Impact Of Fly Ash (Flyash) Fineness On Stability and Density Of Asphalt- Concerete (AC-WC)

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Abstract. In this study, the use of materials of stone dust (fly ash) as material substitution fine fraction on asphalt Concrete mix AC-WC to study the properties and Durabilitasnya.Beton Marshall asphalt is one type of flexible pavement pavement construction. This research focuses on the extent to which the influence of fineness Abu fly to Mix Concrete Asphalt -WC tehadap stability and density of the asphalt concrete mixture. and in the end it is hoped will fly coal ash that was once a waste material can be used as a substitution material fine fraction and alternative filler in road construction penilitan raya.kesimpulan obtained from analysis of the influence of the fineness of the stability and density of asphalt concrete campuaran AC-Wc are as follows stability: Value stability of the mixture in the review of fineness variation tends to increase from variations in levels of fly ash substitution occurs at the rate of 6% optimum zone 3 is equal to 1.435kg and at the level of 8% zone 3 decreased to 1.421kg.DensityValues Density (Bulk Density Standard) mix in the review of fineness variation tends to increase. variations in levels of fly ash substitution occurs at the rate of 8% optimum zone 3 is equal to 2,421kg / cc. Some Suggestions can be submitted to refine the results Research the performance of asphalt concrete (AC-WC) by using substitution fineness and content of fly ash that is: a). For further research in order to analyze the use of the optimum bitumen content of the usage levels of substitution optimum fly ash because of the greater use of ash Marshall then fly parameter values tend to be less than optimal. B) It is advisable to combine other types of materials substitution with fly ash material to obtain results that are more economical. keywords: analysis of effect of fly ash fineness (flyash) on stability and density mixed concrete asphalt (ac-wc)

1. Background

Since 1995 Highways has perfected the concept of hot asphalt mix specification together with the Center for Street. In the new specification introduced hot asphalt mix design with the approach of absolute density. Absolute density is the mass per unit volume including the cavity test sample that is compacted to achieve the highest achieved so that the mixture can not be practically become denser. This is in accordance with the test method specified in "Planning Guidelines Hot Asphalt Mixture Density Absolute Approach"Asphalt Concrete is one type ofpavement flexible pavement construction. The asphalt concrete mixture consisting of coarse aggregate, fine aggregate, filler and using asphalt as pegikat material. *Filler* commonly referred to as a filler material can be obtained from the breakdown of natural and artificial rocks. *Filler* commonly used type of *filler* ash (dust) this research batu.pada *filler* in question is coal fly ash, as a result of coal combustion at Bukit Asam power plant, Tanjung Enim in South Sumatra, Abu fly coal is fine particles which are precipitated of pile burning coal powder was collected by means of electrostatic presipirator. Coal fly ash included in category one waste industry that has a very high potential for use in highway construction. Coal fly ash can be used as a mineral filler for a very fine particle size, and of some of the literature supporting a research done previously, coal fly ash contains elements of *pozzolan*,so it can function as a filler and binder asphalt cavity beton.Berdasarkan observations that have been made in Bukit Asam power plant, Tanjung Enim in South Sumatra, the total production of coal fly ash as a result of burning coal, reaching 10 -15 tons per day. Such coal fly ash significantly untapped and just be waste from the area around the plant. Therefore, it was attempted conduct an experimental study on the use of coal fly ash as filler in asphalt

concrete mixture. This research focuses on the extent to which the influence of fineness Abu fly to Mix Concrete Asphalt tehadap stability and density of the asphalt concrete mixture. and in the end it is hoped will fly coal ash that was once a waste material can be used as a substitution material fine fraction and *filler* alternativein road construction.

1.1 The Problem Formulation

Here'sis a problem that needs to be formulated by the author on the terms of the above background that is:

1. How does the fineness of fly ash *(flyash expower* Bukit Asamplant)toward stability and the density of Asphalt Mix Concrete (AC-WC).
2. How much influence the use of fly ash as a percentage of the fine fraction substitution of asphalt concrete (AC-WC) to obtain the optimum percentage of fly ash.

1.2 Limitation Problem

In this study, the materials used are as follows:

1. Aggregate coarse and stone dust derived from crushed stone results stone crushers *(stone crusher)* from the district Lahat
2. Material substitution fine fraction is used fly ash from the burning of Bukit Asam power plant Tanjung Enim regency Muaraenim
3. Aggregate fine (sand times) using sand Tanjung Raja
4. For bituminous materials usingasphalt Pertaminawith penetration 60/70.
5. Researchers made the test object based on variations in the fineness of Abu fly is Normal without fly ash, Zone 0, Zone 1, Zone 2 and Zone 3
6. Levels of substitution of the fine fraction being used by 4%, 6% and 8%
7. Mixing using the specifications issued by the Ministry of Public Works, in "Manual Work Hot asphalt mixture", DGH 2010 revision 3.

