

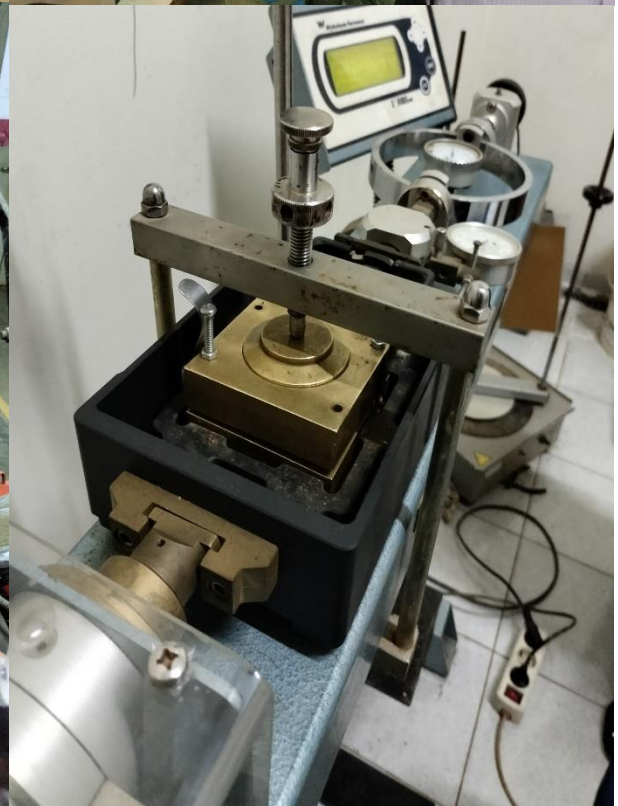
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LAMPIRAN


LAMPIRAN 1. DOKUMENTASI





LAMPIRAN 2. DATA

WATER CONTENT								
PROJECT		: PENELITIAN						
LOCATION		: FAKULTAS TEKNIK UNHAS GOWA						
STASIUN		: -						
TESTING METHOD		: ASTM D 2216-(98), D 2937-(71), AASHTO T100-71				TESTED BY : MUTIARA		
LABORATORY		: HASANUDDIN UNIVERSITY				DATE : 20 AGUSTUS 2022		
								
Bore Hole No.		-					KETERANGAN	
Sample		-	1		2			Rata-Rata
		m	A	B	A	B		
Weight of Container, (1)	Gram	7.69	6.65	7.68	6.67	45.1		
Weight of Container + Wet Soil (2)	Gram	28.42	27.46	27.68	30.52			
Weight of Container + Dry Soil (3)	Gram	18.21	20.40	19.71	20.45			
Water Content, $w=(2-3)/3*100\%$	Gram	56.1	34.6	40.4	49.2			

SPECIFIC GRAVITY TEST RESULTS							
PROJECT		: PENELITIAN					
LOCATION		: FAKULTAS TEKNIK UNHAS GOWA					
QUARRY		: LOKASI PENELITIAN					
BORING DEPTH		: -					
TESTING METHC		: ASTM D 854-58(72)				TESTED BY : MUTIARA	
LABORATORY		: HASANUDDIN UNIVERSITY				DATE : 25 AGUSTUS 2022	
							
Sample	-	1					
Sample Depth & Inclination	m						
Number of Volumetric Flask	-	A	B				
Weight of Vol. Flask + Soil (W2)	Gram	38.40	37.56				
Weight of Vol. Flask (W1)	Gram	28.40	27.56				
Weight of Soil	Gram	10.00	10.00				
Temperature, T (oC)	Degree	28.0	28.0				
Weight of Vol. Flask+Water at T (W4)	Gram	77.22	77.29				
Weight of Vol. Flask+Water+Soil (W3)	Gram	83.19	83.25				
Unit Weight of Water at T, γ_T	Gram/Cm ³	0.99624	0.99624				
Temp. Corr. Coefficient, $\alpha=\gamma_T/\gamma_{20}^{0C}$	-	0.99803	0.99803				
Weight of Dry Soil, Ws	Gram	9.55	9.45				
Specific Gravity of Soil ($G_s=\alpha*W_s/W_u$)	-	2.66	2.70				
Average of Gs	-	2.68					
Remarks:	Unit Weight of Water, $\gamma_{w,20}^{0C}= 0.99821$						

TEST RESULTS OF GRAIN-SIZE ANALYSIS

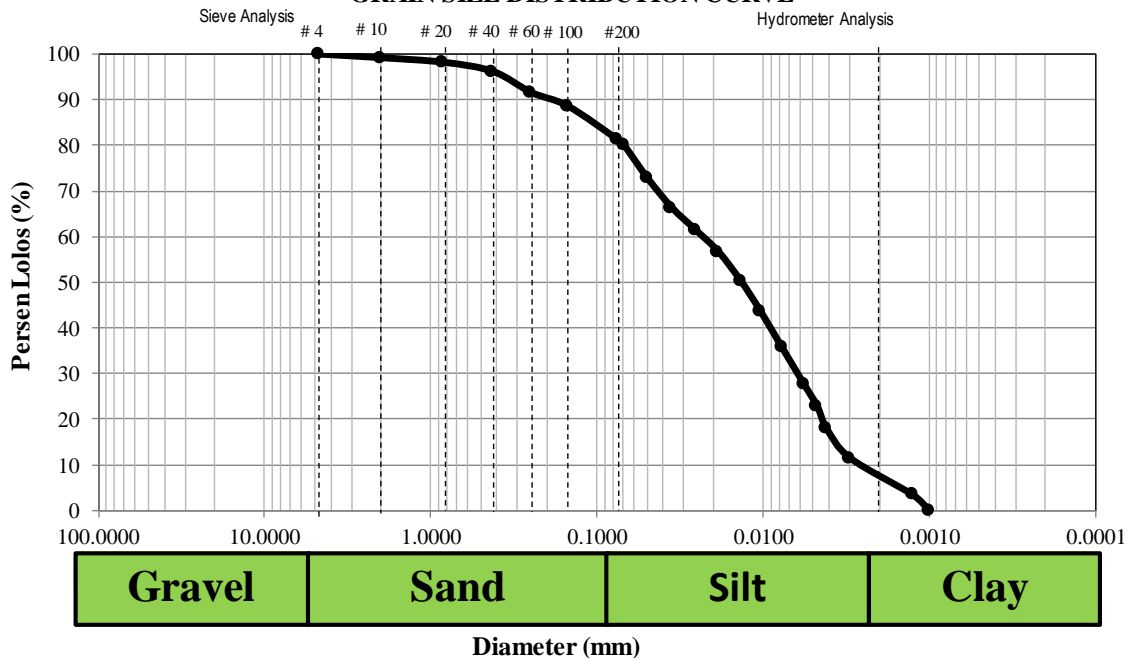
(Sieve-Mechanical and Hydrometer Methods)

PROJECT : PENELITIAN
 LOCATION : FAKULTAS TEKNIK UNIVERSITAS HASANUDDIN
 QUARRY : -
 TESTING METHOD : ASTM D 424-59, D 4318-(00), AASHTO T89/T90
 LABORATORY : HASANUDDIN UNIVERSITY
 TESTED BY : MUTIARA
 DATE : 28 Agustus 2022




Berat Tanah Kering :		500		gr		Spec. Gravity, G _s :		2.680		T :		28.0		°C	
Analisa Saringan						Analisa Hidrometer									
Saringan No.	Diameter (mm)	Berat Tertahan (Gram)	Berat Kumulatif (gram)	Persen Tertahan (%)	Persen Lolos (%)	Waktu (menit)	R	R _{cp} = R + Ft - Fz	% Finer = ((g x Rep) / W _s) x 100% % Finer - Sieve Analysis	R _{cl} = R + F _m	L _c (cm)	A	D = A√L/t (mm)		
4	4.75	0	0	0	100	0.25	54.50	49.65	80.09	55.50	7.90	0.0123	0.06914		
10	2	4	4	0.8	99.2	0.5	50.00	45.15	72.83	51.00	8.20	0.0123	0.04981		
20	0.84	5	9	1.8	98.2	1	46.00	41.15	66.38	47.00	8.35	0.0123	0.03554		
40	0.425	10	19	3.8	96.2	2	43.00	38.15	61.54	44.00	8.70	0.0123	0.02565		
60	0.25	23	42	8.4	91.6	4	40.00	35.15	56.70	41.00	9.15	0.0123	0.01860		
100	0.15	15	57	11.4	88.6	8	36.00	31.15	50.25	37.00	9.80	0.0123	0.01361		
200	0.075	37	94	18.8	81.2	15	32.00	27.15	43.79	33.00	10.80	0.0123	0.01044		
Pan	-	406	500	100	0	30	27.00	22.15	35.73	28.00	11.80	0.0123	0.00771		
						60	22.00	17.15	27.66	23.00	12.80	0.0123	0.00568		
						90	19.00	14.15	22.82	20.00	13.30	0.0123	0.00473		
						120	16.00	11.15	17.99	17.00	13.70	0.0123	0.00416		
						240	12.00	7.15	11.53	13.00	14.30	0.0123	0.00300		
						1440	7.00	2.15	3.47	8.00	15.10	0.0123	0.00126		
Berat jenis air terhadap temperatur, g _{wet} T						= 0.99624									
faktor, K = (1000 x G _s x g _{wet} T) / (10 x W _s (G _s - 1))						= 3.178									
Faktor K _t = f(G _s , T)						= 0.0123									
Temperatur Correction (Ft) = -4.85 + 0.25 T						= 2.15									
Zero Correction (Fz)						= 7.0									
Meniscus correction (Fm)						= 1									
G _s Correction						= 0.99									

