JADWAL PENELITIAN TUGAS AKHIR

No	Uraian	Nop-13				Des-13				Jan-14				Feb-14				Mar-14				Apr-14				Mei-14				Jun-14			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
1	pengambilan sampel tanah																																
2	Penyusunan Proposal																																
3	Presentasi Proposal																																
4	Revisi Proposal																																
5	Uji Laboratorium																																
6	Penyusunan Draft Penelitian																																
7	Presentasi Draft Penelitian																																
8	Revisi Draft																																
9	Ujian Tugas Akhir																																

LAMPIRAN 1

INDEKS PROPERTIES

1. Berat isi tanah (γ)
2. Kadar air (w)
3. Berat Jenis Tanah (Gs)

BERAT ISI TANAH (Y)

BERAT ISI TANAH							
Penambahan Kapur	0% Kapur				5% Kapur	10% Kapur	15% Kapur
	BOR I 1meter	BOR I 2,5meter	BOR II 1meter	BOR II 2,5meter			
Tinggi ring, t (cm)	1	1	1	1	1	1	1
Diameter ring, d (cm)	3	3	3	3	3	3	3
Volume ring, V (cm^3)	7,065	7,065	7,065	7,065	7,065	7,065	7,065
Berat ring, W_1 (gr)	16,6	17,2	16,1	15,5	17,2	15,4	16,6
Berat tanah basah + ring, W_2 (gr)	47,6	47,5	46,5	45,3	46,1	45,4	40
Berat tanah kering + ring, W_3 (gr)	40	39,8	40,7	40,2	40,7	40	36
Berat tanah basah, $W = W_2 - W_1$ (gr)	31	30,3	30,4	29,8	28,9	30	23,4
Berat tanah kering, $W_s = W_3 - W_1$ (gr)	23,4	22,6	24,6	24,7	23,5	24,6	19,4
Berat air, $W_w = W - W_s$ (gr)	7,6	7,7	5,8	5,1	5,4	5,4	4
Kadar air, $w = Ww/Ws \times 100\%$	32,48	34,07	23,58	20,65	22,98	21,95	20,62
Berat isi tanah basah, $\gamma = \frac{W}{V}$ (gr/cm^3)	4,60	4,82	3,34	2,92	3,25	3,11	2,92
Berat isi tanah kering, $\gamma_d = \frac{\gamma}{1+w}$ (gr/cm^3)	3,472	3,959	2,702	2,42	2,64	2,55	2,42
	3,13825						

Contoh Perhitungan Berat Isi Tanah

Tinggi ring,	t	=1 cm
Diameter ring,	d	= 3 cm
Volume ring,	V	$=\frac{1}{4} \times \pi \times d^2 \times t$
		$=\frac{1}{4} \times \pi \times 3^2 \times 1$
		$=7.065\ cm^3$
Berat ring,	W_1	= 16.6 gr
Berat tanah basah + ring,	W_2	= 47.6 gr
Berat tanah kering + ring,	W_3	= 40 gr
Berat tanah basah,	W	$= W_2 - W_1$
		$= 47.6 - 16.6$
		= 31 gr
Berat tanah kering,	W_s	$=W_3-W_1$
		= 40 – 16.6
		= 23.4 gr
Berat air,	W_w	$=W - W_s$
		= 31 – 23.4
		= 7.6 gr
Kadar air,	w	$= \frac{Ww}{Ws} \times 100\%$
		$=\frac{7.6}{23.4} \times 100\%$
		= 32.47%
Berat isi tanah basah,	γ	$= \frac{w}{V}$
		$=\frac{32.47}{7,065}$
		$= 4.59\ gr/cm^3$
Berat isi tanah kering,	γ_d	$= \frac{\gamma}{1+w}$
		$=\frac{4.59}{1+0.3247}$
		$= 3.47\ gr/cm^3$

KADAR AIR TANAH (w)

KADAR AIR TANAH							
Penambahan Kapur	0% Kapur				5% Kapur	10% Kapur	15% Kapur
	BOR I 1meter	BOR I 2,5meter	BOR II 1meter	BOR II 2,5meter			
Berat container, W_1 (gr)	106,5	103,9	69,1	70,2	78,6	82,3	79,3
Berat tanah basah + container, W_2 (gr)	539,9	463,4	315,7	299,7	308,3	324,4	289,4
Berat tanah kering + container, W_3 (gr)	426,3	371,1	251,8	251,5	255,1	268,9	244,2
Berat tanah basah, $W = W_2 - W_1$ (gr)	433,4	359,5	246,6	229,5	229,7	242,1	210,1
Berat tanah kering, $W_s = W_3 - W_1$ (gr)	319,8	267,2	182,7	181,3	176,5	186,6	164,9
Berat air, $W_w = W - W_s$ (gr)	113,6	92,3	63,9	48,2	53,2	55,5	45,2
Kadar air, $w = Ww/Ws \times 100\%$	35,52	34,54	34,98	26,59	30,14	29,74	27,41
	32,90668836						

KADAR AIR TANAH

Contoh Perhitungan Kadar Air Tanah

Berat Container ,	W_1	= 106.5 gr
Berat Tanah Basah+ Container,	W_2	= 539.9 gr
Berat Tanah Kering + Container,	W_3	= 426.2 gr
Berat Tanah Basah,	W	$= W_2 - W_1$
		= 539.9-106.5
		= 433.4 gr
Berat Tanah Kering,	W_s	$= W_3 - W_1$
		= 426.2-106.5
		= 319.8 gr
Berat air,	W_w	$= W - W_s$
		= 433,4-319.8
		= 113.6 gr
Kadar air,	w	$= \frac{W_w}{W_s} \times 100\%$
		$= \frac{113.6}{319.8} \times 100\%$
		= 35.52 %

UJI BERAT JENIS TANAH (Gs)

UJI BERAT JENIS TANAH										
LOKASI	Berat picnometer	Picnometer + tanah	Picnometer + tanah+ air	Picnometer + air	Suhu	Faktor Gt	Berat tanah kering	Berat Air	Gs	Rata - rata
Bor I-1 m	28,1	48,100	88,1	78,4	31	0,99627	20,000	50,300	1,949	2,005
Bor I - 2,5 m	30,9	50,900	89,7	80,6	30,5	0,99627	20,000	49,700	1,842	
Bor II-1 m	17,7	37,700	78,5	68,3	30,5	0,99627	20,000	50,600	2,048	
Bor II - 2,5 m	30,2	50,200	91,5	80,7	30	0,99627	20,000	50,500	2,182	
Penambahan kapur	Berat picnometer	Picnometer + tanah	Picnometer + tanah+ air	Picnometer + air	Suhu	Faktor Gt	Berat tanah kering	Berat Air	Gs	
Penambahan 5% kapur	31,4	51,4	92,1	80,8	30	0,99627	20,000	49,400	2,334	
Penambahan 10% kapur	17,7	37,7	80,6	68,4	30	0,99627	20,000	50,700	2,574	
Penambahan 15% kapur	29,3	49,3	93,6	80,8	30	0,99627	20,000	51,500	2,788	

BERAT JENIS TANAH

Contoh Perhitungan Berat Jenis Tanah

1. **Bor I kedalaman 1 m**

Berat picnometer = 28,1 gr

Picnometer + tanah = 48,1gr

Picnometer + tanah+ air = 88,1gr

Picnometer + air = 78,4gr

Berat tanah kering = 20 gr

Berat Air = Berat pic air – berat pic kosong

= 78,4 – 28,1

= 50.3 gr

FaktorGt = 0,99627

$$GS = \frac{\text{Berat Tanah Kering}}{\{(\text{Berat air} \times \text{Faktor Gt}) - (\text{Berat pikno tanah air} - \text{berat pikno} - \text{berat tanah kering}) \times \text{Faktor Gt}\}}$$

$$= \frac{20}{\{(50.3 \times 0.99598) - (88,1 - 28,1 - 20) \times 0.99598\}}$$

= 1,949

LAMPIRAN 2

Atteberg Limit

1. Batas Cair (LL)
2. Batas Plastis (PL)
3. Indek Plastisitas (IP)

Batas Cair (LL)

BATAS CAIR																
Sampel Tanah	Bor 1 -1 m				Bor 1- 2,5 m				Bor 2 - 1 m				Bor 1 - 2,5 m			
No. Uji	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
No. Container	1	2	3	4	1	2	3	4	1	2	3	4	2	1	3	4
Berat container, W_1 (gr)	12,3	12,4	4,9	4,5	4,5	4,5	4,9	4,6	4,6	4,6	11,6	12,2	4,8	4,7	4,7	4,6
Berat tanah basah + container, W_2 (gr)	15,1	15,1	7,1	8,7	8	8,8	9,5	10,1	8,1	7,9	17,1	16,7	8,8	7,3	9,6	8,3
Berat tanah kering + container, W_3 (gr)	14,2	14,2	6,3	7,1	7,1	7,6	8	8,1	7,1	6,9	15,2	15,1	7,6	6,5	7,9	6,9
Berat tanah basah, $W_4=W_2-W_1$ (gr)	2,8	2,7	2,2	4,2	3,5	4,3	4,6	5,5	3,5	3,3	5,5	4,5	4	2,6	4,9	3,7
Berat tanah kering, $W_5=W_3-W_1$ (gr)	1,9	1,8	1,4	2,6	2,6	3,1	3,1	3,5	2,5	2,3	3,6	2,9	2,8	1,8	3,2	2,3
Berat air, $W_6=W_4-W_5$ (gr)	0,9	0,9	0,8	1,6	0,9	1,2	1,5	2	1	1	1,9	1,6	1,2	0,8	1,7	1,4
Kadar air, w = (W6/W5) x 100	47,37	50,00	57,14	61,54	34,62	38,71	48,39	57,14	40,00	43,48	52,78	55,17	42,86	44,44	53,13	60,87
Jumlah ketukan, N	46	33	23	16	60	50	23	18	52	39	23	19	52	42	24	19
Batas Cair, w_L (%)	55,00				52,00				53,00				58,00			

Batas Cair (LL)

BATAS CAIR												
Sampel Tanah	5 % kapur				10 % kapur				15 % kapur			
No. Uji	1	2	3	4	1	2	3	4	1	2	3	4
No. Container	1	2	3	4	1	2	3	4	1	2	3	4
Berat container, W_1 (gr)	5	4,9	4,9	4,9	7,1	6,5	6,9	6,1	7,2	10,6	10,7	9,8
Berat tanah basah + container, W_2 (gr)	14,9	13,5	10,9	14,9	15,7	12,9	14,7	11	21,4	23,6	20	22,8
Berat tanah kering + container, W_3 (gr)	12,1	10,9	8,7	11,1	13,3	11	12,1	9,2	17,9	19,7	16,8	18,2
Berat tanah basah, $W_4=W_2-W_1$ (gr)	9,9	8,6	6	10	8,6	6,4	7,8	4,9	14,2	13	9,3	13
Berat tanah kering, $W_5=W_3-W_1$ (gr)	7,1	6	3,8	6,2	6,2	4,5	5,2	3,1	10,7	9,1	6,1	8,4
Berat air, $W_6=W_4-W_5$ (gr)	2,8	2,6	2,2	3,8	2,4	1,9	2,6	1,8	3,5	3,9	3,2	4,6
Kadar air, $w = (W_6/W_5)$ x 100	39,44	43,33	57,89	61,29	38,71	42,22	50,00	58,06	32,71	42,86	52,46	54,76
Jumlah ketukan, N	47	43	23	12	61	43	20	9	43	35	24	22
Batas Cair, w_L (%)	53,00				52,00				52,00			

Batas Cair (LL)

BATAS CAIR												
Sampel Tanah	5 % kapur				10 % kapur				15 % kapur			
No. Uji	1	2	3	4	1	2	3	4	1	2	3	4
No. Container	1	2	3	4	1	2	3	4	1	2	3	4
Berat container, W_1 (gr)	5	4,9	4,9	4,9	7,1	6,5	6,9	6,1	7,2	10,6	10,7	9,8
Berat tanah basah + container, W_2 (gr)	14,9	13,5	10,9	14,9	15,7	12,9	14,7	11	21,4	23,6	20	22,8
Berat tanah kering + container, W_3 (gr)	12,1	10,9	8,7	11,1	13,3	11	12,1	9,2	17,9	19,7	16,8	18,2
Berat tanah basah, $W_4=W_2-W_1$ (gr)	9,9	8,6	6	10	8,6	6,4	7,8	4,9	14,2	13	9,3	13
Berat tanah kering, $W_5=W_3-W_1$ (gr)	7,1	6	3,8	6,2	6,2	4,5	5,2	3,1	10,7	9,1	6,1	8,4
Berat air, $W_6=W_4-W_5$ (gr)	2,8	2,6	2,2	3,8	2,4	1,9	2,6	1,8	3,5	3,9	3,2	4,6
Kadar air, $w = (W_6/W_5)$ x 100	39,44	43,33	57,89	61,29	38,71	42,22	50,00	58,06	32,71	42,86	52,46	54,76
Jumlah ketukan, N	47	43	23	12	61	43	20	9	43	35	24	22
Batas Cair, w_L (%)	53,00				52,00				52,00			

CONTOH PERHITUNGAN BATAS CAIR

Perhitungan batas cair (Bor I kedalaman 1 m)

No uji		= 1
No.Container		= 1
Berat Container ,W_1		= 12.3 gr
Berat Tanah Basah+ Container,W_2		= 15.1 gr
Berat Tanah Kering + Container,W_3		= 14,2 gr
Berat Tanah Basah, W_4		$= W_2 - W_1$
		= 15.1 – 12.3
		= 2.8 gr
Berat Tanah Kering,	W_5	$= W_3 - W_1$
		= 14,2 – 12.3
		= 1.9 gr
Berat air,	W_6	$= W_4 - W_5$
		= 2.8 – 1.9
		= 0,9 gr
Kadar air,	w	$= \frac{W_6}{W_5} \times 100\%$
		$= \frac{0,9}{1.9} \times 100\%$
		= 47,37 %
Banyak ketukan,	N	= 46
Batas Cair	W_L	= 55 % (lihat grafik)

No uji	= 2
No.Container	= 2
Berat Container ,W_1	= 12.4 gr
Berat Tanah Basah+ Container,W_2	= 15.1 gr

Berat Tanah Kering + Container, W_3 = 14.2 gr

Berat Tanah Basah, W_4 = W_2 - W_1

= 15.1 – 12.4

= 2.7 gr

Berat Tanah Kering, W_5 = W_3 - W_1

= 14.2 – 12.4

= 1.8 gr

Berat air, W_6 = W_4-W_5

= 2.7 – 1.8

= 0.9 gr

Kadar air, w = $\frac{W_6}{W_5} \times 100\%$

= $\frac{0.9}{1,8} \times 100\%$

= 50 %

Banyak ketukan, N = 33

Batas Cair W_L = 55% (lihat grafik)

No uji = 3

No.Container = 3

Berat Container , W_1 = 4.9 gr

Berat Tanah Basah+ Container, W_2 = 7.1 gr

Berat Tanah Kering + Container, W_3 = 6.3 gr

Berat Tanah Basah, W_4 = W_2 - W_1

= 7.1 – 4.9

= 2.2 gr

Berat Tanah Kering, W_5 = W_3 - W_1

= 6.3 – 4.9

= 1.4 gr

Berat air, W_6 = W_4-W_5
= 2,2 – 1,4
= 0.8 gr

Kadar air, w = $\frac{W_6}{W_5} \times 100\%$
= $\frac{0.8}{1.4} \times 100\%$
= 57.14 %

Banyak ketukan, N = 23
Batas Cair W_L = 55 % (lihat grafik)

No uji = 4
No.Container = 4
Berat Container , W_1 = 4.5 gr
Berat Tanah Basah+ Container, W_2 = 8.7 gr
Berat Tanah Kering + Container, W_3 = 7.1 gr
Berat Tanah Basah, W_4 = W_2 - W_1
= 8.7 – 4.5
= 4.2 gr

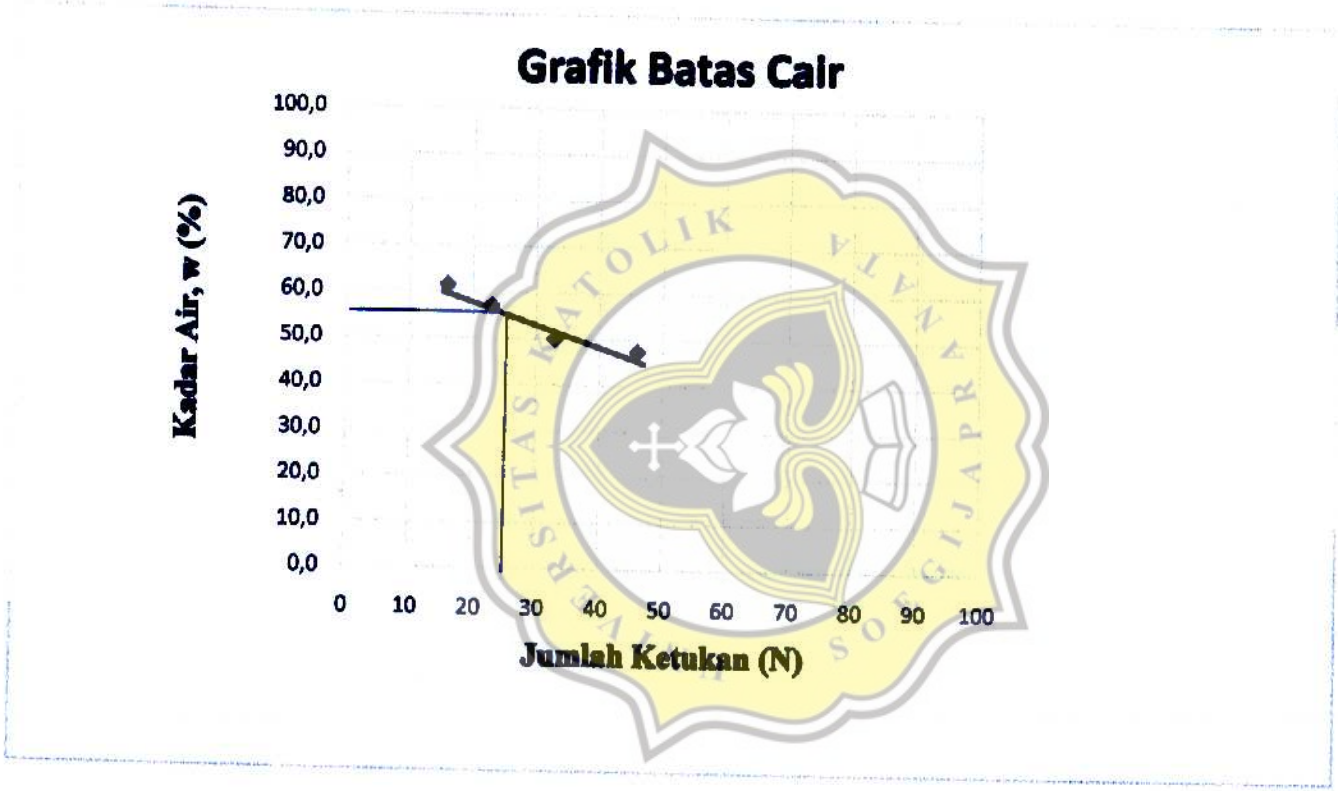
Berat Tanah Kering, W_5 = W_3 - W_1
= 7.1 – 4.5
= 2.6 gr

Berat air, W_6 = W_4-W_5
= 4.2 – 2.6
= 1.6 gr

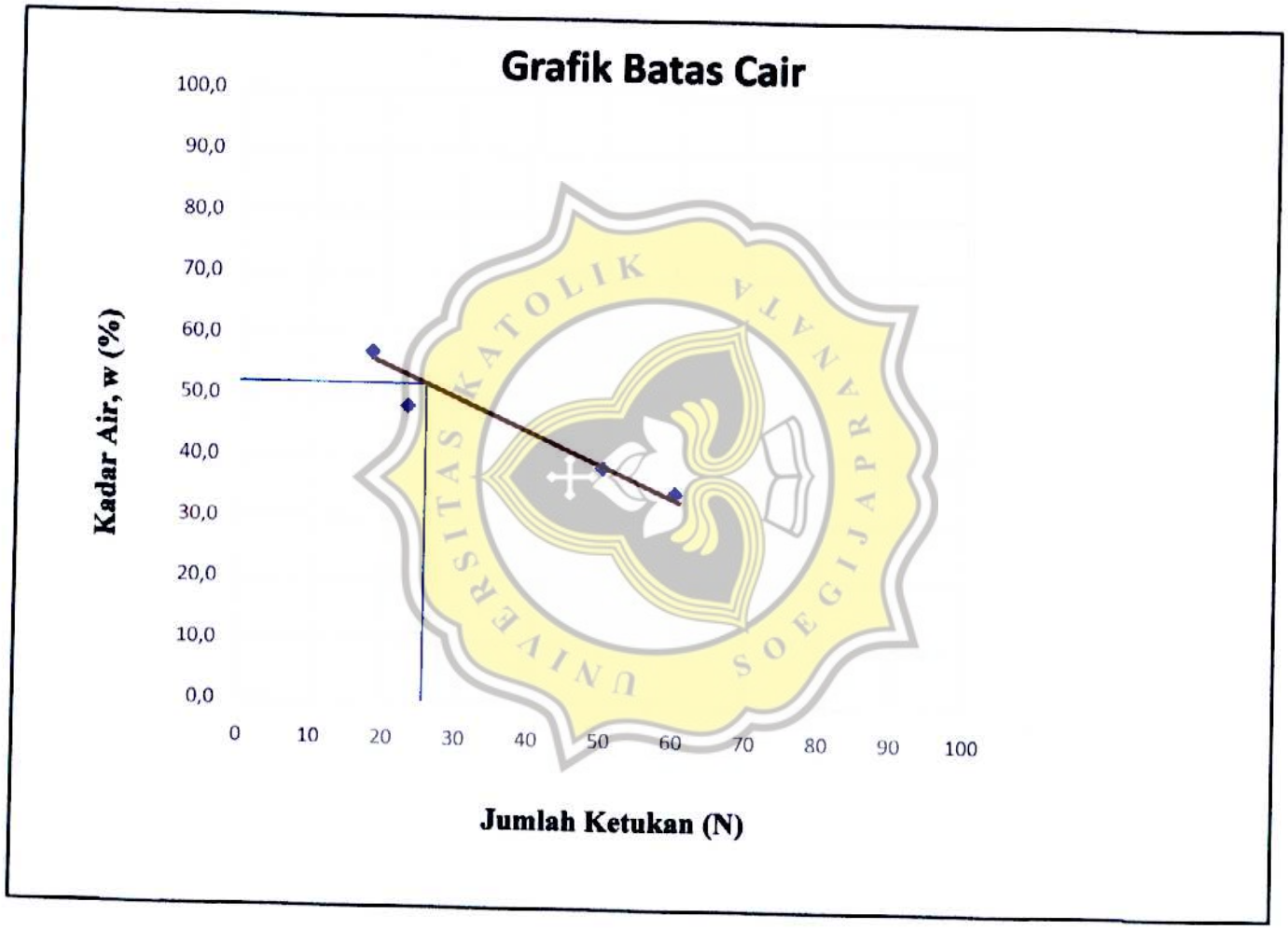
Batas Plastis (PL)

