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USAGE COMPARATIVE ANALYSIS STUDY ASPHALT PEN 60/70 WITH ASPHALT RETONA BLEND 55 ON HOT ASPHALT MIXING WITH MIXING MATERIAL RECLAIMED ASPHALT PAVEMENT

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Abstract- *Use asphalt modification as one alternative. For increased quality structure, roads should be especially addressed for sections serving paths that are congested with ESAL (Equivalent Single Load Axle) or unit burden standards above 10 million per year. With the condition of the existing path, the part has experienced damage and needs great handling. Objective study This is known as optimal asphalt. Use asphalt retona blend 55 and asphalt pen 60/70 with mix RAP ingredients in the mixture of asphalt hot. Study This makes a mixed test object of asphalt hot use using asphalt modification retona blend 55 and asphalt pen 60/70 with mixing RAP (Reclaimed Asphalt Pavement) as material addition aggregate. Study This started with RAP testing, i.e., gradation and extraction. Then testing aggregate new next with make mixture paved hot use asphalt modification Retona Blend 55 and Pen 60/70 asphalt, aggregate new, and RAP From the results of the study with 2 compositions and different asphalts, the rate of optimum bitumen was 5.65% for composition 1 with the use of asphalt Retona. Blend 55 and level optimum bitumen at 5.9% for composition 2 with asphalt Pen 60/70. For composition 1, with the use of asphalt Retona Blend 55, the rate of optimum asphalt is 5.65%, and for the use of addition, the asphalt is more efficient and thriftier. because RAP still contains asphalt at 3.56%. So the rate of asphalt used for composition 1 becomes 5.65% minus 3.56% = 2.09%.*

Keywords : Asphalt, Asphalt Retona Blend 55, Aspal Pen 60/70, Asphalt Pavement.

INTRODUCTION

Along with the development of economics and technology, there has been a significant increase in public activities. This increase in public activities has also led to a rise in transportation needs. To ensure the smoothness of transportation activities, safe and comfortable facilities and infrastructure are crucial, in addition to the economic factors that serve as the foundation. In Indonesia, paved roads are an essential component of transportation infrastructure, although they have not fully reached a good condition or level of comfort. One common issue that arises is the presence of low-quality asphalt, which leads to a deteriorated or uncomfortable road surface.

Roads serve as vital infrastructure that plays a crucial role in the daily lives of individuals. With the existence of adequate road networks, the distribution of goods and services can be expedited, fulfilling the needs of road users. Reclaimed Asphalt Pavement (RAP) is a byproduct obtained from the removal of the surface layer of a road that is no longer in use. This is achieved through the process of dredging the pavement using asphalt rake tools (milling). The Reclaimed Asphalt Pavement (RAP) still contains asphalt content.

One alternative to improving the quality of road structures, especially for roads that serve heavy traffic, is the use of asphalt modification. This approach is particularly relevant for roads that are heavily congested and experience a high number of Equivalent Single Load axles (ESAL) or a standard burden unit exceeding 10 million per year (Bina Marga, 2010). By incorporating asphalt modification techniques, the quality and durability of the road can be enhanced, ensuring a smoother and more reliable transportation network.

Research process utilization This has a number of advantages, including the ability to reduce the need for new material aggregates, save energy, maintain geometric roads, and conserve source nature. Cycles reprocessed and supported with adequate equipment will produce material value mixes whose structure can offset the new mixes. With the condition of the existing path, now part has experienced damage and needs great handling. In implementation, besides a very high cost, insufficient material, requirements Technology cycle repeat is one alternative solution because it is effective and efficient. Use return (recycle) asphalt and aggregate. Aside from being economically beneficial, pavement also helps to conserve natural resources. (Suayarna, 2009) Method study This very potential can be applied to activities such as road repair and maintenance, specifically road urban, street district, street provinces, and road national development. Study This is more focused on the use of material scratch cold milling or RAP, considering economy and environment. Cycle technique: repeat construction of the road (pavement). Alone is processing and using return construction old pavement (existing), good with or without the extra 3 materials, for necessity maintenance, repair, or enhancement of construction pavement roads. Study using Reclaimed Asphalt Pavement as material addition aggregate with asphalt retona blend 55 and asphalt pen 60/70. In the problem above, the author makes an effort to make optimal use of RAP again, then does a study about "Study Analysis

Comparison: Use Asphalt Pen 60/70 with Asphalt Retona Blend 55 On Blend Asphalt Hot with Mixing Material for Reclaimed Asphalt Pavement (RAP)"

RESEARCH METHODS

In study This done method experiment with method do test in the laboratory For obtain desired composition /data. Objective from study This is For know rate optimal asphalt and value marshal's test object complied with standard Specification General Highways 2010 Test results. This is mark marshall. There are 2 types of data in study This is primary data and secondary data.

