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Research Article

The Use of Plastic Bags and Local Senoni Stone on the Marshall Characteristics and Durability of Asphalt Binder

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Abstract - *In Indonesia, the increasing of plastic waste from rice packaging is an environmental problem because it is difficult to decompose and is often burned, causing air pollution. In addition, East Kalimantan still import materials from other region such as Palu which causes higher construction costs. Therefore, innovation is needed to use of plastic bag waste as an additive and Senoni stone from Kutai Kartanegara as a coarse aggregate of asphalt mixture. by using AKAP PG asphalt. 70. AC-BC asphalt mixture is designed with asphalt variations to find Optimum Asphalt Content (OAC) of 4.5%, 5%, 5.5%, 6%, 6.5%, looking for Maximum Plastic Content (MPC) with plastic variations of 4%, 5%, 6%, 7%, and 8%. Then a variety of immersion was carried out for 2 days, 3 days, 4 days, 5 days and 6 days. Based on the results of the study, OAC = 5.7% with Marshall Stability characteristics of 1590 Kg, Flow = 3.6 mm, Marshall Quention (MQ) = 445 Kg/mm, Void In Mix (VIM) = 3.8%, Void Mineral Agregat (VMA) = 15.5%, Void Filled Aggregate (VFA) = 70.8%, Density = 2.32%, and Maximum Plastic Content (MPC) obtained of 6% compared to asphalt weight with Marshall characteristics of stability 1680 Kg, flow = 3.73 mm, MQ = 454.41 Kg/mm, VIM = 4.79%, VMA = 16.02%, VFA = 70.62%, and Density = 2.31 gr/cc. The soaking results were obtained on the 4 days with a Index Retained Strength (IRS) value of 91.04%. This shows that the use of Senoni stone and plastic bag waste in rice packaging can increase the stability value of asphalt mixtures and support the sustainable use of local materials.*

Keywords - *Asphalt Mixture, Senoni stone, Plastic bag, Marshall, IRS.*

I. INTRODUCTION

There are problems with the environment in indonesia, namely the increase in plastic waste in rice packaging is also a serious concern, plastic waste is waste that is difficult to decompose in nature and is often only burned, which actually causes air pollution. For plastic waste itself, according to data from the National Waste Management Information System (SIPSN) managed by the Ministry of Environment and Forestry in 2025, the total waste generation in Indonesia, which mostly comes from household and inorganic waste such as plastic, totals 5.9 million tons/year.

In the available data, out of 278 districts/cities, the figure is 20.3% with the second highest position of plastic waste after food waste, in East Kalimantan the amount of plastic waste is still high at 18.54%, showing a big challenge in managing East Kalimantan's plastic waste, including plastic bag of rice packaging. Therefore, environmentally friendly innovations are needed, one of which is by utilizing plastic waste as an additive in asphalt mixtures. Plastic is one of the worst offenders when it comes to environmental pollution (Appiah et al., 2017).

Environmental conditions and climate are two very important factors that affect the pliable asphalt pavement on roads. To address this environmental issue, different recycling techniques and many research studies on incorporating plastic waste into bitumen and asphalt mixtures have been developed (Angelone et al., 2016). Asphalt pavements are usually under the effects of continuous expansion and contraction from the continuous rise and fall of temperature. As a result, the asphalt pavement structure is subjected to critical stresses and strains that lead to cracks and defects. In recent times, plastic waste has become a problem in our society, due to its negative impact on our environment (Machsus et al., 2021).

Plastic is a synthetic material derived mainly from refined petroleum products of crude oil. Its high melting point, high decomposition temperature and resistance to ultra violet radiation provide many benefits, but also mean that waste plastic remains in the environment for hundreds of years (Guru et al. 2014). After decades of research, significant progress and achievements have been made in improving the performance of asphalt pavements using waste plastic, and notable results have also been achieved in practical engineering (La Macchia et al., 2024).

The second problem in Indonesia, especially East Kalimantan, is that road construction work still uses a lot of aggregates from outside the region, such as stones from Palu, so that construction costs increase due to high transportation costs. In fact, according to Fachriza Noor Abdi, Heri Sutanto, Elmo Dwi Prandaka (2019) this area has local materials such as Senoni stone from Kutai Kartanegara Regency which has strong and hard characteristics compared to other local stones, namely Besaung stone and Sambera stone so that it has the potential to be used as a rough aggregate of asphalted mixture to reduce development costs and optimize local resources.

