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Lampiran 1 Pengujian fisis tanah asli

HASIL PEMERIKSAAN BERAT JENIS

Specific Gravity Test

Laboratorium : Universitas Hasanuddin
Metode Pengujian : ASTM D-854, SNI 1964:2008
Dikerjakan : Nushrah Nugraha
Tanggal : Mei 2024

Nama Sampel	-	**A**							
Kedalaman Sampel	m								
Nomor Piknometer	-	***A***	***B***						
Berat Piknometer + Tanah	g	35.63	36.08						
Berat Piknometer	g	26.07	25.66						
Berat Tanah Sampel	g	10.00	10.00						
Suhu, ***T***	°C	30.0	30.0						
Berat Piknometer + Air pada suhu T	g	74.53	77.01						
Berat Piknometer + Tanah + Air	g	80.76	83.18						
Berat Jenis Air pada suhu T, g_T	g/cm^3	0.99624	0.99624						
Koefisien Koreksi Berat Jenis, $a=g_T/g_2$	-	0.99803	0.99803						
Berat Tanah Kering, ***Ws***	g	10.00	10.00						
Berat Jenis Tanah, ***(Gs=a*Ws/Ww)***	-	2.65	2.61						
Berat Jenis Tanah Rata-rata	-	2.63							

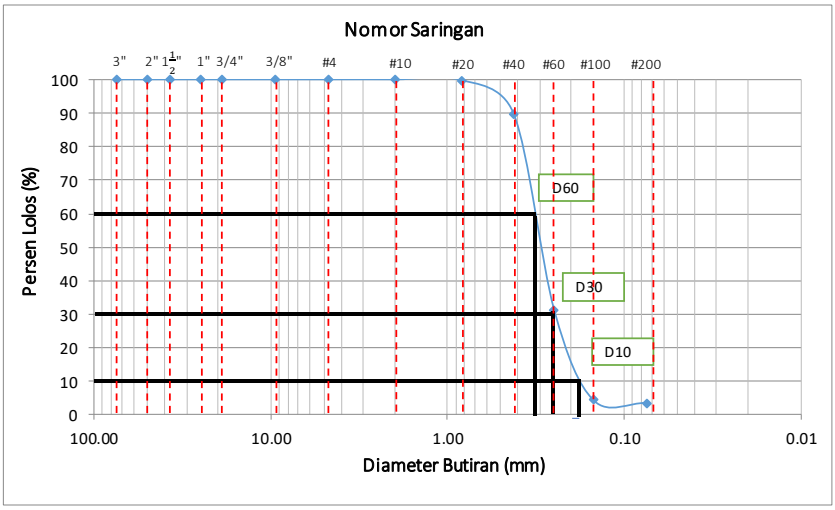
Berat Jenis Air $g_{w,20^oC}$ = 0.99821

HASIL PENGUJIAN ANALISA SARINGAN

Metode Pengujian : ASTM D-6913, ASTM D-7928, SNI 3423:2008
Laboratorium : Universitas Hasanuddin — Dikerjakan : Nushrah Nugraha
Nama Sampel : — Tanggal : Mei 2024

Berat Tanah Kering	500	gram

Saringan No.	Diameter (mm)	Berat Tertahan (gram)	Berat Kumulatif (gram)	Persen (%)	
				Tertahan	Lolos
3"	75.00	0	0	0.0	100.0
2"	50.00	0	0	0.0	100.0
11/2"	37.50	0	0	0.0	100.0
1"	25.00	0	0	0.0	100.0
3/4"	19.00	0	0	0.0	100.0
3/8"	9.500	0	0	0.0	100.0
4	4.750	0	0	0.0	100.0
10	2.000	0	0	0.0	100.0
20	0.840	1	1	0.2	99.8
40	0.425	50	51	10.2	89.8
60	0.250	294	345	69.0	31.0
100	0.150	134	479	95.8	4.2
200	0.075	4	483	96.6	3.4
Pan	-	17	500	100.0	0.0



Rekapitulasi	D10	D30	D60	Cu	Cc
	0.188	0.246	0.358	1.910	0.903

Lampiran 2 Pengujian mekanis tanah asli

HASIL PENGUJIAN KEPADATAN RINGAN

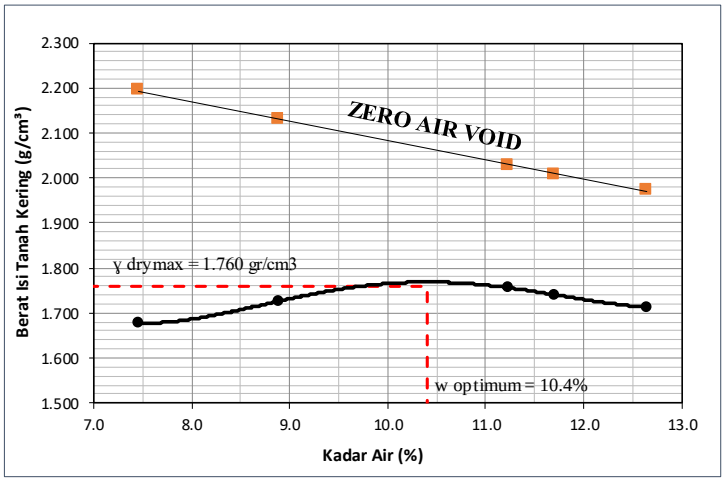
STANDARD PROCTOR TEST

Metode Pengujian	: ASTM D-698, SNI 1742:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	:

Persiapan Uji						
Berat Tanah Uji	g	2500	2500	2500	2500	2500
Kadar Air Mula-mula	%	0.0	0.0	0.0	0.0	0.0
Penambahan Air	ml	200	250	300	325	350
Kadar Air Campuran	%	8.0	10.0	12.0	13.0	14.0

Kepadatan						
Berat Mould	g	1891	1891	1891	1891	1891
Berat Mould + Tanah Basah	g	3688	3765	3838	3829	3815
Berat Tanah Basah	g	1797	1874	1947	1938	1924
Volume Mould	cm^3	997	997	997	997	997
Kepadatan Basah	g/cm^3	1.803	1.880	1.953	1.944	1.930
Kepadatan Kering	g/cm^3	1.678	1.726	1.756	1.740	1.713

Kadar Air											
Nomor Cawan	-	**1A**	**1B**	**2A**	**2B**	**3A**	**3B**	**4A**	**4B**	**5A**	**5B**
Berat Cawan + Tanah Basah	g	46.14	45.79	53.13	57.98	42.15	50.36	89.09	65.44	74.14	87.04
Berat Cawan + Tanah Kering	g	43.44	43.26	49.44	53.93	38.74	46.04	81.32	60.22	67.79	78.69
Berat Air	g	2.70	2.53	3.69	4.05	3.41	4.32	7.77	5.22	6.35	8.35
Berat Cawan	g	8.08	8.53	8.12	8.19	8.04	8.03	15.09	15.53	15.47	15.21
Berat Tanah Kering	g	35.36	34.73	41.32	45.74	30.70	38.01	66.23	44.69	52.32	63.48
Kadar Air	%	7.6	7.3	8.9	8.9	11.1	11.4	11.7	11.7	12.1	13.2
Kadar Air Rata Rata	%	7.5		8.9		11.2		11.7		12.6	



Berat Jenis
2.63

w optimum (%)
10.4

ɣ drymax (gr/cm3)
1.760

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Tak Terdrainase (UU)

Metode Pengujian	: ASTM D3080-11, SNI 2813:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Undrained 1 (Asli)		