GRAIN SIZE DISTRIBUTION CURVE

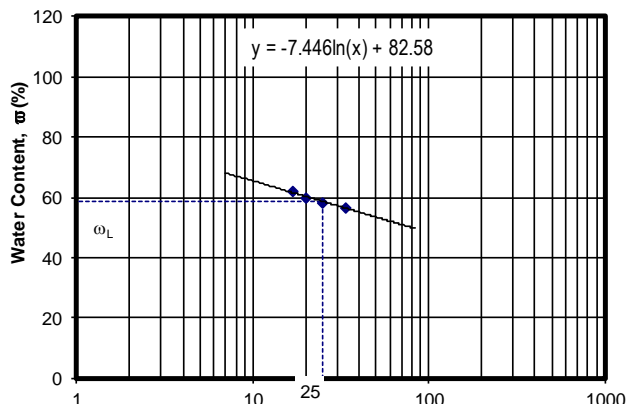


ATTERBERG LIMITS TEST

PROJECT	: PENELITIAN	
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	
QUARRY	: -	
SAMPLING DEPTH	: -	
TESTING METHOD	: ASTM D 4318-10, D 4943-08, AASHTO T89/T90	TESTED BY : MUTIARA
LABORATORY	: HASANUDDIN UNIVERSITY	DATE : 1 September 2022

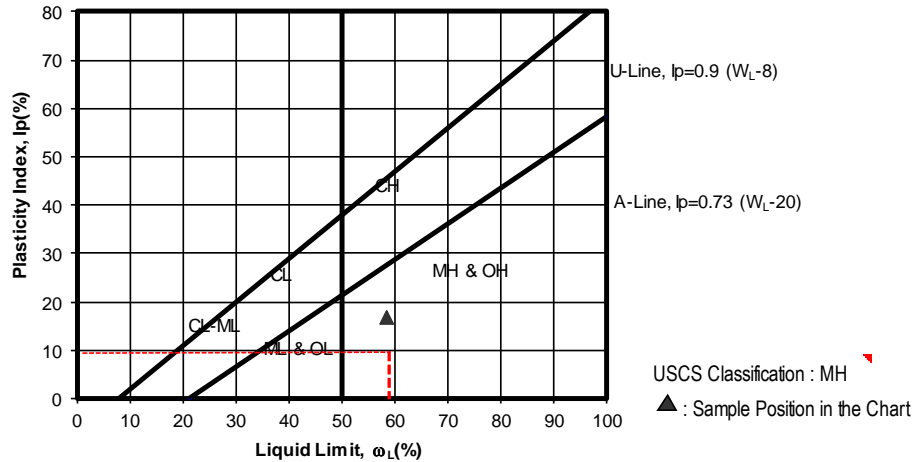
Sample No.	:										
Depth of Sample	:										
	Unit	Plastic Limit		Liquid Limit							
Test Number	-	1	2	1		2		3		4	
Number of Blows	N	-	-	34		28		20		17	
Container No. or Can No.	-	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2
Weight of Wet Soil+Can, W1	gram	15.8	14.6	16.5	24.2	22.7	23.8	25.2	24.3	18.1	14.2
Weight of Dry Soil+Can, W2	gram	14.7	13.4	13.9	20.9	20.1	20.6	21.5	21.1	14.5	11.9
Weight of Water, Ww=W1-W2	gram	1.1	1.2	2.6	3.3	2.6	3.1	3.7	3.2	3.6	2.3
Weight of Can, W3	gram	12.2	11.0	9.4	15.1	15.5	15.4	15.3	15.7	8.6	8.2
Weight of Dry Soil, Ws=W2-W3	gram	2.47	2.35	4.53	5.79	4.55	5.25	6.14	5.42	5.85	3.65
Water Content, $\omega = Ww/Ws * 100\%$	%	45.7	51.5	56.7	56.6	56.9	59.2	60.9	59.0	61.7	62.2
Average of Water Content, w	%	48.62		56.69		58.08		59.98		61.95	

Chart for Liquid Limit Determination



Atterberg Limits	Value
Plastic Limit, $\omega_p(\%)$	49
Liquid Limit, $\omega_L(\%)$	59
Plastic Index, $I_p = \omega_L - \omega_p$	10
Shrinkage Limit, $\omega_s(\%)$	10

Chart for the Unified Soil Classification System



ATTERBERG LIMITS TEST


PROJECT : PENELITIAN
 LOCATION : FAKULTAS TEKNIK UNHAS GOWA
 QUARRY : -
 SAMPLING DEPTH : -
 TESTING METHOD : ASTM D 4318-10, D 4943-08, AASHTO T89/T90
 LABORATORY : HASANUDDIN UNIVERSITY

TESTED BY : MUTIARA
 DATE : 1 September 2022



Sample No.	:	0										
Depth of Sample	:	0										
	Unit	Plastic Limit		Liquid Limit								Shrinkage Limit
Test Number	-	1	2	1		2		3		4		1
Number of Blows	N	-	-	34		28		20		17		-
Container No. or Can No.	-	A1	A2	B1	B2	C1	C2	D1	D2	E1	E2	F1
Weigth of Wet Soil+Can, W1	gram	15.82	14.56	16.50	24.20	22.67	23.75	25.21	24.28	18.06	14.15	65.22
Weigth of Dry Soil+Can, W2	gram	14.69	13.35	13.93	20.92	20.08	20.64	21.47	21.08	14.45	11.88	39.88
Weigth of Water, Ww=W1-W2	gram	1.13	1.21	2.57	3.28	2.59	3.11	3.74	3.20	3.61	2.27	25.34
Weigth of Can, W3	gram	12.22	11.00	9.40	15.13	15.53	15.39	15.33	15.66	8.60	8.23	10.18
Weigth of Dry Soil, Ws=W2-W3	gram	2.47	2.35	4.53	5.79	4.55	5.25	6.14	5.42	5.85	3.65	29.7
Water Content, $\omega = Ww/Ws * 100\%$	%	45.75	51.49	56.73	56.65	56.92	59.24	60.91	59.04	61.71	62.19	85.32
Average of Water Content, w	%	48.62		56.69		58.08		59.98		61.95		85.32
Weigth of Can+Hg, W1	gram											455
Weigth of Shrink dish	gram											35
Weight of displaced Hg + Shrink dish	gram											340
Hg content	gr/cm ³											13.6
Volume of Wet Soil	cm ³											32.71
Volume of Dry Soil	cm ³											10.28
Shrinkage Limit	%											9.81
Average of Shrinkage Limit	%											9.81

COMPACTION TEST RESULTS

PROJECT	: PENELITIAN					
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA					
QUARRY	: -					
SAMPLE / SAMPLE NO.	: -					
TESTING METHOD	: ASTM D 698/ D 1567	TESTED BY				
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 5 SEPTEMBER 2022			

Berat tanah	gram	2000	2000	2000	2000	2000
Kadar air mula-mula	%	11.00	11.00	11.00	11.00	11.00
Penambahan air	ml	150	200	250	300	350
Kadar air akhir	%	19.3	22.1	24.9	27.7	30.4

Berat Isi Basah (Wet density)

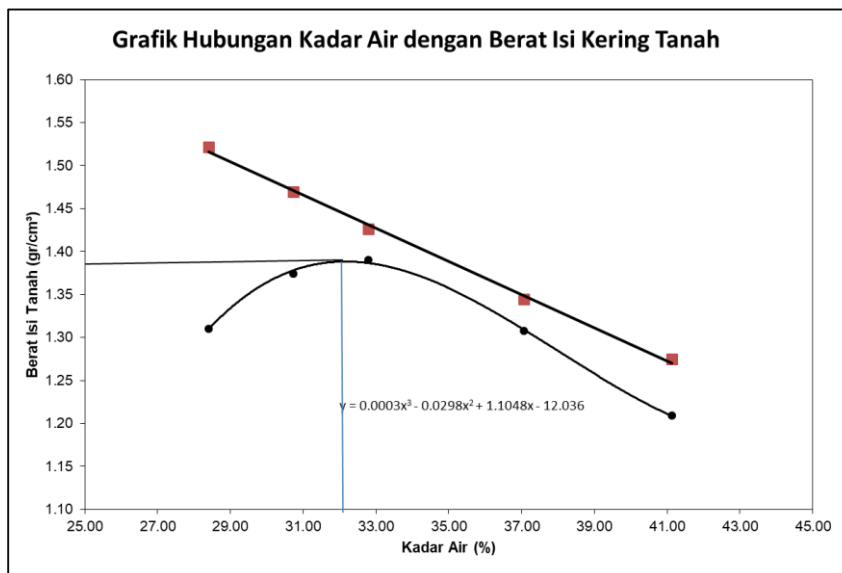
No. Mould	-	1	2	3	4	5
Berat Mould	gram	3529	3529	3529	3529	3529
Berat tanah basah + Mould	gram	5205	5319	5368	5315	5229
Berat tanah basah, W_{wet}	gram	1676	1790	1839	1786	1700
Volume Mould	cm ³	996	996	996	996	996
Berat Volume Basah	gr/cm ³	1.682	1.797	1.846	1.793	1.706

