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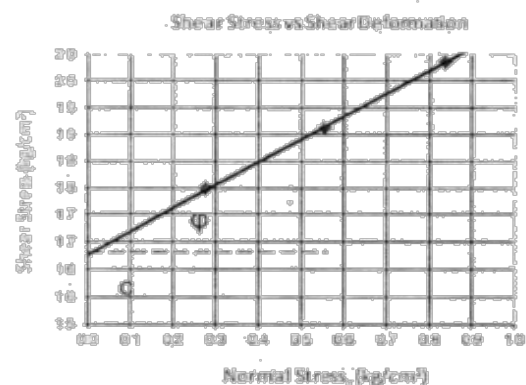
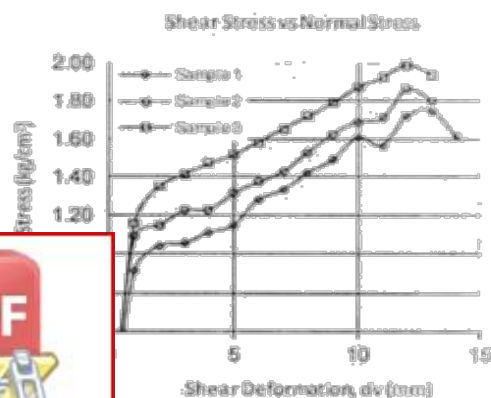


Lampiran 1. Data karakteristik Tanah



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DIRECT SHEAR TEST RESULTS						
PROJECT		: Disertasi				
BORING NUMBER		: SAMPEL ATAS				
TESTING METHOD		: ASTM D 3080-72			TESTED BY : Zainal	
LABORATORY		: HASANUDDIN UNIVERSITY			DATE : Agustus 2017	
Sample Size :		Proving Ring Calibration		= kg/div		
Length of side = 5.00 cm		Displacement Rate		= kg/div		
Height of sample = 2.00 cm		c		= 1.63 kg/cm ²		
Area of sample = 36.00 cm ²		φ		= 23 °		
Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00 kg		P1 = 20.00 kg		P1 = 30.00 kg	
Normal Stress	σ1 = 0.28 kg/cm ²		σ1 = 0.56 kg/cm ²		σ1 = 0.83 kg/cm ²	
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kg/cm ²)	Shear Force (kg)	Shear Stress (kg/cm ²)	Shear Force (kg)	Shear Stress (kg/cm ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
1.00	32.694	0.912	36.149	1.007	41.915	1.153
2.00	37.496	1.042	41.235	1.145	46.476	1.347
3.00	38.003	1.056	43.965	1.221	50.861	1.413
4.00	40.029	1.112	44.186	1.227	52.894	1.469
5.00	41.299	1.147	47.224	1.312	54.566	1.516
6.00	46.024	1.278	48.482	1.372	58.967	1.582
7.00	47.956	1.332	51.367	1.427	59.533	1.654
8.00	51.232	1.423	55.943	1.529	61.838	1.718
9.00	53.632	1.490	59.543	1.626	64.428	1.790
10.00	57.898	1.608	60.830	1.690	67.324	1.870
11.00	56.343	1.565	61.498	1.706	69.224	1.923
12.00	61.967	1.721	68.998	1.861	71.522	1.987
13.00	62.935	1.748	64.835	1.801	69.732	1.937
14.00	57.962	1.610				





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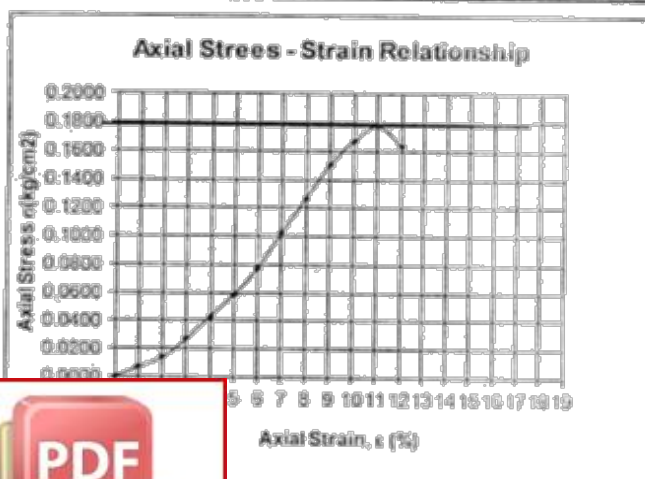
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UNCONFINED COMPRESSION TEST RESULTS

