



KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
POLITEKNIK NEGERI SRIWIJAYA
Jalan Srijaya Negara, Palembang 30139
Telp. 0711-353414 Fax. 0711-355918
Website : www.polsri.ac.id E-mail : info@polsri.ac.id



DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN ANALISA SARINGAN AGREGAT





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN BERAT JENIS DAN PENYERAPAN AGREGAT





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
POLITEKNIK NEGERI SRIWIJAYA
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN KADAR AIR DAN KADAR LUMPUR AGREGAT





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
POLITEKNIK NEGERI SRIWIJAYA
Jalan Srijaya Negara, Palembang 30139
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN BOBOT ISI GEMBUR DAN PADAT AGREGAT





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

**PENGUJIAN KEAUSAN DENGAN MESIN ABRASI *LOS ANGELES*
AGREGAT**





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN BERAT JENIS ASPAL





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN TITK LEMBEK ASPAL





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN PENETRASI ASPAL



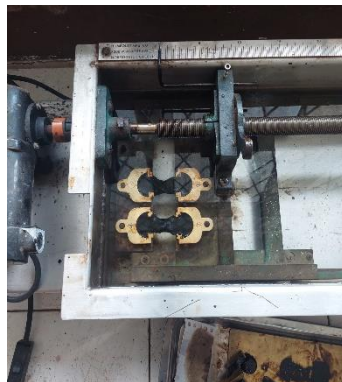


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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN DAKTILITAS ASPAL





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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PEMBUATAN BENDA UJI





KEMENTERIAN PENDIDIKAN DAN KEBUDAYAAN
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DOKUMENTASI PENGUJIAN DI LABORATORIUM

PENGUJIAN MARSHALL



Nama Pengujian : Analisa Saringan Tanggal Pengujian : 31/03/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/2
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Ukuran Saringan (mm)	Sampel I				Rata-Rata Kumulatif Lolos (%)	Sampel II			
	Agregat Tertinggal		% Kumulatif Agregat			Agregat Tertinggal		% Kumulatif Agregat	
	Gram	%	Tertahan	Lolos		Gram	%	Tertahan	Lolos
38,1	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
25,4	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
19	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
12,5	1324,3	67,1	61,80	38,20	37,36	1359,7	68,8	63,48	36,52
9,5	421,6	21,4	81,47	18,53	16,98	451,6	22,8	84,56	15,44
4,75	203,4	10,3	90,96	9,04	8,92	142,3	7,2	91,20	8,80
2,36	6,0	0,3	91,24	8,76	8,70	3,2	0,2	91,35	8,65
1,18	17,7	0,9	92,07	7,93	7,84	19,2	1,0	92,25	7,75
0,6	0,0	0,0	92,07	7,93	7,84	0,0	0,0	92,25	7,75
0,3	0,0	0,0	92,07	7,93	7,84	0,0	0,0	92,25	7,75
0,15	0,0	0,0	92,07	7,93	7,84	0,0	0,0	92,25	7,75
0,075	0,0	0,0	92,07	7,93	7,84	0,0	0,0	92,25	7,75
Total	1973,0	100	785,80			1976,0	100	791,85	
MHB			7,858			MHB		7,915	
MHB Rata-Rata			7,888						

Nama Pengujian : Analisa Saringan Tanggal Pengujian : 30/03/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/1
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Ukuran Saringan (mm)	Sampel I				Rata-Rata Kumulatif Lolos (%)	Sampel II			
	Agregat Tertinggal		% Kumulatif Agregat			Agregat Tertinggal		% Kumulatif Agregat	
	Gram	%	Tertahan	Lolos		Gram	%	Tertahan	Lolos
38,1	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
25,4	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
19	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
12,5	0,0	0,0	0,00	100,0	100,00	0,0	0,0	0,00	100,0
9,5	10,0	0,6	0,63	99,37	99,09	21,5	1,2	1,18	98,82
4,75	973,0	62,1	62,41	37,59	31,30	1345,5	74,4	74,99	25,01
2,36	455,0	29,0	91,30	8,70	5,95	397,5	22,0	96,79	3,21
1,18	90,5	5,8	97,05	2,95	2,23	31,0	1,7	98,49	1,51
0,6	11,5	0,7	97,78	2,22	1,78	3,0	0,2	98,66	1,34
0,3	9,0	0,6	98,35	1,65	1,40	3,5	0,2	98,85	1,15
0,15	18,0	1,1	99,49	0,51	0,72	4,0	0,2	99,07	0,93
0,075	1,0	0,1	99,56	0,44	0,66	1,0	0,1	99,12	0,88
Total	1568,0	100	646,6			1807,0	100	667,1	
MHB			6,466			MHB		6,671	
MHB Rata-Rata			6,568						

Nama Pengujian : Analisa Saringan Tanggal Pengujian : 29/03/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : Abu Batu
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Ukuran Saringan (mm)	Sampel I				Rata-Rata Kumulatif Lolos (%)	Sampel II			
	Agregat Tertinggal		% Kumulatif Agregat			Agregat Tertinggal		% Kumulatif Agregat	
	Gram	%	Tertahan	Lolos		Gram	%	Tertahan	Lolos
38,1	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
25,4	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
19	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
12,5	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
9,5	0,0	0,0	0,00	100,00	100,00	0,0	0,0	0,00	100,00
4,75	24,4	1,0	0,85	99,15	99,17	24,6	0,9	0,82	99,18
2,36	468,8	19,0	17,34	82,66	82,45	511,4	19,8	17,76	82,24
1,18	986,5	39,9	51,67	48,33	48,68	1002,4	38,8	50,97	49,03
0,6	394,6	16,0	65,40	34,60	35,14	402,9	15,6	64,32	35,68
0,3	296,1	12,0	75,70	24,30	24,27	345,6	13,4	75,77	24,23
0,15	198,3	8,0	82,60	17,40	17,62	192,7	7,5	82,15	17,85
0.075	100,3	4,1	86,09	13,91	14,18	102,4	4,0	85,54	14,46
Total	2469,0	100	379,65			2582,0	100	377,31	
MHB			3,796			MHB			3,773
MHB Rata-Rata			3,785						

Nama Pengujian : Berat Jenis Agregat Tanggal Pengujian : 03/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/2
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian		Sampel I	Sampel II
Berat benda uji kering oven (gram)	W1	3172,5	3309,6
Berat benda uji kering permukaan jenuh (gram)	W2	3210,2	3348,4
Berat piknometer + benda uji + air (gram)	W3	1982,3	2070,4
$BJ(Bulk) = \frac{W1}{W2-W3}$		2,584	2,590
<i>BJ(Bulk)rata – rata</i>		2,587	
$BJ\ kering\ jenuh\ permukaan = \frac{W2}{W2 - W3}$		2,614	2,620
<i>BJ kering permukaan jenuh rata – rata</i>		2,617	
$BJ\ semu = \frac{W1}{W1 - W3}$		2,666	2,671
<i>BJ semu rata – rata</i>		2,668	
$BJ\ Efektif = \frac{BJ\ (Bulk) + BJ\ Semu}{2}$		2,625	2,630
<i>BJ Efektif rata – rata</i>		2,627	
$Penyerapan = \frac{W2-W1}{W1} \times 100\%$		1,188	1,172
<i>Penyerapan rata – rata</i>		1,180	

