A Review on Coarse Sand Kerawa Soil Mixture

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ABSTRACT

Now days, inefficient properties of soils are a critical issue in engineering projects. In some cases, improving the characteristic of unsuitable soil is a fundamental step for making construction. Structures on poor soil show early distress causing the premature failure of the structures. Clayey soil usually have the potential to demonstrate undesirable engineering behaviour , such as low bearing capacity , high shrinkage and swell characteristics and high moisture susceptibility. Stabilisation of these soil is a usual practice for improving the strength. Soil stabilization performed the use of technique to adding a binder to the soil in order to improve the engineering performance of soil. The focus of the present study is to investigate the effect of addition of coarse sand in different percentages by weight to karewa soils taken from Awantipora AIIMS site. From the analysis the variation in the strength parameters c and φ, unconfined compression strength (UCS), CBR value and ultimate bearing capacity will be studied with different percentage of coarse sand.

Keywords: Coarse sand, California Bearing Ratio (CBR), Unconfined Compression strength (UCS), Optimum moisture content (OMC), Maximum dry density (MDD), Shear strength.

1. INTRODUCTION

From the beginning of construction work, the necessity of enhancing soil properties has come to the light. Ancient civilizations of the Chinese, Romans and Incas utilized various methods to improve soil strength etc., some of these methods were so effective that their buildings and roads still exist.

In India, the modern era of soil improvement began in early 1970's, with a general shortage of petroleum and aggregates, it became necessary for the engineers to look at means to improve soil other than replacing the poor soil at the building site. Soil improvement was used but due to the use of obsolete methods and also due to the absence of proper technique, soil stabilization lost favor. In recent times, with the increase in the demand for infrastructure, raw materials and fuel, soil improvement has started to take a new shape.

Stabilization, etc. Generally, modification of the soil properties can be done by blending it with different materials such as lime, cement and fly powder or by reinforcing the soil. Real challenge in front of civil engineers is to lay the substructure over poor soil like clay. Stabilization of the soil is one of the conventional and most preferable ways to improve the properties of the kind of soil. Shear strengths of the stabilized soil with different fiber combinations is determined by conducting series of Unconfined Compression (UCC) tests. California Bearing Ratio (CBR) tests are also conducted on stabilized soil to determine the suitability of the best fibre reinforcement. The natural fibers used as reinforcement are coconut coir fibre and Rice husk powder whereas the synthetic fibers used as reinforcement are nylon fiber and glass fiber. The results obtained are compared and inferences are drawn towards the usability and effectiveness of best fiber reinforcement which improves the strength of the soil. In the present study, clay soil is satisfied using combination of coarse sand natural fibers. Studies have already been carried out by many researches to stabilize clay using natural or synthetic fibers. Here the best combination of fiber is found to effectively stabilize the soil.

Here, in this project, soil improvement has been done with the help of coarse sand. The improvement in the bearing capacity and shear strength parameters have been stressed upon and comparative studies have been carried out using different methods of shear resistance measurement.

Objectives:

1. To study the effects of coarse sand on shear strength of clayey soil using DST and UCS.
2. To enhance the CBR of soil by increasing the coarse sand content.
3. To investigate the Atterberg's limits and the in-situ water content and the unit weight of soil.
4. To evaluate the OMC of the sample by carrying out Standard Proctor Test.
5. To study the effect on ultimate bearing capacity of Karewa soil by the addition of coarse content in definite percentages by weight.

2. LITERATURE REVIEW

Dr. Robert, M.Books (2009) The objective of this paper is to upgrade expansive soil as a construction material using rice husk ash (RHA) and flyash. . Stress strain behavior of unconfined compressive strength showed that failure stress and strains increased by 106% and 50% respectively when the flyash content was increased from 0 to 25%. When the RHA content was increased from 0 to 12%, Unconfined Compressive Stress increased by 97% while CBR improved by 47%. Therefore, an RHA content of 12% and a flyash content of 25% are recommended for strengthening the expansive subgrade soil.

Grytan Sarkar, Md.Rafiqul Islam (2012) This paper demonstrates the effects of rice husk ash (RHA) on the geotechnical properties of soil in stabilized forms specifically strength, workability, compaction and compressibility characteristics. The unconfined compressive strength and shear strength of soil can be optimized with the addition of 10% RHA content.

Srilatha N,-igs (2013) A number of studies have been carried out to investigate the effect of addition of waste materials on modifying the properties of soil. The present study shows the modification of soil properties by adding locally available Rice Husk Ash and Fly ash. From the results, it is observed that the maximum dry density is increased with increase in percentages of rice husk ash and the corresponding optimum moisture content is decreased and vice versa with the addition of fly ash to the soil.