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.09	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **φ**	= 23	°
Berat Vol. Kering Awal	= 1.584	kg/cm3	Derajat Kejenuhan Awal	= 41	%
Berat Vol. Kering Uji	= 1.641	kg/cm3	Derajat Kejenuhan Uji	= 45	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	4.0	2.20	0.078	6.0	0.06
2	0.10	4.5	2.48	0.088	6.5	0.07
3	0.15	6.0	3.30	0.117	6.5	0.07
4	0.20	6.5	3.58	0.126	7.0	0.07
5	0.25	6.5	3.58	0.126	7.5	0.08
6	0.30	6.5	3.58	0.126	8.5	0.09
7	0.35	6.5	3.58	0.126	8.7	0.09
8	0.40	6.5	3.58	0.126	9.5	0.10
9	0.45	6.8	3.74	0.132	10.0	0.10
10	0.50	6.9	3.80	0.134	10.0	0.10
11	0.55	7.2	3.96	0.140	10.0	0.10
12	0.60	7.3	4.02	0.142	10.0	0.10
13	0.65	7.3	4.02	0.142	10.5	0.11
14	0.70	7.5	4.13	0.146	11.0	0.11
15	0.75	7.7	4.24	0.150	11.0	0.11
16	0.80	8.0	4.40	0.156	11.0	0.11
17	0.85	8.0	4.40	0.156	11.0	0.11
18	0.90	8.0	4.40	0.156	11.0	0.11
19						
20						
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	4.5	2.48	0.088	7.0	0.07
2	0.10	6.0	3.30	0.117	7.0	0.07
3	0.15	7.0	3.85	0.136	7.0	0.07
4	0.20	7.0	3.85	0.136	7.0	0.07
5	0.25	8.0	4.40	0.156	7.0	0.07
6	0.30	9.0	4.95	0.175	7.0	0.07
7	0.35	9.5	5.23	0.185	7.0	0.07
8	0.40	10.0	5.50	0.195	8.0	0.08
9	0.45	10.0	5.50	0.195	8.0	0.08
10	0.50	10.2	5.61	0.198	8.0	0.08
11	0.55	10.7	5.89	0.208	8.0	0.08
12	0.60	11.0	6.05	0.214	8.0	0.08
13	0.65	11.2	6.16	0.218	8.5	0.09
14	0.70	11.5	6.33	0.224	8.5	0.09
15	0.75	11.8	6.49	0.230	8.5	0.09
16	0.80	12.0	6.60	0.233	8.5	0.09
17	0.85	12.0	6.60	0.233	8.5	0.09
18	0.90	12.3	6.77	0.239	8.5	0.09
19	0.95	12.9	7.10	0.251	8.5	0.09
20	1.00	13.0	7.15	0.253	8.5	0.09
21	1.05	13.0	7.15	0.253	8.5	0.09
22	1.10	13.5	7.43	0.263	8.5	0.09
23	1.15	13.5	7.43	0.263	8.5	0.09
24	1.20	13.5	7.43	0.263	8.5	0.09
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Beban Normal = 20.00 kg

Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	6.8	3.74	0.132	1.0	0.01
2	0.10	7.6	4.18	0.148	1.0	0.01
3	0.15	11	6.05	0.214	1.0	0.01
4	0.20	13.5	7.43	0.263	1.0	0.01
5	0.25	15	8.25	0.292	1.0	0.01
6	0.30	16	8.80	0.311	3.5	0.04
7	0.35	16.3	8.97	0.317	5.0	0.05
8	0.40	16.5	9.08	0.321	8.0	0.08
9	0.45	16.8	9.24	0.327	9.0	0.09
10	0.50	17	9.35	0.331	10.2	0.10
11	0.55	17.5	9.63	0.340	10.5	0.11
12	0.60	18	9.90	0.350	11.8	0.12
13	0.65	18.5	10.18	0.360	12.0	0.12
14	0.70	18.8	10.34	0.366	12.0	0.12
15	0.75	19	10.45	0.370	12.0	0.12
16	0.80	19	10.45	0.370	12.0	0.12
17	0.85	19.5	10.73	0.379	12.0	0.12
18	0.90	19.8	10.89	0.385	12.0	0.12
19	0.95	19.8	10.89	0.385	12.0	0.12
20	1.00	19.8	10.89	0.385	12.0	0.12
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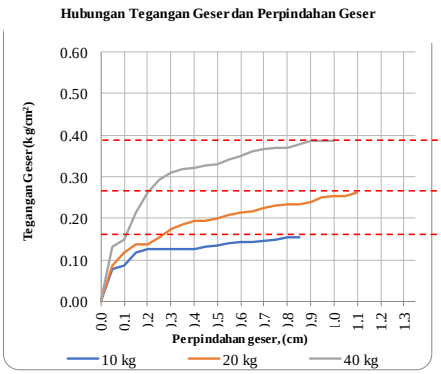

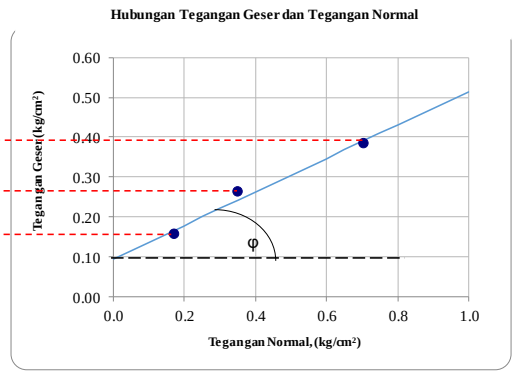

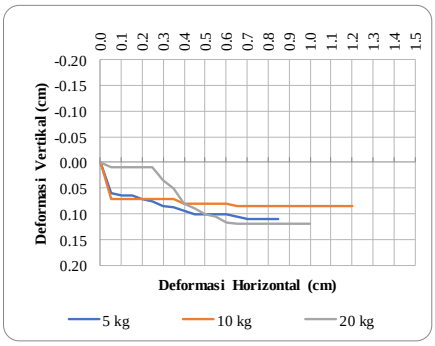

Benda Uji	1	2	3
Awal			
Kadar Air	10.40	10.40	10.40
Berat Isi Kering	1.584	1.584	1.584
Derajat Kejenuhan	41.4	41.4	41.4
Angka Pori	0.66	0.66	0.66
Waktu Uji			
Kadar Air	10.40	10.40	10.40
Berat Isi Kering	1.644	1.630	1.649
Derajat Kejenuhan	45.6	44.6	46.0
Angka Pori	0.60	0.61	0.59
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.156	0.263	0.385

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Tak Terdrainase (UU)

Metode Pengujian	: ASTM D3080-11, SNI 2813:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Undrained 2 (Asli)		

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.05	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **φ**	= 27	°
Berat Vol. Kering Awal	= 1.584	kg/cm3	Derajat Kejenuhan Awal	= 41	%
Berat Vol. Kering Uji	= 1.620	kg/cm3	Derajat Kejenuhan Uji	= 44	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	3.9	2.15	0.076	1.0	0.01
2	0.10	4.2	2.31	0.082	1.0	0.01
3	0.15	5.0	2.75	0.097	2.0	0.02
4	0.20	5.8	3.19	0.113	7.5	0.08
5	0.25	6.0	3.30	0.117	7.5	0.08
6	0.30	6.0	3.30	0.117	7.5	0.08
7	0.35	6.0	3.30	0.117	7.5	0.08
8	0.40	6.0	3.30	0.117	7.5	0.08
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	5.0	2.75	0.097	4.0	0.04
2	0.10	6.0	3.30	0.117	5.5	0.06
3	0.15	6.1	3.36	0.119	5.5	0.06
4	0.20	7.0	3.85	0.136	5.5	0.06
5	0.25	8.0	4.40	0.156	5.5	0.06
6	0.30	8.5	4.68	0.165	5.5	0.06
7	0.35	9.0	4.95	0.175	5.5	0.06
8	0.40	9.2	5.06	0.179	6.0	0.06
9	0.45	9.5	5.23	0.185	6.1	0.06
10	0.50	10.0	5.50	0.195	6.1	0.06
11	0.55	10.2	5.61	0.198	6.1	0.06
12	0.60	10.4	5.72	0.202	6.1	0.06
13	0.65	10.9	6.00	0.212	6.1	0.06
14	0.70	10.9	6.00	0.212	6.1	0.06
15	0.75	11.2	6.16	0.218	6.1	0.06
16	0.80	11.4	6.27	0.222	6.1	0.06
17	0.85	11.7	6.44	0.228	6.1	0.06
18	0.90	11.9	6.55	0.231	6.1	0.06
19	0.95	12.0	6.60	0.233	6.1	0.06
20	1.00	12.1	6.66	0.235	6.1	0.06
21	1.05	12.4	6.82	0.241	6.1	0.06
22	1.10	12.5	6.88	0.243	6.1	0.06
23	1.15	12.5	6.88	0.243	6.1	0.06
24	1.20	12.8	7.04	0.249	6.1	0.06
25	1.25	12.9	7.10	0.251	6.1	0.06

26	1.30	12.9	7.10	0.251	6.1	0.06
27	1.35	12.9	7.10	0.251	6.1	0.06
28						
29						
30						

