

STABILISATION OF SOIL USING CEMENT AND BRICK KILN DUST

Rajat¹, Dr.Rajesh Goyal², Vishal Yadav³

¹M.TECH Student, Modren institute of engineering and technology mohri kurukshetra

²Principal, Modern institute of engineering and technology mohri kurukshetra

³Assistant Professor, Modern institute of engineering and technology mohri kurukshetra

ABSTRACT

The Clay Soil is Known as cohesive soil many time locally available soil properties does not match with the desired standard due to which improvement in soil properties are required the improvement of such engineering properties or the desired standard of properties can be conveyed by the stablisation of weak soil with brick kiln dust or brick powder soil stablisation is process to treat a soil to maintain after or improve the performance of soil as a construction material in this present paper different research result is been reviwed to analysis the effect of brick kiln dust or brick powder stabliser on soil properties this proper throw light on the suitability of waste brick kiln dust as soil stabliser for use in pavement the role of brick kiln powder in improving the characterstics of expansive subgrade material and then subbase is analyzed the amount of cost saving for soil when it stabilized with brick kiln waste initially the physical properties of clay brick kiln dust and red soil have been studies by cconducting wet sieve analysis,liguidlimit,plasticlimit,then for the purpose of determining the strength of virgin and stabilizer material,California bearing ratio test have been conducted.

Keywords; Soil Stablisation,Brick kiln dust,Cement,Soil,Strength,UCS test

I. INTRODUCTION

The engineering properties of soil are depends upon the many points like minerals,watertable,soil water behaviouretc.which vary as per area to area due to which we can't get desire propertiers suitable to our needs of construction to resolve this problem we have technique called stablisation which means to stable or to modify or to improve the soil properties in positive matter.so we have can a construction works which fulfill our needs and objectives

II. STABLISATION

Soil Stablisation is a technique or method its aimed at increasing or maintaining the stability of soil mass and chemical alteration of soil to enhance their engineering propereties

Stablisation allows for establishment of design additives and admixture rate to used in order to achieve stablisation process can include higher resistance value,reduction in plasticity,lowerpermeability,reduction of pavement thickness,elimination of excavation material hauling and holding

Soil stabilisation is done by various methods by adding flyash, rice husk ash, chemical fibres, adding lime, by different geo materials like geo synthetic, geogrid and geotextile, bricks, surkhi, soil stabilisation allows an engineer to distribute a large load with less material over a longer life cycle.

III. ADVANTAGE OF SOIL STABILISATION

- 1) Stabilized soil functions as a working platform for the project.
- 2) Stabilization water proofs the soil.
- 3) Stabilisation improves soil strength.
- 4) Stabilisation helps reduce soil volume change due to temperature or moisture.
- 5) Stabilisation improves soil workability.
- 6) Stabilisation reduces dust in the work environment.
- 7) Stabilisation upgrades marginal materials.
- 8) Stabilisation improves durability.
- 9) Stabilisation dries wet soil.
- 10) Stabilisation conserves aggregate materials.
- 11) Stabilisation reduces cost.

IV. PROPERTIES OF CLAY SOIL

Though different soils have a wide range of colors, texture and other distinguishing features, there are only three types of soil particles that geologists consider distinct. The quality of soil depends on the amount of sand, loam and clay that it contains because soil with differing characteristics. Soil with a large amount of clay is sometimes hard to work with due to some of its characteristics.

- 1) **PARTICLE SIZE:** Clay has the smallest particle size of any soil type.
- 2) **STRUCTURE:** Because of the small particle size of clay soil, the structure of clay heavy soil tends to be very dense.
- 3) **PERMEABILITY AND WATER HOLDING CAPACITY:** With clay soil is its slow permeability resulting in a very large water holding capacity because the soil particles are small and close together.
- 4) **IDENTIFYING CLAY;** There are several tests that can be used to identify clay soil. If rubbed between your fingers, a sample of clay soil often feels sticky and may stick to your finger or leave streaks on your skin.

V. LITERATURE REVIEW

Cement contains calcium required for the pozzolanic reactions to occur. Further, cement already contains silica, thus stabilisation with cement is fairly independent of soil properties. The only thing required is water for the hydration process to begin and attribute to the improvement of strength and compressibility characteristics of soil. It has a long history of use as an engineering material and has been successfully employed in geotechnical applications. Mukesh A. Patel, H. S. Patel research scholar

ganpat university mehsandgujratindia associated professor departed of applied mechanics his work include peteologicalstudies and scaining electron microscope analysis ismail 2017 treated and stabilized these ametriat related to road construction using brick surkhi 20% and brick/soil 3/100 he determine consistency limit compaction properties and shear uniaxial strength The cohesion and the friction angle of the imoroved material increased for all the treared mixture.

