



Stabilization of Black Cotton Soil using Red Mud for Pavement Construction

Prasanna SB, DM Ajay Kumar, Bharath M, Pavan Kumar

UG Students, Department Of Civil Engineering, Dayananda Sagar College Of Engineering, Karnataka, India.

ABSTRACT

Red mud is a sturdy residue Produced in the route of the alumina manufacturing through way of the bayer approach from bauxite. The red mud generated by means of this approach is surprisingly alkaline with pH commonly ranging from 10 to thirteen Due to its hazardous corrosive nature it's posing a very serious and alarming environmental problem. Globally there are about ninety million tones of red mud being produced every and each and every year. More than 4 million tones of red muds generated each year in India only. The volume of the red mud generated per ton of the alumina processed, varies notably with the form of the bauxite ore used. Due to its hazardous nature it is a pinnacle notch challenge to researcher to advance new strategies for the software program of redmud..

Keywords: Bauxite, alumina, Red mud

INTRODUCTION

Sub-grade soil is an imperative problem as it helps the sub-base/base. However, in many situations, soils in herbal kingdom may additionally moreover now no longer possess adequate geotechnical properties so as to be used as groundwork layers, pavement layer or as a improvement material. This may additionally moreover be due to the actuality that the modern-day soil at a unique location famous horrible bearing potential and larger compressibility. Also, soils with substantial plasticity may also additionally minimize and swell drastically with adjustments in moisture conditions. The repeated cycles of swelling or shrinkage of soil, in addition cause deteriorations and distresses on the constructions if these are supported in these types of soil, This necessitates the improvement/stabilization of soil at a internet site on line as an integral activity, due to rising rate of the land and a huge demand for infrastructure enhancement in growing worldwide places like India. Soil stabilization is a approach introduced with the predominant reason to modify the geotechnical homes of the soils making them successful of meeting the requirements of the unique engineering projects. The most ordinary enhancements performed by way of stabilization consist of greater soil gradation bargain of plasticity index or swelling plausible and will increase energy and durability. Various stabilizers such as lime, cement and calcium chloride are traditionally used for the stabilization of expansive soils However, the over dependency on the utilization of such industrially manufactured soil stabilizing elements would possibly additionally particularly extend the charge of development.

METHODOLOGY

1. We collect the black cotton soil from the Gulbarga District, Karnataka region.
2. We check the index properties of soil.
3. Then note down the all-tests results of untreated black cotton soil.
4. The untreated black cotton soil is mixed with red mud with optimum percentage.
5. Then tests will be conducted on mixed black soil with red mud to find the engineering properties and index properties of that soil.
6. Then we will compare the results of all tests (i.e., engineering and index properties) with treated and untreated black cotton soil.

LITERATURE REVIEW

- a) SubasisPati ,Akshaya Kumar Sabat: 'Stabilization of Expansive Soil Using Solid Wastes'. Expansive soil is a challenging soil for civil engineers due to the fact of its low power and cyclic swellshrink behaviour. Stabilization the usage of strong wastes is one of the exclusive techniques of treatment, to enhance the engineering residences and make it appropriate for construction. The recommended consequences of some distinguished strong wastes as acquired in laboratory studies, in stabilization of expansive soil have been mentioned in this paper.
- b) Harekrishna Sutar^{1*}, Subash Chandra Mishra¹, Santosh Kumar Sahoo¹, Ananta Prasad chakraverty¹ and Himanshu Sekhar Maharana: 'Progress of Red Mud Utilization'. Red mud is a stable waste residue of the digestion of bauxite ores with caustic soda for alumina production. Its disposal stays a international difficulty in phrases of environmental concerns. During the previous decades, full-size work has been completed with the aid of a lot of researchers to enhance more than a few financial methods for the utilization of red mud. This paper gives a assessment on the complete utilization of red mud globally. The lookup development of secure stockpiling of red mud is summarized. Enormous extent of red mud is generated global each 12 months posing a very serious and alarming environmental problem.