Beban Normal = 20.00 kg

Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	6	3.30	0.117	5.5	0.06
2	0.10	7.5	4.13	0.146	6.5	0.07
3	0.15	10	5.50	0.195	6.5	0.07
4	0.20	12.5	6.88	0.243	6.5	0.07
5	0.25	14.2	7.81	0.276	6.5	0.07
6	0.30	15.2	8.36	0.296	6.5	0.07
7	0.35	16	8.80	0.311	6.5	0.07
8	0.40	16.2	8.91	0.315	6.5	0.07
9	0.45	16	8.80	0.311	6.5	0.07
10	0.50	16	8.80	0.311	6.5	0.07
11	0.55	16.2	8.91	0.315	6.5	0.07
12	0.60	16.6	9.13	0.323	6.5	0.07
13	0.65	17	9.35	0.331	6.5	0.07
14	0.70	17.7	9.74	0.344	6.5	0.07
15	0.75	18	9.90	0.350	6.5	0.07
16	0.80	18.5	10.18	0.360	6.5	0.07
17	0.85	19	10.45	0.370	6.5	0.07
18	0.90	19.4	10.67	0.377	6.5	0.07
19	0.95	19.8	10.89	0.385	6.5	0.07
20	1.00	20	11.00	0.389	6.5	0.07
21	1.05	20.2	11.11	0.393	6.5	0.07
22	1.10	20.2	11.11	0.393	6.5	0.07
23	1.15	20.2	11.11	0.393	6.5	0.07
24						
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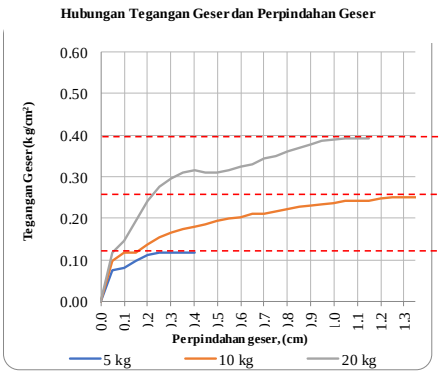

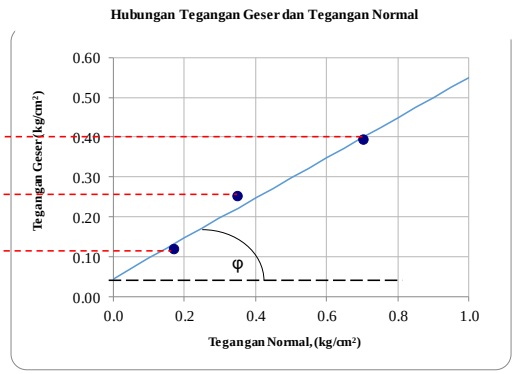

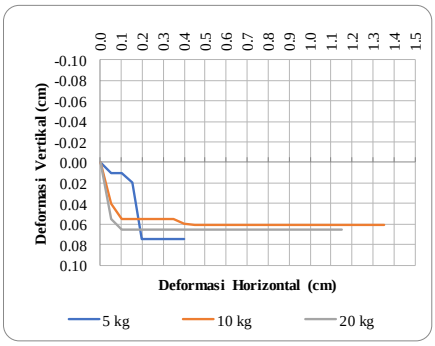

Benda Uji	1	2	3
Awal			
Kadar Air	10.40	10.40	10.40
Berat Isi Kering	1.584	1.584	1.584
Derajat Kejenuhan	41.4	41.4	41.4
Angka Pori	0.66	0.66	0.66
Waktu Uji			
Kadar Air	10.40	10.40	10.40
Berat Isi Kering	1.624	1.617	1.619
Derajat Kejenuhan	44.2	43.6	43.8
Angka Pori	0.62	0.63	0.62
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.117	0.251	0.393

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Terdrainase (UD)

Metode Pengujian	: ASTM D3080-11, SNI 2813:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Drained 1 (Asli)\		

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.04	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **φ**	= 23	°
Berat Vol. Kering Awal	= 1.584	kg/cm3	Derajat Kejenuhan Awal	= 41	%
Berat Vol. Kering Uji	= 1.814	kg/cm3	Derajat Kejenuhan Uji	= 92	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	2.1	1.16	0.041	1.5	0.02
2	0.10	2.7	1.49	0.053	7.0	0.07
3	0.15	2.7	1.49	0.053	15.0	0.15
4	0.20	2.8	1.54	0.054	19.8	0.20
5	0.25	2.9	1.60	0.056	23.0	0.23
6	0.30	3.0	1.65	0.058	27.0	0.27
7	0.35	3.1	1.71	0.060	30.0	0.30
8	0.40	3.2	1.76	0.062	32.0	0.32
9	0.45	3.4	1.87	0.066	35.0	0.35
10	0.50	3.5	1.93	0.068	37.5	0.38
11	0.55	3.8	2.09	0.074	39.5	0.40
12	0.60	3.8	2.09	0.074	40.5	0.41
13	0.65	4.0	2.20	0.078	41.0	0.41
14	0.70	4.2	2.31	0.082	41.0	0.41
15	0.75	4.5	2.48	0.088	41.0	0.41
16	0.80	4.7	2.59	0.091	41.0	0.41
17	0.85	5.0	2.75	0.097	41.0	0.41
18	0.90	5.0	2.75	0.097	41.0	0.41
19	0.95	5.0	2.75	0.097	41.0	0.41
20	1.00	5.0	2.75	0.097	41.0	0.41
21						
22						
23						
24						
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	2.3	1.27	0.045	4.0	0.04
2	0.10	2.4	1.32	0.047	4.0	0.04
3	0.15	2.9	1.60	0.056	9.0	0.09
4	0.20	3.8	2.09	0.074	10.5	0.11
5	0.25	3.6	1.98	0.070	13.0	0.13
6	0.30	3.5	1.93	0.068	15.0	0.15
7	0.35	3.5	1.93	0.068	18.0	0.18
8	0.40	3.5	1.93	0.068	19.0	0.19
9	0.45	3.5	1.93	0.068	20.0	0.20
10	0.50	4.1	2.26	0.080	21.0	0.21
11	0.55	5.1	2.81	0.099	21.0	0.21
12	0.60	5.5	3.03	0.107	21.5	0.22
13	0.65	6.0	3.30	0.117	21.5	0.22
14	0.70	6.5	3.58	0.126	24.0	0.24
15	0.75	7.0	3.85	0.136	24.0	0.24
16	0.80	7.5	4.13	0.146	24.0	0.24
17	0.85	8.0	4.40	0.156	25.0	0.25
18	0.90	8.4	4.62	0.163	26.0	0.26
19	0.95	9.0	4.95	0.175	28.0	0.28
20	1.00	9.6	5.28	0.187	30.0	0.30
21	1.05	10.2	5.61	0.198	32.0	0.32
22	1.10	10.7	5.89	0.208	34.0	0.34
23	1.15	10.0	5.50	0.195	35.0	0.35
24	1.20	10.0	5.50	0.195	35.0	0.35
25	1.25	10.0	5.50	0.195	37.0	0.37

26						
27						
28						
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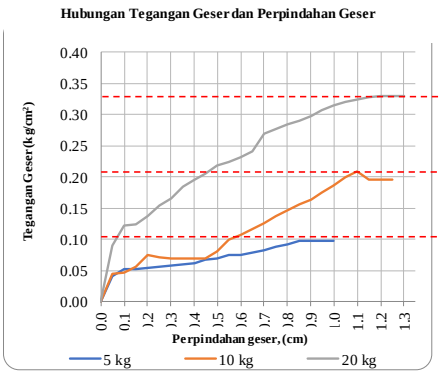
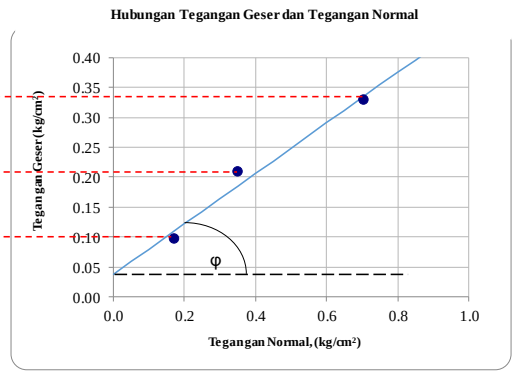
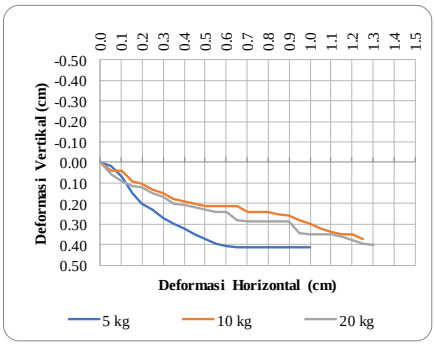
Beban Normal = 20.00 kg

Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	4.6	2.53	0.089	5.5	0.06
2	0.10	6.3	3.47	0.123	9.0	0.09
3	0.15	6.4	3.52	0.124	11.5	0.12
4	0.20	7	3.85	0.136	12.0	0.12
5	0.25	7.9	4.35	0.154	15.0	0.15
6	0.30	8.5	4.68	0.165	16.5	0.17
7	0.35	9.5	5.23	0.185	20.0	0.20
8	0.40	10	5.50	0.195	20.5	0.21
9	0.45	10.5	5.78	0.204	22.0	0.22
10	0.50	11.2	6.16	0.218	23.0	0.23
11	0.55	11.5	6.33	0.224	24.0	0.24
12	0.60	11.9	6.55	0.231	24.0	0.24
13	0.65	12.4	6.82	0.241	28.0	0.28
14	0.70	13.8	7.59	0.268	28.5	0.29
15	0.75	14.2	7.81	0.276	28.5	0.29
16	0.80	14.6	8.03	0.284	28.5	0.29
17	0.85	14.9	8.20	0.290	28.5	0.29
18	0.90	15.3	8.42	0.298	28.5	0.29
19	0.95	15.8	8.69	0.307	34.5	0.35
20	1.00	16.2	8.91	0.315	35.0	0.35
21	1.05	16.4	9.02	0.319	35.0	0.35
22	1.10	16.6	9.13	0.323	35.0	0.35
23	1.15	16.8	9.24	0.327	36.0	0.36
24	1.20	16.9	9.30	0.329	38.0	0.38
25	1.25	16.9	9.30	0.329	39.5	0.40
26	1.30	16.9	9.30	0.329	40.0	0.40
27						
28						
29						
30						