Roobhakshan and kalantari(2013) conducted consistency limit,standard compaction test,unconfined compressive test and CBR test and concluded that there is remarkable influence on strength and CBR value at 1% cement+6% brick kiln dust for CBR and 7% cement+6% brick kiln dust for UCS which as optimum percentage

Sabat(2012) Conducted series of test and concluded that addition of brick dust decrease liguidlimit,plasticlimit,plasticityindex,optimum moisture content,maximum dry density,angle of internal friction of expansive soil.

Al aboon&mahasneh,(2009) the use brick dust as significant effect on the compressive strength while it has sharp effect on slump values.

Misra et al,(2008) the auther using brick dust in soil stablisation production of tiles,mortars and self compactingconcrete

Kowalski et al (7) Portland cement is hydraulic cement made by heating lime stone and clay mixture in a kiln and pulverizing the resulting material which can be used either to ,modify or to improve the quality of tesoil or to transform the soil into a cemented mass with increased strength and durability.the amount of cement used will depend upon whether the soil is to be modified opr stabilized.

Kent Newman and jebes.tingle[5] in their study of previous research efforts.Portland cement was used as the stabilizer control for comparison of properties to the polymers and was used at concentration of 2.75%,6% and 9%.

Previous research work have shown that the addition of inert material (sand) to swelling soil can be a method of soil.

BahaiLouafi and Ramdanebahar[1] in their experimental work have study the effect of performance of an addition of sand as stabilizer on swelling soil. Based on the study undertaken, they found that the addition of sand reduces consistency limits. They have also worked on introducing sand layer into two different configuration and found that these layers effectively reduce the swelling of soil.

A) COMPONENT MATERIAL:

Component material were.

- Soil
- Brick surkhi or brick kiln dust

- Cement

The clayey soil used for the study was collected from sahabad in kurukshetra district clay soils are inorganic clays of medium to high compressibility and form a major soil group in india they are characterized by high shrinkage and swelling properties the clayey soil have been challenge to the civil engineer the clayey soil is very hard when dry but loss its strength completely when in wet condition rich proportion of montmorillonite is found in clayey soil from mineralogical analysis high percentage of monomorllionite render high degree of expansiveness this property result cracks in soil without any warning these cracks may sometimes extent to serves limits.

So building to be found on this soil may suffer serve damage with change of atomospheric conditions.

B. MIXING PROPORTIONS

Clayey soil, bricksurkhi and cement is to be mixed thoroughly to have a uniform and homogenous mixture. sample will be prepared using different combinations of brick surkhi and parent soil and different test will be conducted on the prepared samples and result will be compared with originals clay sample

Sample 1:

Clayey soil =100%

Sample 2:

Clayey soil =92%

Brick surkhi =5%

Cement =3%

Sample 3:

Clayey soil =85%

Brick surkhi =10%

Cement =5%

Sample 4:

Clayey soil = 75%

Brick surkhi= 15%

Cement = 10%

VI. REVIEW CONCLUSION

From the above literatures we can concluded that by the addition of brick surkhi stabilizers the property of soil can be improved above literatures shows that by addition of different stabilizers the expansiveness ,swelling shrinkage can bereduced of clayey soil effectively. Brick dust has good potential for use in geotechnical applications of soil is a proven method to save money and money and

time on construction project. Brick dust creates stabilisation creates long term chemical change in unstable clay.

REFERENCE

- 1) "Soil mechanics" by K.R ARORA.
- 2) IS 2720 (Part 4) 1985-, method of test for soil (grain size analysis.)
- 3) IS 2720 (Part 5) "method of test for soil (Determination of liquid and plastic limit)
- 4) IS 2720 (Part 20) 1992 "method of test for soil (Determination of linear shrinkage.)
- 5) IS 2720 (Part 40) 1977 "method of test for soil (Determination of free swell index of soil)
- 6) IS 2720 (Part 8) 1983 "method of test for soil (Determination of optimum moisture content and maximum dry density for modified proctor test"
- 7) IS 2720 (part 7)-1980 "Method of test for soil (Determination of water content or specific gravity of soil) dry density relation using light compaction "Bureau of Indian standard"
- 8) Amin, E.R (2012) "A review on the soil stabilisation using low cost method" journals of applied science research pp 2193-2196
- 9) Bayka I.G, Yesiller N and Koprulu K (1992) use brick dust based contaminants" environmental geotechnical pp 477-481
- 10) Bahia louafi, Ramdane Bahar, "Sand: An additive for stabilization of swelling clay soil." Vol. 3, pp. 719-725.
- 11) Dr. S.M. Prasanna Kumar, "Cementitious compounds formation using Pozzolans and their effect on stabilization of soils of varying engineering properties," (2011), vol. 8, International conference on Environment science and Engineering.
- 12) Indian Road Congress (IRC-37-2012).
- 13) Mukesh A. Patil, Dr. H.S. Patel, "A Review on effects of stabilization agent for stabilization of weak soil." (2012), Vol. 2, No. 6, IISTE.
- 14) T.K Roy, B.C. Chattopadhyay, and S.K. Roy, "Prediction of CBR from compaction characteristics of cohesive soil," (2009), Highway research journal, IRC, Vol. 2, No. 2.