BATAS PLASTIS 0% kapur												
Sampel Tanah	Bor 1 -1 m			Bor 1- 2,5 m			Bor 2 - 1 m			Bor 1 - 2,5 m		
No. Uji	1	2	3	1	2	3	1	2	3	1	2	3
No. Container	1	2	3	1	2	3	1	2	3	1	2	3
Berat container, W_1 (gr)	4,6	4,7	4,8	4,6	4,9	4,7	11,3	11,3	11,9	4,8	5	5
Berat tanah basah + container, W_2 (gr)	7,1	7,1	7,6	7,5	7,6	7,2	14,5	13,7	14,9	6,8	6,9	6,5
Berat tanah kering + container, W_3 (gr)	6,5	6,6	6,7	6,7	6,8	6,7	13,7	13,2	14,1	6,3	6,4	6,1
Berat tanah basah, $W_4=W_2-W_1$ (gr)	2,5	2,4	2,8	2,9	2,7	2,5	3,2	2,4	3	2	1,9	1,5
Berat tanah kering, $W_5=W_3-W_1$ (gr)	1,9	1,9	1,9	2,1	1,9	2	2,4	1,9	2,2	1,5	1,4	1,1
Berat air, $W_6=W_4-W_5$ (gr)	0,6	0,5	0,9	0,8	0,8	0,5	0,8	0,5	0,8	0,5	0,5	0,4
Kadar air, w = $(W_6/W_5)x\ 100$	31,58	26,32	47,37	38,10	42,11	25,00	33,33	26,32	36,36	33,33	35,71	36,36
Batas plastis, w_p (%)	35,09			35,07			32,00			35,14		
Rata-rata	34,32397281											

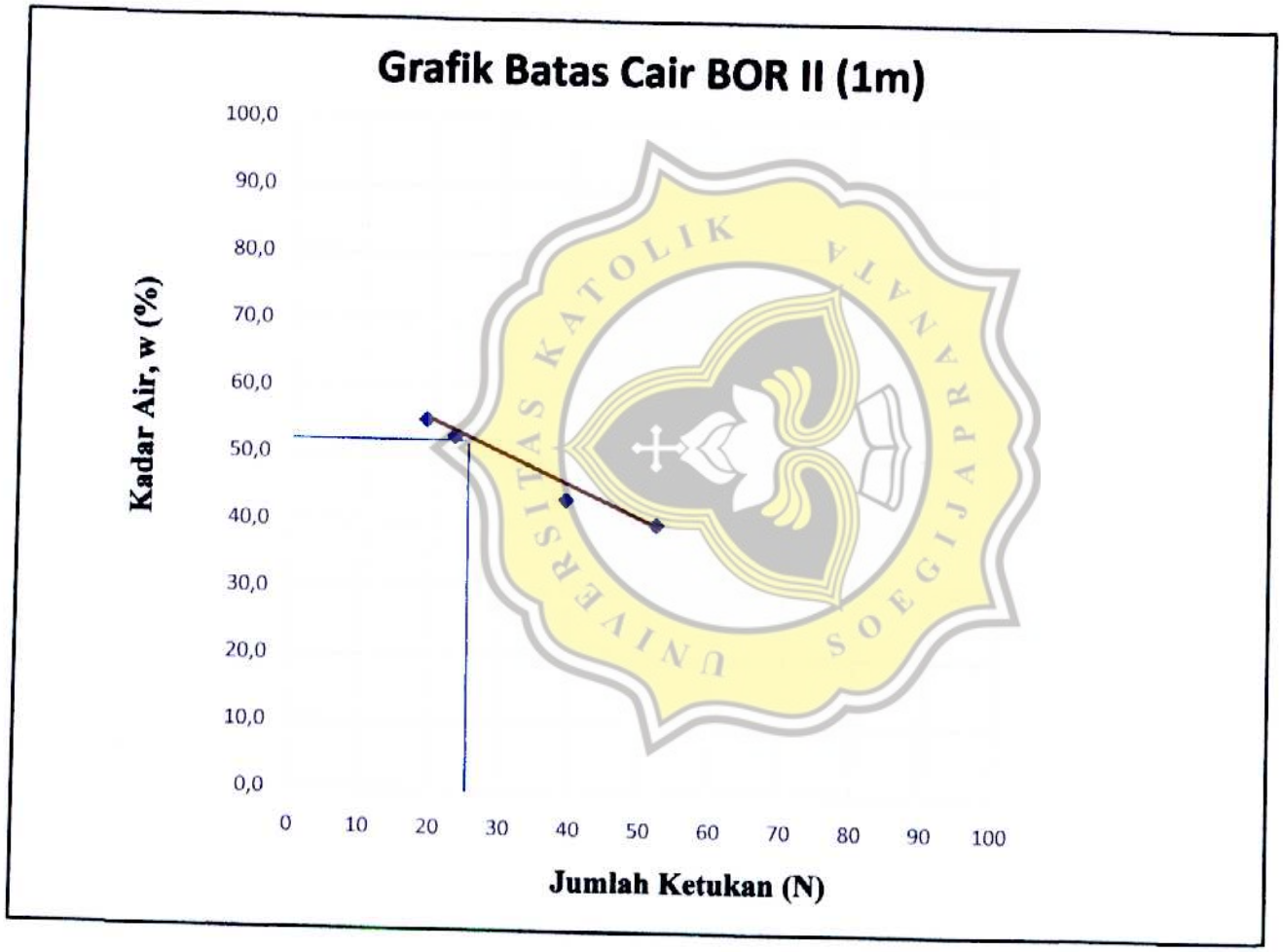
Bor 1 kedalaman 1 meter



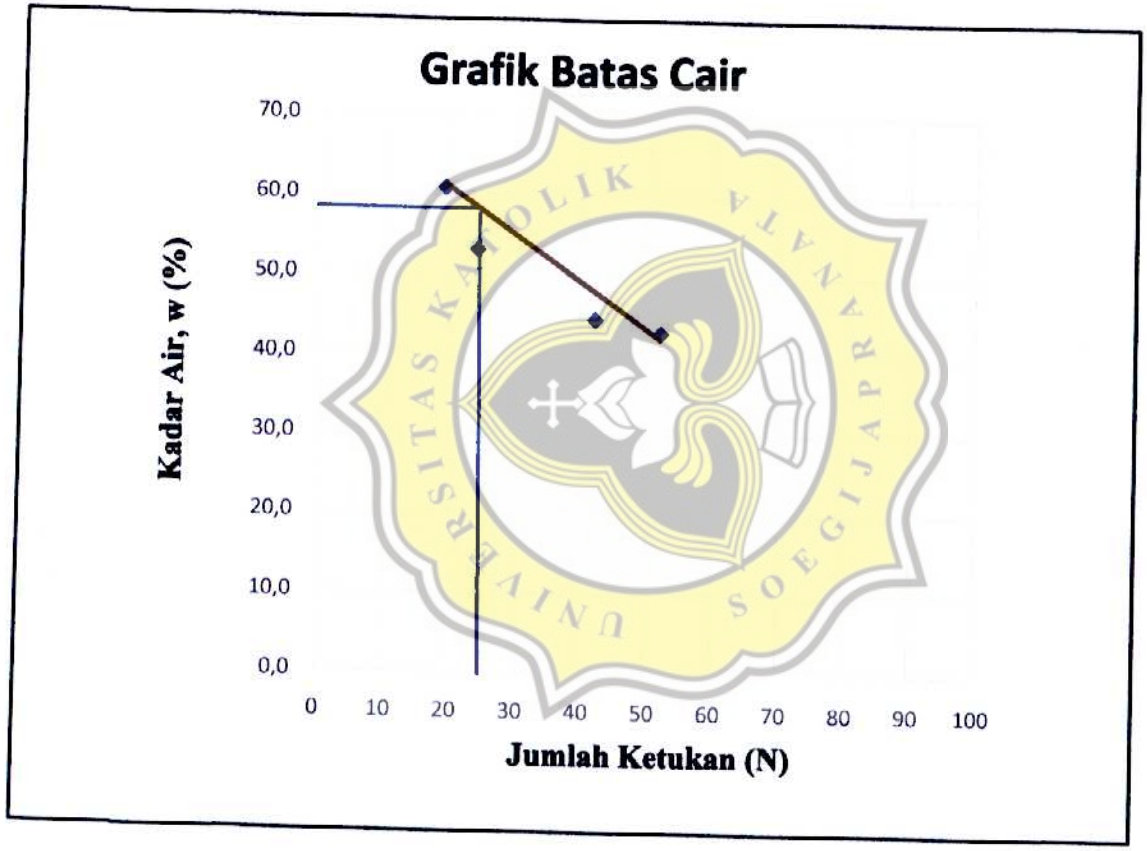
Bor 1 kedalaman 2,5 meter



Bor 2 kedalaman 1 meter

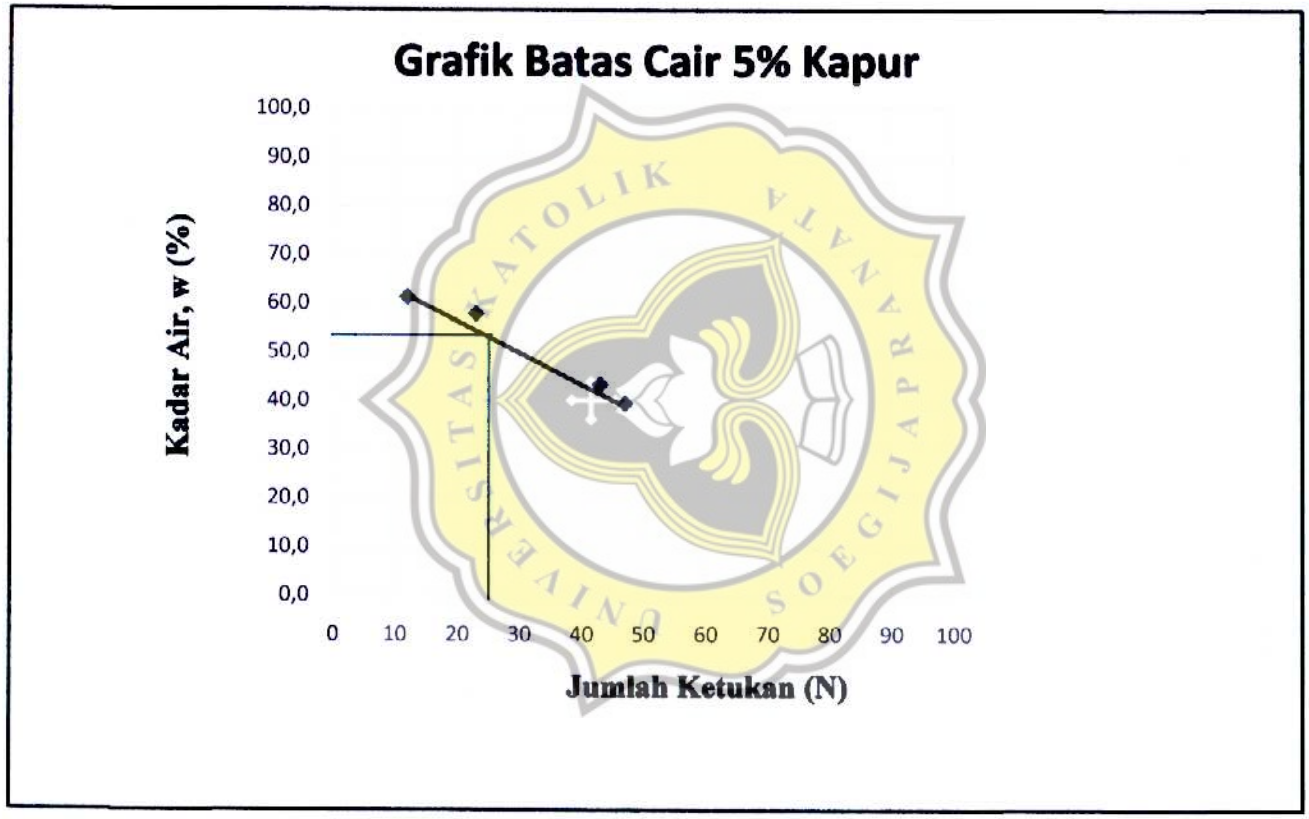


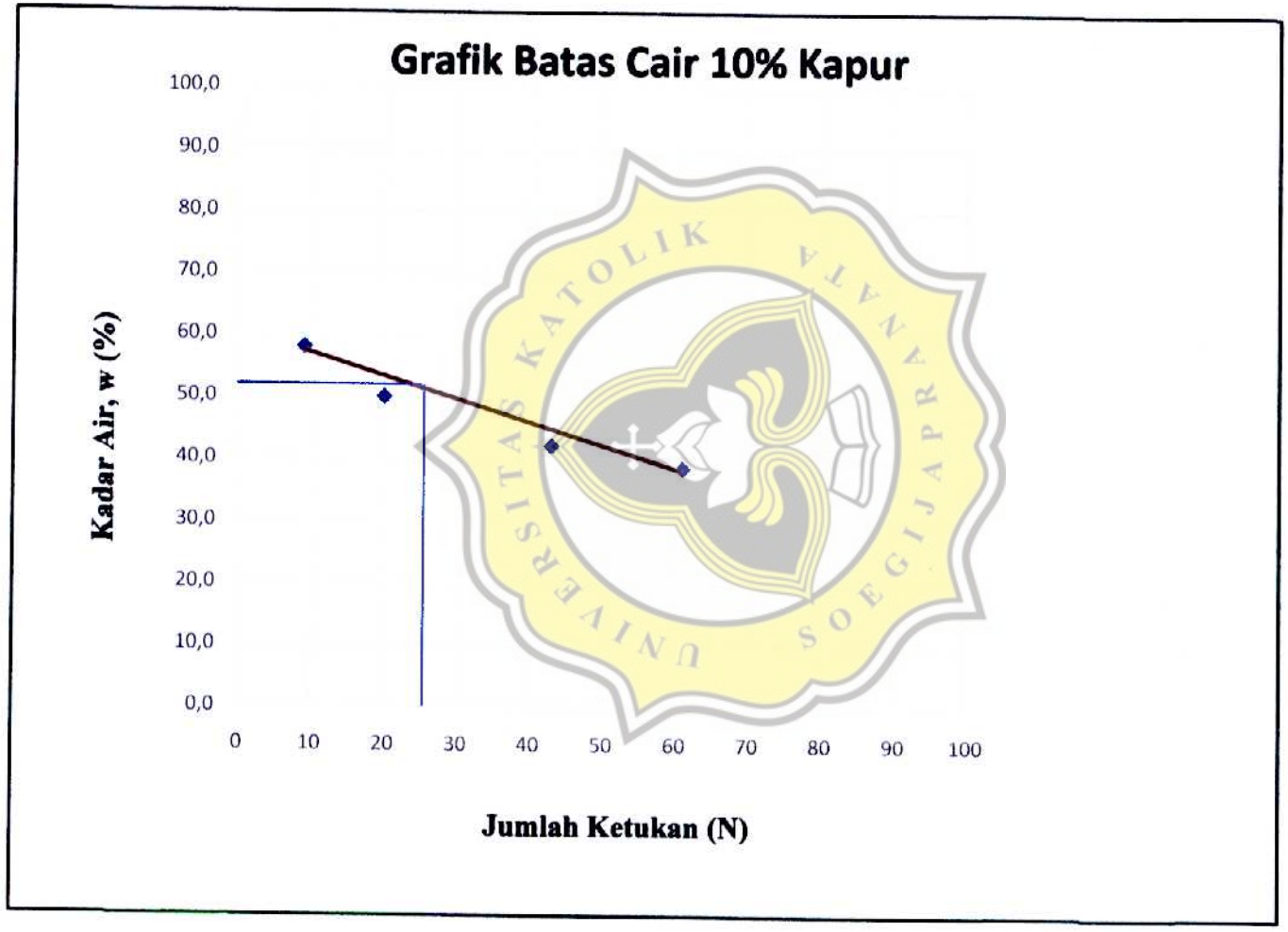
Bor 2 kedalaman 2,5 meter

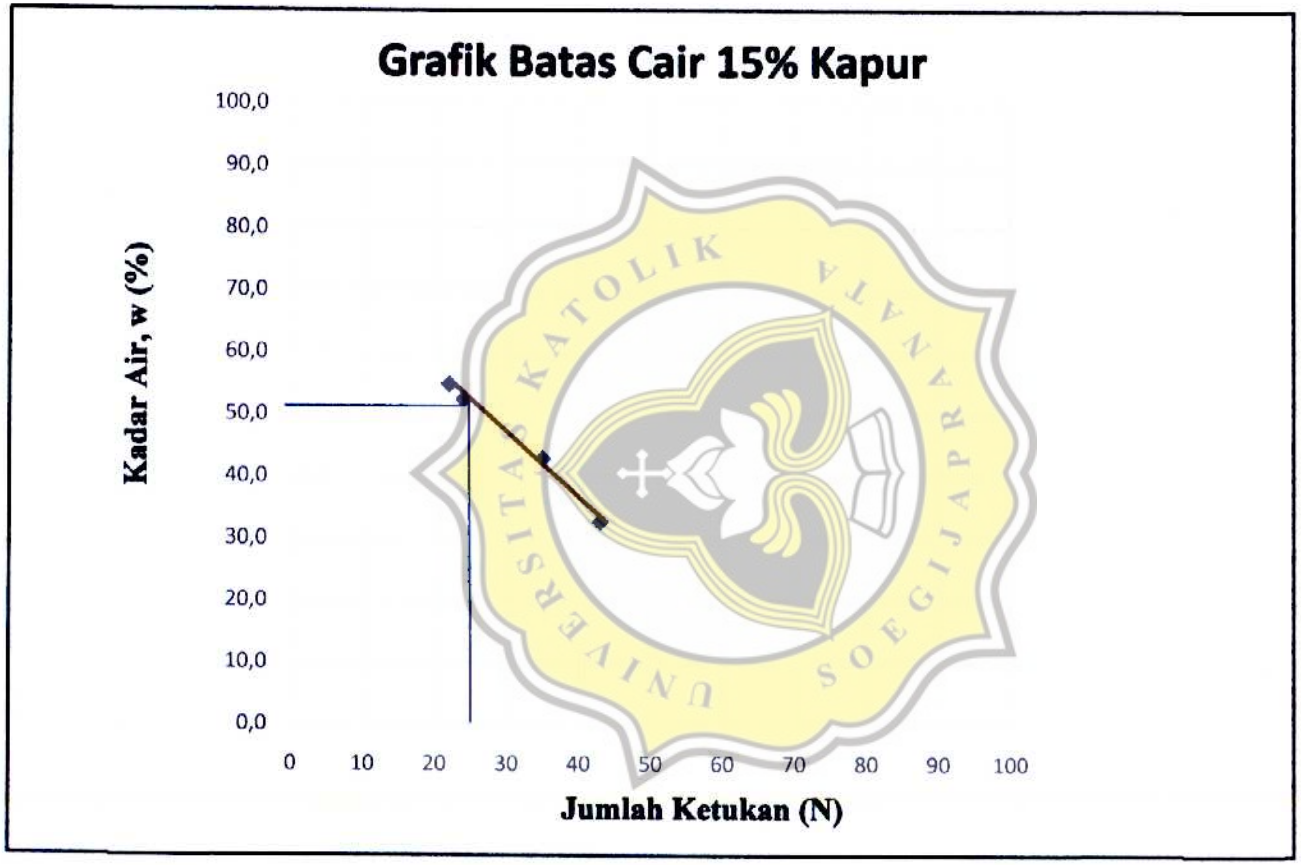


Batas Plastis (PL)

BATAS PLASTIS									
Sampel Tanah	5 % kapur			10 % kapur			15 % kapur		
No. Uji	1	2	3	1	2	3	1	2	3
No. Container	1	2	3	1	2	3	1	2	3
Berat container, W_1 (gr)	4,7	4,7	4,8	4,9	5	4,9	4,9	4,8	4,7
Berat tanah basah + container, W_2 (gr)	8,6	7,8	8,3	6,7	7,4	7,3	6,6	7,2	7,1
Berat tanah kering + container, W_3 (gr)	7,7	7,1	7,4	6,4	6,8	6,7	6,2	6,7	6,6
Berat tanah basah, $W_4=W_2-W_1$ (gr)	3,9	3,1	3,5	1,8	2,4	2,4	1,7	2,4	2,4
Berat tanah kering, $W_5=W_3-W_1$ (gr)	3	2,4	2,6	1,5	1,8	1,8	1,3	1,9	1,9
Berat air, $W_6=W_4-W_5$ (gr)	0,9	0,7	0,9	0,3	0,6	0,6	0,4	0,5	0,5
Kadar air, w = (W_6/W_5)x 100	30,00	29,17	34,62	20,00	33,33	33,33	30,77	26,32	26,32
Batas plastis, w_p (%)	31,26			28,89			27,80		


