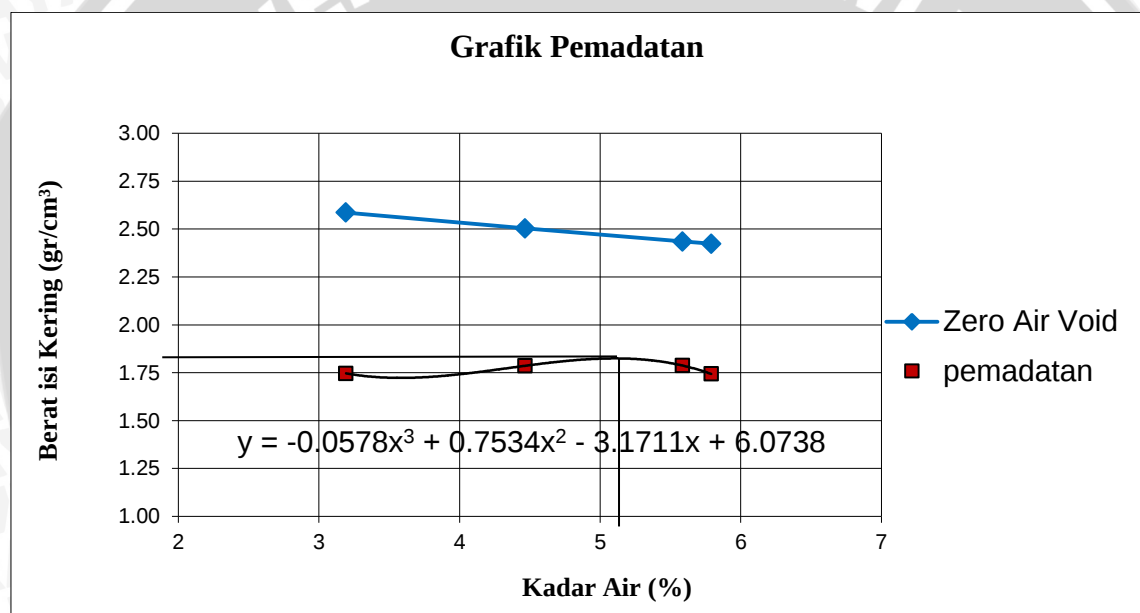
Penambahan air (ml)	100			150			200			250		
Lapisan	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah
Cawan No.	1	2	3	1	2	3	1	2	3	1	2	3
Berat cawan + berat tanah basah (gr)	24.40	19.70	33.90	28.50	28.30	25.10	24.80	33.20	28.90	30.70	29.30	29.80
Berat cawan + berat tanah kering (gr)	23.70	19.30	33.00	27.50	27.20	24.30	23.80	31.70	27.60	29.30	27.90	28.60
Berat air (gr)	0.7	0.4	0.9	1	1.1	0.8	1	1.5	1.3	1.4	1.4	1.2
Berat cawan (gr)	4.20	4.30	5.90	4.20	4.30	5.70	5.40	5.60	4.30	5.60	5.40	5.70
Berat tanah kering (gr)	19.5	15	27.1	23.3	22.9	18.6	18.4	26.1	23.3	23.7	22.5	22.9
Kadar air (w) %	3.59	2.67	3.32	4.29	4.80	4.30	5.43	5.75	5.58	5.91	6.22	5.24
Rata-rata Kadar Air %	3.19			4.47			5.59			5.79		

Berat Isi

Penambahan air (ml)	100	150	200	250
Berat cetakan (gr)	4260	4260	4260	4260
Berat tanah basah + cetakan (gr)	5960	6020	6040	6000
Berat tanah basah (gr)	1700	1760	1780	1740
Isi cetakan (cm ³)	943.261	943.261	943.261	943.261
Berat isi basah (yw) gr/cm ³	1.802	1.866	1.887	1.845
Berat isi kering (yd) gr/cm ³	1.747	1.786	1.787	1.744

Zero Air Void

Kadar air (w) %	3.19	4.47	5.59	5.79
Gs	2.8188	2.8188	2.8188	2.8188
Berat jenis air (yw) gr/cm ³	1	1	1	1
Berat jenis air zero air void (yzad) gr/cm ³	2.586	2.504	2.435	2.423



Dari persamaan grafik pemadatan tersebut didapat kadar air optimum 5,11% dan berat isi kering 1,830 gr/cm³

Lampiran 4

Pemadatan Model Lereng

- Luas Boks = $9800 \text{ cm}^2 = 0,98 \text{ m}^2$
- γ_d yang dipakai untuk perhitungan berat tanah dalam boks adalah γ_d laboratorium sebesar $1,830 \text{ gr/cm}^3 = 1830 \text{ kg/m}^3$
- Volume lereng yang dibuat $100 \text{ cm} \times 100 \text{ cm} \times 70 \text{ cm} = 700.000 \text{ cm}^3 = 0,7 \text{ m}^3$
 Volume lereng pada setiap lapis = $\frac{0,7 \text{ m}^3}{7 \text{ lapis}} = 0,1 \text{ m}^3$
- Berat tanah untuk tinggi rencana 10 cm (tiap lapis) = $1830 \text{ kg/m}^3 \times 0,1 \text{ m}^3 = 183 \text{ kg}$.
 Karena tanah pada penelitian pasir + 20% kerikil, maka:
 - Berat kerikil = $20\% \times 183 \text{ kg} = 36,6 \text{ kg}$
 - Berat pasir = $183 \text{ kg} - 36,6 \text{ kg} = 146,4 \text{ kg}$



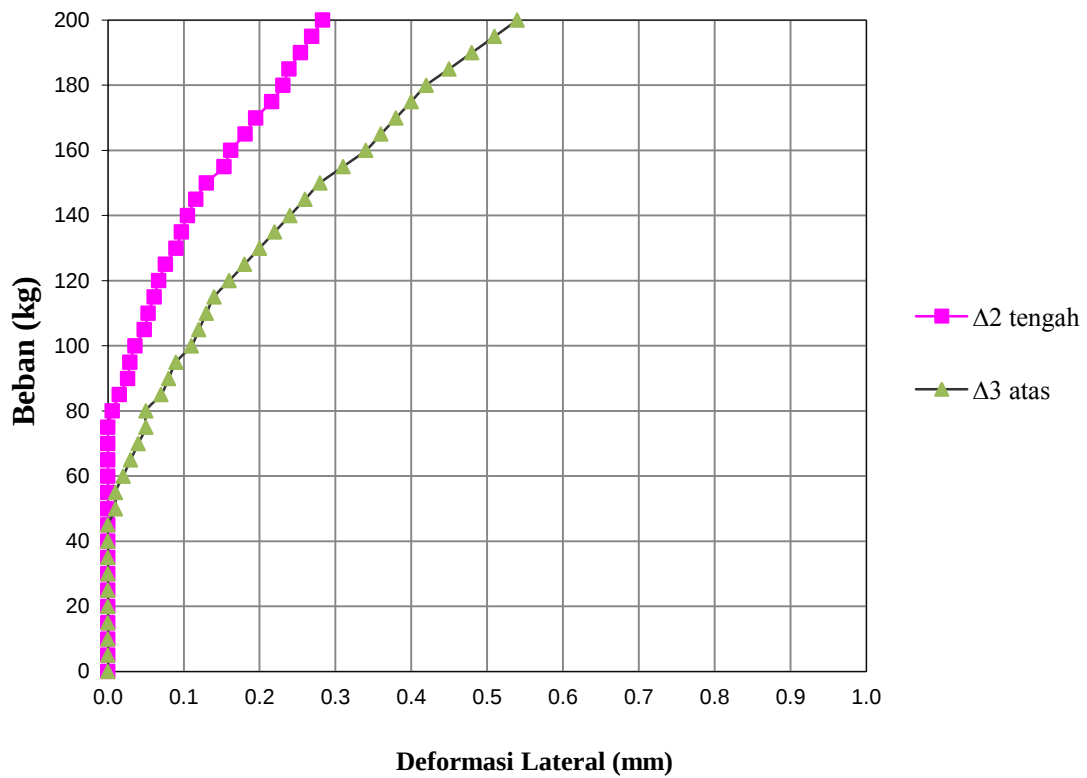
Lampiran 5

Hasil Pengujian Deformasi Lateral

1. Dinding celah 1 cm

No.	Beban (kg)	$\Delta 1$ (mm)	$\Delta 2$ (mm)	$\Delta 3$ (mm)
1	0	0	0	0
2	5	0	0	0
3	10	0	0	0
4	15	0	0	0
5	20	0	0	0
6	25	0	0	0
7	30	0	0	0
8	35	0	0	0
9	40	0	0	0
10	45	0	0	0
11	50	0	0	0.010
12	55	0	0	0.010
13	60	0	0	0.020
14	65	0	0	0.030
15	70	0	0	0.040
16	75	0	0	0.050
17	80	0	0.006	0.050
18	85	0	0.015	0.070
19	90	0	0.026	0.080
20	95	0	0.029	0.090
21	100	0	0.036	0.110
22	105	0	0.048	0.120
23	110	0	0.053	0.130
24	115	0	0.061	0.140
25	120	0	0.067	0.160
26	125	0	0.076	0.180
27	130	0	0.090	0.200
28	135	0	0.097	0.220
29	140	0	0.105	0.240
30	145	0	0.116	0.260
31	150	0	0.130	0.280
32	155	0	0.153	0.310
33	160	0	0.162	0.340
34	165	0	0.181	0.360
35	170	0	0.195	0.380
36	175	0	0.216	0.400
37	180	0	0.231	0.420
38	185	0	0.239	0.450
39	190	0	0.254	0.480
40	195	0	0.269	0.510
41	200	0.000	0.283	0.540

