



## APPLICATION OF GEOSYNTHETICS IN MAINTAINING RURAL PAVEMENT – A REVIEW

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### Abstract:

India is a developing country, where country's economy is based on agriculture. Due to this agriculture based, transportation plays vital role in India. Transportation in India is on the rapid stage as the country is on its developing feature and globalization. Highways play an important role in transportations. Therefore, highways should be designed in proper way and should be economical. Existing highways are properly designed and well oriented but rural roads should be well designed, constructed and maintained so as to serve the villagers. This paper gives the applications of the geosynthesics in maintaining pavement performance. It also gives us a view in order to use the polymeric materials such as geosynthetics in the up gradation and maintaining the rural pavement performance. Geosynthetics are the polymeric materials which are used to stabilize the surface The polymeric nature of the material makes the suitable at the place where high durability is required.

Keywords: Highways, Geosynthetics.

**Introduction:** The use of polymeric materials i.e. geosynthetics in construction projects has attained a wonderful recognition over the past 30 years. Ranging from the reinforcement and severance functions in roadway construction, to the filtration functions in earthen dams, geosynthetic applications are as diverse as the types of geosynthetics are sick bright on today's market. Of exceptional interest to civil engineers is the use of geosynthetics to reinforce roadways. Sometimes it is essential to construct a road on very poor-quality soil, and the planned use of the road does not advantage the expenditure of constructing a elevated quality road. Examples of such roads are service or right to use logging roads, and low volume rural roads. The use of geosynthetics in large-scale civil construction projects has not only saved both time and money, but also made the consequential structures safer.

Rural Road connectivity is an important constituent of rural expansion by promoting access to economic and social services and thus generating amplified undeveloped incomes and productive employment opportunities. It is ao a key component in ensuring poverty decrease.

### What is Geosynthetic:

Geosynthetics consists a variety of synthetic polymer materials that are particularly made-up to be used in geotechnical, geo-environmental, hydraulic and transportation engineering applications. It is an appropriate to distinguish the main function of a geosynthetic as being one of division, filtration, drainage, intensification, fluid/gas containment, or erosion control. In some cases they may serve double functions.

Geosynthetics are artificial materials used to recover soil situation. The appearance is derivative from: Geo = earth or soil + Synthetics = man-made Geo- synthetics are prepared from petrochemical-based polymers that are physically motionless and will not crumble from bacterial or fungal action. though the majority are basically element inert some may be spoiled by petrochemicals and most have some degree of vulnerability to sunlight.

“Geo-synthetics are synthetic products, where at least one of the components is made from a synthetic or natural polymer, in the form of a sheet, a strip or a three-dimensional structure, non-woven, knitted, or woven which is used in contact with soil/rock and/or other materials in geotechnical and civil engineering applications”.

Geo-synthetic materials are placed on or in soil to do one of four things



Separation/confinement/distribute loads. It improves level-grade soil situations such as roads, alleys, and lane ways It improves sloped-grade situations such as banks, hillsides, stream access points reinforce soil- soil walls, bridge abutments, box culverts/bridges, and soil arches It prevents soil movement (piping) while letting water move through the material such as in drainage systems and back fill around water intakes It helps in controlling water pressure allowing flow (drainage) in the plane of the material such as on foundation walls to allow water to move down to perimeter drains.

### **Mechanism of material on pavement**

The position of the various types of geosynthetics just described with the primary function that the material is called upon to serve allows for the creation of an organizational matrix for geosynthetics; see the primary function that each geosynthetic can be called upon to serve is seen. Note that these are primary functions and, in many cases, (if not most) cases there are secondary functions, and perhaps tertiary ones as well. For example, a geotextile placed on soft soil will usually be designed on the basis of its reinforcement capability, but separation and filtration might certainly be secondary and tertiary considerations. As another example, a geomembrane is obviously used for its containment capability, but separation will always be a secondary function. The greatest variability from a manufacturing and materials viewpoint is the category of geocomposites. The primary function will depend entirely upon what is actually created, manufactured, and installed.

### **Maintenance of Road by using Geosynthetics**

Road surfaces must be maintained regularly. Commonly, a paved road becomes a candidate for maintenance when its surface shows significant cracks and potholes. The rehabilitation of cracked roads by simple overlaying is rarely a durable solution. The crack under the over lay rapidly propagate through to the new surface. This phenomenon is called reflective cracking.

Cracks in the pavement surface cause numerous problems, including:

- Riding discomfort for the users.
- Reduction of safety.
- Infiltration of water and subsequent reduction of the bearing capacity of the subgrade.
- Pumping of soil particles through the crack.

The Problem is site conditions are very poor like, Black cotton soil, CBR less than 2, High water table, Traffic medium, Commercial vehicles mainly carrying sand and Sugarcane and other crops on this route.

Usually, the road constructed in this section would not last for more than 6 months, developing severe rut depths and pot holes and would become almost unmemorable

### **Installation of Geotextile**

Before the Installation of Geotextile for the soil stabilization some important options are follows,

- Surface preparation
- Laying of Geotextile
- Surface preparation: -**

Surface preparation like well compacted by roller, layout of road with center line and width of road marking etc.

### **Laying of Geotextile: -**

Laying of Geotextile after the completion of surface preparation we are unrolled the Geotextile on the road surface by manually with very carefully.

### **Results & discussion:**

Results show that geogrids clearly benefit pavement performance, with test sections showing a better ride quality and surface rating than control sections. Surface rating is a composite measure of surface distresses including rutting and cracking. Test sections also had slightly less rutting than control sections, indicating an increased structural capacity. The saw and seal sections also had a better ride



quality than control sections and an even higher surface rating than geogrid sections, but had more rutting than control sections.

### **Conclusion:**

The use of geogrids in road foundations clearly benefits pavement performance, potentially leading to longer service lives for roads and reduced maintenance costs. Geotextiles did not provide increased strength or better pavement performance, performing only as well as and sometimes worse than control sections.

Test sections had more rutting and about the same ride quality and surface rating as control sections. While the use of geotextiles did lead to less transverse cracking than in control sections, they exhibited more longitudinal cracking. Type of Geosynthetics also had the most variation in performance, with some sections performing poorly and others well, whereas geogrid sections had a much more consistent performance.

### **Economic Importance of Geosynthetics**

- Commonly accepted as durable, long lasting and environmentally safe solutions to geotechnical engineering projects.
- The cost of geo-synthetics applied usually between 3 to 5 per cent of the total cost of projects.
- For a number of projects, savings of 30 per cent in total project costs have been reported.
- Minimizes the regular repair and maintenance costs directly.
- Prevent accidents, increase efficiency of structures, minimize pollution and leads to efficient use of natural resources.

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