

Lampiran 19 Hasil Pengujian Marshall Variasi 5 (100% Boyong : 0% Clereng)



LABORATORIUM JALAN RAYA
JURUSAN TEKNIK SIPIL
FAKULTAS TEKNIK SIPIL DAN PERENCANAAN
UNIVERSITAS ISLAM INDONESIA

Jl. Kaliruang KM 14,4 Kampus Terpadu UJI, Gedung Moh. Nateri, Telp. (0274) 898472, 896440, Fax. 895330 Yogyakarta



SIKAT CAMPURAN ASPAL DENGAN METODE MARSHALL

Tanggal Pengujian : 13 Juni 2017
Tipe Campuran : AC - DC
: Agregat Kasar Boyong 100%

Dikerjakan Oleh : Dian Noer Anggita Arrum
Diperiksa Oleh : Ir. Subarkah, M.T.

Sampel	t (cm)	a (%)	b (%)	c (gram)	d (gram)	e (gram)	f (gram)	g Density	h	i	i	k	l	m VMA (%)	m VFA (%)	m VITM (%)	o	p	q Koreksi Tebal	q Stabilitas (kg)	r Flow (mm)	MQ (kg/mm)
1	6.70	4.71	4.00	1182.28	1172.70	645.37	528.73	2.207	2.350	9.688	84.021	6.311	15.373	60.508	50.00	1085.83	50.00	0.876	333.48	3.800	245.843	
2	6.83	4.71	4.50	1174.45	1184.00	641.06	542.94	2.182	2.355	9.478	82.387	8.195	17.672	52.752	47.00	1001.99	47.00	0.897	889.10	2.280	272.572	
3	6.75	4.71	4.50	1168.54	1185.40	648.25	537.15	2.175	2.355	9.532	82.836	7.632	17.164	55.536	43.00	916.61	43.00	0.875	801.81	2.660	301.431	
Yg								2.18						58.88		7.37						
1	6.81	5.26	5.00	1180.85	1192.41	654.48	537.93	2.195	2.333	10.687	83.150	6.163	16.850	63.425	59.00	1257.68	59.00	0.864	1086.48	3.050	356.221	
2	6.83	5.26	5.00	1186.94	1193.17	638.25	540.32	2.194	2.333	10.675	83.089	6.232	16.311	63.143	53.00	1123.78	53.00	0.858	968.35	2.950	328.457	
3	6.76	6.25	6.00	1193.68	1196.19	655.61	538.97	2.192	2.339	10.672	83.034	6.293	16.966	62.905	56.00	1172.41	56.00	0.873	1023.95	2.820	362.104	
Yg								2.19						63.16		6.23						
1	6.83	5.82	5.50	1185.94	1201.21	660.78	540.43	2.194	2.324	11.762	82.684	5.664	17.316	67.870	53.00	1129.78	53.00	0.860	971.61	3.000	323.869	
2	6.75	5.82	5.50	1213.63	1218.81	665.02	553.79	2.191	2.324	11.736	82.574	5.690	17.426	67.348	59.00	1257.68	59.00	0.875	1100.78	3.250	338.702	
3	6.80	5.82	5.50	1180.87	1192.29	663.42	528.87	2.233	2.324	11.938	84.130	3.912	15.870	75.349	57.00	1215.04	57.00	0.865	1090.78	3.350	313.667	
Yg								2.21						78.18		6.35						
1	6.58	6.38	6.00	1177.21	1185.55	654.05	531.50	2.215	2.308	12.940	83.013	4.047	16.987	76.176	52.00	1108.46	52.00	0.913	1011.65	3.800	266.225	
2	6.75	6.38	6.00	1183.65	1189.58	651.71	537.87	2.201	2.308	12.857	82.479	4.665	17.521	73.377	54.00	1151.09	54.00	0.875	1007.49	4.050	248.764	
3	6.71	6.38	6.00	1185.40	1190.97	650.34	540.63	2.193	2.308	12.810	82.179	5.011	17.821	71.881	53.00	1123.78	53.00	0.883	997.31	4.100	243.247	
Yg								2.28						73.81		6.87						
1	6.79	6.95	6.50	1199.62	1199.27	650.06	519.22	2.166	2.293	12.709	80.760	6.541	19.260	71.216	40.00	863.66	40.00	0.867	738.47	4.600	160.766	
2	6.77	6.95	6.50	1184.20	1182.42	648.37	544.05	2.177	2.293	13.776	81.116	5.078	18.854	73.067	41.00	873.98	41.00	0.872	762.00	4.300	177.209	
3	6.70	6.95	6.50	1173.93	1180.43	652.25	528.18	2.223	2.293	14.067	82.859	3.074	17.141	82.067	43.00	916.61	43.00	0.865	810.97	4.900	165.505	
Yg								2.21						76.45		6.96						