This study uses Solid Natural Rubber Asphalt (AKAP) PG 70, which is type I asphalt modified with a mixture of solid natural rubber (SIR 20) so that it has more elastic properties and has met the 2024 Highway Specifications. The use of Senoni stone as a local coarse aggregate and the addition of rice plastic bag waste to the AC-BC mixture are expected to produce stronger, economical, and environmentally friendly pavement.

Since the 1900s, asphalt mixtures have begun to be used as road pavement materials. Asphalt pavements that receive repeated traffic loads and extreme environmental influences are prone to damage due to moisture and poor water drainage. This condition can reduce the bonding power between asphalt and aggregate so that the strength and service life of the pavement are reduced (Nadheer Albayati & Mohammed Qadir Ismael, 2025).

Therefore, Index Retained Strenght (IRS) testing was carried out to assess the resistance of the mixture to the influence of water. Based on the above problems, the researcher tried to conduct a study by analyzing the addition of plastic bag to Marshall characteristics and the durability of the AC-BC mixture using Senoni local stones. It is hoped that the results of this study can be one of the references in the use of plastic bag of rice packaging and local materials in the sustainable development of road infrastructure in East Kalimantan.

II. MATERIALS AND METHODS

This research was conducted at the Materials Laboratory, Department of Civil Engineering, Samarinda State Polytechnic with a research that was an analysis of the addition of plastic bag to Marshall characteristics and the durability of the AC-BC mixture. By using plastic bag of woven rice packaging and Senoni local stones, using modified asphalt AKAP PG. 70 with the 2024 General Specifications of Highways which is the basis for highway construction.

The plan of this study is to use full coarse aggregate from Senoni stone ash from the hammer and sand from the hammer using AKAP PG.70 asphalt with a variation of 4.5%, 5%, 5.5%, 6%, 6.5% of the added material of rice packaging plastic bag with variations of 4%, 5%, 6%, 7%, 8% with a soaking time of 2 days, 3 days, 4 days, 5 days, 6 days, and manufacture of test pieces for *Marshall testing.*

This study was carried out in stages, consisting of testing of asphalt materials of AKAP PG. 70, coarse aggregate, fine aggregate, *Marshall* testing and immersion variation testing (IRS). Testing of argegat includes specific gravity, abrasion testing with Los Angeles machinery and water absorption. While the method used as a mixture test is the *Marshall method* with its components, namely Stability, Void in Total Mix (VIM), Void Failed Asphalt (VFA), Void Mineral Aggregate (VMA), and then the Marshall Quotient.

A. Asphalt

Asphalt is a mixture of mineral aggregates and dark brown to black bitumen where the bitumen serves to bind the mineral aggregates obtained from natural lakes or through petroleum processing (Muzaffar Khan et al., 2013). Asphalt is the main material in flexible pavement which functions as an aggregate binder so that it forms a strong and stable pavement layer. As a material used in flexible pavement construction, asphalt accounts for a small proportion generally only 4%–10% of the total weight or 10%–15% of the total volume yet it is an expensive material (Istiar, Adi, & Sutikno, 2019).

Asphalt has thermoplastic properties, which are that it softens at high temperatures and hardens again when the temperature drops, so that it is able to adapt to changes in temperature and traffic loads. In this study, Solid Natural Rubber Asphalt (AKAP) PG 70 was used, which is a modified asphalt based on Type I asphalt with solid natural rubber added to improve elasticity, adhesion to aggregates, and resistance to permanent deformation. Based on the Performance Grade (PG) classification, PG 70 asphalt is able to maintain its performance and stability at pavement temperatures of up to 70°C, so it is effective for use on roads with high traffic volumes because it has good resistance to rutting and damage due to repeated loads.