PROJECT : Diserasi
BORING NUMBER : SAMPEL Atas
TESTING METHOD : ASTM D 2186-06
LABORATORY : HASANUDDIN UNIVERSITY
TESTED BY : Zaini
DATE : Agustus 2017

Sample Depth	m		Index Properties	Weight of Wet Soil	441	gram
Sample Size	Diameter, d	50.0	mm	Weight of Dry Soil	321	gram
	Height, h	10.00	cm	Water Content	37.363	%
	Volume	159.346	cm ³	Dry Unit Weight	1.6048	gram/cm ³
	Area, A _o	19.635	cm ²	Proving Ring Calibration	0.135	kg/cm

Axial Deformation		Axial Load & Stress				Axial Deformation		Axial Load & Stress			
Dep. Reading	Axial Strain	Dep. Reading	Axial Load	Corrected Area	Stress	Dep. Reading	Axial Strain	Dep. Reading	Axial Load	Corrected Area	Stress
δ	$\epsilon = \delta/h$	δ	P	$A = A_o(1 - \delta/h)$	$\sigma = P/A$	δ	$\epsilon = \delta/h$	δ	P	$A = A_o(1 - \delta/h)$	$\sigma = P/A$
(mm)	(%)	(dv)	(kg)	(cm ²)	(kg/cm ²)	(mm)	(%)	(dv)	(kg)	(cm ²)	(kg/cm ²)
0.00	0.00	0.0	0.00	19.63	0.000	11.00	11.00	25.0	3.92	22.06	0.177
1.00	1.00	1.0	0.14	19.63	0.007	12.00	12.00	27.0	3.66	22.31	0.183
2.00	2.00	2.0	0.27	20.04	0.013						
3.00	3.00	4.0	0.54	20.24	0.027						
4.00	4.00	6.5	0.88	20.45	0.043						
5.00	5.00	9.0	1.22	20.67	0.059						
6.00	6.00	12.0	1.62	20.89	0.078						
7.00	7.00	15.0	2.15	21.11	0.102						
8.00	8.00	20.0	2.70	21.35	0.127						
9.00	9.00	25.0	3.24	21.59	0.150						
10.00	10.00	27.0	3.65	21.82	0.167						



Failure Visualization	
Undersized	Remolded

Unconfined Compression Strength, kg/cm ²	
q _u	U ₁₇₇
< 0.25	Very Soft
0.25 - 0.5	Soft
0.5 - 1.0	Medium
1.0 - 2.0	Stiff
2.0 - 4.0	Very Stiff
> 4.0	Hard





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TEST RESULTS OF GRAIN-SIZE ANALYSIS