Benda Uji	1	2	3
Awal			
Kadar Air	10.40	10.40	10.40
Berat Isi Kering	1.584	1.584	1.584
Derajat Kejenuhan	41.4	41.4	41.4
Angka Pori	0.66	0.66	0.66
Waktu Uji			
Kadar Air	16.03	15.51	15.79
Berat Isi Kering	1.825	1.799	1.818
Derajat Kejenuhan	95.5	88.3	93.1
Angka Pori	0.44	0.46	0.45
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.097	0.208	0.329

Lampiran 3 Properties tanah asli saat uji geser langsung

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI

(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UU)

Metode Pengujian : ASTM D 2216-19, SNI 1971:2011 — Dikerjakan : Nushrah Nugraha
Laboratorium : Universitas Hasanuddin — Tanggal : 8 Agustus 2024
Sampel : Undrained 1 (Asli)

Nama Sampel	-	PRE-1A	PRE-1B	PRE-1C	POS-1A	POS-1B	POS-1C
Kedalaman Sampel	m						
Nomor Ring + Container	-	A	B	C	D	E	F
Diameter Ring	cm	**6.00**	**6.00**	**6.00**	**5.89**	**5.92**	**5.88**
Tinggi ring	cm	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Berat Ring *(1)*	g	**44.24**	**44.24**	**44.24**	**44.24**	**44.24**	**44.24**
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	**143.13**	**143.13**	**143.13**	**143.13**	**143.13**	**143.13**
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	98.89	98.89	98.89	98.89	98.89	98.89
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	54.49	54.96	54.31
Berat Ring + Cawan + Tanah Kering, *(6)*	g	**133.81**	**133.81**	**133.81**	**133.81**	**133.81**	**133.81**
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	89.57	89.57	89.57	89.57	89.57	89.57
Berat Air, *(8)=(4)-(7)*	g	9.32	9.32	9.32	9.32	9.32	9.32
Berat Jenis, *Gs*	-	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	34.06	34.06	34.06	34.06	34.06	34.06
Volume Pori, *(10)=(5)-(9)*	cm^3	22.49	22.49	22.49	20.44	20.90	20.25
Angka Pori, e = *(10)/(9)*	-	0.66	0.66	0.66	0.60	0.61	0.59
Berat Isi Tanah Basah, g_{wet} *=(4)/(5)*	g/cm^3	1.749	1.749	1.749	1.815	1.799	1.821
Kadar Air, *w=(8)/(7)*100%*	%	10.40	10.40	10.40	10.40	10.40	10.40
Berat Isi Tanah Kering, $g_d = g_{wet}/(1+w)$	g/cm^3	1.584	1.584	1.584	1.644	1.630	1.649
Porositas, *n=(10)/(5)**100%	-	39.8	39.8	39.8	37.5	38.0	37.3
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	41.4	41.4	41.4	45.6	44.6	46.0

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI

(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UU)

Metode Pengujian : ASTM D 2216-19, SNI 1971:2011 — Dikerjakan : Nushrah Nugraha
Laboratorium : Universitas Hasanuddin — Tanggal : 8 Agustus 2024
Sampel : Undrained 2 (Asli)

Nama Sampel	-	PRE-1A	PRE-1B	PRE-1C	POS-1A	POS-1B	POS-1C
Kedalaman Sampel	m						
Nomor Ring + Container	-	A	B	C	D	E	F
Diameter Ring	cm	**6.00**	**6.00**	**6.00**	**5.93**	**5.94**	**5.94**
Tinggi ring	cm	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Berat Ring *(1)*	g	**44.24**	**44.24**	**44.24**	**44.24**	**44.24**	**44.24**
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	**143.13**	**143.13**	**143.13**	**143.13**	**143.13**	**143.13**
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	98.89	98.89	98.89	98.89	98.89	98.89
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	55.14	55.40	55.33
Berat Ring + Cawan + Tanah Kering, *(6)*	g	**133.81**	**133.81**	**133.81**	**133.81**	**133.81**	**133.81**
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	89.57	89.57	89.57	89.57	89.57	89.57
Berat Air, *(8)=(4)-(7)*	g	9.32	9.32	9.32	9.32	9.32	9.32
Berat Jenis, *Gs*	-	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	34.06	34.06	34.06	34.06	34.06	34.06
Volume Pori, *(10)=(5)-(9)*	cm^3	22.49	22.49	22.49	21.09	21.35	21.27
Angka Pori, e = *(10)/(9)*	-	0.66	0.66	0.66	0.62	0.63	0.62
Berat Isi Tanah Basah, g_{wet} *=(4)/(5)*	g/cm^3	1.749	1.749	1.749	1.793	1.785	1.787
Kadar Air, *w=(8)/(7)*100%*	%	10.40	10.40	10.40	10.40	10.40	10.40
Berat Isi Tanah Kering, $g_d = g_{wet}/(1+w)$	g/cm^3	1.584	1.584	1.584	1.624	1.617	1.619
Porositas, *n=(10)/(5)* *100%	-	39.8	39.8	39.8	38.2	38.5	38.4
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	41.4	41.4	41.4	44.2	43.6	43.8

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI

(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UD)

Metode Pengujian	: ASTM D 2216-19, SNI 1971:2011	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Drained 1 (Asli)		

Nama Sampel	-	**PRE-1A**	**PRE-1B**	**PRE-1C**	**POS-1A**	**POS-1B**	**POS-1C**
Kedalaman Sampel	m						
Nomor Ring + Container	-	A	B	C	D	E	F
Diameter Ring	cm	**6.00**	**6.00**	**6.00**	**5.59**	**5.63**	**5.60**
Tinggi ring	cm	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Berat Ring *(1)*	g	**44.24**	**44.24**	**44.24**	**44.24**	**44.24**	**44.24**
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	**143.13**	**143.13**	**143.13**	**148.17**	**147.71**	**147.96**
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	98.89	98.89	98.89	103.93	103.47	103.72
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	49.08	49.79	49.26
Berat Ring + Cawan + Tanah Kering, *(6)*	g	**133.81**	**133.81**	**133.81**	**133.81**	**133.81**	**133.81**
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	89.57	89.57	89.57	89.57	89.57	89.57
Berat Air, *(8)=(4)-(7)*	g	9.32	9.32	9.32	14.36	13.90	14.15
Berat Jenis, *Gs*	-	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	34.06	34.06	34.06	34.06	34.06	34.06
Volume Pori, *(10)=(5)-(9)*	cm^3	22.49	22.49	22.49	15.03	15.73	15.20
Angka Pori, e = *(10)/(9)*	-	0.66	0.66	0.66	0.44	0.46	0.45
Berat Isi Tanah Basah, g_{wet}*=(4)/(5)*	g/cm^3	1.749	1.749	1.749	2.117	2.078	2.106
Kadar Air, *w=(8)/(7)*100%*	%	10.40	10.40	10.40	16.03	15.51	15.79
Berat Isi Tanah Kering, $g_d = g_{wet}/(1+w)$	g/cm^3	1.584	1.584	1.584	1.825	1.799	1.818
Porositas, *n=(10)/(5)* *100%	-	39.8	39.8	39.8	30.6	31.6	30.9
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	41.4	41.4	41.4	95.5	88.3	93.1

Lampiran 4 Pengujian mekanis tanah setelah *grouting*

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Tak Terdrainase (UU)

Metode Pengujian	: ASTM D3080-11, SNI 2813:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Undrained 1 (Tergrouting)		