Nama Pengujian : Kadar Air dan Kadar Lumpur Tanggal Pengujian : 06/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/2
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian	Hasil (gram)	
	Sampel I	Sampel II
Berat agregat (W1)	1000	1000
Berat agregat konstan sebelum dicuci (W2)	987,9	988,4
Berat agregat konstan setelah dicuci (W3)	986,3	986,9
$Kadar\ air = \frac{W1-W2}{W2} \times 100\%$	1,225	1,174
<i>Kadar air rata – rata</i>	1,199	
$Kadar\ lumpur = \frac{W2 - W3}{W2} \times 100\%$	0,162	0,152
<i>Kadar lumpur rata – rata</i>	0,1157	

Nama Pengujian : Kadar Air dan Kadar Lumpur Tanggal Pengujian : 06/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/1
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian	Hasil (gram)	
	Sampel I	Sampel II
Berat agregat (W1)	1000	1000
Berat agregat konstan sebelum dicuci (W2)	990,1	989,8
Berat agregat konstan setelah dicuci (W3)	983,9	983,4
$Kadar\ air = \frac{W1-W2}{W2} \times 100\%$	0,99	1,03
<i>Kadar air rata – rata</i>	1,01	
$Kadar\ lumpur = \frac{W2 - W3}{W2} \times 100\%$	0,630	0,651
<i>Kadar lumpur rata – rata</i>	0,641	

Nama Pengujian : Kadar Air dan Kadar Lumpur Tanggal Pengujian : 06/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : Abu Batu
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian	Hasil (gram)	
	Sampel I	Sampel II
Berat agregat (W1)	1000	1000
Berat agregat konstan sebelum dicuci (W2)	936,4	935,9
Berat agregat konstan setelah dicuci (W3)	921,8	921,6
$Kadar\ air = \frac{W1 - W2}{W2} \times 100\%$	6,792	6,849
<i>Kadar air rata – rata</i>	6,821	
$Kadar\ lumpur = \frac{W2 - W3}{W2} \times 100\%$	1,584	1,552
<i>Kadar lumpur rata – rata</i>	1,568	

Nama Pengujian : Berat Isi Agregat Tanggal Pengujian : 05/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/2
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian	Satuan	Gembur		Padat	
		Sampel I	Sampel II	Sampel I	Sampel II
Volume Bejana (A)	Cm ³	6726,54	6726,54	6726,54	6726,54
Berat Bejana (B)	Gram	11123,8	11123,8	11123,8	11123,8
Berat Bejana + Agregat (C)	Gram	21009,3	20995,7	21545,6	21570,4
Berat Agregat (D = C - B)	Gram	9885,5	9871,9	10421,8	10446,6
$Bobot\ isi\ gembur = \frac{D}{A}$	gr/cm ³	1,470	1,468		
<i>Bobot isi gembur rata - rata</i>	gr/cm ³	1,469			
$Bobot\ isi\ padat = \frac{D - B}{A}$	gr/cm ³			1,549	1,553
<i>Bobot isi padat rata - rata</i>	gr/cm ³			1,551	

Nama Pengujian : Berat Isi Agregat Tanggal Pengujian : 05/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/1
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian	Satuan	Gembur		Padat	
		Sampel I	Sampel II	Sampel I	Sampel II
Volume Bejana (A)	Cm ³	6726,54	6726,54	6726,54	6726,54
Berat Bejana (B)	Gram	11123,8	11123,8	11123,8	11123,8
Berat Bejana + Agregat (C)	Gram	20794,0	20809,6	21502,3	21469,1
Berat Agregat (D = C – B)	Gram	9670,2	9685,8	10378,5	10345,3
$Bobot\ isi\ gembur = \frac{D}{A}$	gr/cm ³	1,438	1,440		
$Bobot\ isi\ gembur\ rata - rata$	gr/cm ³	1,439			
$Bobot\ isi\ padat = \frac{D - B}{A}$	gr/cm ³			1,543	1,538
$Bobot\ isi\ padat\ rata - rata$	gr/cm ³			1,540	

Nama Pengujian : Berat Isi Agregat Tanggal Pengujian : 05/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : Abu Batu
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian	Satuan	Gembur		Padat	
		Sampel I	Sampel II	Sampel I	Sampel II
Volume Bejana (A)	Cm ³	6726,54	6726,54	6726,54	6726,54
Berat Bejana (B)	Gram	11123,8	11123,8	11123,8	11123,8
Berat Bejana + Agregat (C)	Gram	20476,9	20486,0	20769,4	20803,8
Berat Agregat (D = C - B)	Gram	9353,1	9362,2	9545,6	9680
$Bobot\ isi\ gembur = \frac{D}{A}$	gr/cm ³	1,390	1,392		
$Bobot\ isi\ gembur\ rata - rata$	gr/cm ³	1,391			
$Bobot\ isi\ padat = \frac{D - B}{A}$	gr/cm ³			1,434	1,439
$Bobot\ isi\ padat\ rata - rata$	gr/cm ³			1,437	

Nama Pengujian : Keausan Agregat Tanggal Pengujian : 08/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/2
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Gradasi Pemeriksaan		Agregat Kasar 1/2			
Ukuran Saringan (mm)		Berat Sampel I (gram)		Berat Sampel II (gram)	
Lolos	Tertahan	Sebelum	Sesudah	Sebelum	Sesudah
76,2	63,5	-	-	-	-
63,5	50,8	-	-	-	-
50,8	37,5	-	-	-	-
37,5	25,4	-	-	-	-
25,4	19	2500	-	2500	-
19	12,5	2500	-	2500	-
12,5	9,5	-	-	-	-
9,5	6,3	-	-	-	-
6,3	4,75	-	-	-	-
4,75	2,36	-	-	-	-
Total		5000	4095,8	5000	4044,1
Jumlah Bola Baja		11	-	11	-
Berat Bola (gram)		4584±25	-	4584±25	-
Catatan : 500 Kali Putaran					
Berat Contoh Sampel I (gram)					
Berat Awal (A)				5000	
Berat Setelah Diayak Saringan No. 1,7 mm (B)				4095,8	
Berat Sesudah (A – B)				904,2	
$\text{Keausan agregat kasar} = \frac{A - B}{A} \times 100\%$				18,084	
Berat Contoh Sampel II (gram)					
Berat Awal (A)				5000	
Berat Setelah Diayak Saringan No. 1,7 mm (B)				4044,1	
Berat Sesudah (A – B)				955,9	
$\text{Keausan agregat kasar} = \frac{A - B}{A} \times 100\%$				19,118	
Keausan agregat kasar rata – rata				18,60	