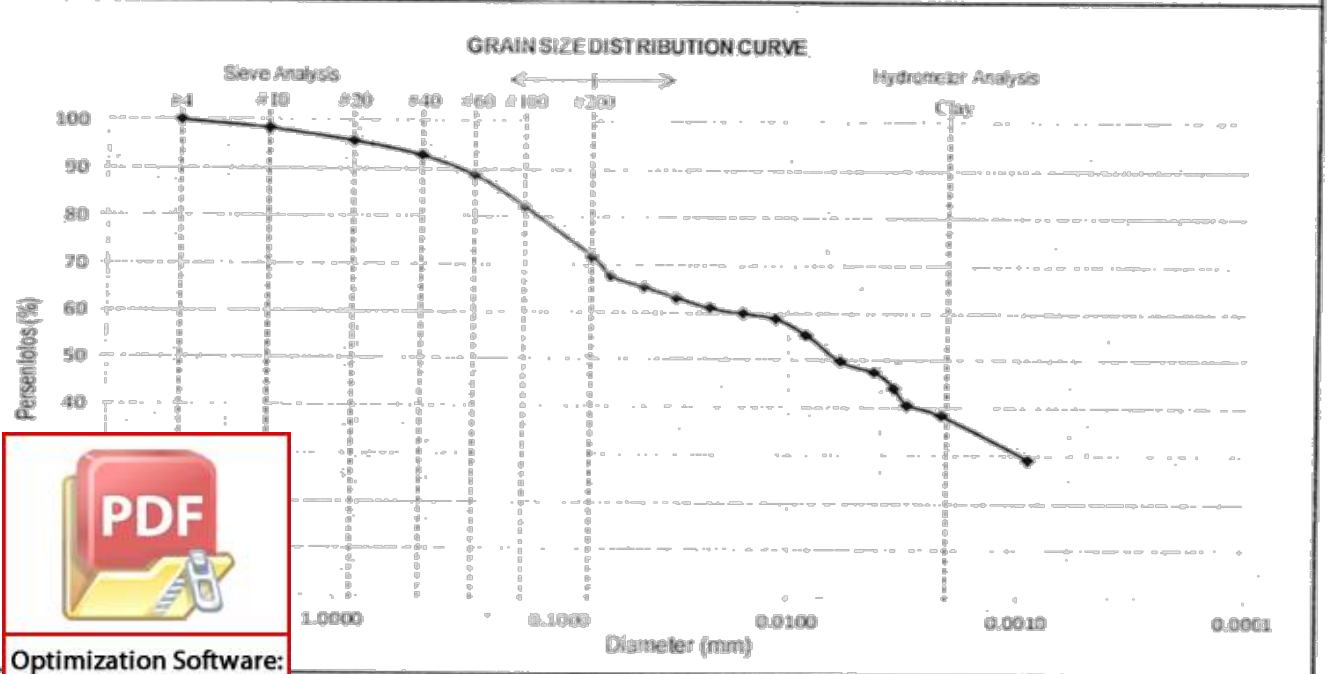
(Sieve-Mechanical and Hydrometer Methods)

PROJECT	: DISERTASI	TESTED BY	: ZANAL
TESTING METHOD	: ASTM D 1140-54, D.421-58	DATE	: AGUSTUS 2017.
LABORATORY	: HASANUDDIN UNIVERSITY		

Bore Hole No.:		Weight of Dry Soil-Container	gram		
Sample	: ATAS	Weight of Container	gram	Gs:	2.734
Sample Depth		Weight of Dry Soil-Container	500 gram		

Sieve Analysis						Hydrometer Analysis							
zaringan No.	Diameter (mm)	Berat Tertahan (Gram)	berat Kumulatif (gram)	persen tertahan (%)	Persent Lulus (%)	Waktu (menit)	Temperatur T(°C)	R	Rw	N = W(R-Rw)/A	Zp = LL - (L/L)	D = Wt (Zp) ^{0.85}	N = % lolos srt. No. 200X
4	4.75	0	0.00	0	100	0.25	20	27.00	-3	0.94240	9.85	0.0517	67.60887
10	2.00	.8	8.00	1.6	98.4	0.5	28	26.00	-3	0.91105	5.95	0.0440	65.41324
20	0.85	13	21.00	4.2	95.8	1	28	25.00	-3	0.87963	6.10	0.0316	63.15761
40	0.425	15	36.00	7.2	92.8	2	28	24.00	-3	0.84822	6.20	0.0225	60.90199
60	0.25	20	56.00	11.2	89.8	4	28	23.50	-3	0.83251	6.35	0.0161	59.77417
100	0.15	33	89.00	17.8	82.2	6	28	23.00	-3	0.81680	6.48	0.0115	58.64636
200	0.075	52	141.00	28.2	71.8	15	28	21.50	-3	0.76968	6.60	0.0085	55.20291
Pen	-	359	500.00	100	0	30	28	19.00	-3	0.69114	6.65	0.0060	49.62384
						60	28	18.00	-3	0.65972	6.70	0.0043	47.36821
						99	28	18.50	-3	0.61260	6.75	0.0035	43.98477
						120	28	15.00	-3	0.56548	6.85	0.0030	40.60132
						240	28	14.00	-3	0.53486	6.88	0.0022	38.34569
						1440	28	10.00	-3	0.40840	7.10	0.0009	29.32318

