

I. INTRODUCTION

A. Background

Pavement is a mixture of aggregate and binder used to serve the traffic load. The aggregate that used like rubble stone or other materials. The binding material used is asphalt, cement or clay. The process manufacture of pavement should be supported and influenced by several aspects. In general, road pavement consist of several types of pavement layers are arranged from bottom to top such as sub grade, sub base course, base course, and surface layer to purpose receive the load from upper and pass it to the layer below. Pavement consist of three types of pavement by the bonding material, such as flexible pavement, rigid pavement and composite pavement.

Type of asphalt mixture is devide into three parts, one of which is Lataston. Lataston or also known as hot rolled sheet is a surface layer of non-strutural gaps that have an aggregate gradation, asphalt filler, coarse aggregate with a certain ratio are mixed and compacted in hot condition. Asphalt HRS-WC has such characteristic likes have good durability, resistance to oxidation, flexible, and resistant to high temperatures. Beside having advantages, asphalt HRS-WC also have weaknees in its stability is not enough to support the load rather than asphalt AC-WC.

Along with the progress of time of many new inventions for the pavement either from the tools or materials to reduce the weakness of the asphalt. Substitute material or substances can be added from the natural material or from sewage like tires or crumb rubber. Material that want to used depending on the purpose and the objectives, as a substitute or as a added material and to improve the stability and the durability that by mixing the material into aggregates or to the binder. The mixture of material for road pavement require an engineered in order to meet the quality requirements of targeted mix.

The mixture used in this final report using of crumb rubber material. Crumb Rubber is dry rubber processing process through crumb stage. Mc Quillen and Hicks (1987) states that the addition of crumb rubber in asphalt of advantages to

the viscosity value compared with conventional asphalt, the surface is more elastic and also more durable. According to Wahyu Purnomo, (2012) crumb rubber has the advantage of adding crumb rubber asphalt mixture resistance to water, withstand heavy traffic loads, and more flexible. In his research, using crumb rubber pass sieve 200 with the addition of 5%, 10% and 12%.

The Hot Rolled Sheet (HRS) blend of asphalt yields a path with considerable flexibility and durability. Mixture of asphalt becomes resistant to crack, but there is damage in the form of changes in shape as the emergence of plastic grooves that can not be avoided. Therefore, the addition of crumb rubber as much as 5% is expected to improve the performance of HRS asphalt mixture. Among them, the surface will be more durable and resistant to cracks due to the load received.

Related to this, the researchers will conduct a further study on "The Performance of Hot Rolled Sheet Stabilized Using Crumb Rubber" using crumb rubber from the tires to see the value Masrhall and durability compared with not using crumb rubber.

B. Problem Statement

Based on the reasons on the background of the study, the writer proposes the following statements:

1. How does the effect of crumb rubber on the stability asphalt mixture HRS – WC using Marshall Test?
2. How the influences of crumb rubber on the durability asphalt mixture HRS – WC?

C. The Purpose of Research

Purpose of the research is as follows :

1. Knowing the stability of characteristics asphalt mixture HRS - WC added by crumb rubber using Marshall Test.
2. Knowing the influence of crumb rubber on the durability asphalt mixture HRS - WC.

D. Benefit of The Study

The research paper is expected to give some benefits. In this research the researcher breaks down the benefit in to three parts as follows:

1. Utilize added crumb rubber as the material of asphalt Hot Rolled Sheet.
2. Knowing how mixing asphalt with crumb rubber in asphalt mixture HRS - WC.
3. As a reference in teaching and research that further.

E. Limitation of The Study

The research is limited by researcher of some points to be focused and targeted as follows:

1. Research conducted at Civil Engineering laboratory of Surakarta Muhammadiyah University.
2. Aggregate gradation used is *HRS - WC* specification.
3. The mixture specification uses Bina Marga 2010, Division 6, Revision 3.
4. This research uses asphalt penetration 60/70 from PT. Pertamina
5. Fine aggregate and coarse aggregate from AMP Boyolali
6. Crumb rubber pass no. 200 with variation 0% and 5%.

F. Originality of The Study

The research under title "*The Performance of Hot Rolled Sheet Wearing Course Stabilized Using Crumb Rubber*" this research has never been done by previous research, but there is some research which has similarity with this research:

1. Darunifah, Nurhayati 2007. The Effect of Added Solid Rubber to the Hot Rolled Sheet – Wearing Course Mixed Characteristics.
2. Ramadan, Indra 2013. Laboratory Review of Utilization Crumb Rubber as Additional Material to Stability and Durability in AC-WC mixture.
3. Nuha Salim Mashaan, all (2013). Performance Evaluation of Crumb Rubber Modified Stone Mastic Asphalt Pavement in Malaysia.

Similarities and differences with previous studies of this research can be seen in Table I.1. below:

Table I.1 Similarities and Differences with a type of Research

Description	Own Research	Darunifah (2007)	Ramadhan, I (2013)	Nuha Salim, All (2013)
Title	The Performance of Hot Rolled Sheet Wearing Course Stabilized Using Crumb Rubber	The Effect of Added Solid Rubber to the Hot Rolled Sheet – Wearing Course Mixed Characteristics	Labolatory Review of Utilization Crumb Rubber as Additional Material to Stability and Durability in AC-WC mixture	Performance Evaluation of Crumb Rubber Modified Stone Mastic Asphalt Pavement in Malaysia
Purpose of Research	<ol style="list-style-type: none"> 1. Knowing the characteristics of the Marshall asphalt mix HRS - WC using crumb rubber. 2. Determine the influence of crumb rubber on the durability asphalt mixture HRS - WC. 	See the correlation levels of elasticity of asphalt on HRS-WC mixtures with additives solid rubber retreading materials to the nature of his Marshall immersion test and standard on some variation of the rubber mixture	<ol style="list-style-type: none"> 1. Knowing the stability of the mixture of AC-WC addition of crumb rubber with a mix of AC - conventional WC. 2. Knowing the durability of a mixture of AC-WC addition of crumb rubber with a mix of conventional AC-WC. 	To Investigate the Effect of Adding Crumb Tyre Rubber as an Addictive to SMA Mixture Performance Properties

This research tries to analysis the performance of hot rolled sheet stabilized using crumb rubber. That this research has never been done before especially in Civil Engineering department, faculty of engineering University of Muhammadiyah Surakarta.