- c) DaryabeigiZand, A., * RabieeAbyaneh, M. and Hoveidi, H.: 'Capability of Reused Waste from Aluminum Industry (Red Mud) in Iran to Improve Compressive Strength of Loose Soil' Jaj arm Alumina Plant, the solely Alumina powder producer in Iran, generates 500,000 lots of purple mud annually. The most typical approach for last disposal of crimson mud in Iran is Tailing dam which is neither reasonably priced nor environmentally friendly. The most important goal of this find out about is to consider the opportunity of red mud recuperation to be used for stabilization of unfastened soils. Red mud samples have been amassed from tailing dam of jai arm Alumina Plant to be characterized, the usage of X-Ray Fluorescence (XRF). The soil stabilizer has been made via mixing crimson mud, metal slag, sodium metasilicate, and sodium hydroxide. In order to learn about the impact of soil stabilizer, 5 soil samples have been organized which include clay, sand, and wind-blown sand ranging from zero to four millimeters. Findings exhibit that including soil stabilizer with red mud substantially enhances compressive electricity of soil samples (4.2, 18.2, 5.4, 4, and 4.1 in S1 to S5 samples, respectively). Also the consequences show that the crimson mud, produced from Aluminum enterprise in Iran, would possibly be efficaciously used to stabilize unfastened soils, thereby improving their compressive characteristics, decreasing environmental troubles related with uncontrolled disposal of such wastes as nicely as advertising built-in strong waste administration strategies

CONCLUSION

The following conclusions are made from the following study:

1. A sequence of exams have been performed to locate the results of red mud on black cotton soil.
2. The consequences from this find out about deliver out the do able advantages of the use of red mud to minimize the plasticity houses & make bigger volumetric balance of soil.
3. The unconfined compressive electricity of black cotton soil will amplify with of red mud percentage.
4. From the learn about of consequences of experiments, it was once determined that modifications in index homes (i.e., particular gravity, liquid limit, plastic limit, shrinkage restriction and sieve analysis).
5. From the learn about of outcomes of experiments, it was once discovered that modifications in engineering houses with combine of black cotton soil with red mud.

REFERENCES

- [1] 'Stabilization of Expansive Soil Using Solid Wastes' by Subasi'sPati ,Akshaya Kumar Sabat -EJGE
- [2] Progress of Red Mud Utilization' by Hare Krishna Sutar1*, Subash Chandra Mishra1 , Santosh Kumar Sahoo1 , Ananta Prasad Chakravarty 1 and Himanshu Sekhar Maharana.-science domain.
- [3] Capability of Reused Waste from Aluminum Industry (Red Mud) in Iran to Improve Compressive Strength of Loose Soil by DaryabeigiZand, A., * RabieeAbyaneh, M. and Hoveidi, H
- [4] Remediation of contaminated soil by red mud and paper ash by P. Oprckala , A. Mladenovic a , N. Zupancic b , J. Scancar c, d , R. Milacic c, d , V. ZalarSerjun a, - elsevier
- [5] Performance of Lime Stabilization on Extremely Alkaline Red Mud Waste under Acidic Environment by Manas Chandan Mishra1 ;Karra Sateesh Babu2 ; N. Gangadhara Reddy3 ; ParthaPratim Dey4 ; and B. HanumanthaRao5- Academia.edu
- [6] Utilization of red mud as a stabilization material for the preparation of clay liners by EkremKalkan- academia.edu
- [7] Neutralization and utilization of red mud for its better waste management by Suchita Rai1 *, K.L. Wasewar2 , J. Mukhopadhyay1 , Chang Kyoo Yoo3 , Hasan Uslu4 -academia.edu.
- [8] EVALUATION OF CHARACTERISTIC PROPERTIES OF RED MUD FOR POSSIBLE USE AS A GEOTECHNICAL MATERIAL IN CIVIL CONSTRUCTION by Kusum Deelwal1 ,Kishan Dharavath2 , Mukul Kulshreshtha3- IJAET.
- [9] Improvement of Soil Sub Grade by Using Red Mud for Flexible Payment by AzharAfsar Pasha1 ,Pratiksha Malviya2- IJRTM.
- [10] Stabilization of Black Cotton Soil by Using Red Mud and Sodium Silicate by Nitin Mane1, Prof M. S. Rajashekhar2,- IRJET.