Berat jenis air terhadap temperatur, ρ_{air} : 0.9963
 faktor K = $(1000 \times Gs \times \rho_{air}) / (10 \times Ws(Gs - 1))$: 3.1415
 Faktor Fd = $1 / (Gs \times T)$: 0.0128





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TEST RESULTS OF GRAIN-SIZE ANALYSIS

(Sieve-Mechanical and Hydrometer Methods)

PROJECT	: DISERTASI	TESTED BY	: ZANAL
TESTING METHOD	: ASTM D 1140-54, D 421-58	DATE	: JULI 2017
LABORATORY	: HASANUDDIN UNIVERSITY		

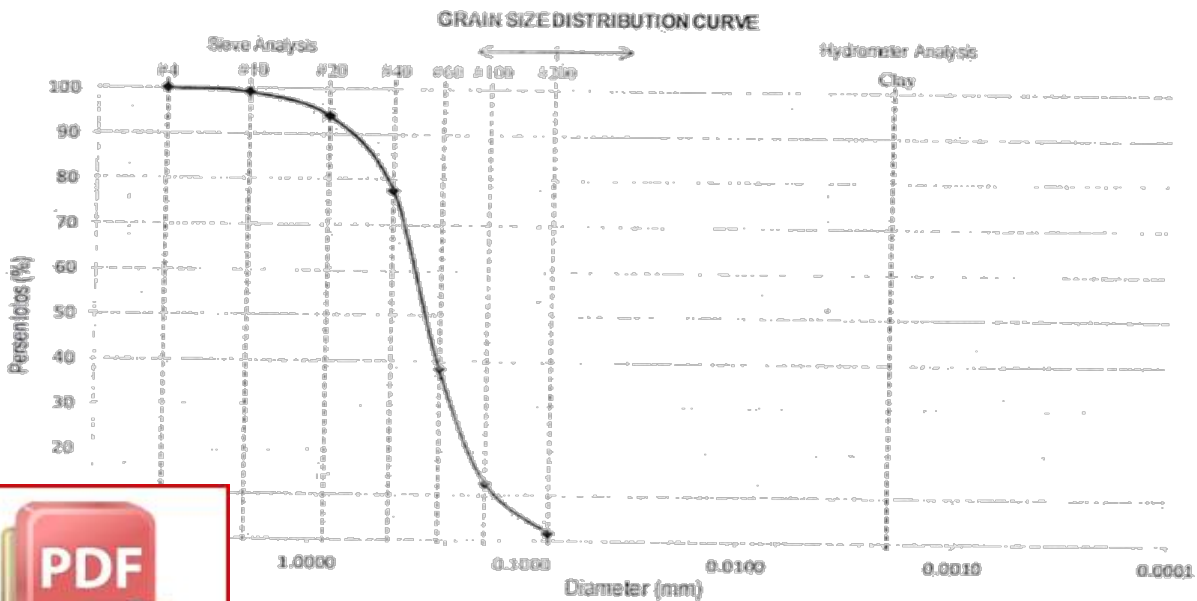
Bore Hole No.		Weight of Dry Soil-Container	: gram		
Sample	: PINGGIR	Weight of Container	: gram	Gs :	2.65
Sample Depth		Weight of Dry Soil-Container	: 500 gram		