Nama Pengujian : Keausan Agregat Tanggal Pengujian : 08/04/2023
 Nama Penguji : 1. Intan Septiana Maharani Agregat : 1/1
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan
 Asal Kampus : Politeknik Negeri Sriwijaya

Gradasi Pemeriksaan		Agregat Kasar 1/1			
Ukuran Saringan (mm)		Berat Sampel I (gram)		Berat Sampel II (gram)	
Lolos	Tertahan	Sebelum	Sesudah	Sebelum	Sesudah
76,2	63,5	-	-	-	-
63,5	50,8	-	-	-	-
50,8	37,5	-	-	-	-
37,5	25,4	-	-	-	-
25,4	19	-	-	-	-
19	12,5	2500	-	2500	-
12,5	9,5	2500	-	2500	-
9,5	6,3	-	-	-	-
6,3	4,75	-	-	-	-
4,75	2,36	-	-	-	-
Total		5000	3970,6	5000	3920,9
Jumlah Bola Baja		11	-	11	-
Berat Bola (gram)		4584±25	-	4584±25	-
Catatan : 500 Kali Putaran					
Berat Contoh Sampel I (gram)					
Berat Awal (A)				5000	
Berat Setelah Diayak Saringan No. 1,7 mm (B)				3970,6	
Berat Sesudah (A – B)				1029,4	
$\text{Keausan agregat kasar} = \frac{A - B}{A} \times 100\%$				20,588	
Berat Contoh Sampel II (gram)					
Berat Awal (A)				5000	
Berat Setelah Diayak Saringan No. 2,36 mm (B)				3943,4	
Berat Sesudah (A – B)				1056,7	
$\text{Keausan agregat kasar} = \frac{A - B}{A} \times 100\%$				21,134	
Keausan agregat kasar rata – rata				20,861	

Nama Pengujian : Berat Jenis Aspal

Tanggal Pengujian : 10/04/2023

Nama Penguji : 1. Intan Septiana Maharani
2. Kanaya Tabhita Sundang
3. Krisna Deka Ramadhan

Asal Kampus : Politeknik Negeri Sriwijaya

Pengujian		Sampel	
		I	II
Berat Piknometer + Tutup (gram)	A	30,25	30,25
Berat Piknometer + Tutup + Air (gram)	B	80,41	80,30
Berat Piknometer + Tutup + Aspal (gram)	C	61,46	60,25
Berat Piknometer + Tutup + Aspal + Air (gram)	D	81,39	81,30
$Berat\ jenis\ aspal = \frac{Berat}{Volume}$	$\frac{(C - A)}{(B - A) - (D - C)}$	1,032	1,034
<i>Berat jenis aspal rata – rata</i>		1,0335	

Nama Pengujian : Titik Lembek Aspal

Tanggal Pengujian : 10/04/2023

Nama Penguji : 1. Intan Septiana Maharani

2. Kanaya Tabhita Sundang

3. Krisna Deka Ramadhan

Asal Kampus : Politeknik Negeri Sriwijaya

Suhu yang Diamati (°C)	Waktu (Detik)				Titik Lembek (°C)			
	I		II		I		II	
	1	2	1	2	1	2	1	1
5	0	0	0	0				
10	4'25"	4'25"	4'35"	4'35"				
15	7'35"	7'35"	7'10"	7'10"				
20	9'35"	9'35"	9'12"	9'12"				
25	11'31"	11'31"	10'50"	10'50"				
30	13'45"	13'45"	12'40"	12'40"				
35	16'10"	16'10"	16'35"	16'35"				
40	18'15"	18'15"	19'09"	19'09"				
45	20'10"	20'10"	21'08"	21'08"				
50					48 22'05"	47 21'38"	50 22'49"	51 22'58"
Rata-rata Titik Lembek (°C)					47,5 21'51,5"		50,5 23'13,5"	
					49 22'32,5"			



Nama Pengujian : Penetrasi Aspal

Tanggal Pengujian : 11/04/2023

Nama Penguji : 1. Intan Septiana Maharani
2. Kanaya Tabhita Sundang
3. Krisna Deka Ramadhan

Asal Kampus : Politeknik Negeri Sriwijaya

Penetrasi Setelah 5 Detik Pembacaan Ke-	Sampel	
	I	II
1	61	63
2	62	63
3	62	62
4	64	61
5	63	64
Rata-rata Penetrasi (mm)	62,4	62,6
Rata- Rata	62,5	

Nama Pengujian : Daktilitas Aspal

Tanggal Pengujian : 11/04/2023

Nama Penguji : 1. Intan Septiana Maharani
2. Kanaya Tabhita Sundang
3. Krisna Deka Ramadhan

Asal Kampus : Politeknik Negeri Sriwijaya

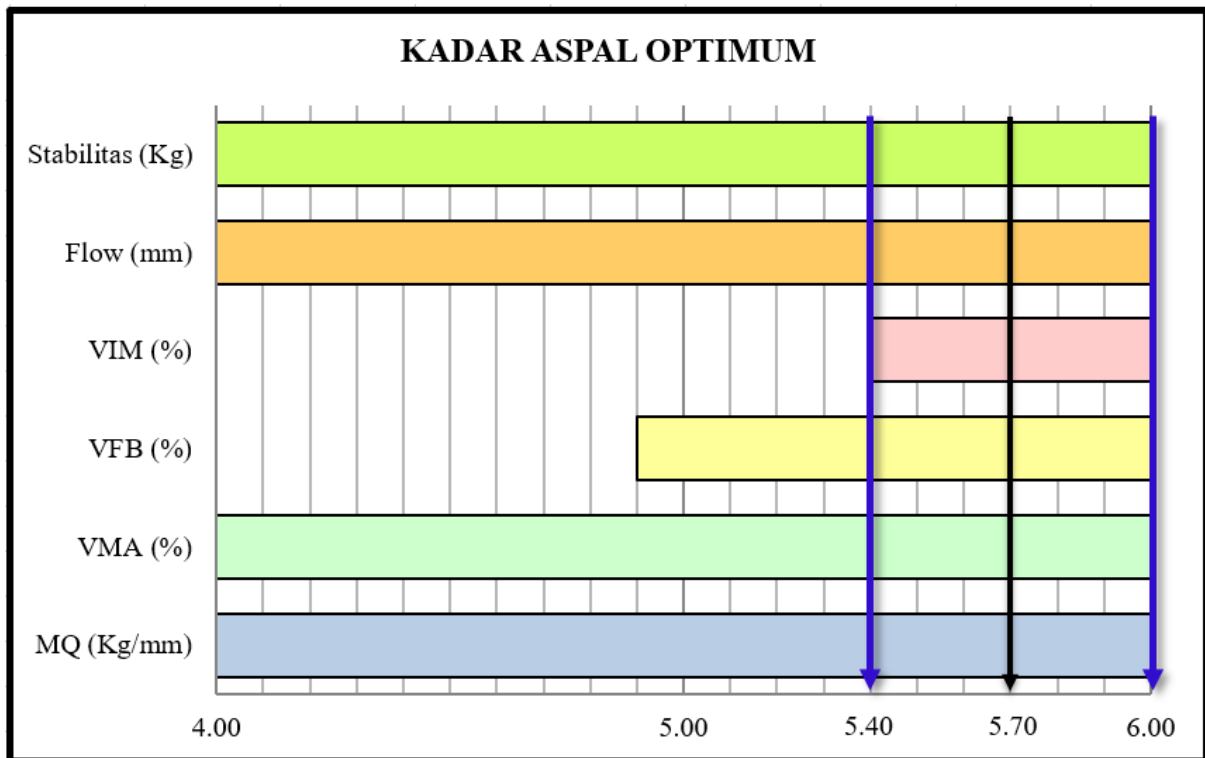
Sampel		Waktu (...’...’)	Jarak Putus (cm)
I	1	23’23’’	110
	2	24’25’’	115
Rata-rata Sampel I		23’54’’	112,5
II	1	26’30’’	125
	2	27’37’’	130
Rata-rata Sampel II		27’3,5’’	127,5
<i>Rata – rata jarak putus</i>			120
<i>Rata – rata waktu putus</i>		25’28,75’’	