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.10	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **ϕ**	= 28	°
Berat Vol. Kering Awal	= 1.077	kg/cm3	Derajat Kejenuhan Awal	= 76	%
Berat Vol. Kering Uji	= 1.124	kg/cm3	Derajat Kejenuhan Uji	= 82	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	3.1	1.71	0.060	4.0	0.04
2	0.10	4.1	2.26	0.080	4.8	0.05
3	0.15	4.1	2.26	0.080	5.3	0.05
4	0.20	4.9	2.70	0.095	5.5	0.06
5	0.25	5.1	2.81	0.099	5.5	0.06
6	0.30	6.2	3.41	0.121	5.0	0.05
7	0.35	7	3.85	0.136	5.0	0.05
8	0.40	7.9	4.35	0.154	5.0	0.05
9	0.45	8.5	4.68	0.165	5.0	0.05
10	0.50	9	4.95	0.175	5.0	0.05
11	0.55	9.5	5.23	0.185	5.0	0.05
12	0.60	9.9	5.45	0.193	7.5	0.08
13	0.65	10	5.50	0.195	10.0	0.10
14	0.70	9.9	5.45	0.193	10.0	0.10
15	0.75	9.5	5.23	0.185	11.5	0.12
16	0.80	9.5	5.23	0.185	12.0	0.12
17	0.85	9.5	5.23	0.185	12	0.12
18						
19						
20						
21						
22						
23						
24						
25						
26						
27						
28						
29						
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	5.0	2.75	0.097	1.0	0.01
2	0.10	7.0	3.85	0.136	2.0	0.02
3	0.15	9.0	4.95	0.175	2.5	0.03
4	0.20	9.5	5.23	0.185	2.5	0.03
5	0.25	12.0	6.60	0.233	2.5	0.03
6	0.30	13	7.15	0.253	3.5	0.04
7	0.35	13.5	7.43	0.263	5.0	0.05
8	0.40	13.9	7.65	0.270	5.0	0.05
9	0.45	13.9	7.65	0.270	6.0	0.06
10	0.50	14.0	7.70	0.272	7.0	0.07
11	0.55	14	7.70	0.272	7.0	0.07
12	0.60	14.1	7.76	0.274	8.0	0.08
13	0.65	14	7.70	0.272	8.0	0.08
14	0.70	13.9	7.65	0.270	9.0	0.09
15	0.75	13.5	7.43	0.263	10.0	0.10
16	0.80	13.5	7.43	0.263	11.0	0.11
17	0.85	13.1	7.21	0.255	12.0	0.12
18	0.90	13.1	7.21	0.255	13.0	0.13
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Beban Normal = 20.00 kg

Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	7.5	4.13	0.146	6.0	0.06
2	0.10	9	4.95	0.175	10.0	0.10
3	0.15	9.9	5.45	0.193	10.2	0.10
4	0.20	10.1	5.56	0.196	10.5	0.11
5	0.25	14.5	7.98	0.282	12.5	0.13
6	0.30	17	9.35	0.331	13.0	0.13
7	0.35	19	10.45	0.370	13.0	0.13
8	0.40	21.1	11.61	0.410	13.0	0.13
9	0.45	23	12.65	0.447	13.0	0.13
10	0.50	24	13.20	0.467	13.0	0.13
11	0.55	24.1	13.26	0.469	13.0	0.13
12	0.60	24.1	13.26	0.469	13.0	0.13
13	0.65	24	13.20	0.467	13.0	0.13
14	0.70	23.1	12.71	0.449	13.0	0.13
15	0.75	23	12.65	0.447	13.0	0.13
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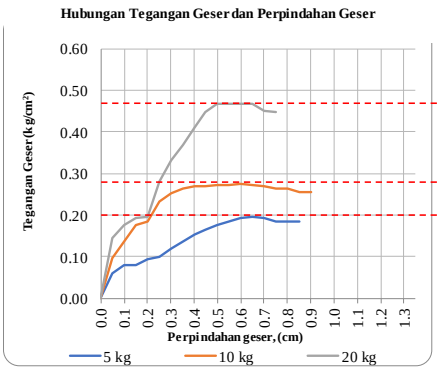

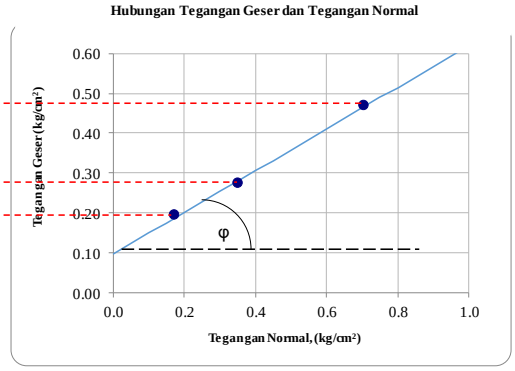

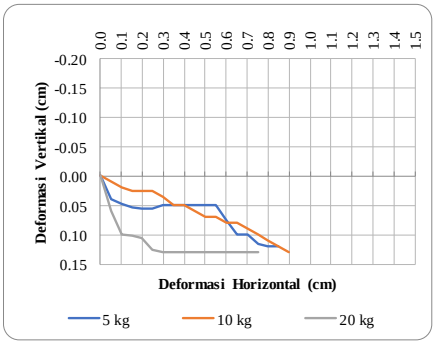

Benda Uji	1	2	3
Awal			
Kadar Air	61.46	24.12	48.60
Berat Isi Kering	0.823	1.303	1.103
Derajat Kejenuhan	73.7	62.3	92.4
Angka Pori	2.19	1.02	1.38
Waktu Uji			
Kadar Air	61.46	24.12	48.60
Berat Isi Kering	0.857	1.362	1.153
Derajat Kejenuhan	78.2	68.1	99.7
Angka Pori	2.07	0.93	1.28
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.195	0.274	0.469

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Tak Terdrainase (UU)

Metode Pengujian	: ASTM D3080-11, SNI 2813:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Undrained 2 (Tergrouting)		

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.13	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **ϕ**	= 20	°
Berat Vol. Kering Awal	= 0.972	kg/cm3	Derajat Kejenuhan Awal	= 78	%
Berat Vol. Kering Uji	= 1.059	kg/cm3	Derajat Kejenuhan Uji	= 89	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	3.2	1.76	0.062	2.5	0.03
2	0.10	3.8	2.09	0.074	3.5	0.04
3	0.15	4.1	2.26	0.080	3.5	0.04
4	0.20	4.6	2.53	0.089	4.2	0.04
5	0.25	4.9	2.70	0.095	5.0	0.05
6	0.30	5.2	2.86	0.101	5.0	0.05
7	0.35	6	3.30	0.117	5.2	0.05
8	0.40	6.7	3.69	0.130	5.2	0.05
9	0.45	7.1	3.91	0.138	5.2	0.05
10	0.50	7.9	4.35	0.154	6.0	0.06
11	0.55	8.2	4.51	0.160	6.0	0.06
12	0.60	8.8	4.84	0.171	7.0	0.07
13	0.65	9.1	5.01	0.177	8.3	0.08
14	0.70	9.5	5.23	0.185	9.8	0.10
15	0.75	9.5	5.23	0.185	10.3	0.10
16	0.80	9.5	5.23	0.185	10.3	0.10
17	0.85	9.2	5.06	0.179	10.8	0.11
18	0.90	9.0	4.95	0.175	10.8	0.11
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	4.5	2.48	0.088	1.5	0.02
2	0.10	5.1	2.81	0.099	5.5	0.06
3	0.15	5.9	3.25	0.115	7.0	0.07
4	0.20	6.0	3.30	0.117	9.0	0.09
5	0.25	7.1	3.91	0.138	10.0	0.10
6	0.30	8.9	4.90	0.173	12.5	0.13
7	0.35	9.8	5.39	0.191	13.0	0.13
8	0.40	10.9	6.00	0.212	13.0	0.13
9	0.45	11.9	6.55	0.231	13.0	0.13
10	0.50	13.0	7.15	0.253	15.0	0.15
11	0.55	13.1	7.21	0.255	18.0	0.18
12	0.60	14	7.70	0.272	20.0	0.20
13	0.65	14	7.70	0.272	21.5	0.22
14	0.70	14.1	7.76	0.274	23.0	0.23
15	0.75	14.0	7.70	0.272	23.5	0.24
16	0.80	13.5	7.43	0.263	24.0	0.24
17	0.85	13.5	7.43	0.263	26.0	0.26
18	0.90	13.1	7.21	0.255	28.0	0.28
19	0.95	13.0	7.15	0.253	29.0	0.29
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Beban Normal = 20.00 kg Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	5.0	2.75	0.097	1.0	0.01
2	0.10	6	3.30	0.117	5.0	0.05
3	0.15	6.9	3.80	0.134	8.0	0.08
4	0.20	7.5	4.13	0.146	11.0	0.11
5	0.25	8.1	4.46	0.158	15.0	0.15
6	0.30	9.1	5.01	0.177	17.0	0.17
7	0.35	10.1	5.56	0.196	18.0	0.18
8	0.40	11	6.05	0.214	19.0	0.19
9	0.45	12.1	6.66	0.235	20.0	0.20
10	0.50	12.5	6.88	0.243	21.0	0.21
11	0.55	13	7.15	0.253	22.0	0.22
12	0.60	13.9	7.65	0.270	23.0	0.23
13	0.65	14	7.70	0.272	24.0	0.24
14	0.70	14.5	7.98	0.282	25.0	0.25
15	0.75	15	8.25	0.292	26.0	0.26
16	0.80	15.5	8.53	0.302	30.0	0.30
17	0.85	16	8.80	0.311	31.0	0.31
18	0.90	16.8	9.24	0.327	31.0	0.31
19	0.95	17	9.35	0.331	32.0	0.32
20	1.00	17.5	9.63	0.340	34.0	0.34
21	1.05	18.5	10.18	0.360	35.0	0.35
22	1.10	19	10.45	0.370	36.0	0.36
23	1.15	19.5	10.73	0.379	36.0	0.36
24	1.20	19	10.45	0.370	36.0	0.36
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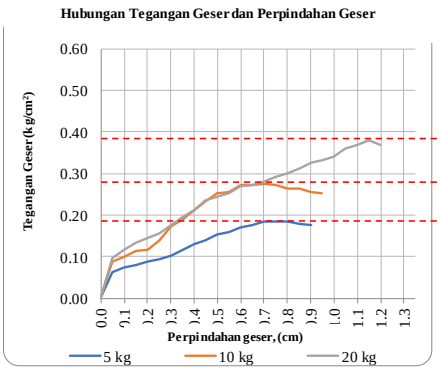