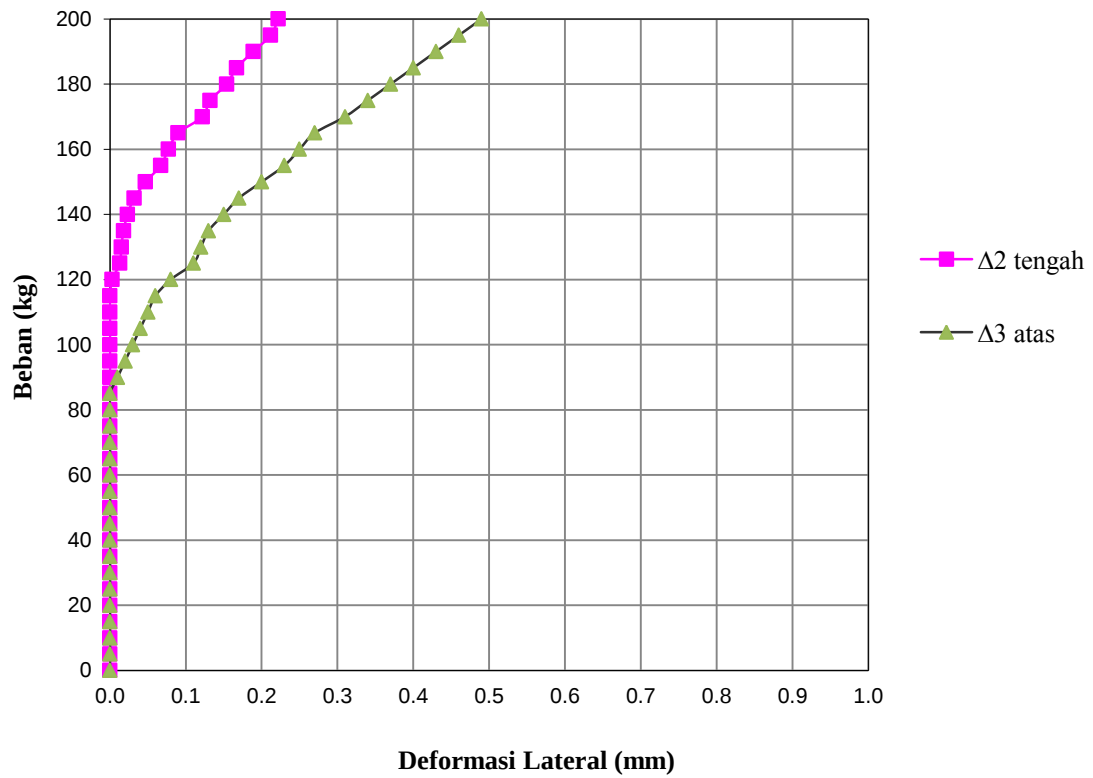
DEFORMASI LATERAL DINDING 1 CM



2. Dinding celah 1,5 cm

No.	Beban (kg)	$\Delta 1$ (mm)	$\Delta 2$ (mm)	$\Delta 3$ (mm)
1	0	0	0	0
2	5	0	0	0
3	10	0	0	0
4	15	0	0	0
5	20	0	0	0
6	25	0	0	0
7	30	0	0	0
8	35	0	0	0
9	40	0	0	0
10	45	0	0	0
11	50	0	0	0
12	55	0	0	0
13	60	0	0	0
14	65	0	0	0
15	70	0	0	0
16	75	0	0	0
17	80	0	0	0
18	85	0	0	0
19	90	0	0	0.010
20	95	0	0	0.020
21	100	0	0	0.030
22	105	0	0	0.040
23	110	0	0	0.050
24	115	0	0	0.060
25	120	0	0.003	0.080
26	125	0	0.013	0.110
27	130	0	0.015	0.120
28	135	0	0.018	0.130
29	140	0	0.023	0.150
30	145	0	0.032	0.170
31	150	0	0.047	0.200
32	155	0	0.067	0.230
33	160	0	0.077	0.250
34	165	0	0.090	0.270
35	170	0	0.122	0.310
36	175	0	0.132	0.340
37	180	0	0.154	0.370
38	185	0	0.167	0.400
39	190	0	0.189	0.430
40	195	0	0.212	0.460
41	200	0	0.222	0.490

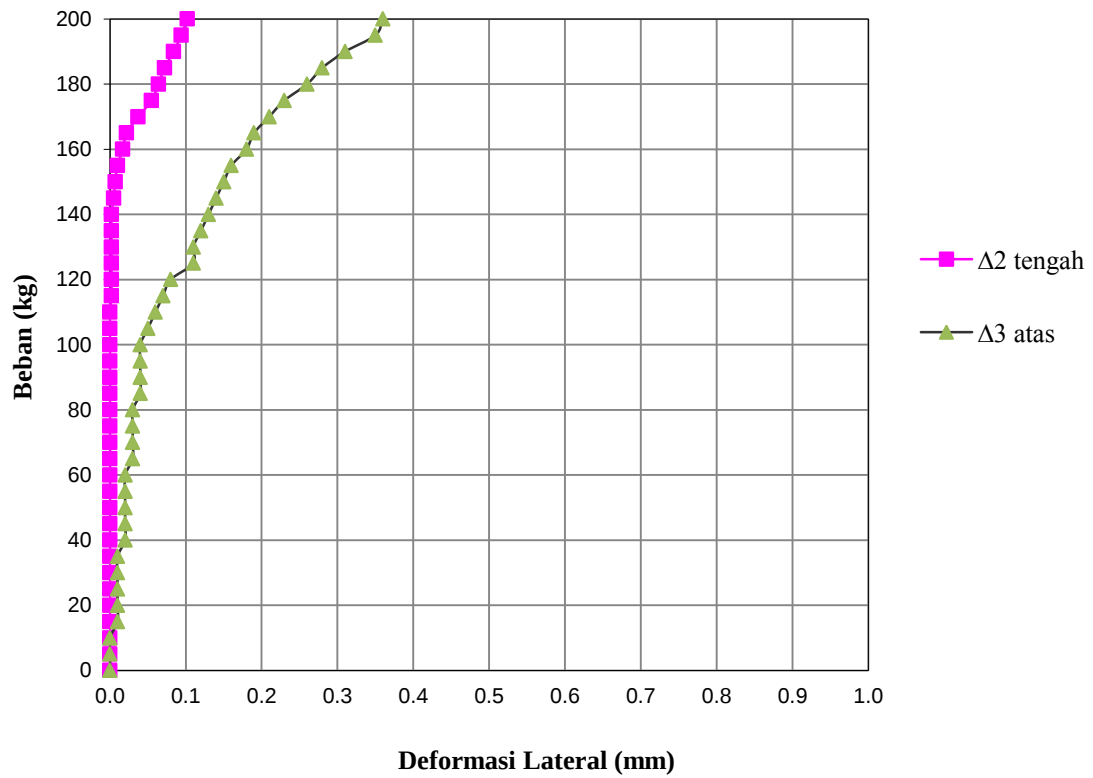
DEFORMASI LATERAL DINDING 1,5 CM



3. Dinding celah 2 cm

No.	Beban (kg)	$\Delta 1$ (mm)	$\Delta 2$ (mm)	$\Delta 3$ (mm)
1	0	0	0	0
2	5	0	0	0
3	10	0	0	0
4	15	0	0	0.010
5	20	0	0	0.010
6	25	0	0	0.010
7	30	0	0	0.010
8	35	0	0	0.010
9	40	0	0	0.020
10	45	0	0	0.020
11	50	0	0	0.020
12	55	0	0	0.020
13	60	0	0	0.020
14	65	0	0	0.030
15	70	0	0	0.030
16	75	0	0	0.030
17	80	0	0	0.030
18	85	0	0	0.040
19	90	0	0	0.040
20	95	0	0	0.040
21	100	0	0	0.040
22	105	0	0	0.050
23	110	0	0	0.060
24	115	0	0.002	0.070
25	120	0	0.002	0.080
26	125	0	0.002	0.110
27	130	0	0.002	0.110
28	135	0	0.002	0.120
29	140	0	0.002	0.130
30	145	0	0.005	0.140
31	150	0	0.007	0.150
32	155	0	0.010	0.160
33	160	0	0.017	0.180
34	165	0	0.022	0.190
35	170	0	0.037	0.210
36	175	0	0.055	0.230
37	180	0	0.064	0.260
38	185	0	0.072	0.280
39	190	0	0.084	0.310
40	195	0	0.094	0.350
41	200	0	0.102	0.360

DEFORMASI LATERAL DINDING 2 CM



Lampiran 6

Hasil Pengujian Kadar Air dan Berat Isi Tanah pada Model Lereng

1. Dinding celah 1 cm

Lapisan		1		2		3		4		5		6		7	
Berat cawan + tanah basah	gr	20.1	20.9	19.1	19.9	20.3	20.1	20.3	19.2	21.0	20.2	20.8	20.6	20.8	20.0
Berat cawan + tanah kering	gr	18.6	19.6	17.9	18.4	19.2	19.0	19.1	17.8	19.7	19.0	19.4	19.2	19.4	18.9
Berat cawan	gr	4.2	5.7	4.2	4.2	6.0	5.6	5.6	4.2	5.6	5.3	5.7	5.7	6.0	5.6
Berat tanah basah	gr	15.9	15.2	14.9	15.7	14.3	14.5	14.7	15.0	15.4	14.9	15.1	14.9	14.8	14.4
Berat tanah kering	gr	14.4	13.9	13.7	14.2	13.2	13.4	13.5	13.6	14.1	13.7	13.7	13.5	13.4	13.3
Berat air	gr	1.50	1.30	1.20	1.50	1.10	1.10	1.20	1.40	1.30	1.20	1.40	1.40	1.40	1.10
Kadar air	%	10.42	9.35	8.76	10.56	8.33	8.21	8.89	10.29	9.22	8.76	10.22	10.37	10.45	8.27
Kadar air rata-rata	%	9.44													

Lapisan		1		2		3		4		5		6		7	
Berat ring + tanah	gr	33.9	33.2	32.90	33.70	32.3	32.5	32.7	33.0	33.4	32.9	33.1	32.9	32.8	32.4
Berat ring	gr	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Diameter ring	cm	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Tinggi ring	cm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Volume ring	cm ³	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39
Berat tanah	gr	15.90	15.20	14.90	15.70	14.3	14.5	14.70	15.00	15.40	14.90	15.1	14.9	14.80	14.40
yt	gr/cm ³	1.530	1.463	1.434	1.511	1.376	1.395	1.415	1.444	1.482	1.434	1.453	1.434	1.424	1.386
Kadar air	%	10.42	9.35	8.76	10.56	8.33	8.21	8.89	10.29	9.22	8.76	10.22	10.37	10.45	8.27
yd	gr/cm ³	1.386	1.338	1.318	1.367	1.270	1.290	1.299	1.309	1.357	1.318	1.318	1.299	1.290	1.280
yt rata-rata	gr/cm ³	1.441													
yd rata-rata	gr/cm ³	1.317													