Grafik Batas Cair 5% Kapur
Kadar Air, w (%)
100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
0
10
20
30
40
50
60
70
80
90
100
Jumlah Ketukan (N)


Grafik Batas Cair 10% Kapur
Kadar Air, w (%)
100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
0
10
20
30
40
50
60
70
80
90
100
Jumlah Ketukan (N)


Grafik Batas Cair 15% Kapur
Kadar Air, w (%)
100,0
90,0
80,0
70,0
60,0
50,0
40,0
30,0
20,0
10,0
0,0
0
10
20
30
40
50
60
70
80
90
100
Jumlah Ketukan (N)

CONTOH PERHITUNGAN BATAS PLASTIS

Perhitungan Batas Plastis BOR I (1 meter)

No uji	= 1
No.Container	= 1
Berat Container , W_1	= 4.6 gr
Berat Tanah Basah+ Container, W_2	= 7.1 gr
Berat Tanah Kering + Container, W_3	= 6.5 gr
Berat Tanah Basah, W_4	$= W_2 - W_1$
	= 7.1 – 4.6
	= 2.5 gr
Berat Tanah Kering, W_5	$= W_3 - W_1$
	= 6.5 – 4.6
	= 1.9 gr
Berat air, W_6	$= W_4 - W_5$
	= 2.5 – 1.9
	= 0.6 gr

Kadar air, w $= \frac{W_6}{W_5} \times 100\%$

$= \frac{0.6}{1.9} \times 100\%$

$= 31.578\ \%$

No uji	= 2
No.Container	= 2
Berat Container , W_1	= 4.7 gr
Berat Tanah Basah+ Container, W_2	= 7.1 gr
Berat Tanah Kering + Container, W_3	= 6.6 gr

Berat Tanah Basah, W_4	$= W_2 - W_1$
	$= 7.1 - 4.7$
	$= 2.4$ gr
Berat Tanah Kering, W_5	$= W_3 - W_1$
	$= 6.6 - 4.7$
	$= 1.9$ gr
Berat air, W_6	$= W_4 - W_5$
	$= 2.4 - 1.9$
	$= 0.5$ gr
Kadar air, w	$= \frac{W_6}{W_5} \times 100\%$
	$= \frac{0.5}{1.9} \times 100\%$
	$= 26.32\ \%$
No uji	$= 3$
No.Container	$= 3$
Berat Container , W_1	$= 4.8$ gr
Berat Tanah Basah+ Container, W_2	$= 7.6$ gr
Berat Tanah Kering + Container, W_3	$= 6.7$ gr
Berat Tanah Basah, W_4	$= W_2 - W_1$
	$= 7.6 - 4.8$
	$= 2.8$ gr
Berat Tanah Kering, W_5	$= W_3 - W_1$
	$= 6.7 - 4.8$
	$= 1.9$ gr
Berat air, W_6	$= W_4 - W_5$
	$= 2.8 - 1.9$

$= 0.9 \text{ gr}$

Kadar air, w

$$= \frac{W_6}{W_5} \times 100\%$$

$$= \frac{0.9}{1.9} \times 100\%$$

$$= 47.37\ \%$$

Batas Plastis, W_P

$$= \frac{w_1 + w_2 + w_3}{3}$$

$$= \frac{31.578 + 26.32 + 47.37}{3}$$

$$= 35.09\ \%$$

INDEK PLASTISITAS

Indek Plastisitas,IP (%)							
Sampel dan penambahan kapur	0% Kapur				5% Kapur	10% Kapur	15% Kapur
	Bor I (1m)	Bor I (2,5m)	Bor II (1m)	Bor II (2,5m)			
Batas cair, LL (%)	35,09	35,07	32	35,14	31,26	28,89	27,8
Batas plastis, PL (%)	55	52	53	58	53	52	52
Indek Plastisitas,IP (%)	19,91	16,93	21	22,86	21,74	23,11	24,2
	20,175						

CONTOH PERHITUNGAN INDEK PLASTISITAS

Perhitungan Indek Plastisitas BOR I (1 meter)

Indek Plastisitas = Batas Plastis – Batas Cair

= 55 - 35,09

= 19,91 %

LAMPIRAN 3

HIDROMETER

1. UJI HIDROMETER 0% KAPUR

A. BOR I Kedalaman 1 Meter

Dispersing Agent :

Berat Jenis Tanah, G_s : 1,949

Faktor Koreksi, a : 1.2787

Zero Correction, C_0 : 1

Meniscus Correction : 2

Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER									
Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	28	30	31,5	80,56%	32	11,1	11,1	0,01638	0,054573
2	28	29	30,5	78,00%	31	11,2	5,6	0,01638	0,038762
4	28	28	29,5	75,44%	30	11,4	2,85	0,01638	0,027653
8	28	27	28,5	72,89%	29	11,5	1,4375	0,01638	0,019639
15	29	25	27,05	69,18%	27	11,9	0,793333	0,01620	0,014429
30	29	23	25,05	64,06%	25	12,2	0,406667	0,01620	0,010331
60	29	21	23,05	58,95%	23	12,5	0,208333	0,01620	0,007394
120	29	20	22,05	56,39%	22	12,7	0,105833	0,01620	0,00527
240	30	17	19,8	50,64%	19	13,2	0,055	0,01602	0,003757
1440	29	10	12,05	30,82%	12	14,3	0,009931	0,01620	0,001614

Contoh Perhitungan Uji Hidrometer

BOR I kedalaman 1 meter :

Faktor Koreksi (a)

$$a = \frac{1.65 \times G_S}{2.65 \times (G_S - 1)}$$

$$= \frac{1.65 \times 1,949}{2.65 \times (1,949 - 1)}$$

$$= 1.2787$$

Correction Hydrometer Reading

Ra	= 30
Zero Correction, Co	= 1
Temp.	= 28°
Ct.	= 2.5
Rc	= Ra – Zero Correction + Ct
	= 30 – 1 + 2.5
	= 31.5

Berat Tanah Kering

W_s = 50 gr

Persen Finer

$$\% \text{ finer} = \frac{Rc \times a}{W_s} \times 100\%$$

$$= \frac{31.5 \times 1.2787}{50} \times 100\%$$

$$= 80.56\ \%$$

Harga R

Ra	= 30
R	= Ra + Mensius Correction
	= 30 + 2
	= 32

Harga L

R	= 32
L	= 11.1 cm

L / t

L	= 11.1 cm
t	= 1 menit
L/t	$= {}^{11.1}/_{1}$

$= 11.1\ {}^{cm}/_{menit}$

Harga K

Temp. $= 28°$

G_w $= 0.99627$

η $= 0.00836$

g $= 981$ cm/s

K^2 $= \dfrac{30 \times \eta}{g \times (G_s - G_w)}$

$= \dfrac{30 \times 0.00836}{981 \times (1.949 - 0.99627)}$

$= 0{,}00026834$

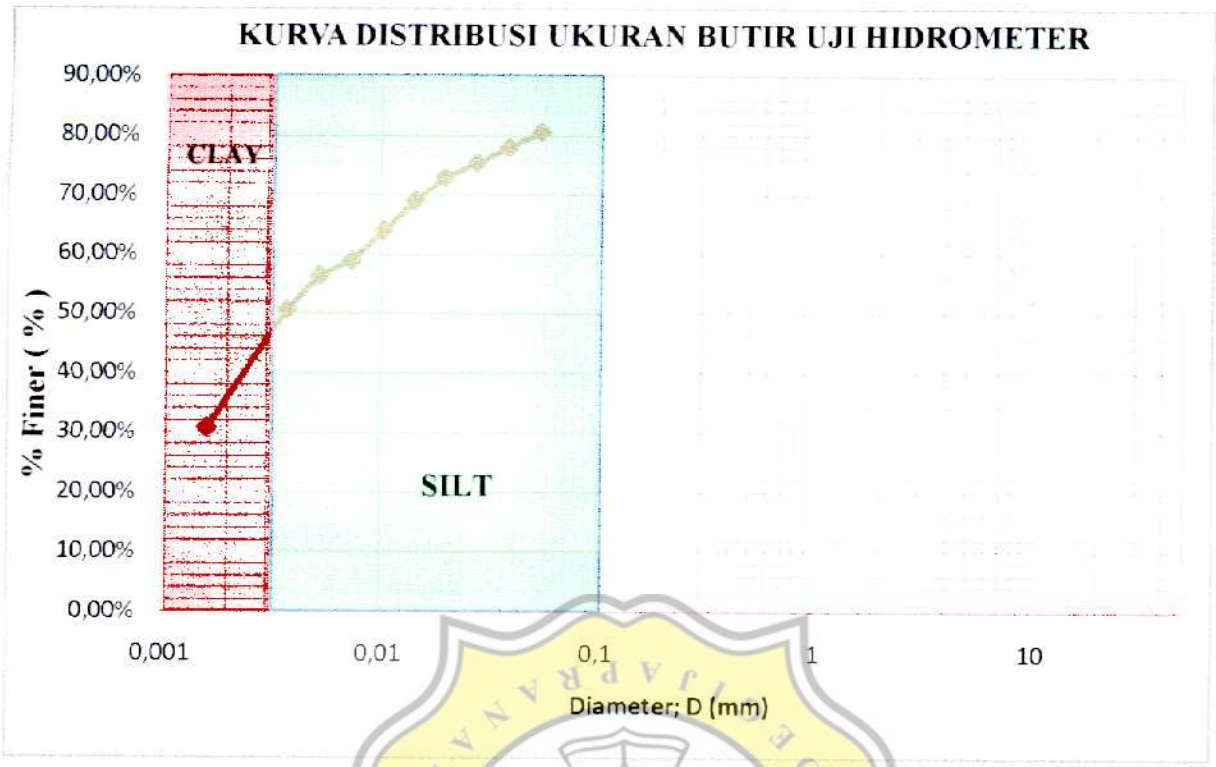
K $= 0{,}01638$

Diameter, D

D $= K \times \sqrt{\dfrac{L}{t}}$

$= 0.01638 \times \sqrt{\dfrac{11.1}{1}}$

$= 0.05447$ mm



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt – clay (%)	80.56
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{{D_{30}}^2}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

D_{10} = 0

D_{30} = 0

D_{60} = 0

Sehingga nilai C_U = 0 dan Cc = 0

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 80,56 %

B. BOR I Kedalaman 2,5 Meter

Dispersing Agent :

Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 1.842

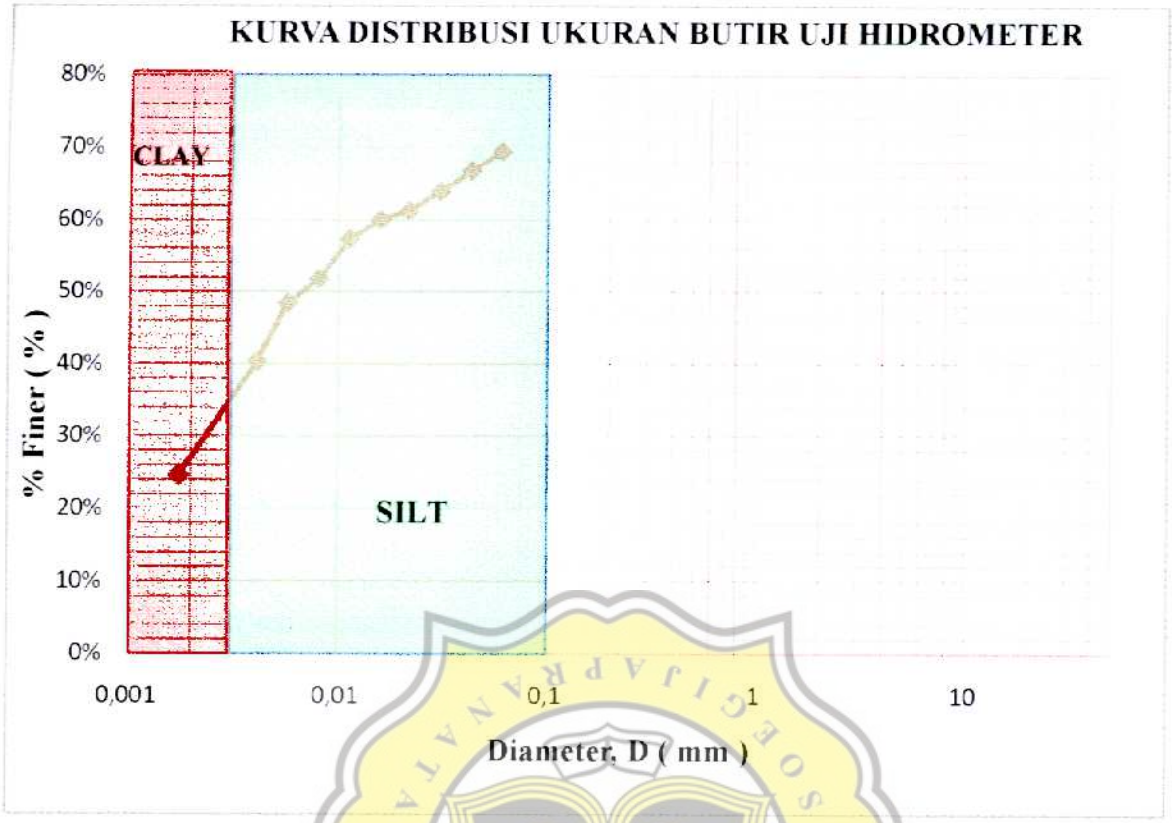
Meniscus Correction : 2

Faktor Koreksi, a : 1.3621

Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER

Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	28	24	25,5	69,47%	-	12	12	0,01738	0,060206
2	28	23	24,5	66,74%	25	12,2	6,1	0,01738	0,042925
4	28	22	23,5	64,02%	24	12,4	3,1	0,01738	0,030601
8	28	21	22,5	61,29%	23	12,5	1,5625	0,01738	0,021725
15	29	20	22,05	60,07%	22	12,7	0,846667	0,01719	0,015817
30	29	19	21,05	57,34%	21	12,9	0,43	0,01719	0,011272
60	29	17	19,05	51,90%	19	13,2	0,22	0,01719	0,008063
120	30	15	17,8	48,49%	17	13,5	0,1125	0,01701	0,005705
240	30	12	14,8	40,32%	14	14	0,058333	0,01701	0,004108
1440	29	7	9,05	24,65%	9	14,8	0,010278	0,01719	0,001743



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt – clay (%)	69.47
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{{D_{30}}^2}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

$D_{10} = 0$

$D_{30} = 0$

$D_{60} = 0$

Sehingga nilai $C_U = 0$ dan $Cc = 0$

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 69,47 %

C. BOR II Kedalaman 1 Meter

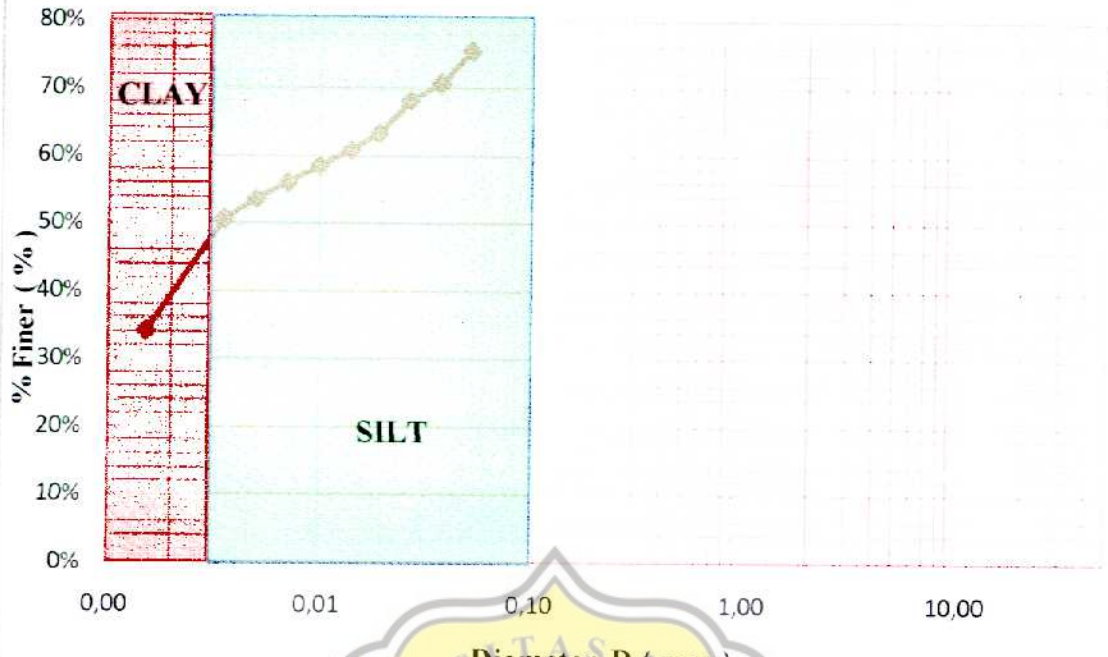
Dispersing Agent : Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 2.048 Meniscus Correction : 2

Faktor Koreksi, a 1.2167 Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER									
Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	29	29	31,05	75,56%	31	11,2	11,2	0,01542	0,051605
2	29	27	29,05	70,69%	29	11,5	5,75	0,01542	0,036976
4	29	26	28,05	68,26%	28	11,7	2,925	0,01542	0,026372
8	29	24	26,05	63,39%	26	12	1,5	0,01542	0,018886
15	29	23	25,05	60,96%	25	12,2	0,813333	0,01542	0,013907
30	29	22	24,05	58,52%	24	12,4	0,413333	0,01542	0,009914
60	29	21	23,05	56,09%	23	12,5	0,208333	0,01542	0,007038
120	29	20	22,05	53,66%	22	12,7	0,105833	0,01542	0,005016
240	30	18	20,8	50,61%	20	13	0,054167	0,01525	0,003549
1440	29	12	14,05	34,19%	14	14	0,009722	0,01542	0,00152

KURVA DISTRIBUSI UKURAN BUTIR UJI HIDROMETER



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt – clay (%)	75.56
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{{D_{30}}^2}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

$D_{10} = 0$

$D_{30} = 0$

$D_{60} = 0$

Sehingga nilai $C_U = 0$ dan $Cc = 0$

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 75,56 %

D. BOR II Kedalaman 2,5 Meter

Dispersing Agent :

Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 2.182

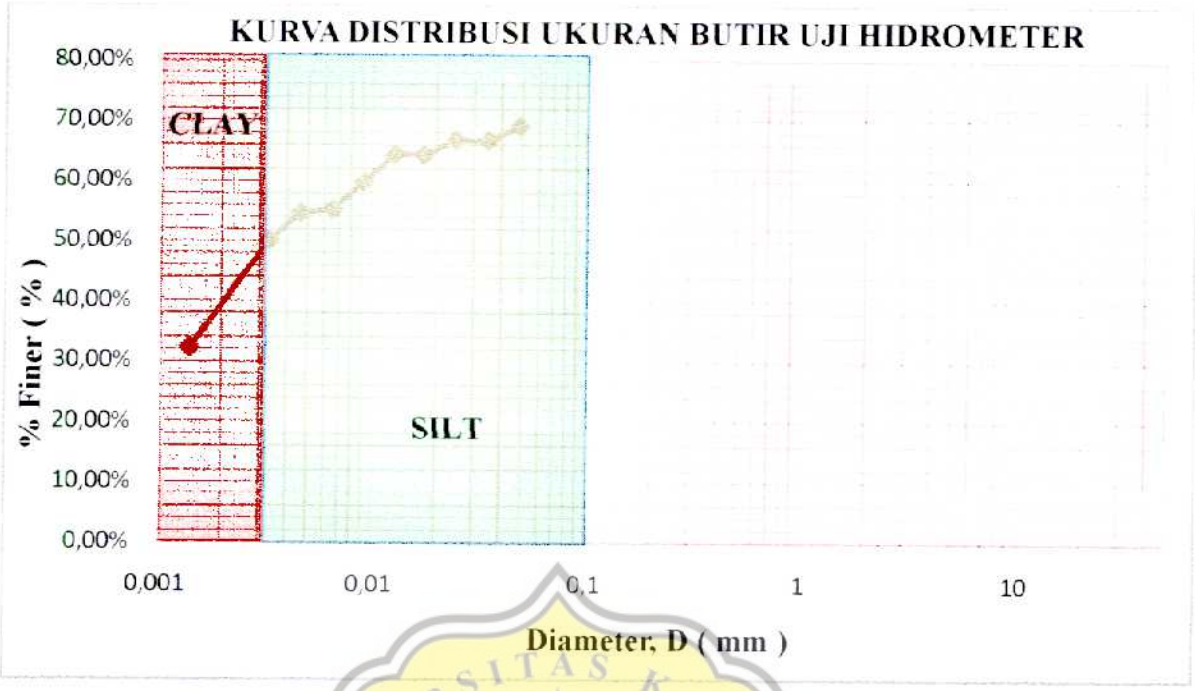
Meniscus Correction : 2

Faktor Koreksi, a : 1.1494

Berat Tanah Kering, W_s : 50 gr

Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	29	28	30,05	69,08%	30	11,4	11,4	0,01452	0,049025
2	29	27	29,05	66,78%	29	11,5	5,75	0,01452	0,034818
4	29	27	29,05	66,78%	29	11,5	2,875	0,01452	0,02462
8	29	26	28,05	64,48%	28	11,7	1,4625	0,01452	0,01756
15	29	26	28,05	64,48%	28	11,7	0,78	0,01452	0,012824
30	29	24	26,05	59,88%	26	12	0,4	0,01452	0,009183
60	29	22	24,05	55,29%	24	12,4	0,206667	0,01452	0,006601
120	30	21	23,8	54,71%	23	12,5	0,104167	0,01436	0,004635
240	30	19	21,8	50,11%	21	12,9	0,05375	0,01436	0,003329

1440	29	12	14,05	32,30%	14	14	0,009722	0,01452	0,001432



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt + clay (%)	69,08
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{{D_{30}}^2}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

