

PERFORMANCE STUDY ON CLAY BASE COURSE USING GEOTEXTILES

Karthik Sharan.S¹, Priyanka.M², Suganth.P³, Suvarans Raj.K⁴, Evanjaline Libie.P⁵

^{1,2,3,4}UG Students, Department of Civil Engineering, KGiSL Institute of Technology, Tamil Nadu

⁵Assistant Professor, Department of Civil Engineering, KGiSL Institute of Technology, Tamil Nadu

ABSTRACT: *The present study geotextiles applications are changing rapidly as research shows result and manufacturing process improve. Geotextiles are generally used for straining and separation in road construction, to prevent relocation and intermingling of materials, thus allowing free movement of water. The functions performed by geotextiles are: drainage, sealing, filtration, separation, and reinforcement. The properties of geotextiles like elongation, textile strength, diffusive permeability, flexibility, etc are predominantly affected by its molecular weight. In 1920's state of Carolina used a cotton textiles to reinforce the underlying materials on a road with a poor quality soils. India is a large producer of jute. Jute is a low cost, renewable, biodegradable and eco-friendly natural product. It is increasing acceptability among geotechnical engineers due to its bio-degradability.*

I. INTRODUCTION

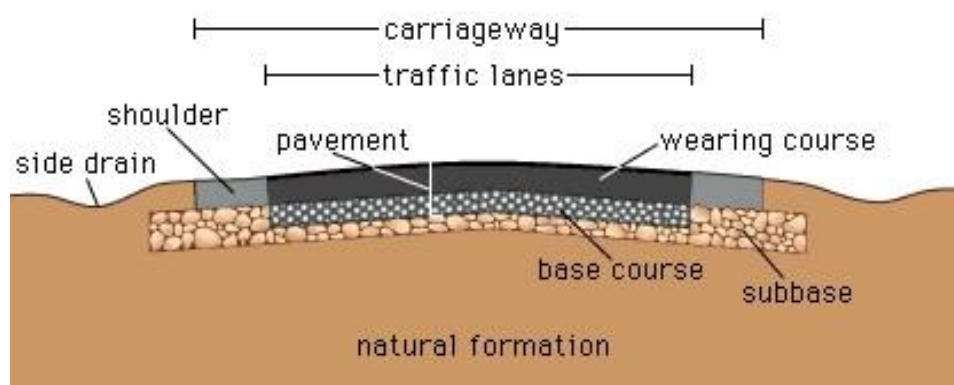
A geotextile is any permeable textile material used with foundation, soil, rock earth, etc. that is an integral part of a construction system. Modern geotextiles are usually made by weaving or bonding from synthetic polymers-polyamides, polyethylene, polyesters, polypropylenes which do not decay under biological and chemical process. Some geotextiles are made of biodegradable materials such as jute or other wood fibers that have been formed into sheets and are more stable. Geotextiles are classified based on the method of production as

1. Woven fabric
2. Non-woven fabric
3. Knitted fabric

II. NEED FOR STUDY

Geo membranes are relatively thin, flexible polymeric materials that are primarily used for containment of liquid or vapour barrier or both. Expansion of clay beneath the road surface happens due to increase in moisture content the clay tends to swell and cause are non-homogenous expansion and contraction. These cause a detrimental effect on payment. By using geo membrane, significant moistures changes in the payment would minimize. It also provides several facilities such as strength properties, lighter weight, portability, cost-saving and so on.

III. PAYMENT LAYER



DETAILING:

1. **Wearing course:** It is the upper layer in roadways, air field and dockyard construction. The wearing course is typically placed on binder course which is then laid on the base course which is normally placed on sub-base which rests on sub-grade.
2. **Base course:** It is the layer or layers of specified materials of designated thickness or rate of application placed on a sub base or sub-grade to support subsequent layers structures. It is located under the surface layer consisting of wearing courses and sometimes extra binder course.
3. **Sub-base:** It is the layer of aggregate material laid on the sub-grade, on which the base course layer is located. It is often the main load bearing layer of the pavement. Its role is to spread the load evenly over the sub-grade.
4. **Sub-grade:** the soil sub-grade is the layer of nature soil prepared to receive the load from other layer of the pavement.