1. Primary data is data collected directly through a series of tests. This primary data is data on physical examination of RAP, physical examination of new aggregates, testing of hot asphalt mixture test objects using retona blend 55 asphalt and pen 60/70 asphalt.
2. Secondary data Secondary data is taken from the results of previous research or tests that are still related to the research. The secondary data of this research is the examination of the characteristics of retona blend 55 and pen 60/70 asphalt obtained from the Laboratory of the National Road Implementation Center for East Java - Bali.

Equipment used in research This is as following :

a. A set of analytical test tools filters and machines vibrator (sieve shaker).
b. A set of Los Angeles testing machines
c. One test set heavy type aggregate coarse and aggregate smooth .
d. A set of shaped molds cylinder with a diameter of 101.45 mm, height 80 mm complete with top plate and neck continued .
e. Tool pounder (compactor) that has shaped flat surface cylinder with weight 4.536 kg (10 lbs), height fall 45.7 cm (18") free.
f. A set of Marshall test kits .
g. One set of water baths.

Materials used in study This are :

a. Asphalt Asphalt used in study This is asphalt retona blend 55 and asphalt pen 60/70.
b. RAP (Reclaimed Asphalt Pavement) RAP used in study This taken from results dredging segment road Waru – Throughout – Krian .
c. Aggregate new Aggregate used originate from gresik. Aggregate This There is two type that is aggregate coarse and aggregate smooth .
d. Fillers are an aggregate mineral from fraction aggregate some smooth most (+ 85%) pass filter no. 200 (0.075mm). fillers used in study This is cement gresik type 1.

RESULTS AND DISCUSSIONS

Material testing in research This There is two result data type the test that is primary data results and secondary data results . The results of testing this primary data is inspection data physical RAP, Examination physique aggregate new , testing mixed test object asphalt hot with use asphalt retina blend 55 and pen 60/70. The results of primary data testing can be seen in the following table:

Table 1. Composition of RAP, Aggregate, Cement and Asphalt in Compositions 1 and 2 for Marshal Test Objects.

Material Type	%	4.6		5.1		5.6		6.1		6.6	
	camp	% camp	gram	% camp	gram	% camp	gram	% camp	gram	% camp	gram
RAP	28%	29.9	358.9	29.8	357.3	29.6	355.6	29.5	353.9	29.4	352.2
Agg. 5 - 10	40%	38.2	457.9	38.0	455.5	37.8	453.1	37.6	450.7	37.4	448.3
Agg. 0 - 5	30%	28.6	343.4	28.5	341.6	28.3	339.8	28.2	338.0	28.0	336.2
Cement	2%	1.9	22.9	1.9	22.8	1.9	22.7	1.9	22.5	1.9	22.4
Asphalt		1.4	16.8	1.9	22.8	2.4	28.8	2.9	34.8	3.4	40.8
Total	100.0%	100.0	1200.0	100.0	1200.0	100.0	1200.0	100.0	1200.0	100	1200.0

Making Marshal test object and refusal test object refer to to SNI 06-2489-1991 and Specifications General Highways 2010 as well results calculation viscosity asphalt so that Marshal test object and refusal test object are made in condition:

a. Aggregate heated at 190 °C for mixture with asphalt Retona Blend 55 and at 170 °C for mixture with asphalt Pen 60/70.
b. The RAP is heated to 160 °C.
c. Asphalt heated to temperature mixing 166 °C for asphalt Retona Blend 55 and 165 ° C for asphalt Pen 60/70.
d. Mixture Marshall specimens were solidified at 155 ° C for mixture with use asphalt Retona Blend 55 meanwhile for 49 mixes with use asphalt Pen 60-70 compacted at 135 °C with amount collision 75 times.
e. Mixture For Refusal / PRD (Percentage Refusal Density) specimens were solidified at 160 ° C for mixture use asphalt Retona Blend 55, meanwhile For mixture use asphalt Pen 60/70 compacted at 140 °C with use pounder with size 4 inches 400 times.

Whereas results secondary data testing study This is inspection data characteristics made two type composition that is composition 1 mix paved test object hot use asphalt Retona Blend 55 and Composition 2 mix paved test object hot use asphalt Pen 60/70.

Test Results of Composition Test Objects 1

Testing mixed test object paved hot This covers Marshall test , Stability remainder (Marshall yield immersion), and density refusal , in a manner detail can seen in the table and figure below.