Nama Pengujian : Penentuan KAO

Tanggal Pengujian : 2023

Nama Penguji : 1. Intan Septiana Maharani
 2. Kanaya Tabhita Sundang
 3. Krisna Deka Ramadhan

Asal Kampus : Politeknik Negeri Sriwijaya



PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 96.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 4.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	51.84	622	622
2.	SCREENING 1-1	33%	31.68	380	1002
3.	BATU SPLIT 1-2	13.0%	12.48	150	1152
4.	RUBBER SHEET	0.0%	0.00	0	1152
5.	ASPHALT	4.00%	4.00	48	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 95.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 5.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	51.30	616	616
2.	SCREENING 1-1	33%	31.35	376	992
3.	BATU SPLIT 1-2	13.0%	12.35	148	1140
4.	RUBBER SHEET	0.0%	0.00	0	1140
5.	ASPHALT	5.00%	5.00	60	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 94.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 6.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.76	609	609
2.	SCREENING 1-1	33%	31.02	372	981
3.	BATU SPLIT 1-2	13.0%	12.22	147	1128
4.	RUBBER SHEET	0.0%	0.00	0	1128
5.	ASPHALT	6.00%	6.00	72	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 95.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 5.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	51.30	616	616
2.	SCREENING 1-1	33%	31.35	376	992
3.	BATU SPLIT 1-2	13.0%	12.35	148	1140
4.	RUBBER SHEET	1.0%	1.00	12	1152
5.	ASPHALT	4.00%	4.00	48	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 94.50%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 5.50%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	51.03	612	612
2.	SCREENING 1-1	33%	31.19	374	987
3.	BATU SPLIT 1-2	13.0%	12.29	147	1134
4.	RUBBER SHEET	1.5%	1.50	18	1152
5.	ASPHALT	4.00%	4.00	48	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 94.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 6.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.76	609	609
2.	SCREENING 1-1	33%	31.02	372	981
3.	BATU SPLIT 1-2	13.0%	12.22	147	1128
4.	RUBBER SHEET	2.0%	2.00	24	1152
5.	ASPHALT	4.00%	4.00	48	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 93.50%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 6.50%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.49	606	606
2.	SCREENING 1-1	33%	30.86	370	976
3.	BATU SPLIT 1-2	13.0%	12.16	146	1122
4.	RUBBER SHEET	2.5%	2.50	30	1152
5.	ASPHALT	4.00%	4.00	48	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 93.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.22	603	603
2.	SCREENING 1-1	33%	30.69	368	971
3.	BATU SPLIT 1-2	13.0%	12.09	145	1116
4.	RUBBER SHEET	3.0%	3.00	36	1152
5.	ASPHALT	4.00%	4.00	48	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 94.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 6.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.76	609	609
2.	SCREENING 1-1	33%	31.02	372	981
3.	BATU SPLIT 1-2	13.0%	12.22	147	1128
4.	RUBBER SHEET	1.0%	1.00	12	1140
5.	ASPHALT	5.00%	5.00	60	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 93.50%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 6.50%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.49	606	606
2.	SCREENING 1-1	33%	30.86	370	976
3.	BATU SPLIT 1-2	13.0%	12.16	146	1122
4.	RUBBER SHEET	1.5%	1.50	18	1140
5.	ASPHALT	5.00%	5.00	60	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 93.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.22	603	603
2.	SCREENING 1-1	33%	30.69	368	971
3.	BATU SPLIT 1-2	13.0%	12.09	145	1116
4.	RUBBER SHEET	2.0%	2.00	24	1140
5.	ASPHALT	5.00%	5.00	60	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 92.50%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.50%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.95	599	599
2.	SCREENING 1-1	33%	30.53	366	966
3.	BATU SPLIT 1-2	13.0%	12.03	144	1110
4.	RUBBER SHEET	2.5%	2.50	30	1140
5.	ASPHALT	5.00%	5.00	60	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 92.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 8.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.68	596	596
2.	SCREENING 1-1	33%	30.36	364	960
3.	BATU SPLIT 1-2	13.0%	11.96	144	1104
4.	RUBBER SHEET	3.0%	3.00	36	1140
5.	ASPHALT	5.00%	5.00	60	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 93.30%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 6.70%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.38	605	605
2.	SCREENING 1-1	33%	30.79	369	974
3.	BATU SPLIT 1-2	13.0%	12.13	146	1120
4.	RUBBER SHEET	1.0%	1.00	12	1132
5.	ASPHALT	5.70%	5.70	68	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 92.80%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.20%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.11	601	601
2.	SCREENING 1-1	33%	30.62	367	969
3.	BATU SPLIT 1-2	13.0%	12.06	145	1114
4.	RUBBER SHEET	1.5%	1.50	18	1132
5.	ASPHALT	5.70%	5.70	68	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 92.30%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.70%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.84	598	598
2.	SCREENING 1-1	33%	30.46	366	964
3.	BATU SPLIT 1-2	13.0%	12.00	144	1108
4.	RUBBER SHEET	2.0%	2.00	24	1132
5.	ASPHALT	5.70%	5.70	68	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 91.80%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 8.20%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.57	595	595
2.	SCREENING 1-1	33%	30.29	364	958
3.	BATU SPLIT 1-2	13.0%	11.93	143	1102
4.	RUBBER SHEET	2.5%	2.50	30	1132
5.	ASPHALT	5.70%	5.70	68	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 91.30%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 8.70%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.30	592	592
2.	SCREENING 1-1	33%	30.13	362	953
3.	BATU SPLIT 1-2	13.0%	11.87	142	1096
4.	RUBBER SHEET	3.0%	3.00	36	1132
5.	ASPHALT	5.70%	5.70	68	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 93.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	50.22	603	603
2.	SCREENING 1-1	33%	30.69	368	971
3.	BATU SPLIT 1-2	13.0%	12.09	145	1116
4.	RUBBER SHEET	1.0%	1.00	12	1128
5.	ASPHALT	6.00%	6.00	72	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 92.50%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 7.50%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.95	599	599
2.	SCREENING 1-1	33%	30.53	366	966
3.	BATU SPLIT 1-2	13.0%	12.03	144	1110
4.	RUBBER SHEET	1.5%	1.50	18	1128
5.	ASPHALT	6.00%	6.00	72	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 92.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 8.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.68	596	596
2.	SCREENING 1-1	33%	30.36	364	960
3.	BATU SPLIT 1-2	13.0%	11.96	144	1104
4.	RUBBER SHEET	2.0%	2.00	24	1128
5.	ASPHALT	6.00%	6.00	72	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 91.50%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 8.50%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.41	593	593
2.	SCREENING 1-1	33%	30.20	362	955
3.	BATU SPLIT 1-2	13.0%	11.90	143	1098
4.	RUBBER SHEET	2.5%	2.50	30	1128
5.	ASPHALT	6.00%	6.00	72	1200
TOTAL			100.0	1200.0	

