Fundamental Journals
International Journal of Fundamental Physical Sciences (IJFPS)

Original Research Papers
Open Access Journals
ISSN: 2231-8186

IJFPS, Vol 6, No 4, pp 23-25, Dec, 2016
DOI:10.14331/ijfps.2016.330099

R.. Sharifi
http://fundamentaljournals.org/ijfps/index.html

Geotextiles and Study of Their Behaviour on Sand Embankments

Rahman Sharifi

Soil Conservation and Watershed Management Research Department,
Tehran Agricultural and Natural Resources Research and Education Center,
AREEO , Varamin, Iran

r.sharifi@areeo.ac.ir

(*Received Sep 2016; Published Dec 2016*)

ABSTRACT

Today, soil reinforcement is applied as an effective and reliable way to increase the resistance of the soil mass. This method works in a variety of instruments to stabilize earthen dam, layers below the surface, the embankment road and pavement. Geotechnical applications needs advanced behavioral models to simulate nonlinear and time- functionality of soils. Whole problem is analyzed numerically with software plaxis, including an embankment with crest width 2b and height (H) which is located on soft clay layer. The clay layer is placed under the stabilized layer and the embankment located on it. The initial dimensions of the plane strain analysis, including the embankment crest width of 6 meters by 9 meters with side slopes of 2:1 (V: H) on deep clay layer of 40 meters. In this paper, we first review the results of the initial analysis and then discuss the results of previous research done in this area; the results are compared to the software plaxis. Then, the sensitivity analysis of parameters such as slopes on either side of the embankment, the embankment width and height of the embankment is performed.

Keywords: Sensitivity Analysis, Geotextile, Sand Embankment

https://doi.org/10.14331/ijfps.2016.330099

INTRODUCTION

Since the initial human aware of the thousands Year Until a few decades ago, all engineering and technical advances based on the use of construction equipment, piles of dirt as always with good shear strength and tensile strength, which are poorly known (Beddoe, Take, & Rowe, 2011).

Soil material that well against pressure and shear strength, but does not enable the Show little resistance to tensile force. From ancient times to the experimentally observed Trees or plants have been effective in improving the soil mass. Reinforced soil, building complex which has a tensile strength of soil aggregates are operating as weapons. Today, soil reinforcement as an effective and reliable technology for increased strength and stability of earth masses to be handled. This method works in a variety of structures for the Guardian earthen dam to stabilize the layers beneath shallow foundations, road and pavement Weir are used (Belli, Glisic, Inaudi, & Gebreselassie, 2009).

The new concept of soil reinforced by a French engineer, Vidal was introduced in 1966. He simultaneously applying a granular soil I wasn't have a steel belt guards to backfill mass adhesion to anisotropy along the belt. Then Steff Ten gunmen from the territory of the technique in most countries, especially

the United States of America in the structural development was normal speed (Holtz & Kovacs, 1981). Today a variety of ways both arms of the doubt to the bar, networking page, rods or filaments, both in terms of the roughness of the rough or smooth, both in terms of the relative difficulty of the relatively high hardness such as steel or hard relatively low polymer fabrics used (Palmeira, Fannin, & Vaid, 1997).

Of the synthetic fabric used 8 0 onwards woven or nonwoven geotextiles as well as the network of plastic called Geo Tkstayl as reinforcement materials or organ amplifiers were widely popular. The reason could be attributed to a better coordination of performance fabrics with low relative hardness of the soil, the ratio of the relative hardness of the metallic reinforcement materials to be high. The permeation and corrosion resistant fabrics and some varying attacks against rot bacteria and acids are stable and non-toxic (Fannin, Vaid, & Shi, 1994).

Soil behavior and performance of mutual interaction and reinforcement element two, the complicated behavior of reinforced soil. According to surveys conducted prior to the recent decades the most important materials used in the soil to improve soil shear strength has been the production of polymeric materials in the soil Brtslyh various aspects of the soil improvement and take advantage of a structures, provided, that in the absence of soil alone was impossible (Horrocks & Anand, 2000) . Today, in addition to the reinforcement material in a certain direction (horizontally) The mass of soil to be handled. Separate strands that are randomly distributed in the bulk soil is used. At This method is distinct disciplines simply be mixed with the soil. This method is similar to the addition of cement Limestone and other Add to the soil., One of the major benefits of using randomly distributed discrete fibers, maintaining soil consistency and the absence of weak pages that could potentially now a ten-directional parallel reinforcement materials, arise (Testing & Materials, 1986).