B. Aggregate Senoni

Aggregates are a primary component of flexible highway pavements, constituting approximately 90% to 95% of the total weight of the hot mix asphalt (Adi et al., 2019). Asphalt mixture aggregates provide resistance to the majority of loads applied to the pavement; therefore, it is essential to evaluate the physical and mechanical properties of the aggregates (Cruz et al., 2022). There are several types of local stone in East Kalimantan, including Senoni stone, Besaung stone, and Sambera stone.

According to Fachriza Noor Abdi, Heri Sutanto, Elmo Dwi Prandaka (2019) Senoni stone is a local stone that comes from Kutai Kartanegara, Besaung stone has a cube and angular texture and Sambera stone has a flat and oval texture, One of the local materials used in this study is Senoni stone, utilized as coarse aggregate in the construction of asphalt pavement. based on abrasion results that Senoni stone is stronger than other local stones.

C. Rice Packaging Plastic Bag

Plastic is a material whose basic materials are carbon and hydrogen derived from petroleum and natural gas. One type of plastic is *polypropylene* or polypropene (PP). According to Adre (2005) in Wahyu Kartini (2007), *polypropylene* fiber comes from the monomer C_3H_6, which is a pure hydrocarbon whose basic material is commonly used in producing materials made of plastic. This material is in the form of filaments that when mixed in asphalt mixing the strands will decompose. According to Chandra Asri (2025) *polypropylene* is a thermoplastic linear hydrocarbon polymer resin that is slightly rigid and has resistance to chemicals, polypropylene plastic is thermoplastic like the properties of asphalt, which can soften if exposed to high temperatures and harden again at low temperatures, according to Dina (1999) in Setiawan (2013).

The advantages of this type of plastic waste are due to the properties of *polypropylene* materials (PP) which is able to improve the bonding strength, improve resistance to erosion, improve the durability of concrete asphalt so that plastic is suitable as an additive in asphalt mixtures. By 2026, PP production will reach up to 88 million metric tons. The melting point of *polypropylene* type plastic is at 160-168°C with a specific gravity of 0.9.

Figure 1. (a) Woven Rice Packaging (b) Non Woven Rice Packaging Plastic

According to Condifine (2026) As for the difference between *woven and non-woven polypropylene*, for the woven itself is a container designed to store and transport materials such as rice. These bags are produced by weaving thin strands of plastic polymers, with vertical and horizontal bands that are intertwined. This braid creates a sturdy structure so that it is durable. It performs well in air circulation, helping to prevent moisture and ensuring that stored contents are protected.

This circulation is particularly suitable for certain industries such as the agricultural sector. Furthermore, for non-woven it is usually cheaper and more flexible than woven PP bags. Its flexibility is due to the way it is manufactured, where non-woven PP bags, do not have seams like woven bags. Non-woven PP is made of multiple layers of material that has impressive stretchability. But these bags are not as strong as woven PP, with a lower overall tensile strength so they can only hold relatively light loads. It can be seen in the following figure 1:

However, there are several types of plastics, namely: HDPE (*High Density Polyrthylene*), LDPE (*Low Density Polyethylene*), PET or PETE (*Polyethylene Terephthalate*), PP (*Polypropylene*), PS (*Polystyrene*), PVC (*Polyviny Chloride*). The differences between these types of plastics can be seen in the following table 1:

Table 1. Type of Plastic

Plastic Material	Melting Point	Main Characteristics
HDPE (*High-Density Polyethlene*)	120°C-130°C	Strong and rigid, lightweight, not easy to absorb water.
LDPE (*Low Density Polyethylene)*	105°C-115°C	Soft, flexible, easy to form and process.
PET (*Polyethylene Terephthalate*)	250°C-260°C	Strong, clear, recyclable
PS (*Polystyrene*)	210°C-240°C	Fragile, inexpensive, malleable
PVC (*Polyviny Chloride*)	100°C-260°C	Durable, varies in flexibility

Source*: Artikel Europlas dan Hlc-Metalparts*

D. Index Retained Strength

Residual Marshall stability testing is used to determine the durability level of Marshall stability. Durability in asphalt pavement refers to the ability of the asphalt mixture to withstand asphalt aging, aggregate disintegration, stripping (the loss of the asphalt coating from the aggregate) due to weathering, and traffic loads (Asphalt Institute MS-2, 1997). Durability testing based on SNI M-58-1990 measures the durability of the mixture solely by assessing the effect of water immersion on its stability value. The pavement's durability level is determined by the Index of Retained Strength (IRS) value, which reflects the durability of the asphalt mixture following immersion.