1.3 The Purpose and Objective Study

Of thepurpose and goal of this research is to determine how much influence the fineness of the fly ash to concrete asphalt mix in terms of stability and density of asphalt concrete mixtures

1.4 Benefit Research

With the existence of this study, is expected to provide insight and add insight about the effect of fineness of fly ash as an alternative material substitution fine fraction in the asphalt concrete (AC-WC), in particular the nature of *Marshall (Marshall* stability, *Marshall* remainder after soaking 60^0C for 24 hours and the density of the mixture is shown by the *bulk density standard.*

2. Literature Library

2.1 Concrete Asphalt

ConcreteAsphalt is one type of flexible pavement pavement construction. Lists different types of pavement type mixture evenly between aggregates and bitumen as a binder at a certain temperature. Construction of flexible pavement consists of strata are placed over the compacted subgrade. The strata serve to receive traffic load and pass it to the layer below. The composition of the layers of flexible pavement construction consists of (Silvia Sukirman, 1999):

a. The surface layer *(surface course)*
b. Upper base course *(base course)*
c. Lapis subbase *(subbasecourse)*
d. Layers of foundation soil *(subgrade)*

2.2 Mix Concrete Asphalt (AC WC)

Bitumen is a mixture of hydrocarbons derived from nature or from a pamanasan, or derived from these two processes can be gaseous, liquid, semi-solid or solid, and the mixture soluble karbondisulfida. The asphalt used in road construction has important physical properties such as: resistance to weathering due to the weather, the degree of hardening, and endurance influence of water.

2.3 Aggregates

Aggregates are particles - particles of mineral grains that are used in combination with various types of adhesives form a mass of concrete or as a road base material. Quarry aggregates qualities produced, depending on the type of asphalt assistance. There are 3 types of rocks are igneous origin, an igneous rock formed from cooling magma frozen liquid. Coarse grained igneous rock formed from molten magma that solidifies slowly. Such fine grained igneous rock formed by cooling faster and layered. Sedimentary rock formed from mineral deposits and sediment compaction chemically and seabed. Some types ofrocks *sedimentary* with a composition contained: limestone *(calciumcarbonate)* dolomite *(calciumcarbonate and magnesium* carbonate) flakes of clay *(clay), sandstone (Quartyz)* gysum *(calcium sulphate),*

Aggregates are used in the manufacture of asphalt concrete, generally have requirements on its properties include: set of items*(gradation)*resistance to friction / eternity *(soundness),* purity and cleanliness *(Cleanliness)* internal friction and the nature of a surface*(surfacetexture),* while group-based aggregates will be more specific according to its kind whether coarse aggregate, fine or *filler* physical properties and mechanical aggregates and their relation to the performance of a mix including aggregate coarse aggregate coarse is aggregate with grain size more of the sieve no. 8 (= 2.36 mm). Agregat rough for asphalt concrete. Fine aggregate is aggregate with a finer grain size of sieve No. 8 (2.36 mm) of fine aggregate for asphalt concrete.

2.4 Fillers

stone dust*(stonedust)* and filler added must be dry and free of lumps and when tested by filtering according to SNI 03-4142-1996 must contain ingredients that pass the filter 200 (75 *micron)*not less than 75% of which escapes sieve No. 30 (600 micron)