MODEL GEOMETRY

Whole problem is analysed numerically with software plaxis, including an embankment with crest width 2b and height H which is located on soft clay layer. (Figure.1)

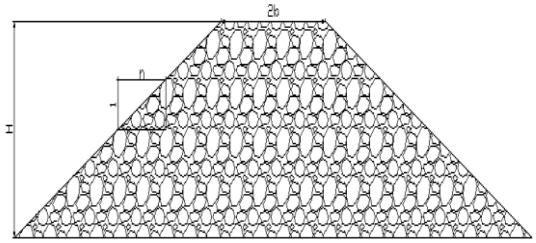

Fig.1 Model Geometry

MATERIAL CHARACTERISTIC

Soil and rock under load to behave nonlinearly. The behavior of the stress - strain nonlinearity can be modelled with several behavioral models. Obviously, the more complex the model, the number of model parameters increases. For modelling the behavior of soil and rock material elastoplastic Mohr-Coulomb behavior model is used. Model Mohr - Coulomb model is non-linear, strong, simple can be considered as a first estimate of the actual behavior of the soil or rock. The elasto-plastic model with five input parameters include the modulus of elasticity, Poisson's ratio, cohesion, friction angle and dilation angle needs. It is important to note that the range of parameters used in other behavioral models that are not specific enough to span the full elastoplastic model parameters used in the specified Soil Mechanics Books (Pilarczyk, 2000).

SENSITIVITY ANALYSIS

Then the sensitivity on parameters such as the slope of the sides of the levee, the levee crown width, depth of the clay layer is examined.

A) Change sides levee slopes (n)

10/23/1358 instructions PBO steep sides of the gravel paths of 1:1 is recommended. If this foundation embankment on soft clay to build the numerical value is uncertain and may cause instability of the levee. The more reasonable bounds, 2:1 slope and the slope was used in the initial analysis. But the effect of this parameter embankment slope of 1:1 and 3:1 were used. Table 1, the maximum settlement amount based on the slopes of the parties and the percentage change compared with the initial analysis with a slope of 2:1 is given Based on that, the rate of change of n from 1 to 3, the maximum settlement amount from 14% to 8% higher than the initial state to the initial state is altered.

Table. 1 Maximum level settlement on the slopes of the parties and the percentage change compared with the initial analysis

N	Max settlement (mm)	Change percentage to initial case
1	0.31	-14.0
2	0.36	0.0
3	0.39	+8.0

Based on the two sides of the slopes increases, the maximum settlement amount with gentle slopes and linear increases.

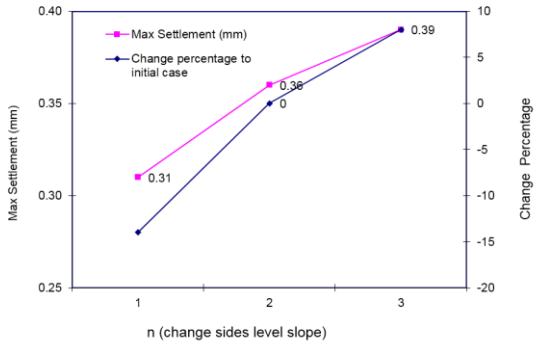

Fig. 2 Change the maximum settlement levee slopes

B) Changes in the levee crown width

In the initial analysis of the project levee width of 9 meters is used. To examine the effect of these parameters, the model is within the 6 and 12 meters. Table 2, the maximum settlement amount based on the levee crown width and percentage change compared with the initial analysis is presented which, by changing the weir crest width of 6 to 12, the maximum settlement rate of 11% less than the initial state up to 8 percent more than the initial state is altered.

Table .2 Maximum level settlement on the levee crown width and percentage change compared with the initial analysis.

2b	Max settlement (mm)	Change percentage to initial case
6	0.32	-11.0
9	0.36	0.0
12	0.39	+8.0

Based on Figure 3, the increase in the levee crown width, maximum settlement amount with gentle slopes and linear increases.

