CHAPTER I

INTRODUCTION

1.1 Background

Movement of people from one location to another is called transportation, (Coyley and Novack, 2006). There are three modes of transportation include air modes, rail modes, road modes, water modes , cable modes, pipeline modes, and space modes, which are built up to support the mobilization of people. Now, the entire way the water or air travels must not be built up, but the entire way the land travels must be built up. Every year, there was an increment in the volume of road users which become a problem for the land travel and it must be supported by the increment of a quality the road by improvement the selection of material,planned of structure design, calculation of structure's strength, etc., (Coyle and Novack, 2006).

Before we have a good structure, there are many aspects which should be planned, for instance condition of land and load of vehicles, transportation technology of road's structure, consideration of geometric and a pavement design.

Indonesiarequires good transportation facilities and infrastructure to support the smoothdevelopment ofthe mobilization economy, but mode oftransportationinIndonesiaespeciallyroadsandbridges are inappropriate. It is causedby extremely repetition of load on the street andhighrainfallwhichcaused road failure.

Majority roadsinIndonesia are using asphalt pavement, it called Hot Rolled Sheet (HRS). It was regulated by Bina Marga, to resist the aging of the roads and to maintenance a good stability to avoid a cracking. If HRS frequently exposed to water, it willloosenthe bondbetween elements in HRS andform ahole, that is happen because of characteristic of HRS that are too stiffness and unstable making its way faster perforated. Holes areformedwhengivencontinuouslyoverloadwillcausesevere damagesuch as road inIndonesia, (Wibowo, Ph.D., 2010). Aswe have known, floodsinIndonesia are caused not only by high rainfall but also causedby a lot ofgarbage. Approximately30milliontonsof garbage which aremade ofHPDEplastic, (Ceresana, 2011).

High-density polyethylene (HDPE) is a polyethylenethermoplastic made from petroleum. Known for its large strength to density ratio, HDPE is commonly used in the production of plastic bottles, corrosion-resistant pipe and plastic lumber. It takes the equivalent of 1.75 kilograms of petroleum (in energy and raw materials) to make one kilogram of HDPE. HDPE is commonly recycled, and has the number "2" as its recycling symbol. HDPE is known for its large strength to density ratio. The mass density of high-density polyethylene can range from 0.93 to 0.97 g/cm^3. Although the density of HDPE is only marginally higher than that of low-density polyethylene, HDPE has little branching, giving it stronger intermolecular forces and tensile strength than LDPE. The difference in strength exceeds the difference in density, giving HDPE a higher specific strength. It is also harder and more

opaque and can with stand some what higher temperatures (120 °C/ 248 °F for short periods, 110 °C /230 °F continuously). (Ides.com, 2011)

Based ontwosituations above, I decidedtoexamine **TheInfluenceofHigh densitypolyethylene(HDPE) tocharacteristicofHotRolledSheet,** Ifoundthat of the charactersof HDPE aresimilar toHRS butit is more flexible, resistant tohightemperaturesandit is morestable, it is also able toincreasestrength, durable, elastic, and increased the economic valueof theHRS.

1.2. Problems

Based on background above, scope of the problems statement in this research are:

1. Can HDPE be used for additive for HRS?
2. What is the influence of HDPE to HRS ?

1.3. Limitation

There are several limitations in this research that may affect the quality of conclusion:

1. Used Specification for standard from Bina Marga 2010.
2. The asphalt mix design is Hot Rolled Sheet Wearing Course.
3. Materials were taken from :
    a. PT SURADI SEJAHTERA for asphalt concrete type 60/70.
    b. Clereng, Kulon Progo for aggregate.
    c. Waste collection center in Yogyakarta city for HDPE.
4. The Asphalt content are selected for 5%, 5.5 %, 6 %, 6.5 %, 7 %

5. The HDPE content in this researches are 0%, 3%, 5%, 7%, 9%
6. The proportion of HDPE is planned for variables are measure as Marshall Test standard which are :
   a. stability
   b. flow
   c. Void In The Mix (VITM)
   d. Void Filled With Asphalt (VFWA)
   e. density
   f. Marshall Quotient (MQ)
7. This researchassumed that chemical reaction is part of this experiment.

1.4 Research Objectives

The objectives of this research are:

1. To gain understanding whenever HDPE main influence asphalt pavement.
2. To examine characteristic of HRS-WC added with HDPE.

1.5 Research Originality

There are some previous researches the use of additive and filler in asphalt concrete:

1. Rahayu, R.H., etal. 2009. *StudiKarakteristikCampuran Beton Asphal lapis Aus (AC-WC) yang Ditambahkan Plastik PVC*(Study of PVC uses in AC –

WC). Engineering Faculty, University Tadulako, Palu, Indonesia. In this research, observer used the proportion of PVC 2% - 8%. The result showed that stability of asphalt and Marshall Quotient increased as the adding of PVC.

2. Pangestiaji, Anderson.2011. *Pengaruh Sampah Plastik Sebagai Bahan Tambah Terhadap Karakteristik Marshall pada Hot Rolled Sheet* –B *(HRS-B)*(The uses of plastic waste to influence Marshall characteristic of HRS – B). Engineering facultyUniversity Atma Jaya Yogyakarta. Research use LDPE (low density polyethylene) used 3%-5% additive and chalk husk as filler. The result showedthat LDPE can be used to increase the stability, void in the mix, MQ. It decrease, flow.

The differences of this research and previous researches are materials type involved such as mix design, AC type and the additive.

1.6 Hypothesis

It is expected that HDPE will improve quality of asphalt concrete, especially HDPE, by increasing stiffness and stability. By this, despite there is HDPE in the mix, asphalt concrete comply with the standard quality, such as Bina Marga standard.

serviens in lumine veritatis