Residual Marshall stability is determined by comparing the stability value obtained at 60°C with a 24-hour immersion period against the stability value obtained at 60°C with a 30-minute immersion period. Residual Marshall stability is a requirement for road pavement surface layers, ensuring the layer can withstand weather, water, temperature fluctuations, and wear caused by vehicle friction. The ratio of immersed stability to standard stability is expressed as a percentage (%), calculated using the following equation:

$$\text{IRS} = \left[\frac{MSi}{MSs}\right] x\ 100\%$$

Where:

IRS = Index RetainedStrength
MSi = Masrhall Stability after 24-hour immersion
MSs = Masrhall Stability after 30-minute immersion

E. Mixed Combination Method

The mixture design for this study involved preparing test specimens using 100% Senoni coarse aggregate across five predetermined asphalt content variations; three specimens were produced for each variation resulting in a total of 15 specimens with a compaction effort of 2 × 75 blows per specimen, followed by testing to determine Marshall parameters and the Optimum Asphalt Content (OAC).

After determining the Optimum Asphalt Content (KAO) for Senoni aggregate, the next step involves preparing test specimens using that established KAO, supplemented with plastic at varying percentages: 4%, 5%, 6%, 7%, and 8%. The plastic is incorporated by cutting it into small pieces measuring 0.5–1 cm. Three samples are prepared for each plastic addition level resulting in a total of 15 plastic-modified asphalt specimens with each specimen subjected to 75 blows on each side before undergoing Marshall testing. These test results will yield the maximum plastic content percentage alongside the previously determined Optimum Asphalt Content.

The next step is to prepare test specimens for the soaking variations, using the previously determined Maximum Plastic Sack (KPM) and KAO contents. The soaking periods are set at 2, 3, 4, 5, and 6 days; three specimens are prepared for each variation, resulting in a total of 15 specimens. Thus, the total number of samples prepared for this study was 45, comprising 15 specimens of KAO + Senoni stone, 15 specimens of KAO + Senoni stone + KPM, and 15 specimens for immersion variations. Each cylindrical test specimen weighed 1,200 grams, with dimensions of approximately 7 cm in height and 10 cm in diameter.

III. RESULTS AND DISCUSSION

In this study, the results of testing and data processing are described and continued with a discussion based on the requirements of the 2024 General Specification of Highways. The testing is carried out in stages, which consists of testing the material properties (asphalt, coarse aggregate and fine aggregate) and the manufacture of test specimens for Marshall testing.

After the test results data are obtained, further analysis is carried out to determine the Optimum Asphalt Content (OAC), then determine the percentage of Maximum Plastic Content (MPC), and determine the maximum immersion time of the Retained Strength Index (IRS) that meets the technical specification standards on the mixture *of Asphalt Concrete-Binder Course* with modified asphalt of the AKAP PG type. 70.

A. Material Testing

The initial stage is to test the materials that make up the asphalted mixture, namely coarse aggregate, fine aggregate, Asphalt PG. 70 asphalt, and *filler*, to determine the characteristics of these materials before the mixing process is carried out. Based on the test results in the asphalt testing laboratory, specific gravity, penetration, Ductility and Softening point values were obtained Softness and ductility meet the requirements of asphalt PG. 70. The results of the physical property tests on the asphalt are presented in Table 2 below.

Table 2. Result Testing of Asphalt Properties

Type of testing	Requirement	Result
Penetration, 25^{O}C	Reported	64
Softening point (^{O}C)	Min. 48	56
Ductility 25^{O}C (cm)	Min. 100	117
Specific Grafity	-	1.02

The results of testing the physical properties of coarse aggregate, fine aggregate and filler meet the requirements and can be seen on Table 3 below.