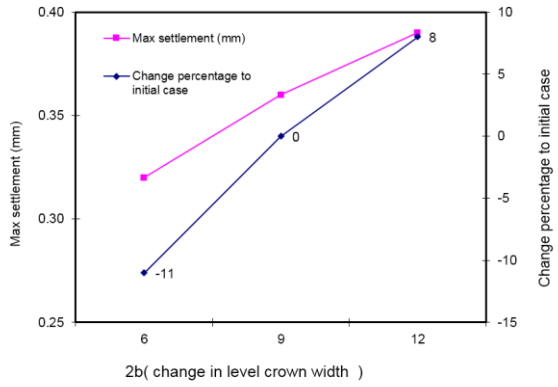

Fig. 3 Change the maximum settlement levee width

C) Changes in levee height (H)

Initial analysis of the levee height of 6 meters. To examine the effect of this parameter, 3 and 9 meters high embankment is modelled. Table 3, the maximum settlement amount based on percentage change relative to the height of the embankment and initial analysis is presented which, by changing the height of the levee from 3 to 9, the maximum settlement amount from 67% to 94 percent lower than the initial state than the initial state is altered.

Table. 3 Maximum sat on the levee height and percentage change compared with the initial analysis

H	Max settlement (mm)	Change percentage to initial case
3	0.12	-67.0
6	0.36	0.0
9	0.70	+94.0

According to Figure 4, with increasing levee height, maximum settlement rate linearly increases.

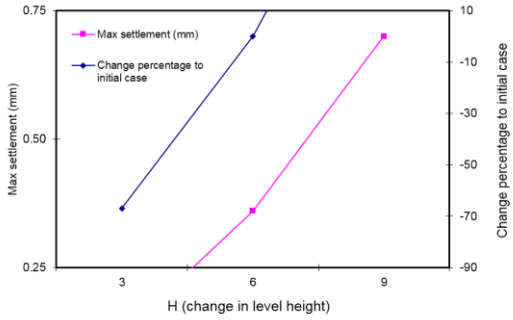

Fig. 4 Change the maximum levee height of settlement

CONCLUSION

Numerical studies have been conducted in this paper show that: 1-With the increase in the slope of the parties, the amount of maximum sessions with gentle slopes and linear increases. In fact, the rate of change of n from 1 to 3, the maximum settlement rate of 14% to 8% higher than the initial state to the initial state is altered. 2-Increasing the levee width, maximum settlement amount with gentle slopes and linear increases. Changing the weir crest width of 6 to 12, the maximum settlement rate of 11% to 8% higher than the initial state to the initial state is altered. 3-Levee height increases, the maximum settlement rate linearly increases. Weir height changed from 3 to 9, the maximum settlement rate of 67 percent to 94 percent more than the initial state to the initial state is altered.

ACKNOWLEDGEMENTS

The research author would like to thank the Tehran Agricultural and Natural Resources Research and Education Center of management for aid this project.

REFERENCES

Beddoe, R. A., Take, W. A., & Rowe, R. K. (2011). Water-retention behavior of geosynthetic clay liners. *Journal of Geotechnical and Geoenvironmental Engineering*, *137*(11), 1028-1038.

Belli, R., Glisic, B., Inaudi, D., & Gebreselassie, B. (2009). *Smart Textiles for SHM of Geostructures and Buildings.* Paper presented at the 4th International Conference on Structural Health Monitoring on Intelligent Infrastructure (SHMII-4).

Fannin, R., Vaid, Y., & Shi, Y. (1994). Filtration behaviour of nonwoven geotextiles. *Canadian Geotechnical Journal*, *31*(4), 555-563.

Holtz, R. D., & Kovacs, W. D. (1981). *An introduction to geotechnical engineering*.

Horrocks, A. R., & Anand, S. C. (2000). *Handbook of technical textiles*: Elsevier.

Palmeira, E., Fannin, R., & Vaid, Y. (1997). A study on the behaviour of soil geotextile systems in filtration tests. *Canadian Geotechnical Journal*, *33*(6), 899-912.

Pilarczyk, K. (2000). *Geosynthetics and geosystems in hydraulic and coastal engineering*: CRC Press.

Testing, A. S. f., & Materials, A. (1986). *Annual Book of ASTM Standards 1986*.