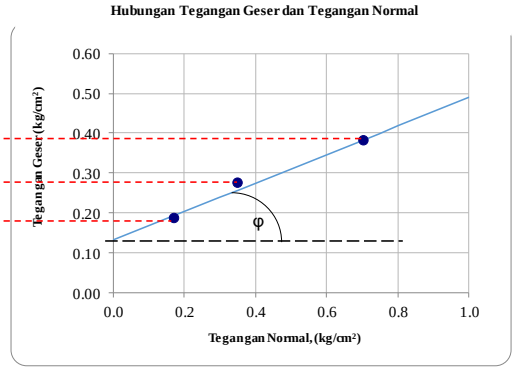

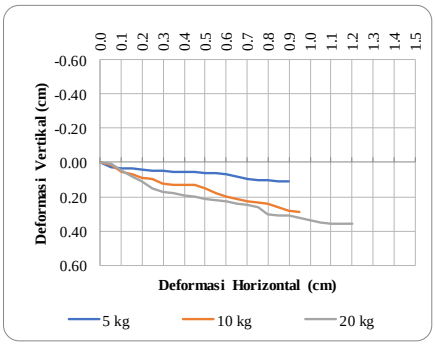

Benda Uji	1	2	3
Awal			
Kadar Air	55.69	37.76	59.90
Berat Isi Kering	0.993	1.026	0.898
Derajat Kejenuhan	88.8	63.5	81.6
Angka Pori	1.65	1.56	1.93
Waktu Uji			
Kadar Air	55.69	37.76	59.90
Berat Isi Kering	1.029	1.133	1.016
Derajat Kejenuhan	94.2	75.1	99.2
Angka Pori	1.56	1.32	1.59
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.185	0.274	0.379

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Tak Terdrainase (UU)

Metode Pengujian	: ASTM D3080-11, SNI 2813:2008	Dikerjakan	: Nushrah Nugraha
Laboratorium	: Universitas Hasanuddin	Tanggal	: 8 Agustus 2024
Sampel	: Undained 3 (Tergrouting)		

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.15	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **ϕ**	= 20	°
Berat Vol. Kering Awal	= 1.334	kg/cm3	Derajat Kejenuhan Awal	= 54	%
Berat Vol. Kering Uji	= 1.385	kg/cm3	Derajat Kejenuhan Uji	= 58	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	4.5	2.48	0.088	1.0	0.01
2	0.10	5	2.75	0.097	1.0	0.01
3	0.15	5	2.75	0.097	1.0	0.01
4	0.20	5.5	3.03	0.107	1.0	0.01
5	0.25	6	3.30	0.117	1.0	0.01
6	0.30	7	3.85	0.136	1.5	0.02
7	0.35	8	4.40	0.156	4.5	0.05
8	0.40	8.5	4.68	0.165	4.5	0.05
9	0.45	10	5.50	0.195	4.5	0.05
10	0.50	10.5	5.78	0.204	4.5	0.05
11	0.55	11	6.05	0.214	4.5	0.05
12	0.60	11.1	6.11	0.216	4.5	0.05
13	0.65	11.1	6.11	0.216	4.5	0.05
14	0.70	11.5	6.33	0.224	4.5	0.05
15	0.75	11.5	6.33	0.224	4.5	0.05
16	0.80	11.5	6.33	0.224	4.5	0.05
17	0.85	11.5	6.33	0.224	4.5	0.05
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	6.0	3.30	0.117	1.5	0.02
2	0.10	6.9	3.80	0.134	3.0	0.03
3	0.15	7.0	3.85	0.136	3.0	0.03
4	0.20	8.5	4.68	0.165	5.5	0.06
5	0.25	10.8	5.94	0.210	6.0	0.06
6	0.30	12.5	6.88	0.243	6.0	0.06
7	0.35	13.1	7.21	0.255	6.0	0.06
8	0.40	13	7.15	0.253	6.0	0.06
9	0.45	12.8	7.04	0.249	6.0	0.06
10	0.50	12.5	6.88	0.243	6.0	0.06
11	0.55	12.1	6.66	0.235	6.0	0.06
12	0.60	12.1	6.66	0.235	6.0	0.06
13	0.65	12.1	6.66	0.235	6.0	0.06
14	0.70	12.1	6.66	0.235	6.0	0.06
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Beban Normal = 20.00 kg Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	6.0	3.30	0.117	7.0	0.07
2	0.10	7.5	4.13	0.146	12.0	0.12
3	0.15	7.5	4.13	0.146	13.0	0.13
4	0.20	9.1	5.01	0.177	15.5	0.16
5	0.25	12	6.60	0.233	19.0	0.19
6	0.30	13.5	7.43	0.263	20.0	0.20
7	0.35	15.1	8.31	0.294	21.0	0.21
8	0.40	17.1	9.41	0.333	21.0	0.21
9	0.45	19	10.45	0.370	21.0	0.21
10	0.50	20	11.00	0.389	21.0	0.21
11	0.55	20.5	11.28	0.399	21.0	0.21
12	0.60	20.9	11.50	0.407	21.0	0.21
13	0.65	20.5	11.28	0.399	21.0	0.21
14	0.70	20.5	11.28	0.399	21.0	0.21
15	0.75	20.2	11.11	0.393	21.0	0.21
16	0.80	20.1	11.06	0.391	21.0	0.21
17	0.85	20	11.00	0.389	21.0	0.21
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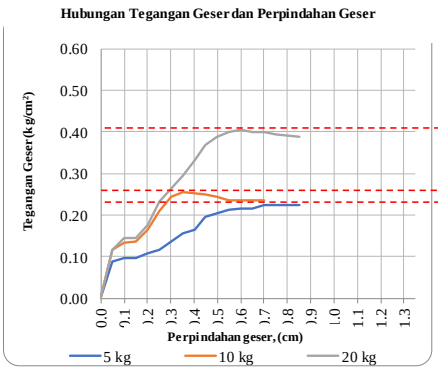

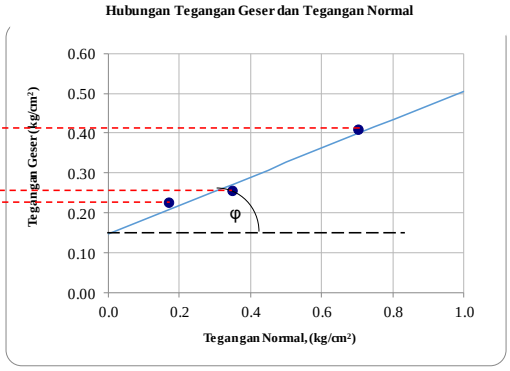

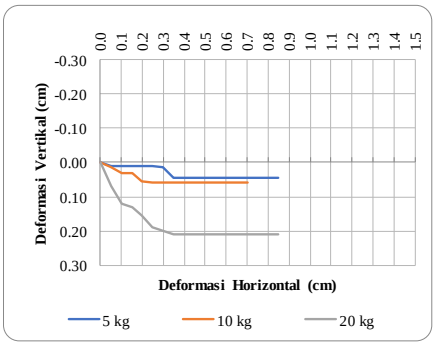

Benda Uji	1	2	3
Awal			
Kadar Air	35.10	21.55	8.65
Berat Isi Kering	1.142	1.390	1.470
Derajat Kejenuhan	70.9	63.6	28.8
Angka Pori	1.30	0.89	0.79
Waktu Uji			
Kadar Air	35.10	21.55	8.65
Berat Isi Kering	1.160	1.418	1.578
Derajat Kejenuhan	72.8	66.4	34.1
Angka Pori	1.27	0.85	0.67
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.224	0.255	0.407

HASIL PENGUJIAN GESER LANGSUNG

Tak Terkonsolidasi - Terdrainase (UD)