Mengetahui
Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

Dian Noer Anggita
12511035

Lampiran 20 Hasil Pengujian Immersion Test Variasi 1 (0% Boyong : 100% Clereng)



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HASIL PENGUJIAN IMMERSION TEST KADAR ASPAL OPTIMUM GRADASIRAPAT ASPAL STARBIT I-69

Asal Material : Lab. Jalan Raya FTSP UII
 Jenis Campuran : AC - BC Variasi 1 : 0% Boyong + 100% Clereng
 Di terapkan Oleh : Dian Noer Anggita Arman

Sampel	t (cm)	a (%)	b (%)	c (gram)	d (gram)	e (gram)	f (gram)	g Density	h	i	j	k	l VALA (%)	m VFA (%)	n VTM (%)	o	p	q Koreksi Tebal	r Stabilitas (kg) Flow (mm)	s MQ (kg/mm)
0.5	1	6.62	5.62	1167.93	1187.15	563.43	521.72	2.239	2.329	11.595	84.510	3.824	15.490	74.161	3.894	74.00	1577.42	0.502	1423.35	608.275
	2	6.36	5.62	1163.26	1187.90	561.45	519.45	2.239	2.329	11.600	84.539	3.850	15.461	75.022	3.860	77.00	1641.37	0.593	1629.97	737.554
	3	6.50	5.62	1165.58	1175.26	560.55	515.31	2.262	2.329	11.717	85.383	2.834	14.611	80.191	2.894	75.00	1593.74	0.933	1491.77	663.003
3.347																				
14.147																				
76.995																				
1415.04																				
2.267																				
663.61																				
24	1	6.69	5.62	1178.49	1183.71	563.85	525.36	2.241	2.329	11.610	84.609	3.730	15.591	75.426	3.780	76.00	1627.06	0.887	1437.13	211.805
	2	6.73	5.62	1174.14	1185.14	563.52	521.52	2.251	2.329	11.660	84.975	3.555	15.025	77.606	3.365	81.00	1725.64	0.879	1517.13	219.791
	3	6.56	5.62	1171.73	1173.65	561.70	516.95	2.267	2.329	11.741	85.567	2.672	14.432	81.350	2.692	75.00	1593.74	0.917	1465.25	193.304
3.353																				
14.950																				
76.131																				
1473.21																				
6.649																				
212.19																				

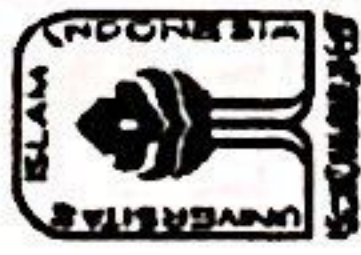
Mengetahui
 Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

Dian Noer Anggita
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Lampiran 21 Hasil Pengujian Immersion Test Variasi 2 (25% Boyong : 75% Clereng)



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HASIL PENGUJIAN IMMERSION TEST KADAR ASPAL OPTIMUM GRADASI RAPAT ASPAL STARBIT E-60

Asal Material : Lab. Jalan Raya FTSP UII
 Jenis Campuran : AC-BC (Variasi 2 : 25% Boyong + 75% Clereng)
 Di kerjakan Oleh : Dian Noer Anggita Arram

Sampel	t (cm)	a (%)	b (%)	c (gram)	d (gram)	e (gram)	f (gram)	g Density	h	i	j	k	l VMA (%)	m VFA (%)	n VTM (%)	o	p	q Koreksi Tebal	r Stabilitas (kg) Flow (mm)	s MQ (kg/mm)	
1	6.75	5.97	5.63	1173.72	1183.99	660.50	523.49	2.242	2.320	12.291	84.364	3.343	11.636	78.609	3.345	78.00	1652.69	0.876	1456.10	2.370	614.389
2	6.74	5.97	5.63	1176.55	1187.35	660.76	526.59	2.234	2.320	12.248	84.070	3.682	11.930	76.887	3.682	82.00	1747.96	0.878	1534.16	2.410	636.381
3	6.88	5.97	5.63	1182.20	1190.53	656.24	534.29	2.213	2.320	12.130	83.256	4.614	15.744	72.443	4.614	80.00	1755.32	0.855	1457.78	2.369	617.702
													16.10	75.968	3.898				1467.68	2.389	627.89
1	6.80	5.97	5.63	1154.03	1164.65	659.85	524.80	2.199	2.320	12.055	82.742	3.203	17.258	69.850	5.203	76.00	1620.06	0.866	1403.27	5.840	340.287
2	6.78	5.97	5.63	1153.99	1165.01	637.49	527.52	2.188	2.320	11.992	82.312	3.693	17.688	67.800	5.695	78.00	1652.69	0.870	1446.33	6.000	241.956
3	6.54	5.97	5.63	1165.84	1171.24	660.14	511.10	2.281	2.320	12.505	85.829	1.666	14.171	88.242	1.666	73.00	1536.11	0.922	1435.38	7.000	205.054
													16.372	75.398	4.188				1471.33	6.789	278.89