2. Dinding celah 1,5 cm

Lapisan		1		2		3		4		5		6		7	
Berat cawan + tanah basah	gr	19.7	20.9	19.1	20.8	21.3	20.6	20.4	21.6	20.4	20.8	20.5	20.6	20.4	21.2
Berat cawan + tanah kering	gr	18.6	20.0	17.9	19.5	19.9	19.5	19.0	20.2	19.5	19.8	19.2	19.3	19.0	19.8
Berat cawan	gr	4.2	6.0	4.2	6.0	5.6	5.7	4.2	5.7	5.3	5.6	5.6	5.7	4.2	5.6
Berat tanah basah	gr	15.5	14.9	14.9	14.8	15.7	14.9	16.2	15.9	15.1	15.2	14.9	14.9	16.2	15.6
Berat tanah kering	gr	14.4	14.0	13.7	13.5	14.3	13.8	14.8	14.5	14.2	14.2	13.6	13.6	14.8	14.2
Berat air	gr	1.10	0.90	1.20	1.30	1.40	1.10	1.40	1.40	0.90	1.00	1.30	1.30	1.40	1.40
Kadar air	%	7.64	6.43	8.76	9.63	9.79	7.97	9.46	9.66	6.34	7.04	9.56	9.56	9.46	9.86
Kadar air rata-rata	%	8.65													

Lapisan		1		2		3		4		5		6		7	
Berat ring + tanah	gr	33.5	32.9	32.90	32.80	33.7	32.9	34.2	33.9	33.1	33.2	32.9	32.9	34.2	33.6
Berat ring	gr	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Diameter ring	cm	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Tinggi ring	cm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Volume ring	cm ³	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39
Berat tanah	gr	15.50	14.90	14.90	14.80	15.7	14.9	16.20	15.90	15.10	15.20	14.9	14.9	16.20	15.60
yt	gr/cm ³	1.492	1.434	1.434	1.424	1.511	1.434	1.559	1.530	1.453	1.463	1.434	1.434	1.559	1.501
Kadar air	%	7.64	6.43	8.76	9.63	9.79	7.97	9.46	9.66	6.34	7.04	9.56	9.56	9.46	9.86
yd	gr/cm ³	1.386	1.347	1.318	1.299	1.376	1.328	1.424	1.395	1.367	1.367	1.309	1.309	1.424	1.367
yt rata-rata	gr/cm ³	1.476													
yd rata-rata	gr/cm ³	1.358													

3. Dinding celah 2 cm

Lapisan		1		2		3		4		5		6		7	
Berat cawan + tanah basah	gr	21.5	20.1	20.2	21.1	21.3	20.8	20.3	21.5	21.7	21.3	21.1	20.0	19.8	20.7
Berat cawan + tanah kering	gr	20.5	19.1	19.1	19.9	19.9	19.7	18.9	20.2	20.3	20.1	19.8	18.9	18.6	19.4
Berat cawan	gr	5.7	4.2	4.2	5.6	5.6	6.0	4.2	6.0	5.7	5.6	5.7	5.3	4.2	5.6
Berat tanah basah	gr	15.8	15.9	16.0	15.5	15.7	14.8	16.1	15.5	16.0	15.7	15.4	14.7	15.6	15.1
Berat tanah kering	gr	14.8	14.9	14.9	14.3	14.3	13.7	14.7	14.2	14.6	14.5	14.1	13.6	14.4	13.8
Berat air	gr	1.00	1.00	1.10	1.20	1.40	1.10	1.40	1.30	1.40	1.20	1.30	1.10	1.20	1.30
Kadar air	%	6.76	6.71	7.38	8.39	9.79	8.03	9.52	9.15	9.59	8.28	9.22	8.09	8.33	9.42
Kadar air rata-rata	%	8.48													

Lapisan		1		2		3		4		5		6		7	
Berat ring + tanah	gr	33.8	33.9	34.00	33.50	33.7	32.8	34.1	33.5	34.0	33.7	33.4	32.7	33.6	33.1
Berat ring	gr	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Diameter ring	cm	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Tinggi ring	cm	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Volume ring	cm ³	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39	10.39
Berat tanah	gr	15.80	15.90	16.00	15.50	15.7	14.8	16.10	15.50	16.00	15.70	15.4	14.7	15.60	15.10
yt	gr/cm ³	1.521	1.530	1.540	1.492	1.511	1.424	1.549	1.492	1.540	1.511	1.482	1.415	1.501	1.453
Kadar air	%	6.76	6.71	7.38	8.39	9.79	8.03	9.52	9.15	9.59	8.28	9.22	8.09	8.33	9.42
yd	gr/cm ³	1.424	1.434	1.434	1.376	1.376	1.318	1.415	1.367	1.405	1.395	1.357	1.309	1.386	1.328
yt rata-rata	gr/cm ³	1.497													
yd rata-rata	gr/cm ³	1.380													

Lampiran 7

Hasil Analisis Uji Geser Langsung (*Direct Shear*)

1. Dinding celah 1 cm

Lapisan 2

Kalibrasi alat = 0,358

Diameter sampel = 6 cm

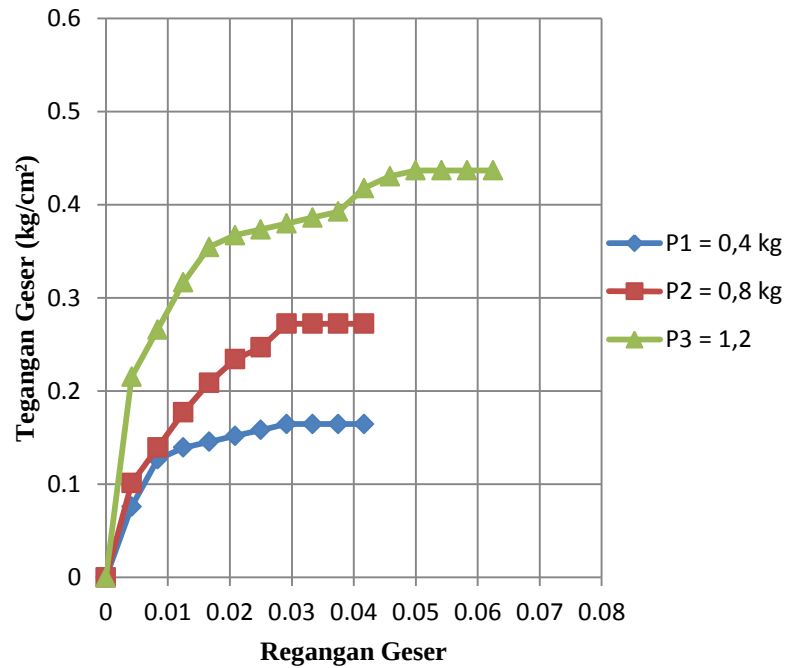
Tinggi sampel = 2 cm

Luas sampel = 28,274 cm²

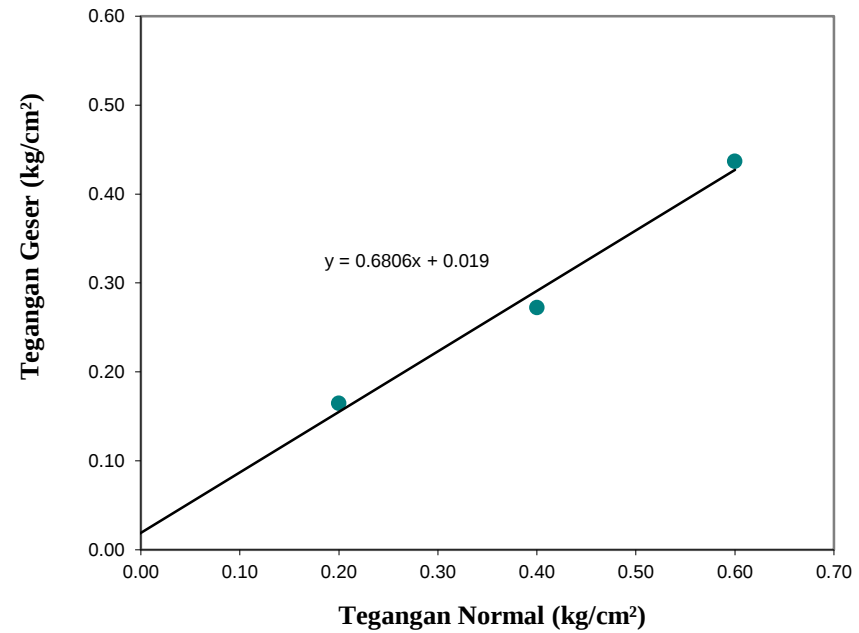
Faktor lengan (*level ratio*) = 14,14

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan Panjang (mm)	Regangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser	Pembacaan Dial	Gaya Geser	Tegangan Geser
0	0	0	0	0	0	0	0	0	0	0
0.25	0.0042	6.0	2.1480	0.0760	8.0	2.8640	0.1013	17.0	6.0860	0.2153
0.5	0.0083	10.0	3.5800	0.1266	11.0	3.9380	0.1393	21.0	7.5180	0.2659
0.75	0.0125	11.0	3.9380	0.1393	14.0	5.0120	0.1773	25.0	8.9500	0.3165
1	0.0167	11.5	4.1170	0.1456	16.5	5.9070	0.2089	28.0	10.0240	0.3545
1.25	0.0208	12.0	4.2960	0.1519	18.5	6.6230	0.2342	29.0	10.3820	0.3672
1.5	0.0250	12.5	4.4750	0.1583	19.5	6.9810	0.2469	29.5	10.5610	0.3735
1.75	0.0292	13.0	4.6540	0.1646	21.5	7.6970	0.2722	30.0	10.7400	0.3799
2	0.0333	13.0	4.6540	0.1646	21.5	7.6970	0.2722	30.5	10.9190	0.3862
2.25	0.0375	13.0	4.6540	0.1646	21.5	7.6970	0.2722	31.0	11.0980	0.3925
2.5	0.0417	13.0	4.6540	0.1646	21.5	7.6970	0.2722	33.0	11.8140	0.4178
2.75	0.0458							34.0	12.1720	0.4305
3	0.0500							34.5	12.3510	0.4368
3.25	0.0542							34.5	12.3510	0.4368
3.5	0.058333333							34.5	12.3510	0.4368
3.75	0.0625							34.5	12.3510	0.4368

