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Analysis Characteristics Dense Graded Emulsion Mix (DGEM) Mixture Using Mixed Filler Husk Ash Waste Rice And Lime off

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Abstract . Husk ash paddy generated from remainder burning bricks still _ _ have score low benefit , from _ Thing this conducted experiment mixing Among waste ash husk rice and lime off as replacement filler filler on mix asphalt emulsion CRS-1 type . Use mixture cold with asphalt emulsion no cause pollution as well as friendly environment . Destination in study this is analyze characteristics Dense Graded Emulsion Mix (DGEM) using mixed filler waste ash husk rice and lime off.Composition use of mixed fillers waste ash husk rice and lime off by 60% ash husk rice and 40% lime solid , 70% ash husk rice and 30% lime extinguished , and 80% ash husk rice and 20% lime extinguished , with a curing period of 3, 7 and 11 days with the curing method is carried out inside temperature room and immersion . Mixture waste ash husk rice and lime off best customized with percentage comparison that is testing stability highest with limit minimum specification 300 kg of mixed filler composition (60% ABS + 40% KP) with a curing period of 11 days .

Keywords : Asphalt _ Emulsion , Waste , DGEM , Stability .

1. Introduction

Husk paddy is product abundant side , necessary _ conducted study utilization husk paddy in Thing this husk paddy changed more formerly Becomes ash and with addition chalk as expected material _ could stabilize the mix that will conducted research , in Thing this serve influence addition ash husk rice and lime off as *filler* in mix *Dense Graded Emulsion Mix* (DGEM). Based on elements contained in lime _ off is the mineral calcium the usual carbonate ($CaCO_3$) used as ingredient raw cement manufacture [1].

Purpose and research this is for knowing appropriateness utilization waste ash husk rice and body lime as *filler* in mix *Dense Graded Emulsion Mix* (DGEM *)* against asphalt emulsion *Cationic Rapid Setting* (CRS–1). In implementation construction pavement flexible required a number of consideration about a number of Thing among others on material quality , cost implementation , method implementation and impact to environment around . The use of PT. Multi Build Indonesia against utilization waste ash husk rice and lime off as *fillers* obtained could resolve various problem in pavement flexible among others, dependence on crushed stone aggregates , the use of expensive *filler* , heating excessive mix and pollution _ the air at the moment burning asphalt oil . Analyze and determine design Dense Graded Imulsion Mix (DGEM) asphalt emulsion type CRS-1 based on material from AMP PT. Multi Bangun Indonesia Sayung-Demak . The mixed *filler* that will used in research this use mixture waste ash husk rice and lime off with 60% ash composition husk on and 40% lime extinguished , 70% ash husk on and 30% lime extinguished , 805 ash husk rice and 20% lime extinguished . With *curing* for 3, 7 and 11 days with method *curing* done inside _ temperature room and immersion .

2. Methods

Methodology research conducted _ is study laboratory conducted at the Civil Engineering Laboratory , PGRI University Semarang. Laboratory Testing _ meant for get traits material to be used in research this and at the same time choose material that meets Technical requirements required [2] .

2.1. Research Flowchart

Flowchart _ study for study *marshall* parameter parameter study on pavement flexible asphalt mixture cold with various test equipment illustrated as following :