Kadar Air (Water Content)

No. Container	-	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B
Berat tanah basah + Container	gram	47.61	46.18	49.87	44.77	38.52	46.26	44.33	49.81	47.01	43.27
Berat tanah kering + Container	gram	38.83	37.81	40.23	36.05	30.91	36.91	34.47	38.64	35.71	33.01
Berat air	gram	8.78	8.37	9.64	8.72	7.61	9.35	9.86	11.17	11.3	10.26
Berat container	gram	8.08	8.17	8.20	8.24	7.95	8.07	8.14	8.20	8.12	8.16
Berat tanah kering	gram	30.75	29.64	32.03	27.81	22.96	28.84	26.33	30.44	27.59	24.85
Kadar air	%	28.6	28.2	30.1	31.4	33.1	32.4	37.4	36.7	41.0	41.3
Kadar air rata-rata	%	28.4		30.7		32.8		37.1		41.1	

Berat Isi Kering (Dry Density)

Berat tanah basah, W_{wet}	gram	1676	1790	1839	1786	1700
Kadar air rata-rata	%	28.40	30.73	32.78	37.07	41.12
Berat kering	gram	1305.34	1369.27	1384.97	1302.97	1204.63
Volume Mould	cm ³	996.31	996.31	996.31	996.31	996.31
Berat isi kering	gr/cm ³	1.31	1.37	1.39	1.31	1.21
$\gamma_{zav} = gw/(w+(1/Gs))$	gr/cm ³	1.52	1.47	1.43	1.34	1.27



DIRECT SHEAR TEST RESULTS (UU)

PROJECT : PENELITIAN
 LOCATION : FAKULTAS TEKNIK UNHAS GOWA
 NO SAMPLE : -
 QUARRY : -
 TESTING METHOD : ASTM D 3080-04
 LABORATORY : HASANUDDIN UNIVERSITY

Kadar Bakteri : 0 %
 Pemeraman : 0 Hari

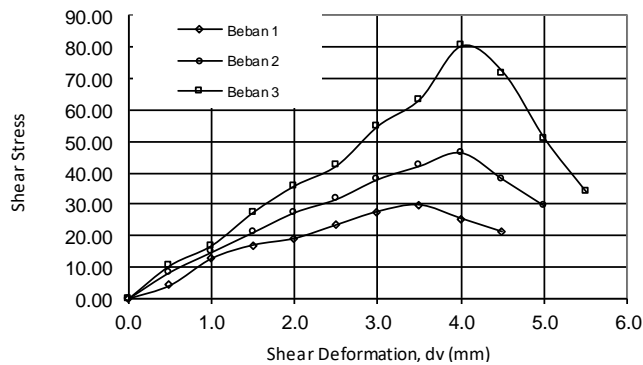


TESTED BY : MUTIARA
 DATE : 20/12/2022

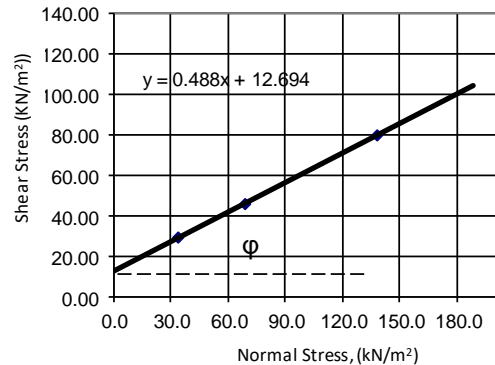
Sample Size :	Proving Ring Calibration = 1.22 kg/div
Diameter Sample = 6.00 cm	Displacement Rate = kg/div
Height of Sample = 2.00 cm	c = 12.69 kN/m ²
Area of Sample = 28.27 cm ²	φ = 26.06 °

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00 kg		P1 = 20.00 kg		P1 = 40.00 kg	
Normal Stress	σ1 = 34.68 kg/cm ²		σ1 = 69.37 kg/cm ²		σ1 = 138.74 kg/cm ²	
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	1.220	4.231	2.440	8.463	3.050	10.579
1.00	3.660	12.694	4.270	14.810	4.880	16.926
1.50	4.880	16.926	6.100	21.157	7.930	27.504
2.00	5.490	19.041	7.930	27.504	10.370	35.967
2.50	6.710	23.273	9.150	31.736	12.200	42.314
3.00	7.930	27.504	10.980	38.083	15.860	55.009
3.50	8.540	29.620	12.200	42.314	18.300	63.472
4.00	7.320	25.389	13.420	46.546	23.180	80.397
4.50	6.100	21.157	10.980	38.083	20.740	71.934
5.00	0.000	0.000	8.540	29.620	14.640	50.777
5.50	0.000	0.000	0.000	0.000	9.760	33.852
6.00	0.000	0.000			0.000	0.000
6.50	0.000					
7.00	0.000					
7.50	0.000					
8.00	0.000					
8.50	0.000					
9.00	0.000					


Shear Stress vs Shear Deformation



Shear Stress vs Normal Stress

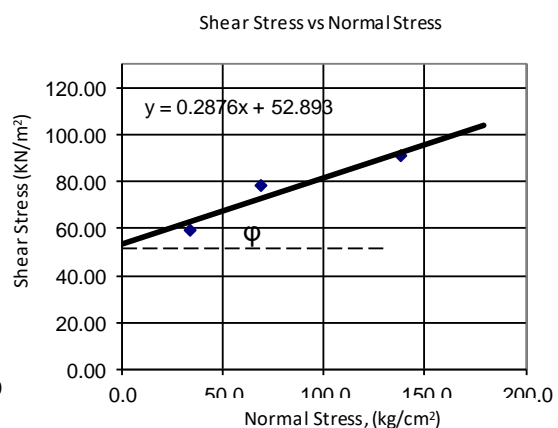
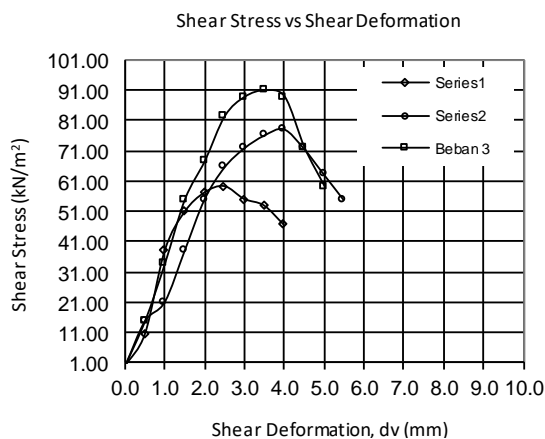


DIRECT SHEAR TEST RESULTS (UU)

PROJECT	: PENELITIAN	Kadar Bakteri	: 4 %	
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri	: 3 Hari	
NO SAMPLE	: -	Pemeraman	: 7 Hari	
QUARRY	: -			
TESTING METHOD	: ASTM D 3080-72	TESTED BY	: MUTIARA	
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 27/12/2022	

Sample Size :		Proving Ring Calibration	=	1.22	kg/div
Diameter Sample	= 6.00 cm	Displacement Rate	=		kg/div
Height of Sample	= 2.00 cm	c	=	52.89	KN/m ²
Area of Sample	= 28.27 cm ²	φ	=	16.13	°

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00	kg	P1 = 20.00	kg	P1 = 40.00	kg
Normal Stress	σ1 = 34.68	kN/m ²	σ1 = 69.37	kN/m ²	σ1 = 138.74	kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	3.050	10.579	4.270	14.810	4.270	14.810
1.00	10.980	38.083	6.100	21.157	9.760	33.852
1.50	14.640	50.777	10.980	38.083	15.860	55.009
2.00	16.470	57.124	15.860	55.009	19.520	67.703
2.50	17.080	59.240	18.910	65.587	23.790	82.513
3.00	15.860	55.009	20.740	71.934	25.620	88.860
3.50	15.250	52.893	21.960	76.166	26.230	90.976
4.00	13.420	46.546	22.570	78.282	25.620	88.860
4.50	0.000	0.000	20.740	71.934	20.740	71.934
5.00	0.000		18.300	63.472	17.080	59.240
5.50	0.000		15.860	55.009	0.000	0.000
6.00	0.000		0.000	0.000	0.000	0.000
6.50	0.000		0.000	0.000	0.000	
7.00	0.000		0.000		0.000	
7.50	0.000		0.000		0.000	
8.00	0.000		0.000		0.000	
8.50	0.000		0.000		0.000	
9.00	0.000		0.000		0.000	
9.50	0.000		0.000		0.000	
10.00	0.000		0.000		0.000	