PROPORTION AC - WC

Nama : Intan Septiana Maharani

Date : 01 April 2023

Kanaya Tabhita Sundang
Krisna Deka Ramadhan

Weight Total : 1200 gram
Agregat : 91.00%

Politeknik Negeri Sriwijaya, 2023

Aspal + RS : 9.00%

NO.	DESCRIPTION	% WEIGHT BY TOTAL AGGREGATE	% WEIGHT BY TOTAL MIX	INDIVIDUAL WEIGHT (gram)	CUMULATIVE WEIGHT (gram)
1.	ABU BATU	54.0%	49.14	590	590
2.	SCREENING 1-1	33%	30.03	360	950
3.	BATU SPLIT 1-2	13.0%	11.83	142	1092
4.	RUBBER SHEET	3.0%	3.00	36	1128
5.	ASPHALT	6.00%	6.00	72	1200
TOTAL			100.0	1200.0	

MARSHALL TEST
(SNI 06-2489-1991)

Date test	Item	Location
10 Juni 2023	AC Wearing	Laboratorium PT. HKA

Kalibrasi	Aggregate	Bulk	App
22.01	Abu Batu	2.551	2.685
	Medium Agg.	2.565	2.657
	CA 1 - 2	2.587	2.668

No.	Aggregate (%)	A.C mixes (%)	Weight (gram)			Volume cc	Unit Weight (grm/cc) Actual	VMA AASTHO 209 - 74 (%)	VIM (%)	VFB (%)	Read Dial stability	Stability		Flow mm	Marshall Quotient Kg/mm	% Bitumen Effectif %	
			Dry	SSD	In Water							Calibrasi Kg	Correlation Kg				
																	$f = d - e$
0% A	96.00	4.00	1180.0	1218.6	690.5	528.1	2.234				40	880.4	880	3.10			
0% B	96.00	4.00	1182.3	1212.4	684.1	528.3	2.238				42	924.4	924	3.00			
Average							2.236	2.399	16.14	6.80				902	3.05	296	3.64
0% A	95.00	5.00	1186.2	1223.2	695.7	527.5	2.249				43	946.4	946	3.30			
0% B	95.00	5.00	1188.5	1225.9	696.4	529.5	2.245				44	968.4	968	3.40			
Average							2.247	2.379	16.63	5.58				957	3.35	286	4.64
0% A	94.00	6.00	1193.9	1217.6	689.9	527.7	2.262				41	902.4	902	3.60			
0% B	94.00	6.00	1198.3	1220.1	691.1	529.0	2.265				44	968.4	968	3.40			
Average							2.264	2.361	16.88	4.11				935	3.50	267	5.64
Bj.bulk	2.560	Bj.Bitument	1.034			Bj.Eff Agg	2.584	Absp Bitument	0.380								

Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)

$$Gmm = \frac{\frac{100}{Bj.Effagg} + \frac{100}{Bj.Bitument}}{100}$$

* GMM With AASTHO T 209
Degree asphalt optimum Aprox imately
Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston

** Bj, Eff Agg

$$\frac{100 - KA}{Gmm} = \frac{KA}{Bj.Asphalt}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) \cdot g}{Bj.Bulk \text{ aggregate}}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filleds Bitument 100 * (1 - j) / i
- l = Reading dial stability
- m = Stabilitas (l x Calibration proving ring) Kg
- n = Stabilitas (m x Correlation sample) Kg
- o = Flow (mm)
- p = Marshall Quotient (Kg/mm)

*** Absorbion Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b = \frac{Abs.Bitument (100 - b)}{100}$$

** Surface Area : 5.30

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
	Abu Batu	2.551	2.685
	Medium Agg. CA 1 - 2	2.565 2.587	2.657 2.668

RUBBER SHEET	Aggregate	A.C mixes	Weight (gram)			Volume	Unit Weight (grm/cc)		VMA	VIM	VFB	Read	Stability		Flow	Marshall	% Bitumen
	(%)	(%)	Dry	SSD	In Water	cc	Actual	AASTHO 209 - 74 T	(%)	(%)	(%)	Dial stability	Calibrasi Kg	Correlation Kg	mm	Quotient Kg/mm	Effectif %
	a	b	c	d	e	f = d - e	g = c / f	h	i	j	k	l	m	n = m * scr	o	p = n / o	q
1% A	96.00	4.00	1178.7	1218.6	692.4	526.2	2.240					38	836.4	836	3.40		
1% B	96.00	4.00	1169.2	1205.2	683.6	521.6	2.242					37	814.4	814	3.50		
Average							2.241	2.371	15.97	5.49	65.60			825	3.45	239	3.64
1,5% A	96.00	4.00	1196.3	1223.8	691.1	532.7	2.246					40	880.4	880	3.70		
1,5% B	96.00	4.00	1182.9	1220.5	693.4	527.1	2.244					39	858.4	858	3.60		
Average							2.245	2.371	15.82	5.32	66.37			869	3.65	238	3.64
2% A	96.00	4.00	1179.4	1209.0	684.1	524.9	2.247					42	924.4	924	3.90		
2% B	96.00	4.00	1182.2	1198.6	672.9	525.7	2.249					41	902.4	902	3.85		
Average							2.248	2.371	15.71	5.20	66.92			913	3.88	236	3.64
Bj.bulk	2.560	Bj.Bitument	1.034				Bj.Eff Agg	2.584	Absp Bitument	0.380							