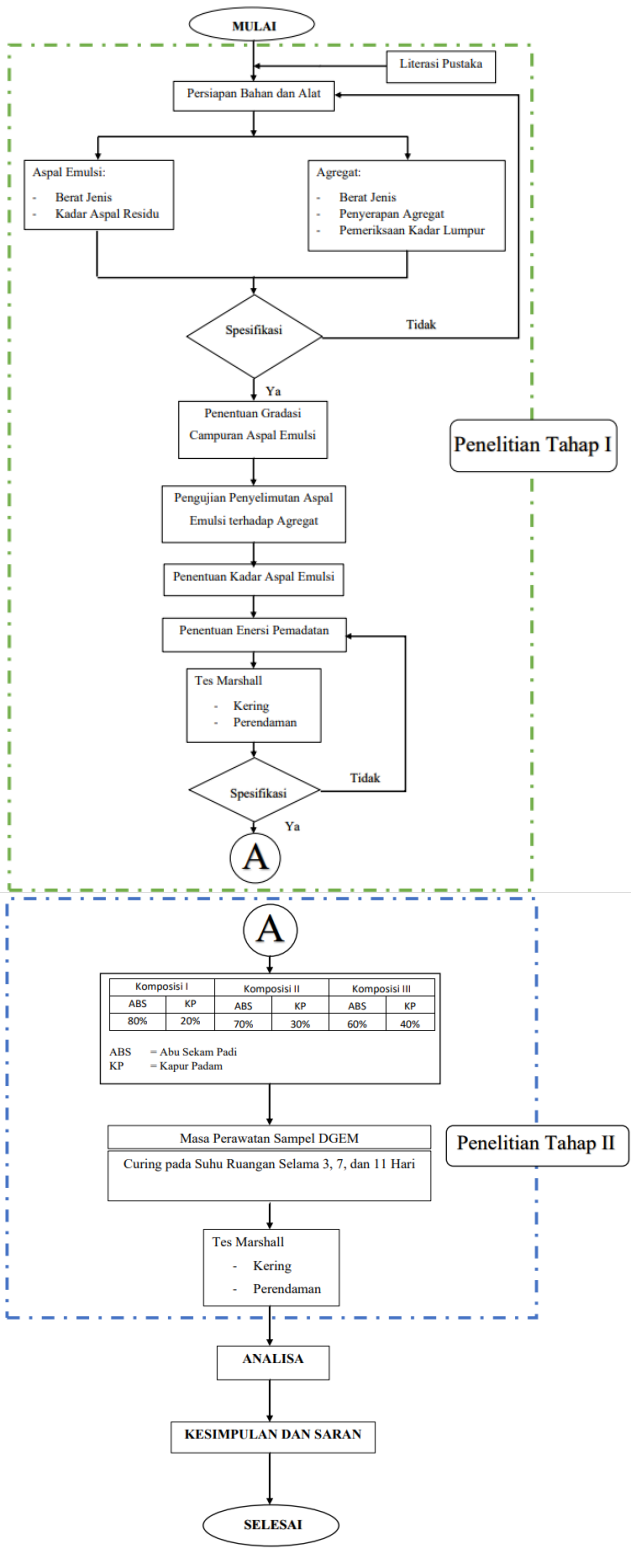

Figure 1. Flowchart Study

3. Results And Discission

3.1. Test Results Aggregate

Inspection aggregate in accordance with Highways special specification and other standard , because that inspection aggregate conducted in accordance characteristics testing aggregate as reference determine gradation target plan used _ as ingredient mixture asphalt emulsion [3][4].

Table 1. Gradation Mixture Emulsion graded Meeting

Ukuran Ayakan		Type of DGEM					
No	mm	I	II	III	**IV**	V	VI
2''	50	100	-	-	**-**	-	-
1 ½''	37,5	90 – 100	100	-	**-**	-	-
1''	25	-	90 – 100	100	**-**	-	-
¾''	19	60 – 80	-	90 – 100	**100**	-	-
½''	12,5	-	60 – 80	-	**90 – 100**	100	100
3/8''	9,5	-	-	60 – 80	**-**	90 – 100	
No.4	4,75	20 – 55	25 – 60	35 – 65	**45 – 70**	60 – 80	75 – 100
No.8	2,36	10 – 40	15 – 45	20 – 50	**25 – 55**	35 – 65	-
No.16	1,18	-	-	-	**-**	-	-
No.30	0,6	-	-	-	**-**	-	-
No.50	0,3	2 – 16	3 – 13	3 – 20	**50 – 20**	6 – 25	15 – 30
No.100	0,15	-	-	-	**-**	-	-
No.200	0,075	0 - 5	1 - 7	2 - 8	**2 - 9**	2 – 10	5 – 12
Sand Equivalent (%)		35 min	35 min	35 min	**35 min**	35 min	35 min
Los Agles test @ 500 Putaran		40 max	40 max	40 max	**40 max**	40 max	40 max
Bidang Pecah (%)		65 min	65 min	65 min	**65 min**	65 min	65 min