D_{10} = 0

D_{30} = 0

D_{60} = 0

Sehingga nilai C_U = 0 dan Cc = 0

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 69,08 %

2. UJI HIDROMETER 5% KAPUR

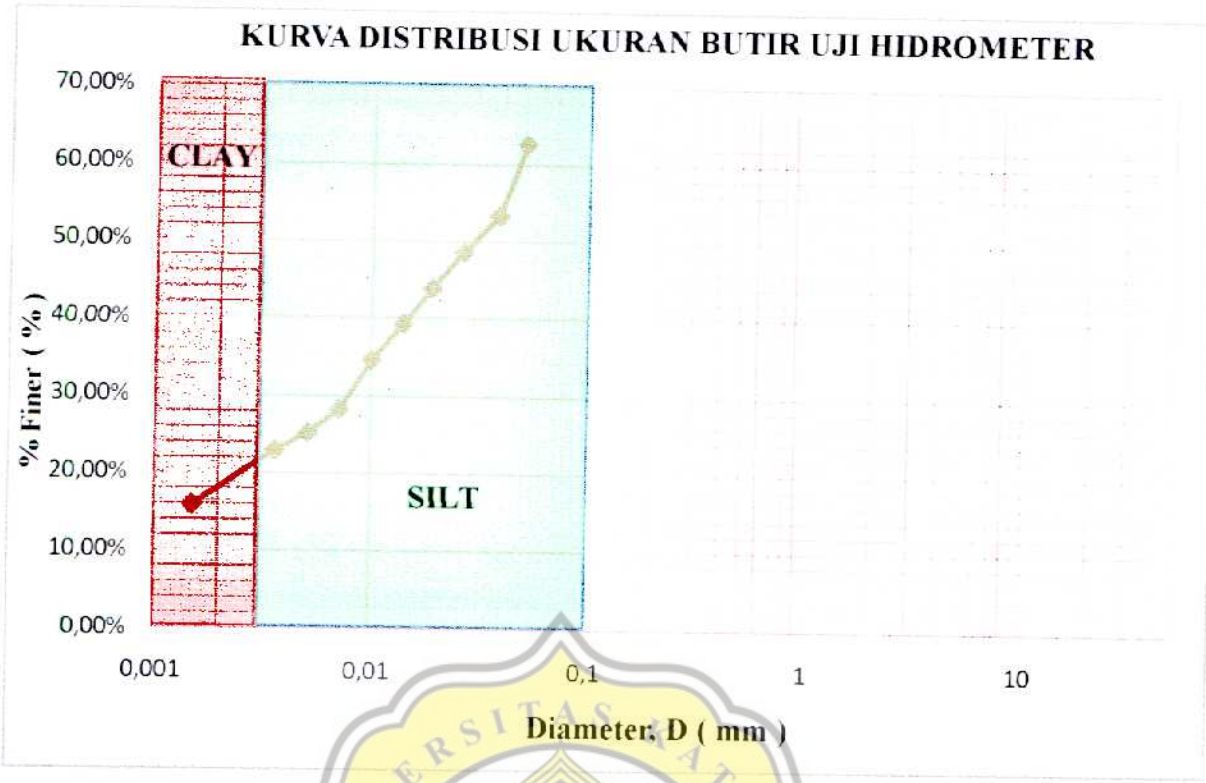
Dispersing Agent : Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 2.334 Meniscus Correction : 2

Faktor Koreksi, a : 1.1707 Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER									
Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	30	24	26,8	62,75%	26	12	12	0,01465	0,050749
2	30	20	22,8	53,38%	22	13,7	6,85	0,01465	0,038343
4	30	18	20,8	48,70%	20	13	3,25	0,01465	0,026411
8	30	16	18,8	44,02%	18	13,3	1,6625	0,01465	0,018889
15	30	14	16,8	39,34%	16	13,7	0,913333	0,01465	0,014001
30	30	12	14,8	34,65%	14	14	0,466667	0,01465	0,010008
60	30	10	12,05	28,21%	12	14,3	0,238333	0,01465	0,007152
120	30	8	10,8	25,29%	10	14,7	0,1225	0,01465	0,005128
240	30	7	9,8	22,95%	9	14,8	0,061667	0,01465	0,003638
1440	30	4	6,8	15,92%	6	15,3	0,010625	0,01465	0,00151

KURVA DISTRIBUSI UKURAN BUTIR UJI HIDROMETER



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt – clay (%)	62.75
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{D_{30}^{\ 2}}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

D_{10} = 0

D_{30} = 0

D_{60} = 0

Sehingga nilai C_U = 0 dan Cc = 0

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 62,75 %

3. UJI HIDROMETER 10% KAPUR

Dispersing Agent :

Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 2.574

Meniscus Correction : 2

Faktor Koreksi, a : 1.2167

Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER									
Elapsed Time t (minute)	Temp. (°C)	Actual Hyd Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	30	22	24,8	60,35%	24	12,4	12,4	0,01245	0,043841
2	30	21	23,8	57,91%	23	12,5	6,25	0,01245	0,031125
4	30	19	21,8	53,05%	21	12,9	3,225	0,01245	0,022358
8	30	14	16,8	40,88%	16	13,7	1,7125	0,01245	0,016292
15	30	13	15,8	38,45%	15	13,8	0,92	0,01245	0,011942
30	30	12	14,8	36,01%	14	14	0,466667	0,01245	0,008505
60	30	11	13,8	33,58%	13	14,2	0,236667	0,01245	0,006057
120	30	10	12,8	31,15%	12	14,3	0,119167	0,01245	0,004298
240	30	9	11,8	28,71%	11	14,5	0,060417	0,01245	0,00306
1440	30	8	10,8	26,28%	10	14,7	0,010208	0,01245	0,001258

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

D_{10} = 0

D_{30} = 0

D_{60} = 0

Sehingga nilai C_U = 0 dan Cc = 0

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 62,75 %

3. UJI HIDROMETER 10% KAPUR

Dispersing Agent

Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 2.574

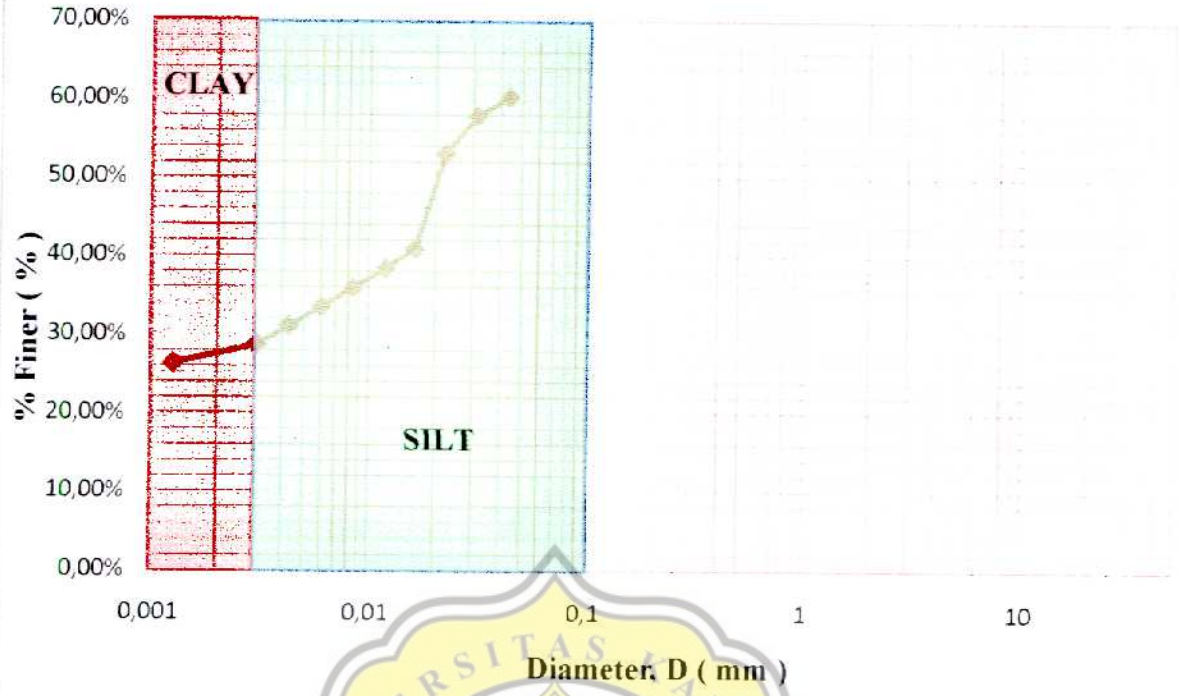
Meniscus Correction : 2

Faktor Koreksi, a : 1.2167

Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER									
Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	30	22	24,8	60,35%	24	12,4	12,4	0,01245	0,043841
2	30	21	23,8	57,91%	23	12,5	6,25	0,01245	0,031125
4	30	19	21,8	53,05%	21	12,9	3,225	0,01245	0,022358
8	30	14	16,8	40,88%	16	13,7	1,7125	0,01245	0,016292
15	30	13	15,8	38,45%	15	13,8	0,92	0,01245	0,011942
30	30	12	14,8	36,01%	14	14	0,466667	0,01245	0,008505
60	30	11	13,8	33,58%	13	14,2	0,236667	0,01245	0,006057
120	30	10	12,8	31,15%	12	14,3	0,119167	0,01245	0,004298
240	30	9	11,8	28,71%	11	14,5	0,060417	0,01245	0,00306
1440	30	8	10,8	26,28%	10	14,7	0,010208	0,01245	0,001258

KURVA DISTRIBUSI UKURAN BUTIR UJI HIDROMETER



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt – clay (%)	60.35
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{D_{30}{}^2}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari percobaan didapat :

$D_{10} = 0$

$D_{30} = 0$

$D_{60} = 0$

Sehingga nilai $C_U = 0$ dan $Cc = 0$

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 60,35 %

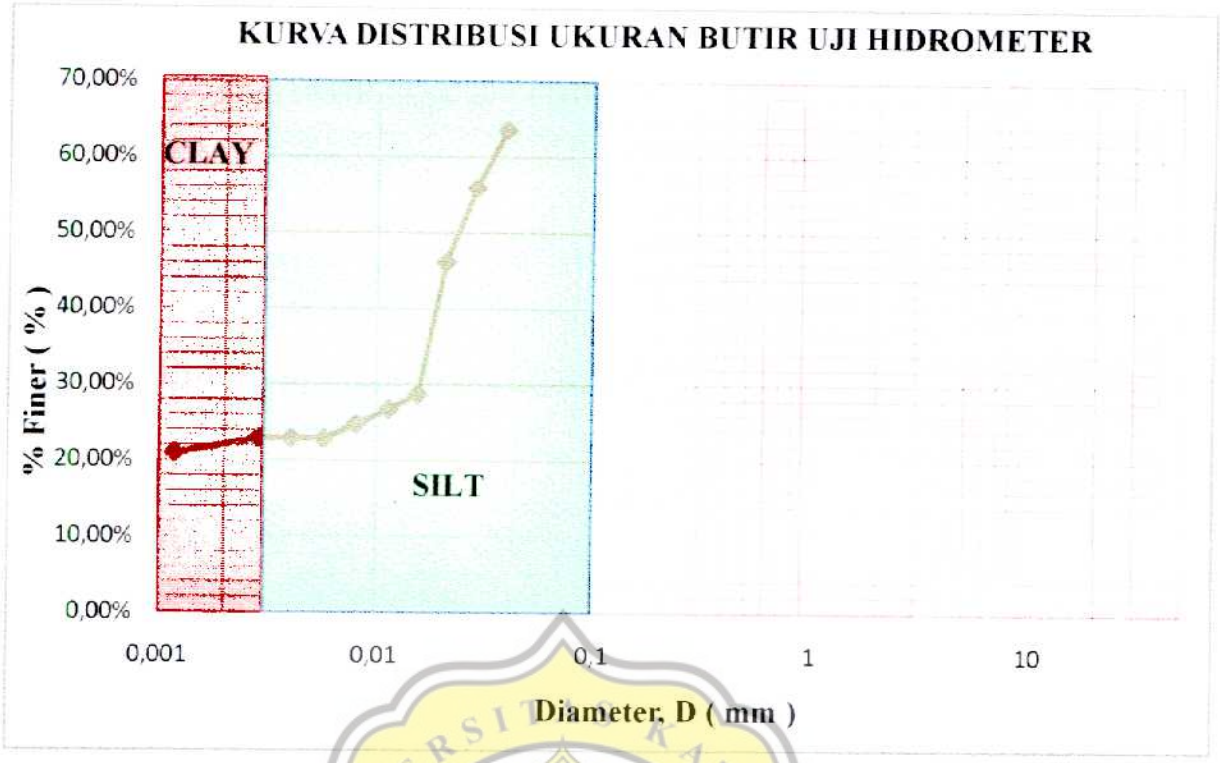
4. UJI HIDROMETER 15% KAPUR

Dispersing Agent : Zero Correction, C_0 : 1

Berat Jenis Tanah, G_s : 2,788 Meniscus Correction : 2

Faktor Koreksi, a : 0,97087 Berat Tanah Kering, W_s : 50 gr

UJI HIDROMETER									
Elapsed Time t (minute)	Temp. (°C)	Actual Hyd. Reading Ra	Corr. Hyd. Reading Rc	% Finer	Hyd. Corr. Only for Meniscus R	L cm	L/t cm/mnt	K	Diameter D (mm)
0	-	-	-	-	-	-	-	-	-
1	30	30	32,8	63,69%	32	11,1	11,1	0,01169	0,038947
2	30	26	28,8	55,92%	28	11,7	5,85	0,01169	0,028274
4	30	21	23,8	46,21%	23	12,5	3,125	0,01169	0,020665
8	30	12	14,8	28,74%	14	14	1,75	0,01169	0,015464
15	30	11	13,8	26,80%	13	14,2	0,946667	0,01169	0,011374
30	30	10	12,8	24,85%	12	14,3	0,476667	0,01169	0,008071
60	30	9	11,8	22,91%	11	14,5	0,241667	0,01169	0,005747
120	30	9	11,8	22,91%	11	14,5	0,120833	0,01169	0,004064
240	30	9	11,8	22,91%	11	14,5	0,060417	0,01169	0,002873
1440	30	8	10,8	20,97%	10	14,7	0,010208	0,01169	0,001181



TABEL UJI HIDROMETER

Persentase gravel (%)	0
Persentase coarse to medium sand (%)	0
Persentase fine sand (%)	0
Persentase silt – clay (%)	63.69
D_{10}	0
D_{60}	0
D_{30}	0
$C_u = \frac{D_{60}}{D_{10}}$	0
$C_c = \frac{{D_{30}}^2}{D_{60} \times D_{10}}$	0

KESIMPULAN PERCOBAAN ANALISA HIDROMETER

Silt atau lanau adalah tanah dengan ukuran butir antara 0.002 mm – 0.075 mm.

Clay atau lempung adalah tanah dengan ukuran butir lebih kecil dari 0.002 mm.

Dari perobaan didapat :

$D_{10} = 0$

$D_{30} = 0$

$D_{60} = 0$

Sehingga nilai $C_U = 0$ dan $Cc = 0$

Maka tanah bergradasi buruk.

Persentase gravel = 0

Persentase coarse to medium = 0

Persentase fine sand = 0

Persentase silt – clay = 63,69 %

LAMPIRAN 4

KOMPAKSI

CONTOH PERHITUNGAN UJI PEMADATAN

Percobaan dengan 0% kapur dengan campuran kadar air 100 cc

Percobaan ke = 1

Berat tanah basah = 4240 gr

Diameter mold = 15 cm

Tinggi tanah setelah ditekan = 12.667 cm

Volume sample $= \frac{1}{4} \times \pi \times d^2 \times t$

$= \frac{1}{4} \times \pi \times 15^2 \times 12.667$

$= 2237.31\ cm^3$

Berat isi tanah $= \frac{\text{berat tanah basah}}{\text{volume sample}}$

$= \frac{4240}{2237.31}$

$= 1.89\ gr/cm^3$

No. container = atas

Berat container = 11.6 gr

Berat container +tanah basah = 43.5 gr

Berat container+tanah kering = 37.5 gr

Berat tanah basah = (berat container + tanah basah) – berat container

= 43.5– 11.6

= 31.9 gr

Berat tanah kering = (berat container + tanah kering) – berat container

= 37.5– 11.6

= 25.9 gr

Kadar air, w $= \frac{(BC+tb)-(BC+tk)}{(BC+tk)-BC} \times 100\ \%$

$= \frac{(11.6+31.5)-(11.6+25.9)}{(11.6+25.9)-11.6} \times 100\%$

= 23.166%

No. container = tengah

Berat container = 13 gr

Berat containe +tanah basah = 47.6 gr

Berat container+tanah kering = 43 gr

Berat tanah basah = (berat container + tanah basah) – berat container

= 47.6 – 13

= 34.6 gr

Berat tanah kering = (berat container + tanah kering) – berat container

= 43 – 13

= 30 gr

Kadar air, w $= \frac{(BC+tb)-(BC+tk)}{(BC+tk)-BC} \; x \; 100\ \%$

$= \frac{(13\ +34{,}6\ )-(13\ +30\ )}{(13\ +30\ )-13} \times 100\%$

= 15.33 %

No. container = bawah

Berat container = 13.3 gr

Berat containe +tanah basah = 46.1 gr

Berat container+tanah kering = 38.4 gr

Berat tanah basah = (berat container + tanah basah) – berat container

= 46.1 – 13.3

=32.8 gr

Berat tanah kering = (berat container + tanah kering) – berat container

= 38.4 – 13.3

= 25.1 gr

Kadar air, w $= \frac{(BC+tb)-(BC+tk)}{(BC+tk)-BC} \; x \; 100\ \%$

$= \frac{(13.3\ +32.8)-(13.3\ +\ 25.1\ )}{(13.3\ +\ 25.1\ )-13.3} \times 100\%$

= 30.677 %

Kadar air rata – rata = (kadar air atas+kadar air tengah+ kadar air bawah) / 3

= (23.166+15.33 +30.677)/3

= 23.058 %

Berat isi kering $= \frac{\text{Berat tanah basah}}{(\text{v.sampel}(1+\frac{\text{kadar air rata-rata}}{100})}$

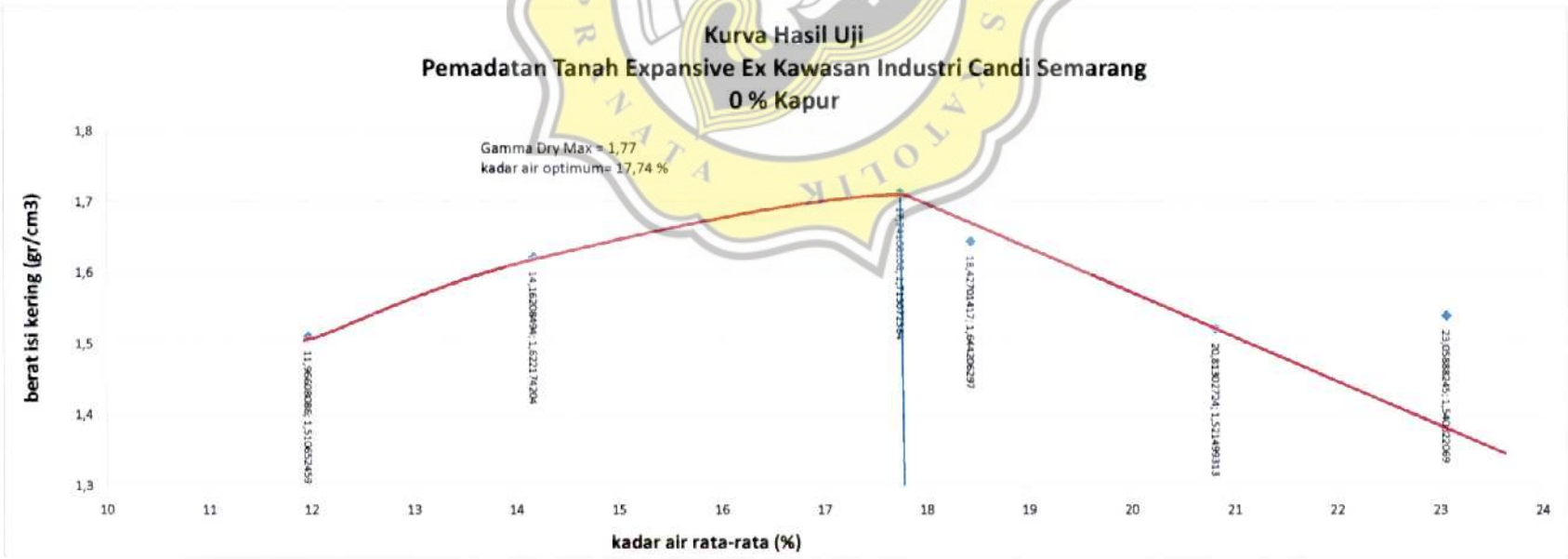
$= \frac{4240}{(2237.31(1+\frac{23.058}{100})}$

= 1.54 gr/cm^3

Kompaksi 0% Kapur

Percobaan Ke	1			2			3			4			5			6		
Berat sample (gr)	4240			4870			4770			4950			4620			4750		
Diameter sample (cm)	15			15			15			15			15			15		
Tinggi sample (cm)	12,667			15			15,9667			15,1333			13,4333			13,3333		
Volume sample (cm3)	2237,308875			2649,375			2820,118388			2672,919113			2372,656613			2354,994113		
Berat isi tanah (gr/cm3)	1,895133947			1,83816938			1,691418354			1,851907892			1,947184424			2,01699018		
Berat isi kering (gr/cm3)	**1,540022069**			**1,521499313**			**1,510652459**			**1,622174204**			**1,644206297**			**1,713072584**		
No Container	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah
Berat Container (gr)	11,6	13	13,3	11,9	11,4	7	6,9	7	6,7	6,9	7	6,7	6,7	6,7	7	6,7	6,1	7
Berat Container + tanah basah(gr)	43,5	47,6	46,1	55,4	42,3	44	45,2	47,1	55,4	48,6	44,6	46,2	46,8	51,1	43,6	45,2	39,6	46,7
Berat Container + tanah Kering(gr)	37,5	43	38,4	45,4	37,5	39,4	40,4	43	50,9	44,1	38,4	42,4	41,2	44,9	36,8	41,3	32,1	42,1
Berat Tanah basah (gr)	31,9	34,6	32,8	43,5	30,9	37	38,3	40,1	48,7	41,7	37,6	39,5	40,1	44,4	36,6	38,5	33,5	39,7
Berat Tanah kering (gr)	25,9	30	25,1	33,5	26,1	32,4	33,5	36	44,2	37,2	31,4	35,7	34,5	38,2	29,8	34,6	26	35,1
Kadar air (%)	23,16602	15,33333	30,67729	29,85075	18,3908	14,19753	14,32836	11,38889	10,181	12,09677	19,74522	10,64426	16,23188	16,23037	22,81879	11,27168	28,84615	13,10541
[illegible]	[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]		