Table 2. Test Results of Composition 1 Test Objects with Asphalt Retone Blend 55

No	Description	Composition Plan Asphalt Content 1					Condition
		4,6	5,1	5,6	6,1	6,6	
1	Void in Mix (VIM) (%)	8.04	6,86	4.04	3.64	1.64	Min. 3 and Max . 5
2	Void in Mineral Aggregate (VMA) (%)	20,33	20.30	18,91	19.57	18,91	Min. 15
3	Void in Filled Bitumen (VFB) (%)	60,47	66,23	78,62	81.42	91.35	Min. 65
4	Melting(Flow)(mm)	3,13	3,40	3.65	3.53	3.37	Min. 2 and Max . 4
5	Marshall Quotient (MQ)	403.5	372,3	344.3	373.8	361.4	Min. 300
6	Marshall Stabilization	1262.5	1262.5	1255.8	1320,1	1210.0	Min. 90
7	VIM PRD (Refusal) (%)	-	3.86	2.79	1.57	-	Min. 2

Test results test object composition 1 with use asphalt Retona Blend 55 is visible with increasing rate asphalt in mix :

1. Cavity value in mix / Void in Mix (VIM) drops , ie range between 8.04 to with 1.64.
2. Cavity value to Void in Mineral Aggregate (VMA) decreased , ie range between 20.33 to with 18.91.
3. Cavity value filled asphalt / Void in Filled Bitumen (VFB) goes up, ie range between 60.47 to with 91.35.
4. Melting values fluctuate from 3.13 up until with 3.65 then down until with 3.37.
5. The value of the Marshall Quotient is down from 403.5 to with 361.4.
6. Marshall stability value down from 1262.5 to with 1210.
7. Cavity value in mix / VIM on density decreased refusal from 3.86 to with 1.57.

From points _ on Then made graphic depicting rate filling asphalt every condition For determine Optimum Asphalt Level / Optimum Asphalt Level (KAO) such as picture under this:

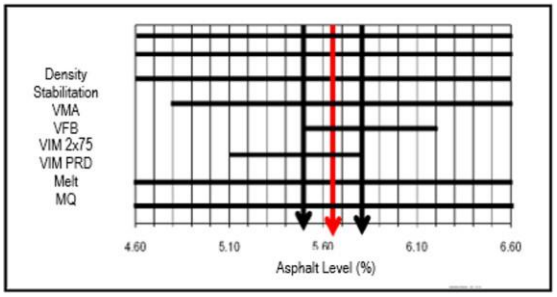


Figure 1. Determination of KAO Composition 1 with Asphalt Retona Blend 55

Picture above show that on range rate bitumen 5.5% to with 5.8% of its values fulfil whole requirements , so KAO was obtained in composition 1 with use asphalt Retona Blend 55 of 5.65%.

Results of Test Objects Composition 2

Testing mixed test object paved hot For these 2 compositions covers testing The same with testing test object composition 1 namely Marshall test , Stability remainder (Marshall yield immersion), and density refusal , in a manner detail can seen in Table and pictures below this:

Table 3. Test Results of Composition 2 Test Objects with Asphalt Pen 60/70

No	Description	Composition Plan Asphalt Content 1					Condition
		4,6	5,1	5,6	6,1	6,6	
1	Void in Mix (VIM) (%)	8.04	6,86	4.04	3.64	1.64	Min. 3 and Max . 5
2	Void in Mineral Aggregate (VMA) (%)	20,33	20.30	18,91	19.57	18,91	Min. 15
3	Void in Filled Bitumen (VFB) (%)	60,47	66,23	78,62	81.42	91.35	Min. 65
4	Melting(Flow)(mm)	3,13	3,40	3.65	3.53	3.37	Min. 2 and Max . 4
5	Marshall Quotient (MQ)	403.5	372,3	344.3	373.8	361.4	Min. 300
6	Marshall Stabilization	1262.5	1262.5	1255.8	1320,1	1210.0	Min. 90
7	VIM PRD (Refusal) (%)	-	3.86	2.79	1.57	-	Min. 2

Test results test object composition 2 with use asphalt Pen 60/70 visible with increasing rate asphalt in mix :

a. Cavity value in mix / Void in Mix (VIM) drops , ie range between 7.60 to with 3.52. 56
b. Cavity value to Void in Mineral Aggregate (VMA) decreased , ie range between 15.98 to with 16.59.
c. Cavity value filled asphalt / Void in Filled Bitumen (VFB) goes up, ie range between 52.44 to with 78.83.
d. Melting values fluctuate from 3.33 up until with 3.57 then down until with 3.37.
e. Marshall Quotient values also fluctuate from 304.4 then up until with 328.3 then down until with 293.5 and up again of 303.7.
f. Marshall stability values fluctuate from 1004.2 up to with 1105 then down until with 1016.7.
g. Cavity value in mix / VIM on density decreased refusal from 4.15 to with 1.78.