2.5 Definition Abu Fly (Fly Ash)

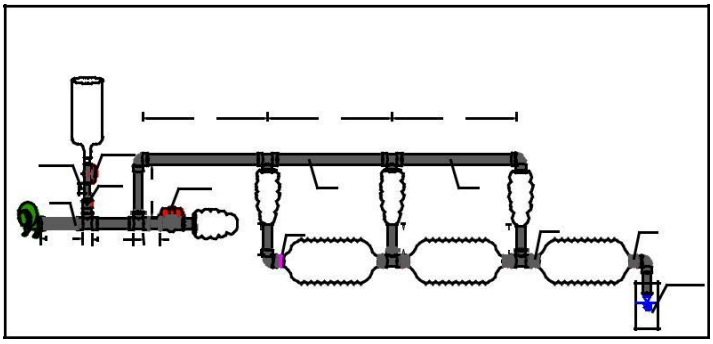
According to SNI 03-6414-2002 defines pengertianabu coal fly is the result of coal combustion waste in furnaces of steam power plants in the form of smooth, round and are pozolanik. is a material that has a grain size that is smooth, grayish and derived from the combustion fly ash batubara.Pada core containing chemical elements include silica (SiO2), alumina (Al2O 3),ferrous oxide (Fe2O3)and calcium oxide (CaO), also mengandungunsur other extras that magnesium oxide (MgO), titanium oxide (TiO2),alkaline (Na2 O and K2O), sulfur trioxide (SO3),phosphorus oxide (P2O5)and Carbon (Anonymous, 2008). The use of coal fly ash as a substitute for the fine fraction and *Filler* replacement Abu Cement coal fly (Ex Bukit Asam power plant Tanjung Enim - SUMSEL). Abu coal fly an inorganic material from coal combustion and is formed of mineral material changes due to the combustion process. In the combustion of coal in power plants which are formed two types of ash coal fly ash (fly ash) and bottom ash (bottom ash). Particles of ash carried by the flue gas called coal fly ash, while the remaining ash and removed from the bottom of the furnace is called bottom ash. Partly molten ash bottom ash called slag (slag). Coal fly ash to be used in this research is coal fly ash waste from the power plant Tanjung Enim -Sumsel Bukit Asam. Intake of coal fly ash is done in one location, namely making Hopper. Hopper is a cone-shaped building that serves to accommodate the fly ash coal (size of particles is rather subtle) captured by means of Electrostatic Presipirator before input into the shelter of coal fly ash. In this study were reviewed and analyzed is the issue fineness fraction of coal fly ash by dividing the fineness into

a. Zone 0
   (Z0) of the original fly ash material taken from Bukit Asam power plant in dilkakukan Without separation with blowers.
b. Zone 1
   fly ash material taken from a distance of 50cm from the separator Blower
c. Zone 2
   Abu terbang material taken from a distance of 200 cm from the separator blowers
d. Zone 3
   fly ash material taken from a distance of 350 cm from the separator Blower

3. Research Methods

The method used in this study are experimental methods that do the testing laboratory Road Implementing Agency (BBPJN) V National South Sumatra and Asphalt Laboratory PT.Sumber Sarana Utama Research Sites this study begins with an examination of the characteristics of the material burning coal ash waste from Bukit Asam power plant. Personality characteristics of some samples of the materials will be decisive parameter in the object properties testing Briquettes Test Asphalt AC-WC to be carried out at the Laboratory Testing Laboratory Road Implementing Agency (BBPJN) V South Sumatra and Asphalt Laboratory PT.Sumber Sarana Utama Enim and filtering by means of filter fineness (Eden and Ishak Yunus, 2015).

SET-UP SCREENING FLY ASH



Bak Control Materials and Equipment Materials used in this study include:

1. Abu fly from waste incineration coal power plantBukit Asam
2. flyAbu done separator apparatus and is divided into four zones based on the fineness of the fly ash each zone 0, zona1
3. agr EGAT smoothfrom Tanjung Raja
4. Coarse aggregateorigin Lahat
5. hard asphalt Pen 60/70

The tools used in this study include:

a. Sieve sieve 25 mm, 19 mm, 9.5 mm, 4.75 mm, 2.36 mm, 1, 18 mm, No. 30, No. 50, No. 100
b. Tools filter fineness of fly ash (Modified result of previous studies, (Paradise and Ishak yunus, 2015)
c. Oven, which is used to dry the sample in the examination of materials - materials that will be used in the concrete mix.
d. Scales, to determine the weight of the material
   - material preparation of Asphalt
e. measuring cup to measure water volume, density and examine the levels Lumpursand
f. test machine press *Marshall* with a capacity of 22.2 KN (= 5000 lbf) and *flowmeter*
g. Tools to make asphalt samples include: Mold (mold) and automatic pounder
h. Oven, used to dry the sample in the inspection of the materials to be used in asphalt mixtures
i. Water Bath (Bath marinade asphalt)

3.1 research Procedure

research procedure is divided into three main stages partially follows:

examination of the Properties of fly ash material that will be in use in this study was taken from the location Power Plant Tanjung acid hills From the above filtering material will be in for menjai 4 Zones each ma sing Zone 0 (Code F1 = no filtering), Zone 1 (F2), Zone 2 (F3) and Zone 3 (F4). In preparation of the specimen, there are some things that need to be considered include:

a. The number of test specimens were prepared.
b. Preparation of aggregate to be used.
c. Determination of mixing and compaction temperatures.

d. Preparation of asphalt with fly ash
e. compaction test specimen.
f. Preparations for thetest. *Marshall*