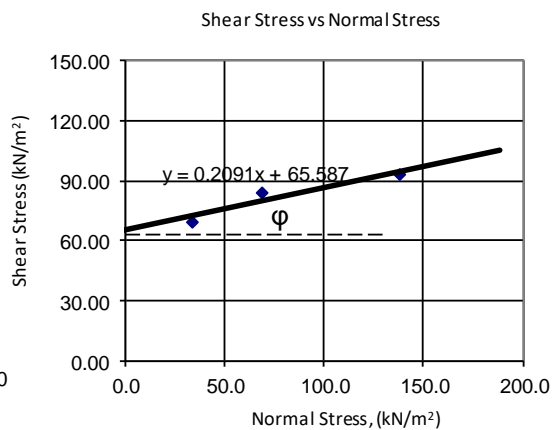
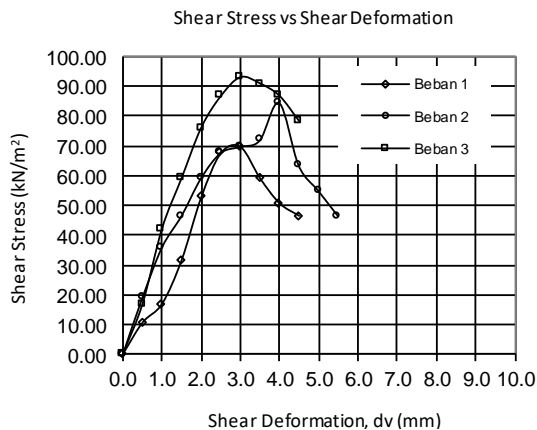
DIRECT SHEAR TEST RESULTS (UU)

PROJECT	: PENELITIAN	Kadar Bakteri	: 6 %
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri	: 3 Hari
NO SAMPLE	: -	Pemeraman	: 7 Hari
QUARRY	: -		
TESTING METHOD	: ASTM D 3080-72	TESTED BY	: MUTIARA
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 21/12/2022



Sample Size :		Proving Ring Calibration	=	1.22	kg/div
Diameter Sample	= 6.00 cm	Displacement Rate	=		kg/div
Height of Sample	= 2.00 cm	c	=	65.59	kN/m ²
Area of Sample	= 28.27 cm ²	φ	=	11.85	°

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00	kg	P1 = 20.00	kg	P1 = 40.00	kg
Normal Stress	σ1 = 34.68	kN/m ²	σ1 = 69.37	kN/m ²	σ1 = 138.74	kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/cm ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	3.050	10.579	5.490	19.041	4.880	16.926
1.00	4.880	16.926	10.370	35.967	12.200	42.314
1.50	9.150	31.736	13.420	46.546	17.080	59.240
2.00	15.250	52.893	17.080	59.240	21.960	76.166
2.50	19.520	67.703	19.520	67.703	25.010	86.745
3.00	20.130	69.819	20.130	69.819	26.840	93.092
3.50	17.080	59.240	20.740	71.934	26.230	90.976
4.00	14.640	50.777	24.400	84.629	25.010	86.745
4.50	13.420	46.546	18.300	63.472	22.570	78.282
5.00	0.000	0.000	15.860	55.009	0.000	0.000
5.50	0.000	0.000	13.420	46.546	0.000	0.000
6.00	0.000		0.000	0.000	0.000	0.000
6.50	0.000		0.000	0.000	0.000	0.000
7.00	0.000		0.000	0.000	0.000	0.000
7.50	0.000		0.000		0.000	
8.00	0.000		0.000		0.000	
8.50	0.000		0.000		0.000	
9.00	0.000		0.000		0.000	
9.50	0.000		0.000		0.000	
10.00	0.000		0.000		0.000	



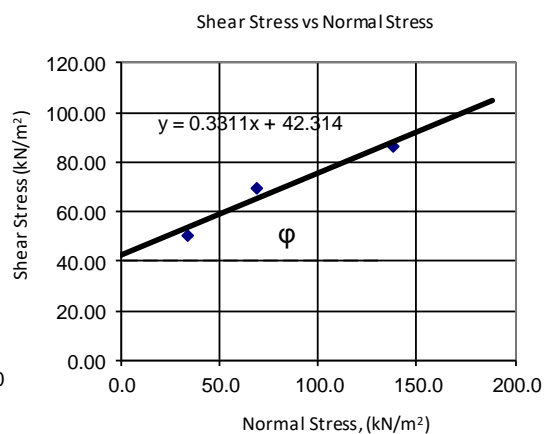
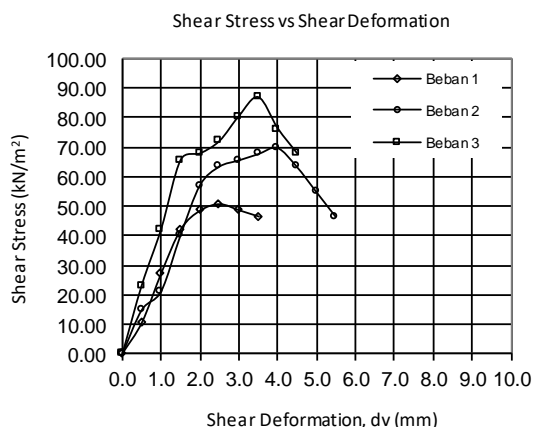
DIRECT SHEAR TEST RESULTS (UU)

PROJECT : PENELITIAN	Kadar Bakteri : 8 %
LOCATION : FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri : 3 Hari
NO SAMPLE : -	Pemeraman : 7 Hari
QUARRY : -	
TESTING METHOD : ASTM D 3080-72	TESTED BY : MUTIARA
LABORATORY : HASANUDDIN UNIVERSITY	DATE : 27/12/2022




Sample Size :	Proving Ring Calibration = 1.22 kg/div
Diameter Sample = 6.00 cm	Displacement Rate = kg/div
Height of Sample = 2.00 cm	c = 42.31 kN/m ²
Area of Sample = 28.27 cm ²	φ = 18.40 °

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00 kg		P1 = 20.00 kg		P1 = 40.00 kg	
Normal Stress	σ1 = 34.68 kN/m ²		σ1 = 69.37 kN/m ²		σ1 = 138.74 kN/m ²	
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	3.050	10.579	4.270	14.810	6.710	23.273
1.00	7.930	27.504	6.100	21.157	12.200	42.314
1.50	12.200	42.314	11.590	40.199	18.910	65.587
2.00	14.030	48.662	16.470	57.124	19.520	67.703
2.50	14.640	50.777	18.300	63.472	20.740	71.934
3.00	14.030	48.662	18.910	65.587	23.180	80.397
3.50	13.420	46.546	19.520	67.703	25.010	86.745
4.00	0.000	0.000	20.130	69.819	21.960	76.166
4.50	0.000	0.000	18.300	63.472	19.520	67.703
5.00	0.000	0.000	15.860	55.009	0.000	0.000
5.50	0.000		13.420	46.546	0.000	0.000
6.00	0.000		0.000	0.000	0.000	0.000
6.50	0.000		0.000		0.000	0.000
7.00	0.000		0.000		0.000	0.000
7.50	0.000		0.000		0.000	0.000
8.00	0.000		0.000		0.000	0.000
8.50	0.000		0.000		0.000	0.000
9.00	0.000		0.000		0.000	0.000
9.50	0.000		0.000		0.000	0.000
10.00	0.000		0.000		0.000	0.000

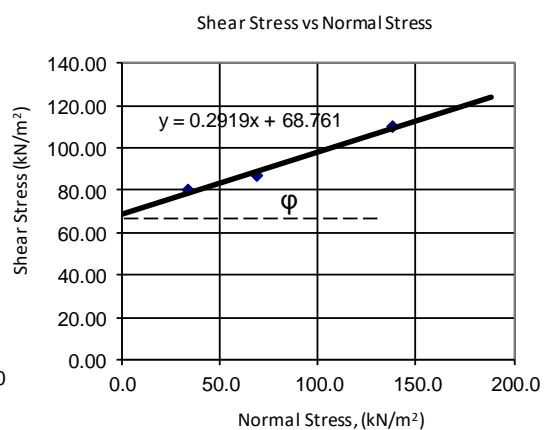
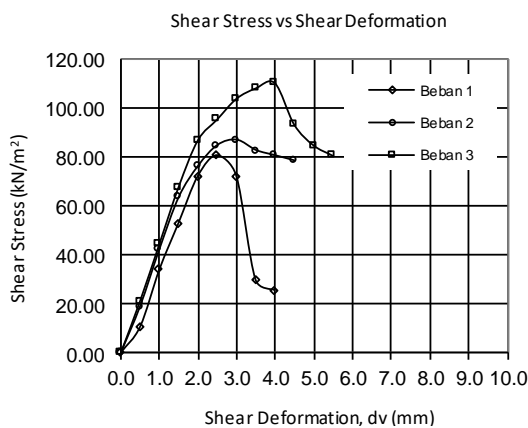