Saringan No.	Diameter (mm)	Sieve Analysis				Hydrometer Analysis							
		Berat Tertahan (Gram)	berat Kumulatif (gram)	persen tertahan (%)	Persentase Lolos (%)	Wetida (ment)	Temperatur (°C)	R	R _w	N = K(R-R _w)/%	Zr = LL - (U/L)	D = Kt (2x) ^{0.85}	N = 84 lbs sgr No. 200K
4	4.75	0	0.00	0	100	0.25							
10	2.00	4	4.00	0.8	99.2	0.5							
20	0.85	26	30.00	6	94	1							
40	0.425	82	112.00	22.4	77.6	2							
60	0.25	197	309.00	61.8	38.2	4							
100	0.15	127	436.00	87.2	12.8	8							
200	0.075	55	491.00	98.2	1.8	15							
Pan		9	500.00	100	0	30							
						60							
						80							
						120							
						240							
						480							

Berat jenis air terhadap temperatur, g /cc = 0.9983

faktor, K = (1000 x Gs x g /cc) / (10 x Ws(Gs - 1)) = 3.1979

Faktor Kt = f(Gs, T) = 0.0125





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SPECIFIC GRAVITY TEST RESULTS

PROJECT	: Disertasi	TESTED BY	: Zahal
TESTING METHOD	: ASTM D 854-86(72)	DATE	: Juli 2017
LABORATORY	: HASANUDDIN UNIVERSITY		

Sample		Sampel Pinggir		Sampel Atas					
		1	2	1	2				
Number of Volumetric Flask	-								
Weight of Vol. Flask + Soil (W2)	Gram	96.0	97.0	96.0	97.0				
Weight of Vol. Flask (W1)	Gram	30.56	31.56	30.56	31.56				
Weight of Dry Soil (Ws=W2-W1)	Gram	25.00	25.00	25.00	25.00				
Temperature, T (oC)	Degree	28.0	28.0	28.0	28.0				
Weight of Vol. Flask+Water at T (W4)	Gram	80.47	81.5	80.27	81.0				
Weight of Vol. Flask+Water+Soil (W3)	Gram	96.98	95.9	95.84	97.2				
Unit Weight of Water at T, γ_w	Gram/Cm ³	0.9983	0.9983	0.9983	0.9983				
Temp. Corr. Coefficient, $\alpha = \gamma_w / \gamma_w^{20^\circ C}$	-	0.9981	0.9981	0.9981	0.9981				
Weight of Soil (Wu=(Ws+W4-W3))	Gram	8.5	10.5	9.4	8.8				
Specific Gravity of Soil ($G_s = \alpha \cdot W_s / W_u$)	-	2.989	2.367	2.646	2.823				
Average of Gs	-	2.653		2.734					
Remarks:	Unit Weight of Water, $\gamma_w^{20^\circ C} = 0.99823$								

Mengetahui,

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PERMEABILITY TEST RESULT					
PROJECT	: Userias				
TESTING METHOD	: ASTM D698/D 1557			TESTED BY	: ZAINAL
LABORATORY	: HASANUDDIN UNIVERSITY			DATE	: JULI 2017
PERHITUNGAN PERMEABILITAS					
Constan Head					
Diameter buret (d)	:	1.2	cm		
Diameter sampel (D)	:	6	cm		
Sampel				Pinggir	
Luas potongan melintang buret ($a = 1/4\pi d^2$)	cm ²	1.131			
Luas potongan melintang sampel ($A = 1/4\pi D^2$)	cm ²	28.274			
Ketinggian hidrolik (h)	cm	108.7			
Panjang sampel (L)	cm	6			
Waktu pengujian (t)	detik	857.4			
Temperatur (T)	°C	28			
Volume air yang terkumpul (Q)	(cm ³)	100			
Koefisien permeabilitas (Q.L / h.A.t)	(cm/det)	0.0002			
Falling Head					
Diameter buret	:	1.2	cm		
Diameter sampel	:	6	cm		
Sampel				Atas	
Luas potongan melintang buret ($a = 1/4\pi d^2$)	cm ²	1.131			
Luas potongan melintang sampel ($A = 1/4\pi D^2$)	cm ²	28.274			
Tinggi puncak hidrolik pada permulaan pengujian (h ₁)	cm	31.5			
Tinggi puncak hidrolik pada akhir pengujian (h ₂)	cm	24.12			
Panjang sampel (L)	cm	6			
Waktu pengujian (t)	detik	120			
Temperatur (T)	°C	28			
Koreksi viskositas (η_T / η_{20})	-	0.847			
Koefisien permeabilitas, $k_T = (a.L/A.t) \times \ln(h_1/h_2)$	cm/det	0.000534			
Koefisien permeabilitas standar, $k_{20} (k_T(\eta_T/\eta_{20}))$	cm/det	0.000452			
untuk temperatur 28°C					
η_T	=	0.847			
η_{20}	=	1			