Source : Direktorat Jendral Bina Marga , 1991

Appropriateness as a mixed material *Dense Graded Emulsion Mix* (DGEM) type IV with composition mixture aggregate by 58% for use aggregate rough , 35% usage aggregate smooth , and 7% for use *fillers.*

Table 2. Composition Analysis Aggregate

Bahan	Saringan		Spesifikasi Lolos %		Tinggal Diatas %	Analisa jumlah bahan Spesifikasi		Jumlah Bahan Susunan			Kadar Residu (%)	Aspal Emulsi (gram)
	Mm	#	Range	Target		Tinggal (%)	gr	Berat (%)	% thd agg	% thd camp		
1200 gr	19	¾	100	100	0	0	0	696	58,00	52,46	65,75	126,60
	12,5	½	100 - 90	91	9	9	108					
	4,74	*# 4*	*45 - 70*	*65*	35	26	312					
	2,36	# 8	25 - 55	42	58	23	276					
	0,3	# 50	5 - 20	15	85	27	324	420	35,00	31,66		
	0,075	# 200	2 - 9	7	93	8	96					
Filler					100	7	84	84	7,00	6,33		
Bahan Ikat	Aspal Emulsi Tipe CRS-1					6,93		126,60		9,54		
			Jumlah				1200	1326,60	100	100		

Source : Analysis, 2022

3.2. Comparison of Test Results Using Husk Ash Waste Filler Mix Rice and Lime off

Based on results calculation rate asphalt residue got value 65.70% with addition asphalt emulsion of 126.60 grams, the total weight of the mixture for 1 piece test object ± 1200 grams, with amount *filler* is 7% replaceable use mixed *filler* waste ash husk rice and lime extinguished . For each use mixed *filler* made 2 pieces test object . On withdrawal this will is known values from heavy type *bulk*, Stability ,

Fatigue *(flow)*, cavity in mixed (VIM), cavity between aggregate (VMA), cavity filled asphalt (VFB) [5]. As for the results end from testing *marshall* use mixed *filler* waste ash husk rice and lime off as following :

Table 3. Test Results *Marshall*

Masa Curing	Karakteristik Campuran	Variasi *Filler* Campuran ABS + KP			Spesifikasi	Satuan
		60% ABS + 40% KP	70% ABS + 30% KP	80% ABS + 20% KP		
3 hari	Stabilitas	781,63	731,21	545,42	Min 300	Kg
	Flow	10,414	10,668	11,983	-	mm
	VIM	9,432	8,79	9,858	5 - 10	%
	VMA	78,274	78,351	78,045	-	%
	VFB	87,949	88,781	87,369	-	%
	Penyerapan	3,618	3,863	3,059	< 4	%
	Density	2,059	2,070	2,043	-	gr/cm³
7 hari	Stabilitas	832,06	714,4	478, 62	Min 300	Kg
	Flow	7,874	8,001	8,001	-	mm
	VIM	9,274	9,618	9,982	5 - 10	%
	VMA	77,940	78,150	78,013	-	%
	VFB	88,013	87,694	87,204	-	%
	Penyerapan	3,391	3,858	3,106	< 4	%
	Density	2,062	2,051	2,040	-	gr/cm³
11 hari	Stabilitas	1033,8	851,08	500,3	Min 300	Kg
	Flow	12,827	7,874	7,112	-	mm
	VIM	8,964	9,349	9,807	5 - 10	%
	VMA	78,384	78,219	78,056	-	%
	VFB	88,565	88,046	87,435	-	%
	Penyerapan	3,607	3,224	3,350	< 4	%
	Density	2,069	2,057	2,084	-	gr/cm³

