

Bearing Capacity of Soil: A Review

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Abstract— Soil is used as a base of any foundation of building, bridge, road etc. If the strength of soil is poor then soil become fails in shear under excessive application of load. So, bearing capacity of soil is important factor for any structure which determine by several formula. Foundation is the lower part of structure which bear the dead load, live load etc. Failure of structure may occur due to shear, settlement. By considering failure condition it is required to study load condition analytical and practical.

Keywords: Bearing Capacity, Soil

I. INTRODUCTION

Stable foundation of structure are so designed that the soil can bear the load without any shear and settlement failure. Shear strength of soil is important term which affect the property of soil upon which the foundation are designed. Another soil property like shrinkage limit, density, permeability, liquid and plastic limit etc. Which are also affect the bearing capacity of soil. At the shallow depth shallow foundation are provide which can safely take the load of structure. If absence of adequate bearing capacity then provide the deep foundation.

II. LITERATURE REVIEW

(P.K. Kolay, S. Kumar & D. Tiwari)¹ Several test have been investigated in the bearing capacity of silty clay soil which shows performance on various parameters. By the use of geogrids at different depth, the result shows that bearing capacity increases significantly with increased number of geogrid layers. The problem of settlement of shallow foundation due to surrounding soil has been improved by using geogrids. The performance of geogrids on slope stabilization of soil has been also improved on silty clay soil and Sandy soil. The silty clay soil and Sand are used which classified as CL and SP.

(R. Manisana, N. N. Patil, H. M. R Swamy. R. Shivshaker)² Studied that in a weak soil problem of settlement and shear failure occur which causes structure failure and barrier to development in an area. Responsibility of civil engineers to improve the weak at the site for safe and stable construction of building. By the method of vibroflotation, compaction pile, earth reinforcement, grouting, compaction granular soil property improves which help for making safe work. Earth reinforcement is technique by which improvement of soil can be done. Best example of earth reinforcement are roots of trees and plants which hold earth. The ultimate bearing capacity can be achieved by using soil reinforcement. Soil reinforcement can be done by fibre and geosynthetic materials.

V. Bala kumar, V. Kalaiarasi & Dr. K. Llamparuthi 2006)³ In this paper we study about over consolidated clay. Its application on moderate loaded building on sand and pre dominantly Sandy soil in further articles. Several model test

on prototype piled raft foundation supporting a twelve storied structure which was constructed, designed and analysed by settlement gauges. It is analysed that the pile group of raft pile was present an elastic and hardening behaviour and resist heavy load. It shows the three phase behaviour and in beginning major part of load beared by pile group which are capable by considering factor of safety. In practical analysis of this paper it is found that settlement increased the load sharing ratio decreased. The performance on piled raft is satisfactory in sand for mordrately loaded structure.

A. atisfactory D. P. Gupta, R. K. Bakshi, R. K. Manchiryal (2013)⁴ By using geotextile an additional improvement in property of soil shown. It separate the base course and subgrade by using geotextile. At the earthen dam geotextile improve the errosion of soil on slopping ground. Geotextile have been mostly used for drainage, seperation, in roadway application. Geotextile can be used for unpaved road reinforced with geotextile by neglecting the effect of aggregate interlock. It begin with seperation, filtration, and reinforcement at base subgrade interface. Test where performed in a steel tank having diameter of 700mm a height of 700mm and 500mm dia rigid circular footing. The economic advantages of geotextile reinforcement primarily in possibility to reduce the thickness of fill layer. It also saves the use of granular material and the amount of unsuitable material for removal and deposition elsewhere which has both economical and ecological aspects.

B. Panigrai & P. K. Pedha (2019)⁵ The loose soil strata causes structural damaged and loss of capacity to sustain the load of structure. Deep foundation are given for such soil to stable the structure. For economical construction deep foundation is not suitable and some alternative measures should be taken. For improvement of ground subgrade condition for safe and without failure of structure geo-synthetic is most common method. Some biodegradeble synthetics are also present but they are decay along with time. Geo-synthetics act as a reinforcing material to the soil which gives strengthened in form of strip, bars, sheets or grid (meshes). When the load is applied to the reinforced soil mass these material resist tensile stresses which developed within reinforced soil mass. It also increase the bearing capacity and reduce the settlement of foundation resisting on loose soil. Geotextile use in many geotechnical construction works like foundation, retaining wall, embankments etc.

Anurag kashyap (2019)⁶ foundations design can be done by considering two factor first one is to know about ultimate bearing capacity of soil and second one is about tolerable load settlement. For the analysis of ultimate bearing capacity of soil study of finite element analysis is used by conducting prototype. Many of the theory are analysed by cosidering soil as homogeneous material. But this theory was fail when non homogeneous soil is present in subgrade strata. Finite element analysis has been used by different

investigators in introduction to plastic theory, to predict bearing capacity of strip footing.

Eng. Mohamed k Hussein, Dr. Rami M. El-Sherbiny, Prof. Mohamed I. Amer (2019)⁷ It present the laboratory model test on shallow footings resting on geosynthetic reinforced replacement soil overlaying loose sand. Number of reinforcement layer increase when punching shear failure is observed in the laboratory test for unreinforced soil. Replacement of existing weak soil up to a shallow depth with a compacted granular soil with inclusion of geosynthetic reinforcement layers to improve the ultimate bearing capacity and decrease settlement. The effect of using reinforcement layer has a minimal effect on the bearing capacity ratio at lower settlement value due to mobilizing membrane effect.

S. B. Akipla, I. W. Omunguye(2013)⁸For both stability and deformation of shallow foundation on sand overlaying soft clay, having allowable bearing pressure values ranges with 126-133kN/m². Bearing capacity of soil slight lateral variability is noticeable in the compressible soil. Whereas the variability in bearing capacity values with depth at investigated points is almost reproducible. The allowable bearing capacity does not change if foundation dimensions varies. With the increase in foundation depth and size consolidation settlement on mat foundation was found to decrease.

III. CONCLUSION

Bearing capacity of silty clay soil can be improved by using the geogrid (natural and artificial). Geojute (gunny bags) is used as geotextile, whereas sand is used as soil media. Loose soil strata have no capacity to sustain to structural load of structure. To avoid this problem most common method for improvement of ground is adopted. Use of reinforcement materials like metal strips and geo-synthetics to increase the bearing capacity of sand has been traditional.

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