Remarks,

a = % Asphalt by Aggregate
 b = % Asphalt by Mix
 c = Weight Sample dry (gr)
 d = Weight Sample SSD (gr)
 e = Volume Sample (d - e)
 f = Weight Volume Actual (c / f)
 g = Bj.Maximum mixer (teoritis)
 h = $G_{mm} = \frac{100}{\frac{w_{asph}}{Bj.Effagg} + \frac{w_{bitument}}{Bj.Bitument}}$

* GMM With AASTHO T 209
 Degree asphalt optimum Aprox imately
 $P_b = 0.035 (\%CA) + 0.045 (\%FA) + 0.18 (\%FF) + K$
 $K = 0.5 - 1$ for laston, 2.0 - 3.0 for lastaston
 ** Bj, Eff Agg
 $\frac{100 - KA}{G_{mm}} - \frac{KA}{BjAsphalt}$

I = % Rongga diantara Agg
 $100 - \frac{(100 - b) q}{Bj.Bulk aggregate}$
 j = % Voids With Mixer 100 - (100 g / h)
 k = % Voids Filled Bitument 100 * (1 - j) / i
 l = Reading dial stability
 m = Stabilitas (l x Calibration proving ring) Kg
 n = stability (m x Lorreation sample) kg
 o = Flow (mm)
 p = Marshall Quotient (Kg/mm)

*** Absorbion Bitument With aggregate
 $100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$
 q = % Bitument Effectif
 $b = \frac{Abs.Bitument (100 - b)}{100}$
 *> Surface Area : **5.29**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
22.01	Abu Batu	2.551	2.685
	Medium Agg.	2.565	2.657
	CA 1 - 2	2.587	2.668

RUBBER SHEET	Aggregate	A.C mixes	Weight (gram)			Volume	Unit Weight (gm/cc)	VMA	VIM	VFB	Read	Stability		Flow	Marshall	% Bitumen	
	(%)	(%)	Dry	SSD	In Water	cc	Actual	AASHTO 209 - 74 T	(%)	(%)	(%)	Dial stability	Calibrasi Kg	Correlation Kg	mm	Quotent Kg/mm	Effectif %
	a	b	c	d	e	f = d - e	g = c / f	h	i	j	k	l	m	n = m * scr	o	p = n / o	q
2,5% A	96.00	4.00	1179.2	1205.2	680.3	524.9	2.247					44	968	968	4.20		
2,5% B	96.00	4.00	1182.9	1212.7	685.9	526.8	2.245					45	990	990	4.20		
Average							2.246	2.371	15.78	5.27	66.57			979	4.20	233	3.64
3% A	96.00	4.00	1185.4	1222.9	693.2	529.7	2.238					46	1012	1012	4.35		
3% B	96.00	4.00	1188.3	1229.3	697.7	531.6	2.235					45	990	990	4.40		
Average							2.237	2.371	16.13	5.67	64.84			1001	4.38	229	3.64

Bj.bulk	2.560	Bj.Bitument	1.034	Bj.Eff Agg	2.584	Absp Bitument	0.380
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Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)
- Gmm = $\frac{\% Agg + \% Bitument}{Bj.Effagg \cdot Bj.Bitument} \cdot 100$

* GMM With AASHTO T 209
Degree asphalt optimum Aprox imately
Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston

** Bj, Eff Agg

$$\frac{100}{Gmm} = \frac{100 - KA}{BjAsphalt}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) \cdot g}{Bj.Bulk \text{ aggregate}}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filleds Bitument 100 * (1 - j) / i
- l = Reading dial stability
- m = Stabilitas (l x Calibration proving ring) Kg
- n = Stability (m x Correlation Sample) Kg
- o = Flow (mm)
- p = Marshall Quotent (Kg/mm)

*** Absorbion Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b \cdot \frac{Abs.Bitument (100 - b)}{100}$$

* Surface Area : **5.29**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
	Abu Batu	2.551	2.685
	Medium Agg. CA 1 - 2	2.565 2.587	2.657 2.668

RUBBER SHEET	Aggregate (%) a	A.C mixes (%) b	Weight (gram)			Volume cc f = d - e	Unit Weight (grm/cc)		VMA (%) I	VIM (%) j	VFB (%) k	Read Dial stability l	Stability		Flow mm o	Marshall Quotient Kg/mm p = n/o	% Bitumen Effectif % q
			Dry	SSD	In Water		Actual	AASTHO 209 - 74 T					Calibrasi Kg m	Correlation Kg n = m * scr			
			c	d	e		g = c/f	h									
1% A	95.00	5.00	1165.2	1193.3	676.2	517.1	2.253				42	924.4	924	3.50			
1% B	95.00	5.00	1168.6	1195.5	673.0	522.5	2.237				44	968.4	968	3.55			
Average							2.245	2.371	16.69	5.32	68.14		946	3.53	268	4.64	
1,5% A	95.00	5.00	1176.3	1197.2	675.9	521.3	2.256				45	990.5	990	3.85			
1,5% B	95.00	5.00	1175.5	1199.2	676.8	522.4	2.250				46	1012.5	1012	3.80			
Average							2.253	2.371	16.38	4.96	69.69		1001	3.83	262	4.64	
2% A	95.00	5.00	1186.5	1206.7	679.2	527.5	2.249				49	1078.5	1078	4.20			
2% B	95.00	5.00	1188.6	1199.5	676.4	523.1	2.272				50	1100.5	1101	4.30			
Average							2.261	2.371	16.11	4.65	71.12		1089	4.25	256	4.64	
Bj.bulk	2.560	Bj.Bitument	1.034			Bj.Eff Agg	2.584	Absp Bitument	0.380								

Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)

* GMM With AASTHO T 209
Degree asphalt optimum Aprox imately
Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston

** Bj, Eff Agg

$$Gmm = \frac{100}{\frac{100 - KA}{Gmm} + \frac{KA}{BjAsphalt}}$$

$$Gmm = \frac{100}{\frac{100 - KA}{Gmm} + \frac{KA}{BjAsphalt}}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) q}{Bj.Bulk aggregate}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filled Bitument 100 * (I - j) / i
- l = Reading dial stability
- n = Stabilitas (l x Calibration proving ring) Kg
- m = Stabilitas (m x Lorreatation sample j kg
- o = Flow (mm)
- p = Marshall Quotient (Kg/mm)

*** Absorbion Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b = \frac{Abs.Bitument (100 - b)}{100}$$

* Surface Area : **5.30**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
22.01	Abu Batu	2.551	2.685
	Medium Agg.	2.565	2.657
	CA 1 - 2	2.587	2.668