Source : Analysis, 2022

3.3. Stability

Stability is the parameter of epiris for knowing ability pavement Street accept burden then cross without occur change form permanent like waves , grooves , and blending . Stability value influenced by several factors , including : gradation aggregate , grade asphalt , internal friction , particles aggregate , interlocking and power sticky asphalt , where? shape and texture surface aggregate used _ will effect on internal friction and interlocking. Stability value according to specification for type asphalt cold limited to a minimum of 300 kg [6]. Based on results testing obtained whole mixture Fulfill minimum specification requirements .

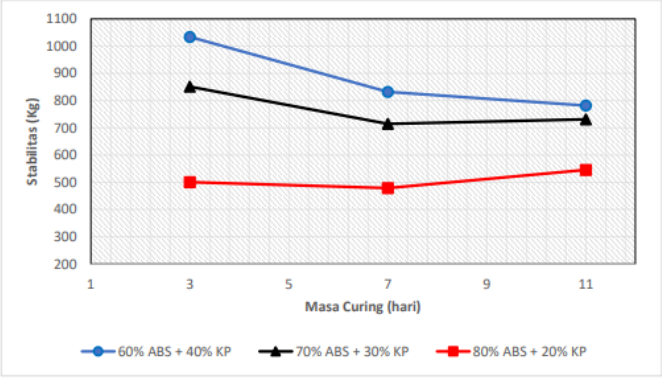

Figure 2. connection mixed *filler* with stability

3.4. Melt (flow)

Fatigue *(flow)* is an empirical parameter that is an indicator of a change form plastic mixture asphalt caused by the load . Melting rate mixture influenced by the rate asphalt in mixture , temperature , viscosity asphalt and shape particle aggregate . Low melting value _ make mixture Becomes stiff and vulnerable to crack .

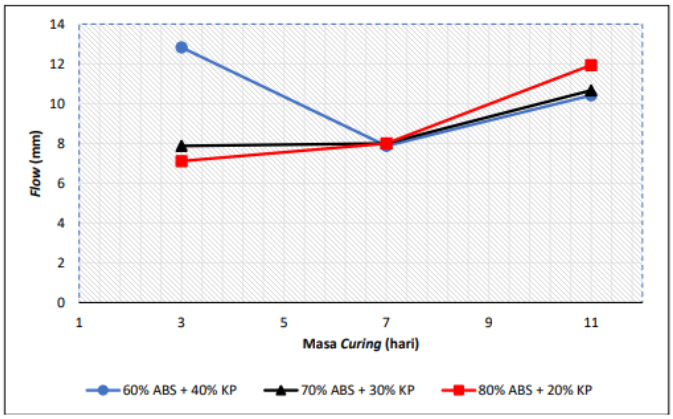

Figure 3. Chart Connection mixed *filler* with *Flow*

3.5. Cavity in Mixed (VIM)

Cavity in mixture pavement asphalt consist on room air between particle covered aggregate _ asphalt . VIM declared in percentage to asphalt volume solid , from results testing comparison ash *filler* husk rice and lime off obtained VIM value as following :