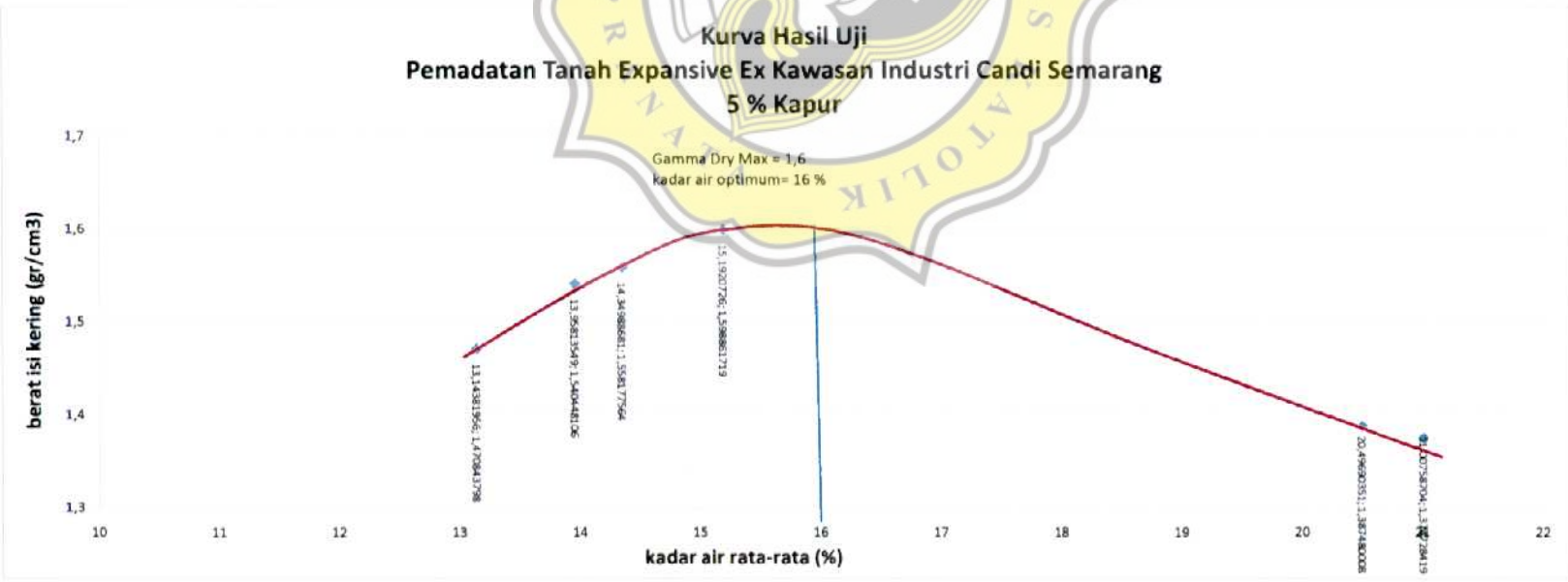
gamma dry rata	**1,540022069**	**1,521499313**	**1,510652459**	**1,622174204**	**1,644206297**	**1,713072584**
w rerata	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



Kompaksi 5% Kapur

Percobaan Ke	1			2			3			4			5			6		
Berat sample (gr)	5230			5400			5020			5240			5350			5330		
Diameter sample (cm)	15			15			15			15			15			15		
Tinggi sample (cm)	17,8			16,6			17			16,9			17			18,13333333		
Volume sample (cm3)	3143,925			2931,975			3002,625			2984,9625			3002,625			3202,8		
Berat Isi tanah (gr/cm3)	1,663525688			1,841761952			1,671870447			1,75546594			1,781774281			1,664168852		
Berat isi kering (gr/cm3)	**1,374728419**			**1,598861719**			**1,387480008**			**1,540448106**			**1,558177564**			**1,470843798**		
No Container	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah
Berat Container (gr)	12,5	11,9	11,3	6,8	4,8	6,2	4,7	6,8	6,6	7,1	11,2	9,6	6,2	11,3	5,4	7,1	11,2	4,6
Berat Container + tanah basah(gr)	55,8	67,2	75,1	53,3	40,7	55,5	37,1	55,3	59,2	55,9	70,7	47	56,2	75,8	74,4	72,9	70,4	54,6
Berat Container + tanah Kering(gr)	47,9	57,6	64,6	47,1	35,8	49,3	31,5	46,6	50,9	50	64	42	47,9	71,7	64,7	63,7	64,5	49,2
Berat Tanah basah (gr)	43,3	55,3	63,8	46,5	35,9	49,3	32,4	48,5	52,6	48,8	59,5	37,4	50	64,5	69	65,8	59,2	50
Berat Tanah kering (gr)	35,4	45,7	53,3	40,3	31	43,1	26,8	39,8	44,3	42,9	52,8	32,4	41,7	60,4	59,3	56,6	53,3	44,6
Kadar air (%)	22,31638	21,00656	19,69981	15,38462	15,80645	14,38515	20,89552	21,8593	18,73589	13,75291	12,68939	15,4321	19,90408	6,788079	16,3575	16,25442	11,06942	12,10762
[illegible]	[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]		

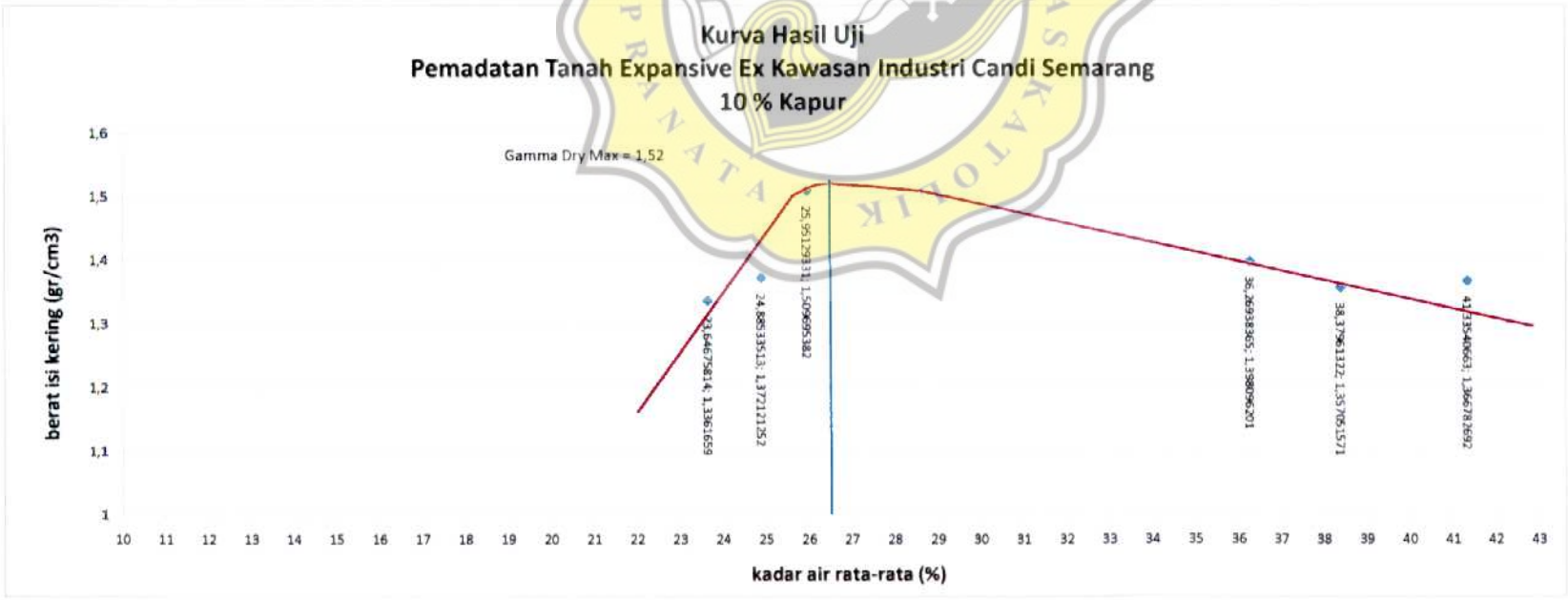
gamma dry rata	**1,374728419**	**1,598861719**	**1,387480008**	**1,540448106**	**1,558177564**	**1,470843798**
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]



Kompaksi 10% Kapur

Percobaan Ke	1			2			3			4			5			6		
Berat sample (gr)	4630			4550			5340			5130			5425			5900		
Diameter sample (cm)	15			15			15			15			15			15		
Tinggi sample (cm)	15,86666667			15,03333333			15,9			15,46666667			15,9			17,53333333		
Volume sample (cm3)	2802,45			2655,2625			2808,3375			2731,8			2808,3375			3096,825		
Berat isi tanah (gr/cm3)	1,652125818			1,713578224			1,901480858			1,877882715			1,931747876			1,905177077		
Berat isi kering (gr/cm3)	1,3361659			1,372121252			1,509695382			1,357051571			1,366782692			1,398096201		
No Container	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah
Berat Container (gr)	11,2	6,5	4,7	12,7	6,6	4,6	12,9	6,2	4,8	11,9	6,6	4,8	12,9	6,2	4,7	11,9	6,6	4,8
Berat Container + tanah basah(gr)	63,3	53,4	43,9	64,2	61,9	36,8	52,3	49,1	46,2	54,5	46,3	53,1	53,6	49,1	41,6	52,3	44,5	36,3
Berat Container + tanah Kering(gr)	53,2	47,8	34,1	54,7	50,4	30,2	44,5	40,2	37,4	43,4	34,5	39,9	42,8	34,2	32,1	41	35,9	27,2
Berat Tanah basah (gr)	52,1	46,9	39,2	51,5	55,3	32,2	39,4	42,9	41,4	42,6	39,7	48,3	40,7	42,9	36,9	40,4	37,9	31,5
Berat Tanah kering (gr)	42	41,3	29,4	42	43,8	25,6	31,6	34	32,6	31,5	27,9	35,1	29,9	28	27,4	29,1	29,3	22,4
Kadar air (%)	24,04762	13,55932	33,33333	22,61905	26,25571	25,78125	24,68354	26,17647	26,99387	35,2381	42,29391	37,60684	36,1204	53,21429	34,67153	38,83162	29,35154	40,625
Kadar air rata-rata (%)	[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]		

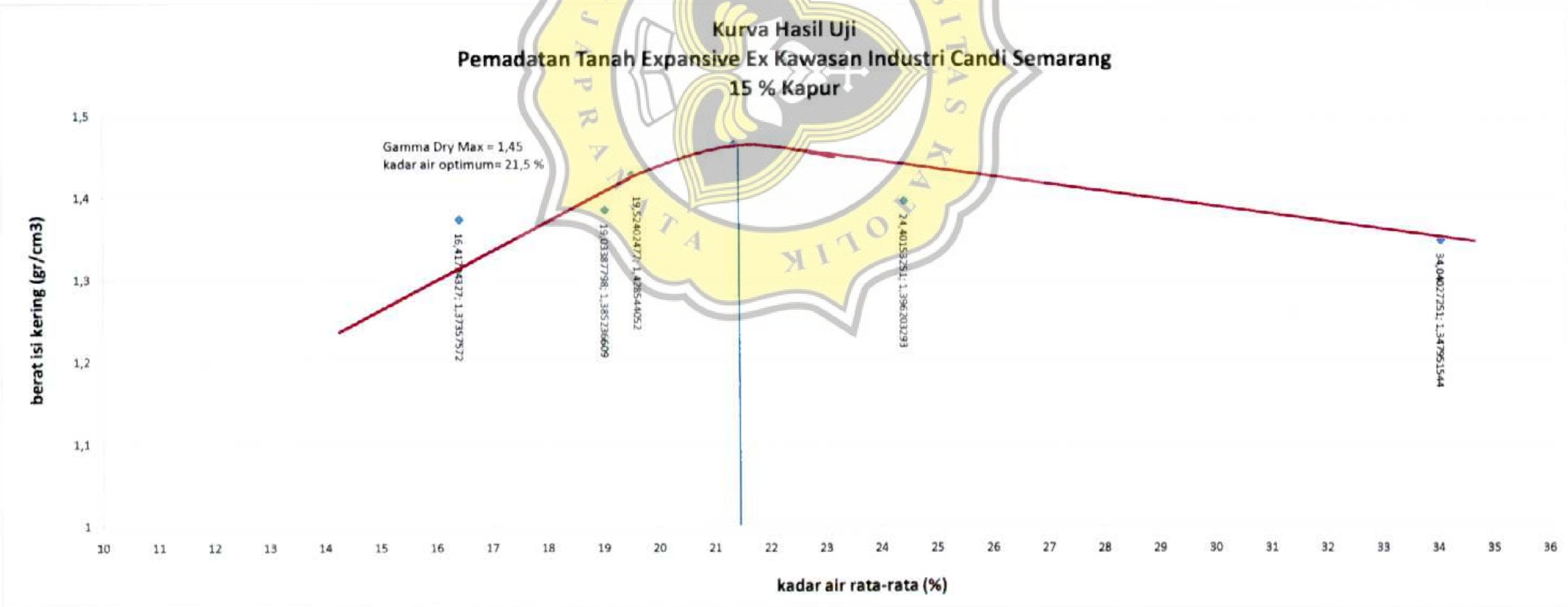
gamma dry rata	1,3361659	1,372121252	1,509695382	1,357051571	1,366782692	1,398096201
w rerata	23,64675814	24,88533513	25,95129311	36,26938365	38,37961122	41,35406663



Kompaksi 15% Kapur

Percobaan Ke	1			2			3			4			5			6		
Berat sample (gr)	5790			5650			5730			5970			5430			5840		
Diameter sample (cm)	15			15			15			15			15			15		
Tinggi sample (cm)	20,5			19,4			19			19			17,7			18,3		
Volume sample (cm3)	3620,8125			3426,525			3355,875			3355,875			3126,2625			3232,2375		
Berat isi tanah (gr/cm3)	1,599088602			1,648900854			1,707453347			1,778969717			1,736898293			1,806797922		
Berat isi kering (gr/cm3)	1,37357572			1,385236609			1,428544052			1,465854495			1,396203293			1,347951544		
No Container	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah	Atas	Tengah	Bawah
Berat Container (gr)	4,7	12,2	7,1	4,7	12,8	4,7	4,6	12,5	7	4,7	11,3	9,4	4,8	12	6,7	4,7	11,3	6,7
Berat Container + tanah basah(gr)	65,6	75,5	72,4	69,1	81,5	64	64,1	83,7	77,7	57,7	77,4	74,2	56	85,6	63,3	67	85,3	72,2
Berat Container + tanah Kering(gr)	54,6	67,9	64,6	55,8	71,5	56,7	55,1	72,3	65,1	48,5	65,5	62,9	45,8	71	52,5	48,5	68,6	56,8
Berat Tanah basah (gr)	60,9	63,3	65,3	64,4	68,7	59,3	59,5	71,2	70,7	53	66,1	64,8	51,2	73,6	56,6	62,3	74	65,5
Berat Tanah kering (gr)	49,9	55,7	57,5	51,1	58,7	52	50,5	59,8	58,1	43,8	54,2	53,5	41	59	45,8	43,8	57,3	50,1
Kadar air (%)	22,04409	13,64452	13,56522	26,0274	17,03578	14,03846	17,82178	19,06355	21,68675	21,00457	21,95572	21,1215	24,87805	24,74576	23,58079	42,23744	29,14485	30,73852
Kadar air rata-rata (%)	16,41794327			19,03387798			19,52402477			[illegible]			24,40153251			34,04027251		

gamma dry rata	1,37357572	1,385236609	1,428544052	1,465854495	1,396203293	1,347951544
w rerata	16,41794327	19,03387798	19,52402477	[illegible]	24,40153251	34,04027251



LAMPIRAN 5

CBR

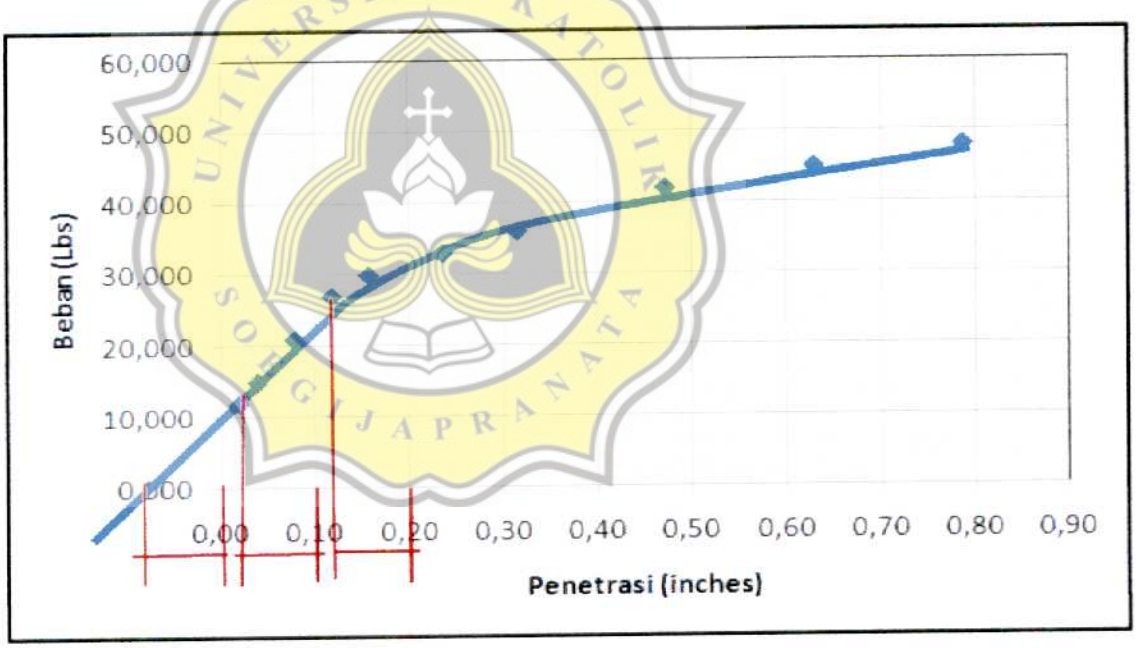
(California Bearing Ratio)

UJI CBR LABORATORIUM

Project	: TUGAS AKHIR	Date	: 5 april 2014
Location	: TANAH EKSPANSIF KAWASAN INDUSTRI CANDI, SMG	Time	: 16:48
Test by	: DEDY (09.12.0021) HERYANTO S. (09.12.0028)	Kalibrasi	: 5.99387 lbf/div
Penetrasi	: inch / menit		

Tingkat pemadatan : 6 passing penambahan kapur 0 % kapur

WAKTU	Penurunan (inch)	Bacaan Dial	Beban (lb)
15 detik	0,02	2,00	11,988
30 detik	0,04	2,50	14,985
1 menit	0,08	3,50	20,979
1,5 menit	0,12	4,50	26,972
2 menit	0,16	5,00	29,969
3 menit	0,24	5,50	32,966
4 menit	0,31	6,00	35,963
6 menit	0,47	7,00	41,957
8 menit	0,63	7,50	44,954
10 menit	0,79	8,00	47,951



Penurunan (inch)	Beban Terkoreksi	Nilai CBR (%)	Keterangan
0,1	12	1,2	CBR 0.2 > CBR 0.1
0,2	24	1,6	

Catatan :

CBR_0,1 = 12 x 100/1000 =1,2 %

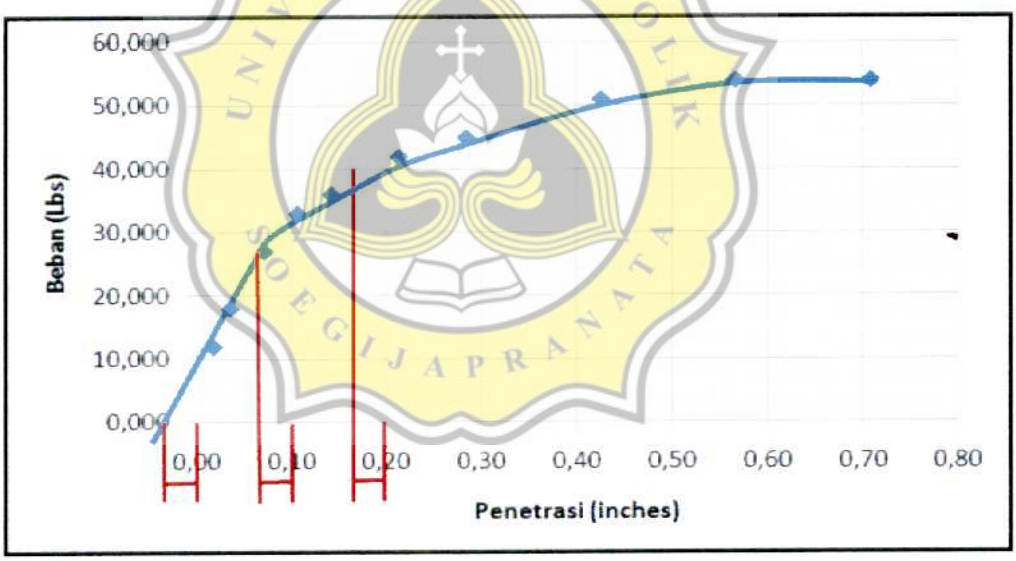
CBR_0,2 = 24 x 100/1500 =1,6 %

Kesimpulan : CBR 0.2 > CBR 0.1 "tidak OK"