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,019 \text{ kg/cm}^2$

$\phi = 34,24^\circ$

Lapisan 4

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

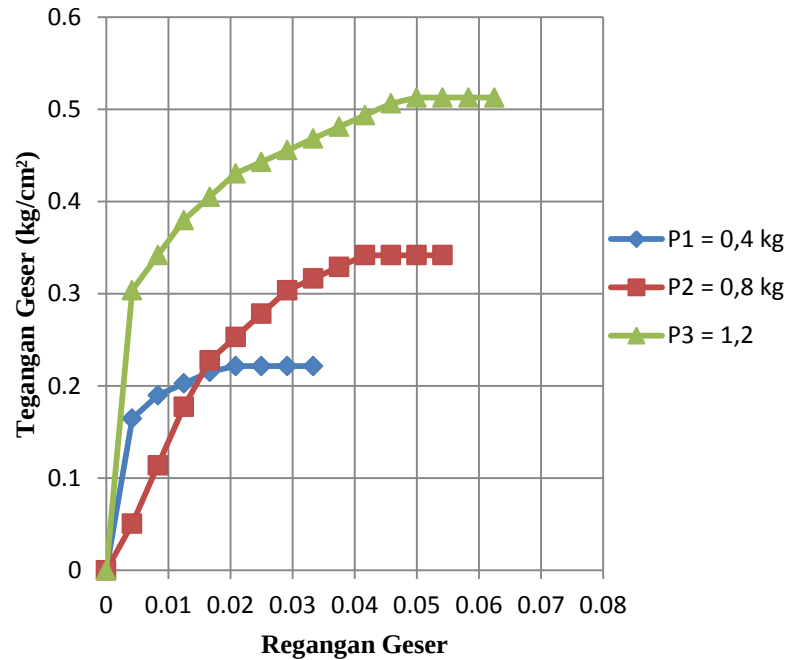
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

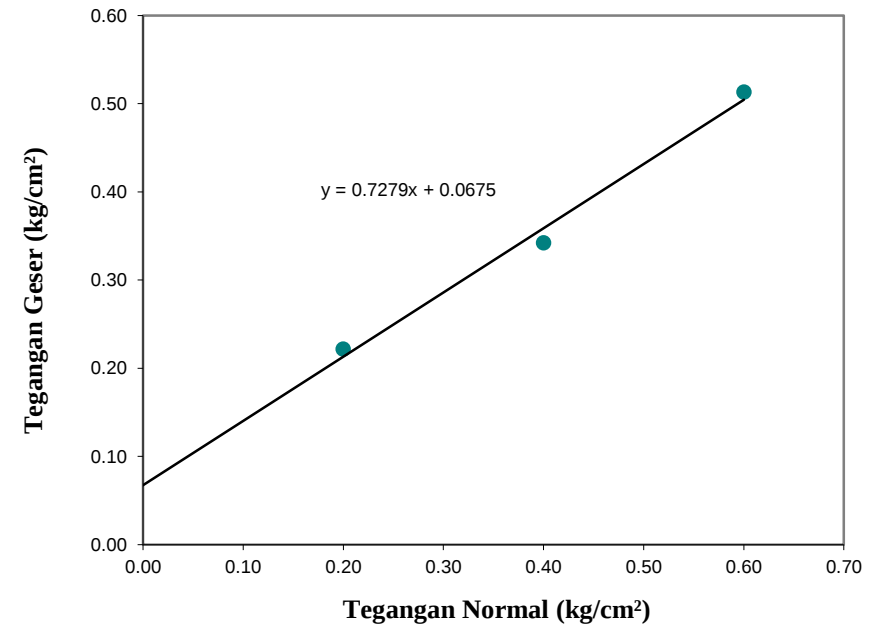
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0	0	0	0	0	0	0	0	0	0
0.25	0.0042	13.0	4.6540	0.1646	4.0	1.4320	0.0506	24.0	8.5920	0.3039
0.5	0.0083	15.0	5.3700	0.1899	9.0	3.2220	0.1140	27.0	9.6660	0.3419
0.75	0.0125	16.0	5.7280	0.2026	14.0	5.0120	0.1773	30.0	10.7400	0.3799
1	0.0167	17.0	6.0860	0.2153	18.0	6.4440	0.2279	32.0	11.4560	0.4052
1.25	0.0208	17.5	6.2650	0.2216	20.0	7.1600	0.2532	34.0	12.1720	0.4305
1.5	0.0250	17.5	6.2650	0.2216	22.0	7.8760	0.2786	35.0	12.5300	0.4432
1.75	0.0292	17.5	6.2650	0.2216	24.0	8.5920	0.3039	36.0	12.8880	0.4558
2	0.0333	17.5	6.2650	0.2216	25.0	8.9500	0.3165	37.0	13.2460	0.4685
2.25	0.0375				26.0	9.3080	0.3292	38.0	13.6040	0.4811
2.5	0.0417				27.0	9.6660	0.3419	39.0	13.9620	0.4938
2.75	0.0458				27.0	9.6660	0.3419	40.0	14.3200	0.5065
3	0.0500				27.0	9.6660	0.3419	40.5	14.4990	0.5128
3.25	0.0542				27.0	9.6660	0.3419	40.5	14.4990	0.5128
3.5	0.0583							40.5	14.4990	0.5128
3.75	0.0625							40.5	14.4990	0.5128

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,0675 \text{ kg/cm}^2$

$\phi = 36,05^\circ$

Lapisan 6

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

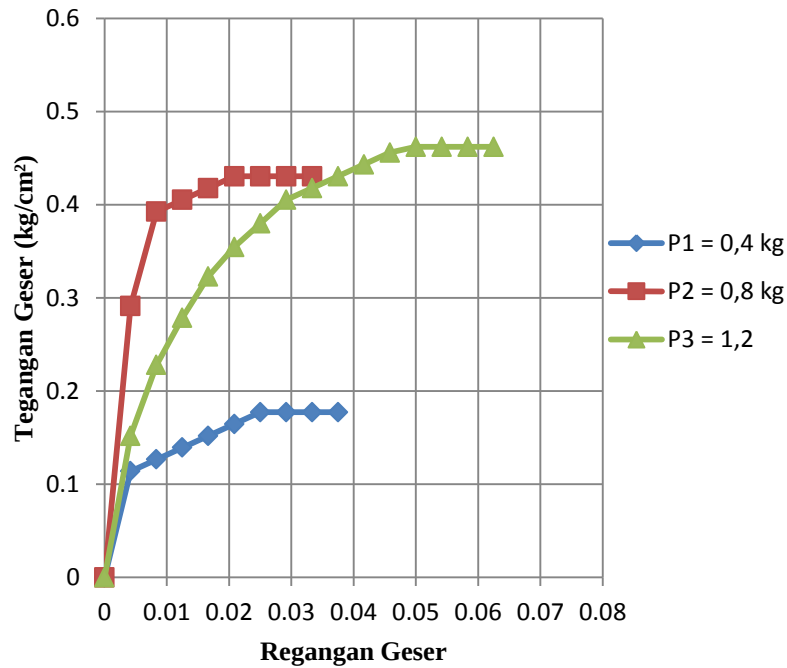
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

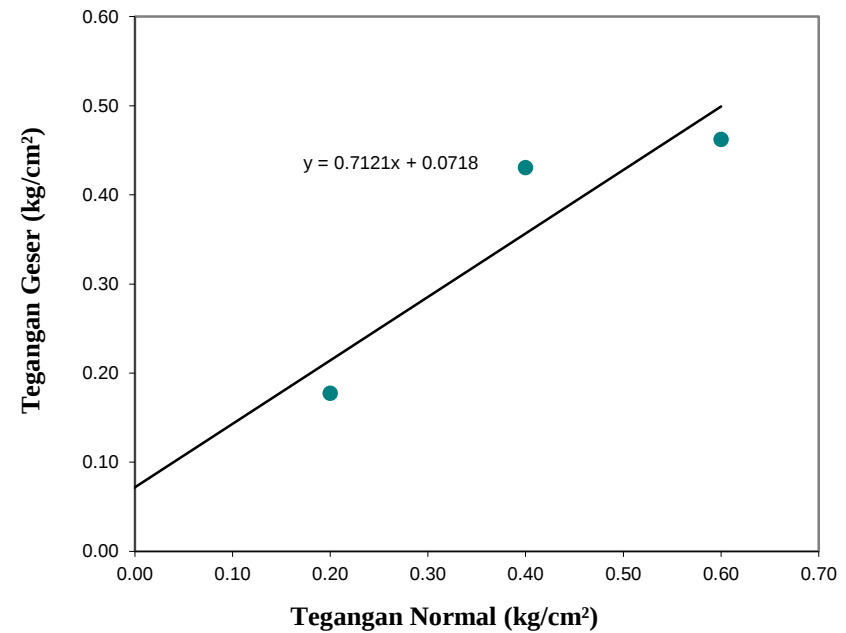
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0	0	0	0	0	0	0	0	0	0
0.25	0.0042	9.0	3.2220	0.1140	23.0	8.2340	0.2912	12.0	4.2960	0.1519
0.5	0.0083	10.0	3.5800	0.1266	31.0	11.0980	0.3925	18.0	6.4440	0.2279
0.75	0.0125	11.0	3.9380	0.1393	32.0	11.4560	0.4052	22.0	7.8760	0.2786
1	0.0167	12.0	4.2960	0.1519	33.0	11.8140	0.4178	25.5	9.1290	0.3229
1.25	0.0208	13.0	4.6540	0.1646	34.0	12.1720	0.4305	28.0	10.0240	0.3545
1.5	0.0250	14.0	5.0120	0.1773	34.0	12.1720	0.4305	30.0	10.7400	0.3799
1.75	0.0292	14.0	5.0120	0.1773	34.0	12.1720	0.4305	32.0	11.4560	0.4052
2	0.0333	14.0	5.0120	0.1773	34.0	12.1720	0.4305	33.0	11.8140	0.4178
2.25	0.0375	14.0	5.0120	0.1773				34.0	12.1720	0.4305
2.5	0.0417							35.0	12.5300	0.4432
2.75	0.0458							36.0	12.8880	0.4558
3	0.0500							36.5	13.0670	0.4622
3.25	0.0542							36.5	13.0670	0.4622
3.5	0.0583							36.5	13.0670	0.4622
3.75	0.0625							36.5	13.0670	0.4622