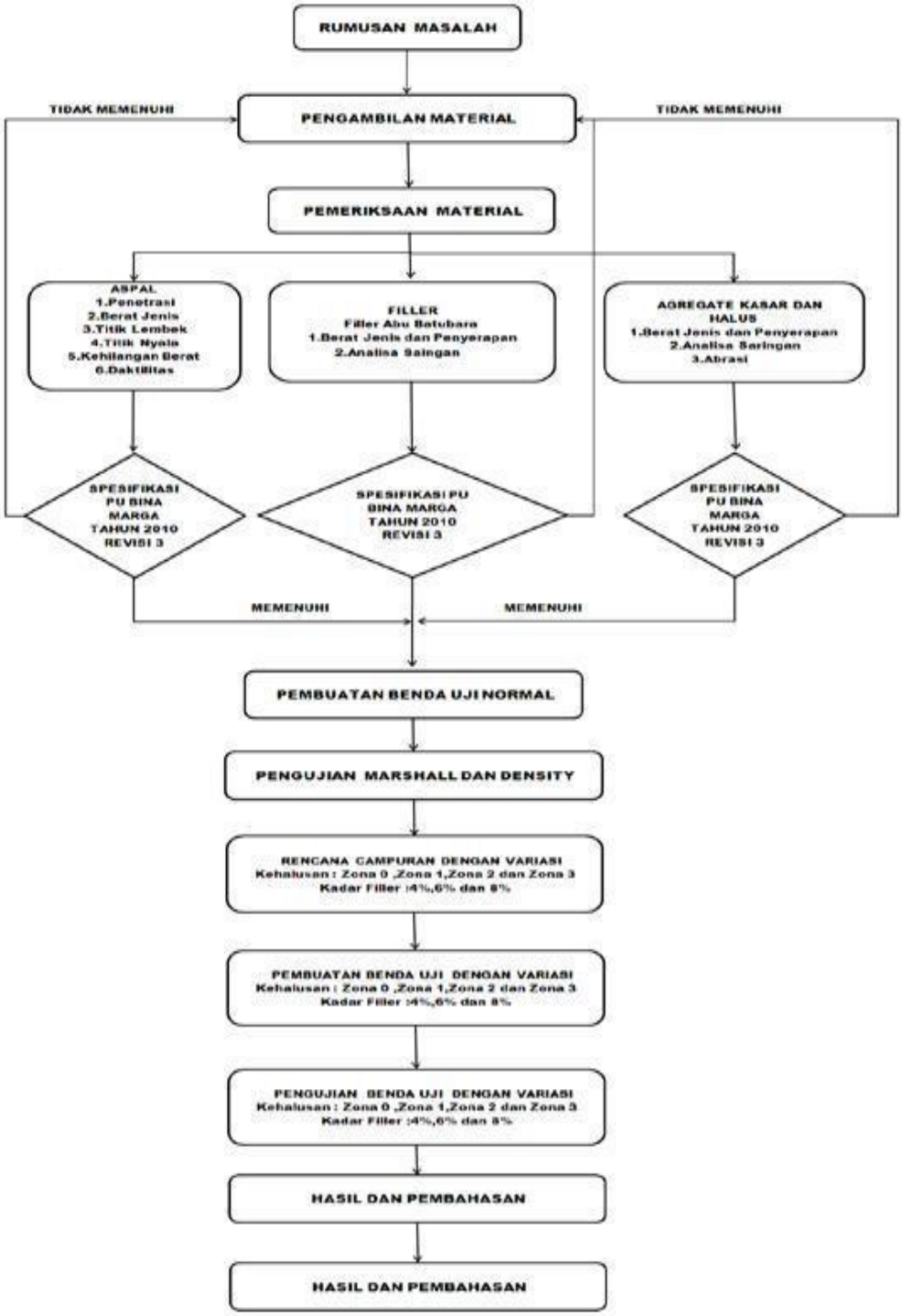


Table 1. The number of samples (briquette) which will be made

Smoothness Flyash	Percentage of Filler	Total Specimens	TOTAL (fruit)
NORMAL	0%	7	7
F1	4%	7	21

	6%	7	
(zone 0)			
	8%	7	
F2	4%	7	21
	6%	7	
(zone 1)			
	8%	7	
F3	4%	7	21
	6%	7	
(zone 2)			
	8%	7	
F4	4%	7	21
	6%	7	
(zone 3)			
	8%	7	

Based on the objectives and the formulation of the problem of this research, the test results will be the value of the parameter mix asphalt concrete, while the parameters to be analyzed are:

- Density Mix Asphalt concrete
  for the tests performed with two (2) types of collisions is by Density Standard (75 x 2 collisions)
- Marshall Stability
  Stability is the ability pavement receives the traffic load without changing its form remains (permanent deformation) like waves, grooves *(rutting),*and mengalamibleeding. Value dipengaroleh cohesion stability of asphalt, bitumen content, friction *(internal*friction),the nature of the interlocking *(interlocking)* of the particles - particles aggregate, shape and surface texture as well as the aggregate,to limit the specification of Public Works Highways 2010 Revision 3 value ofStability *Marshall* is a minimum of 800kg

4. Results and Discussion

In this chapter will discuss the results of testing of the building blocks of Asphalt Concrete AC-WC, the process of making objects Test (briquette) and Marshall tests carried out at the testing laboratory of the National Road Implementing Agency PT.Sumber asphalt V and laboratory Sarana Utama .In this study using a mixture experiment gradation*(cold*bin) :

1. From the test results 60/70 PEN bitumen material can be concluded that the value of penetration in the test at a temperature of 25 ° C, 100 g, 5 seconds; 0.1 mm penetration values obtained 64.34 means that the value meets the specifications are 60-79. intests in the softening point to the value of 50.4 ° C meets the existing requirements that the value of 48-58 ° C, testing ductility values in the can is equal to the minimum limit set 140cm is 100cm, the specific gravity test results obtained amounted to 1.063 penguijan meet the value of the specification that is at least 1 kg / $cm^{3,}$ a weight-premises testing sedangan TFOT test (Thin Film Over test) the value of the difference between the value before and after heating penetration is an average value of 0.3%, according to SNI 06-2440- 2011 is the max value of 0.8% to meet the specification value.
2. Nilai gravity specific average is equal to 2,539, gravity specific dry surface saturated 2584, apparent specific gravity 2,659 with aggregate absorption of 1,772% to meet specifications PU Highways 2010 Revision 3

3. Density obtained at 2:50 and meet the minimum specifications, value of saturated surface dry density and apparent specific gravity is 2,564 and 2,672, while the value of absorption was 2.575% this result meets specifications.

4.1 Mixed Design AC-WC

From the test results are agregte coarse material, fine aggregate, stone dust, fly ash and hard asphalt komposis comparison can be concluded as follows:

A. A mixture 1.Komposisi AC-WC for the objects of the specimen following AC-WC Normal results campuaran asphalt composition calculation analysis Ac-wc as follows: composition of asphalt mixture AC-WC Normal From the results of calculations for a specimen in the Normal AC-wc can mix asphalt composition of Ac-wc as follows: 1/1 of 47.00% stone, stone dust amounting to 37.60%, the sand at 7:52%, Filler by 1.88% and Optimum bitumen content of 6%.
B. Mixed 2.Komposisi AC-WC for one specimen with fly ash substitution Zone 0. 4% .Here campuaran asphalt composition analysis results Ac-wc as follows: Composition of Asphalt AC-WC mixture of fly ash as much as 4% Zone 0, From the calculation for one specimen AC-wc with stone dust Zone 0 as much as 4% in the composition of the asphalt mixture can Ac-wc as follows: 1/1 stone by 47.00%, amounting to 35.48% of stone dust, sand for 7:52%, fly ash at 4:00% and Optimum asphalt content by 6:00%.
C. Mixed 3.Komposisi AC-WC for one specimen with fly ash substitution Zone 0. 6%, following the results of the analysis of the composition of Ac-wc campuaran asphalt as follows: Composition of Asphalt AC-WC mixture of fly ash Zone 0 as much as 6%, Composition of Asphalt Mixture AC-WC Zone 0 the fly ash as much as 6% in the composition of the asphalt mixture can Ac-wc as follows: 1/1 stone by 47.00%, amounting to 33.48% of stone dust, sand for 7:52%, fly ash at 6:00% and Optimum bitumen content of 6:00%.
D. Mixed 4.Komposisi AC-WC for one specimen with fly ash substitution Zone 0 of 8%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as follows: Composition of Asphalt AC-WC mixture of fly ash Zone 0 for 8%, From the calculation for one specimen composition asphalt AC-WC mixture of fly ash Zone 0 for 8% as follows: 1/1 stone by 47.00%, amounting to 31.48% of stone dust, sand for 7:52%, fly ash at 8:00% and Optimum bitumen content amounted 6:00 %.
E. Mixed 5.Komposisi AC-WC for one specimen with fly ash substitution Zone 1 by 4%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as follows: Composition of Asphalt AC-WC mixture of fly ash Zone 1 as much as 4%, From the calculation to the test object asphalt AC-WC mixture of fly ash Zone 1 as much as 4% AC-wc as follows: 1/1 stone by 47.00%, amounting to 35.48% of stone dust, sand for 7:52%, fly ash at 4:00% and Optimum bitumen content at 6:00%.
F. Mixed 6.Komposisi AC-WC for one specimen with fly ash substitution Zone 1 at 6%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as follows: Composition of Asphalt AC-WC mixture of fly ash Zone 1 6% From the calculation for an asphalt mixture specimen conditioned fly ash WC Zone 1 as much as 6% as follows: 1/1 stone by 47.00%, amounting to 33.48% of stone dust, sand for 7:52%, fly ash at 6:00% and Optimum bitumen content for 6:00%.
G. Mixed 7.Komposisi AC-WC for one specimen with fly ash substitution Zone 1 by 8%, following the results of the analysis of the composition of Ac-wc campuaran asphalt as follows: Composition of Asphalt AC-WC mixture of fly ash Zone 1 as much as 8% From the calculation for an asphalt mixture specimen conditioned fly ash WC Zone 1 as much as 8% as follows: 1/1 stone by 47.00%, amounting to 31.48% of stone dust, sand for 7:52%, fly ash at 8:00% and Optimum bitumen content for 6:00%.
H. Mixed 8.Komposisi AC-WC for one specimen with fly ash substitution Zone 2 by 4%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as