IV. MATERIAL PROPERTIES

Clay: they are finer than silts. Clay soil exhibit stickiness, high strength when dry, and show no dilatancy. Black soil and other expansive clay exhibit swelling and shrinkage properties paste of clay with water when rubbed in between fingers leaves stain, which is not observed for silt.

Jute geotextiles: The performance of pavement constructed on soft soil can be improved using jute geotextiles. Jute fabric when used as separator prevents the penetration of subgrade material into voids of granular base course. The permeability characteristic of the fabric also aids in faster dissipation of pore pressures and ensures better drainage which results in better long term performance of pavement. Provision of fabric enables sub grade develops its full bearing capacity and thus controls rutting.



Advantages of jute geotextiles:

1. Abundant quantity.
2. Great moisture retention capability.
3. Lower cost compare to synthetic geotextiles.
4. High initial tensile strength.
5. Bio-degradable properties.

V. RESULTS AND DISCUSSION

1. Sieve analysis of clay soil:

Sieve size	Weight retained	% of weight retained	Cumulative weight retained	Percentage fines	Fineness modulus
4.75	60	6	6	94	528
2.36	30	3	9	91	531
1.18	135	13.5	22.5	77.5	520.5
0.60	395	39.5	62	38	494.5
0.50	10	1	63	37	533
0.425	190	19	82	18	515
0.30	80	8	90	10	526
0.075	95	9.5	99.5	0.5	524.5
Pan	5	0.5	100	0	533.5

2. Specific gravity of soil particle:

- Specific gravity of soil grain is an important property and it is used to determine the voids ratio, porosity, and degree of saturation. If density and water content are known.
- The specific gravity of clay soil is $G=2.54$

3. Determination of liquid limits, plastic limits, shrinkage limit:

- To determine the liquid limit, plastic limit and shrinkage limit of the soil sample to find the flow index and the toughness index of the soil.



- Liquid limit of the clay soil is found to be 46%

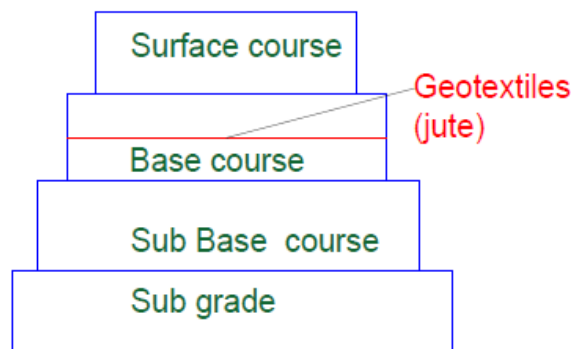


- Plastic limit of the clay soil is found to be 39%
- Shrinkage limit of clay soil is found to be 28%

4. Properties of jute geotextiles:

properties	Test values
Thickness	5mm
Weight	750gsm
Tensile strength	15KN/m
Elongation	10%
Punching resistance	350N
Overlap length	300mm
Type of fibre	Woven

5. Placing of geotextiles in base course:



VI. CONCLUSION

- Certain fundamental consideration are necessary for success in any application of geotextiles. We must know the soil to select the proper geotextile in road construction and maintenance.
- Permeability should also always be consider in separation uses to allow moisture to move freely through the system.
- JCT is also the most drapable of all geo-synthetics a property essential for control of surficial soil erosion its low extensibility and high initial strength helps in enhancing the bearing capacity of the soil.
- Utilization of geotextiles improves the binding property of mix.
- The road using geotextiles can also be constructed in area having high temperatures.
- Geotextiles in roads increase the stability value and durability to a great extent.

VII. REFERENCES

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