From points _ on Then made graphic depicting rate full asphalt every condition For determine the Optimum Asphalt Content (KAO) such as picture under this :

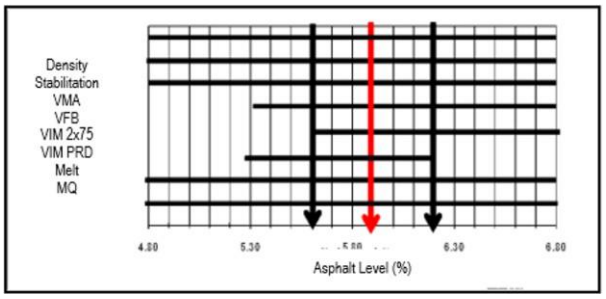


Figure 2. Determination of KAO Composition 2 with Asphalt Pen 60/70

Image on on show that on range rate bitumen 5.6% to with 6.2% of its values fulfil whole requirements , 60 so KAO was obtained in composition 2 with use asphalt Pen 60/70 by 5.9%.

Test Results

From the results of the marshall test and refusal test with 2 compositions with use different asphalt , then obtained enough results significant . In composition 1 with using 28% RAP, 40% aggregate medium coarse (5-10), 30% aggregate refined (0-5) and 2% cement with use asphalt Retona Blend 55 is obtained mark stability which Enough tall and full condition with the average value of each rate asphalt estimated minimum 2000 kg , whereas mark stability in composition 2 with use material mix 28% RAP, 40% aggregate medium coarse (5-10), 30% aggregate refined (0-5) and 2% cement with use asphalt Pen 60/70 obtained mark satisfactory average stability condition is rate asphalt estimated 4.6%, up with 6.6% with mark each of 1004.2 kg, 1012.5 kg, 1105.0 kg, 1041.5 kg and 1016.7 kg. With conclusion that composition 1 with use asphalt Retona Blend 55 grades its stability Enough tall compared to with composition 2 with use asphalt Pen 60/70 on the mix paved hot . In accordance with condition Specification General Highways 2010 for composition 1 uses asphalt Retona Blend 55, then rate filling asphalt all condition is rate asphalt estimation between 5.5% - 5.8%. While in composition 2 using asphalt Pen 60/70 content 61 asphalt satisfactory estimates all condition is rate asphalt estimation between 5.6% - 6.2%. From the results research with 2 compositions with different asphalt obtained rate optimum bitumen 5.65% for composition 1 with use asphalt Retona Blend 55 and levels optimum bitumen 5.9% for composition 2 with use Asphalt Pen 60/70 . For composition 1 with results rate optimum asphalt 5.65%, then For use addition the asphalt more efficient and thrifty Because in RAP still contain rate asphalt by 3.56%. So that rate asphalt used For composition 1 becomes 5.65% - 3.56% = 2.09%





Figure 3. Composition 1 test object Figure 4. Composition 2 test object

CONCLUSIONS

After doing test laboratory and analysis to results test the can concluded :

1. RAP gradation results for work mixture paved hot No enter in envelope gradation , then need addition aggregate new to get fulfil in limit envelope required gradation . because that , got composition addition aggregate new with each aggregate medium course 5-10 by 40%, aggregate refined 0-5 by 30% and cement by 2%. Whereas results RAP extraction yields mark rate asphalt by 3.56%. Secondary data results testing asphalt Retona Blend 55 delivers mark penetration 50 dmm , viscosity 745 centiStokes , period soft 54°C, ductility >140 cm, solubility in trichlor ethylene 99.299%, by weight type 1.051 weight lost after 0.299% TFOT, penetration after TFOT 92.667%, ductility after TFOT>140 cm which is strictly whole asphalt The Retona Blend 55 complied whole condition asphalt . Whereas For asphalt Pen 60/70 produces mark penetration 61 dmm , viscosity 475 centiStokes , period soft 50.1°C, ductility >140 cm, solubility in trichlor ethylene 99.81%, by weight kind of 1.037 weight lost after 0.018% TFOT, penetration after TFOT 96.721%, ductility after TFOT >140 cm, by whole asphalt Pen 60/70 meets condition Specification General

Highways 2010. Results of 64 tests aggregate new rough produce mark eternity to Na2SO4 2.06%, abrasion 25.88%, tackiness to asphalt > 95%, angularity 96.94/94.10, particles flat oval 3.71%, by weight type 2.614 as well absorption aggregate crude 2.149%. Whereas For aggregate fine new mark equivalent sand 79.15%, angularity 67.59%, weight 2.633 type and absorption aggregate refined 1.266%.

2. From the results research with 2 compositions with different asphalt obtained rate optimum bitumen 5.65% for composition 1 with use asphalt Retona Blend 55 can seen in Figure 4.22 and levels optimum bitumen 5.9% for composition 2 with use asphalt Pen 60/70.
3. Quality results mixed test object asphalt hot with use asphalt Retona Blend 55 and Pen asphalt 60/70 with mix the resulting RAP very significant . From the results testing marshall test for composition 1 with use asphalt Retona Blend 55 grades its stability taller than composition 2 with use asphalt Pen 60/70. However , 2 compositions the has fulfil all condition Specification General Highways 2010 .

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