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,0718 \text{ kg/cm}^2$

$\phi = 35,45^\circ$

2. Dinding celah 1,5 cm

Lapisan 2

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

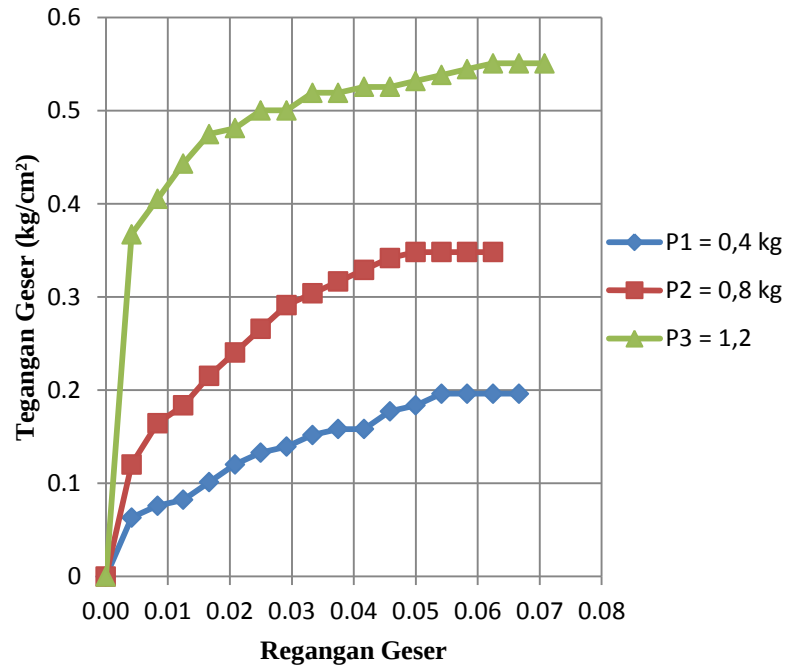
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

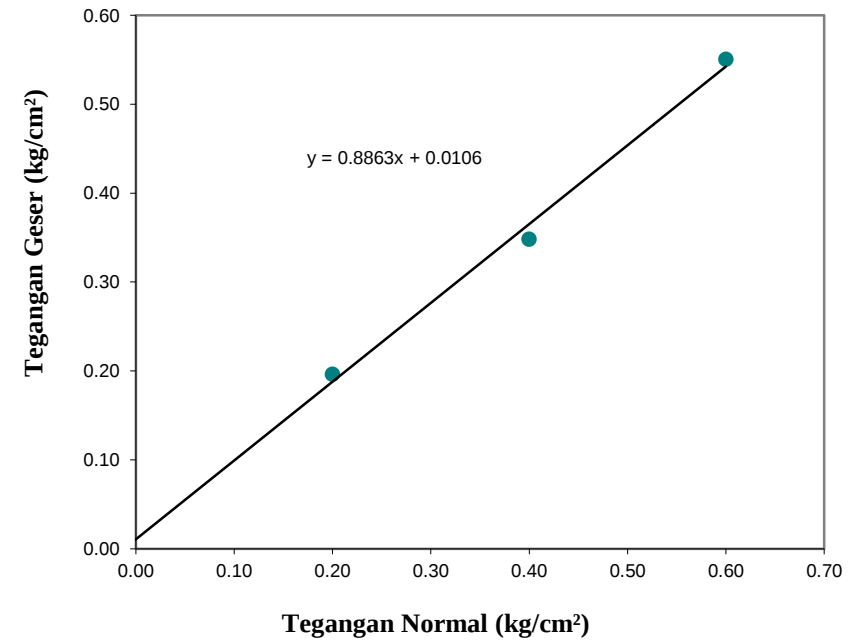
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0.0000	0	0	0	0	0	0	0	0	0
0.25	0.0042	5.0	1.7900	0.0633	9.5	3.4010	0.1203	29.0	10.3820	0.3672
0.5	0.0083	6.0	2.1480	0.0760	13.0	4.6540	0.1646	32.0	11.4560	0.4052
0.75	0.0125	6.5	2.3270	0.0823	14.5	5.1910	0.1836	35.0	12.5300	0.4432
1	0.0167	8.0	2.8640	0.1013	17.0	6.0860	0.2153	37.5	13.4250	0.4748
1.25	0.0208	9.5	3.4010	0.1203	19.0	6.8020	0.2406	38.0	13.6040	0.4811
1.5	0.0250	10.5	3.7590	0.1329	21.0	7.5180	0.2659	39.5	14.1410	0.5001
1.75	0.0292	11.0	3.9380	0.1393	23.0	8.2340	0.2912	39.5	14.1410	0.5001
2	0.0333	12.0	4.2960	0.1519	24.0	8.5920	0.3039	41.0	14.6780	0.5191
2.25	0.0375	12.5	4.4750	0.1583	25.0	8.9500	0.3165	41.0	14.6780	0.5191
2.5	0.0417	12.5	4.4750	0.1583	26.0	9.3080	0.3292	41.5	14.8570	0.5255
2.75	0.0458	14.0	5.0120	0.1773	27.0	9.6660	0.3419	41.5	14.8570	0.5255
3	0.0500	14.5	5.1910	0.1836	27.5	9.8450	0.3482	42.0	15.0360	0.5318
3.25	0.0542	15.5	5.5490	0.1963	27.5	9.8450	0.3482	42.5	15.2150	0.5381
3.5	0.0583	15.5	5.5490	0.1963	27.5	9.8450	0.3482	43.0	15.3940	0.5445
3.75	0.0625	15.5	5.5490	0.1963	27.5	9.8450	0.3482	43.5	15.5730	0.5508
4	0.0667	15.5	5.5490	0.1963				43.5	15.5730	0.5508
4.25	0.0708							43.5	15.5730	0.5508
4.5	0.0750							43.5	15.5730	0.5508

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,0106 \text{ kg/cm}^2$

$\phi = 41,55^\circ$

Lapisan 4

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

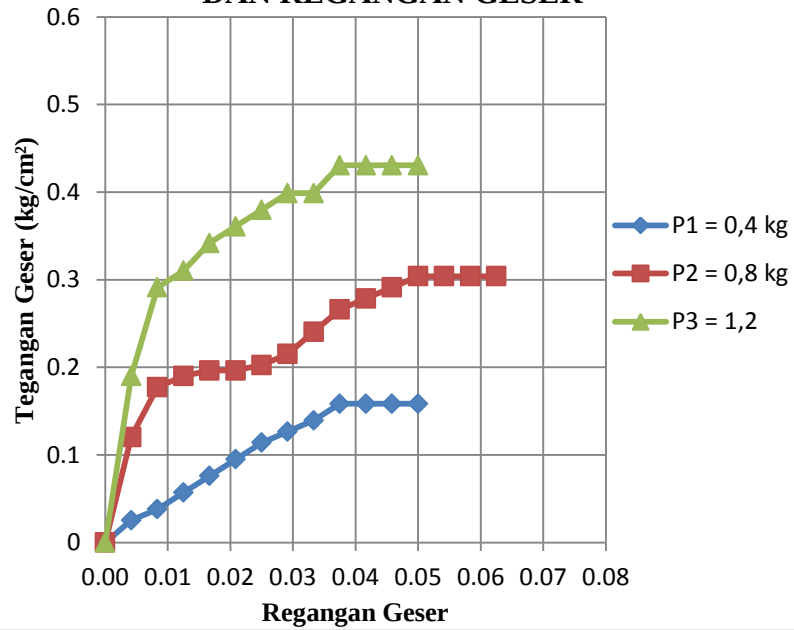
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

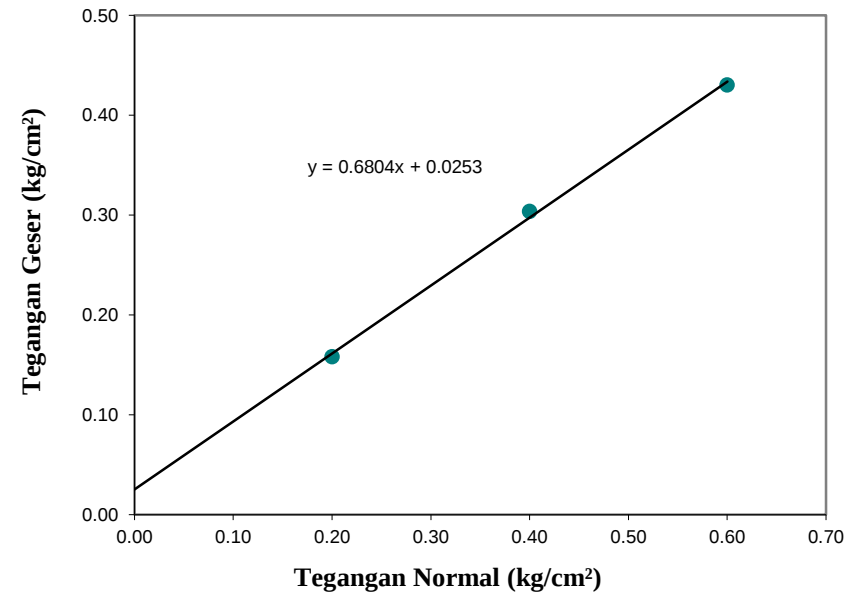
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0.0000	0	0	0	0	0	0	0	0	0
0.25	0.0042	2.0	0.7160	0.0253	9.5	3.4010	0.1203	15.0	5.3700	0.1899
0.5	0.0083	3.0	1.0740	0.0380	14.0	5.0120	0.1773	23.0	8.2340	0.2912
0.75	0.0125	4.5	1.6110	0.0570	15.0	5.3700	0.1899	24.5	8.7710	0.3102
1	0.0167	6.0	2.1480	0.0760	15.5	5.5490	0.1963	27.0	9.6660	0.3419
1.25	0.0208	7.5	2.6850	0.0950	15.5	5.5490	0.1963	28.5	10.2030	0.3609
1.5	0.0250	9.0	3.2220	0.1140	16.0	5.7280	0.2026	30.0	10.7400	0.3799
1.75	0.0292	10.0	3.5800	0.1266	17.0	6.0860	0.2153	31.5	11.2770	0.3988
2	0.0333	11.0	3.9380	0.1393	19.0	6.8020	0.2406	31.5	11.2770	0.3988
2.25	0.0375	12.5	4.4750	0.1583	21.0	7.5180	0.2659	34.0	12.1720	0.4305
2.5	0.0417	12.5	4.4750	0.1583	22.0	7.8760	0.2786	34.0	12.1720	0.4305
2.75	0.0458	12.5	4.4750	0.1583	23.0	8.2340	0.2912	34.0	12.1720	0.4305
3	0.0500	12.5	4.4750	0.1583	24.0	8.5920	0.3039	34.0	12.1720	0.4305
3.25	0.0542				24.0	8.5920	0.3039			
3.5	0.0583				24.0	8.5920	0.3039			
3.75	0.0625				24.0	8.5920	0.3039			