Mengetahui,

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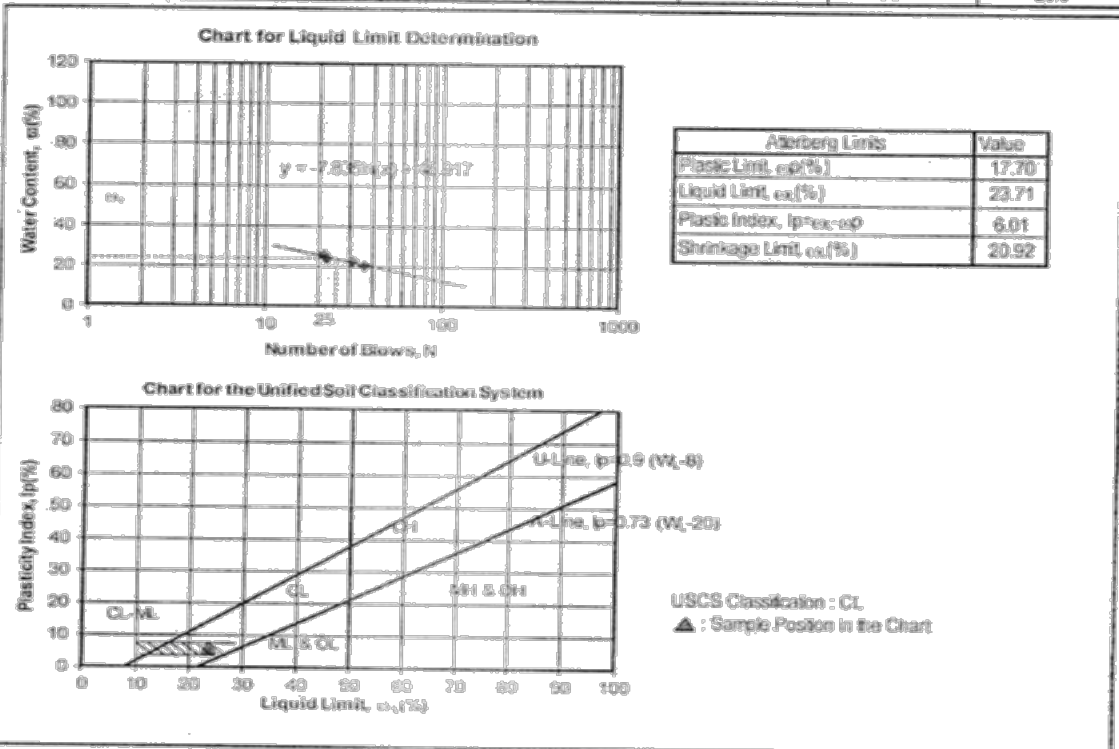


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ATTERBERG LIMITS TEST

PROJECT : DSERTAS
 BORING NUMBER : SAMPEL ATAS
 TESTING METHOD : ASTM D 431-89, D 4318 (92), AASHTO T 99
 LABORATORY : HASANUDDIN UNIVERSITY
 TESTED BY : Zairul
 DATE : JULI 2017