DIRECT SHEAR TEST RESULTS (UU)

PROJECT : PENELITIAN	Kadar Bakteri : 4%	
LOCATION : FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri : 3 Hari	
NO SAMPLE :-	Pemeraman : 14 Hari	
QUARRY :-		
TESTING METHOD : ASTM D 3080-72	TESTED BY : MUTIARA	
LABORATORY : HASANUDDIN UNIVERSITY	DATE : 10/01/2023	

Sample Size :	Proving Ring Calibration	= 1.22	kg/div
Diameter Sample = 6.00 cm	Displacement Rate	=	kg/div
Height of Sample = 2.00 cm	c	= 68.76	kN/m ²
Area of Sample = 28.27 cm ²	φ	= 16.29	°

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00	kg	P1 = 20.00	kg	P1 = 40.00	kg
Normal Stress	σ1 = 34.68	kN/m ²	σ1 = 69.37	kN/m ²	σ1 = 138.74	kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	3.050	10.579	5.490	19.041	6.100	21.157
1.00	9.760	33.852	12.200	42.314	12.810	44.430
1.50	15.250	52.893	18.300	63.472	19.520	67.703
2.00	20.740	71.934	21.960	76.166	25.010	86.745
2.50	23.180	80.397	24.400	84.629	27.450	95.207
3.00	20.740	71.934	25.010	86.745	29.890	103.670
3.50	8.540	29.620	23.790	82.513	31.110	107.902
4.00	7.320	25.389	23.180	80.397	31.720	110.017
4.50	0.000	0.000	22.570	78.282	26.840	93.092
5.00	0.000	0.000	0.000	0.000	24.400	84.629
5.50	0.000	0.000	0.000	0.000	23.180	80.397
6.00	0.000	0.000	0.000	0.000	0.000	0.000
6.50	0.000	0.000	0.000	0.000	0.000	0.000
7.00	0.000	0.000	0.000	0.000	0.000	0.000
7.50	0.000	0.000	0.000	0.000	0.000	0.000
8.00	0.000	0.000	0.000	0.000	0.000	0.000
8.50	0.000	0.000	0.000	0.000	0.000	0.000
9.00	0.000	0.000	0.000	0.000	0.000	0.000
9.50	0.000	0.000	0.000	0.000	0.000	0.000
10.00	0.000	0.000	0.000	0.000	0.000	0.000



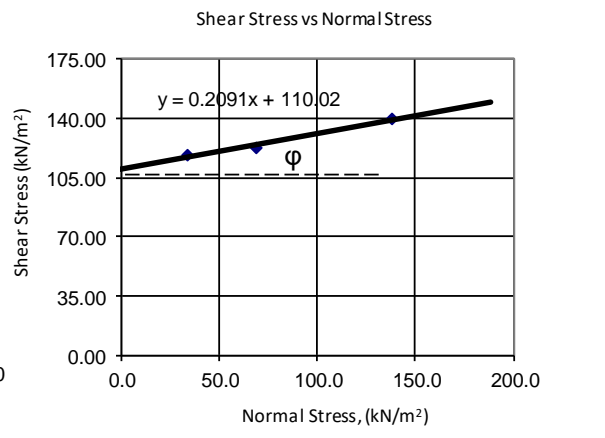
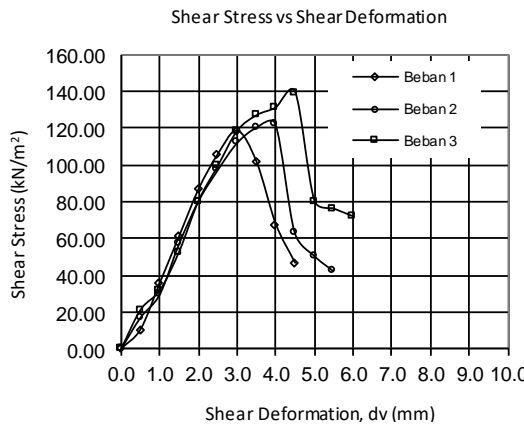
DIRECT SHEAR TEST RESULTS (UU)

PROJECT	: PENELITIAN	Kadar Bakteri	: 6 %
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri	: 3 Hari
NO SAMPLE	: -	Pemeraman	: 14 Hari
QUARRY	: -		
TESTING METHOD	: ASTM D 3080-72	TESTED BY	: MUTIARA
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 10/01/2023




Sample Size :		Proving Ring Calibration	=	1.22	kg/div
Diameter Sample	= 6.00 cm	Displacement Rate	=		kg/div
Height of Sample	= 2.00 cm	c	=	110.02	kN/m ²
Area of Sample	= 28.27 cm ²	φ	=	11.84	°

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00	kg	P1 = 20.00	kg	P1 = 40.00	kg
Normal Stress	σ1 = 34.68	kN/m ²	σ1 = 69.37	kN/m ²	σ1 = 138.74	kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	3.050	10.579	4.880	16.926	6.100	21.157
1.00	10.370	35.967	8.540	29.620	9.150	31.736
1.50	17.690	61.356	16.470	57.124	15.250	52.893
2.00	25.010	86.745	23.180	80.397	23.180	80.397
2.50	30.500	105.786	28.060	97.323	28.670	99.439
3.00	34.160	118.480	32.330	112.133	34.160	118.480
3.50	29.280	101.555	34.770	120.596	36.600	126.943
4.00	19.520	67.703	35.380	122.712	37.820	131.175
4.50	13.420	46.546	18.300	63.472	40.260	139.637
5.00	0.000		14.640	50.777	23.180	80.397
5.50	0.000		12.200	42.314	21.960	76.166
6.00	0.000		0.000		20.740	71.934
6.50	0.000		0.000		0.000	
7.00	0.000		0.000		0.000	
7.50	0.000		0.000		0.000	
8.00	0.000		0.000		0.000	
8.50	0.000		0.000		0.000	
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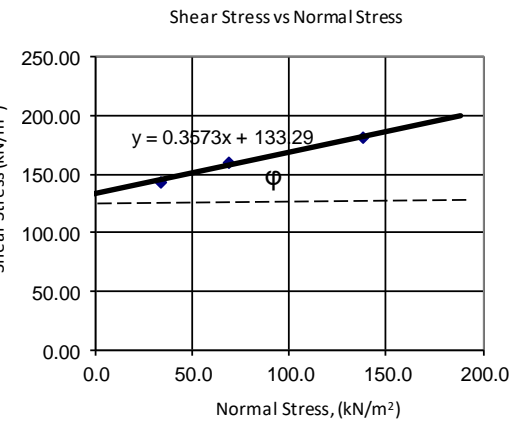
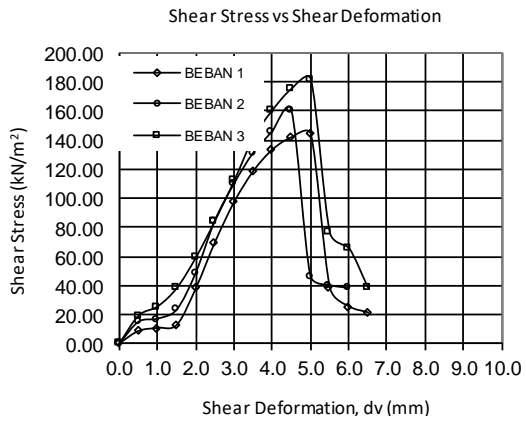
DIRECT SHEAR TEST RESULTS (UU)

PROJECT	: PENELITIAN	Kadar Bakteri	: 4 %	
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri	: 3 Hari	
NO SAMPLE	: -	Pemeraman	: 28 Hari	
QUARRY	: -			
TESTING METHOD	: ASTM D 3080-72	TESTED BY	: MUTIARA	
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 07/02/2023	

Sample Size :	Proving Ring Calibration	= 1.22	kg/div
Diameter Sample = 6.00 cm	Displacement Rate	=	kg/div
Height of Sample = 2.00 cm	c	= 133.29	kN/m ²
Area of Sample = 28.27 cm ²	φ	= 19.70	°

Test No.	Test (1)	Test (2)	Test (3)
Normal Load	P1 = 10.00 kg	P1 = 20.00 kg	P1 = 40.00 kg
Normal Stress	σ1 = 34.68 kN/m ²	σ1 = 69.37 kN/m ²	σ1 = 138.74 kN/m ²