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,0253 \text{ kg/cm}^2$

$\phi = 34,23^\circ$

Lapisan 6

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

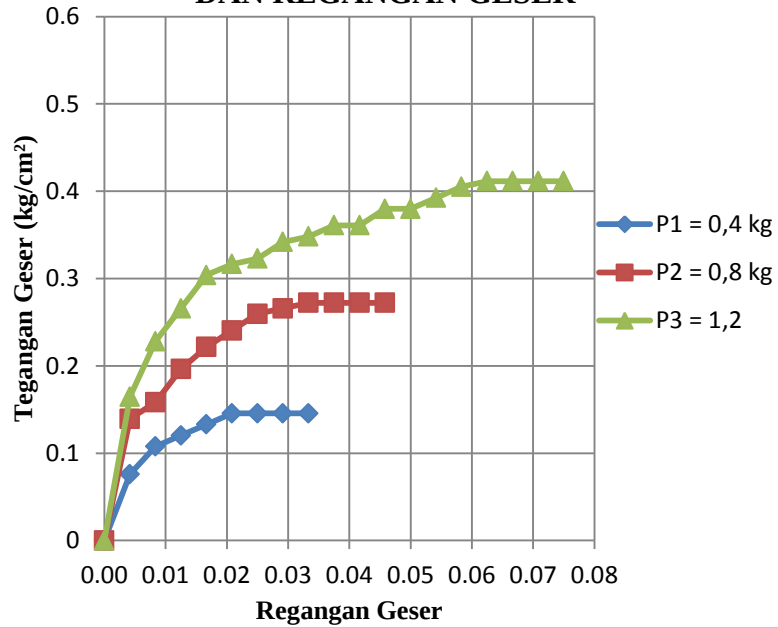
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

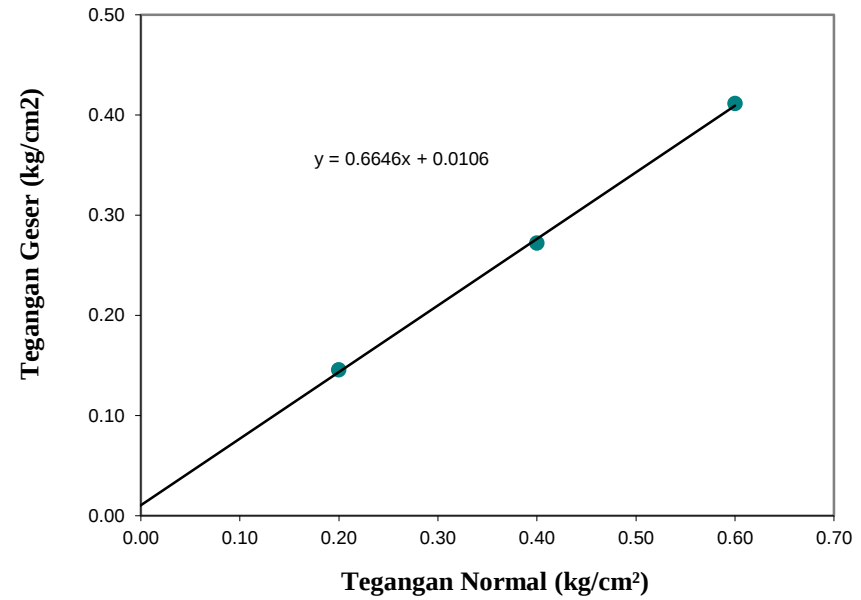
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0.0000	0	0	0	0	0	0	0	0	0
0.25	0.0042	6.0	2.1480	0.0760	11.0	3.9380	0.1393	13.0	4.6540	0.1646
0.5	0.0083	8.5	3.0430	0.1076	12.5	4.4750	0.1583	18.0	6.4440	0.2279
0.75	0.0125	9.5	3.4010	0.1203	15.5	5.5490	0.1963	21.0	7.5180	0.2659
1	0.0167	10.5	3.7590	0.1329	17.5	6.2650	0.2216	24.0	8.5920	0.3039
1.25	0.0208	11.5	4.1170	0.1456	19.0	6.8020	0.2406	25.0	8.9500	0.3165
1.5	0.0250	11.5	4.1170	0.1456	20.5	7.3390	0.2596	25.5	9.1290	0.3229
1.75	0.0292	11.5	4.1170	0.1456	21.0	7.5180	0.2659	27.0	9.6660	0.3419
2	0.0333	11.5	4.1170	0.1456	21.5	7.6970	0.2722	27.5	9.8450	0.3482
2.25	0.0375				21.5	7.6970	0.2722	28.5	10.2030	0.3609
2.5	0.0417				21.5	7.6970	0.2722	28.5	10.2030	0.3609
2.75	0.0458				21.5	7.6970	0.2722	30.0	10.7400	0.3799
3	0.0500							30.0	10.7400	0.3799
3.25	0.0542							31.0	11.0980	0.3925
3.5	0.0583							32.0	11.4560	0.4052
3.75	0.0625							32.5	11.6350	0.4115
4	0.0667							32.5	11.6350	0.4115
4.25	0.0708							32.5	11.6350	0.4115
4.5	0.0750							32.5	11.6350	0.4115

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,0106 \text{ kg/cm}^2$

$\phi = 33,61^\circ$

3. Dinding celah 2 cm

Lapisan 2

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

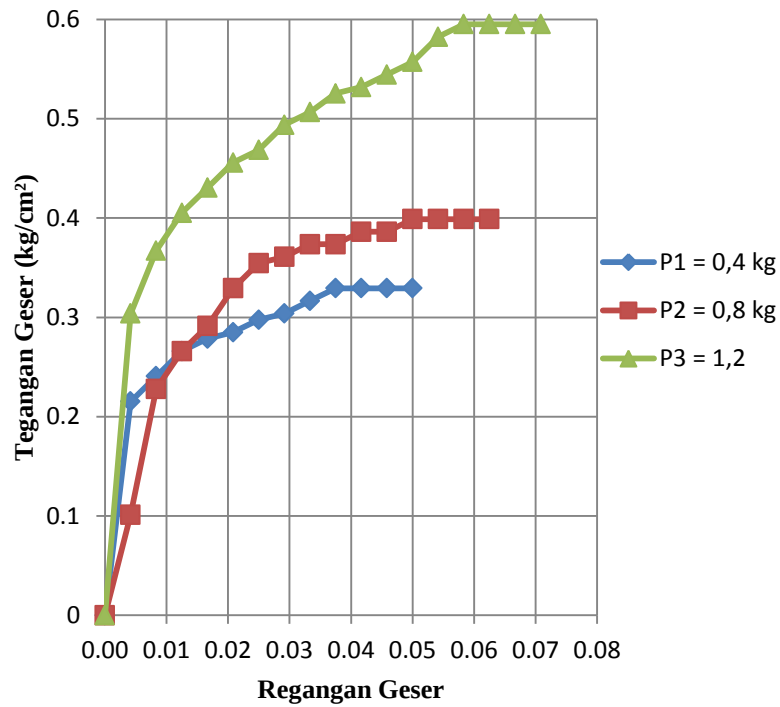
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

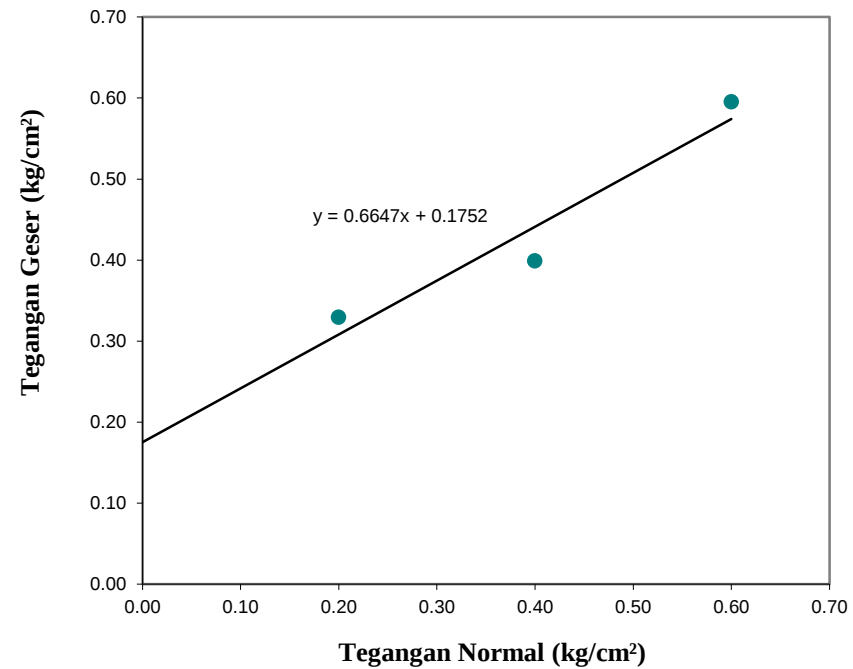
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0.0000	0	0	0	0	0	0	0	0	0
0.25	0.0042	17.0	6.0860	0.2153	8.0	2.8640	0.1013	24.0	8.5920	0.3039
0.5	0.0083	19.0	6.8020	0.2406	18.0	6.4440	0.2279	29.0	10.3820	0.3672
0.75	0.0125	21.0	7.5180	0.2659	21.0	7.5180	0.2659	32.0	11.4560	0.4052
1	0.0167	22.0	7.8760	0.2786	23.0	8.2340	0.2912	34.0	12.1720	0.4305
1.25	0.0208	22.5	8.0550	0.2849	26.0	9.3080	0.3292	36.0	12.8880	0.4558
1.5	0.0250	23.5	8.4130	0.2976	28.0	10.0240	0.3545	37.0	13.2460	0.4685
1.75	0.0292	24.0	8.5920	0.3039	28.5	10.2030	0.3609	39.0	13.9620	0.4938
2	0.0333	25.0	8.9500	0.3165	29.5	10.5610	0.3735	40.0	14.3200	0.5065
2.25	0.0375	26.0	9.3080	0.3292	29.5	10.5610	0.3735	41.5	14.8570	0.5255
2.5	0.0417	26.0	9.3080	0.3292	30.5	10.9190	0.3862	42.0	15.0360	0.5318
2.75	0.0458	26.0	9.3080	0.3292	30.5	10.9190	0.3862	43.0	15.3940	0.5445
3	0.0500	26.0	9.3080	0.3292	31.5	11.2770	0.3988	44.0	15.7520	0.5571
3.25	0.0542				31.5	11.2770	0.3988	46.0	16.4680	0.5824
3.5	0.0583				31.5	11.2770	0.3988	47.0	16.8260	0.5951
3.75	0.0625				31.5	11.2770	0.3988	47.0	16.8260	0.5951
4	0.0667							47.0	16.8260	0.5951
4.25	0.0708							47.0	16.8260	0.5951

