Study on Performance Evaluation of A Cement Stabilized Soil For Highway Material

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Abstract- *Soil stabilization Is A typical process of mixing A Soil with cement In Such a way to Improve the Performance of the Soil As a pavement Material. The various Changes In The stabilized Soil Properties Are analyzed By Mechanical Mixing Of Various Soil Types.The Point Of The Examination Is To Survey On Stabilization Of Soil Using Cement.In This Report Soil Has Been Taken In The City And A Laboratory Test Is Done On That Soil Sample And Soil Mixed With Cement.The Analyses Done On The regular And Un conventional Soil Are Atterberg"S Limit , Standard Compaction Test, Water Content, Direct Shear Test And California Bearing ratio Test By adding different percentages Of Cement as 3%, 4% And 5% to soil*

Keywords- CBR, stabilization

I. INTRODUCTION

A correct understanding of the geotechnical properties of soils may be a pre-requisite for its use in engineering construction works. Studies on the engineering properties of those materials have created geologists and engineers attentive to a large vary of properties. but the relative abundance of soil nevertheless, its suitableness for numerous functions may be increased through the modification of its properties by stabilization. future performance of pavement structures usually depends on the soundness of the underlying soils. Engineering style of those made facilities depends on the belief that every layer within the pavement has the minimum such structural quality to support and distribute the super obligatory hundreds. These layers should resist excessive permanent deformation, resist shear and avoid excessive deflection which will end in fatigue cracking in superjacent layers. on the market earth materials don't continuously meet these needs and will need enhancements to their engineering properties so as to remodel these cheap earth materials into effective construction materials. this can be often accomplished by physical or chemical stabilization or modification of those problematic soils. though the answer seems simple and simple, engineering properties of individual soils could vary wide thanks to nonuniformity in soil composition, distinction in small and macro structure among soils, variability and nonuniformity of geological deposits and thanks to variations in physical and chemical interactions of air/water with soil particles. These variations necessitate the utilization of site-specific treatment choices for stabilization.

II.TYPES OF STABILIZATION

1. Mechanical stabilization
2. Geosynthetic stabilization
3. Chemical stabilization

I. Mechanical stabilization – this is often the method of fixing soil properties by ever- changing the gradation through intermixture with different soils, densifying the soils exploitation compaction efforts, or undercutting the prevailing soils and replacement them with granular material. a standard remedial procedure for wet and soft sub grade is to hide it with granular material or to partly take away and replace the wet sub grade with a granular material to a pre-determined depth below the grade lines. The compacted granular layer distributes the wheel masses over a wider space and is a operating platform.

II. Geosynthetic stabilization Geogrid has been wont to reinforce road sections. The inclusion of geogrid in sub grades changes the performance of the road in many ways.
Empirical design and post-construction analysis have lumped the higher than represented edges into higher pavement performance throughout the planning life.

III. Chemical stabilization – The transformation of soil index properties by adding chemicals like cement, fly ash, lime, or a mixture of those, usually alters the physical and chemical properties of the soil as well as the cementation of the soil particles.

III. LITERATURE REVIEW

Engineers are usually Janus-faced with the matter of constructing roadbeds on or with soils, that don't possess comfortable strength to support wheel masses obligatory upon them either in construction or throughout the service lifetime of the pavement. It is, at times, necessary to treat these soils to supply a stable sub grade or a operating platform for the development of the pavement. These treatments lead to less time and energy needed for the production, handling, and placement of road and bridge fills and sub grades and so, less time to finish the development method therefore reducing the disruption and delays to traffic. These treatments are typically classified into 2 processes, soil modification or soil stabilization. the aim of sub grade modification is to form a operating platform for construction instrumentation. Manikant Mandal and Dr, Mayajit Mazumdar (1995), a study was created on the result of additives on lateritic soil stabilization with cement and lime. significantly, the strength and fatigue behaviour, below continual flexure, of stable latertic soil treated with additives, haven't been studied in our country until currently. Arumugam and K. Muralidharan (1997), stabilising the domestically on the market soils and exploitation them as subgrade materials typically scale back the price of pavement construction. it had been finished that the mechanical stabilization saving within the construction value of pavement upto forty third has been accomplished. Lime and cement stabilization saves the number by forty six.2% and 27.56% severally. T.Lopez-Lara, J.A. Zepeda-Garrido and V.M. Castario (1999) this paper includes the analysis of the most index properties of the soil, along side a characterization of the materials through X-ray diffraction. Abu siddique and Bipradas rajbongshi (2002), A study of Mechanical properties of a cement stable coastal soil to be used in building, this paper gift the soil cement stabilization with 1 Chronicles, 3%, and five-hitter cement fulfill the necessities of road sub-base and base subjected to lightweight traffic. Analyses exploitation CIRCLY worm were conducted to estimate the thickness of soil-cement for paved and unpaved rural road most dimension two.5 m and subjected to anticipated style traffic loading of sunshine race vehicle (LCCV), i.e, jeep. Virender Kumar (2002).Costas A.Anagno–stopoulos (2004), during this study, A series of tests are conducted with the addition of fifty to half-hour of cement contents and acrylate resin of fifty . it's finished that the event of strength and stiffness for a brief natural action time (7 days) is delayed considerably as a result of A.R addition whereas for long natural action time (28 days) the engineering parameters are enlarged significantly