UJI CBR LABORATORIUM

Project	: TUGAS AKHIR	Date	: 5 april
Location	: TANAH EKSPANSIF KAWASAN INDUSTRI CANDI,	Time	: 17:18
Test by	: DEDY (09.12.0021) HERYANTO S. (09.12.0028)	Kalibrasi	: 5.99387 lbf/div
Penetrasi	: inch / menit		
Tingkat pemadatan :	6 passing	penambahan kapur	0 % kapur

WAKTU	Penurunan (inch)	Bacaan Dia	Beban (lb)
15 detik	0,02	2,00	11,988
30 detik	0,04	3,00	17,982
1 menit	0,07	4,50	26,972
1,5 menit	0,11	5,50	32,966
2 menit	0,14	6,00	35,963
3 menit	0,21	7,00	41,957
4 menit	0,28	7,50	44,954
6 menit	0,43	8,50	50,948
8 menit	0,57	9,00	53,945
10 menit	0,71	9,00	53,945



Penurunan (inch)	Beban Terkoreksi	Nilai CBR (%)	Keterangan
0,1	25	2,5	CBR 0.2 > CBR 0.1
0,2	36	2,4	

Catatan :

CBR_0,1 = 25 x 100/1000 =2,5 %

CBR_0,2 = 36 x 100/1500 =2,4 %

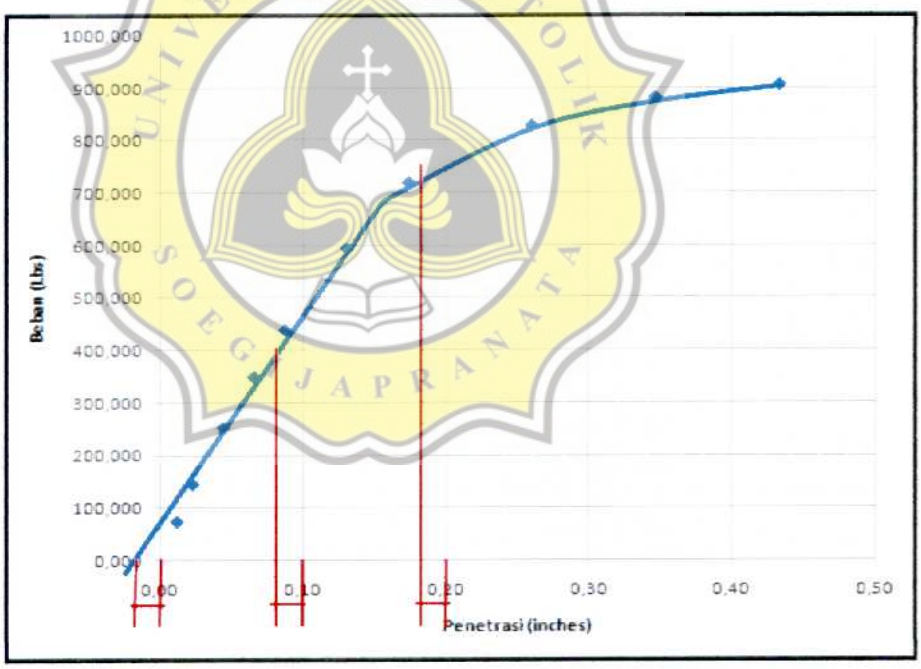
Kesimpulan : CBR 0.2 < CBR 0.1 " OK"

UJI CBR LABORATORIUM

Project	: TUGAS AKHIR	Date	: 11 april 2014
Location	: TANAH EKSPANSIF KAWASAN INDUSTRI CANDI,	Time	: 15.23
Test by	: DEDY (09.12.0021) HERYANTO S. (09.12.0028)	Kalibrasi	: 5.99387 lbf/div
Penetrasi	: inch / menit		

Tingkat pemadatan : 6 passing penambahan kapur 5 % kapur

WAKTU	Penurunan (inch)	Bacaan Dia	Beban (lb)
15 detik	0,01	12,00	71,926
30 detik	0,02	24,00	143,853
1 menit	0,04	42,00	251,743
1,5 menit	0,06	58,00	347,644
2 menit	0,09	73,00	437,553
3 menit	0,13	99,00	593,393
4 menit	0,17	120,00	719,264
6 menit	0,26	138,00	827,154
8 menit	0,35	147,00	881,099
10 menit	0,43	151,00	905,074



Penurunan (inch)	Beban Terkoreksi	Nilai CBR (%)	*Keterangan*
0,1	380	38	CBR 0.2 > CBR 0.1
0,2	720	48	

Catatan :

CBR_0,1 = 380 x 100/1000 =38 %

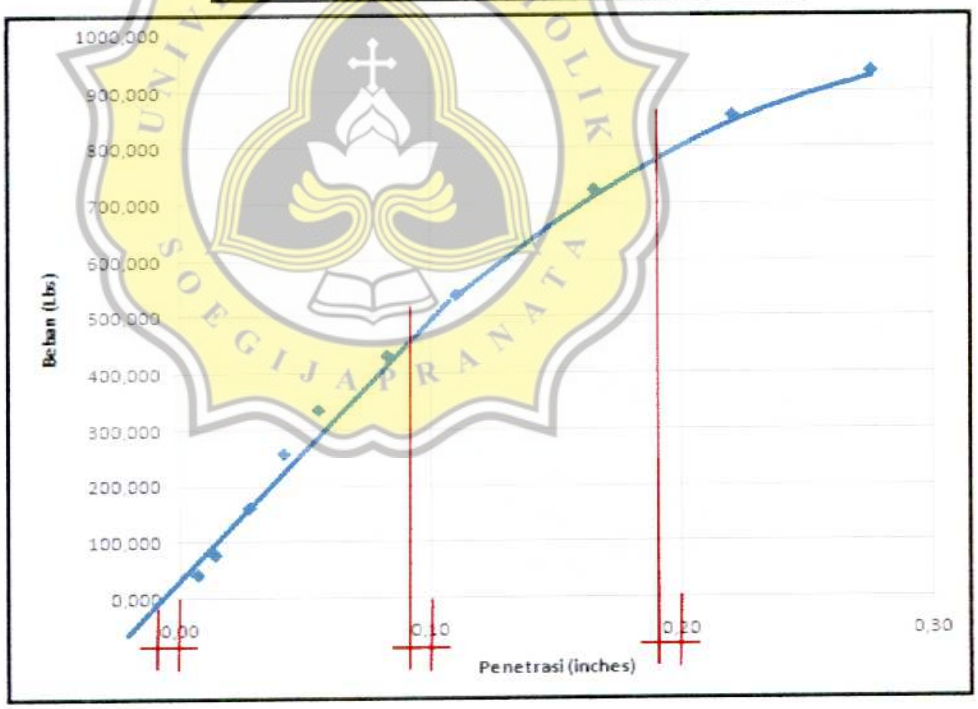
CBR_0,2 = 720 x 100/1500 =48 %

Kesimpulan : CBR 0.2 > CBR 0.1 "tidak OK"

UJI CBR LABORATORIUM

Project	: TUGAS AKHIR	Date	: 16 april 2013
Location	: TANAH EKSPANSIF KAWASAN INDUSTRI CANDI, SMG	Time	: 15:00
Test by	: DEDY (09.12.0021) HERYANTO S. (09.12.0028)	Kalibrasi	: 5.99387 lbf/div
Penetrasi	: inch / menit		
Tingkat pemadatan	: 6 passing	penambahan kapur	10 % kapur

WAKTU	Penurunan (inch)	Bacaan Dial	Beban (lb)
15 detik	0,01	7,00	41,957
30 detik	0,01	13,00	77,920
1 menit	0,03	27,00	161,834
1,5 menit	0,04	43,00	257,736
2 menit	0,06	56,00	335,657
3 menit	0,08	72,00	431,559
4 menit	0,11	90,00	539,448
6 menit	0,17	121,00	725,258
8 menit	0,22	143,00	857,123
10 menit	0,28	156,00	935,044



Penurunan (inch)	Beban Terkoreksi	Nilai CBR (%)	Keterangan
0,1	450	45	CBR 0.2 > CBR 0.1
0,2	780	52	

catatan :

CBR_0,1 = 450 x 100/1000 =45 %

CBR_0,2 = 780 x 100/1500 =52 %

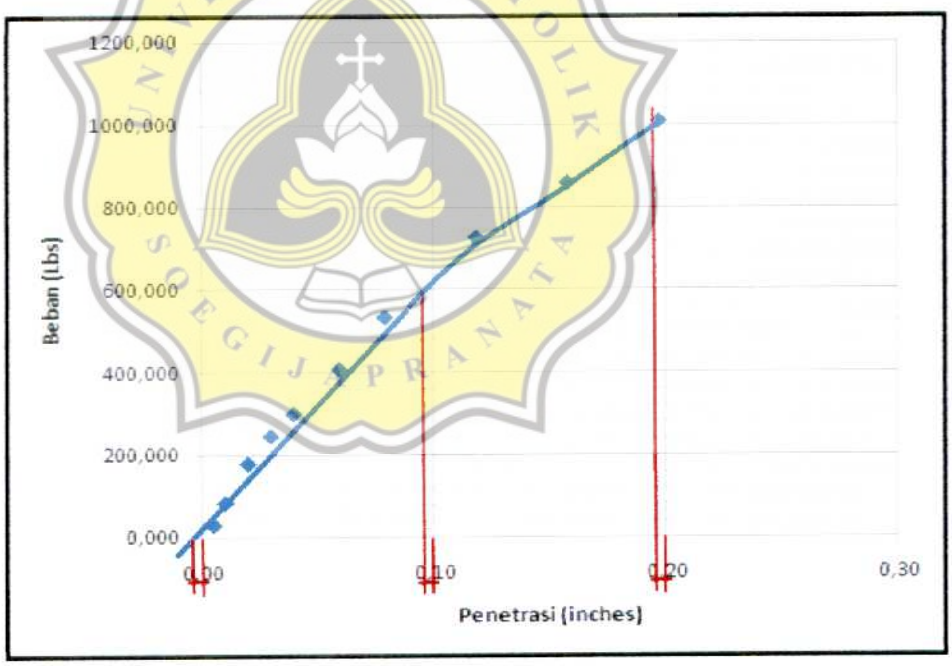
Kesimpulan : CBR 0.2 > CBR 0.1 "tidak OK"

UJI CBR LABORATORIUM

Project	: TUGAS AKHIR	Date	: 16 april 2014
Location	: TANAH EKSPANSIF KAWASAN INDUSTRI CANDI, SMG	Time	: 15 : 45
Test by	: DEDY (09.12.0021) HERYANTO S. (09.12.0028)	Kalibrasi	: 5.99387 lbf/div
Penetrasi	: inch / menit		

Tingkat pemadatan : 6 passing penambahan kapur 10 % kapur

WAKTU	Penurunan (inch)	Bacaan Dial	Beban (lb)
15 detik	0,00	5,00	29,969
30 detik	0,01	14,00	83,914
1 menit	0,02	30,00	179,816
1,5 menit	0,03	41,00	245,749
2 menit	0,04	50,00	299,694
3 menit	0,06	68,00	407,583
4 menit	0,08	89,00	533,454
6 menit	0,12	121,00	725,258
8 menit	0,16	143,00	857,123
10 menit	0,20	168,00	1006,970



Penurunan (inch)	Beban Terkoreksi	Nilai CBR (%)	Keterangan
0,1	600	60	CBR 0.2 > CBR 0.1
0,2	980	65	

Catatan :

CBR_0,1 = 600 x 100/1000 =60 %

CBR_0,2 = 980 x 100/1500 =65 %

Kesimpulan : CBR 0.2 > CBR 0.1 "tidak OK"

LAMPIRAN 6

DIRECT SHEAR

Penambahan 0% kapur

Beban 5 kg

Kalibrasi 0,111 kg/div

Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,18227 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	15	1,665	0,05892
20	29	3,219	0,11391
30	35	3,885	0,13747
40	40	4,44	0,15711
50	43	4,773	0,1689
60	46	5,106	0,18068
70	46	5,106	0,18068
80	46	5,106	0,18068
90	47	5,217	0,18461
100	47	5,217	0,18461
110	48	5,328	0,18854
120	49	5,439	0,19246
130	49	5,439	0,19246
140	49	5,439	0,19246
150	49	5,439	0,19246
160	49	5,439	0,19246

Beban 10 kg

Penambahan 0% kapur

Kalibrasi 0,111 kg/div

Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,364562 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	4	0,444	0,0157113
20	6	0,666	0,0235669
30	8	0,888	0,0314225
40	12	1,332	0,0471338
50	16	1,776	0,062845
60	19	2,109	0,0746285
70	22	2,442	0,0864119
80	25	2,775	0,0981953
90	28	3,108	0,1099788
100	30	3,33	0,1178344
110	32	3,552	0,12569
120	34	3,774	0,1335456
130	35	3,885	0,1374735
140	36	3,996	0,1414013
150	38	4,218	0,1492569
160	39	4,329	0,1531847
170	39	4,329	0,1531847
180	40	4,44	0,1571125
190	41	4,551	0,1610403
200	42	4,662	0,1649682
210	43	4,773	0,168896
220	43	4,773	0,168896
230	44	4,884	0,1728238
240	44	4,884	0,1728238
250	45	4,995	0,1767516
260	45	4,995	0,1767516
270	45	4,995	0,1767516
280	46	5,106	0,1806794
290	46	5,106	0,1806794
300	47	5,217	0,1846072
310	48	5,328	0,188535
320	48	5,328	0,188535
330	48	5,328	0,188535
340	49	5,439	0,1924628
350	50	5,55	0,1963907
360	50	5,55	0,1963907
370	51	5,661	0,2003185
380	51	5,661	0,2003185
390	51	5,661	0,2003185
400	52	5,772	0,2042463

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	52	5,772	0,2042463
420	53	5,883	0,2081741
430	53	5,883	0,2081741
440	54	5,994	0,2121019
450	54	5,994	0,2121019
460	54	5,994	0,2121019
470	54	5,994	0,2121019
480	55	6,105	0,2160297
490	56	6,216	0,2199575
500	57	6,327	0,2238854
510	57	6,327	0,2238854
520	57	6,327	0,2238854
530	57	6,327	0,2238854
540	57	6,327	0,2238854
550	57	6,327	0,2238854

Beban 15 kg

Penambahan 0% kapur

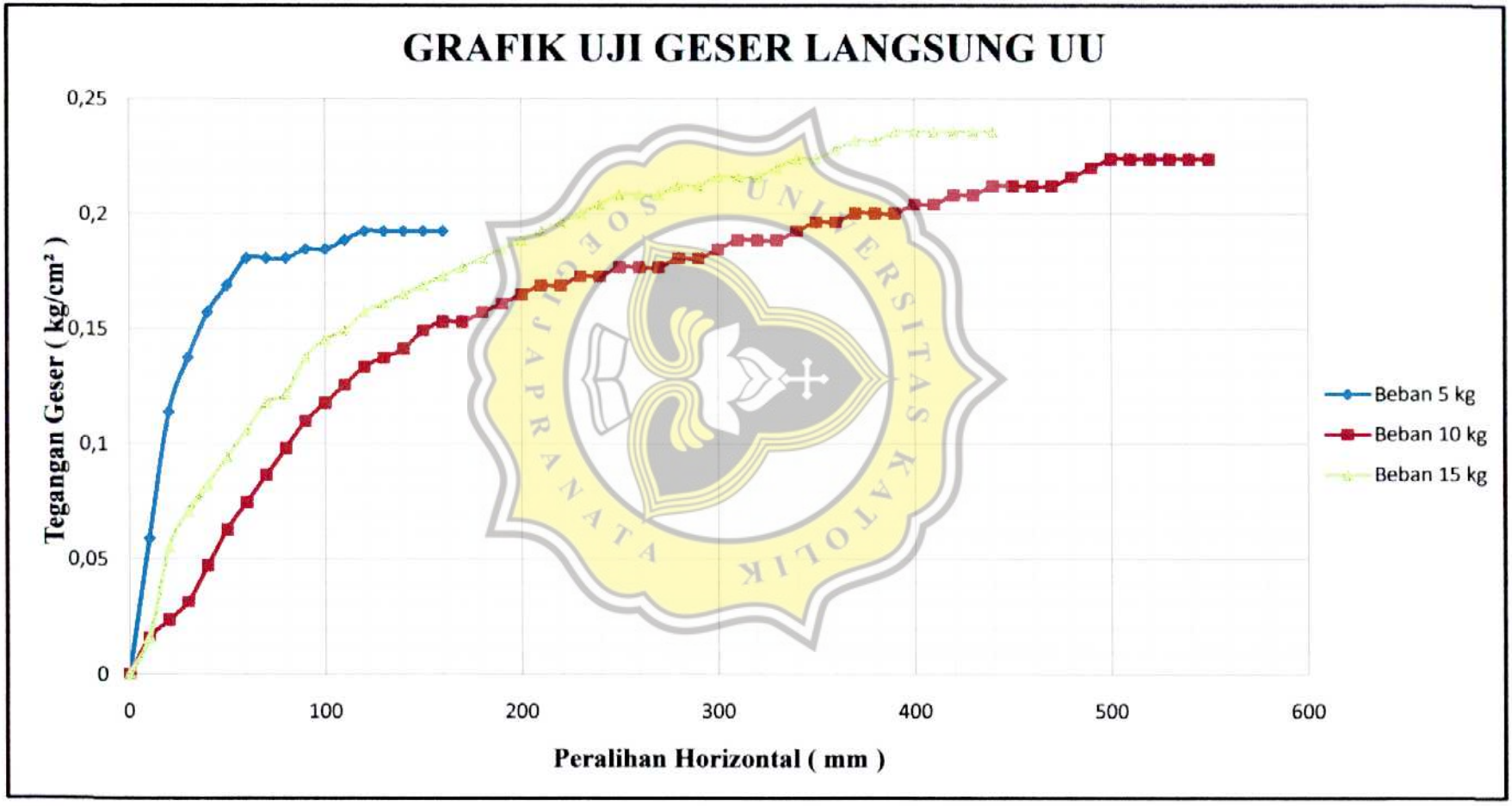
Kalibrasi 0,111 kg/div

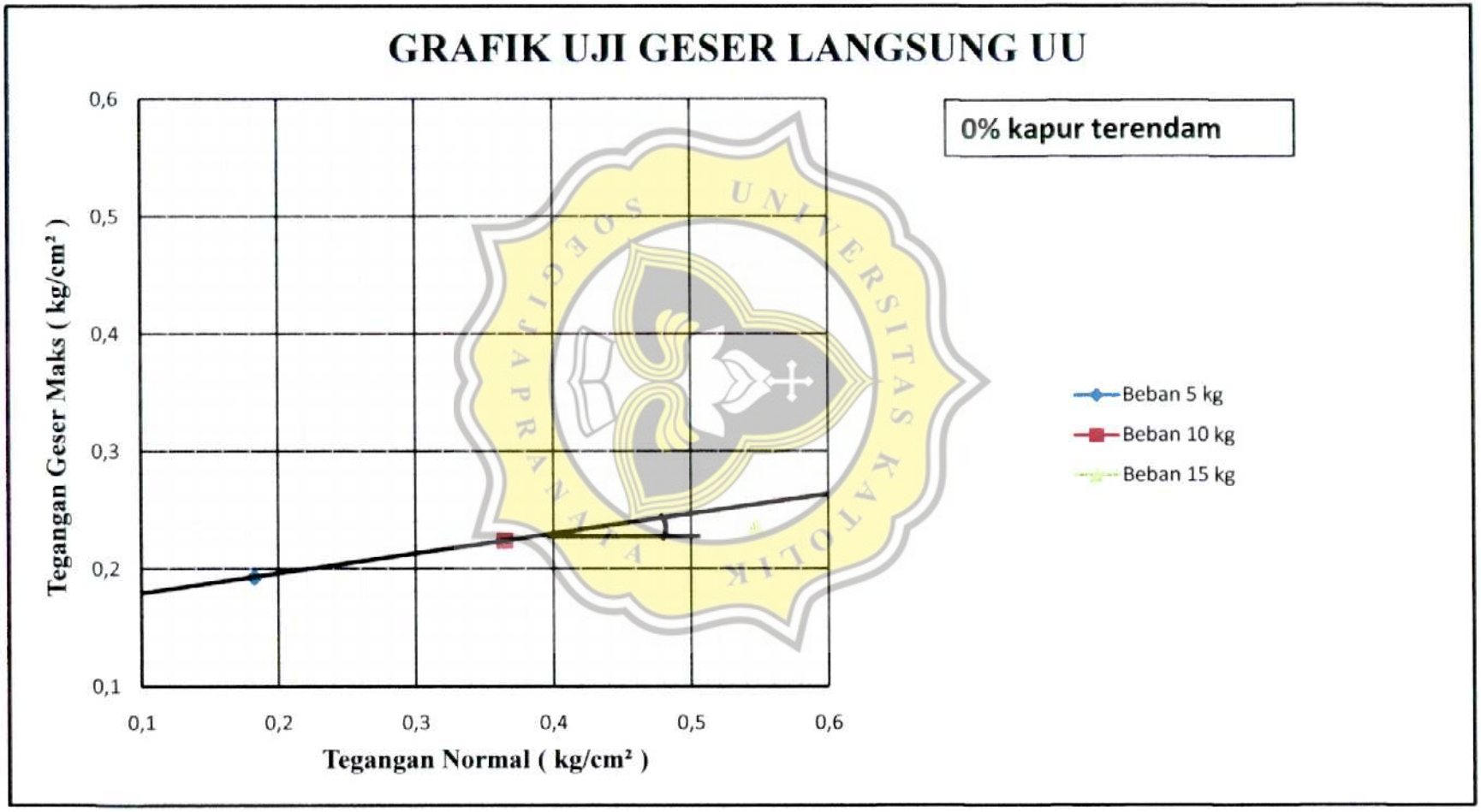
Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,5467974 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	4	0,444	0,015711
20	14	1,554	0,054989
30	18	1,998	0,070701
40	21	2,331	0,082484
50	24	2,664	0,094268
60	27	2,997	0,106051
70	30	3,33	0,117834
80	31	3,441	0,121762
90	35	3,885	0,137473
100	37	4,107	0,145329
110	38	4,218	0,149257
120	40	4,44	0,157113
130	41	4,551	0,16104
140	42	4,662	0,164968
150	43	4,773	0,168896
160	44	4,884	0,172824
170	45	4,995	0,176752
180	46	5,106	0,180679
190	47	5,217	0,184607
200	48	5,328	0,188535
210	49	5,439	0,192463
220	50	5,55	0,196391
230	51	5,661	0,200318
240	52	5,772	0,204246
250	53	5,883	0,208174
260	53	5,883	0,208174
270	53	5,883	0,208174
280	54	5,994	0,212102
290	54	5,994	0,212102
300	55	6,105	0,21603
310	55	6,105	0,21603
320	55	6,105	0,21603
330	56	6,216	0,219958
340	57	6,327	0,223885
350	57	6,327	0,223885
360	58	6,438	0,227813
370	59	6,549	0,231741
380	59	6,549	0,231741
390	60	6,66	0,235669
400	60	6,66	0,235669

