

# Flexible Pavement Using Woven Geotextile Reinforcement

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**Abstract-**This paper provide review on utilization on geotextiles reinforcement in road construction. Generally bituminous pavement are impervious in nature due to these many defect such as improper drainage, segregation, surface deformation, cracks, disintegration occur. To overcome these defect many researcher used woven geotextile reinforcement to make pavement permeable without affecting its strength. Objective of these work is to compare conventional flexible pavement with geotextile reinforced flexible pavement. Geotextiles such as coir and banana are naturally occurring fibre. Some studies show that coir fibre can increase the stability and strength of pavement. Banana has high tensile strength and moisture absorption capacity.

**Index Terms-** Permeability, Flexible Pavement, Strength, Banana Fibre, Coir Fibre.

## 1. INTRODUCTION

Road are the lifelines and make a crucial contribution to economic development. The study of advance construction material for road has to maintain the standard of road. India has second largest road network in the world. The adequate transportation system help in development in economical, industrial, social and overall growth of country. Various methods are used in construction of road but it is responsibility of highway engineer to select and appropriate material which is locally available and economical for particular road project without compromising the quality of work.

Permeability of bituminous mixes is property that is important in defining durability of the pavement. Coir is natural material obtain as byproduct of coconut husk obtain is most durable natural fibre because of its lignin content, coir geotextile are extensively used for many geotechnical application such as strengthening sub grade, soil stabilization and erosion control in embankment. Banana fibre has high tensile strength and moisture absorption. Use of banana and coir fibre in construction of flexible pavement improve the permeability on pavement without affecting its strength. It is locally available, ecofriendly and non-hazardous to human health.

## 2. LITERATURE REVIEW

E. A. Subaida, S. Chandrakaran, N. Sanskar (2009)<sup>[1]</sup>, It is concluded that bearing capacity of thin unpaved road section can be increased by the inclusion of woven coir geotextile. Woven coir geotextile significantly decreased the permanent vertical deformation over the loaded area of the pavement

under repeated loading by restraining the lateral spreading of the base material.

Loui. T. R, Dr. M. Satyakumar (2013)<sup>[2]</sup>, It is determined that shear resistance is sensitive to property of geo-textiles and thickness of tack coat(binder).CCM 400 geotextiles show higher value, because its thickness is less so layer separation effect will reduce and also large mesh size hold the bituminous mix giving a confining effect and better interlocking.

David K. Hein (2014)<sup>[3]</sup>, It is studied that permeable pavement can be a major contributor to the effective management of stormwater. They provide the opportunity of transforming a traditional source of storm water runoff into a best management practice for capturing, storing and infiltrating stormwater into a natural surrounding.

Harish L (2014)<sup>[4]</sup>, It is concluded that permeability increases exponentially with increase in air voids and falling head method has higher correlation coefficient than constant head method for testing permeability of bituminous mixes.

Ramadhanshya Putra Jaya (2015)<sup>[5]</sup>, It is concluded that detailed investigation should be done on the coconut fibre like reinforcing mechanisms as well as optimum fibre and shell content.

Anjani Kumar Shukla, Shivam Singh Pate (2017)<sup>[6]</sup>, By studying number of researchers it is found that there is always scope to further explore the judicial assessment of mixing any other locally available

materials by which the cost of construction could be reduced considerably.

Dr. P. Sentil Kumar, R. Rajkumar (2012)<sup>[7]</sup>, Interfacing of both woven as well as non woven geotextile in an unpaved road especially with soft sub-grade, increases the preparation resistance and hence the CBR strength. Therefore, the performance of unpaved road is better with inclusion of both geotextiles and improve further at larger depth of penetration.

Aiswarya Gopinath, Amala D (2017)<sup>[8]</sup>, From the experimental investigation studied that permeability characteristic in 1 metre square area is nearly 248 litres. So banana fibre reinforced pervious concrete is highly effective.

### 3. METHODOLOGY

#### 3.1. Material

##### 3.1.1. Bitumen

Bitumen is a black or dark colored solid or viscous cementitious substance consist chiefly high molecular weight hydrocarbons derived from distillation of petroleum or natural asphalt has adhesive properties and is soluble in carbon disulphide. It is composed of partially hydrogenated polycyclic compound having density of 1040 kg per cubic meter and boiling point of 525°C.

Grades of Bitumen:

1. Bitumen 80/100
2. Bitumen 60/70
3. Bitumen 30/40

##### 3.1.2. Aggregates

Locally available crushed stones conforming to graded aggregate of nominal size 20mm-10mm.

##### 3.1.3. Coir Fibre

Coir fibre is natural fibre extracted from husk of coconut and used in product such as floor mats, door mats, brushes and mattresses. Coir fibre has high tensile strength and moisture absorption.



Fig.1.Coir Fibre

##### 3.1.4. Banana Fibre

Banana fibre can be used as raw material in industry for production of wide range of product like paper,

cardboard, tea bag, currency notes and reinforced as polymer composite in high quality dress material. Banana fibre has high tensile strength and moisture absorption capacity.



Fig.2.Banana Fibre

### 3.2. Equipments

#### 3.2.1. Marshall Stability Test Apparatus

Marshall Stability Test Apparatus – (MSA-01) The test is applicable to hot mix designs using bitumen and aggregates upto a maximum size of 25mm. The marshall stability of mix is defined as maximum load carried by compacted specimen at a standard test temperature of 60°C.



Fig.3.Marshall Stability Test Apparatus

#### 3.2.2. Permeameter

Falling head permeability test apparatus is used to determine the permeability of bituminous pavement.

### 3.3. Testing Program

#### 3.3.1. Marshall Stability Test

Marshall stability of test specimen is maximum load required to produce failure when the specimen is preheated to a prescribed temperature placed in a special test head and the load is applied at constant

strain (5cm per minute). Determine Marshall stability and flow.

### 3.3.2. *Permeability Test*

Permeability test is measure of rate of flow of water through bitumen. In these test water is forced by a known constant pressure through a bitumen specimen of known dimensions and rate of flow is determined.

## 4. CONCLUSION

- Properties of flexible pavement are influenced by the volume of geotextile reinforcement.
- Tensile strength and moisture absorption capacity are improved with addition of woven geotextile.
- According to previous research it is noted that woven geotextile reinforced flexible pavement is more durable than conventional flexible pavement.

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