RUBBER SHEET	Aggregate	A.C mixes	Weight (gram)			Volume	Unit Weight (g/cm ³)		VMA	VIM	VFB	Read Dial stability	Stability		Flow	Marshall Quotient	% Bitumen Effectif
	(%)	(%)	Dry	SSD	In Water	cc	Actual	ASTMHO 209 - 74	(%)	(%)	(%)	l	Calibrasi Kg	Correlation Kg	mm	Kg/mm	%
	a	b	c	d	e	f = d - e	g = c / f	h	i	j	k	l	n = m * scr	o	p = n / o	q	
2,5% A	95.00	5.00	1190.5	1212.7	685.2	527.5	2.257					52	1145	1190	4.70		
2,5% B	95.00	5.00	1192.1	1215.6	687.9	527.7	2.259					51	1123	1167	4.60		
Average							2.258	2.371	16.21	4.77	70.58			1179	4.65	254	4.64
3% A	95.00	5.00	1181.1	1202.1	677.4	524.7	2.251					54	1189	1189	5.00		
3% B	95.00	5.00	1183.3	1199.4	674.7	524.7	2.255					55	1211	1211	4.90		
Average							2.253	2.371	16.39	4.97	69.65			1200	4.95	242	4.64

Bj.bulk	2.560	Bj.Bitument	1.034	Bj.Eff Agg	2.584	Absp Bitument	0.380
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Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)

* GMM With AASTHO T 209
Degree asphalt optimum Aprox imately
Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston

** Bj, Eff Agg

$$\frac{100 - KA}{Gmm} - \frac{KA}{BjAsphalt}$$

$$Gmm = \frac{\% Agg + \% Bitument}{BjEffagg \quad Bj.Bitument}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) g}{Bj.Bulk \text{ aggregate}}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filled Bitument 100 * (I - j) / i
- l = Reading dial stability
- m = Stabilitas (l x Calibration proving ring) Kg
- n = Stability (m x Correlation Sample) Kg
- o = Flow (mm)

p = Marshall Quotient (Kg/mm)

*** Absorbition Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b \cdot \frac{Abs.Bitument (100 - b)}{100}$$

* Surface Area : **5.30**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
	Abu Batu	2.551	2.685
	Medium Agg. CA 1 - 2	2.565 2.587	2.657 2.668

RUBBER SHEET	Aggregate	A.C mixes	Weight (gram)			Volume	Unit Weight (grm/cc)		VMA	VIM	VFB	Read	Stability		Flow	Marshall	% Bitumen
	(%)	(%)	Dry	SSD	In Water	cc	Actual	ASTHO 209 - 74 T	(%)	(%)	(%)	Dial stability	Calibrasi Kg	Correlation Kg	mm	Quotient Kg/mm	Effectif %
	a	b	c	d	e	f = d-e	g = c/f	h	I	J	k	l	m	n = m*scr	o	p = n/o	q
1% A	94.00	6.00	1206.2	1226.2	694.5	531.7	2.269					50	1100.5	1101	3.60		
1% B	94.00	6.00	1204.1	1229.4	698.4	531.0	2.268					51	1122.5	1123	3.70		
Average							2.268	2.371	16.72	4.34	74.03			1112	3.65	305	5.64
1,5% A	94.00	6.00	1204.6	1223.1	692.6	530.5	2.271					53.5	1177.5	1178	4.20		
1,5% B	94.00	6.00	1195.8	1210.6	684.2	526.4	2.272					55	1210.6	1211	4.00		
Average							2.271	2.371	16.61	4.21	74.64			1194	4.10	291	5.64
2% A	94.00	6.00	1211.1	1230.9	698.6	532.3	2.275					55	1210.6	1211	4.50		
2% B	94.00	6.00	1219.5	1240.5	704.2	536.3	2.274					55.5	1221.6	1222	4.30		
Average							2.275	2.371	16.48	4.07	75.32			1216	4.40	276	5.64
Bj.bulk	2.560	Bj.Bitument	1.034				Bj.Eff Agg	2.584	Absp Bitument	0.380							

Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)

- * GMM With AASTHO T 209
- Degree asphalt optimum Aprox imately
- Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) +K
- K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston

** Bj, Eff Agg

$$Gmm = \frac{100}{\frac{100 - KA}{Gmm} + \frac{KA}{BjAsphalt}}$$

$$Gmm = \frac{\% Agg + \frac{\% Bitument}{BjEffagg}}{\% Bitument / Bj.Bitument}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) g}{Bj.Bulk aggregate}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filled Bitument 100 * (I - j) / I
- l = Reading dial stability
- m = Stabilitas (1 x Calibration proving ring) Kg
- n = Stabilitty (m x Correlation Sample) Kg
- o = Flow (mm)
- p = Marshall Quotient (Kg/mm)

*** Absorbion Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b = \frac{Abs.Bitument (100 - b)}{100}$$

* Surface Area : **5.30**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
22.01	Abu Batu	2.551	2.685
	Medium Agg.	2.565	2.657
	CA 1 - 2	2.587	2.668

RUBBER SHEET	Aggregate	A.C mixes	Weight (gram)			Volume	Unit Weight (grm/cc)		VMA	VIM	VFB	Read	Stability		Flow	Marshall	% Bitumen
	(%)	(%)	Dry	SSD	In Water	cc	Actual	ASTHO 209 - 74 T	(%)	(%)	(%)	Dial stability	Calibrasi Kg	Correlation Kg	mm	Quobient Kg/mm	Effectif %
	a	b	c	d	e	f = d-e	g = c/f	h	i	j	k	l	m	n = m*scr	o	p = n/o	q
2,5% A	94.00	6.00	1179.8	1196.6	677.6	519.0	2.273					58	1277	1328	4.90		
2,5% B	94.00	6.00	1184.2	1199.2	677.5	521.7	2.270					56	1233	1282	4.75		
Average							2.272	2.371	16.59	4.20	74.71			1305	4.83	270	5.64
3% A	94.00	6.00	1185.1	1198.6	675.8	522.8	2.267					60	1321	1321	5.30		
3% B	94.00	6.00	1184.7	1199.3	676.4	522.9	2.266					59	1299	1299	5.15		
Average							2.266	2.371	16.79	4.42	73.67			1310	5.23	251	5.64

Bj.bulk	2.560	Bj.Bitument	1.034	Bj.Eff Agg	2.584	Absp Bitument	0.380
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Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)
- Gmm = $\frac{100}{\frac{\% Agg}{Bj.Effagg} + \frac{\% Bitument}{Bj.Bitument}}$

- * GMM With AASTHO T 209
- Degree asphalt optimum Aprox imately
- Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
- K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston
- ** Bj, Eff Agg
- $\frac{100 - KA}{Gmm} - \frac{KA}{BjAsphalt}$