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	60	6,66	0,2356688
420	60	6,66	0,2356688
430	60	6,66	0,2356688
440	60	6,66	0,2356688


GRAFIK UJI GESER LANGSUNG UU
Tegangan Geser (kg/cm²)
0,25
0,2
0,15
0,1
0,05
0
0
100
200
300
400
500
600
Peralihan Horizontal (mm)
Beban 5 kg
Beban 10 kg
Beban 15 kg


GRAFIK UJI GESER LANGSUNG UU
0% kapur terendam
Tegangan Geser Maks (kg/cm²)
0,6
0,5
0,4
0,3
0,2
0,1
0,1
0,2
0,3
0,4
0,5
0,6
Tegangan Normal (kg/cm²)
Beban 5 kg
Beban 10 kg
Beban 15 kg

penambahan 5% kapur

Beban 5 kg

Kalibrasi 0,111 kg/div

Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,18227 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	8	0,888	0,031423
20	13	1,443	0,051062
30	18	1,998	0,070701
40	23	2,553	0,09034
50	34	3,774	0,133546
60	44	4,884	0,172824
70	51	5,661	0,200318
80	59	6,549	0,231741
90	67	7,437	0,263163
100	75	8,325	0,294586
110	81	8,991	0,318153
120	88	9,768	0,345648
130	94	10,434	0,369214
140	100	11,1	0,392781
150	106	11,766	0,416348
160	112	12,432	0,439915
170	118	13,098	0,463482
180	122	13,542	0,479193
190	128	14,208	0,50276
200	133	14,763	0,522399
210	139	15,429	0,545966
220	144	15,984	0,565605
230	149	16,539	0,585244
240	153	16,983	0,600955
250	157	17,427	0,616667
260	162	17,982	0,636306
270	170	18,87	0,667728
280	174	19,314	0,683439
290	178	19,758	0,699151
300	183	20,313	0,71879
310	187	20,757	0,734501
320	191	21,201	0,750212
330	195	21,645	0,765924
340	199	22,089	0,781635
350	203	22,533	0,797346
360	206	22,866	0,80913
370	209	23,199	0,820913
380	212	23,532	0,832696
390	215	23,865	0,84448
400	217	24,087	0,852335

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	220	24,42	0,864119
420	222	24,642	0,871975
430	223	24,753	0,875902
440	225	24,975	0,883758
450	226	25,086	0,887686
460	228	25,308	0,895541
470	229	25,419	0,899469
480	230	25,53	0,903397
490	230	25,53	0,903397
500	231	25,641	0,907325
510	231	25,641	0,907325
520	231	25,641	0,907325
530	231	25,641	0,907325

Beban 10 kg

penambahan 5% kapur

Kalibrasi 0,111 kg/div
Kecepatan Peralihan 0,2582 mm/div
Tegangan normal 0,36456 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	6	0,666	0,023567
20	10	1,11	0,039278
30	15	1,665	0,058917
40	39	4,329	0,153185
50	60	6,66	0,235669
60	84	9,324	0,329936
70	100	11,1	0,392781
80	115	12,765	0,451699
90	129	14,319	0,506688
100	143	15,873	0,561677
110	160	17,76	0,62845
120	176	19,536	0,691295
130	192	21,312	0,75414
140	207	22,977	0,813057
150	225	24,975	0,883758
160	237	26,307	0,930892
170	249	27,639	0,978025
180	260	28,86	1,021231
190	270	29,97	1,06051
200	280	31,08	1,099788
210	288	31,968	1,13121
220	295	32,745	1,158705
230	302	33,522	1,1862
240	307	34,077	1,205839
250	312	34,632	1,225478
260	317	35,187	1,245117
270	322	35,742	1,264756
280	328	36,408	1,288323
290	333	36,963	1,307962
300	344	38,184	1,351168
310	355	39,405	1,394374
320	360	39,96	1,414013
330	362	40,182	1,421868
340	365	40,515	1,433652
350	369	40,959	1,449363
360	372	41,292	1,461146
370	374	41,514	1,469002
380	377	41,847	1,480786
390	380	42,18	1,492569
400	382	42,402	1,500425

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	383	42,513	1,504352
420	384	42,624	1,50828
430	388	43,068	1,523992
440	390	43,29	1,531847
450	390	43,29	1,531847
460	390	43,29	1,531847
470	390	43,29	1,531847

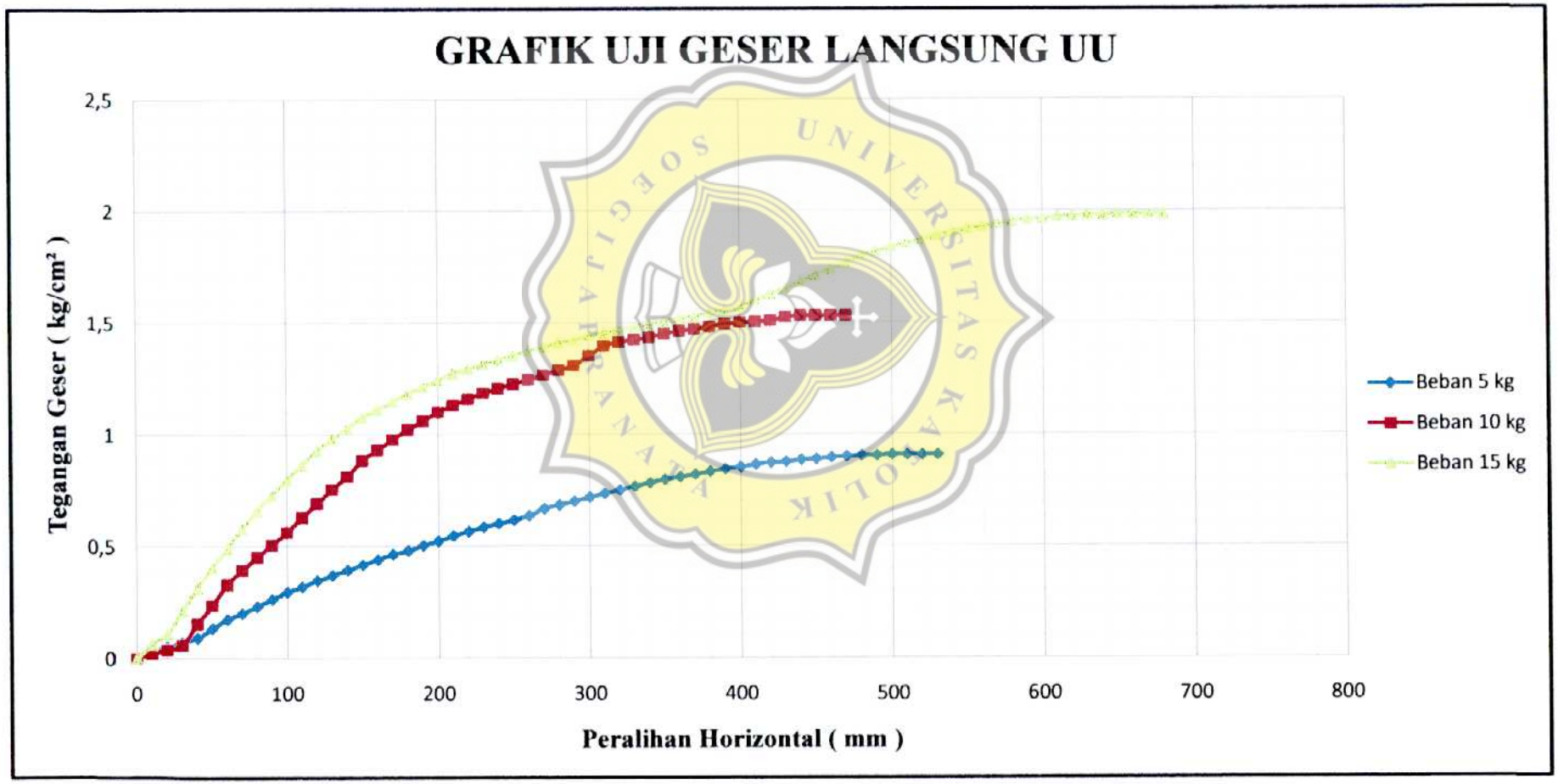
penambahan 5% kapur

Beban 15 kg

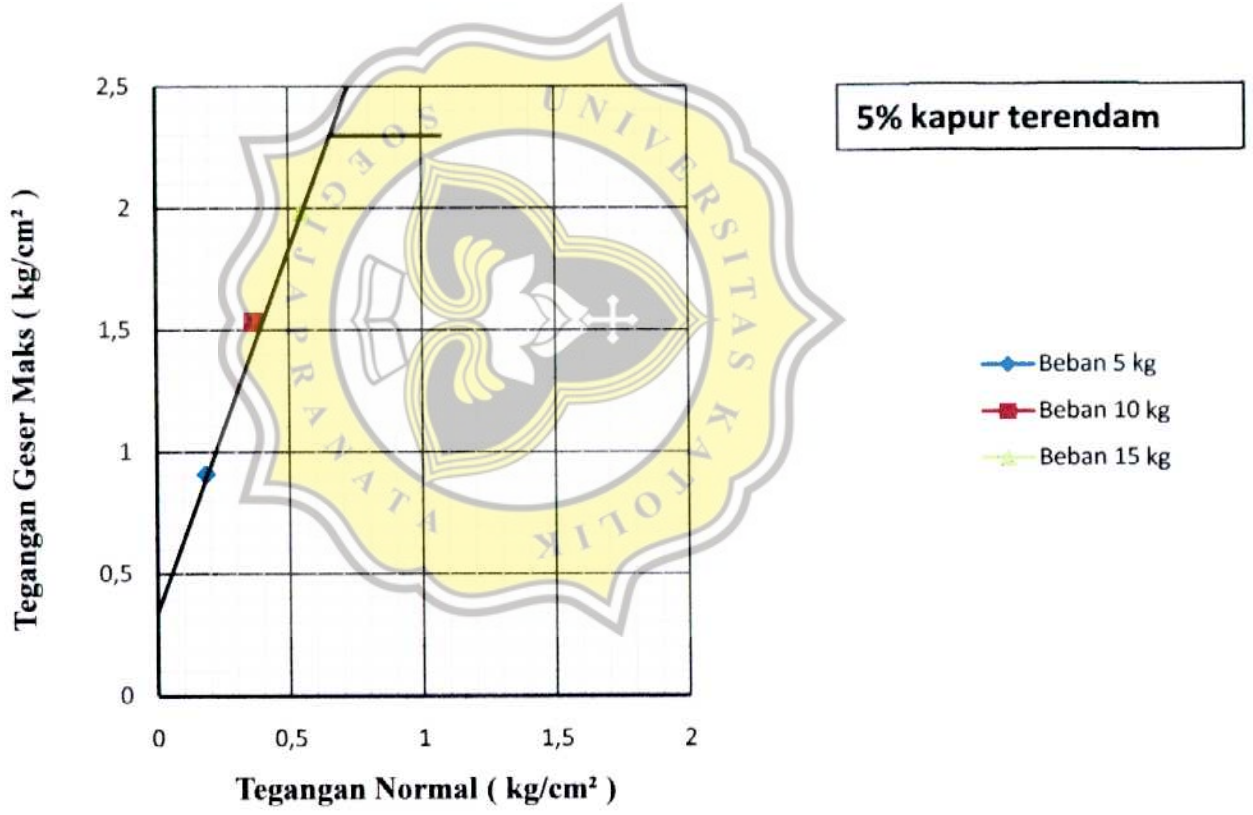
Kalibrasi 0,111 kg/div
Kecepatan Peralihan 0,2582 mm/div
Tegangan normal 0,546797 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	17	1,887	0,066773
20	28	3,108	0,109979
30	54	5,994	0,212102
40	80	8,88	0,314225
50	103	11,433	0,404565
60	125	13,875	0,490977
70	147	16,317	0,577389
80	168	18,648	0,659873
90	185	20,535	0,726645
100	203	22,533	0,797346
110	220	24,42	0,864119
120	236	26,196	0,926964
130	249	27,639	0,978025
140	261	28,971	1,025159
150	274	30,414	1,076221
160	283	31,413	1,111571
170	292	32,412	1,146921
180	301	33,411	1,182272
190	309	34,299	1,213694
200	316	35,076	1,241189
210	324	35,964	1,272611
220	329	36,519	1,292251
230	335	37,185	1,315817
240	340	37,74	1,335456
250	344	38,184	1,351168
260	350	38,85	1,374735
270	354	39,294	1,390446
280	359	39,849	1,410085
290	362	40,182	1,421868
300	367	40,737	1,441507
310	370	41,07	1,453291
320	374	41,514	1,469002
330	377	41,847	1,480786
340	380	42,18	1,492569
350	383	42,513	1,504352
360	387	42,957	1,520064
370	389	43,179	1,527919
380	393	43,623	1,543631
390	396	43,956	1,555414
400	400	44,4	1,571125

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	407	45,177	1,59862
420	414	45,954	1,6261146
430	421	46,731	1,6536093
440	428	47,508	1,681104
450	436	48,396	1,7125265
460	443	49,173	1,7400212
470	450	49,95	1,7675159
480	458	50,838	1,7989384
490	463	51,393	1,8185775
500	468	51,948	1,8382166
510	472	52,392	1,8539278
520	476	52,836	1,8696391
530	481	53,391	1,8892781
540	485	53,835	1,9049894
550	489	54,279	1,9207006
560	491	54,501	1,9285563
570	494	54,834	1,9403397
580	497	55,167	1,9521231
590	499	55,389	1,9599788
600	500	55,5	1,9639066
610	502	55,722	1,9717622
620	503	55,833	1,97569
630	504	55,944	1,9796178
640	504	55,944	1,9796178
650	505	56,055	1,9835456
660	505	56,055	1,9835456
670	505	56,055	1,9835456
680	505	56,055	1,9835456


GRAFIK UJI GESER LANGSUNG UU
Tegangan Geser (kg/cm²)
2,5
2
1,5
1
0,5
0
0
100
200
300
400
500
600
700
800
Peralihan Horizontal (mm)
Beban 5 kg
Beban 10 kg
Beban 15 kg

GRAFIK UJI GESER LANGSUNG UU



Penambahan 10% kapur

Beban 5 kg

Kalibrasi 0,111 kg/div
Kecepatan Peralihan 0,2582 mm/div
Tegangan normal 0,182266 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	6	0,666	0,023567
20	18	1,998	0,070701
30	22	2,442	0,086412
40	30	3,33	0,117834
50	38	4,218	0,149257
60	40	4,44	0,157113
70	50	5,55	0,196391
80	59	6,549	0,231741
90	68	7,548	0,267091
100	76	8,436	0,298514
110	83	9,213	0,326008
120	89	9,879	0,349575
130	105	11,655	0,41242
140	110	12,21	0,432059
150	115	12,765	0,451699
160	119	13,209	0,46741
170	122	13,542	0,479193
180	128	14,208	0,50276
190	132	14,652	0,518471
200	136	15,096	0,534183
210	140	15,54	0,549894
220	144	15,984	0,565605
230	148	16,428	0,581316
240	151	16,761	0,5931
250	155	17,205	0,608811
260	159	17,649	0,624522
270	162	17,982	0,636306
280	165	18,315	0,648089
290	168	18,648	0,659873
300	171	18,981	0,671656
310	174	19,314	0,683439
320	176	19,536	0,691295
330	178	19,758	0,699151
340	182	20,202	0,714862
350	183	20,313	0,71879
360	184	20,424	0,722718
370	186	20,646	0,730573
380	188	20,868	0,738429
390	190	21,09	0,746285
400	191	21,201	0,750212

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	193	21,423	0,758068
420	194	21,534	0,761996
430	196	21,756	0,769851
440	197	21,867	0,773779
450	198	21,978	0,777707
460	199	22,089	0,781635
470	200	22,2	0,785563
480	200	22,2	0,785563
490	201	22,311	0,78949
500	202	22,422	0,793418
510	202	22,422	0,793418
520	202	22,422	0,793418
530	202	22,422	0,793418

Penambahan 10% kapur

Beban 10 kg

Kalibrasi 0,111 kg/div

Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,364562 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	30	3,33	0,117834
20	46	5,106	0,180679
30	55	6,105	0,21603
40	65	7,215	0,255308
50	73	8,103	0,28673
60	80	8,88	0,314225
70	87	9,657	0,34172
80	94	10,434	0,369214
90	99	10,989	0,388854
100	105	11,655	0,41242
110	110	12,21	0,432059
120	115	12,765	0,451699
130	121	13,431	0,475265
140	126	13,986	0,494904
150	131	14,541	0,514544
160	135	14,985	0,530255
170	140	15,54	0,549894
180	145	16,095	0,569533
190	148	16,428	0,581316
200	152	16,872	0,597028
210	159	17,649	0,624522
220	162	17,982	0,636306
230	165	18,315	0,648089
240	169	18,759	0,6638
250	172	19,092	0,675584
260	174	19,314	0,683439
270	177	19,647	0,695223
280	180	19,98	0,707006
290	182	20,202	0,714862
300	185	20,535	0,726645
310	188	20,868	0,738429
320	191	21,201	0,750212
330	193	21,423	0,758068
340	195	21,645	0,765924
350	198	21,978	0,777707
360	200	22,2	0,785563
370	202	22,422	0,793418
380	204	22,644	0,801274
390	206	22,866	0,80913
400	207	22,977	0,813057

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	208	23,088	0,816985
420	209	23,199	0,820913
430	210	23,31	0,824841
440	211	23,421	0,828769
450	212	23,532	0,832696
460	212	23,532	0,832696
470	212	23,532	0,832696
480	212	23,532	0,832696