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,1752 \text{ kg/cm}^2$

$\phi = 33,61^\circ$

Lapisan 4

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

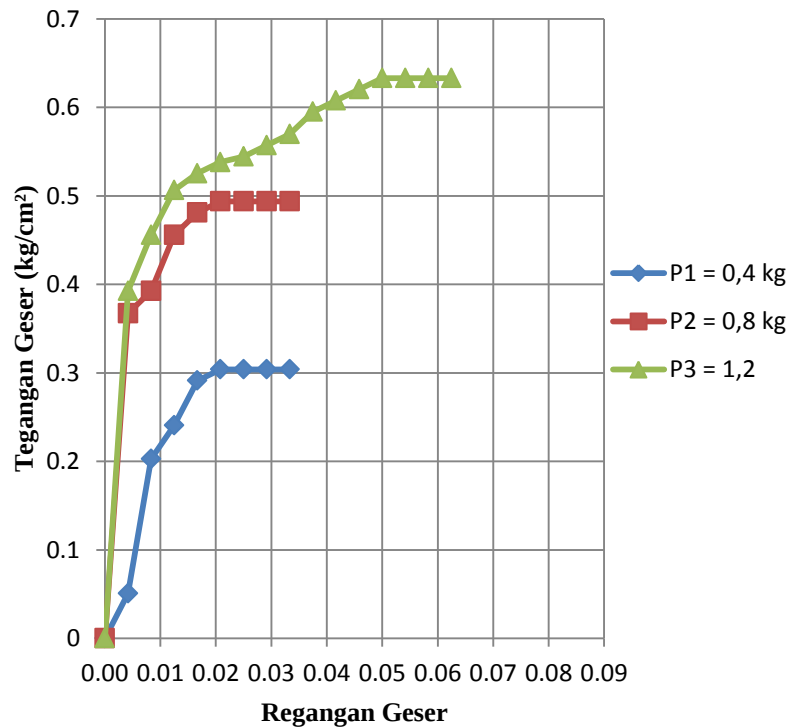
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

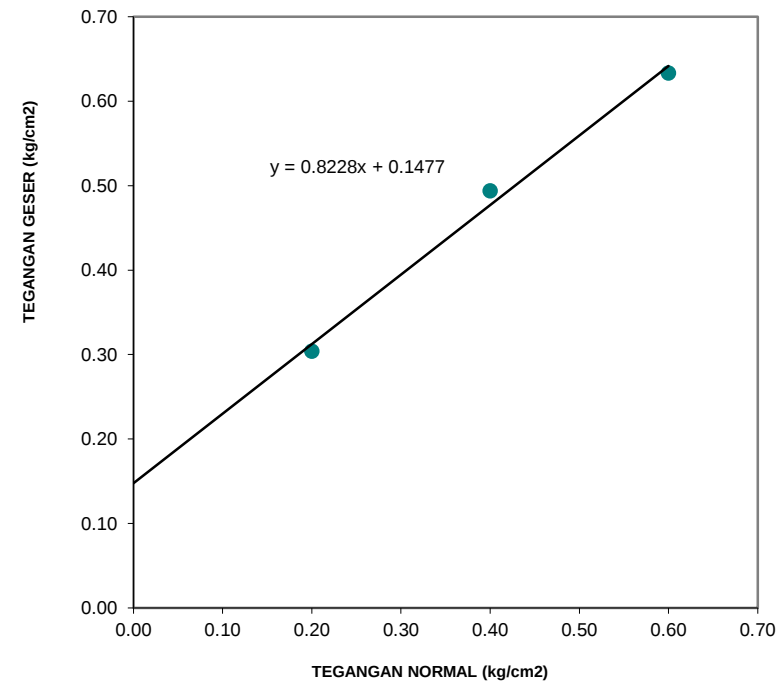
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0.0000	0	0	0	0	0	0	0	0	0
0.25	0.0042	4.0	1.4320	0.0506	29.0	10.3820	0.3672	31.0	11.0980	0.3925
0.5	0.0083	16.0	5.7280	0.2026	31.0	11.0980	0.3925	36.0	12.8880	0.4558
0.75	0.0125	19.0	6.8020	0.2406	36.0	12.8880	0.4558	40.0	14.3200	0.5065
1	0.0167	23.0	8.2340	0.2912	38.0	13.6040	0.4811	41.5	14.8570	0.5255
1.25	0.0208	24.0	8.5920	0.3039	39.0	13.9620	0.4938	42.5	15.2150	0.5381
1.5	0.0250	24.0	8.5920	0.3039	39.0	13.9620	0.4938	43.0	15.3940	0.5445
1.75	0.0292	24.0	8.5920	0.3039	39.0	13.9620	0.4938	44.0	15.7520	0.5571
2	0.0333	24.0	8.5920	0.3039	39.0	13.9620	0.4938	45.0	16.1100	0.5698
2.25	0.0375							47.0	16.8260	0.5951
2.5	0.0417							48.0	17.1840	0.6078
2.75	0.0458							49.0	17.5420	0.6204
3	0.0500							50.0	17.9000	0.6331
3.25	0.0542							50.0	17.9000	0.6331
3.5	0.0583							50.0	17.9000	0.6331
3.75	0.0625							50.0	17.9000	0.6331

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,1477 \text{ kg/cm}^2$

$\phi = 39,48^\circ$

Lapisan 6

Kalibrasi alat = 0,358

Tinggi sampel = 2 cm

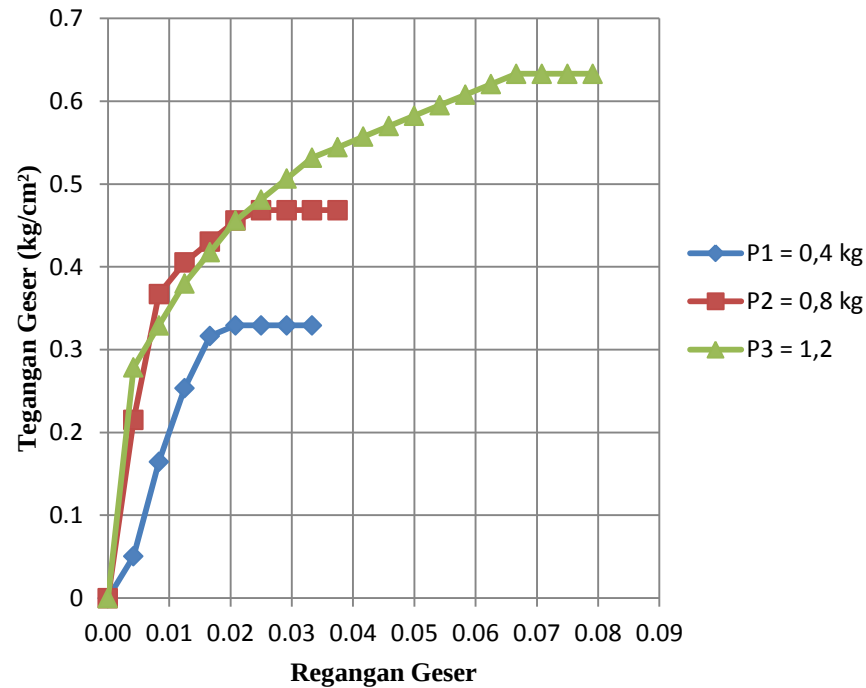
Faktor lengan (*level ratio*) = 14,14

Diameter sampel = 6 cm

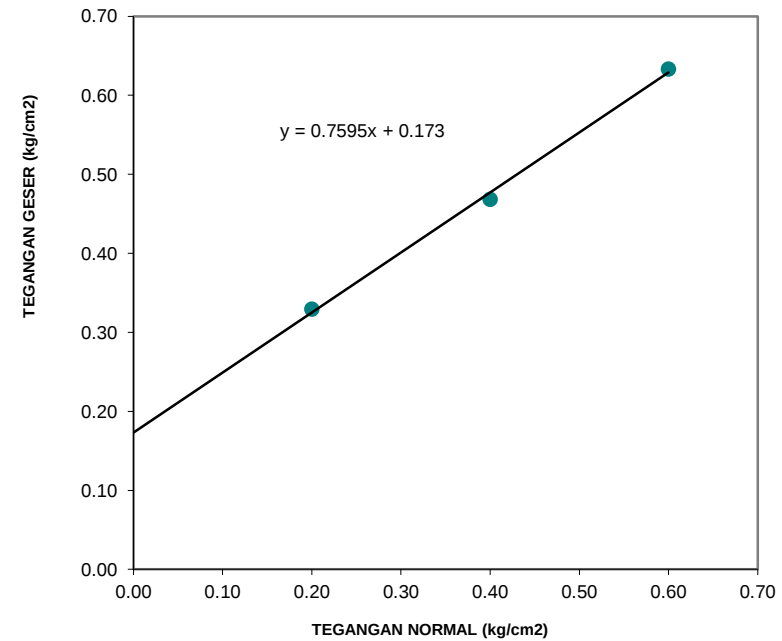
Luas sampel = 28,274 cm²

Beban Normal		P ₁ = 0.4 kg			P ₂ = 0.8 kg			P ₃ = 1.2 kg		
Tegangan Normal		σ ₁ = 0.20 kg/cm ²			σ ₂ = 0.40 kg/cm ²			σ ₃ = 0.60 kg/cm ²		
Penambahan	Regangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan	Pembacaan	Gaya	Tegangan
Panjang (mm)	Geser	Dial	Geser	Geser	Dial	Geser	Geser	Dial	Geser	Geser
0	0.0000	0	0	0	0	0	0	0	0	0
0.25	0.0042	4.0	1.4320	0.0506	17.0	6.0860	0.2153	22.0	7.8760	0.2786
0.5	0.0083	13.0	4.6540	0.1646	29.0	10.3820	0.3672	26.0	9.3080	0.3292
0.75	0.0125	20.0	7.1600	0.2532	32.0	11.4560	0.4052	30.0	10.7400	0.3799
1	0.0167	25.0	8.9500	0.3165	34.0	12.1720	0.4305	33.0	11.8140	0.4178
1.25	0.0208	26.0	9.3080	0.3292	36.0	12.8880	0.4558	36.0	12.8880	0.4558
1.5	0.0250	26.0	9.3080	0.3292	37.0	13.2460	0.4685	38.0	13.6040	0.4811
1.75	0.0292	26.0	9.3080	0.3292	37.0	13.2460	0.4685	40.0	14.3200	0.5065
2	0.0333	26.0	9.3080	0.3292	37.0	13.2460	0.4685	42.0	15.0360	0.5318
2.25	0.0375				37.0	13.2460	0.4685	43.0	15.3940	0.5445
2.5	0.0417							44.0	15.7520	0.5571
2.75	0.0458							45.0	16.1100	0.5698
3	0.0500							46.0	16.4680	0.5824
3.25	0.0542							47.0	16.8260	0.5951
3.5	0.0583							48.0	17.1840	0.6078
3.75	0.0625							49.0	17.5420	0.6204
4	0.0667							50.0	17.9000	0.6331
4.25	0.0708							50.0	17.9000	0.6331
4.5	0.0750							50.0	17.9000	0.6331
4.75	0.0792							50.0	17.9000	0.6331