Table 3. Result Testing of Aggregate Properties

Type of Test	Requirement	Result
Coarse Aggregate ¾"		
Specific Grafity	Min. 2,5	2,6662
Absosption (%)	Maks. 3%	0,459
Abrasion (%)	Maks. 40%	23,76
Medium Aggregate 3/8"		
Specific Grafity	Min. 2,5	2,52

Absosption (%)	Maks. 3%	1,76
Abrasion (%)	Maks. 40%	31,28
Fine Aggregate		
Specific Grafity	Min. 2,5	2,61
Absosption (%)	Maks. 3%	1,73
Sand		
Specific Grafity	Min. 2,5	2,58
Absosption (%)	Maks. 3%	2,04

B. Marshall Test Using Senoni Stone

Once the aggregate composition and design asphalt content variations were determined, test specimen mixtures were prepared for each asphalt content level. Three samples were produced for each asphalt content variation, resulting in a total of 15 samples using Senoni stone. The test parameter results are presented in Table 4 below:

Table 4. Marshall Results for Optimum Asphalt Content

Marshall Characteristic	**Result**	**Specification**
Stability (Kg)	1590	Min 1000 Kg
Flow (mm)	3,6	2 – 4 mm
Void In Mix (VIM) (%)	3,8	3 – 5 %
Void Mineral Aggregate (VMA) (%)	15,5	Min 14 %
Void Filled Asphalt (VFA) (%)	70,8	Min 65 %
Marshall Quention (MQ) (Kg/mm)	445	Min 250 kg/mm
Optimum Asphalt Content (OAC) (%)	5,7	
Density gr/cc	2,32	

Based on Table 4, the optimum asphalt content obtained is 5.7%. After determining this Optimum Asphalt Content (OAC) of 5.7% from the previous testing, plastic rice bag were added to the asphalt mixture using the dry process method. Based on the Marshall test results obtained by fixing the asphalt content at the optimum level and using the predetermined plastic content variations, the Marshall parameter values shown in Table 5 were obtained.

Table 5. Marshall Stone Senoni with Plastic Additives

Characteristic of Marshall	**Grade Senoni stone with Plastic**					**Specification**	
	4%	5%	6%	7%	8%	Min.	Max.
Optimum Asphalt Content (OAC) (%)	5,7%					-	-
Stability (kg)	1427,58	1650,24	1680	1590,87	1543,55	1000	-
Flow (mm)	3,23	3,40	3,73	4,05	4,10	2	4
Void In Mix (VIM) (%)	4,27	4,51	4,79	5,19	5,29	3	5
Void Mineral Aggregate (VMA) (%)	15,60	15,82	16,02	16,41	16,50	14	-
Void Filled Asphalt (VFA) (%)	72,88	71,58	70,62	68,41	67,95	65	-
Marshall Quention (MQ) (kg/mm)	442,94	488,51	454,41	393,27	376,57	250	-
Density (gr/cc)	2,32	2,31	2,31	2,30	2,29	-	-
Information	Yes	Yes	Yes	No	No		

From the data obtained, the optimum plastic content is obtained by adding 6% plastic to the weight of asphalt, so that the mashall parameter data can be seen in the following table 6 below:

Table 6. Marshall Results for Optimum Plastic

Marshall	Result	Specification
Stability (kg)	1680	Min 1000 Kg
Flow (mm)	3,73	2 – 4 mm
Void In Mix (VIM) (%)	4,79	3 – 5 %
Void Mineral Aggregate (VMA) (%)	16,02	Min 14 %
Void Filled Asphalt (VFA) (%)	70,62	Min 65 %
Marshall Quention (MQ) (kg/mm)	454,41	Min 250 kg/mm
Optimum Asphalt Content (%)	5,7	
Plastic Optimum (%)	6	
Density (gr/cc)	2,31	

C. Asphalt Mixture Composition Using Senoni Stone and Plastic

After determining the Optimum Asphalt Content (OAC) of 5.7% and the Optimum Plastic Content of 6%, test specimens were prepared based on the resulting mixture composition; subsequently, sample weight measurements and Marshall tests were conducted, as shown in Table 7 below.