Shear Displacement (mm)	Test (1)		Test (2)		Test (3)	
	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	2.440	8.463	4.270	14.810	5.490	19.041
1.00	3.050	10.579	4.880	16.926	7.320	25.389
1.50	3.660	12.694	6.710	23.273	10.980	38.083
2.00	10.980	38.083	14.030	48.662	17.080	59.240
2.50	20.130	69.819	24.400	84.629	24.400	84.629
3.00	28.060	97.323	31.720	110.017	32.330	112.133
3.50	34.160	118.480	37.820	131.175	40.870	141.753
4.00	38.430	133.290	42.090	145.985	46.360	160.795
4.50	40.870	141.753	46.360	160.795	50.630	175.605
5.00	41.480	143.869	13.420	46.546	52.460	181.952
5.50	10.980	38.083	11.590	40.199	21.960	76.166
6.00	7.320	25.389	10.980	38.083	18.910	65.587
6.50	6.100	21.157	0.000		10.980	38.083
7.00	0.000	0.000	0.000		0.000	0.000
7.50	0.000		0.000		0.000	
8.00	0.000		0.000		0.000	
8.50	0.000		0.000		0.000	
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10.00	0.000		0.000		0.000	

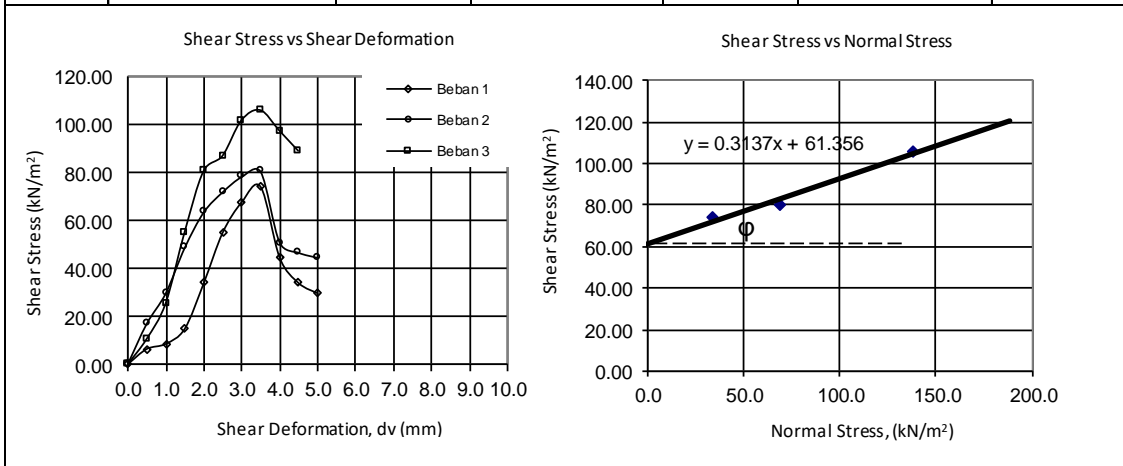


DIRECT SHEAR TEST RESULTS (UU)

PROJECT	: PENELITIAN	Kadar Bakteri	: 8 %	
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri	: 3 Hari	
NO SAMPLE	: -	Pemeraman	: 14 Hari	
QUARRY	: -			
TESTING METHOD	: ASTM D 3080-72	TESTED BY	: MUTIARA	
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 10/01/2023	

Sample Size :		Proving Ring Calibration	=	1.22	kg/div
Diameter Sample	= 6.00 cm	Displacement Rate	=		kg/div
Height of Sample	= 2.00 cm	c	=	61.36	kg/cm ²
Area of Sample	= 28.27 cm ²	φ	=	17.46	°

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 =	10.00 kg	P1 =	20.00 kg	P1 =	40.00 kg
Normal Stress	σ1 =	34.68 kN/m ²	σ1 =	69.37 kN/m ²	σ1 =	138.74 kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	1.830	6.347	4.880	16.926	3.050	10.579
1.00	2.440	8.463	8.540	29.620	7.320	25.389
1.50	4.270	14.810	14.030	48.662	15.860	55.009
2.00	9.760	33.852	18.300	63.472	23.180	80.397
2.50	15.860	55.009	20.740	71.934	25.010	86.745
3.00	19.520	67.703	22.570	78.282	29.280	101.555
3.50	21.350	74.050	23.180	80.397	30.500	105.786
4.00	12.810	44.430	14.640	50.777	28.060	97.323
4.50	9.760	33.852	13.420	46.546	25.620	88.860
5.00	8.540	29.620	12.810	44.430	22.570	78.282
5.50	0.000		0.000	0.000	0.000	0.000
6.00	0.000		0.000	0.000	0.000	0.000
6.50	0.000		0.000	0.000	0.000	0.000
7.00	0.000		0.000	0.000	0.000	0.000
7.50	0.000		0.000	0.000	0.000	0.000
8.00	0.000		0.000	0.000	0.000	0.000
8.50	0.000		0.000	0.000	0.000	0.000
9.00	0.000		0.000	0.000	0.000	0.000
9.50	0.000		0.000	0.000	0.000	0.000
10.00	0.000		0.000	0.000	0.000	0.000



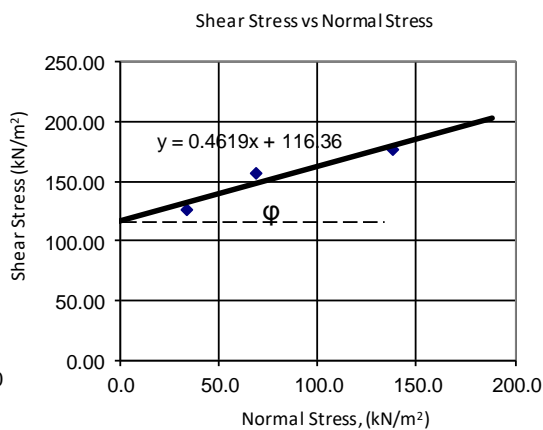
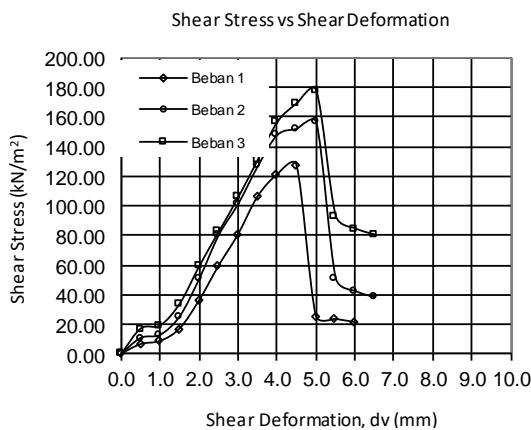
DIRECT SHEAR TEST RESULTS (UU)

PROJECT : PENELITIAN	Kadar Bakteri : 8 %
LOCATION : FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri : 3 Hari
NO SAMPLE : -	Pemeraman : 28 Hari
QUARRY : -	
TESTING METHOD : ASTM D 3080-72	TESTED BY : MUTIARA
LABORATORY : HASANUDDIN UNIVERSITY	DATE : 07/02/2023



Sample Size :	Proving Ring Calibration	= 1.22 kg/div
Diameter Sample = 6.00 cm	Displacement Rate	= kg/div
Height of Sample = 2.00 cm	c	= 116.36 kN/m ²
Area of Sample = 28.27 cm ²	φ	= 24.89 °

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00	kg	P1 = 20.00	kg	P1 = 40.00	kg
Normal Stress	σ1 = 34.68	kN/m ²	σ1 = 69.37	kN/m ²	σ1 = 138.74	kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	1.830	6.347	3.050	10.579	4.880	16.926
1.00	2.440	8.463	3.660	12.694	5.490	19.041
1.50	4.880	16.926	7.320	25.389	9.760	33.852
2.00	10.370	35.967	14.640	50.777	17.080	59.240
2.50	17.080	59.240	23.180	80.397	23.790	82.513
3.00	23.180	80.397	29.280	101.555	30.500	105.786
3.50	30.500	105.786	36.600	126.943	37.820	131.175
4.00	34.770	120.596	42.700	148.100	45.140	156.563
4.50	36.600	126.943	43.920	152.332	48.800	169.258
5.00	7.320	25.389	45.140	156.563	51.240	177.720
5.50	6.710	23.273	14.640	50.777	26.840	93.092
6.00	6.100	21.157	12.200	42.314	24.400	84.629
6.50	0.000		10.980	38.083	23.180	80.397
7.00	0.000		0.000		0.000	
7.50	0.000		0.000		0.000	
8.00	0.000		0.000		0.000	
8.50	0.000		0.000		0.000	
9.00	0.000		0.000		0.000	
9.50	0.000		0.000		0.000	
10.00	0.000		0.000		0.000	