Sample No.	Depth of Sample	Unit	Plastic Limit		Liquid Limit							
			1	2	1	2	3	4				
Test Number	-	-	1	2	1	2	3	4				
Number of Blows	N	-	-	-	21	22	31	36				
Container No. or Can No.	-	-	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
Weight of Wet Soil + Can, W1	gram	13.4	0.0	18.5	0.0	17.8	0.0	18.7	0.0	20.6	0.0	
Weight of Dry Soil + Can, W2	gram	12.6	0.0	16.5	0.0	16.9	0.0	16.8	0.0	18.5	0.0	
Weight of Water, Ww = W1 - W2	gram	0.8	0.0	2.1	0.0	1.9	0.0	1.9	0.0	2.1	0.0	
Weight of Can, W3	gram	8.1	0.0	8.3	0.0	8.0	0.0	8.1	0.0	8.2	0.0	
Weight of Dry Soil, Ws = W2 - W3	gram	4.5	0.0	8.1	0.0	8.9	0.0	8.7	0.0	10.2	0.0	
Water Content, $w = Ww/Ws \cdot 100\%$	%	17.7	0.0	25.8	0.0	23.8	0.0	22.2	0.0	20.8	0.0	
Average of Water Content, w	%		17.70		25.83		23.81		22.17		20.8	



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TEST RESULTS OF GENERAL PROPERTIES (Wet Density, Water Content, Dry Density, Porosity, & Degree of Saturation)					
PROJECT	: DISERTASI			TESTED BY	: ZAINAL
TESTING METHOD	: ASTM D 2937-06, D 2937-(71), AASHTO T100-71			DATE	: JULI 2017
LABORATORY	: HASANUDDIN UNIVERSITY				
Sample		PUNGGIR	ATAS		
Ring / Container Number	-	1	1		
Weight of Ring, (1)	Gram	59.71	59.71		
Weight of Container, (2)	Gram	10.66	13.67		
Weight of Ring+Container+Wet Soil, (3)	Gram	189.16	195.14		
Weight of Wet Soil, (4)=[(3)-(2)-(1)]	Gram	118.79	121.76		
Volume of Soil or Ring, (5)	cm ³	81.39	73.08		
Weight of Ring+Container+Dry Soil, (6)	Gram	155.25	167.97		
Weight of Dry Soil, (7)=[(6)-(2)-(1)]	Gram	84.88	94.59		
Weight of Water, (8)=(4)-(7)	Gram	33.91	27.17		
Specific Gravity, G _s	-	2.653	2.734		
Volume of Dry Soil, (9)=(7)/G _s	cm ³	31.99	34.59		
Volume of Pore, (10)=(5)-(9)	cm ³	49.40	38.49		
Wet Density, $\gamma_{wet}=(4)/(5)$	Gr/cm ³	1.460	1.666		
Water Content, $w=(8)/(7)*100\%$	%	39.95	28.72		
Dry Density, $\gamma_d=\gamma_{wet}/(1+w)$	Gr/cm ³	1.043	1.294		
Porosity, $n=(10)/(5)*100\%$	%	60.69	52.87		