Beban 15 kg

Penambahan 10% kapur

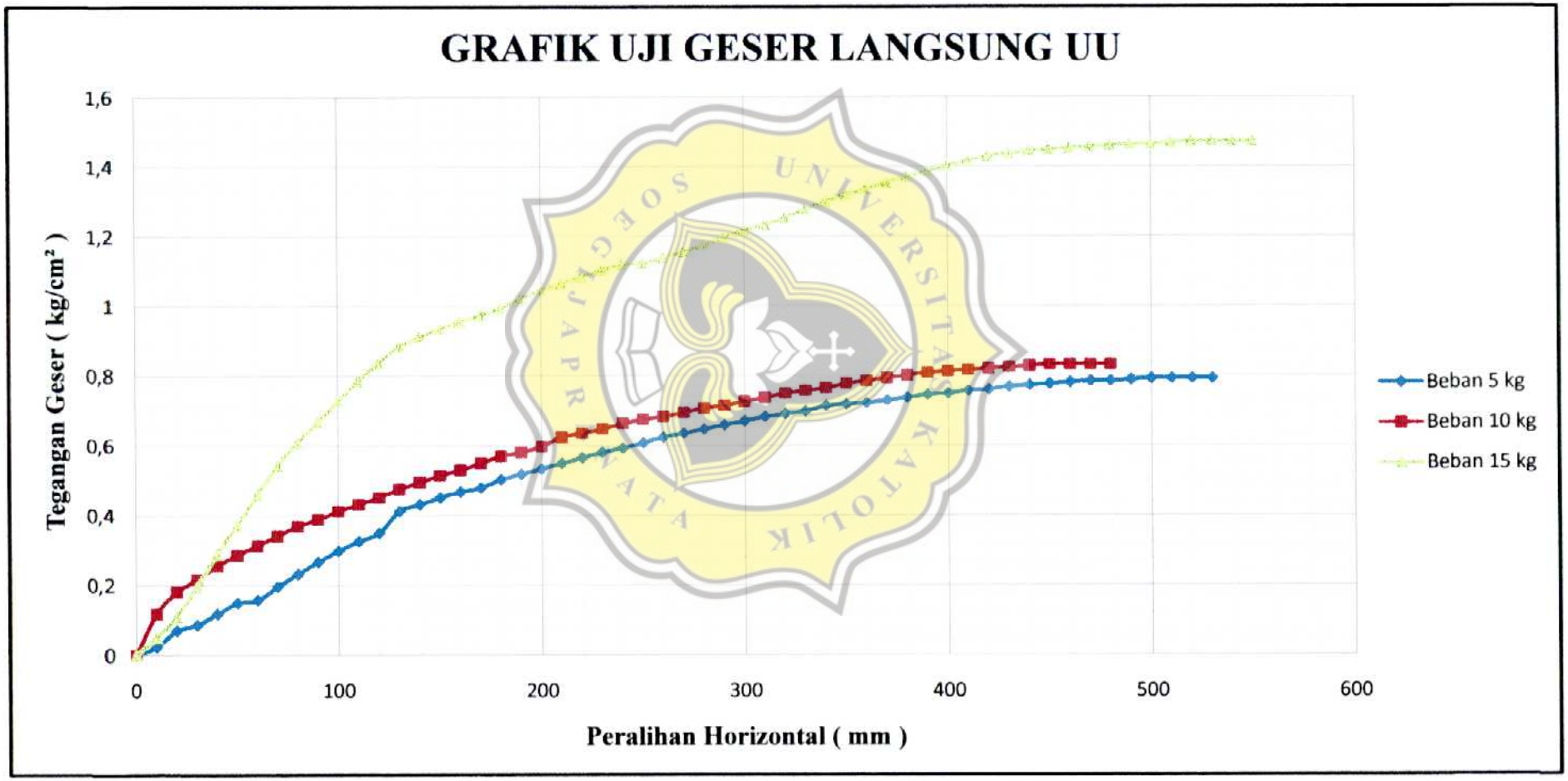
Kalibrasi 0,111 kg/div

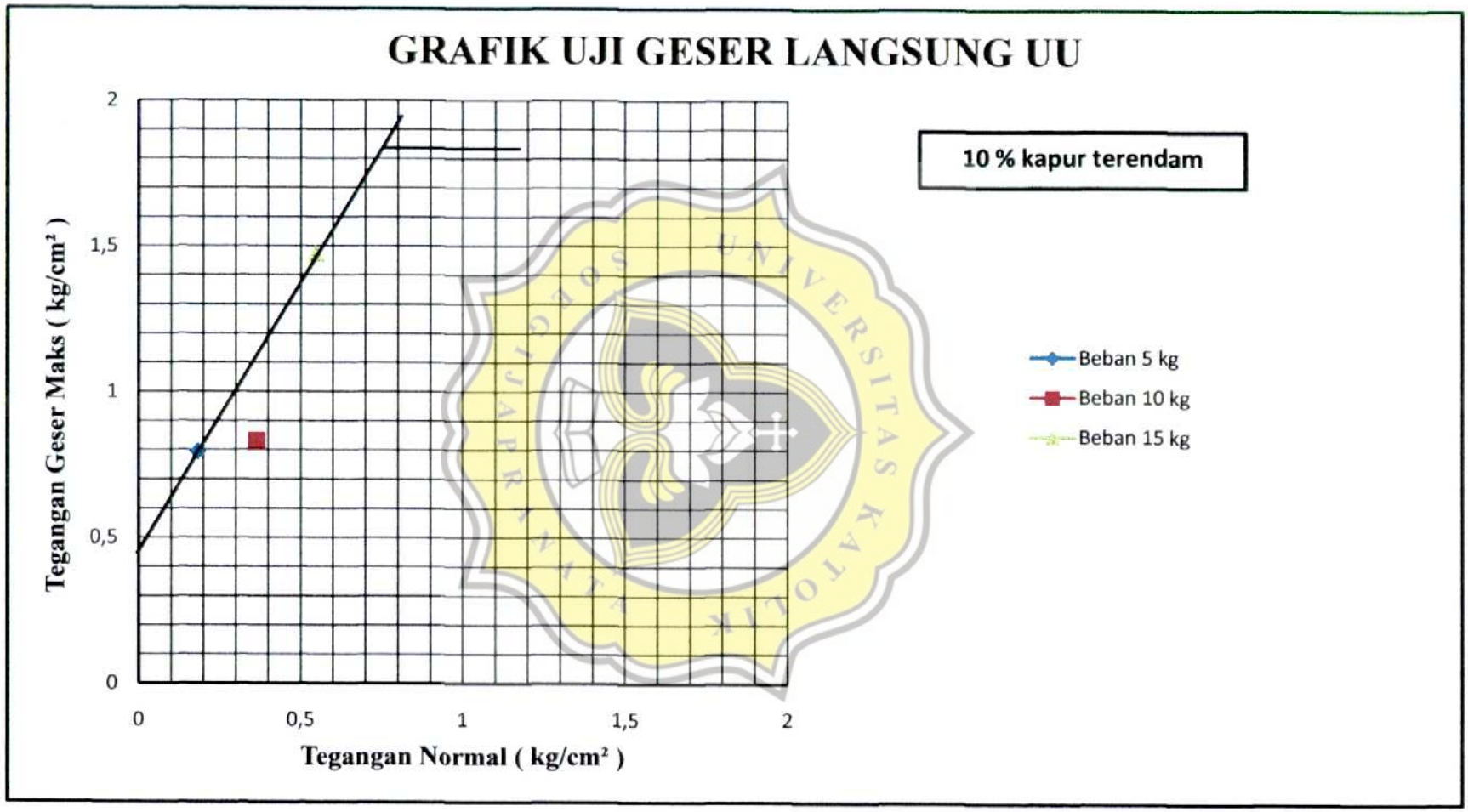
Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,546797 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	13	1,443	0,051062
20	28	3,108	0,109979
30	50	5,55	0,196391
40	74	8,214	0,290658
50	95	10,545	0,373142
60	117	12,987	0,459554
70	138	15,318	0,542038
80	155	17,205	0,608811
90	170	18,87	0,667728
100	185	20,535	0,726645
110	200	22,2	0,785563
120	213	23,643	0,836624
130	225	24,975	0,883758
140	232	25,752	0,911253
150	238	26,418	0,93482
160	243	26,973	0,954459
170	248	27,528	0,974098
180	253	28,083	0,993737
190	260	28,86	1,021231
200	266	29,526	1,044798
210	271	30,081	1,064437
220	276	30,636	1,084076
230	281	31,191	1,103715
240	285	31,635	1,119427
250	286	31,746	1,123355
260	290	32,19	1,139066
270	294	32,634	1,154777
280	299	33,189	1,174416
290	305	33,855	1,197983
300	310	34,41	1,217622
310	314	34,854	1,233333
320	319	35,409	1,252972
330	325	36,075	1,276539
340	331	36,741	1,300106
350	336	37,296	1,319745
360	340	37,74	1,335456
370	345	38,295	1,355096
380	349	38,739	1,370807
390	353	39,183	1,386518
400	357	39,627	1,402229

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	361	40,071	1,417941
420	364	40,404	1,429724
430	366	40,626	1,43758
440	368	40,848	1,445435
450	369	40,959	1,449363
460	370	41,07	1,453291
470	371	41,181	1,457219
480	372	41,292	1,461146
490	373	41,403	1,465074
500	373	41,403	1,465074
510	374	41,514	1,469002
520	375	41,625	1,47293
530	375	41,625	1,47293
540	375	41,625	1,47293
550	375	41,625	1,47293


GRAFIK UJI GESER LANGSUNG UU
Tegangan Geser (kg/cm²)
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
0
100
200
300
400
500
600
Peralihan Horizontal (mm)
Beban 5 kg
Beban 10 kg
Beban 15 kg


GRAFIK UJI GESER LANGSUNG UU
10 % kapur terendam
Beban 5 kg
Beban 10 kg
Beban 15 kg
Tegangan Geser Maks (kg/cm²)
Tegangan Normal (kg/cm²)
0
0,5
1
1,5
2

Beban 5 kg

Penambahan 15% kapur

Kalibrasi 0,111 kg/div

Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,182266 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	16	1,776	0,062845
20	20	2,22	0,078556
30	30	3,33	0,117834
40	40	4,44	0,157113
50	50	5,55	0,196391
60	61	6,771	0,239597
70	73	8,103	0,28673
80	82	9,102	0,322081
90	90	9,99	0,353503
100	98	10,878	0,384926
110	103	11,433	0,404565
120	110	12,21	0,432059
130	115	12,765	0,451699
140	119	13,209	0,46741
150	123	13,653	0,483121
160	126	13,986	0,494904
170	128	14,208	0,50276
180	132	14,652	0,518471
190	134	14,874	0,526327
200	136	15,096	0,534183
210	138	15,318	0,542038
220	140	15,54	0,549894
230	142	15,762	0,557749
240	143	15,873	0,561677
250	145	16,095	0,569533
260	147	16,317	0,577389
270	148	16,428	0,581316
280	150	16,65	0,589172
290	151	16,761	0,5931
300	152	16,872	0,597028
310	154	17,094	0,604883
320	156	17,316	0,612739
330	157	17,427	0,616667
340	158	17,538	0,620594
350	159	17,649	0,624522
360	160	17,76	0,62845
370	162	17,982	0,636306
380	164	18,204	0,644161
390	165	18,315	0,648089
400	168	18,648	0,659873

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	170	18,87	0,6677282
420	173	19,203	0,6795117
430	175	19,425	0,6873673
440	178	19,758	0,6991507
450	179	19,869	0,7030786
460	181	20,091	0,7109342
470	183	20,313	0,7187898
480	184	20,424	0,7227176
490	186	20,646	0,7305732
500	188	20,868	0,7384289
510	189	20,979	0,7423567
520	190	21,09	0,7462845
530	191	21,201	0,7502123
540	192	21,312	0,7541401
550	193	21,423	0,7580679
560	195	21,645	0,7659236
570	197	21,867	0,7737792
580	198	21,978	0,777707
590	199	22,089	0,7816348
600	200	22,2	0,7855626
610	201	22,311	0,7894904
620	202	22,422	0,7934183
630	204	22,644	0,8012739
640	205	22,755	0,8052017
650	206	22,866	0,8091295
660	208	23,088	0,8169851
670	209	23,199	0,820913
680	210	23,31	0,8248408
690	211	23,421	0,8287686
700	212	23,532	0,8326964
710	213	23,643	0,8366242
720	215	23,865	0,8444798
730	215	23,865	0,8444798
740	215	23,865	0,8444798
750	215	23,865	0,8444798

Beban 10 kg

Penambahan 15% kapur

Kalibrasi 0,111 kg/div

Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,364562 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	10	1,11	0,039278
20	17	1,887	0,066773
30	24	2,664	0,094268
40	34	3,774	0,133546
50	47	5,217	0,184607
60	64	7,104	0,25138
70	80	8,88	0,314225
80	92	10,212	0,361359
90	105	11,655	0,41242
100	117	12,987	0,459554
110	127	14,097	0,498832
120	136	15,096	0,534183
130	145	16,095	0,569533
140	153	16,983	0,600955
150	161	17,871	0,632378
160	167	18,537	0,655945
170	172	19,092	0,675584
180	178	19,758	0,699151
190	183	20,313	0,71879
200	188	20,868	0,738429
210	193	21,423	0,758068
220	196	21,756	0,769851
230	200	22,2	0,785563
240	204	22,644	0,801274
250	208	23,088	0,816985
260	212	23,532	0,832696
270	216	23,976	0,848408
280	221	24,531	0,868047
290	224	24,864	0,87983
300	228	25,308	0,895541
310	231	25,641	0,907325
320	234	25,974	0,919108
330	238	26,418	0,93482
340	241	26,751	0,946603
350	243	26,973	0,954459
360	245	27,195	0,962314
370	248	27,528	0,974098
380	250	27,75	0,981953
390	253	28,083	0,993737
400	255	28,305	1,001592

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	257	28,527	1,009448
420	259	28,749	1,0173036
430	260	28,86	1,0212314
440	261	28,971	1,0251592
450	262	29,082	1,029087
460	264	29,304	1,0369427
470	268	29,748	1,0526539
480	270	29,97	1,0605096
490	272	30,192	1,0683652
500	273	30,303	1,072293
510	274	30,414	1,0762208
520	275	30,525	1,0801486
530	275	30,525	1,0801486
540	275	30,525	1,0801486
550	275	30,525	1,0801486

Beban 15 kg

Penambahan 15% kapur

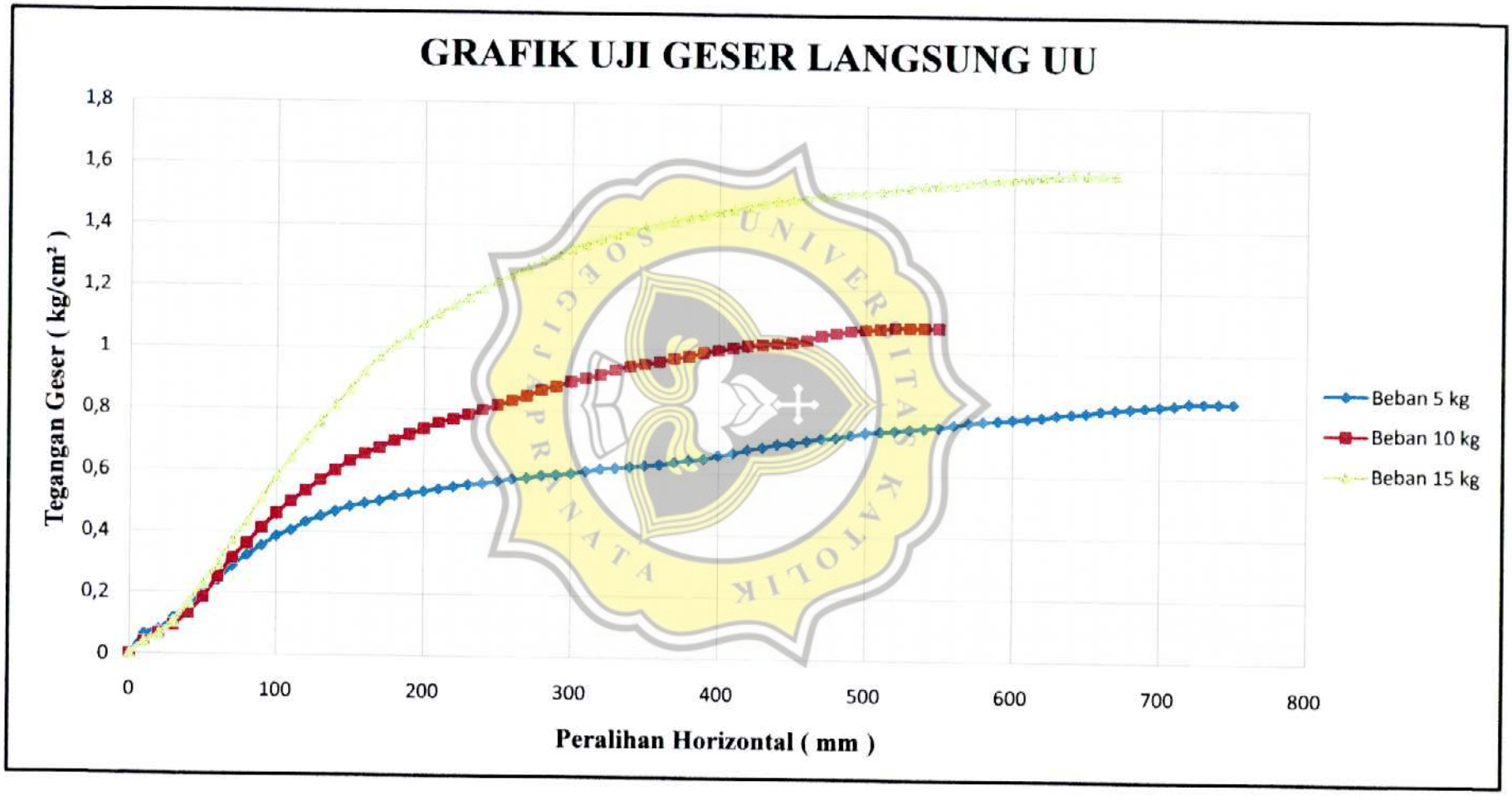
Kalibrasi 0,111 kg/div

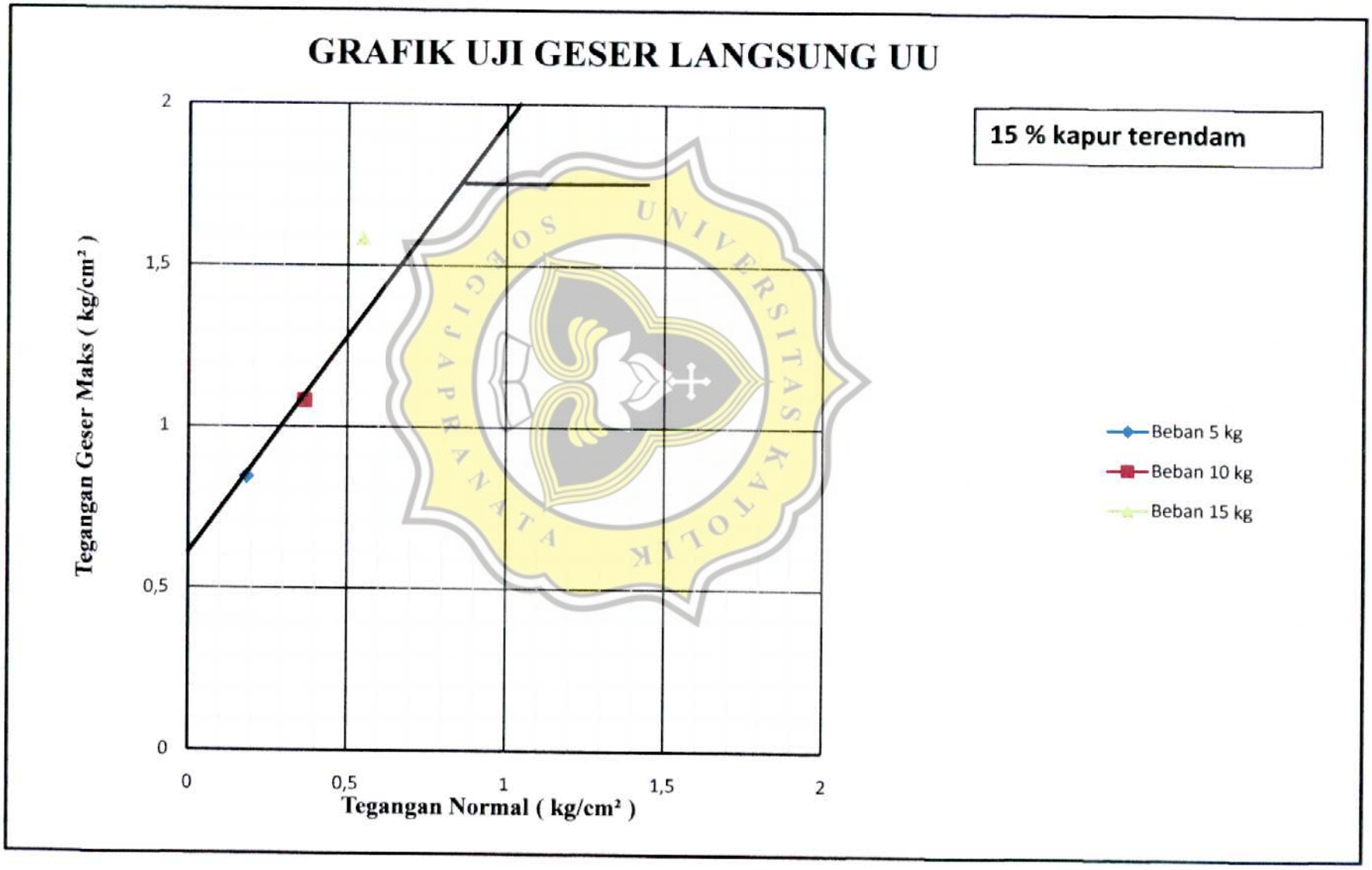
Kecepatan Peralihan 0,2582 mm/div

Tegangan normal 0,546797 kg/cm2

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
0	0	0	0
10	10	1,11	0,039278
20	16	1,776	0,062845
30	27	2,997	0,106051
40	43	4,773	0,168896
50	59	6,549	0,231741
60	75	8,325	0,294586
70	94	10,434	0,369214
80	110	12,21	0,432059
90	130	14,43	0,510616
100	147	16,317	0,577389
110	163	18,093	0,640234
120	179	19,869	0,703079
130	193	21,423	0,758068
140	207	22,977	0,813057
150	220	24,42	0,864119
160	235	26,085	0,923036
170	247	27,417	0,97017
180	257	28,527	1,009448
190	266	29,526	1,044798
200	275	30,525	1,080149
210	283	31,413	1,111571
220	290	32,19	1,139066
230	297	32,967	1,166561
240	304	33,744	1,194055
250	310	34,41	1,217622
260	316	35,076	1,241189
270	322	35,742	1,264756
280	328	36,408	1,288323
290	333	36,963	1,307962
300	338	37,518	1,327601
310	342	37,962	1,343312
320	346	38,406	1,359023
330	350	38,85	1,374735
340	353	39,183	1,386518
350	356	39,516	1,398301
360	359	39,849	1,410085
370	362	40,182	1,421868
380	365	40,515	1,433652
390	367	40,737	1,441507
400	370	41,07	1,453291

Peralihan Horisontal (mm)	Load Dial reading (div)	Beban Horisontal (kg)	Tegangan Geser (kg/cm2)
410	372	41,292	1,4611465
420	374	41,514	1,4690021
430	377	41,847	1,4807856
440	379	42,069	1,4886412
450	380	42,18	1,492569
460	382	42,402	1,5004246
470	383	42,513	1,5043524
480	385	42,735	1,5122081
490	386	42,846	1,5161359
500	387	42,957	1,5200637
510	388	43,068	1,5239915
520	389	43,179	1,5279193
530	391	43,401	1,5357749
540	392	43,512	1,5397028
550	393	43,623	1,5436306
560	394	43,734	1,5475584
570	396	43,956	1,555414
580	397	44,067	1,5593418
590	398	44,178	1,5632696
600	399	44,289	1,5671975
610	400	44,4	1,5711253
620	401	44,511	1,5750531
630	402	44,622	1,5789809
640	403	44,733	1,5829087
650	403	44,733	1,5829087
660	403	44,733	1,5829087
670	403	44,733	1,5829087


GRAFIK UJI GESER LANGSUNG UU
Tegangan Geser (kg/cm²)
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
0
100
200
300
400
500
600
700
800
Peralihan Horizontal (mm)
Beban 5 kg
Beban 10 kg
Beban 15 kg


GRAFIK UJI GESER LANGSUNG UU
15 % kapur terendam
Tegangan Geser Maks (kg/cm²)
Tegangan Normal (kg/cm²)
0
0,5
1
1,5
2
Beban 5 kg
Beban 10 kg
Beban 15 kg