Table 7. Sample and Marshall Testing

Immersion	Plastic optimum (%)	Asphalt optimum (%)	Specimen	Weight of Specimen (gram)			Thick (mm)	Correct ion factor	Marshall test	
				Dry	In water	SSD			Stability (kg)	Flow (mm)
Day 2	6	5,7	1	1158	661	1163	64,60	0,973	1639,70	3,10
			2	1176	675	1177	65,00	0,963	1635,22	3,51
			3	1177	669	1181	64,20	0,983	1631,27	3,40
Day 3	6	5,7	1	1181	671	1184	64,10	0,985	1572,03	3,35
			2	1170	673	1175	65,13	0,959	1605,32	3,53
			3	1175	668	1178	64,20	0,983	1542,75	3,43
Day 4	6	5,7	1	1157,5	664	1162,5	65,40	0,953	1532,42	3,53
			2	1173,5	665	1176	65,20	0,958	1515,82	3,81
			3	1172	668	1175	64,90	0,965	1540,11	3,34
Day 5	6	5,7	1	1172	664	1174	65,11	0,960	1383,59	4,10
			2	1155	661	1159	64,88	0,966	1478,77	3,90
			3	1167,5	662	1170	65,25	0,957	1441,40	4,30
Day 6	6	5,7	1	1176	663	1179	64,43	0,977	1219,43	4,10
			2	1171	669	1175	65,51	0,975	1242,03	4,40
			3	1167	663	1170	65,19	0,958	1171,75	4,17

D. Results of Marshall Immersion Test on Stability

Mixture stability refers to the ability of the pavement layer to withstand loads without undergoing deformation, consistent with the design traffic load. The stability values for the AC-BC mixture incorporating

Senoni stone and 6% rice-packaging plastic sack additive at immersion periods of 2, 3, 4, 5, and 6 days are shown in the following figure.

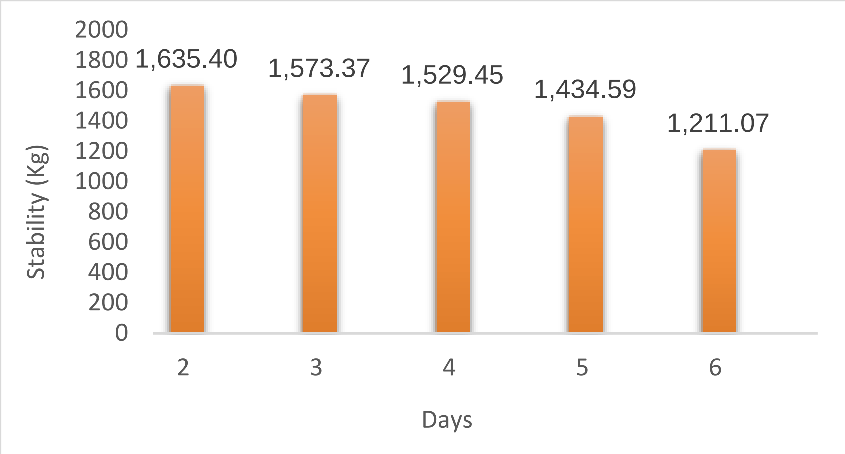

Figure 2. Relationship between Marshall Immersion and Stability

The figure above shows a red line representing the minimum stability threshold of 1,000 kg. Stability values fluctuated, with the lowest value recorded on day 6 (1,211.07 kg) and the highest on day 2 (1,635.40 kg). Following the immersion period, a decline in stability was observed; this reduction is attributed to the duration of immersion, which weakened the bond between the aggregate and the asphalt. Consequently, stability decreased. Low stability in asphalt mixtures makes them susceptible to rutting, as the pavement becomes soft and less capable of supporting loads. Nevertheless, the stability value of 1,211.07 kg recorded on day 6 still meets the minimum technical specification requirement of 1,000 kg.