follows: Composition of Asphalt AC-WC mixture of fly ash in Zone 2 by 4% .From the calculation results to the test object asphalt AC-WC mixture of fly ash in Zone 2 by 4% AC-wc as follows: 1/1 stone by 47.00%, amounting to 35.48% of stone dust, sand for 7:52%, fly ash at 4:00% and Optimum bitumen content at 6:00%.

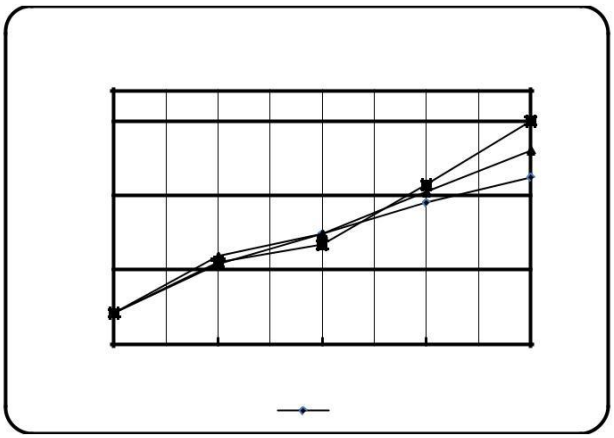
I. Mixed 9.Komposisi AC-WC for one specimen with fly ash substitution Zone 2 by 6%, following the results of the analysis of the composition of the asphalt campuaran Ac-wc following composition Asphalt AC-WC mixture of fly ash as much as 6% in Zone 2, The calculation for an asphalt mixture specimen conditioned fly ash WC Zone 2 as much as 6% as follows: 1/1 stone by 47.00%, amounting to 33.48% of stone dust, sand for 7:52%, fly ash at 6:00% and Optimum bitumen content for 6:00%.
J. Composition of Mixed AC-WC for one specimen with fly ash substitution Zone 2 by 8%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as follows: Composition of Asphalt AC-WC mixture of fly ash as much as 8% in Zone 2, From the calculation to the test object asphalt AC-WC mixture of fly ash as much as 8% in Zone 2 as follows: 1/1 stone by 47.00%, amounting to 31.48% of stone dust, sand for 7:52%, fly ash at 8:00% and Optimum asphalt content by 6:00%.
K. The composition of the mixture AC-WC for one specimen with fly ash substitution Zone 3 by 4%, following the results of the analysis of the composition of Ac-wc campuaran asphalt as follows: Composition of Asphalt Mixture AC-WC 3 Zones fly ash as much as 4% From the calculation for an asphalt mixture specimen conditioned fly ash WC Zone 3 by 4% AC-wc as follows: 1/1 stone by 47.00%, amounting to 35.48% of stone dust, sand for 7:52%, fly ash at 4:00% and Optimum bitumen content of 6:00%.
L. The composition of the mixture AC-WC for one specimen with fly ash substitution Zone 3 by 6%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as follows: Composition of Asphalt Mixture AC-WC 3 Zones fly ash as much as 6%, From the calculation for one specimen Mix asphalt AC-WC 3 Zones fly ash as much as 6% as follows: 1/1 stone by 47.00%, amounting to 33.48% of stone dust, sand for 7:52%, fly ash at 6:00% and Optimum asphalt content by 6:00%.
M. Composition of Mixed AC-WC for one specimen with fly ash substitution Zone 3 by 8%, following the results of the analysis of the composition of the asphalt campuaran Ac -Wc as follows: Composition of Asphalt AC-WC mixture of fly ash Zone 3 by 8%, from the results calculation for a single specimen AC-WC asphalt mixture of fly ash Zone 3 as much as 8% as follows: 1/1 stone by 47.00%, amounting to 31.48% of stone dust, sand for 7:52%, fly ash at 8:00% and Optimum bitumen content amounted 6:00 %.