Mengetahui
 Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

Dian Noer Anggita
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Lampiran 22 Hasil Pengujian Immersion Test Variasi 3 (50% Boyong : 50% Clereng)



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HASIL PENGUJIAN IMMERSION TEST KADAR ASPAL OPTIMUM GRADASI RAPAT ASPAL STARBIT E-60

Asal Material : Lab. Jalan Raya FTSP UII
Jenis Campuran : AC-BC (Variasi 3 : 50% Boyong + 50% Clereng)
Di kerjakan Oleh : Dian Noer Anggita Arrum

Sampel	t (cm)	a (%)	b (%)	c (gram)	d (gram)	e (gram)	f (gram)	g Density	h	i	j	k	l VMA (%)	m VFVA (%)	n VITM (%)	o	p	q Koreksi Tebal	r Flow (mm)	MIQ (kg/mm)	
0.5	1	5.99	5.65	1173.58	1186.81	654.14	532.67	2.203	2.319	12.121	82.883	4.996	17.117	70.811	4.996	79.00	1684.01	0.890	1498.77	2.820	531.477
	2	5.99	5.65	1181.45	1184.29	661.58	522.71	2.260	2.319	12.435	85.029	2.337	14.971	83.055	2.337	70.00	1492.16	0.913	1361.84	2.640	515.850
	3	5.99	5.65	1174.42	1188.66	658.32	530.34	2.214	2.319	12.183	83.307	4.311	16.693	72.979	4.311	77.00	1641.37	0.888	1458.05	2.760	528.280
								2.225					16.761	75.815	4.315				1459.55	2.740	525.20
24	1	5.99	5.65	1193.83	1197.37	670.50	526.87	2.266	2.319	12.466	85.241	2.293	14.759	84.462	2.293	69.00	1470.84	0.930	1367.88	4.830	283.206
	2	5.99	5.65	1174.60	1186.13	659.52	526.61	2.230	2.319	12.271	83.909	3.820	16.091	76.262	3.820	70.00	1492.16	0.896	1336.60	3.350	398.985
	3	5.99	5.65	1184.01	1193.02	665.51	527.51	2.245	2.319	12.348	84.437	3.214	15.563	79.345	3.214	71.00	1513.47	0.917	1388.49	3.380	410.795
								2.247					16.473	80.803	3.189				1364.92	3.853	364.19

Mengetahui
Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

Dian Noer Anggita
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Lampiran 23 Hasil Pengujian Immersion Test Variasi 4 (75% Boyong : 25% Clereng)



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HASIL PENGUJIAN IMMERSION TEST KADAR ASPAL OPTIMUM GRADASI RAPAT ASPAL STARBIT E-60

Asal Material : Lab. Jalan Raya FTSP UII
Jenis Campuran : AC-BC (Variasi 4 : 75% Boyong + 25% Clereng)
Di kerjakan Oleh : Dian Noer Anggita Arrum

Sampel	t (cm)	n (%)	b (%)	c (gram)	d (gram)	e (gram)	f (gram)	g Density	h	i	j	k	l VMA (%)	m VFVA (%)	n VITM (%)	o	p	Koreksi Tebal	q Stabilitas (kg)	r Flow (mm)	MQ (kg/mm)		
0,5	1	6.68	6.10	5.75	1172.03	1190.41	666.09	524.32	2.235	2.316	12.515	84.002	3.482	15.998	78.232	3.482	75.00	1598.74	0.889	1.421.18	2.780	511.216	
	2	6.89	6.10	5.75	1172.32	1191.13	655.40	535.73	2.188	2.316	12.252	82.234	5.515	17.766	68.960	5.515	74.00	1577.42	0.854	1.346.87	3.000	448.955	
	3	6.69	6.10	5.75	1166.37	1184.45	662.53	521.92	2.235	2.316	12.512	83.981	3.507	16.019	78.109	3.507	72.00	1534.79	0.887	1.361.17	3.090	440.507	
24	1	6.54	6.10	5.75	1156.25	1168.46	632.92	515.54	2.243	2.316	12.557	84.283	3.160	15.717	79.893	3.160	80.00	1705.32	0.924	1.575.01	4.900	321.430	
	2	6.75	6.10	5.75	1160.69	1173.97	642.35	531.62	2.183	2.316	12.224	82.047	5.729	17.953	68.090	5.729	75.00	1598.74	0.876	1.599.90	4.000	349.974	
	3	6.66	6.10	5.75	1189.45	1193.94	662.27	531.67	2.237	2.316	12.526	84.072	3.402	15.928	78.641	3.402	46.00	980.56	0.893	875.48	3.440	254.499	