E. Results of Marshall Immersion Test on Index Retained Strength (IRS)

The durability level of the pavement is determined by the Retained Strength Index (IRS), where the IRS value reflects the durability of the asphalt mixture after immersion. The results of the immersion test are presented in Table 8 below:

Table 8. Marshall Testing with Immersion

***Index Retained Strenght* (IRS)**				
Standard immersion		1680	kg	
Minimum requirements		90%		
Tes Specimen		**Stability**	**IRS**	**Average of IRS**
Days	**Sample**			
2	1	1639,70	97,60%	97,35
	2	1635,22	97,33%	
	3	1631,27	97,10%	
3	1	1572,03	93,57%	93,65
	2	1605,32	95,56%	
	3	1542,75	91,83%	
4	1	1532,42	91,22%	91,04
	2	1515,82	90,23%	
	3	1540,11	91,67%	

5	1	1383,59	82,36%	85,39
	2	1478,77	88,02%	
	3	1441,40	85,80%	
6	1	1219,43	72,59%	72,09
	2	1242,03	73,93%	
	3	1171,75	69,75%	

The IRS value of Asphalt mixture with Senoni stone and the added material of rice packaging plastic bag is 6% with a soaking time of day 2 days, 3 days, 4 days, 5 days and 6 days, respectively is 97.35%, 93.65%, 91.04%, 85.39%, 72.09%.

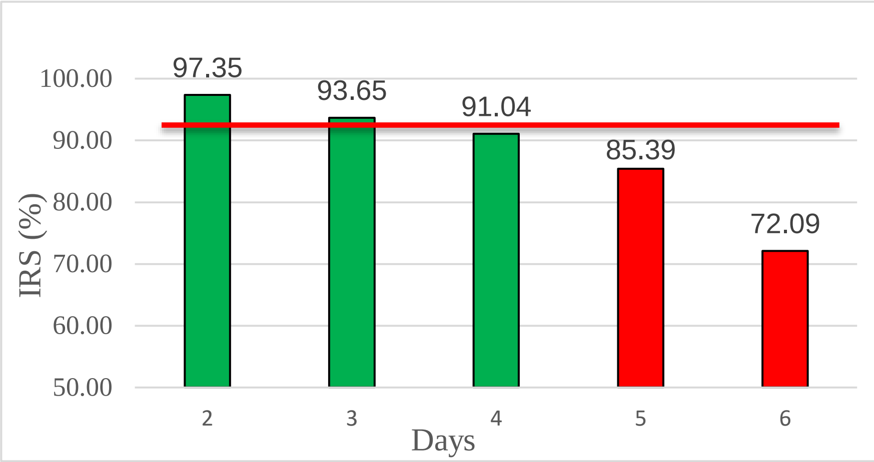

Figure 3. Relationship between Marshall Immersion with Index Retained Strength

Based on the graph above, the red line represents the minimum IRS threshold of 90%; green bars indicate compliance with specifications, whereas red bars do not meet the IRS requirements. The highest IRS value, 97.35%, was observed after two days of immersion, while the lowest value, 72.09%, was recorded after 6 days. For the 5 days and 6 days immersion variations, the IRS values failed to meet the 90% minimum requirement. The results shown in the graph also reflect the impact of immersion duration, which caused a reduction in the bond strength between the aggregate and the asphalt.

IV. CONCLUSION

After testing and analyzing the effect of immersion on the pavement of *the Asphalt Concrete-Binder Course* (AC-BC) with Senoni stone and plastic bag additives on *Marshall* characteristics and durability, the following conclusions were obtained:

1. Based on the results of the Asphalt Concrete-Binder Coarse mixture test, the results of the Optimum Asphalt Content were obtained with *a Masrhall value*, namely stability = 1590 Kg, *flow* = 3.6 mm, MQ = 445 Kg/mm, VIM = 3.8%, VMA = 15.5%, VFA = 70.8%, and Density = 2.32 gr/cc, all of which meet the requirements of the 2024 Bina Marga General Specifications.
2. The Maximum Plastic Content was obtained at 6% with a stability value = 1680 Kg, *flow* = 3.73 mm, MQ = 454.41 Kg/mm, VIM = 4.79%, VMA = 16.02%, VFA = 70.62%, and Density = 2.31gr/cc, all of which meet the requirements of the 2024 Bina Marga General Specification.
3. The *Retained Strength Index* (IRS) value was obtained on the 4th day of immersion with the IRS value still meeting the minimum requirements of the 2024 technical specification, which is 91.04%.

Based on the research findings, the use of the local Senoni stone material generally yields results that meet the requirements for road pavement applications; therefore, the utilization of this local material could be increased in the future to contribute to the construction sector, particularly in road infrastructure. Test results indicate that adding plastic to asphalt increases the stability value of the mixture.

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