Analysis Results Test results Mix Asphalt Concrete by properties marshall, Based on the above test result can be analyzed parameters marshall namely:

4.2 Density Mix Asphalt Concrete

For the tests performed with two (2) types of collisions is by Density Standard (75 x 2 collision) and the density of Refusal (400 x2 collision) while the test results can jelsakan in the following table:

Comparison of variations in fineness and percentage of fly ash on the Bulk Density Standard (75x2collision)

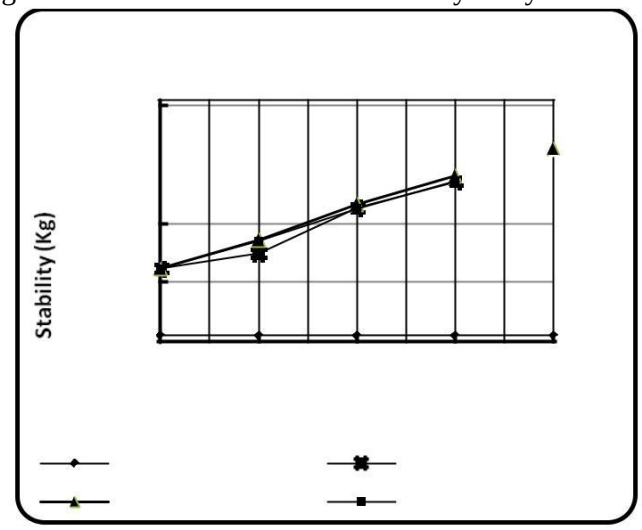


Graph Relations Zone, the percentage of fly ash and the results of Bulk Density Standard. From the table and graph can be concluded ditas Bulk density standard value in the asphalt mixture Ac-normal Wc is equal to 2.310 g / cc, the percentage of fly ash 4 % Bulk density value standard in bandingakan the normal mix has increased every variation of subtlety to the maximum value ie 2,398 g / cc, the percentage of fly ash 6% of the value of bulk density standards in bandingakan on a mixture of normal increase every variation of subtlety to the maximum value is 2.430 g / cc, the percentage of fly ash 8% value Bulk density standards in bandingakan on a mixture of normal increased every variation of subtlety to the maximum value is 2.410 g / cc, from 3 chart above kecenduranganya abuterbang each percentage increase of fly ash that is more refined thenbulk density values standardgreater and the greatest value is at a level of 6% in value 2.430gr / cc

4.3 Marshall Stability

Stability is the ability pavement receives the traffic load without permanent deformation (permanent deformation) like waves, grooves (rutting), as well as experiencing bleeding. Value stability dipengaroleh cohesion of asphalt, bitumen content, friction (internal friction), the nature of the interlocking (interlocking) of the particles - particles aggregate, shape and surface texture as well as the aggregate, to limit the specification of Public Works Highways 2010 Revision 3 value of Marshall Stability is a minimum of 800kg. From the research results can be seen from the tables and graphs as follows:

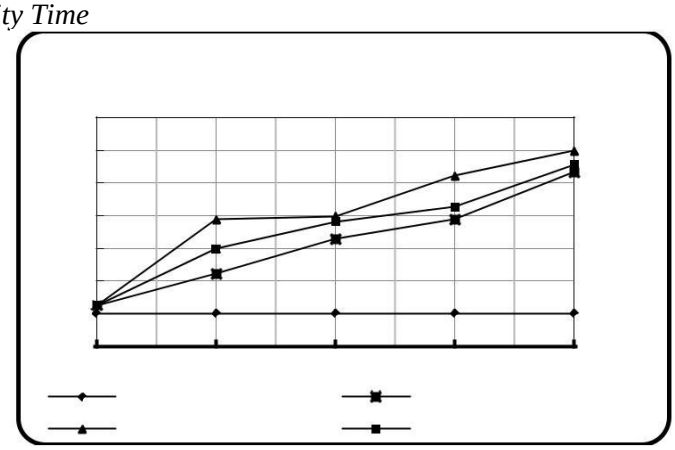
Comparison of percentage variation of smoothness and stability of fly ash to marshall (Kg).



