



# STABILIZATION OF SOIL USING GEOSYNTHETICS

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**Abstract:** Soil stabilization is the progression which involves enhancing the substantial properties of soil in order to develop its strength, durability etc. By blending or mixing with additives. The dissimilar forms of technique used for soil stabilization are: Soil stabilization with cement, Soil stabilization with lime, Soil stabilization with bituminous hydrocarbon, and Chemical stabilization associated an innovative promising experience of stabilization by Geo textiles and Geo artificial fibers. Geotextiles have been effectively used for reinforcement of soils to recover the bearing capacity. Roads are arteries of a city and an increase in population increases traffic. Heavy traffic demands strong, smooth, durable and well maintained road pavement and hence healthy and strengthened road network is essential for socioeconomic development of a country. Reinforcement of road pavement using various materials is in practice, geosynthetics being popular among them. Geosynthetics are synthetic products used to stabilize terrain. The focus of this project is on better understanding of natural and artificial Geotextiles for strengthening of sub grade soil. This project gives effect of reinforcement of Geotextiles on sub grade soil. Laboratory California bearing ratio (CBR) tests were performed to examine the load-penetration performance of reinforced granular soils with geotextile. Samples of granular soil with diverse Grading are chosen and tested lacking reinforcement. The consequences of these tests demonstrate that, bearing ratio of reinforced granular soils with geotextile increases.

**Keywords:** Soft soil, CBR value, geo-grids, reinforcement, Geotextile

## INTRODUCTION

**General:** Soil stabilization is the progression which involves enhancing the substantial properties of the soil in order to develop its strength, durability etc. by blending or mixing with additives. The dissimilar forms of technique used for soil stabilization are: Soil stabilization with cement, Soil stabilization with lime, Soil stabilization with bituminous hydrocarbon, and Chemical stabilization associated an innovative promising experience of stabilization by Geo textiles and Geo artificial fibers. Geotextiles have been effectively used for reinforcement of soils to recover the bearing capacity. Roads are arteries of a city and an increase in population increases traffic. Heavy traffic demands strong, smooth, durable and well maintained road pavement and hence healthy and strengthened road network is essential for socioeconomic development of a country. Reinforcement of road pavement using various materials is in practice, geosynthetics being popular among them. Geosynthetics are synthetic products used to stabilize terrain. The focus of this project is on better understanding of natural and artificial Geotextiles for strengthening of sub grade soil.

## Geosynthetics

Geosynthetics with high tensile strength used in combination with soil of high compressive strength have been found to be effective in the design of many civil engineering applications. The application of Geosynthetics in the field of geotechnical, transportation, hydraulics, and geo-environmental engineering has been explained by many researchers. The materials employed in the manufacture of geosynthetics square measure primarily artificial materials, generally, derived from crude oil oils, though rubber, fiberglass. Geosynthetics could be a generic name representing a broad vary of plane merchandise factory-made from compound materials. the foremost common ones square measure geotextiles, geogrids, geo nets, geomembranes and geo composites, that square measure employed in contact with soil, rock Associate in Nursing d/or the other material as an integral a part of a artificial project, structure.



### The various types of geosynthetics:

1. Geotextiles (GT)
2. Geogrids (GG)
3. Geo nets (GN)
4. Geomembranes (GM)
5. Geosynthetic clay liners (GCL)
6. Geopipe (GP)
7. Geofoam (GF)
8. Geocomposite

### Geotextiles (GT)

Geotextiles type one among the 2 largest teams of geosynthetics. Their rise in growth throughout the past 35years has been nothing wanting extraordinary. They're so textiles within the ancient sense, however they comprises artificial fibers instead of natural ones like cotton, wool, or silk. Thus, biodegradation and resultant short life isn't a drag. These artificial fibers are created into versatile, porous materials by normal weaving machinery or are matted along during a random non-woven manner. Some also are unwoven. There are at-least a hundred specific application areas for geotextiles that are developed, however, the material invaria by performs a minimum of one among four distinct functions: separation, reinforcement, filtration and/or drain.



## Objective of the study

1. The main objective of the present work is to study the effect of the soil strength after the application of geosynthetics.
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3. In the present thesis the analysis of soil has been carried out by application of geosynthetics in soils by using sieve analysis and CBR test.
4. The future scope appears to be more promising with stronger and more durable geosynthetics emerging into the market along with fibrous system to be mixed with soil for giving more hope as well as challenge to the geotechnical engineer in the years to come

## Application of geosynthetics

The procedure for testing remains a similar for each the cases except the addition of geosynthetic layers into the soil whereas compacting at totally different heights of the soil within the mould. The geotextile and therefore the geogrid were take circular items that will match specifically into the mould while not. Layers were placed higher than of the primary and therefore the third layer whereas compacting the soil which might grow to be top of second layer and fourth layer when inverting the mould for cosmic microwave background testing and CBR test was conducted.



## Methodology:

Major kinds of soils that are encountered are:

- (i) Black cotton soil – marshy regions, dried up river or lake beds, etc.
- (ii) Marine clay – river delta, high rainfall zones, d/s of erosion prone areas.
- (iii) Granular soil– Desert regions, coastal areas, etc.
- (iv) Red laterite soil – Plateaus, boulder regions.



## Future scope of the work

1. It is expected that the use of geosynthetics will become increasingly routine, and that geosynthetics will be the standard material of choice for several applications.
2. It can be used in environmental engineering for landfill projects. It can also be applied in railway construction which includes anti filtration, anti-seepage, drainage, protection and reinforcement needle punched staple fiber nonwovens were used as filtration for subgrades.

## CONCLUSION

When soil reinforced with geosynthetics it develop into stronger and stiffer than soil without reinforcement. Placing of geotextile material in soil improves bearing capacity and load carrying capacity of soil and thus augment service existence of pavement. Experimental studies show increase in sub grade strength which support the theoretical studies carried out. Geosynthetics when used in pavements perform different functions like reinforcement, separation, drainage and filtration. Geotechnical test were accepted out to decide Grain size analysis, Waterberg, compaction and California bearing ratio test. CBR test were approved out by insertion the geo-grids at varying depths and in solitary layer under unsoaked conditions to conclude the strength of the soil. The consequence shows that the strength of sub grade is significantly increased by introducing geo-grids reinforcement in the soil. It is establish that geo-grids placed at  $3/5$  the distance from the base showed superior CBR value than when placed at  $2/5$  and  $4/5$  distances from the base. The differences in the behavior of the soil under unsoaked conditions develop on increasing the number of layers of geo-grids. As a sub grade stabilizer it has shown great effect of improvement. It has short preservation, corrosion resistance and augments the service life of road pavement. Geo-grids should be employed as a modernized form of improving road construction on poor sub grade material.

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