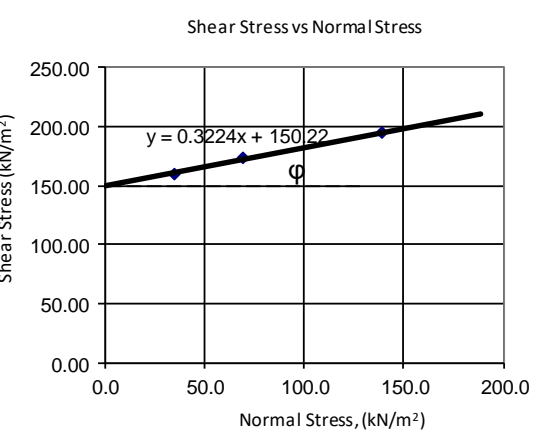
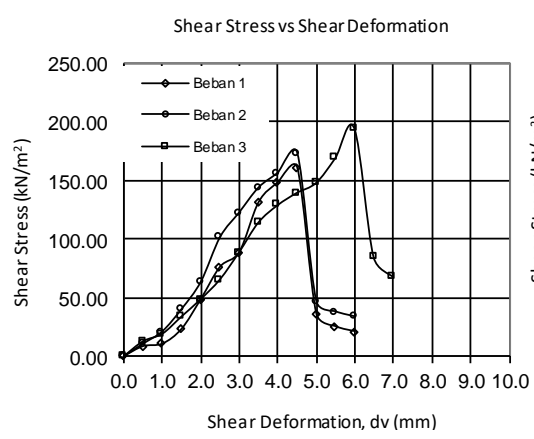
DIRECT SHEAR TEST RESULTS (UU)

PROJECT	: PENELITIAN DISERTASI	Kadar Bakteri	: 6 %
LOCATION	: FAKULTAS TEKNIK UNHAS GOWA	Kultur Bakteri	: 3 Hari
NO SAMPLE	: -	Pemeraman	: 28 Hari
QUARRY	: -		
TESTING METHOD	: ASTM D 3080-72	TESTED BY	: MUTIARA
LABORATORY	: HASANUDDIN UNIVERSITY	DATE	: 07/02/2023



Sample Size :	Proving Ring Calibration	=	1.22	kg/div
Diameter Sample = 6.00 cm	Displacement Rate	=		kg/div
Height of Sample = 2.00 cm	c	=	150.22	kN/m ²
Area of Sample = 28.27 cm ²	φ	=	17.91	°

Test No.	Test (1)		Test (2)		Test (3)	
Normal Load	P1 = 10.00	kg	P1 = 20.00	kg	P1 = 40.00	kg
Normal Stress	σ ₁ = 34.68	kN/m ²	σ ₁ = 69.37	kN/m ²	σ ₁ = 138.74	kN/m ²
Shear Displacement (mm)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)	Shear Force (kg)	Shear Stress (kN/m ²)
0.00	0.000	0.000	0.000	0.000	0.000	0.000
0.50	2.440	8.463	3.050	10.579	3.660	12.694
1.00	3.050	10.579	6.100	21.157	5.490	19.041
1.50	6.710	23.273	11.590	40.199	9.760	33.852
2.00	14.030	48.662	18.300	63.472	14.030	48.662
2.50	21.960	76.166	29.280	101.555	18.910	65.587
3.00	25.620	88.860	35.380	122.712	25.620	88.860
3.50	37.820	131.175	41.480	143.869	32.940	114.249
4.00	42.700	148.100	45.140	156.563	37.210	129.059
4.50	46.360	160.795	50.020	173.489	40.260	139.637
5.00	10.370	35.967	13.420	46.546	42.700	148.100
5.50	7.320	25.389	10.980	38.083	48.800	169.258
6.00	6.100	21.157	9.760	33.852	56.120	194.646
6.50	0.000		0.000		24.400	84.629
7.00	0.000		0.000		19.520	67.703
7.50	0.000		0.000		0.000	
8.00	0.000		0.000		0.000	
8.50	0.000		0.000		0.000	
9.00	0.000		0.000		0.000	
9.50	0.000		0.000		0.000	
10.00	0.000		0.000		0.000	



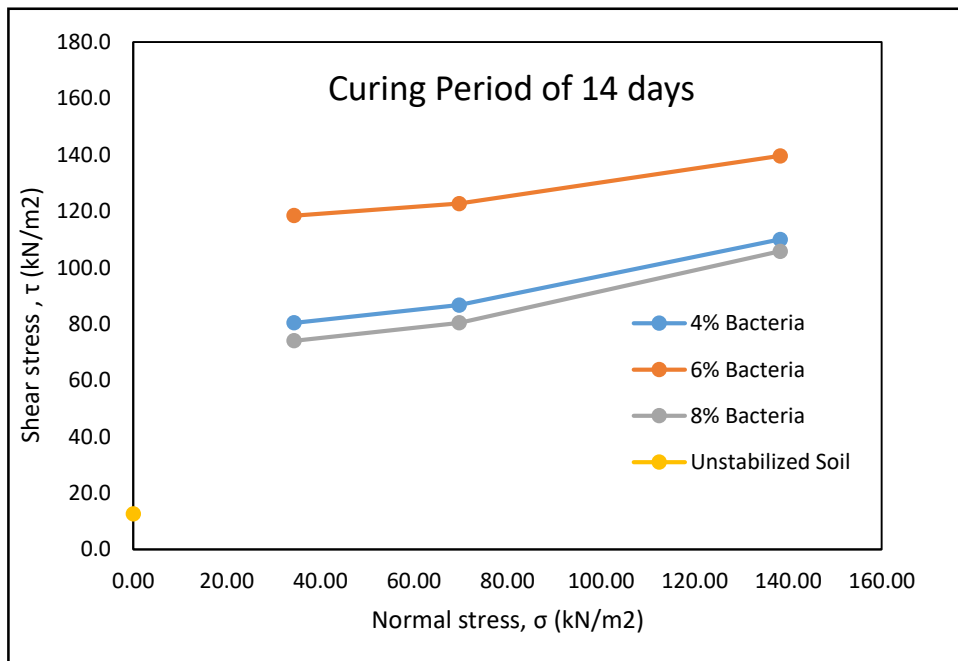
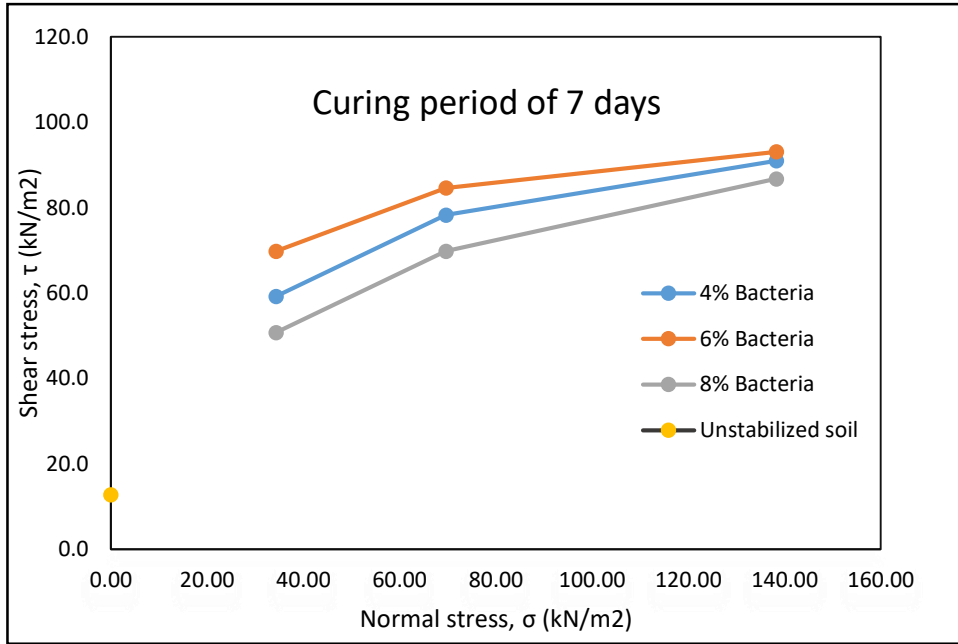
**Parameter Shear Stength tanah
Stabilisasi MICP Bacillus subtilis**