Ogudoju A, Michael B, Aderinlewo O and Olufowobi J (2014) In this study glass powder wth sodium hydroxide is used to enhance the properties of soil. The work is carried out for calculating OMC and MDD for different proportion of glass powder alone and NAOH alone and treating the same with optimum quantity of glass powder with varying perce ntage of NAOH and the same is treated for strength characteristics by performing UCS test for sample cured for 3days, 7days and 14day.

A Modarres, YM Nosoudy (2015) This study evaluates the technical and environmental effects of coal waste materials on the stabilization of a medium plastic clay. Combination of these additives with lime resulted in considerably higher compressive strength and CBR especially in saturated condition.

MY.Shah and B.A.Mir (2017) In this study, Kerewa soils were stabilized by adding different percentages of Gliment as an additive for various laboratory tests as per relevant Codal procedures. Gliment is a chemical additive prepared by mixing broken glass powder with lime in equal percentages. Tests results showed tremendous improvement in engineering properties and CBR value with increase in Gliment content.

A ur Rahman, A Khan, M Hasnain (2019) By adding saw dust ash the properties of soil like plastic limit, plasticity index, specific gravity, unsoaked CBR and unconfined compressive strength of treated soil were improved. Reduction occurs in maximum dry unit weight by increasing amount of saw dust ash. This research found that adding 4% sda ,CBR values increases by 103.11% and unconfined compressive strength increases by 26.35. The main importance of this additive is that it results in the reduction of construction cost of roads especially in rural areas of developing countries like India.

3. CONCLUSION

From various research studies it was observed that various additives like rice husk, flyash, granite chips, soda lime glass, glass with sodium hydroxide, coal waste material, gliment (broken glass powder with lime in equal percentage), ordinary Portland cement, poly vinyl chloride powder crushed with glass, saw dust ash and many more additives had been used by researchers. But coarse sand have not been used yet. The reason behind using coarse sand is that it is available in large quantity near the site. The reason behind choosing clay is that it has some problems. The main problem is that it undergoes consolidation settlement due to the application of long term loading. Another problem is it shrinks significantly if it is dried and expands significantly if it absorbs moisture which exerts much pressure on the substructure. Coarse sand is chosen to check the improvement because it is cohesionless material. Addition of cohesionless material to the cohesive soil means it will lessen the consolidation settlement and expansive nature of soil. Researches have showed that shear strength parameter φ (angle of shearing resistance) gets increased with increase in coarse content which ultimately leads to the increase in shear strength. Aim of my research is to add coarse content at different percentage and to see the corresponding increase in shear strength, unconfined compression strength, CBR value, and ultimate bearing capacity by performing DST, UCS and CBR tests.

4. REFRENCES

1. Ranjan Gopal, and Rao, A.S.R, “Basic and applied soil mechanics”, New Age International Publishers.
2. Arora.K.R, “Soil Mechanics and Foundation Engineering”, Standard Publishers.

3. R. Salgado (2000). Shear Strength and Stiffness of Silty Sand. Journal of Geotechnical and Geoenvironmental Engineering, ASCE, Vol.126, May. No.5, 451- 462.
4. H. Mastuoka, S. Liu, D. Sun, and U.Nishikata,"Development of New In-Situ Direct Shear Test," Geotechnical Testing Journal 24,no. 1(2001)
5. MM.Monkul ,G.Ozden ,"Compressional behavior of clayey sand and transition fines content" Engineering Gelogy volume -96 (2007)
6. Dr.Robert , M.Books," Soil stabilization with fly ash and rice husk ash". International journal of research and reviews of applied science, volume 1, Issunce 3 (December 2009)
7. Grytan Sarkr, Md.Rafiqul Islam,"Interpretation of rice husk ash on Geotechnical properties of cohesive soil". Journal of research in engineering. [s.1] v.12n (Feb. 2012)
8. Srilatha N, igs,"Stabilization of soil using rice husk ash and fly ash". International journal of research and review in applied science. (2013).
9. Md.Nuruzzman and Dr.Md Akhtar Hossian,"Effect of soda lime glass dust on properties of clayey soil".Global journal inc (USA) volume 14 Issue 5,version 1, year 2014.
10. A Modarres, YM Nosoundy,"Clay stabilization using coal waste and lime",Applied clay science. 2015 Elsevier.
11. P Dahale, P Nagarnaik,"Effect of fly ash and lime on stabilization of expansive soil". (2016)
12. M.Y.Shah and B.A.Mir, "Role of gliment as an additive on the CBR behavior of Kerewa soils". Indian geotechnical conference 2017.
13. Arif ur Rehman, Adeeb khan,Muhammad Hasnain. "Stabilization of subgrade by using additives (cement,lime)".Global scientific journal.volume 7,issue 4,April 2019.