IV. METHODOLOGY

The employment of stabilization to enhance the properties of a fabric is changing into a lot of widespread because of the enlarged strength and cargo spreading ability that these materials offers. A collective expertise has incontestable that cement will be mixed to extend the strength of soil in numerous ways that.However, the fundamentals forever stay the same: treated soil is that the easy product of cement with soil.There is no secret ingredient or proprietary formula that produces treated soil mixed with cement. Sstabilization is that the method of blending a device, as an example cement, with a soil or foreign combination to supply a fabric whose strength is larger than that of the initial unbound material. during this report soil has been taken from HYDERABAD REGION, and several other laboratory check is finished on it soil sample and soil mixed with cement. The experiments done on the treated and untreated soil are Atterberg‟s limit (liquid limit and plastic limit), commonplace proctor check, Direct shear check and California bearing magnitude relation (CBR) test by adding 2%, 4%, and 6 %cement on the soil sample.

V. EXPERIMENTAL INVESTIGATION

This provides detail of materials utilized in the experimental work. A laboratory investigation program was meted out to guage the mechanical properties of the untreated soil and soil stable with waste tyre rubber. The soil was stable with cement contents by weight of soil. The check that meted out on the samples of untreated and stable soil are as follows:

1. Grain Size Analysis
2. Atterberg‟s Limits
3. Proctor Compaction check
4. Direct Shear check
5. California Bearing magnitude relation check

VI. SUMMARY

According to the literature review ,stabilization of soil with cement are often done to extend the steadiness of sub grade material , most dry density will increase whereas optimum wet content reduced with increasing two, 4%, and 6 June 1944 cement with reference to untreated soil sample.here during this paper with minimum usage of cement ,soil cement stabilization could provide sensible results compared to the untreated soils.

REFERENCES

[1] Anil Misra, Debabrata Biswas and Sushant Upadhyaya (13 Decemeber 2004), "Physio- mechanical behavior of self-cementing class C flyash-clay mixtures," www.sciencedirect.com

[2] Azm S. Al-Homoud, Taisir Khedaywi and Abdullah M. Al. Ajlouni (1999), "Comparison of effectiveness and economic feasibility of bitumen, lime and cement as stabilizing agents for reduction of swell potential of a clayey soil," Indian Highways, January 1999, pp.51–58.

[3] M. Chittaranjan, M. Vijay, D. Keerthi, Agricultural wastes as soil stabilizers, in: Int. J. Earth Sci. Eng. 4 (6) (2011) 50–51.

[4] R.G. Kiran, L. Kiran, Analysis of strength characteristics of Black cotton soil using Bagasse ash and additives as stabilizer, in: Int. J. Eng. Res. Technol. 7 (2013) 2240–2246.

[5] Aparna Roy, Soil stabilization using rice husk ash and cement, in: Int. J. Civil Eng. Res. 5 (1) (2014) 49–54. 10.Duna Samson, Omoniyi Tope Moses, Investigating the pozzolonic potential of cow dung ash in cement paste and mortar, in: Civil Eng. Res. 6 (8) (2014) 110–118.

[6] Dilip Shrivastava, A.K. Singhai, R.K. Yadav, Effect of lime and rice husk ash on engineering properties of black cotton soil, Int. J. Res. Eng. Technol. 3 (2) (2014) 292–296.