Zone effect relationship chart,ash percentage fly of the Stability. From the table and graph above we can conclude the value of Marshall Stability in asphalt mixtures Ac-Wc normal amounted to 1026 kg, the percentage of fly ash 4% value Stability Marshal in bandingakan on a mixture of normal increase every

variation of subtlety to the maximum value that is 1411kg, the percentage of fly ash 6% of the value of stability marshall in bandingakan on a mixture of normal increase every variation of subtlety to the maximum value is 1435 kg, the percentage of ash each percentage abuterbang kecenduranganya increased fly ash that is more refined then the value stabili the larger bag and value marshal marshall stability in the review of the percentage of fly ash highest at the rate of 6% in value 1.435Kg

4.4 Marshall Stability Time



Is the value of the ratio between the value of stability marshall marshall stability after soaking at 60^0C for 24 hours, the this ratio is usually an indicator of the value of peeling asphalt when marshall residual value of more than 90%, then the mixture is safe for the specified design life for the specification limits Highways PU 2010 Revision 3 Marshall Stability value is at least 90%. From the table and graph above we can conclude on the residual value of Marshall Stability Ac-mix asphalt normal Wc amounted to 90.26%, the percentage of fly ash 4% residual value of Marshall Stability in bandingakan on a mixture of normal increase every variation of subtlety to the maximum value is 94.34%, the percentage of fly ash 6% of the value of stability marshall remainder in bandingakan on a mixture of normal increase every variation of subtlety to the maximum value is 94.99%, the percentage of fly ash 8% value Marshall stability in bandingakan the normal mix has increased every variation of subtlety to the maximum value is 94.56%, from 3 gra fik above each kecenduranganya fly ash percentage increased fly ash that is more refined then marshall residual value greater stability and value marshall stability in the review of the percentage of fly ash highest at the rate of 6% in value 94.99%.

5. Conclusion The results of the analysis Discussion

From the results of parameter marshall the above it can be concluded that campuaran asphalt concrete using the substitution of fly ash were viewed the effect of variation fineness and percentage of fly ash can be concluded as follows: Based on the investigation and analysis of the characteristics of the mixture of asphalt concrete AC-WC with using the substitution of fly ash based on variations in the fineness and degree of substitution of fly ash coal showed an increase in performance concrete mix asphalt in the state in the properties as follows:

A. Stability

value stability of the mixture in the review of variation fineness tends to increase, the value of stability in a mixture of normal at 1,026 kg then the stability of the value of each variation of the fineness of the zone 0 to a maximum of 1.124kg, the value of maximum stability in zone 1 of 1.245kg, the maximum value of stability in zone 2 of 1.342kg and maximum values of stability in zone 3 of 1,435 kg. Nilai stabilitas campuran ditinjau dari variasi kadar subtitusi abu terbang yaitu pada kadar 4% nilai stabilitas maksimum terjadi pada zona 3 sebesar 1.411kg, kadar 6% nilai stabilitas maksimum terjadi pada zona 3 sebesar 1.435 kg dan kadar 8% nilai stabilitas maksimum terjadi pada zona 3sebesar 1.421kg . dari variasi kadar subtitusi abu terbang terjadi optimum pada kadar 6% zona 3 yaitu sebesar 1.435kg dan pada kadar 8% zona 3 mengalami penurunan menjadi 1.421kg.

B. Density

Nilai Kepadatan (Bulk Density Standar) campuran di tinjau dari variasi kehalusan cenderung mengalami peningkatan, nilai Kepadatan (Bulk Density Standar) pada campuran normal sebesar 2,357kg/cc kemudian nilai Kepadatan *(Bulk Density Standar)* masing-masing variasi kehalusan zona 0 maksimum sebesar 2,369 kg/cc , nilai maksimum Kepadatan *(Bulk Density Standar)* maksimum pada zona 1 sebesar 2,390 kg/cc, nilai maksimum Kepadatan *(Bulk Density Standar)* pada zona 2 sebesar 2,399 kg/cc dan nilai maksimum Kepadatan *(Bulk Density Standar)* pada zona 3 sebesar 2,421 kg/cc. Nilai Kepadatan *(Bulk Density Standar)* campuran ditinjau dari variasi kadar subtitusi abu terbang yaitu pada kadar 4% nilai Kepadatan *(Bulk Density Standar)* maksimum terjadi pada zona 3 sebesar 2,389 kg/cc, kadar 6% nilai Kepadatan *(Bulk Density Standar)* maksimum terjadi pada zona 3 sebesar 2,410 kg/cc dan kadar 8% nilai Kepadatan (*Bulk Density Standar)* maksimum terjadi pada zona 3sebesar 2,421kg/cc . dari variasi kadar subtitusi abu terbang terjadi optimum pada kadar 8 % zona 3 yaitu sebesar 2,421kg/cc.

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