GRAFIK HUBUNGAN TEGANGAN GESER DAN REGANGAN GESER



TEGANGAN GESER DAN NORMAL



$C = 0,173 \text{ kg/cm}^2$

$\phi = 37,22^\circ$

Lampiran 8

Tabel Data Analisis Lendutan Pada Dinding Bercelah 1cm (δ_1) ; 1,5 cm (δ_2); dan 2 cm (δ_3) (Alfin Suprayugo, 2013)

Beban (kg)	δ_1 (mm)	δ_2 (mm)	δ_3 (mm)
25	0.09	0.115	0.050
50	0.235	0.255	0.100
75	0.465	0.435	0.150
100	0.645	0.635	0.220
125	1.07	0.890	0.285
150	1.26	1.180	0.395
175	1.59	1.545	0.595
200	1.815	1.910	0.765

Besarnya kekakuan pada dinding :

$$K_1 = \frac{P}{\delta_1} = \frac{200}{1,815} = 110,193 \text{ kg/cm}$$

$$K_2 = \frac{P}{\delta_2} = \frac{200}{1,910} = 104,712 \text{ kg/cm}$$

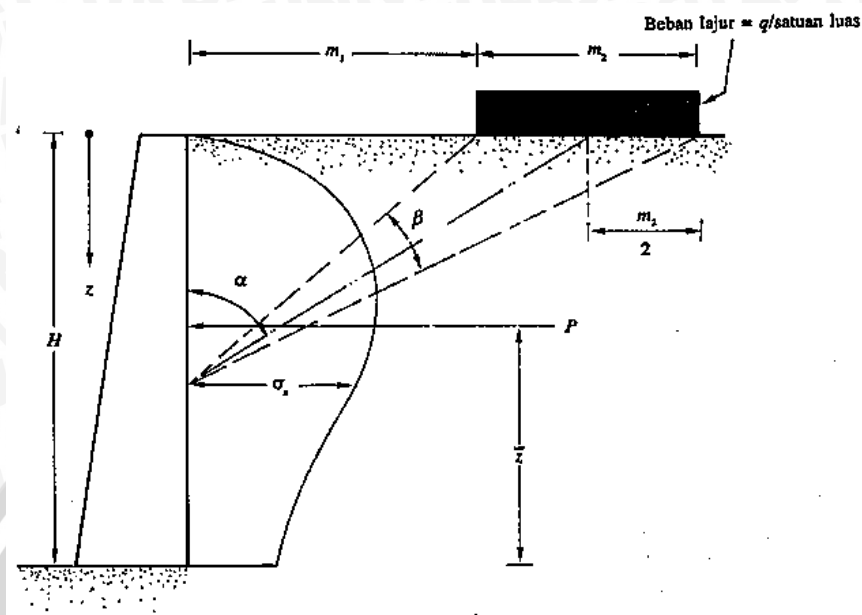
$$K_3 = \frac{P}{\delta_3} = \frac{200}{0,765} = 261,438 \text{ kg/cm}$$



Lampiran 9

Deformasi Lateral Secara Analitis

- Beban Luar



Beban luar = 200 kg

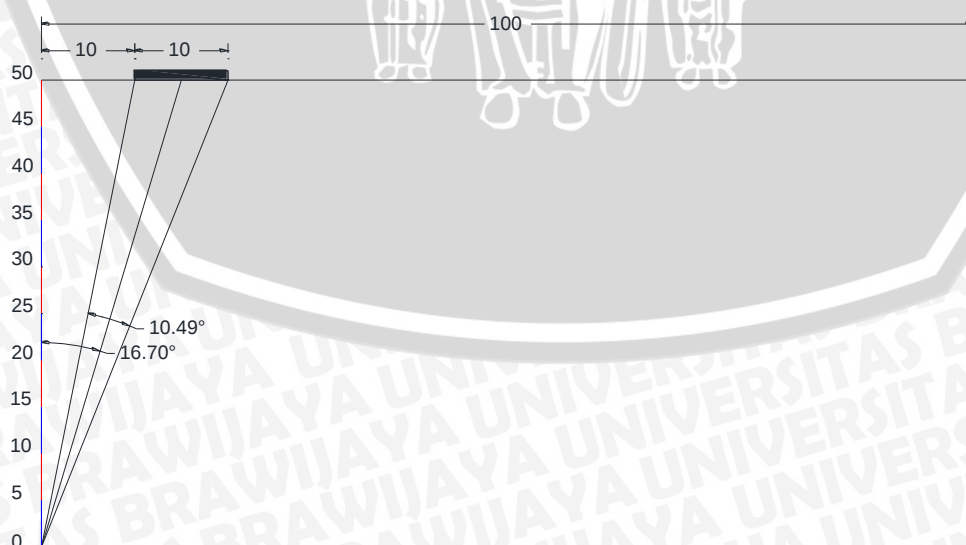
Ukuran pondasi = 98 cm x 10 cm

Sehingga beban lajur $q = \frac{200}{98 \times 10} = 0,2041 \text{ kg/cm}^2$

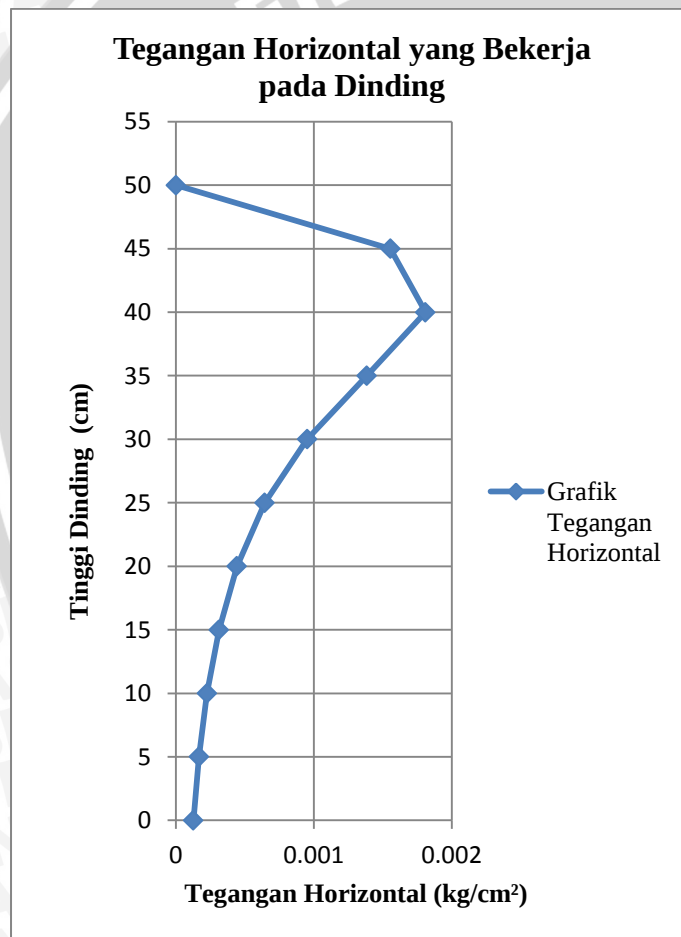
Tinggi dinding (H) = 50 cm

Tegangan horizontal tiap H = 5 cm

$$\sigma_x = \frac{q}{H} (\beta - \sin \beta \cos 2\alpha)$$



H (cm)	α (°)	β (°)	σ_x (kg/cm ²)
0	16.7	10.5	0.00013
5	18.4	11.4	0.00017
10	20.6	12.5	0.00023
15	23.2	13.8	0.00031
20	26.6	15.3	0.00044
25	31	16.9	0.00064
30	36.9	18.4	0.00095
35	45	19.4	0.00138
40	56.3	18.4	0.00181
45	71.6	12.2	0.00156
50	0	0	0



Interval Tinggi Dinding (cm)	Luas (kg/cm)
0 - 5	0.00073
5 - 10	0.00098
10 - 15	0.00134
15 - 20	0.00189
20 - 25	0.00272
25 - 30	0.00399
30 - 35	0.00584
35 - 40	0.00799
40 - 45	0.00841
45 - 50	0.00389
Total	0.03778

- Gaya P per satuan lebar dinding dari distribusi tekanan arah horizontal = 0,03778 kg/cm

Maka $P = 0,03778 \times 98 = 3,702 \text{ kg}$

- Deformasi:

$$\delta_1 = \frac{P}{K_1} = \frac{3,702}{110,193} = 0,0336 \text{ cm} = 0,336 \text{ mm}$$

$$\delta_2 = \frac{P}{K_2} = \frac{3,702}{104,712} = 0,0354 \text{ cm} = 0,354 \text{ mm}$$

$$\delta_3 = \frac{P}{K_3} = \frac{3,702}{261,438} = 0,0142 \text{ cm} = 0,142 \text{ mm}$$

Lampiran 10

Analisis Debit Aliran Air Secara Analitis dan Aktual

Dimensi galon:

Diameter : 26 cm

Tinggi : 50 cm

Tinggi air : 30 cm

Diameter kran : 1 cm

Kecepatan air yang keluar dari galon:

$$g = 9,8 \text{ m/detik}^2$$

$$V = \sqrt{2gh}$$

$$= \sqrt{2 \cdot 9,8 \cdot 0,3}$$

$$= 2,425 \text{ m/detik}$$

$$= 2425 \text{ mm/detik}$$

Debit air yang keluar dari galon:

$$Q = A \cdot V$$

$$= (1/4 \cdot \pi \cdot d^2) \cdot V$$

$$= (1/4 \cdot \pi \cdot 10^2) \cdot 2425$$

$$= 190459,055 \text{ mm}^3/\text{detik}$$

Intensitas hujan rencana yang turun:

$$I = Q/A_{\text{area}}$$

$$= 190459,055/(980 \cdot 970)$$

$$= 0,200 \text{ mm/detik}$$

$$= 720 \text{ mm/jam}$$

Debit aktual air yang keluar dari galon:

$$Q = 1000 \text{ ml}/13\text{detik} = 1000000 \text{ mm}^3/13\text{detik} = 76923,07692 \text{ mm}^3/\text{detik}$$

Intensitas hujan yang turun:

$$I = Q/A_{\text{area}}$$

$$= 76923,07692/(980 \cdot 970)$$

$$= 0,08 \text{ mm/detik}$$

$$= 288 \text{ mm/jam}$$