Metode Pengujian : ASTM D3080-11, SNI 2813:2008
Laboratorium : Universitas Hasanuddin
Sampel : Drained 1 (Tergrouting)

Dikerjakan : Nushrah Nugraha
Tanggal : 8 Agustus 2024

Ukuran Sampel			Kalibrasi Proving Ring	= 0.55	kg/div
Diameter, ***d***	= 6.00	cm	Kecepatan Geser	= 2	mm/menit
Tinggi, ***h***	= 2.00	cm	Kohesi, ***c***	= 0.11	kg/cm^2
Luas, ***A***	= 28.27	cm^2	Sudut geser dalam, **ϕ**	= 13	°
Berat Vol. Kering Awal	= 1.400	kg/cm3	Derajat Kejenuhan Awal	= 29	%
Berat Vol. Kering Uji	= 1.449	kg/cm3	Derajat Kejenuhan Uji	= 86	%

Beban Normal = 5.00 kg — Tegangan Normal = 0.18 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	3.5	1.93	0.068	2.0	0.02
2	0.10	4.1	2.26	0.080	2.0	0.02
3	0.15	4.5	2.48	0.088	3.0	0.03
4	0.20	4.8	2.64	0.093	3.5	0.04
5	0.25	5.0	2.75	0.097	4.0	0.04
6	0.30	5.8	3.19	0.113	4.0	0.04
7	0.35	6.8	3.74	0.132	4.0	0.04
8	0.40	7.1	3.91	0.138	4.0	0.04
9	0.45	7.9	4.35	0.154	5.0	0.05
10	0.50	8.1	4.46	0.158	5.0	0.05
11	0.55	8.5	4.68	0.165	5.0	0.05
12	0.60	8.8	4.84	0.171	5.0	0.05
13	0.65	8.5	4.68	0.165	6.0	0.06
14	0.70	8.1	4.46	0.158	6.0	0.06
15	0.75	8.0	4.40	0.156	6.0	0.06
16	0.80	8.0	4.40	0.156	6.0	0.06
17	0.85	8.0	4.40	0.156	6.0	0.06
18						
19						
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Beban Normal = 10.00 kg — Tegangan Normal = 0.35 kg/cm^2

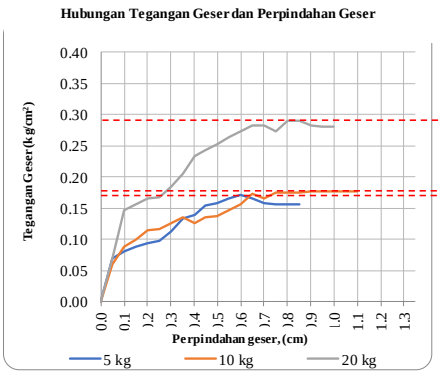
No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0.0	0.00	0.000	0.0	0.00
1	0.05	3.1	1.71	0.060	3.0	0.03
2	0.10	4.5	2.48	0.088	4.0	0.04
3	0.15	5.1	2.81	0.099	5.5	0.06
4	0.20	5.9	3.25	0.115	6.0	0.06
5	0.25	6.0	3.30	0.117	6.5	0.07
6	0.30	6.5	3.58	0.126	6.5	0.07
7	0.35	6.9	3.80	0.134	6.5	0.07
8	0.40	6.5	3.58	0.126	6.5	0.07
9	0.45	6.9	3.80	0.134	6.5	0.07
10	0.50	7.0	3.85	0.136	6.5	0.07
11	0.55	7.5	4.13	0.146	6.5	0.07
12	0.60	8.0	4.40	0.156	6.5	0.07
13	0.65	8.9	4.90	0.173	6.5	0.07
14	0.70	8.5	4.68	0.165	6.5	0.07
15	0.75	9.0	4.95	0.175	6.5	0.07
16	0.80	9.0	4.95	0.175	6.5	0.07
17	0.85	9.0	4.95	0.175	6.5	0.07
18	0.90	9.1	5.01	0.177	7.0	0.07
19	0.95	9.1	5.01	0.177	7.0	0.07
20	1.00	9.1	5.01	0.177	7.0	0.07
21	1.05	9.1	5.01	0.177	7.0	0.07
22	1.10	9.1	5.01	0.177	7.0	0.07
23						
24						
25						

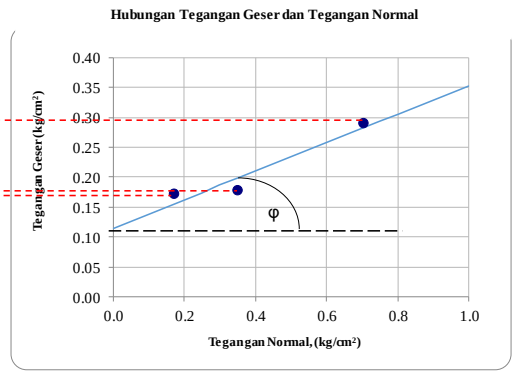
26						
27						
28						
29						
30						

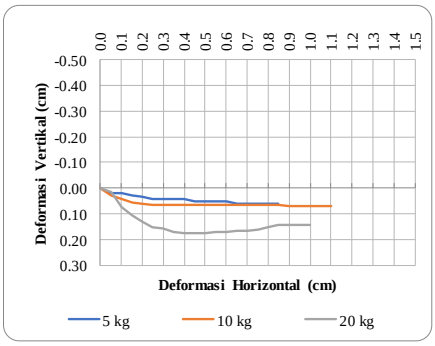
Beban Normal = 20.00 kg

Tegangan Normal = 0.71 kg/cm^2

No	Defomasi Horizontal (cm)	Dial Pembebanan	Gaya Geser (kg)	Tegangan Geser (kg/cm2)	Vertikal	
					Dial	Defomasi (cm)
0	0.00	0	0.00	0.000	0.0	0.00
1	0.05	3.5	1.93	0.068	1.5	0.02
2	0.10	7.5	4.13	0.146	7.5	0.08
3	0.15	8	4.40	0.156	10.5	0.11
4	0.20	8.5	4.68	0.165	13.0	0.13
5	0.25	8.6	4.73	0.167	15.0	0.15
6	0.30	9.5	5.23	0.185	15.8	0.16
7	0.35	10.5	5.78	0.204	17.2	0.17
8	0.40	12	6.60	0.233	17.5	0.18
9	0.45	12.5	6.88	0.243	17.5	0.18
10	0.50	13	7.15	0.253	17.5	0.18
11	0.55	13.5	7.43	0.263	17.0	0.17
12	0.60	14	7.70	0.272	17.0	0.17
13	0.65	14.5	7.98	0.282	16.8	0.17
14	0.70	14.5	7.98	0.282	16.5	0.17
15	0.75	14	7.70	0.272	16.0	0.16
16	0.80	14.9	8.20	0.290	15.0	0.15
17	0.85	14.9	8.20	0.290	14.5	0.15
18	0.90	14.5	7.98	0.282	14.5	0.15
19	0.95	14.4	7.92	0.280	14.5	0.15
20	1.00	14.4	7.92	0.280	14.5	0.15
21						
22						
23						
24						
25						
26						
27						
28						
29						
30						







Benda Uji	1	2	3
Awal			
Kadar Air	9.61	10.04	9.57
Berat Isi Kering	1.449	1.350	1.400
Derajat Kejenuhan	31.0	27.8	28.7
Angka Pori	0.81	0.95	0.88
Waktu Uji			
Kadar Air	29.31	20.92	29.08
Berat Isi Kering	1.479	1.382	1.485
Derajat Kejenuhan	99.0	60.9	99.2
Angka Pori	0.78	0.90	0.77
Tegangan Normal	0.177	0.354	0.707
Tegangan Geser Maks.	0.171	0.177	0.290

Lampiran 4 Properties tanah setelah *grouting* saat uji geser langsung

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI
(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UU)

Metode Pengujian : ASTM D 2216-19, SNI 1971:2011 — Dikerjakan : Nushrah Nugraha
Laboratorium : Universitas Hasanuddin — Tanggal : 8 Agustus 2024
Sampel : Undrained 1 (Tergrouting)