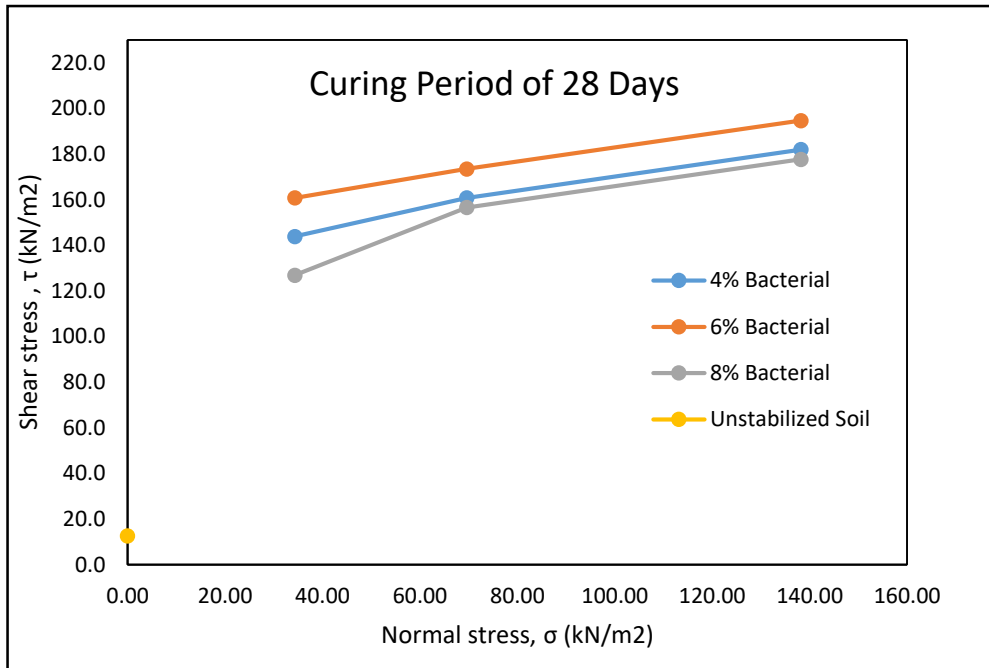
Materials			Parameters				
MICP Bacillus Subtilis			Shear stress τ (kN/m ²)				
Culture (days)	Volume (%)	Curring time (days)	C (kN/m ²)	ϕ (°)	34.32	69.63	138.27
4		7	52.89	16.13	59.24	78.28	90.98
		14	68.76	16.29	80.40	86.74	110.02
		28	133.29	19.70	143.87	160.79	181.95
6		7	65.59	11.85	69.82	84.63	93.09
		14	110.02	11.84	118.48	122.71	139.64
		28	150.22	17.91	160.79	173.49	194.65
8		7	42.31	18.40	50.78	69.82	86.74
		14	61.36	17.46	74.05	80.40	105.79
		28	116.36	24.89	126.94	156.56	177.72
Tanpa Bakteri			12.69	26.06	29.62	46.55	80.40

Shear stress τ (kN/m ²)				
Curring time (days)	Volume (%)	Normal stress σ (kN/m ²)		
		34.32	69.63	138.27
7	4	59.24	78.28	90.98
	6	69.82	84.63	93.09
	8	50.78	69.82	86.74

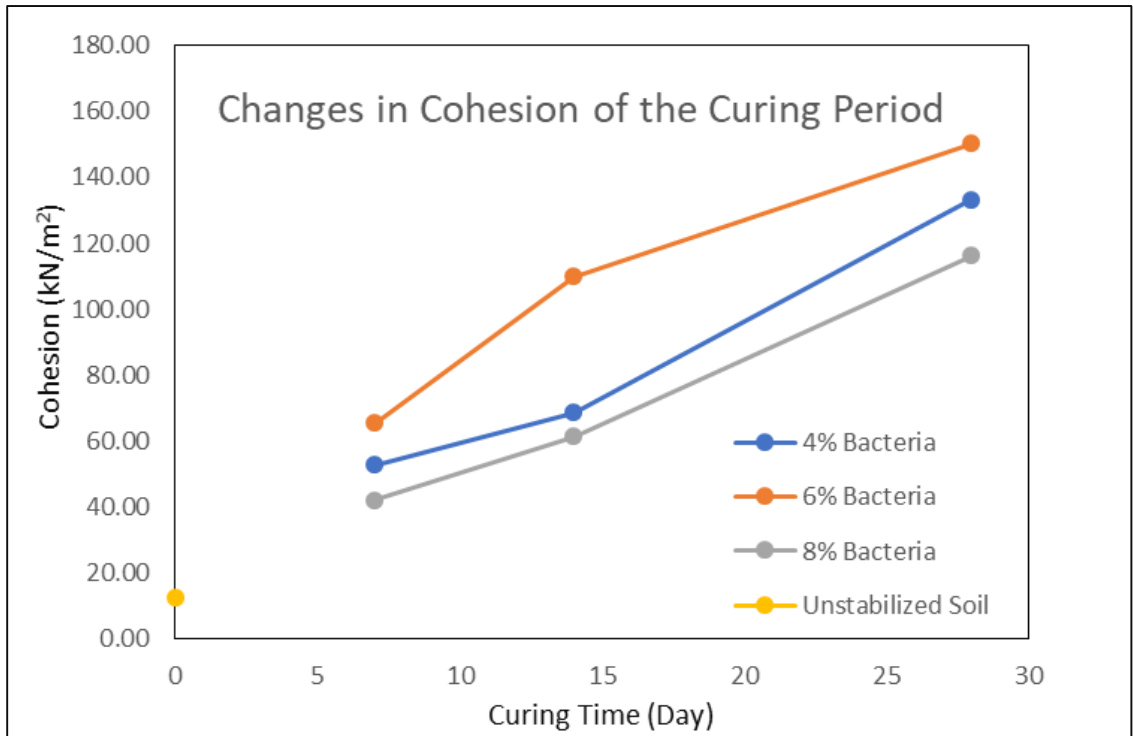
Shear stress τ (kN/m ²)				
Curring time (days)	Volume (%)	Normal stress σ (kN/m ²)		
		34.32	69.63	138.27
14	4	80.40	86.74	110.02
	6	118.48	122.71	139.64
	8	74.05	80.40	105.79

Shear stress τ (kN/m ²)				
Curring time (days)	Volume (%)	Normal stress σ (kN/m ²)		
		34.32	69.63	138.27
28	4	143.87	160.79	181.95
	6	160.79	173.49	194.65
	8	126.94	156.56	177.72

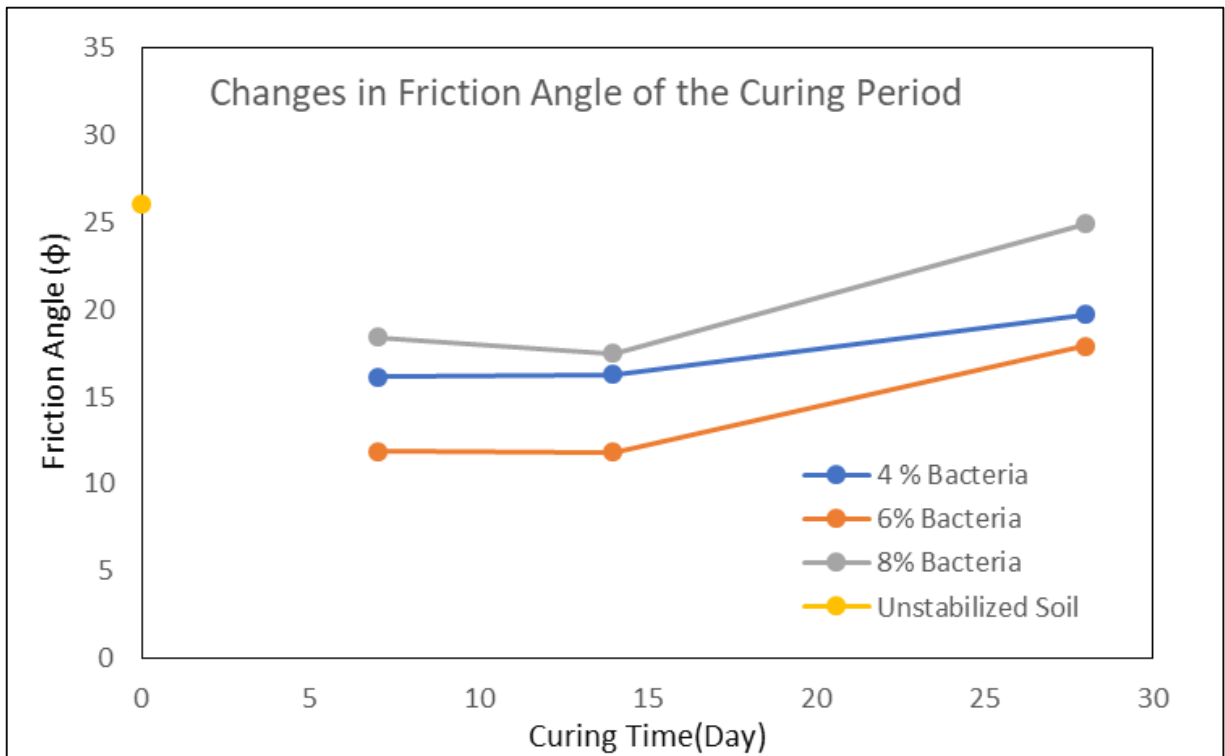




Cohesion of the curing Period				
Culture (days)	Volume (%)	Curring time (days)		
		7	14	28
3	4	52.89	68.76	133.29
	6	65.59	110.02	150.22
	8	42.31	61.36	116.36



Culture (days)	Volume (%)	Curing time (days)		
		7	14	28
3	4	16.13	16.29	19.70
	6	11.85	11.84	17.91
	8	18.40	17.46	24.89



Nilai Kuat Geser Tanah Terstabilisasi Bakteri			
Variation of Addiction Bacteria	Curing Time (Day)		
	7	14	28
4%	63.33	79.31	146.21
6%	73.16	117.58	161.88
8%	54.32	72.70	133.10