Mengetahui
Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

Dian Noer Anggita
12511035

Lampiran 24 Hasil Pengujian Immersion Test Variasi 5 (100% Boyong : 0% Clereng)



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HASIL PENGUJIAN IMMERSION TEST KADAR ASPAL OPTIMUM GRADASI RAPAT ASPAL PERTAMINA 60/70

Asal Material : Lab. Jalan Raya FTSP UII
 Jenis Campuran : AC-BC (Variasi 5 : 100% Boyong + 0% Clereng)
 Di kerjakan Oleh : Dian Noer Anggita Arrum

Sampel	t (cm)	a (%)	b (%)	c (gram)	d (gram)	e (gram)	f (gram)	g Density	h	i	j	k	l VMA (%)	m VFWA (%)	n VITM (%)	o	p	q Koreksi Tebal	r Flow (mm)	MIQ (kg/mm)																					
0.5	1	6.73	6.16	5.80	1181.96	1194.16	665.48	528.68	2.236	2.314	12.626	83.971	3.403	16.029	78.770	3.403	67.00	1428.21	0.879	4.000	313.782																				
	2	6.65	6.16	5.80	1199.70	1203.14	660.11	543.03	2.209	2.314	12.477	82.979	4.544	17.021	73.303	4.544	69.00	1470.84	0.895	3.550	370.818																				
	3	6.85	6.16	5.80	1173.58	1194.44	660.45	533.99	2.198	2.314	12.412	82.546	5.042	17.454	71.114	5.042	68.00	1449.53	0.859	3.660	340.011																				
Σ																					16.87																				
24	1	6.77	6.16	5.80	1166.34	1179.43	659.02	520.41	2.241	2.314	12.657	84.178	3.165	15.822	79.997	3.165	63.00	1342.94	0.871	2.400	487.446																				
	2	6.78	6.16	5.80	1162.21	1176.26	651.09	525.17	2.213	2.314	12.498	83.120	4.382	16.880	74.039	4.382	64.00	1364.26	0.869	5.960	198.818																				
	3	7.10	6.16	5.80	1181.25	1196.98	651.29	545.69	2.165	2.314	12.225	81.305	6.470	18.695	65.391	6.470	62.00	1321.63	0.834	2.750	400.767																				
Σ																					17.33																				
Σ																					117.99																				
Σ																					302.37																				

Mengetahui
 Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

Dian Noer Anggita
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Lampiran 25 Hasil Pengujian Indirect Tensile Strength Test



LABORATORIUM JALAN RAYA
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HASIL PENGUJIAN INDIRECT TENSILE STRENGTH TEST

Asal Material : Lab. Jalan Raya FTSP UII
 Jenis Campuran : AC-BC
 Di kerjakan Oleh : Dian Noer Anggita Artum

6:100	1	6.68	57.00	1122.44	0.888	1609.110
	2	6.44	55.00	1092.76	0.948	1035.495
	3	6.75	55.00	1152.31	0.875	1008.240
		6.626				1096.278
25:75	1	6.70	50.00	942.37	0.88	877.640
	2	6.62	54.00	1112.57	0.90	1002.261
	3	6.65	53.00	1052.97	0.89	941.969
		6.649				940.957
50:50	1	6.62	47.00	932.77	0.90	842.568
	2	6.61	45.00	912.90	0.90	826.697
	3	6.79	42.00	834.42	0.88	733.828
		6.673				801.031
75:25	1	6.72	40.00	794.69	0.88	698.884
	2	6.67	45.00	952.63	0.89	848.723
	3	6.88	45.00	894.02	0.86	764.858
		6.787				770.828
100:0	1	6.69	45.00	952.63	0.89	848.723
	2	6.59	44.00	874.16	0.91	795.816
	3	6.98	35.00	695.24	0.85	597.912
		6.753				742.958

Mengetahui
 Dosen Pembimbing

Ir. Subarkah, M.T.

Penguji

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