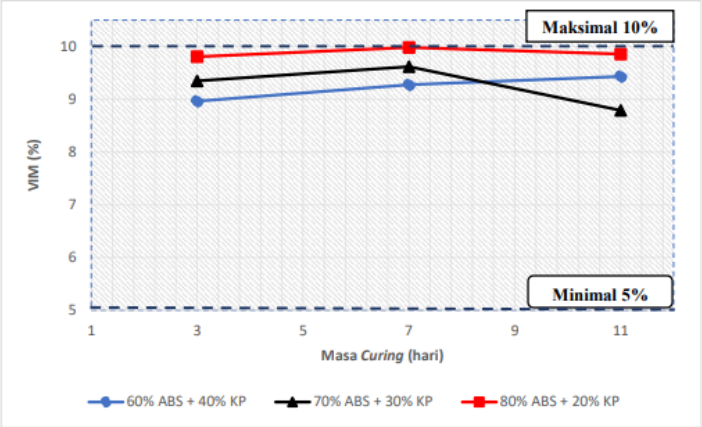

Figure 4. Graph of mixed *filler relationship with VIM*

3.6. Cavity in Aggregate (VMA)

Cavity between mineral aggregates (VMA) is cavity between particle aggregate on a pavement paved , including cavity air and asphalt volume effective (no including the volume of asphalt absorbed aggregate), from testing ash *filler* husk rice and lime off obtained VMA value as following :

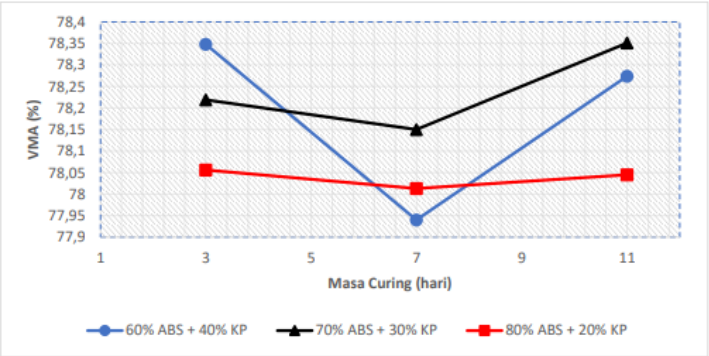

Figure 5. Chart connection mixed *filler* with VMA

3.7. Cavity Filled Asphalt

Cavity filled asphalt or *volume of voids filled with bitumen* is percent the cavity contained between particle aggregate (VMA) filled with asphalt , not including asphalt absorbed by the aggregate . Test results ash *filler* husk rice and camp off obtained FVB value as following :

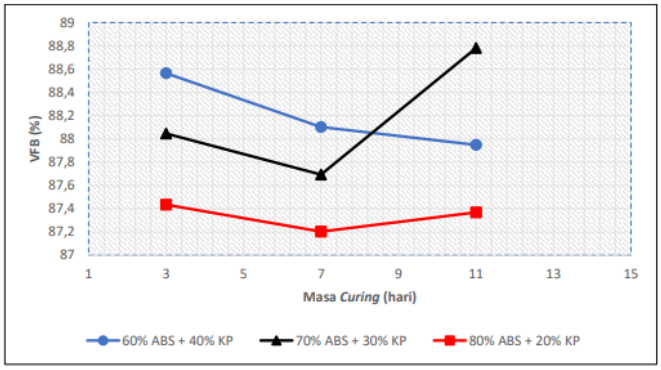

Figure 6. Graph of mixed *filler relationship with VFB*

3.8. Discussion of Research Results

The results of the test using a *filler* of rice husk ash and slaked lime on a mixture of asphalt emulsion type CRS-1 at the Civil Engineering Laboratory, University of PGRI Semarang are better than stone ash seen from the number of tests that meet the specifications.

4. Conclusion

From the research that has been done, it can be concluded that the use of *filler* mixture of rice husk ash and lime waste with the most optimum results at emulsion asphalt content of 6.93% CEBR type IV mixture, namely the composition of *filler* mixture of 60% rice husk ash waste and 40% extinguished lime with stability value is 1033.80 kg, melt/ *flow* is 12.827 mm, porosity/ *Void In Mix* (VIM) is 8.964%, voids between aggregate grains/ *Voids in Mineral Aggregate* (VMA) are 78.384%, air voids are filled with asphalt/ *Voids Filled with Bitumen* (VFB) of 88.565% for a *curing* period of 11 days.

Thank-you note

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