- I = % Rongga diantara Agg
- $100 - \frac{(100 - b) g}{Bj,Bulk\ aggregate}$
- j = % Voids With Mixer $100 - (100 g / h)$
- k = % Voids Filled Bitument $100 * (I - j) / i$
- l = Reading dial stability
- m = Stabilitas (l x Calibration proving ring) Kg
- n = Stability (m x Correlation Sample) Kg
- o = Flow (mm)
- p = Marshall Quotient (Kg/mm)

- *** Absorbion Bitument With aggregate
- $100 \times \frac{Bj,eff - Bj,bulk}{Bj,eff \times Bj,bulk} \times Bj.Bitument$
- q = % Bitument Effectif
- $b = \frac{Abs.Bitument (100 - b)}{100}$
- *> Surface Area : **5.30**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
	Abu Batu	2.551	2.685
	Medium Agg.	2.565	2.657
	CA 1 - 2	2.587	2.668

RUBBER SHEET	Aggregate (%) a	A.C mixes (%) b	Weight (gram)			Volume cc f = d - e	Unit Weight (grm/cc)		VMA (%) I	VIM (%) J	VFB (%) K	Read Dial stability l	Stability		Flow mm o	Marshall Quotient Kg/mm p = n/o	% Bitumen Effectif q
			Dry c	SSD d	In Water e		Actual g = c/f	AASTHO 209 - 74 T h					Calibrasi Kg m	Correlation Kg n = m * scr			
			d	e	f		g	h					m	n			
1% A	94.30	5.70	1193.9	1216.3	689.0	527.3	2.264				48	1056.5	1056	3.60			
1% B	94.30	5.70	1193.5	1219.2	690.8	528.5	2.258				49	1078.5	1078	3.70			
Average							2.261	2.371	16.71	4.63	72.28		1067	3.65	292	5.34	
1,5% A	94.30	5.70	1196.1	1215.3	687.6	527.7	2.266				51	1122.5	1123	4.00			
1,5% B	94.30	5.70	1189.7	1207.2	682.0	525.2	2.265				52	1144.5	1145	3.90			
Average							2.266	2.371	16.54	4.44	73.17		1134	3.95	287	5.34	
2% A	94.30	5.70	1203.7	1223.6	692.8	530.9	2.267				53	1166.5	1167	4.40			
2% B	94.30	5.70	1210.2	1228.2	695.9	532.3	2.273				52	1144.5	1145	4.30			
Average							2.270	2.371	16.37	4.24	74.08		1156	4.35	266	5.34	
Bj.bulk	2.560	Bj.Bitument	1.034			Bj.Eff Agg	2.584	Absp Bitument	0.380								

Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)

- * GMM With AASTHO T 209
- Degree asphalt optimum Aprox imately
- Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
- K = 0.5 - 1 for laston, 2.0 - 3.0 for lataston

** Bj, Eff Agg

$$Gmm = \frac{\frac{100}{Bj.Effagg} + \frac{100}{Bj.Bitument}}{100}$$

$$\frac{100}{Gmm} = \frac{100 - KA}{Bj.Asphalt}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) g}{Bj.Bulk aggregate}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filled Bitument 100 * (I - j) / i
- l = Reading dial stability
- m = Stabilitas (l x Calibration proving ring) Kg
- n = Stability (m x Correlation Sample) Kg
- o = Flow (mm)
- p = Marshall Quotient (Kg/mm)

*** Absorbion Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b = \frac{Abs.Bitument (100 - b)}{100}$$

* Surface Area : **5.30**

MARSHALL TEST
(SNI 06-2489-1991)

AC - WC KOMBINASI RUBBER SHEET

Date test	Item	Location
10 Juni 2023	AC Wearing	AMP PT. HKA

Kalibrasi	Aggregate	Bulk	App
22.01	Abu Batu	2.551	2.685
	Medium Agg.	2.565	2.657
	CA 1 - 2	2.587	2.668

RUBBER SHEET	Aggregate	A.C mixes	Weight (gram)			Volume	Unit Weight (grm/cc)		VMA	VIM	VFB	Read Dial	Stability		Flow	Marshall Quotient	% Bitumen Effectif
	(%)	(%)	Dry	SSD	In Water	cc	Actual	ASTHO 209 - 74	(%)	(%)	(%)	Stability	Correlation	mm	Kg/mm	%	
	a	b	c	d	e	f = d - e	g = c / f	h	i	j	k	l	n = m * scr	o	p = n / o	q	
2,5% A	94.30	5.70	1198.0	1224.0	696.1	527.9	2.269					56	1233	1233	4.80		
2,5% B	94.30	5.70	1197.6	1227.1	699.4	527.7	2.270					55	1211	1211	4.60		
Average							2.270	2.371	16.40	4.28	73.91			1222	4.70	260	5.34
3% A	94.30	5.70	1182.4	1198.2	676.3	521.9	2.266					58	1277	1277	5.20		
3% B	94.30	5.70	1182.8	1197.8	675.1	522.7	2.263					57	1255	1255	5.10		
Average							2.264	2.371	16.60	4.50	72.86			1266	5.15	246	5.34
Bj.bulk	2.560	Bj.Bitument	1.034			Bj.Eff Agg	2.584	Absp Bitument	0.380								

Remarks,

- a = % Asphalt by Aggregate
- b = % Asphalt by Mix
- c = Weight Sample dry (gr)
- d = Weight Sample SSD (gr)
- e = Weight Sample in Water (gr)
- f = Volume Sample (d - e)
- g = Weight Volume Actual (c / f)
- h = Bj.Maximum mixer (teoritis)

* GMM With AASTHO T 209
Degree asphalt optimum Aprox imately
Pb = 0.035 (%CA) + 0.045 (%FA) + 0.18 (%FF) + K
K = 0.5 - 1 for laston, 2.0 - 3.0 for lastaston

** Bj, Eff Agg

$$\frac{100}{Gmm} - \frac{100 - KA}{BjAsphalt}$$

$$Gmm = \frac{\frac{\% Agg +}{BjEffagg} + \frac{\% Bitument}{Bj.Bitument}}{100}$$

I = % Rongga diantara Agg

$$100 - \frac{(100 - b) g}{Bj.Bulk aggregate}$$

- j = % Voids With Mixer 100 - (100 g / h)
- k = % Voids Filled Bitument 100 * (I - j) / i
- l = Reading dial stability
- m = Stabilitas (l x Calibration proving ring) Kg
- n = Stability (m x Correlation Sample) Kg
- o = Flow (mm)
- p = Marshall Quotient (Kg/mm)

*** Absorbion Bitument With aggregate

$$100 \times \frac{Bj.eff - Bj.bulk}{Bj.eff \times Bj.bulk} \times Bj.Bitument$$

q = % Bitument Effectif

$$b - \frac{Abs.Bitument (100 - b)}{100}$$

* Surface Area : **5.30**