Nama Sampel	-	PRE-UU-1A	PRE-UU-1B	PRE-UU-1C	POS-UU-1A	POS-UU-1B	POS-UU-1C
Kedalaman Sampel	m						
Nomor Ring + Container	-	A	B	C	D	E	F
Diameter Ring	cm	6.00	6.00	6.00	5.88	5.87	5.87
Tinggi ring	cm	2.00	2.00	2.00	2.00	2.00	2.00
Berat Ring *(1)*	g	44.24	43.94	44.24	44.24	43.94	44.24
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	119.42	135.43	136.95	119.42	135.43	136.95
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	75.18	91.49	92.71	75.18	91.49	92.71
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	54.31	54.12	54.12
Berat Ring + Cawan + Tanah Kering, *(6)*	g	90.80	117.65	106.63	90.80	117.65	106.63
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	46.56	73.71	62.39	46.56	73.71	62.39
Berat Air, *(8)=(4)-(7)*	g	28.62	17.78	30.32	28.62	17.78	30.32
Berat Jenis, *Gs*	-	2.63	2.63	2.63	2.63	2.63	2.63
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	17.70	28.03	23.72	17.70	28.03	23.72
Volume Pori, *(10)=(5)-(9)*	cm^3	38.84	28.52	32.83	36.60	26.10	30.40
Angka Pori, e = *(10)/(9)*	-	2.19	1.02	1.38	2.07	0.93	1.28
Berat Isi Tanah Basah, g_{wet}*=(4)/(5)*	g/cm^3	1.329	1.618	1.639	1.384	1.690	1.713
Kadar Air, *w=(8)/(7)*100%*	%	61.46	24.12	48.60	61.46	24.12	48.60
Berat Isi Tanah Kering, $g_d = g_{wet}/(1+w)$	g/cm^3	0.823	1.303	1.103	0.857	1.362	1.153
Porositas, *n=(10)/(5)* *100%	-	68.7	50.4	58.1	67.4	48.2	56.2
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	73.7	62.3	92.4	78.2	68.1	99.7

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI
(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UU)

Metode Pengujian : ASTM D 2216-19, SNI 1971:2011 — Dikerjakan : Nushrah Nugraha
Laboratorium : Universitas Hasanuddin — Tanggal : 8 Agustus 2024
Sampel : Undrained 2 (Tergrouting)

Nama Sampel	-	PRE-UU-2A	PRE-UU-2B	PRE-UU-2C	POS-UU-2A	POS-UU-2B	POS-UU-2C
Kedalaman Sampel	m						
Nomor Ring + Container	-	D	E	F	D	E	F
Diameter Ring	cm	**6.00**	**6.00**	**6.00**	**5.89**	**5.71**	**5.64**
Tinggi ring	cm	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Berat Ring *(1)*	g	**43.94**	**44.24**	**43.94**	**43.94**	**44.24**	**43.94**
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	**131.32**	**124.15**	**125.12**	**131.32**	**124.15**	**125.12**
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	87.38	79.91	81.18	87.38	79.91	81.18
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	54.53	51.21	49.97
Berat Ring + Cawan + Tanah Kering, *(6)*	g	**100.06**	**102.25**	**94.71**	**100.06**	**102.25**	**94.71**
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	56.12	58.01	50.77	56.12	58.01	50.77
Berat Air, *(8)=(4)-(7)*	g	31.26	21.90	30.41	31.26	21.90	30.41
Berat Jenis, *Gs*	-	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	21.34	22.06	19.30	21.34	22.06	19.30
Volume Pori, *(10)=(5)-(9)*	cm^3	35.21	34.49	37.24	33.19	29.16	30.66
Angka Pori, e = *(10)/(9)*	-	1.65	1.56	1.93	1.56	1.32	1.59
Berat Isi Tanah Basah, g_{wet}*=(4)/(5)*	g/cm^3	1.545	1.413	1.436	1.602	1.560	1.625
Kadar Air, *w=(8)/(7)*100%*	%	55.69	37.76	59.90	55.69	37.76	59.90
Berat Isi Tanah Kering, $g_d = g_{wet}/(1+w)$	g/cm^3	0.993	1.026	0.898	1.029	1.133	1.016
Porositas, *n=(10)/(5)* *100%	-	62.3	61.0	65.9	60.9	56.9	61.4
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	88.8	63.5	81.6	94.2	75.1	99.2

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI

(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UU)

Metode Pengujian : ASTM D 2216-19, SNI 1971:2011 Dikerjakan : Nushrah Nugraha
Laboratorium : Universitas Hasanuddin Tanggal : 8 Agustus 2024
Sampel : Undrained 3 (Tergrouting)

Nama Sampel	-	PRE-UU-3A	PRE-UU-3B	PRE-UU-3C	PRE-UU-3A	PRE-UU-3B	PRE-UU-3C
Kedalaman Sampel	m						
Nomor Ring + Container	-	A	B	C	A	B	C
Diameter Ring	cm	**6.00**	**6.00**	**6.00**	**5.96**	**5.94**	**5.79**
Tinggi ring	cm	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Berat Ring *(1)*	g	**44.24**	**43.94**	**44.24**	**44.24**	**43.94**	**44.24**
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	**131.52**	**139.50**	**134.53**	**131.52**	**139.50**	**134.53**
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	87.28	95.56	90.29	87.28	95.56	90.29
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	55.70	55.42	52.66
Berat Ring + Cawan + Tanah Kering, *(6)*	g	**108.84**	**122.56**	**127.34**	**108.84**	**122.56**	**127.34**
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	64.60	78.62	83.10	64.60	78.62	83.10
Berat Air, *(8)=(4)-(7)*	g	22.68	16.94	7.19	22.68	16.94	7.19
Berat Jenis, *Gs*	-	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	24.56	29.89	31.60	24.56	29.89	31.60
Volume Pori, *(10)=(5)-(9)*	cm^3	31.99	26.66	24.95	31.14	25.53	21.06
Angka Pori, e = *(10)/(9)*	-	1.30	0.89	0.79	1.27	0.85	0.67
Berat Isi Tanah Basah, g_{wet}*=(4)/(5)*	g/cm^3	1.543	1.690	1.597	1.567	1.724	1.715
Kadar Air, *w=(8)/(7)*100%*	%	35.10	21.55	8.65	35.10	21.55	8.65
Berat Isi Tanah Kering, $g_d=g_{wet}/(1+w)$	g/cm^3	1.142	1.390	1.470	1.160	1.418	1.578
Porositas, *n=(10)/(5)* *100%	-	56.6	47.1	44.1	55.9	46.1	40.0
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	70.9	63.6	28.8	72.8	66.4	34.1

HASIL PEMERIKSAAN KADAR AIR DAN BERAT ISI

(Sampel Geser Grouting Waterglass + Asam Klorida Kondisi UD)

Metode Pengujian : ASTM D 2216-19, SNI 1971:2011 Dikerjakan : Nushrah Nugraha
Laboratorium : Universitas Hasanuddin Tanggal : 8 Agustus 2024
Sampel : Drained 1 (Tergrouting)

Nama Sampel	-	PRE-UD-1A	PRE-UD-1B	PRE-UD-1C	POS-UD-1A	POS-UD-1B	POS-UD-1C
Kedalaman Sampel	m						
Nomor Ring + Container	-	A	B	C	D	E	F
Diameter Ring	cm	**6.00**	**6.00**	**6.00**	**5.94**	**5.93**	**5.83**
Tinggi ring	cm	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**	**2.00**
Berat Ring *(1)*	g	**44.24**	**44.24**	**43.94**	**44.24**	**44.24**	**43.94**
Berat Cawan *(2)*	g	0.00	0.00	0.00	0.00	0.00	0.00
Berat Ring + Cawan + Tanah Basah *(3)*	g	**134.08**	**128.23**	**130.68**	**150.23**	**136.54**	**146.12**
Berat Tanah Basah *(4)={(3)-(2)-(1)}*	g	89.84	83.99	86.74	105.99	92.30	102.18
Volume Ring *(5)*	cm^3	56.55	56.55	56.55	55.42	55.24	53.30
Berat Ring + Cawan + Tanah Kering, *(6)*	g	**126.20**	**120.57**	**123.10**	**126.20**	**120.57**	**123.10**
Berat Tanah Kering, *(7)={(6)-(2)-(1)}*	g	81.96	76.33	79.16	81.96	76.33	79.16
Berat Air, *(8)=(4)-(7)*	g	7.88	7.66	7.58	24.03	15.97	23.02
Berat Jenis, *Gs*	-	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**	**2.63**
Volume Tanah Kering, *(9)=(7)/Gs*	cm^3	31.17	29.02	30.10	31.17	29.02	30.10
Volume Pori, *(10)=(5)-(9)*	cm^3	25.38	27.53	26.45	24.26	26.22	23.20
Angka Pori, e = *(10)/(9)*	-	0.81	0.95	0.88	0.78	0.90	0.77
Berat Isi Tanah Basah, g_{wet}*=(4)/(5)*	g/cm^3	1.589	1.485	1.534	1.912	1.671	1.917
Kadar Air, *w=(8)/(7)*100%*	%	9.61	10.04	9.57	29.31	20.92	29.08
Berat Isi Tanah Kering, $g_d=g_{wet}/(1+w)$	g/cm^3	1.449	1.350	1.400	1.479	1.382	1.485
Porositas, *n=(10)/(5)* *100%	-	44.9	48.7	46.8	43.8	47.5	43.5
Derajat Kejenuhan, *Sr=(8)/(10)*100%*	%	31.0	27.8	28.7	99.0	60.9	99.2

Lampiran 5 Dokumentasi selama penelitian