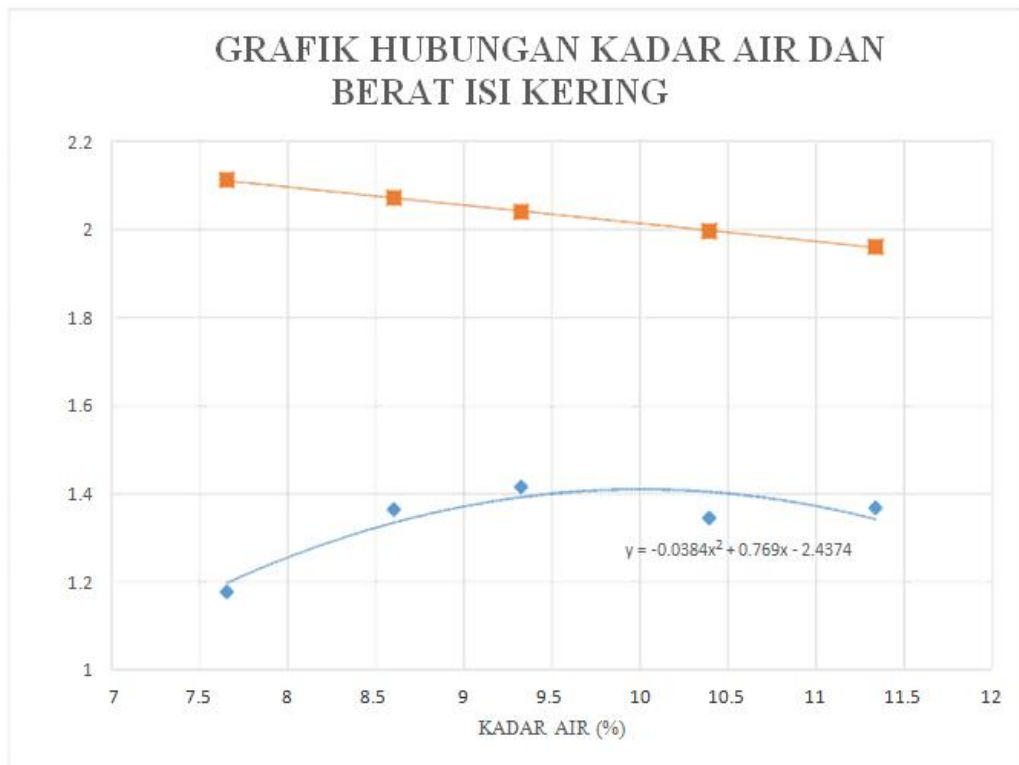
Mengetahui,

Sekretaris Laboratorium Laboratorium Mekanika Tanah

Jurusan Sipil, Fakultas Teknik Universitas Hasanuddin


(Farid Sitepu, ST., MT.)





Persamaan garis regresi (dari grafik)

$$y = -0,0384 x^2 + 0,7690 x - 2,4374$$

$$y' = -0,0768 x + 0,769$$

$$0 = -0,0768 x + 0,769$$

$$x = 10,01 \% \text{ gr/cm}^3$$

Jadi, kadar air optimum dicapai pada saat 10.01 % dan berat isi kering 1,4 gr/cm³



Lampiran 2. Hasil Analisis Kadar Organik Tanah



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Telp. (0411) 587 076, Fax (0411) 587 076

HASIL ANALISIS CONTOH TANAH

Nomor : 002.T.LKKT/2017
Permintaan : Meny Sriwati
Asal Contoh/Lokasi : Kab. Maros
Objek : Penelitian
Tgl. Penerimaan : 28 Agustus 2017
Tgl. Pengujian : 5 September 2017
Jumlah : 1 Contoh Tanah

Nomor Contoh		Tekstur (pipet)			Ekstrak 1:2.5		Terhadap contoh kering 105 °C				
Urut	Laboratorium	Pengirim	Pasir/Debu	Liat	Klas. Tekstur	pH		Bahan organik			Olsen P ₂ O ₅ ppm
						H ₂ O	KCl	Walkley & Black C	Kjeldahl N	C/N	
1	MN										

Catatan:

Hasil pengujian ini hanya berlaku bagi contoh yang diuji dan tidak untuk diperbanyak

Makassar, 5 September 2017
Kepala Laboratorium

Dr. H. Bachrul Ibrahim, M.Sc.
Nip. 195302761979031002



Lampiran 3. Dokumentasi



Pengujian Vane Shear



Pemadatan Tanah Untuk Sampel Pengujian



Lampiran 4. Hasil PengujianHasil Pengujian pada Kemiringan 10⁰Hasil Pengujian pada Kemiringan 20⁰Hasil Pengujian pada Kemiringan 30⁰